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# **COVID 19: Impact and Response**

## **Volume XII**

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**Editors**

**Dr. Eti Khatri**

**Dr. Akhtarunnisa Qureshi**

**Dr. Ragini K. Chahande**



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# COVID 19: Impact and Response Volume XII

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## **PREFACE**

*The new respiratory pandemic disease i.e. COVID-19 has caused disruptions in the lives and customs of people with significant impact on the economies of nations. The outbreak of the disease is a global health emergency and of international interest. This global health challenge leads to the infection, morbidity and mortality of many people.*

*In the weeks since the World Health Organization manifest the corona virus (COVID – 19) episode a worldwide unstipulated wellbeing crisis, the COVID-19 pandemic has influenced 212 nations and forfeit increasingly than 400,000 lives. Still today there is no successful remedy to lockup the spreading of this infection. The pandemic is developing prior disparities, uncovering vulnerabilities in social, political and financial frameworks which are thusly intensifying the effects of the pandemic.*

*Governments of various nations adopted restrictive measures involving both within the countries and at international borders as effective response to the corona virus pandemic. These measures includes confinements of workers and order to work from home, banning of social and religious gatherings, closure of market places, closure of workplaces including airports, building or creation of testing and isolation centers, quarantining/isolation of suspected persons, self-imposed isolations, and the use of face masks whether surgical or cloth type in situations where there is a cogent reason to defy the restriction.*

*Academic communities were not left out as institutions of learning were requested to close in many countries since it is very easy to spread the virus among students and youths in tertiary institutions where socialization is an essential part of their lives.*

*To address the various issues related with the COVID – 19 we have published the present book. The interdisciplinary approach of the book will make the book useful and informative to the students, teachers, researchers, scientists and policy makers in India and abroad.*

*We thank all contributors, publishers and all our well-wishers for their blessings, without which this book would not have come into existence.*

- **Editors**

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## **IMPACT OF COVID-19 ON MILK INDUSTRY IN INDIA**

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### **Abstract:**

The COVID-19 pandemic affected many aspects of human existence, including the preservation of food and the supply chain. It had drastically altered the whole environment, posing several problems for the governments of India and the rest of the globe. As an agricultural economy, India was very susceptible to supply shocks. Various food businesses were influenced by the pandemic in a variety of ways, including a loss in capacity utilisation, a decline in pricing owing to decreased demand, a decline in their shares of the food sector index, etc. Food production, consumption, and buying habits altered the markets, compelling them to assess the pandemic's effect and implement new strategies. The epidemic has had the greatest impact on the dairy industry, which is extremely perishable and dependent on an integrated, time-sensitive supply chain. Due to the severe decline in demand for milk and other dairy products during the outbreak, dairy farms were forced to dispose of milk. This chapter provides insights on food security, with a focus on obstacles and potential mitigation techniques to jointly alleviate the effect. It might reduce the likelihood of significant shocks that would have a devastating impact on everyone, especially the poor and the most vulnerable.

### **Introduction:**

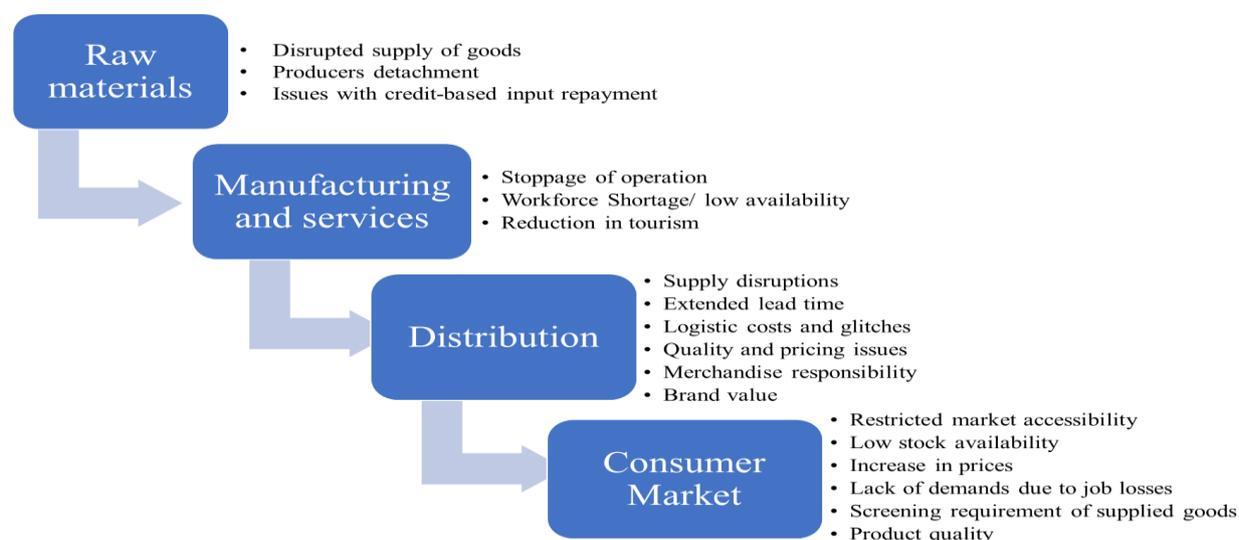
The COVID-19 pandemic posed difficulties in terms of food security, accessibility, and waste. In addition, it was discovered that the limitation on mobility and the labour scarcity had entirely shattered the supply chains, resulting not only in a lack of food but also in the waste of

farm-level resources. The effects of the pandemic in India were characterised by enormous employment losses in the informal sector, including wage labourers, manufacturing employees, home workers, street sellers, and others. The governments of the separate countries declared a lockdown of the country after determining that life was more important than livelihood. Realizing that a rapid spread of COVID-19 in India would wipe out a significant portion of the global population, the government of India (GOI) was forced to decide whether to spare lives or livelihoods. In addition to milk output and farm turnover, the labour market on farms might also be impacted. All three main sectors of the Indian economy have been affected by the pandemic: primary (agricultural and associated operations), secondary (industrial and manufacturing), and tertiary (health, education, telecom, tourism, etc.).

The unpredictability of the epidemic makes it incredibly challenging for governments throughout the globe to establish plans. However, the difficulty is greater for India. Given the vast informal economy of the country, which relies heavily on migrant labour, the lockdown predictably resulted in the loss of livelihood for many, as a result of which hundreds of thousands of migrant workers left their workplaces to walk hundreds of miles to their respective hometowns, resulting in lockdown violations. The combination of lockdown standards, media hype, worldwide experience with prolonged lockdowns in established countries, and a primarily youthful population that had never seen a pandemic of this kind generated extraordinary terror. Daily wage workers had a negative income shock due to the lockdown. Due to the consequences of the COVID-19 pandemic on perishable food supply chains (PFSCs), governments worldwide were failing to meet client expectations. Increased feed costs, a decline in milk price, and an increase in total milk output all have a negative impact on farm revenue. The COVID-19 epidemic had damaged almost all industries to an unprecedented degree, including the dairy industry. Due to the COVID-19 lockout, the dairy industry suffered multidimensional losses in production, marketing, and the processing of milk into milk products. The dairy industry, a source of income for millions of rural Indian people, experienced interruptions owing mostly to a broken supply chain and a decline in demand. The inability to immediately adjust production to demand, the high perishability of milk, the larger share (60%) of the unorganized sector, the low level of processing, the high income elasticity of milk and milk products, and the large number of farmers with a small marketable surplus all contributed to its vulnerability.

The interconnections between the pandemic and the dairy industry are extremely apparent, but a rigorous scientific evaluation and calculation of the losses are still mostly absent from the literature. Quantification is essential for comprehending the depth of the situation,

especially in a nation like India, where more than 80 percent of dairy farmers are landless or marginal and rely on dairying for a consistent livelihood. Thus, even a modest drop in the growth of the dairy industry has a substantial impact on a large portion of our population, which is already susceptible owing to low income, inadequate savings, and a dearth of other means of subsistence. With this context in mind, the purpose of the current research was to analyze the multidimensional effect of such a crisis on dairy farmers and identify the coping techniques they used to minimize their losses. The pandemic has damaged both the upstream and downstream portions of the supply chain. Food consumption transitioned from food service to the home, e-commerce grew swiftly and concurrently developed online channels and in-store purchasing, and suppliers switched to retail order sizes. This causes a shortage of dairy products in grocery shops, resulting in higher pricing. Dairy products are very perishable and reliant on integrated and time-sensitive supply networks, making the dairy industry one of the most affected industries. After the introduction of pasteurization and ultra-high temperature (UHT) sterilization technologies, dairy products such as liquid milk, milk powder, and other dairy products gained popularity across the globe. From 2015 to 2019, both the production and consumption of dairy products worldwide will increase year over year prior to COVID-19.



### **Risks involved with food supply chain**

#### **Scenario framework**

India is the greatest producer of milk in the world, with an estimated 176.35 MT of milk produced. After the COVID-19 epidemic, PFSCs were severely impacted, and significant quantities of food were lost, resulting in enormous losses for Indian farmers. Due to a lack of demand, dairy farmers pour milk into drains. Energy, culture, economics, and climate must be seen as components of a complex and systemic framework. Due to the fact that dairy products

are very perishable and depend on an integrated and time-sensitive supply chain, the dairy sector has suffered the most from the COVID-19. Through the effect of COVID-19 on dairy businesses, the faults underlying the government's dairy sector policies must be explored.

### **Producers**

COVID-19 also had a big effect on manufacturers, who are an important part of making dairy products. As far as the producers are concerned, the drop in dairy production and the lack of storage space, which caused a lot of milk to be dumped, along with the rise in the price of feed and the risk of workers getting the virus, forced them to come up with a set of policies to protect production, such as giving some workers high-paying leave. With less demand for dairy products and strict time limits on average daily production, many manufacturers had to throw away a lot of milk. The disruption of the supply chain is the fundamental cause of the failure of a business plan, businesses, and transportation services. Specific disruptions are due to the occurrence of cataclysmic events, pandemics (e.g., the Yellow Fever Epidemic of 1793, the Spanish Flu of 1918–20, the 2002–04 SARS outbreak, the swine flu of 2009, and the recent COVID-19); these have a low frequency of occurrence but a high impact on the SC. The current coronavirus epidemic has disrupted a variety of activities and created exceptional living conditions for individuals. During these difficult times, the need for critical commodities has skyrocketed, yet several SC-related activities have ceased owing to the epidemic. This has caused problems in SCs for crucial products, including medications and perishable groceries.

The closure of hotels, restaurants, and cafeterias precipitated a sharp fall in demand for milk and milk products as soon as the lockdown was implemented. This loss in demand led to a subsequent decrease in milk procurement. Cooperatives first attempted to buy at least the same amount of milk as before, but were finally obliged to announce either milk vacations or a reduction in procurement costs due to a decline in demand and insufficient infrastructural resources. In the meantime, producers were left with excess milk and no purchasers. During the lockdown, however, supply chain interruptions resulted in an 11% drop in the availability of cattle feed and fodder in the nation. As a consequence, producers faced double losses due to decreasing yields and concurrent increases in milk production costs. In addition, dairy producers may have faced implicit losses as a result of the unavailability of artificial insemination (AI) services, a change in the value of animals, the lack of animal health care, and the increased expense of maintaining preventative measures. In order to assist policymakers in mitigating the consequences of the pandemic on PFSCs, this framework ranks the identified obstacles in order of importance.

### **Major issues faced by the dairy farmers**

The dairy producers identified a decline in milk prices as the most severe problem. This was especially true for individuals who sold milk directly to houses. Due to concern over COVID-19, consumers refrained from buying milk directly from farmers and instead opted for bottled milk. Therefore, farmers who supplied milk to these homes had no choice but to reduce milk prices in order to dispose of it. During the lockout, there was a significant surge in customer demand for packaged milk. In contrast, the cooperatives' procurement prices remained largely consistent. All farmers, regardless of their marketing channel, had difficulties owing to a lack of forage and a rise in its price. Regarding the availability of labour and livestock feed, farmers had substantially fewer obstacles. In contrast to farmers in other Indian states, dairy producers saw fewer challenges with the supply of cow fodder during the early lockdown days.

### **Economic losses incurred by dairy farmers**

During the lockdown, a rise in the cost of milk production, a fall in returns, and extra costs for preventive measures negatively impacted the profitability of all dairy farms. In contrast, 41, 16, and 26.5% of farmers experienced losses owing to expenditures on the disposal of excess milk, the sale of live animals, and missing AI, respectively. Overall, each milk cow experienced a loss of \$7,175 for the dairy producers. It had been accounted for solely by the losses related to extra costs, decreased productivity, and unsold milk, which explains why they acquired a smaller loss value (incurring \$4,000 per milking animal). Approximately 49% of the overall loss was attributable to a decline in returns. Missed AI appeared as an additional significant contributor, generating 22% of the overall losses. In addition, the quantity of loss differed between milk distribution networks. Farmers who sold milk directly to consumer families were impacted more severely than those who sold milk through cooperatives. Farmers engaged in direct milk marketing were harmed primarily as a result of a decline in milk prices, which led to diminishing profits. In addition, they had to incur extra expenses to dispose of the excess milk. In the case of category I (DC) farmers, neither prices nor procurement were significantly impacted, but they suffered mostly from missed artificial insemination. When dairy producers sold milk directly to customer families, their losses increased considerably. The decision to use mixed marketing channels over the cooperative channel also led to greater losses as a result of the following:

- i. Insufficient availability of dry fodder
- ii. Increase in fodder prices
- iii. Insufficient availability of green fodder
- iv. Absence of transportation facilities

- v. Absence of healthcare services
- vi. Insufficient supply of cow feed
- vii. Decreased milk procurement/sales
- viii. Falling milk pricing
- ix. Missed artificial insemination
- x. Increase in the price of cow feed
- xi. Disposal of excess milk
- xii. Labour unavailability
- xiii. Difficulties in purchasing and selling animals.
- xiv. Increased costs of milk production.
- xv. Declining profits from milk production.
- xvi. Expenses associated with the disposal of excess milk
- xvii. Expenses incurred in the transaction (buying/selling) of live animals.

### **Pandemic factors affecting milk supply**

#### **Operational variables**

- I. Production Shutdown:** The Food Service Industry (FSI) is the primary industrial unit that uses perishable goods as inputs. India has a large and constantly expanding market for milk and dairy products, which is dominated by the food service industry.
- II. Price fluctuations in perishable commodities:** According to the Agricultural Produce Market Committee (APMC), the demand for perishable commodities has decreased due to the cessation of bulk orders (from restaurants, cafés, etc.). This has led to a 25–50 % decrease in the price of perishable goods such as milk.
- III. Cash flow limitations:** Cash flow or liquidity may be described as the synchronisation of a supply chain's cash inflows and outflows. Any fluctuation in cash flow or liquidity may hamper the operations of the SC in question. The current pandemic has restricted the financial flow of PFSCs. During the pandemic, cash expenditures (in processing, feeding, marketing, etc.) in PFSCs were greater than cash inflows (government payments, etc.) and the cash on hand, as well as any funds collected from the sale of goods. This factor will influence the PFSCs' future operations and performance.
- IV. Insufficient capacity to fulfill consumer requests:** COVID-19 has had a significant influence on producers' capacity to create products and fulfill client orders on time, hence impeding the functioning of several SCs for vital commodities such as medications, perishable foods, etc. To limit the consequences of SC disruption, several organisations

that manufacture perishable goods have embraced just-in-time or lean management practices. In contrast, several production plants for perishable goods have closed or decreased operations. In addition, ports have been shuttered, container shipments have decreased, and other forms of transportation are in "delayed status." All of these variables have had a significant influence on the cross-border distribution of perishable goods.

- V. Poor delivery accuracy:** During the pandemic, managing SC flexibility to maintain efficient product flow and on-time delivery remained a critical problem for PFSCs. Milk, and other necessities are being diligently sent through online platforms. Nonetheless, a scarcity of delivery slots has brought about uncertainty in PFSCs. As a result of the continuing nationwide lockdown, online shops are seeing a three- to fivefold spike in demand from customers. Despite the lack of delivery slots, several e-retailers have witnessed between 1.2 and 1.3 million daily active users on their platforms; this has produced uncertainty and unreliable delivery agents for PFSCs.
- VI. Increased total transportation expenses:** Transportation plays a crucial role in SCs; this function is especially crucial when carrying perishable foods such as fruits and vegetables because of their short shelf lives, high transit times, temperature control requirements, etc. Transport is an essential component of PFSCs. With the entrance of COVID-19, however, transportation networks have severely disrupted PFSCs, since truckers and carriers have boosted costs by 80%. Freight operators are using surcharges (such as a 25% emergency situation fee, or ESS) for transportation since they face severe shortages of human resources (from truck drivers to on-site delivery personnel) in logistics. Pressures on PFSCs have resulted in a significant performance decline due to the devaluation of perishable product pricing and the rise in total transportation costs, accompanied by early logistical glitches.

### **Behavioural factors**

Behavioural variables may be described as human behaviour-based factors. Behavioural variables are among the most influential aspects impacting PFSCs during the pandemic, since the virus has generated an atmosphere of elevated worry, dread, and uncertainty over the future. This section gives a subjective examination of the environmental conditions that influence the behaviour of PFSCs.

- i. Panic buying and stockpiling:** During an emergency, purchasing decisions are governed by a different set of considerations than during regular times. The worldwide epidemic has prompted behaviour of hoarding. This behaviour is known as "panic purchasing," and

it is neither useful nor practical. There is a severe scarcity of basic commodities in supermarkets, pharmacies, and other establishments due to hoarding. Therefore, hoarding is causing a shortage of vital products in SCs.

- ii. Consumer attitude:** COVID-19 has had a devastating effect on the domestic poultry sector. The attitude of consumers about chicken products has been influenced by rumours spread through social media. While few entities are seeing or are likely to observe the closing of a firm.
- iii. Concerns about violating social distancing standards:** Social distancing is an attempt to prevent the spread of coronavirus in crowded places such as supermarkets, mandis, and shopping malls. Emphasizing the necessity of social separation, places where huge people congregate are either closed or have restricted access. The WHO advises those working in these sectors to limit their social interactions. Despite these principles, the reality on the ground in a number of locations is unsatisfactory as people consistently violate social distance standards. Frequent breaches of social distancing rules have had a psychological effect on many persons working in industries requiring basic commodities; sellers and wholesalers are particularly at danger since mandis (vegetable marketplaces) in India are heavily populated. This psychological component has reduced the number of workers on the market, so impairing its functionality.
- iv. Proactive health-conscious purchasing:** Prior to the pandemic, the majority of consumers would visit a store with a specific goal in mind. However, with the introduction of COVID-19 and due to time constraints, the majority of consumers are unable to process product information and rely heavily on heuristics; for instance, brand name, price, product images, and color-coded labels influence their food selections, particularly for perishable products. This is referred to as proactive health-minded purchasing, and it demonstrates that individuals choose global-PFSCs over local-PFSCs during the pandemic. This sort of psychological behaviour has a significant impact on PFSCs since local markets face a decline in sales.
- v. Less physical purchasing:** The increase of online purchasing, particularly for perishable goods, is remarkable in terms of behavioural shifts. In March 2020, a substantial proportion of purchasers of all ages attempted online shopping for the first time; many are likely to continue buying perishable goods online as long as the epidemic persists. The majority of individuals have forgotten the social experience of shopping, since they

keep a distance from actual purchasing. Therefore, the accessibility of internet channels has disturbed local PFSCs.

### **Government Policies and Regulations**

During the pandemic, governments have adopted several rules and policies to guide PFSCs. Some restrictions, such as a nationwide shutdown, are required to prevent the spread of the virus, while other policies may indirectly affect PFSCs. This flexibility should exist not just at the national level, but also at the local level, given that states and municipalities have their own sets of regulations. Indeed, foreign regulations may also impact PFSCs. During the pandemic, this section describes in detail the government rules and policies impacting PFSCs.

- i. Closure or limited operation of mandis:** Traders and agents in agricultural marketplaces throughout the nation face losses due to the closure or restricted operation of mandis. Due to the spread of COVID-19 in wholesale marketplaces for fruits and vegetables, the Indian government has either banned these markets or curtailed their operation. These limitations have resulted in a 60-80 percent decline in merchants' fruit and vegetable purchases. As a consequence, retail prices for perishable goods have risen while wholesale prices have decreased by 25%.
- ii. Import-export restriction:** As the global health crisis intensifies, the majority of governments have closed their borders, restricting the passage of passengers and freight. In the middle of an all-out lockdown, manufacturing and other businesses remain closed, negatively impacting commerce and the economy. This has had a significant impact on international trade, particularly for PFSCs that depend on the import and export of perishable goods such as fruits, vegetables, and certain processed foods. Consequently, Indian farmers have suffered enormous losses due to the absence of an international supply network.
- iii. Lockdown nationwide:** National lockdown was the leading cause of PFSC interruptions. The market has been altered by the lockdown's rigorous rules and regulations. The operation of the whole PFSC is disrupted since newly imposed limits have had a significant negative effect on the primary drivers of SCs. The ranchers' labour went to waste as a result of the abrupt market shutdown. Temporary blockages and testing have become routine in warehouse operations.
- iv. Lack of policies for dairy farmers:** In India, the pandemic has disrupted the cattle value chains, leading to a decline in the procurement and sale of animal-based foods. Animals are in danger due to inadequate food and lack of veterinary care. The challenges of

ranchers are exacerbated by rumours and false information linking animal issues to COVID-19. All of these factors have a negative impact on the revenue of ranchers and the state/national economy. It is anticipated that livestock extension and advisory services (EAS) would assist farmers in overcoming these challenges. The government must develop effective rules for poultry, seafood, and dairy producers.

- v. **Scarcity of labour:** The PFSC in India has been severely hampered by the labour shortage. With the arrival of COVID-19, employees have returned to their homes, resulting in an 80 percent labour shortage in the perishable products industry. The government has provided notice for industries to maintain functioning with 30-40% of their personnel. With so few staff, businesses are unable to meet the demand for perishable goods, impacting the functioning of the PFSC.

### **Technology and supply chain infrastructure**

It plays a crucial role in the perishable food industry. Appropriate and adequate infrastructure assists businessmen in maintaining their businesses efficiently and successfully. Technology may aid in addressing declining post-harvest earnings and time squandered on operational tasks.

- i. **Inadequate transit network:** In times of crisis, inadequate transportation networks are one of the most critical variables influencing PFSCs. Despite the vast number of current infrastructure projects in India, there was a severe lack of workers with the necessary skills and training to operate contemporary transportation technologies. After the epidemic, several interruptions have caused time-definite deliveries in PFSCs to be augmented and delayed.
- ii. **Technical issues in carrying perishable items with little human interaction:** COVID-19 had caused considerable difficulties for delivery agents bringing perishable commodities to clients. Due to India's dense population, it is not viable to provide items in a "touch-me-not" atmosphere with little human interaction in all regions. Lack of COVID-19 testing and inappropriate screening of delivery agents had caused serious disruptions in PFSCs; incidents of contaminated delivery agents had been documented from almost every region of India. Despite the fact that many businesses have replaced delivery humans with delivery drones, this technical improvement is insufficient to combat the disruption.
- iii. **Low area coverage for perishable commodities on e-commerce platforms:** According to reports, the Indian e-commerce business was expanding at an astounding rate.

However, the current pandemic had badly disrupted its operations and revealed glaring weaknesses in its e-commerce systems for agricultural supplies sales. Prior to the launch of COVID-19, e-commerce platforms for perishable commodities in India were restricted to major cities. After the shutdown, individuals were excessively reliant on e-commerce platforms; however, many online companies were unable to supply perishable items because they were unavailable. Consequently, the poor geographical penetration of e-commerce platforms for perishable goods is a technical and infrastructure problem hurting PFSCs.

- iv. Manipulation of information:** Information flow among partners is one of the most important methods for supply chain coordination. As a result of the worldwide pandemic, household demand for perishable commodities has grown, resulting to an increase in orders at local retail establishments, which in turn creates supply strains on wholesalers and a bullwhip effect inside the PFSC. This bullwhip effect ultimately reaches upstream manufacturers (i.e., farmers), so altering the PFSC's information flow.
- v. Inadequate packing capabilities:** For perishable food, packaging was essential, particularly during COVID-19. Without proper packaging, it was very difficult to prevent the transmission of the virus. In India, it was customary to purchase perishable items from street sellers without wrapping. This culture had diminished India's emphasis on its packaging skills. As a result of the pandemic, there had been a dramatic spike in demand for packaged goods as opposed to unpackaged ones, in order to avoid violating government-issued criteria for preventing the spread of the virus. Due to a lack of infrastructure for efficient packaging, the rising demand for packaged commodities was causing issues for farmers.

As the pandemic continued to spread, numerous implications on agricultural stakeholders in India demonstrate how they had adapted to the pandemic's incidence and tried to streamline the food supply chain.

### **Coping strategies**

The dairy producers used a variety of coping mechanisms to minimise their losses. They sought out new customers to purchase the extra milk. Even though milk was supplied to them at a lesser price, the farmers found this technique to be the most successful for disposing of excess milk and making ghee. In the event of a delay in payments, farmers opted to use their reserves to cover day-to-day expenditures while producing their own feed mix to address concerns with cattle feed supply. The chapter focuses on analysing the variables impacting PFSCs during the

pandemic and enhancing their resilience, which may assist in understanding the pandemic's influence mechanism, lessen the effect of this and future pandemics, and increase the industry's capacity to endure market shock.

### **Strategies followed to overcome the losses**

Increased milk procurement by public and commercial dairy factories is the first and most important measure that might be taken. Typically, dairy facilities operate at 60 to 80 % of their capacity. By acquiring excess milk from communities, not only can processing companies use their maximum capacity, but they may also reduce farmers' price-related losses. The surplus capacity may be used to make dairy products with relatively longer shelf lives, such as butter, ghee, skim milk powder (SMP), etc. However, due to the competition in the industry, we must develop fair pricing methods to enhance the competitiveness of merchants. In order to retain a long-term connection with consumers, businesses often keep prices stable or raise them modestly. The government should thus endeavour to streamline wholesale and retail marketing and initiate procurement activities. Due to the pandemic epidemic, dairy producers suffered enormous losses.

In India, the national government and the Reserve Bank of India (RBI) unveiled a number of fiscal and monetary measures in conjunction with larger economic changes. In addition, a number of state governments announced fiscal stimulus measures, including the Pradhan Mantri Garib Kalyan Yojana with a Rs. 1.7 lakh Nirbhar financial package and the Atma-Nirbhar package with three components: (I) monetary actions, (II) fiscal actions, and (III) economic reforms. Taking into account the packages extensive effect and demand, it fell short and may need improvement. For agricultural enterprises to be sustainable, a substantial increase in expenditures is required to support and safeguard farmers, agricultural labourers, and employees in supply chains, ensuring the seamless functioning of postharvest operations, product marketing, cold storage, and transportation. Despite the different technologies highlighted, COVID-19 presents a significant potential for the adoption and digitalization of technology to improve current processes. Integrating market knowledge and improving departmental and ministry collaboration helps decrease supply chain risks. The robustness of the agricultural value chain at the national and local levels will be increased by providing incentives for research and development. The dairy industries and governments must collaborate to develop long-term strategies and policies that strike a balance between the industries' efficiency and flexibility, product specialisation and diversification, supply chain integration, local food systems, market mechanisms, and policy regulations and interventions.

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## IMPACT OF COVID 19 ON PSYCHOLOGICAL WELL-BEING

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The outbreaks of the COVID-19 pandemic challenge not only the worldwide health and economy but also burden individuals with concerns about their health due to potential infection or infection to family members and friends, as well as financial and occupational worries. The impact of the COVID-19 pandemic on mental health and protective resources might differ in individuals. Thus, it is important to recognize especially vulnerable population subgroups and their characteristics in order to apply targeted preventive interventions promoting mental health without major delay. Several already active national and international surveys started investigating the impact of the COVID-19 pandemic on social and psychological status with the advantage of a reference from former surveys. Pierce *et al.* (2020) examined longitudinal changes in mental health among 53,351 adults in the UK using regression models. The author reported an increase of 8.4% in the incidence of clinically significant mental disorders from 2018-2019 to April 2020.

In addition, values of the traditional General Health Questionnaire (GHQ-12) increased from 2018-2019 to April 2020 identifying more stress and lower mental health. The changes in mental health were mainly noticeable among women, younger individuals between 18 and 34 years, and people living with young children. Another study identified the psychological impact of COVID-19 on China at an early stage of the pandemic by using survey data of 1,210 participants. In total, 53.8% of participants rated the psychological impact of the pandemic outbreak as moderate or severe. 16.5% reported moderate to severe depressive symptoms, 28.8% moderate to severe anxiety symptoms, and 8.1% moderate to severe stress levels. In line with other literature (Pierce *et al.*, 2020; Delmastro *et al.*, 2020) they reported greater psychological stress, anxiety, and depression among individuals with specific COVID-19-related physical symptoms and poor self-rated health status.

Further risk factors for psychological stress include low socio-economic status, unemployment, and frequent exposure to social media and news concerning COVID-19. Yamada *et al.*, 2020 conducted a large-scale cross-cultural study through a global survey and investigated

the psychological (e.g., stress, trust) and behavioral responses (e.g., compliance) of the COVID-19 pandemic. It is interesting that authors suggested a link between prolonged states of emergency and stress related with decreased compliance regarding public health actions for virus containment. Further studies machine learning (ML) methods to inspect the COVID-19 pandemic's psychological effects and relevant influencing factors. Analyzing posts on the online Chinese social network Weibo, *et al.*, 2020 observed increased negative emotions and sensitivity to social risks with decreased positive emotions and life satisfaction. Jha *et al.*, 2020 combined Bayesian networks and ML methods on a representative sample of 17,764 adults in the USA to identify the key factors for mental health during the COVID-19 pandemic. They were able to predict the level of mental health of each and every individual with an average accuracy of 80%. Based on these preliminary findings, especially women, younger participants, and participants at higher risk of a severe course of disease should be identified as vulnerable in their psychological well-being with increased anxiety, depression, and decreased quality of life during the COVID-19 pandemic in the investigated German sample. This should be reflected in their relationship as the same cluster in a cluster analysis, based on mental health with increased scores regarding anxiety, depression, and concerns as well as decreased quality of life. Villani *et al.* (2021) in this study sample size was 501, of which 35.33% were classified as anxious and 72.93% as depressed. Over 90% of respondents had a good understanding of the preventive measures, despite over 70% suffered from having no possibility of physically seeing and meeting their friends and partners. Around 55% of students were willing to contribute much more to face the pandemic.

An increase in the occurrences of anxiety was associated with being female, being a student of the Rome campus, suffering from the impossibility of attending university, being distant from friends, and unable to physically see one's partner. Doing physical activity reduce these chances. The execution of a nationwide lockdown disrupts the day-to-day lives of the general public. The pandemic has caused incomparable shrinkage in the UK's economy and the shutting of businesses across the country. In combat, the UK government has provided financial sustain for businesses and the self-employed equating to 80% of their monthly wages. Due to the high demand for emergency funding, many self-employed individuals are bound to take short-term bank loans to maintain lines of income. Those how live with low salary, self-employed or insecure occupation experience the supreme impact due to loss of work or the provisional closure of their business. There have been reported that feelings of anxiety and depression have increased, with some terrified of post-lockdown anxiety and paranoia. The largest stressor is

living with an overarching feeling of loss (loss of income, routine or social interaction). Other at-risk groups include children and students who have experienced the closure of schools or universities cause significant disruption to daily routines, with factors such as exam postponement, accommodation expulsion, and graduation cancellations. Furthermore, there has been a significant damaging impact on those who suffer from ongoing mental health conditions, due to decreased access to support and resources.

The COVID-19 pandemic has seen the incidence of domestic abuse severely increase globally because of a reduction in options for support, increased exposure to exploitative relationships, and disaster-related instability within the household. As a result, there have been 32- 36% increase in domestic abuse incidents in France, 21- 35% increase across the USA, 25% increase in UK domestic abuse hotline calls, and increase of about 75% in Google searches related to domestic abuse support. The social-distancing and sheltering-in-place measures are important to reduce the spread of COVID-19. However, this dramatically increases the risk of domestic and inter-family violence (Holmes *et al.*, 2019; Usher *et al.*, 2020).

Indeed, the pandemic led general population to a high incidence of mental health disorders, such as acute stress, post-traumatic stress, anxiety, depression, irritability, insomnia, and decreased attention and these symptoms were more general in individuals with epidemic-types experiences. Overall, the COVID-19 pandemic had a huge impact on the mental health of people in many countries around the world cause similar reaction in terms of emotions and concerns at the population level. In fact, a raise in mental health disorder, especially anxiety and depression, in many Asian and European countries, the first continents affected by the pandemic have resulting in an anxiety and depression prevalence of 32.9 and 35.3%, in the Asia and a stress prevalence of 31.9% in Europe (Salari *et al.*, 2020; Tang *et al.*, 2021). In Italy, as it was the first European country affected by the COVID-19 pandemic represent a novelty that generated fear, anxiety and depression, especially in the young and elderly population, with a prevalence of anxiety, depression and stress of 18.7, 32.7 and 27.2%, respectively (Mazza *et al.*, 2020). Indeed, uncertainties related to the virus' characteristics, absence of treatments, rapid spread and lack of protective devices created a huge source of stress resulting in common health disorders.

With exploratory investigate effects of the COVID-19 pandemic on psychological well-being and mental health (here researched via scores describing anxiety, depression as well as quality of life), we applied an unsupervised clustering method suitable for mixed data sets and analyzed the resulting clusters within correlations between age, sex, risk factors defined by the

Robert-Koch Institute (RKI), infection concern, and contact behavior with several psychological scores, as well as regression models to identify the influencing key factors of those psychological scores.

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## **IMPACT OF COVID-19 ON HUMAN BEHAVIOUR**

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### **Abstract:**

Due to COVID-19, the human legacy and way of life have abruptly changed throughout the world (Coronavirus). Due to COVID-19, the established procedures created by many states of the world to harness the planet's resources for human growth came to an end. We have studied how the current pandemic is changing our world and its immediate repercussions in a way that has never been seen before. The purpose of the essay is to explore and analyze how this affects people while offering suitable solutions. The data was gathered via online methods, and the participants' conduct was observed, examined, and finally represented with appropriate assessments.

**Keywords:** COVID-19, Pandemic, social distancing, Lockdown

### **Introduction:**

The epidemic of the coronavirus that began in 2019, gained attention after China alerted WHO to a pneumonia outbreak in Wuhan, Hubei province. Immediately following the discovery of the pneumonia-causing pathogen, the 2019 novel coronavirus (2019-nCoV), which the International Committee on Virus Taxonomy eventually dubbed as severe respiratory syndrome coronavirus 2, (SARS- CoV-2). On January 30, 2020, it happened.

The WHO has designated COVID-19, caused by SARS-CoV-2, as a Public Health Emergency of International Concern. The Director-General of WHO, Dr. Tedros Adhanom, spoke shortly after in a news brief on March 11, 2020. Dr. Tedros Adhanom Ghebreyesus informed that in just two weeks, the number of cases outside of China had climbed by 13 fold, and the number of nations had increased by threefold. He pronounced the novel coronavirus (COVID-19) to be a pandemic. About having the highest rate of human transmission, COVID-19 differs significantly from other viruses. It is thought to be extremely lethal for the elderly and individuals with underlying conditions that cause a weakened immune system.

Researchers discovered that the virus SARS-CoV2 is the cause of COVID-19 from samples of patients in China. Additionally, they discovered that patients' faces and their respiratory systems both contained active viruses. They concluded that the live virus's extensive

transmission may be caused by its respiratory and other respiratory pathways. Another study discovered that COVID-19 had a greater reproduction rate than the SARS coronavirus. Since SAR-CoV-2 is closely related to two bat-derived acute respiratory syndromes, bat-SL-CoVZC45 and bat-SL-CoVZXC21, several studies assert that bats may be the main source of SAR-CoV-2.

There is, however, no verified research on the intermediate source of COVID-19 transmission from bat to human. Although the intermediary source of COVID-19's transmission may not yet be established, it is undeniable that COVID-19 has halted all economic, social, and political activity worldwide. COVID-19 has shaken up the continuous competition between the world's military superpowers, forcing military planners to reconsider their long-term budgetary plans for their arsenals of weapons.

The COVID-19 epidemic, which has infected more than 4 million people worldwide and is still growing, has rocked the world. In addition to having an impact on political, social, and religious activity, COVID-19 also caused the global economy to collapse. The leading economies of developed nations, including those of the US, China, the UK, Japan, Germany, France, and Italy, are on the verge of collapsing. Even the price of a barrel of crude oil went below zero as the stock market crashed to record lows. The number of young people without jobs in the US more than doubled in only one week, going from 3.3 million to 6.6 million. India, the world's fifth-richest nation by GDP, has been the worst affected of the top 10 economies in the world. Data from Monitoring Indian Economy show that the jobless rate has increased from 8.7% to 27.1%. As a result, people are experiencing more stress and worry, which has a variety of psychological effects and health concerns.

### **Review of Literature:**

A brief introduction of the review presented

- Miraz Uddin *et al.* (2021) have studied the perception of 250 Bangladeshi students regarding the Impact of Covid-19 on students' mental health. The structural questionnaire was prepared to collect the data using the personal interview. The research found that economic factors, social factors, and educational factors have a significant impact on the students' mental health during the Covid-19 pandemic situations.
- Nader Salaria *et al.* (2020) have done research work on the topic Prevalence of stress, anxiety, and depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. In this research paper to perform a meta-analysis of the collected studies, the random effects model was used, and the heterogeneity of studies was investigated using the I2 index. Moreover, data analysis was conducted using the

Comprehensive Meta-Analysis (CMA) software. As a result of this study paper, it was found that COVID-19 not only causes physical health concerns but also results in several psychological disorders. The spread of the new coronavirus can impact the mental health of people in different communities. Thus, it is essential to preserve the mental health of individuals and to develop psychological interventions that can improve the mental health of vulnerable groups during the COVID-19 pandemic.

- Amy Dawell *et al.* (2020) have conducted research work by conducting surveys on the topic of The Effect of COVID-19 on Mental Health and well-being in a Representative Sample of Australian Adults. They have suggested that minimizing disruption to work and social functioning, and increasing access to mental health services in the community, are important policy goals to minimize pandemic-related impacts on mental health and wellbeing. Innovative and creative strategies are needed to meet these community needs while continuing to enact vital public health strategies to control the spread of COVID-19.
- Mark E. Czeisler *et al.* (2020) have conducted research on the topic of Mental Health during the COVID-19 Pandemic: Challenges, Populations at Risk, Implications, and Opportunities. The research was conducted.
- Jennifer A. Sumner *et al.* (2020), have researched the topic The Long Arm of Mental Health: New Urgency with the COVID-19 Pandemic. A lot of research using the articles and survey was conducted.

### **Impact of the COVID-19 pandemic**

The COVID-19 pandemic has been shown to have impacted all aspects of human life, with the strongest effects being felt in the major economic sectors. Aside from the physical effects, it has turned daily life into a source of extreme stress, which causes panic and terror in people all over the world.

### **Economic impact**

The COVID-19 pandemic, which has already claimed 288,201 lives and spread like wildfire throughout 212 countries and territories, reduced the whole world to its knees.

The idea of staying at home and social isolation were extensively embraced throughout the world to stop the spread of COVID-19. More than 80 nations have closed their borders and mandated that each corporate unit close.

People all across the world started postponing their vacation and business travel, which had a direct impact on the hotel, events, travel, and airline businesses as well as other sectors that

are either directly or indirectly related to them. The hotel industry, like the airline industry, is requesting US \$150 billion in corona assistance.

If COVID-19 is not stopped as soon as feasible, the airline sector is expected to suffer a significant loss, estimated at roughly US \$113 billion by the IATA (International Air Transportation Association).

International trade in 2020 is projected to decline by 13% to 32%, which will have a devastating effect on the global economy. A loss of \$5 billion was suffered by the world cinema business. India's private sector banks face the most credit list risk at this time.

A UN research claims that the COVID-19 pandemic may cause a 1% decline in the world economy in 2020. 2019 had a 3% decline in the dollar amount of global merchandise exports, which came to US \$18.89 trillion. In just one week, US \$6 trillion disappeared from the global stock market. The market value of the S&P 500 fell by US \$5 trillion in a single week.

India, the fifth-richest nation in terms of GDP, has a similar history. The South Asian Association for Regional Cooperation's (SAARC) COVID-19 emergency fund received a \$10 million donation from the Indian government. An economic stimulus plan worth 1.7 trillion rupees (\$22.6 billion) will provide direct cash transfers and food security measures to millions of underprivileged individuals affected by the statewide lockdown.

### **Mental health**

According to professional opinions, findings from surveys undertaken by numerous organizations, and lessons learned from earlier calamities, particularly pandemic outbreaks in history, the COVID-19 pandemic may have a significant short- and long-term impact on the general public's mental health.

The coronavirus epidemic will cause another crisis that involves mental health problems, despair, anxiety, and a spike in suicide rates. This crisis could continue for weeks, months, or even years, according to experts and federal authorities. The COVID-19 pandemic has made people feel isolated due to social withdrawal, fear of infection and death for themselves and their loved ones, uncertainty about the future, disruptions to their daily time, dietary and sleep changes, prohibited gatherings, travel restrictions, limited access to social activities, unemployment or fear of losing jobs, business and school closures, closure of recreation centers, and increased family responsibilities as a result of the closure of daycare facilities. The effects of this are most noticeable in the following population groups:

- Seniors and those suffering from chronic illnesses

- Patients with COVID infections; adolescents; front-line medical workers and their families;
- Those who already have mental illnesses.

Other vulnerable groups include those who have lost their jobs or experienced financial hardship, those who are suspected to have the Coronavirus and are being held in administrative quarantine, those who have lost loved ones to the pandemic, autistic children, and kids with special needs who can no longer access mental health services, which exacerbates their conditions.

According to research, substance misuse and financial loss are strongly correlated. Drug and alcohol overdose is a major concern during the pandemic due to the increased risk of infection from COVID-19 of almost 63%, which is double that of the general population, as well as the increased risk of related health complications, greater barriers to rehabilitation and treatment due to COVID-19.

### **Increase in gender-based violence**

During the COVID outbreak, domestic violence, intimate partner violence, child abuse, and other forms of gender-based violence have increased at an alarming rate, according to media reports and statistics from numerous information sources. Between 23 March and 12 April 2020, domestic violence deaths in the UK increased by two times the amount they did on average over the previous ten years, according to a program monitoring violence against women.

Domestic violence has significantly increased during the pandemic due to disruptions in business and office work, limited opportunities to break free from the abuser, limited access to social and protective support networks, increased stress levels and household tensions caused by economic losses, and other factors.

### **Physical health and lifestyle**

People are being forced to stay indoors due to lockdown and social distance rules, which may have a significant impact on their lifestyle and physical health, particularly those who live in urban regions. Obesity and other health problems can be brought on by a lack of physical activity, a sedentary lifestyle, less time spent exercising and participating in sports because gyms and stadiums have closed, irregular and extended sleep patterns, overeating, and the consumption of unbalanced foods because some foods are unavailable.

### **Increased screen time**

People use screens (TVs, video games, smartphones, and tablets) more frequently than they normally do, whether to attend professional duties, amuse themselves by subscribing to web

channels, pay utility bills online, or stay in touch with friends and family via social media. The majority of young people work from home, online learning is an alternative to classroom learning, and cinemas, malls, and other entertainment sources are closing. People may be exposed to dangers such as exposure to violent or dangerous content, cyberbullying, cybercrimes, phishing attacks, etc. The risks of excessive screen usage include myopia development, eyestrain, brain damage, loss of attention, and cognitive control, and eyestrain.

### **Infodemics and rumors**

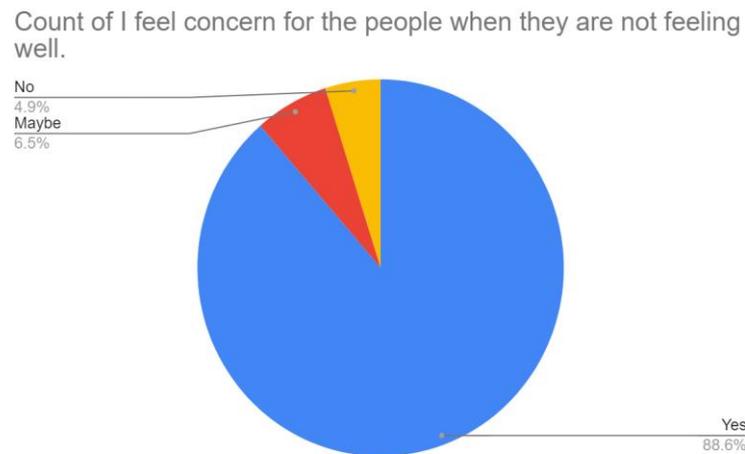
When the coronavirus was under lockdown, pranksters took advantage of social media platforms to spread false and misleading information about COVID-19, which served to further the fears and uncertainties of those who were already concerned about the virus's potential effects. This false news storm caused many people to fall into the trap of distributing unverified, untrue information without confirming it, which made everyone who read it anxious. People had it all, which increased their stress levels and made them more susceptible to infodemics relating to COVID-19. This included promises of COVID-19 home treatments, information on how the coronavirus spreads, and rumors about a COVID-19 vaccine being developed.

### **Education**

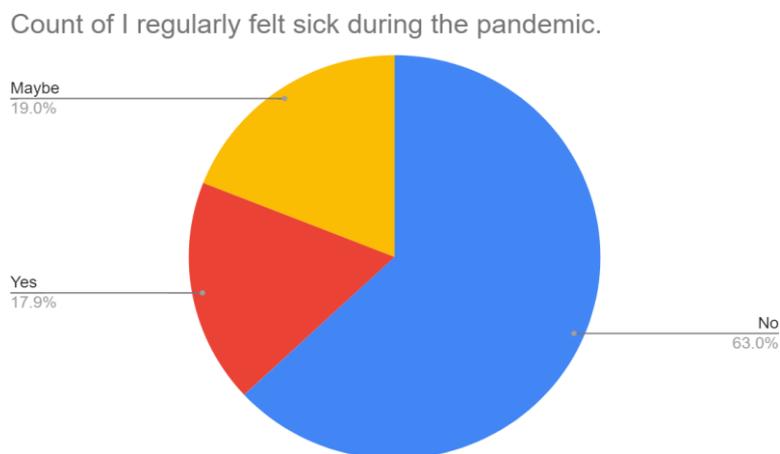
More than 190 countries were forced to close their educational institutions because of COVID-19, which had an impact on 1.725 billion pupils worldwide (As per a UNESCO report). As a result, the educational system has been seriously disturbed. The Coronavirus forced the \$600 billion US higher education business to go online. The Indian government was forced to announce a lockdown of educational institutions because of the rising incidence of COVID-19 infections across the whole nation. As of May 18, 2020, there were 0.05 million higher education institutions, 0.32 million students who were affected by school closures, and 1.5 million students who were enrolled in schools. Even while the majority of educational institutions are working hard to cut costs by switching to an online platform, access to digital devices and Internet penetration continue to be important obstacles to the successful implementation of online learning, particularly in developing nations. Digital literacy of instructors and a lack of training or guidelines to support the use of online platforms and tools for teaching and learning processes are further barriers to the actual implementation of online teaching and learning processes. According to research on educational technology, there are 1.5 million faculty members in America, or about 70% of all professors, who have never taught utilizing a virtual platform.

## Data analysis

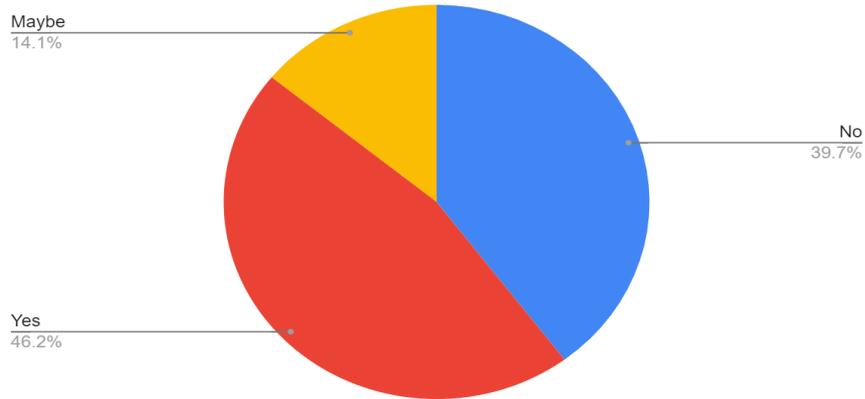
Almost 185 volunteers from primary schools across India participated in the study, which was conducted. Approximately 54.3% of the participants were female, compared to 45.7% of the participants who were male. The pupils of the relevant age group were given a set of questions that were created using the Google form. About 12–15 pupils were also subjected to some telephone interviews. 31.4% of the participants were from rural areas, while 69.4% of the participants were from metropolitan areas.



From the poll, it was discovered that the majority of students, or 56.6%, did not feel unwell during the pandemic (i.e., suffering from any ailment like a cold, cough, fever, etc.), while 17% did and the remaining 26.4% were unsure about the situation. This demonstrates that while some students had good physical health, followed a healthy diet, and took appropriate precautions, others may not have been exercising or otherwise staying active, making them sicker and less able to cooperate with a sudden lockdown. Alternatively, they may have been overworked and overburdened by their online classes, which caused them to be overly busy.

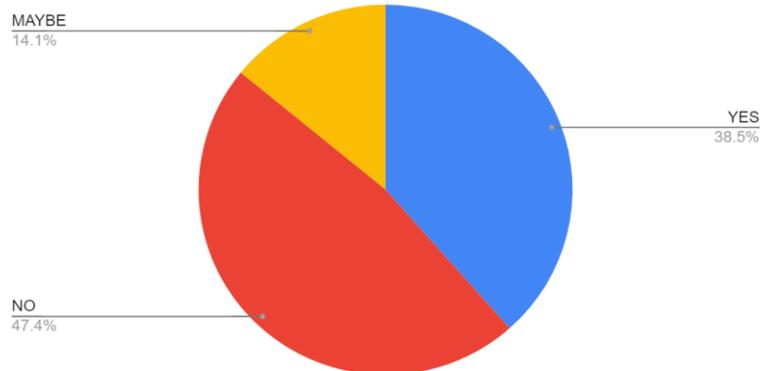


Count of Have you experienced any kind of change, loss, or trauma recently?



The COVID pandemic, on the other hand, also caused the pupils a great deal of fear. They followed all the guidelines and instructions, and they even requested that their relatives do the same. They made an effort to assist those in need and actively participated in home tasks. They complied with every request made of them.

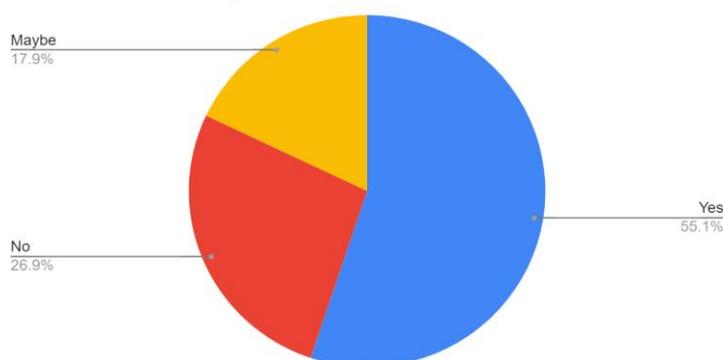
Count of Are you reliant on substances, people, or circumstances to bring you happiness or relief?



The survey also revealed that a few of the pupils were not outgoing and had trouble making or meeting friends. They possessed no pals. Students, businesspeople, and others were all required to remain at home throughout the pandemic and remain alone. This has significantly contributed to the mental health issue that every second individual we meet is currently dealing with.

The upbringing of children is greatly influenced by friends, culture, the environment, parents, etc. Everything is crucial to helping them become decent people. Students who don't have friends are more likely to experience stress, despair, etc.

Count of Do you feel that you have a person to talk through emotions and feelings with?



Additionally, it was reported that some of the pupils began acting more aggressively, engaging in fighting, screaming, and other aggressive behaviors. This could be brought on by despair, stress, or loneliness.

The students have begun to form an unfavorable impression of themselves. Because of the pandemic, isolation, etc., they have grown to have a very low sense of self. 40 to 45 percent of kids reported having extremely low self-esteem. This can substantially harm academic performance and cause worry, tension, loneliness, and an increased risk of depression. Self-esteem affects how we make decisions, how we interact with others, how we feel emotionally, and how we feel overall. Additionally, it affects motivation since those who have a healthy, positive self-view are aware of their potential and may be motivated to take on new challenges.

### **Significance:**

The paper's theme is "the impact of covid-19 on the behavior of human," which I selected. The reason I chose this topic is not only because it is the most crucial issue that has to be acknowledged, but also because everyone, from young children in elementary school to wealthy businessmen, is impacted by the pandemic. But this is the only reason I can think of for the present rise in suicides each day. Every year, almost 800,000 individuals die by suicide throughout the world. One person every 40 seconds, then.

### **Objective:**

The objectives of this research study include:-

- To investigate the effects of the COVID-19 pandemic on many facets of the general population. These elements include perspectives on lockdown, social distancing as a strategy to slow the spread of COVID-19 infection, physical health, emotional health, economic health, infodemics, online education, connections with spouse and family, use of social media platforms, etc.

- To comprehend their viewpoint on the problem and potential remedies for the COVID-19-related global crisis.
- To determine how well-informed the public is on the precautions needed to stop the COVID-19 illness from spreading.

**Method:**

To understand how COVID-19 has affected people's day-to-day lives, mental and physical health, social and economic conditions, infodemics, online education, relationships with family, screen time, etc., the survey's questionnaire included both closed-ended multiple-choice questions and self-reports. The study summarizes the substantive findings with an emphasis on the respondents' qualitative data. There were 4 open-ended questions and 32 closed-ended questions in the survey. The respondents were questioned about how they perceived the impact of COVID-19 on their lives:

- Health
- Economy
- Online Education
- Relationships
- Adherence to health guidelines regarding COVID-19
- Infodemics
- Work
- Spending time
- Methods- Descriptive, Questioner, Personal Interview, survey
- Sample- 120 students of different primary schools from all over India.
- Tool- questionnaire was made and circulated amongst the students on the impact of COVID-19 on HUMAN BEHAVIOUR.

**Conclusion:**

Understanding the effects of COVID-19 on the population's health, economy, education, and way of life is the main goal of this research study. Another goal is to gauge how well-informed the general public is about the symptoms of COVID-19 and the precautions that should be taken to prevent the infection from spreading to others. The study of the data reveals that the

In particular, for those who already have physical or mental health concerns, COVID-19 hurts the population's physical and mental health by limiting access to support systems. The evaluation of the data obtained from the online poll, along with the analysis that followed, reveals that people's physical health has been impacted by a lack of physical activity, and the

closing of gyms and parks, among other factors. Due to financial frustrations, job loss, etc., it has negatively impacted relationships with family and spouse as well. Boredom and a lack of amusement have led to increased food consumption, while a lack of some food necessities has led to an imbalanced diet and an increase in the risk of eating-related illnesses like obesity.

The results show an increase in screen usage among those staying at home during a lockdown. The findings also show that people's negative emotions, stress levels, and anxiety have increased as a result of their worry about contracting COVID-19 and dying as a result.

People's negative perceptions of COVID-19 have been further exacerbated by unreliable news and misinformation that has been spread on social media.

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## POST -COVID COMPLICATIONS IN COVID-19 PATIENTS

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### Abstract:

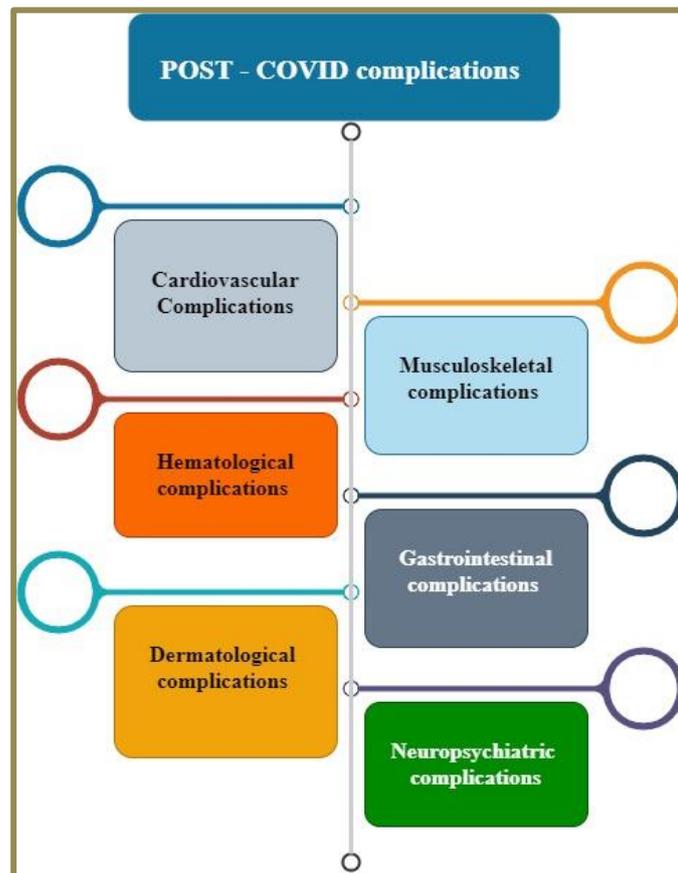
The short and long-term impacts of SARS-CoV-2 infection are expanding continuously. Long-term heterogeneity exists in the same way that it does in the acute infectious phase, problems were noticed later during the COVID-19 infection. "Long COVID" refers to the long-term effects of COVID-19 in individuals with assumed or confirmed COVID-19 infection. These are noticed in a subset of recovered individuals who continue to display COVID-19 symptoms for much longer than the illness pattern would suggest. COVID-19 is now recognized as a disease affecting multiple organs with a wide variety of symptoms. Similar to post-viral symptoms observed in survivors of past virulent coronavirus pandemics, there are an increasing number of reports of persisting and protracted sequelae following acute COVID-19. The goal of this book chapter is to highlight the Post -COVID complications in the current scenario.

**Keywords:** COVID-19, Post-COVID, SARS-CoV-2, ARDS.

### Introduction:

The coronavirus accountable for COVID-19, severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), is now present in every region of the globe. Although the coronavirus disease 2019 (COVID-19) pandemic was declared over 2 year ago, it's devastating impact on morbidity, mortality, healthcare systems, and the global economy continues to be felt today. It appears that COVID-19 can range in severity from being asymptomatic or causing a minor viral illness to be a systemic disease that causes pneumonia, fever, dry cough, breathing difficulties (dyspnoea), headache, anosmia, and occasional diarrhoea (Chen *et al.*, 2020; Huang *et al.*, 2020). Severe infections can cause consequences such as pneumonia, acute respiratory distress syndrome (ARDS), sepsis, multiple organ failure, blood clotting, acute myocardial infarction and acute kidney injury (Rodriguez *et al.*, 2020; Zheng *et al.*, 2021). Even though the vast majority of the available information on COVID-19 is almost entirely on acute illness (Lagier *et al.*, 2020; Eythorsson *et al.*, 2020; Maltezou *et al.*, 2021) it has been abundantly clear that there are long-term repercussions. The Patient-Led Research Collaborative is a citizen-scientist group that conducted the first survey of enduring COVID-19 symptoms in the spring of

2020, which provided the first description of Post-COVID syndrome. Doctors quickly discovered that the symptoms of COVID-19 patients continued for weeks after the initial infection when the first cases of COVID-19 occurred (McCorkell *et al.*, 2021; Morin *et al.*, 2021). COVID-19 symptoms include exhaustion, shortness of breath, issues with smell and taste, chest pain, and myalgia. (Havervall *et al.*, 2021; Dicipinigaitis *et al.*, 2020).



**Figure 1: Post COVID complications in COVID patients**

**Pathophysiology:**

Even though we don't know exactly what causes COVID-19 infections for long-term problems, there are various pathophysiological mechanisms of the virus that may explain these problems. Possible pathophysiological mechanisms comprise direct damage to tissue by the virus. The SARS-CoV-2 entry receptor, angiotensin-converting enzyme 2 (ACE2), can be located throughout the body. This allows the virus to enter target cells by activating its spike protein with transmembrane serine protease 2. Early studies of the pandemic showed that endothelial cells had a lot of ACE2 and that COVID-19 infection caused a lot of damage to the integrity of the blood vessel barrier and made it easier for blood to clot (Gupta *et al.*, 2020). Follow-up studies of COVID-19 survivors have shown that these changes have long-term

effects. For example, 3 months after being infected with COVID-19, 71% of patients had radiological anomalies in their lungs and 25% of patients had efficient abnormalities (Hoffmann *et al.*, 2020).

Various studies on the long-term effects of the SARS-CoV-1 virus, which came out before the SARS-CoV-2 virus in 2003, found the same difficulties and long-term effects (Qi *et al.*, 2020). Both of these viruses use the same host cell receptor, ACE2, which suggests that they use similar ways to get into cells. SARS-CoV-2, on the other hand, has a higher affinity for the receptor and an additional cleavage site, which may make infection simpler and produce more severe long-term difficulties (Jin *et al.*, 2020). Pathological inflammation, which can have several underlying causes including viral persistence, immunological dysregulation, and autoimmunity, is currently the most widely accepted aetiology for chronic lung disease. It is noteworthy that the patient rarely recovered after 20 days of symptom onset (Zhao *et al.*, 2020), suggesting that prolonged symptoms are driven predominantly by immunological processes. It's also probable that the immune system has trouble clearing the body of the virus because some of the viruses are hiding out in immunologically favoured areas (Ngai *et al.*, 2010; Shang *et al.*, 2020).

### **1. Cardiovascular complications:**

Pathological inflammation, which can have several underlying causes including viral persistence, immunological dysregulation, and autoimmunity, is currently the most widely accepted etiology for chronic lung disease. There is a lot of evidence that influenza, SARS, and MERS viruses can cause heart problems. These problems usually show up as myocarditis, acute myocardial infarction, acute heart failure, arrhythmia, sub-clinical diastolic impairment, and cardiac arrest (Ferrari *et al.*, 2020; Xiong *et al.*, 2020). The SARS-CoV-2 can cause short-term damage to the heart and increase the risk of long-term damage (Zheng *et al.*, 2020). Also, people with heart problems who get SARS-CoV-2 have a higher mortality rate (Zheng *et al.*, 2020). Emami *et al.* 2020, looked at 76,993 patients with COVID-19 from 10 studies. They found that hypertension, CVDs, diabetes, kidney disease, smoking, and chronic obstructive pulmonary disease were some of the most common underlying diseases. Out of these, CVD was the most common disease that put people at more risk for COVID-19, with a rate of 12.1% (Emami *et al.*, 2020). Shi *et al.* (2020), who did a study on 416 people in Wuhan, reported that 82 people, or 19.7%, had cardiac injuries. These patients had higher leukocyte counts and levels of C-reactive protein, high-sensitivity troponin - I, N-terminal pro-B-type natriuretic peptide, and creatinine

than the patients who did not have cardiac injury. Additionally, these patients were significantly older than the patients who did not have cardiac injuries (Shi *et al.*, 2020).

## **2. Cytokine release syndrome:**

Cytokine release syndrome, often known as CRS, is a systemic inflammatory reaction that can be brought on by a number of different reasons, including infections and some medicines. When the anti-T-cell antibody muromonab-CD3 (OKT3) was first used in the clinic as an immunosuppressive treatment for solid organ transplantation in the early 1990s, the phrase "cytokine release syndrome" was coined for the first time (Chatenoud *et al.*, 1989; Chatenoud *et al.*, 1990). This was the same time that the antibody was first used. CRS can express itself with a wide range of symptoms, from mild, flu-like symptoms to severe, life-threatening indications of the overshooting inflammatory response. These symptoms can range in severity from mild to severe. Fever, fatigue, headache, rash, arthralgia, and myalgia are examples of the mild symptoms that can accompany CRS. In severe situations, hypotension and high fever can develop into an uncontrolled systemic inflammatory response with circulatory shock requiring vasopressors, vascular leakage, disseminated intravascular coagulation, and multi-organ failure (Shimabukuro *et al.*, 2018). Common laboratory abnormalities in CRS patients include cytopenias, increased creatinine and liver enzymes, abnormal coagulation parameters, and a high CRP level.

## **3. Hematological complications:**

Acute COVID-19 infection has been related to a higher risk of thrombotic events, particularly in patients who are severe (Helms *et al.*, 2020; Klok *et al.*, 2020). The cause of this coagulopathy is a combination of things, such as microvascular dysfunction and increased expression of tissue factors in response to inflammatory cytokines, as well as the effects of hypoxia on upregulation of hypoxia-inducible transcription factors (Benkova *et al.*, 2021; Lazzaroni *et al.*, 2021). Although the exact duration of hypercoagulability is unknown, it appears that the majority of venous thromboembolic events take place within two to four weeks of infection (Roberts *et al.*, 2020; Salisbury *et al.*, 2020). It has been suggested that VTE prophylaxis should be continued for COVID-19 patients who are hospitalized beyond discharge and into the outpatient setting; however, the recommendations that are currently in place do not support this as a regular treatment (Leentjens *et al.*, 2021). COVID-19 is a systemic infection that has a major influence on both the hematopoietic system and the blood clotting process. Lymphopenia has the potential to be a cardinal laboratory finding, meaning that it can be used to predict outcomes. When identifying the severity of a case, the ratio of neutrophils to

lymphocytes and the peak platelet-to-lymphocyte ratio may also be of predictive relevance. A longitudinal study of lymphocyte count dynamics and inflammatory indices, including LDH, CRP, and *IL-6*, may help to detect cases with a bleak prognosis and timely intervention in order to improve outcomes. This evaluation is performed throughout the course of the disease (Terpos *et al.*, 2020). In both the etiology of disease and its clinical manifestation, COVID-19 is an essential component of the immunological response of the host. It does this by stimulating the antiviral immune system to produce an excessive inflammatory response, which can lead to haematological abnormalities such as lymphopenia, lymphocytes, and abnormalities in granulocyte and monocyte populations. These haematological abnormalities can make it easier for other bacteria to infect the patient, which can then lead to septic shock and multiple organ dysfunction. In addition, people who have comorbid disorders such as hypertension, obesity, diabetes, and other similar conditions have an elevated risk of contracting a coronavirus infection (Yang *et al.*, 2020; Foldi *et al.*, 2020).

#### **4. Neuropsychiatric complications:**

Neuropsychiatric symptoms, notably delirium, were prominent in prior coronavirus outbreaks of SARS and Middle East respiratory illness (MERS) (Rogers *et al.*, 2020). So far, it appears that COVID-19 follows a similar pattern to that of COVID-19, in which delirium is the most common acute neuropsychiatric syndrome (McLoughlin *et al.*, 2020) and may be the only presenting symptom of covid-19 in older persons and those with dementia (Poloni *et al.*, 2020). One-third of patients have reported cognitive and behavioural problems after discharge, and this is especially true for those who needed intensive care, where delirium is strongly associated with worse outcomes (Poloni *et al.*, 2020; Helms *et al.*, 2020). During previous coronavirus pandemics, depression and anxiety were common in the early stages of the disease, while psychosis and catatonia only happened in a small number of cases (Rogers *et al.*, 2020). People who were in the hospital for COVID-19 and got better, have been found to have high rates of anxiety, depression, and post-traumatic stress disorder, but it's still too early to tell what the long-term effects will be (Mazza *et al.*, 2020). A full picture might not be clear for years, like when it was found that children born during flu pandemics were more likely to have psychotic disorders as adults (Kępińska *et al.*, 2020; Butler *et al.*, 2020).

#### **5. Dermatologic problems:**

Congestion, cough, dyspnoea, and fever are the most common COVID-19 symptoms (Recalcati *et al.*, 2020). One early study found that only two out of 1099 people had a "rash," but the researchers may have missed a few people (Guan *et al.*, 2020). In a more recent study, 18 out

of 88 patients had a rash, and 8 of these patients had a rash right away. In another study, 5 out of 103 patients had a rash on skin (Recalcati *et al.*, 2020; Hedou *et al.*, 2020). People with COVID-19 have been thought to have rashes for more than one reason. The first is diffuse microvascular vasculitis, which is caused by the activation of the complement system. A vasculitic phenomenon was suggested by the presence of complement protein deposition in dermal capillaries, as well as interstitial and perivascular neutrophilia with pronounced leukocytoclasia. (Magro *et al.*, 2020). Some have hypothesized that this is a direct result of being infected with the virus. This is because of the presence of a high number of lymphocytes but no eosinophils, as well as other characteristics such as papillary dermal edema, epidermal spongiosis, and lymphohistiocytic infiltrates (Gianotti *et al.*, 2020; Sanchez *et al.*, 2020). Skin manifestations have been reported to occur many days after the onset of other symptoms (Magro *et al.*, 2020; Henry *et al.*, 2020; Genovese *et al.*, 2020) while most research show they occur few days after the onset of respiratory symptoms. These signals could be used to alert doctors to the condition before any respiratory symptoms appear, and they could also help pinpoint any consequences that need to be treated (Gottlieb *et al.*, 2020)

#### **6. Musculoskeletal complications:**

COVID-19 is an illness that mostly affects the lungs, but the disease is now showing signs outside of the lungs, such as in the muscles and bones. The musculoskeletal symptoms of fatigue, myalgia, and arthralgia are common among those infected with COVID-19. Cipollaro *et al.* 2020, reported clinical data on 12,046 patients (54% male and 46% female) to determine the prevalence of musculoskeletal symptoms and epidemiological characteristics in patients with COVID-19. The overall prevalence of fatigue symptoms was 25.6%, while the prevalence of arthralgia and myalgia was 15.5%. The exact incidence of musculoskeletal affliction is unknown. A total of eight investigations found that more than half of patients experienced fatigue (Escalera *et al.*, 2020; Vaishya *et al.*, 2021). It was not obvious how or why COVID-19 acquired its musculoskeletal symptoms. Possible entrance points for the new Coronavirus SARS-CoV-2 include the Angiotensin-Converting Enzyme 2 (ACE-2) receptor in the central nervous system, peripheral nervous system, and smooth muscles, and the TMPRSS-2 expressed in skeletal muscles and the synovium (Disser *et al.*, 2020; Keyhanian *et al.*, 2020).

#### **7. Gastrointestinal complications:**

Some people infected with SARS-CoV-2 have more severe multiorgan dysfunction, even though the vast majority of patients show no symptoms or have moderate symptoms. In most cases, the devastating effects of COVID-19 are compounded by a number of comorbidities,

including high blood pressure, diabetes, obesity, and/or old age. In the early stages of the disease, SARS-CoV-2 can also induce gastrointestinal symptoms such vomiting, diarrhoea, and abdominal pain (Villapol *et al.*, 2021). The gut microbiota shifts and inflammatory cytokines rise in response to intestinal dysfunction. Therefore, it may be important to diagnose gastrointestinal symptoms that precede respiratory difficulties during COVID-19 to improve early detection and treatment. Middle East respiratory syndrome (MERS) has been linked to diarrhoea in anywhere from 14 percent to 50 percent of documented cases, according to several research (Assiri *et al.*, 2013).



**Figure 2: Diseases and problems associated with Post COVID complications**

**Conclusion:**

Doctors and governments will be able to help patients who survived COVID-19 in a more complete way if they have a clear idea of the long-term effects of the disease. This is important because the long-term effects of COVID-19 are expected to be hard on the patients, their caretakers, and the healthcare system. As doctors learn more about COVID-19 patients, they are slowly realizing how dangerous the effects and complications that COVID-19 patients are. Early detection of possible complications and effects of each system will improve clinical outcomes and make them less likely to happen. The pathophysiology of 2019-nCoV and the damage it

could do to different systems will be hard to understand without lab and clinical data (Yang *et al.*, 2021). In conclusion, the most important thing to do after the COVID-19 pandemic is to prevent and treat complications and long-term effects in COVID-19 patients. This is the top priority and experts and scholars from all over the world.

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**Abbreviations:**

SARS-CoV-2: Severe acute respiratory distress syndrome coronavirus-2

COVID-19: Coronavirus disease 2019

ACE2: Angiotensin-converting enzyme- 2

MERS: Middle east respiratory syndrome

CVD: Cardiovascular disease

CRS: Cytokine release syndrome

VTE: Venous thromboembolism

LDH: Lactate Dehydrogenase

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## **MASS VACCINATION PROGRAM AND COVID-19 CASE FATALITY RATE: A CROSS COUNTRY ANALYSIS**

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### **Abstract:**

Recent epidemiological studies reveal an association between people who receive some kind of vaccines and reduced COVID-19 fatality rate. Considering vaccination coverage of 175 countries, this study reassesses the relationship using linear regression model and represent the link with statistical conviction for most vaccines. The results show that, controlling the role of confounding factors COVID-19, case fatality rate (CFR) bears an inverse association with vaccination coverage. This implicates the fact that one of the key determinants of the variation in COVID-19 CFR across countries of the world is the variation in vaccination coverage. There is strong evidence that the median age of the population which is positively correlated with countries level of development makes a clear difference of COVID-19 CFR across countries. Thus, the case fatality rate (CFR) may be reduced slowly through greater vaccination coverage and enhancing immunity.

**Keywords:** Vaccination, case fatality rate, COVID-19, regression, median age, temperature.

### **Introduction:**

Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) or COVID-19 has become greater threat to the existence of entire humanity and posed a major cause of ongoing economic depression across the globe. Most of the COVID-19 infected patients experience mild to moderate respiratory illness and recover without requiring special treatment. But COVID-19 can be manifested fatal with the presence of co-morbidities and higher risk for aged people or older section of population those with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop serious illness.

However, within such short span of time, the researchers have found several facts and findings about the emergence and pathogenicity of COVID-19. As such, Adamu et al. (2020) observe that childhood immunization is crucial to reduce the impact of COVID-19. That is, the frequent and repeated administration of vaccinations in childhood may be trigger in trained

immunity of innate immune cells, immune fitness of adaptive immune cells or cross-protection of antibodies in the children.

More specifically, a group of studies have observed the relation between some kind of vaccination coverage and reduced COVID-19 case fatality rate (CFR) across countries. For example, there is evidence that countries with mass Bacille Calmette-Guérin (BCG) immunizations have experienced a lower mortality of COVID-19 compared to those without such programs. But the association between BCG vaccination and COVID-19 CFR influenced by the socio-economic and demographic differences across countries. Higher BCG vaccination coverage is also associated with reduced number of COVID-19 cases per million. Besides the negative association between BCG coverage and COVID-19 CFR, there is also an association between higher tuberculosis (TB) incidence and lower COVID-19 CFR across countries.

In contrast, few studies have investigated the effect of meteorological conditions like temperature and relative humidity on morbidity and mortality of the pandemic. Wu et al. (2020) has revealed that temperature and relative humidity were both negatively related to daily new cases and deaths of COVID-19. Besides, these factors play an important role in COVID-19 transmission. They report that weather with low temperature, mild daytime temperature and low humidity may aggravate COVID-19 transmission. Apart from these associations, comorbidities with other diseases and older ages are also important factors of high morbidity and mortality in COVID-19 patients with possible pathophysiological mechanisms.

Thus it becomes imperative to test any hypothetical proposition that vaccination coverage may work as a protecting shield against the morbidity and mortality of COVID-19. To corroborate it, this study proposes the main objective as to investigate the association between different vaccines and COVID-19 CFR (details about the vaccines and their associated diseases are given in the Appendix Table A.1).

### **Materials and Methods:**

The study focuses on the potential impact of the immunization in preventing COVID-19 CFR across 175 countries of the world. Mitigating the role of confounding factors that can influence COVID-19 CFR, this study assesses whether vaccination coverage is effective in reducing COVID-19 CFR. Below we specify the data and sources, statistical model, as well as discuss the findings.

### **The variables**

Based on the summary of previous literatures, 4 variables (with notation in parentheses) are selected to address the relation between vaccination coverage and morbidity and mortality of

COVID-19. Consistent with earlier studies (like in Miyasaka, 2020), COVID-19 CFR (CFR\_COVID-19) is used as the dependent variable. The estimated immunization coverage of each vaccine in the year 2019 is used as an independent variable. Published epidemiological data and a few studies (see, for example, Zhou et al., 2020; Butlera and Barrientosa, 2020) reveal that COVID-19 CFR increases with age, thus median age of the population (Med\_ag) is used as a predictor variable of average age of country's population. Studies established the role of meteorological factors such as temperature and humidity in influencing COVID-19 transmission and fatality. This study thus considers country's annual average temperature (Tem\_av) to examine the influence of temperature on COVID-19 CFR. In addition, this study categorises countries into four groups based on human development index (HDI) value see how COVID-19 CFR varies across them. Here, the four groups of countries, in question, are (i) very high human development (HDI value  $\geq 0.8$ ), (ii) high human development ( $0.79 \geq$  HDI value  $\geq 0.7$ ), (iii) medium human development ( $0.69 \geq$  HDI value  $\geq 0.55$ ), and (iv) low human development (HDI value  $< 0.55$ ).

### Data and Sources

The data on COVID-19 CFR are calculated based on the reported cases and deaths by country, territory, or conveyance compiled by the Worldometer on 20 July 2020. The number of countries is basically selected on the availability of COVID-19 data. Since vaccination coverage data are as of in July, thus COVID-19 CFR is also considered for the month of July. The estimated average immunization coverage is the WHO/UNICEF Estimates of National Immunization Coverage (WUENIC) of various vaccines for 1980-2019 as of 1 July 2020. Time period to compute the average coverage of each vaccine is chosen based on available data. Data on median age of the population are basically drawn from the World Development Indicators (WDI) published by the World Bank. Average annual temperature data are drawn from Climate Research Unit (CRU), compiled by University of East Anglia.

### Econometric model

The following statistical model is used to estimate the impact of immunization on COVID-19 CFR:

$$y_i = \alpha + \beta_1 x_{1i} + \dots + \beta_k x_{ki} + \varepsilon_i \quad \dots \dots \dots \quad (1)$$

Where,  $y_i$  denotes COVID-19 CFR in country  $i$  ( $i = 1, 2, \dots, 175$ );  $\alpha$  is the intercept;  $\beta_1, \dots, \beta_k$  are the coefficients associated with the  $k$  explanatory variables  $x_1 \dots x_k$ ; and  $\varepsilon_i$  is the random disturbance term which is assumed to be independent and identically distributed (i.i.d.)

with  $E(\varepsilon_i) = 0$  and  $Var(\varepsilon_i) = \sigma^2$ . The study fits linear regression model using robust standard error to control heteroskedasticity and multicollinearity.

**Results and Discussion:**

Table 1 displays the summary statistics mainly mean and standard deviation (SD) of COVID-19 CFR, median age of the population and annual average temperature of the countries under study in four groups. It is evident that COVID-19 CFR, median age of the population and average annual temperature differ considerably across four groups of countries. In particular, countries with very high human development are registering the highest average CFR in COVID-19 including median age of the population than the other three groups of countries. Average COVID-19 CFR is lowest in countries with medium human development. At the other end, countries with low human development experience higher annual average temperature than the other three groups of countries.

**Table 1: Summary Statistics**

Variables →	CFR_COVID-19		Tem_av		Med_ag	
Countries ↓	Mean	SD	Mean	SD	Mean	SD
Very high human development (59 countries)	41.93	0.70	14.11	0.14	39.63	0.09
High human development (49 countries)	25.30	0.45	21.12	0.14	31.81	0.11
Medium human development (31 countries)	18.68	0.48	21.49	0.22	23.68	0.13
Low human development (36 countries)	32.44	1.30	25.07	0.11	19.27	0.07

Source: Author’s calculation based on Secondary data.

Results of linear regressions estimating the impact of immunization coverage on COVID-19 CFR are presented in Table 2. As shown in Table 2, at least four vaccines (BCG, MCV2, HepB3 and HepB BD) are found to have statistically significant impact in reducing COVID-19 CFR. The result implies that, all else equal, the variation in COVID-19 CFR across countries may be explained by the variation in immunization coverage. The coefficient estimate of median age of the population is positive and significant suggesting higher COVID-19 CFR across countries as people grow older. This result has important implication in explaining the higher COVID-19 CFR in some developed countries. Perhaps, the higher median age of the population

in developed countries may be a strong predictor why these countries are registering higher COVID-19 CFR than the developing and underdeveloped countries. The higher COVID-19 CFR in developed countries is also supported by the positive and significant coefficient estimates (in most cases) of the grouping of countries (based on HDI value).

**Table 2: Results of Linear Regression-1 (N = 175)**

Dependent Variable (Y) = Case Fatality Rate (CFR) of COVID-19						
Intercept ( $\alpha$ )	Vaccination (X <sub>1</sub> ) (Estimated average coverage)	Median age of the population in 2019 (X <sub>2</sub> )	Average annual temperature in 2018 (X <sub>3</sub> )	Group of country by HDI (X <sub>4</sub> )	R <sup>2</sup>	
<b>-9.330</b> (22.766)	BCG (1980-2019)	-0.236** (0.095)	1.373*** (0.454)	-0.233 (0.273)	8.088** (4.060)	0.111
<b>-21.530</b> (25.037)	MCV1 (1980-2019)	-0.0667 (0.177)	1.565*** (0.490)	-0.341 (0.308)	7.356* (3.998)	0.073
<b>-16.954</b> (22.846)	MCV2 (2000-2019)	-0.179* (0.107)	1.746*** (0.504)	-0.402 (0.277)	5.502 (4.499)	0.088
<b>-30.523</b> (23.462)	RCV1 (1980-2019)	0.186 (0.133)	1.291** (0.562)	-0.462 (0.323)	10.592** (4.407)	0.079
<b>-34.881</b> (26.148)	DTP1 (1980-2019)	0.084 (0.158)	1.566*** (0.496)	-0.404 (0.326)	8.683** (4.136)	0.074
<b>-27.311</b> (25.876)	DTP3 (1980-2019)	-0.001 (0.153)	1.567*** (0.494)	-0.362 (0.313)	7.999* (4.151)	0.073
<b>-3.501</b> (27.402)	HepB3 (1990-2019)	-0.348** (0.135)	1.472*** (0.502)	-0.028 (0.264)	3.973 (4.653)	0.112
<b>-12.548</b> (22.262)	HepB BD (2000-2019)	- 0.246*** (0.061)	1.494*** (0.454)	-0.413 (0.286)	5.413 (3.994)	0.124

*Note: \* prob. < 0.1, \*\* prob. < 0.05, \*\*\* prob. < 0.01; Robust standard errors in parentheses.*

*Source: Author's calculation based on Secondary data.*

**Table 3: Results of Linear Regression-2 (N = 175) using Prevalence**

Dependent Variable (Y) = Case Fatality Rate (CFR) of COVID-19

Intercept ( $\alpha$ )	Prevalence (X <sub>1</sub> ) (Estimated average prevalence)	Median age of the population in 2019 (X <sub>2</sub> )	Average annual temperature in 2018 (X <sub>3</sub> )	Group of country by HDI (X <sub>4</sub> )	R <sup>2</sup>
<b>-10.411</b> (23.028)	TB (2000- 2019) 0.038*** (0.014)	- 1.202** (0.490)	-0.524* (0.310)	9.090** (4.232)	0.101
<b>-27.364</b> (23.823)	Measles (1980- 2019) -0.000 (0.010)	1.566*** (0.494)	-0.363 (0.299)	8.012* (4.200)	0.073
<b>-20.803</b> (23.763)	Mumps (1998- 2019) - 0.159*** (0.032)	1.508*** (0.488)	-0.508* (0.295)	7.926* (4.121)	0.089
<b>-25.053</b> (23.439)	Rubella (1998- 2019) -0.262** (01.23)	1.588*** (4.881)	-0.491 (0.299)	8.370** (4.121)	0.090
<b>-28.402</b> (25.888)	Diphtheria (1980- 2019) 2.303 (8.803)	1.579*** (0.513)	-0.305 0.373	7.461** (3.108)	0.074
<b>-29.419</b> (23.428)	Tetanus (1980- 2019) 1.888 (1.180)	1.654*** (0.488)	-0.400 (0.296)	7.189* (4.204)	0.082
<b>-31.785</b> (25.088)	Pertussis (1980- 2019) 0.225 (0.209)	1.640*** (0.506)	-0.309 (0.298)	7.307* (3.748)	0.084
<b>-25.739</b> (24.918)	Hepatitis B (2017) -0.000 (0.001)	1.517*** (0.520)	-0.349 (0.299)	8.701** (3.576)	0.074

*Note:* \* prob. < 0.1, \*\* prob. < 0.05, \*\*\* prob. < 0.01; Robust standard errors in parentheses.

*Source:* Author's calculation based on Secondary data.

There is no evidence that increase in temperature significantly reduces COVID-19 CFR. This finding, however, deviates from the results obtained by Liu *et al.* (2020), Ujiiea *et al.* (2020), and Wu *et al.* (2020). One of the reasons of this deviation may be because of using

country annual average temperature data on 2018. The findings provide some support for the research question posed in the paper. First, some vaccines are important in reducing the fatality among COVID-19 infected people. It implicates that lower COVID-19 CFR is associated with higher vaccination coverage across countries irrespective of their level of development. Secondly, COVID-19 CFR increases with age. The higher fatality among the elderly may be because of low vaccination coverage, particularly 60 years and older.

At various times countries have established compulsory vaccination policies with the aim of reducing the risk of some diseases. But there are countries that have never adopted mass vaccination policies for all. Instead, they recommend vaccines to some specific groups of people, and in some countries vaccination is neither mandatory nor recommended. Thus measuring of immunization that is limited to vaccination coverage will be missing an important part of the story. An alternative regression is run using the average prevalence of disease(s) associated with each vaccine (see Appendix Table for more details).

Results are presented in Table 3. The average incidence of TB, mumps and rubella are found to have significant impact in reducing COVID-19 CFR. The results indicate that countries with either high BCG and MCV2 vaccination coverage, or higher incidence of TB, mumps and rubella disease have experienced lower COVID-19 CFR. There is no evidence that high incidence of Hepatitis B reduces COVID-19 CFR. The result is due to the fact that in countries with higher incidence of disease(s), more number of people receives medical treatment that may lower COVID-19 CFR. The relation between higher incidence of disease(s) and lower COVID-19 CFR may be conferred by either latent or previous disease infection.

**Conclusion:**

Since its outbreak, COVID-19 has spread rapidly posing serious threat to countries worldwide. However, without proven clinical treatment for COVID-19, enhancement of immune system may be a potential hope to fight against the pandemic. This study provides systematic evidence regarding the relation between immunity and COVID-19 CFR. The analysis, hence, indicates that the effect of the pandemic in terms of case fatality rate may be ease slowly through mass vaccination program and enhancing immunity. While the study analyses the impact of each vaccine separately and their associated diseases, there has also been a need to estimate the effect of multiple vaccines on COVID-19 CFR. Studies confronting the association between people who receive multiple vaccines and COVID-19 CFR may provide additional insight to overcome the severity of the pandemic.

## Appendix Table

Different types of Diseases and their Vaccines

Disease	Vaccine	Spread by	Symptoms
<b>Tuberculosis</b>	BCG (Bacille Calmette-Guérin) Vaccine	Air, direct contact	May be no symptoms, cough (sometimes blood-tinged), weight loss, night sweats and fever.
<b>Diphtheria</b>	DTP (Diphtheria, Tetanus, Pertussis) Vaccine	Air, direct contact	Sore throat, mild fever, weakness, swollen glands in neck.
<b>Tetanus</b>	Vaccine	Exposure through Cuts in skin	Stiffness in neck and abdominal muscles, difficulty swallowing, muscle spasms, fever.
<b>Pertussis</b>		Air, direct contact	Severe cough, runny nose, apnea (a pause in breathing in infants).
<b>Measles</b>	MMR (Measles, Mumps, Rubella) Vaccine	Air, direct contact	Rash, fever, cough, runny nose, pink eye
<b>Mumps</b>		Air, direct contact	Swollen salivary glands (under the jaw), fever, headache, tiredness, muscle pain.
<b>Rubella</b>		Air, direct contact	Sometimes rash, fever, swollen lymph nodes.
<b>Meningitis</b>	MCV (Meningococcal Vaccine)	Air, direct contact	Headache, fever and a stiff neck.
<b>Haemophilus influenzae type b</b>	HiB ( <i>Haemophilus influenzae</i> type b) Vaccine	Air, direct contact	May be no symptoms unless bacteria enter the blood.
<b>Hepatitis A</b>	HepA (Hepatitis A) Vaccine	Direct contact, contaminated food or water	May be no symptoms, fever, stomach pain, loss of appetite, fatigue, vomiting, jaundice, dark urine.
<b>Hepatitis B</b>	HepB (Hepatitis B) Vaccine	Contact with blood or body fluids	May be no symptoms, fever, headache, weakness, vomiting, jaundice (yellowing of skin and eyes), joint pain.
<b>Influenza (Flu)</b>	Influenza Vaccine	Air, direct contact	Fever, muscle pain, sore throat, cough, extreme fatigue.
<b>Polio</b>	IPV (Inactivated	Air, direct contact,	May be no symptoms, sore throat,

	Polio Vaccine)	through the mouth	fever, nausea, and headache.
<b>Pneumococcal Diseases (like Pneumonia)</b>	PCV (Pneumococcal Conjugate Vaccine)	Air, direct contact	May be no symptoms, Pneumonia (Infection in the lungs).
<b>Rotavirus infection</b>	Rotavirus (RotaC) Vaccine	Through the mouth	Diarrhea, fever, vomiting

**Source:** Centers for Disease Control and Prevention (CDC) & World Health Organization (WHO)

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## **A STUDY OF IMPACT OF COVID19 ON RETAIL INDUSTRY IN INDIA**

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### **Abstract:**

Growth in India's retail industry is skyrocketing, and new malls and shopping centres are springing up all throughout the country, not only in the megalopolises and other large urban areas but in the interiors as well. Investment and progress in the Indian retail industry have been positive. E-commerce has been a lifesaver for businesses during this epidemic. This paper discusses the various challenges faced by retailers during Pandemic. Further it also presents opportunities for retailers during pandemic. The retail industry in India is very adaptable and must constantly adapt to survive. Because of the pandemic, both the organised and unorganised retail sectors have been hit, and now is the moment for them to reevaluate their operations. Pandemic has offered methods to essential goods merchants to establish a novel strategy, implementation of technology, operational adjustments, etc., to remain in the business, while having a significant influence on the non-essential goods retail sector. Automation and digitalization like bar-coding system should be adopted for easy flow and location of goods in transit.

**Keywords:** Covid19, Pandemic, Impact, Retailers, Challenges, Opportunities

### **Introduction:**

The retail sector in India is one of the world's fastest-growing markets. It is no surprise that India has quickly become one of the world's most popular shopping destinations, ranking fifth biggest overall. Growth in India's retail industry is skyrocketing, and new malls and shopping centres are springing up all throughout the country, not only in the megalopolises and other large urban areas but in the interiors as well. By 2024, the percentage of purchases made on the Internet is projected to rise from the current 4.7 percent to 10.7 percent. India Ratings and Research (Ind-Ra) forecasts a 10% Year-over-year growth in financial year 2022 for organised domestic food and grocery stores. Mobile shopping, which is estimated to rise at a CAGR of 21% over the next four years, would be a major contributor to the 84% expansion in India's e-commerce market to US\$ 111 billion by 2024 (IBEF, 2022).

Investment and progress in the Indian retail industry have been positive. E-commerce has been a lifesaver for businesses during this epidemic. With the epidemic beginning to abate, the future of the Indian retail industry is looking bright.

The country's e-commerce sector is growing rapidly. Increasing product variety at ever-decreasing prices is what customers like most these days. The expansion of the organised retail industry in India may be attributed to a number of causes, including the country's growing economy, shifting demographics, rising disposable income, rapid urbanisation, and varying shoppers likes and preferences. This paper discusses the various challenges faced by retailers during Pandemic. Further it also presents opportunities for retailers during pandemic.

### **Review of Literature:**

Debnath (2020) in her research aims to examine how the pandemic has affected retail consumers' spending habits by looking at how the scenario has affected their knowledge of shopping options, their use of online services, and the steep increases in the prices of many goods. The results of this research suggest that although demand is growing for online services, meeting that need requires strict adherence to standards of both timeliness and cleanliness. Maintaining a positive rapport with customers requires that online orders be delivered promptly. Rajalakshmi (2020) On the basis of consumer opinion, the author of this article examines how COVID 19 would affect the essentials market and the non-essentials market. While this covid-19 had a profound effect on the non-essentials retail industry, it provided essentials merchants with insights about how to adapt to the changing retail landscape through strategic and technological innovation. Whether its impact has been beneficial or bad, COVID-19 has undoubtedly contributed to the development of novel elements within the retail sector.

According to Dholakia (2020), consumers' priorities have shifted dramatically after COVID-19, with more money being spent on necessities and less on less essentials and costly goods. According to Sheth (2020), there were numerous significant and immediate repercussions of the epidemic on consumer behaviour. When customers were put in a bind, they adapted by adopting new practises, such as shopping online instead of going to a physical store.

### **Objectives of study:**

1. To discuss the impact of Covid19 on retail industry in India.
2. To know the challenges faced by retailers during pandemic.
3. To know the opportunities for retailers during pandemic.

### **Research Methodology:**

This study is descriptive-analytical which is based on secondary data like journals, annual reports, newspaper etc.

### **Impact of Covid-19 on retail sector**

Due to a combination of causes, including the lockdown, the retail sector in the country has been thrown into a black zone by the effects of covid-19. The results are devastating for both India's organised and unorganised retail sectors. India's GDP growth rate has slowed as a result of the altered forecasts of global financial institutions. The demand, manufacturing, and operations, and supply chain of India's retail industry have all been adversely impacted. Indian retail industry is one of the cornerstones of Indian economy; it employs over 40 million Indians. As a capital- and labor-intensive industry, retail is particularly vulnerable to disruptions, which may have far-reaching effects on the economy and the jobs market. Part-time, low-wage workers are overrepresented in the retail sector, and the absence of social protection measures has exacerbated the social effects of the retail industry's problem.

The retail business has seen a switch in the customer behaviours and general lifestyle. Consumers have a greater awareness of health and safety issues and a greater aversion to crowded areas as a result of Covid-19. Customers no longer go out to physical stores but rather purchase from the comfort of their own homes while using contactless payment methods.

### **Challenges faced by retailers during pandemic**

Epidemic has forced retailers to make adjustments to their business strategies and put them in the path of several adversaries. These are only few examples of the difficulties that stores confront today:

Since the lockdown began, the economy as a whole has slowed down, and businesses across the board have seen a decline in customer traffic and sales. Similarly, consumers' spending habits have shifted, with an expected drop of 25-30% over the following 6-9 months. Fears of sickness, loss of income, and job security have all contributed to a general drop in consumer confidence as a result of the lockdown. In a recent shift, customers are now less likely to shop at many stores, even for necessities. Due to transportation constraints imposed during a lockdown, however, individuals choose to shop at stores directly in their immediate vicinity for necessities rather than go out to their typical shopping hubs. This has cleared the path for customers to utilize/change over to private labels, since private label products are being sold in greater quantities at smaller outlets.

The merchants have to adapt themselves in the style of operating their business. Organized merchants have to handle the supply chain interruptions, limitation in the traffic of the shops owing to the social distance, cleanliness improvements according to the local administration, and decrease in promotional activities so as to prevent crowding.

Losses were incurred by all but since the stores were forbidden to offer the luxury items that would have provided them with a greater profit. This covid-19 affects the fiscal year 2020 as the retail stores have a tradition of holding clearance sales in the month of March.

Consumers who are committed to a certain brand because they perceive that brand to be superior in terms of quality, service, product or experience compared to competitors is said to be loyal to that brand. Brand loyalty was affected to large as a result of lockdown restrictions. Further, Problems with stock and product deliveries have plagued merchants.

The Indian retail sector is beginning to acknowledge that a lack of sufficient facilities is a major obstacle or challenge. Basic amenities, delivery services, sanitation, a lack of modern energy sources, etc. are just the tip of the iceberg of the problems developing nations face. The critical role that infrastructure had in fostering sustained investment and growth in the country's thriving retail sector is now recognized. Incompetent distribution channels are particularly challenging to manage and may result in enormous losses, making this the biggest obstacle for Indian merchants whereas industrialized nations have constructed the correct distribution systems.

### **Opportunities for retailers during pandemic**

Despite the increased dangers posed by COVID 19, the retail industry has been presented with an opportunity to adapt to new customer expectations:

Online shopping has seen a dramatic increase in popularity as a result of the pandemic, at the expense of traditional storefronts. So, conventional and well-organized shops need to discover a way to offer their wares online without driving clients away from their brick-and-mortar locations. Merchants in both the first and second tiers of cities are increasingly turning to messaging apps like Whatsapp and Messenger to conduct business and accept payments from customers, who in turn may use services like Phonepe etc, and so on.

Middle class family of India representation in organized retail is quite high and they have an adverse effect owing to this lockdown and. To assure their continuity in the industry, merchants might aim for decrease in pricing and also value and selection. Instead of focusing on high-end items, merchants must prioritize those with lower premiums.

### **Future of retail sector**

Omni- channels will be prevalent. Customers in the post-pandemic period require adaptability even more than before. To properly serve customers, a store has to be available whenever and wherever they want to interact with the brand. A store's high brand recall value generated by its physical location is what drives its online presence, while the online store's ability to reach customers regardless of where they live, their willingness to share personal information, and their level of engagement with the brand are what make it successful. Quick gratification is highly valued by consumers, especially millennial. Having proximity presence to the client, resolves work better in terms of unit economics in the long run. The only kind of retail to show growth in the aftermath of the epidemic is the convenience store, which has had a renaissance in recent years. To be successful or even to break even, retail stores must minimize overheads and become technology dependant in all elements of their organisation.

### **Conclusions:**

The retail industry in India is very adaptable and must constantly adapt to survive. Because of the pandemic, both the organised and unorganised retail sectors have been hit, and now is the moment for them to reevaluate their operations. Pandemic has offered methods to essential goods merchants to establish a novel strategy, implementation of technology, operational adjustments, etc., to remain in the business, while having a significant influence on the non-essential goods retail sector. The globe has seen significant transformations as a result of covid-19. It has repercussions on the populace's standard of living and economic well-being. India's retail industry, both formal and informal, has been hit hard by the country's ongoing financial crisis. Covid19 has a significant effect on retail sales, especially of luxury goods. Many people had stocked up on necessities from surrounding supermarkets and small Kirana stores, making them the apparent winners of this epidemic. Digital purchasing and payment have become the norm in the wake of COVID-19, which has been embraced by both customers and merchants in India. The pandemic has presented several difficulties for today's retailers while also opening up new doors for its more conventional counterparts.

### **Recommendations:**

1. The unorganized retailers should start their own mobile applications to retain customers.
2. Tax relief should be given to increase the spending.
3. Automation and digitalization like bar-coding system should be adopted for easy flow and location of goods in transit.

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## **RE-DEFINING SURVIVAL OF LABOUR IN A POST-COVID NEW WORLD ORDER**

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### **Abstract:**

The COVID-19 pandemic has changed the world of labour. Millions of workers have lost their livelihoods, and many more – especially women in the informal sector, have become vulnerable. As with so many aspects of this pandemic, the impacts are falling disproportionately on those who were already in precarious circumstances and who can least absorb the additional blow. This is true, especially among smaller enterprises, where millions of workers are vulnerable to income loss and layoffs. The impact on income-generating activities is especially harsh for unprotected workers and the most vulnerable groups in the informal economy. In developing countries like India, hard-hit sectors have a high proportion of workers in informal employment and limited access to health services and social protection. Without appropriate policy measures, workers face a high risk of falling into poverty and will experience more significant challenges in regaining their livelihoods during recovery.

The pandemic has increased economic insecurity, disrupted supply chains, and halted manufacturing. Tightening credit is constraining financial markets in many countries. Public budgets are straining to keep up. When these and other factors result in losses in household income, expectations that women and children contribute financially can intensify. More women and children could be forced into exploitative and hazardous jobs. Those already working may do so for long hours or under worsening conditions. Gender inequalities may grow more acute within families, with women and girls expected to perform additional household chores and agricultural work. Another contentious issue for India is the reform of labour laws, perhaps to match the times. Although the new labour laws make doing business easier, workers have been urging caution since significant changes could leave them at risk. Many new labour laws violate rights, such as working hours, hiring, firing, etc. This aggravates the risk and vulnerability of the labour force.

Under the above circumstances, this paper attempts an analysis of labour's survival in a post-Covid New World Order. It begins with a historical perspective on labour. It then goes on to

explore the changing labour scenario in a post-Covid world where the risk and vulnerability of labour have increased manifold. Women and children, who work in the informal sector, are most exposed to such transition—the paper relooks at the post-Covid labour scenario from a gender perspective. The paper also attempts to understand the increase in the risk and helplessness of labour under labour reforms initiated in the country. It tries to assess the exposure of labour in a new world order with reduced labour rights, a large informal sector, and a gig economy where uncertainty in livelihood becomes a new normal and prescribes an inclusive approach involving a collective role of the public and the private sector.

**Keywords:** Informal Labour, Covid-19, Vulnerability, Gender

### **Introduction:**

Social, political and economic transformations are potent forces that impact many aspects of our lives, including the world of labour, where labourers are often forced to take drastic steps to adapt, to remain competitive and survive. Covid-19 has produced fundamental changes in work, work practices, and the relationship of workers to co-workers, companies and localities. To reduce the effect of covid-19 and protect the health of labourers, the government has adopted remote work arrangements, social distancing measures, staggered working hours and other methods. Those practices were widespread but not uniform in their adoption and training across labour markets in India. Labourers engaged in physical world activities must maintain their physical presence at work, thus exposing them to more significant health risks.

Over the years of the pandemic, the government has introduced curfews, locked down, physical distancing, quarantine, and other isolation measures of varying degrees as the virus spread across the globe. Under the above circumstances, the paper aims to reflect on the coronavirus's impact on labour and their struggles in India. In addition, to measure the economic, social and humanitarian crisis, the perspective and debate in India enable the impact of Covid 19 on labour to be examined in a contest where 90 per cent of the working population are employed in the informal sector and, where judicial and institutional boundaries of many of the labouring activities as well as distinctions between productive and reproductive activities have always been inherently blurred. From this perspective, the “survival of labour” unfolding in response to the pandemic appears differently. Covid 19 has worsened the material condition of labours in India and resulted in an “increase in trafficking, bonded labour and slave-like working conditions. It has further widened inequality between the rich and poor” (Sinha, 2020a).

### **Impact of Covid-19 on informal labour**

In this section, the probable consequences of the lockdown on the informal sector in India have been assessed by bringing out both short and long-run effects. According to the Centre for

Monitoring Indian Economy (CMIE), around 122 million people lost their jobs in April 2020 alone. More than half of these were small traders and wage labourers, mainly in the informal sector (Thomas, 2020). Estimates from the Periodic Labour Force Survey (PLFS) 2017–18 showed that of 471 million workers, nearly 21% were self-employed. Casual labourers in agriculture were estimated at 50 million and 64 million in non-agriculture in 2018. Thomas computed the labour share of income in the GDP at 30% in 2018. Extrapolating from the 2018 figures, Thomas made a bold estimate of a loss of Rs. 4 lakh crore of income among the vulnerable workers in the two months of lockdown since 25 March 2020 (Thomas, 2020). Further, according to Pranob Sen, Chief Statistician of India, unemployment rates are expected to rise to 8.5% in the financial year 2021 (Suneja, 2020). The International Labour Organization (ILO) described it in its report as ‘the worst global crisis since World War II’. It is estimated that four in five people (81%) of the global workforce of 3.3 billion people are affected by the lockdowns in various countries. The United States, United Kingdom, Canada and most European and Asian countries are experiencing a rise in unemployment. The Head of the International Monetary Fund (IMF), Kristalina Georgieva, said the world is going through the worst economic crisis since the Great Depression in the 1930s. According to the ILO report, in India, more than 40 crore informal workers may get pushed into deeper poverty due to the COVID-19 outbreak and sectors such as hospitality and accommodation, retail and wholesale, business services, construction, and industry have suffered drastic consequences with a decrease in production and loss of hours and employment figures.

In India, the National Commission for Enterprises in the Unorganized Sector (NCEUS) observed that informal employment had been 98% in the agricultural sector, 75% in industry, and 72% in services (Sengupta et al., 2009). Much of the economic impact of COVID-19 on informal trading comes from the ‘aversion behaviour’. Aversive behaviour is people’s actions to prevent themselves from being infected with the virus, such as reduced going out and the government ban on ‘nonessential’ shops, etc. These actions affect all sectors of the economy and translate into lower incomes, both on the supply side (declining in production) and the demand side (reduced consumer demand). The closure of businesses resulted in lost wages for workers in many cases, especially in the informal economy where there is no paid leave. The lockdown has already started showing us the adverse effects on the casual sector workers. The exodus of migrant workers, as widely seen over social media and reported in various news reports, is the fallout of the crisis. India has about 40-50 million seasonal migrant workers who work in construction sites, factory production and service activities.

Since industries closed and the market shut, migrant workers ran out of work and returned to their native places. Some have died returning on foot because of Lockdown's unavailability of buses and trains. Some of the migrant labourers were trapped in areas of their work. It became extremely difficult for them and their family members to survive without work, income or savings. A recent study of migrant workers by the Delhi-based NGO Jan Sahas revealed that 90% of those polled had already lost their only source of income and that 42% had gone more than a day without food. A separate study of 11,000 workers discovered that 89% had not received payment from their employers during the lockdown, and 96% had not received food rations from the government.

### **Defining labour in the post covid scenario: some perspectives**

According to Marshall, “ Any exertion of mind or body experienced incompletely or wholly with a view to some good other than the pleasure deduced directly from work, is called labour ”. “Labour consists of all mortal sweats of body or mind, accepted in anticipation of a price”- Thomas. W. Arthur Lewis presented his model of surplus labour over fifty years ago (Lewis, 1954). More concerning is that development and economic growth in many countries, especially in South Asia and Africa, have been characterized by a rising dominance of the informal sector in urban areas. The rural poor have been moved from agriculture to working as construction workers and street traders in cities instead of being absorbed into large-scale manufacturing enterprises. Thus, segmentation in developing countries' labour markets continues to persist in rural and urban areas. Moreover, further formalization of the formal sector, notably through casual and contract labour, has resulted in newer forms of labour market duality in many developing and developed countries.

A key challenge witnessed in all developing and developed countries is gender disparities in the labour market. Women tend to be over-represented in informal and vulnerable employment as they face various barriers to accessing jobs in the formal economy (due to skills). For this reason, when women work, they are more likely to be family or domestic workers and less likely to work in the formal economy. Moreover, among the other factors, the persistent wage gap based on gender reflects the setbacks women suffer because they withdraw from the labour force to raise children. As discussed in ILO (2010), World Bank (2011), and other studies, several factors drive women's poor labour market outcomes, which include cultural beliefs and norms, illiteracy, dominance in the low-value segment of jobs, barriers to ownership of land and business and not enough support from government policies and programmes.

Every person in a democratic country enjoys the right to a life of dignity, which is lacking in labour in India. The ruling class frequently ignores the value of their work and claims

that the slight improvement in many workers' material circumstances is sufficient. Even worse, they depict this slight improvement as evidence of the effectiveness of the current unfair economic system, suggesting that the workers should be grateful for it. Equity does not rank highly in the contemporary economic philosophy that is prevailing. With COVID-19 as a pretext, state after state is repealing or weakening numerous regulations to support businesses, decreasing the little security there was for workers. There are at least 14 labour laws in Uttar Pradesh, including the Industrial Disputes Act and the Minimum Wages Act, which were suspended for three years to attract capital. Similar is the case in Madhya Pradesh and Bihar. A writ petition was filed by Harsh Mander before the Supreme Court requesting it issue a direction to the central and state governments to ensure minimum wages for all the migrant workers, to instruct the central and state governments to work on disaster management plans for dealing with the COVID-19 pandemic, or to pass any orders that the Court may consider appropriate. The Supreme Court of India issued an order dated 31st 2020, instructing the Center to ensure accessibility of necessities and medical facilities for migrant workers given the nationwide lockdown. Parameswaran Iyer, CEO of NITI AAYOG, said that the most adaptable species would survive the change rather than the strongest or most intelligent ones.

### **Survival of labourer in post-covid scenario**

To understand India's immediate response to the question of the survival of informal labourers, this section focuses on temporary relief measures that involve existing schemes, targeting the most vulnerable group.

The Indian government invoked social distancing and curfew in the country on 11<sup>th</sup> March 2020 based on the existing Epidemic Diseases Act of 1897. The Prime Minister of India, Shri Narendra Modi, announced a strict nationwide lockdown on 25<sup>th</sup> March 2020. The Indian government failed to pass any significant social policy legislation to ensure protection of the livelihoods of those in need. The Indian parliament was suspended for large parts of 2020. Not one piece of legislation was passed between 23<sup>rd</sup> March and 14<sup>th</sup> September 2020 (Government of India, 2020). The President of India has certain law-making powers to promulgate ordinances under such circumstances, as are granted by Article 123 of the Constitution of India. Laws thus enacted the bulk of the immediate social policy response for providing crisis relief on the recommendation by the Indian Union cabinet; similarly, state governments had used the executive orders for the same purpose (Joyita, 2020). Within existing welfare regime research, India has been characterized as having a "failing informal welfare regime" due to low social expenditure and poor social outcomes (Wood and Gough, 2006; Abu-Shark and Gough, 2010).

The Government of India responded with a set of temporary relief measures that broadly focused on food, security, and income subsidies, as well as housing schemes for the unorganized sector. All these measures used the existing welfare provision infrastructure, such as the Public Distribution System (PDS), the bank accounts opened up for the poor under the Pradhan Mantri Jan Dhan Yojana (PMJDY) scheme. In addition, several Indian states implemented ad hoc measures providing, for instance, additional compensation to poor workers (Uttar Pradesh, Odisha), transient inter-state migrants (West Bengal), social pensions (Delhi), food programmes at schools (Kerala) or for night shelters (Delhi). Twenty-four hours after the nationwide lockdown on 25 March 2020, the Indian government announced a relief package worth INR 1,700 billion. The relief package included the provision of free rice, wheat, and pulses for the next three months under the Pradhan Mantri Garib Kalyan Anna Yojana (PMGKAY – which translates into the Prime Minister’s Food Security Scheme for the Poor).

As noted by Benjamin and Mbaye (2015) there is a strong presence of females in the informal sector. About 60% of working women in the developing world are in the informal economy. Thus, the Indian government introduced Pradhan Mantra Jan Dhan Yojana (PMJDY) to provide temporary financial support to female users through existing bank accounts, including widows, the disabled and the elderly. A decision taken by the Indian government made sure that the scheme would provide free LPG (cooking) cylinders for three months from 1<sup>st</sup> May 2020 onwards (OECD, 2020) to around 83 million women.

The situation of Indian Labourers has changed significantly after independence. The literacy rate has increased along with better healthcare facilities. Child mortality has been decreasing while longevity has increased. Electricity and tap water are now available in most villages in India. This is because of the growth of GDP. Since 1950, the GDP of India has shown growth of 32.2 times and per capita income by 8.2 times, resulting in some fruits of development trickling down to the marginalized.

Expectations can't be made regarding things returning to their normal pre-pandemic state even in the medium run when the pandemic subsides. Despite much discussion on the actions of policy, developing countries like India undertake to lessen the economic costs of the pandemic. In reality, some middle-income ‘emerging’ countries came up with the required infrastructure; few have the means to afford prudent and meaningful policy action. Some countries are expanding social safety nets by offering tax relief measures, guaranteeing credit, and strengthening health care systems. But government agencies were required to take adequate actions efficiently to implement these measures. Several state governments in India have taken immediate actions to support the poor, women informal workers, the elderly, the disabled,

construction workers, and migrant workers. The government provided compensation for their daily wage, welfare pensions, employment guarantee programs, free food distribution, MSME loans etc., to mitigate wage loss due to the disruption of economic activities during the nationwide lockdown. The government ensured the presence of resilience, inclusion, and sustainability while formulating the policy for labourers in India.

### **Withering of labour rights: Can the labour survive?**

The world of labour has been severely affected by the global Covid-19 pandemic. The pandemic has threatened both public health and long-term livelihoods and well-being because of social and economic disruption. There is a huge variation of income groups across the country and their response to recovery packages to mitigate labour market damage.

The future of work is here, and more hybrid working patterns are likely to emerge with higher take-up of remote working levels than before the COVID-19 crisis. There was a fundamental change in the way people work and shifted towards a new digital trend post-pandemic. This will challenge the existing working patterns and models, which include national systems and the fundamental rights of Labour, which will cause detrimental damage to Labour's basic rights, working conditions, remuneration, working hours, work-life balance, health and safety at work, and gender equality. The constant pressure on workers to be available at any time can often be further aggravated if the organizational culture at work incentivizes employees to accept heavy workloads and overtime, often unpaid. This will affect the work-life balance, resulting in conflicts between work and home, inadequate rest and health-related problems such as work-related stress and sleep disorders.

In India, around 90 per cent of the workforce belongs to the unorganized or informal sector, and almost 50 per cent of the national income comes from this sector. Since the liberalization policies of early nineties, the formalization of jobs has become a matter of concern. An informal economy has emerged due to increasing market opportunities, greater competition, and scarcity of resources. A growing percentage of the population is now living in working poverty as a result of the informal sector's dominance, which has caused the advantages of economic growth to be concentrated among a small number of people.

Previously, in order to request leave, an employee had to have worked a minimum of 240 days in a calendar year. Employees are now only required to work 180 days a year; after 180 days, they are eligible to request and take a day off. The rule of one leave per 20 working days is still in place. The four-day workweek may soon become a reality thanks to the new labour laws, causing a stir in the media. Instead of the current working culture, which requires five working

days per week, stories explore how employees might be entitled to three paid weekly offs if they choose to work just four days.

But these codes have a lot more parts that need to be understood in addition to how they are implemented. Every establishment adheres to a set of guidelines outlined by the registered labour acts governing it. Do all of these actions permit the same amount of hours to be worked over a four-day workweek as they would over a traditional five- or six-day week? Let's examine each of these behaviours in more detail. The laws regarding work hours overtime pay, and weekly off as per each state's Shops and Commercial Establishment Act would apply to businesses registered under that state's Shops and Commercial Establishment Act. However, no adult worker must be permitted to work longer than nine hours on any day and forty-eight hours on any week for organizations registered under the Factories Act and abiding by the guidelines.

The definitions of all three in the new regulations appear to overlap, which might have an impact on how the principles are applied in the future. For instance, an Uber driver operating without a letter of employment, with unregulated hours, etc., shows that there isn't a "typical employer-employee relationship," thus fitting the criteria of a gig worker. However, they are hired and employed by Uber with the "Uber app," an online platform, which turns them into a platform worker. As a result, it is unclear how each would implement the particular schemes. Benefits and rights for such workers are not explicitly defined in the Code on Social Security 2020. It does not offer a platform for compliance or a uniform registration process for all employees. The Standing Committee proposed that "minimum entitlement" be provided for construction and unorganized employees across several states to enable portability, but it never materialized. We should think about implementing what the French entrepreneur Nicolas Colin calls "a new social contract" that would protect workers from the new risks of the day. For example, it would be impossible to rent housing in cities if your income comes from gig platforms. You would also have access to loans when and where you need them, not necessarily to buy a car but rather to learn new skills when it's time to move on.

Organizations cannot require their employees to work four days a week without compensating them overtime for the extra work hours because the weekly working hours are still forty-eight hours, and the amount of overtime is only one hundred and twenty-five hours every quarter. Therefore, a four-day workweek cannot be implemented within the current structure of the S&E Act, the Factories Act, and the new labour standards. In Karnataka, the overtime limit is 125 hours every quarter. Therefore either one must be paid extra upon exceeding the allotted working hours for the day, or employers must cut working hours in a week (i.e., below the statutory limit) as a matter of policy. Otherwise, the government should change the Occupational

Safety, Health and Working Conditions Code, 2020 provisions to implement a four-day workweek.

A number of nations, including Spain, Japan, New Zealand, Ireland, Scotland, and Iceland, have already tried out the four-day workweek. However, doing so necessitated reducing the number of hours worked each week. Nothing in Indian law prohibits a company from lowering the amount of hours worked each week and implementing a four-day workweek. The Indian government may attempt to issue a suitable announcement to study the possibility of a four-day workweek on a voluntary and experimental basis.

### **A new world order for labour**

"Unorganized workers, gig workers, and platform workers are peas in a pod", not literally, but the problems they face are similar. Only about 8 % of the total employment in India is in the organized sector. In contrast, more than 90 % of the workers are engaged in informal sector activities or are involved in the unorganized sector, which is mainly outside the reach of any social security benefits such as medical benefit schemes, pension schemes, provident fund benefits, and suffers from many impediments in the form of limited access to institutional and other support facilities. They are dependent on various jobs due to the insecurity of work. Such employment depends on factors such as climate change, location, etc., forcing workers to opt for different work every 3-6 months. Article 23 of the Constitution of India prohibits employing workers for wages below the statutory minimum as it results in forced labour. The Supreme Court upheld the Labour right of the workers to immediately petition the government for the enforcement of their rights in accordance with Article 32 of the Indian Constitution. The Supreme Court extended the scope of Article 21 of the Constitution of India (Right to life) to include the right to livelihood and the "right to live with basic human dignity". Despite specific provisions, workers are not provided with the minimum wage per the standards, making their lives miserable and uncertain.

"Gig workers" and "platform workers" have been born in recent decades. To say crudely, the big corporations worked out a plan to bypass the labour laws globally and minimize their liability concerning the rights of such workers.

### **Conclusion:**

The Government of India has been unable to adequately address the social and economic crisis in India post-Covid-19, as there were insufficient safety measures to counter immediate social emergencies. In the absence of new legislative initiatives, the Indian government's strategy was to implement an extensive array of temporary relief measures by ordinances specifically targeting distinct groups, for example, "the poorest of the poor", elderly, widows,

disabled, farmers, construction workers, unorganized sector workers, and fishermen. Apart from the housing scheme (ARHC), no new longer-term plans have been developed directly in response to the global pandemic. Historically, India's categorization as a failing 'informal-insecurity' regime can be partially explained by the absence of workers' voices in shaping policies related to social welfare and employment-orientated productive skills.

We need better protection for workers in our new digital reality to ensure the well-being of all workers when they are not working—at home with their family in the evening, on leave or holiday—and during teleworking. While minimizing their detrimental effects on labour rights, these new working patterns and models should be viewed as a resource that helps both companies and employees. The Right to Disconnect, and proper legal frameworks for telework, should be seen as essential social policy instruments to protect workers' rights and decent working conditions in the future work post-COVID-19. Designing decent work in different sectors of the online gig economy would yield instructive results for comparison. Examining the challenges specific to women online gig workers is equally relevant. An exploration of decent work based on the skill level of workers would deconstruct the link between skills and precarity in online gig work. These questions will clarify and contextualize decent work for different segments of online gig workers.

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## **ADVANTAGES AND DISADVANTAGES OF IMPACT OF COVID-19**

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### **Abstract:**

The Covid-19 pandemic is a period during which people suffers so much. At some level it has its positive and negative impact. If we consider its positive effects, it provides work efficiency, keeps work-life balance and great work control. While its negative effects are home, office constraints, inadequate tools, loss in job, lives and economy. Main disadvantages for students' online class which affect the eyes of students, due to long hours in front of screen. Primary school and playschool children have low concentration power and do not have ability to sit for longer time. There are no exam, students are given marks by the internals. This may impact their career in the future. Covid-19 is an acute respiratory illness in humans caused by Coronavirus. It was originally identified in China in 2019 and became pandemic in 2020.

### **Advantages:**

In many cities around the world the streets are cleared of their cars, vehicles, factories have closed and many flights have been canceled. Playing an important role to drop down emission from toxic gases and improved air quality. The shutdown of most business and reduced use of public transport decreased in electricity consumption that decline production of thermal and nuclear power station and increase renewable energies in electricity. Covid-19 has a positive indirect effect on environment, improving air quality by reducing greenhouse gas, emission such as sulfur dioxide, nitrogen oxide, industrial limitation during covid-19 are the main cause of reduction in air pollution. During the lockdown, air quality in all countries of the world has improved due to strict restriction and adaptation of quarantine measures and traffic control. The reduction of industrial activities has decreased energy consumption all over the world reduce environmental pollution during the period of Covid-19. In education system due to spread of virus the traditional teaching method was replaced by online teaching that stimulates student learning during this critical time. Such distance courses are more flexible and more suitable for students with physical disabilities as they only require reduced mobility. The spirit of engagement and self-exploratory learning could gradually develop through this new educational technology.

**Disadvantages:**

Covid-19 has affected day to day life and come down the global economy, business disrupted the world trade and movement. Most of countries slowed down their manufacturing of the product, patients with other diseases and health problem are getting neglected. Poor cash flow in market was observed. It also has great affect on social life mostly peoples avoid national and international travelling, disruptions of celebration of cultural religion events. It crated social distancing with our peer and family members. It became life dull due to closer of hotel, restaurant religion places, movie, play, theaters. Sports, club etc. The Covid-19 alter the direct interaction between human and nature. The gradual spread of Covid-19 and insufficient capacity hospital has led to the growth of home are which came a major source of waste contaminated with the virus and disruption of municipal solid waste management water quality became declined through stools of people infected with this virus high consumption of detergent int the period of Covid-19 allow the transmission of organic and metallic compound in domestic water and degradation of the water quality. During crises of Covid-19 the single use of protective equipment causes a massive pressure and significant challenges in the waste management sector. The daily life style and eating habits of the majority of people have undergone a drastic change due to consumption of food during this pandemic period. The rapid spread of the Covid-19 has led a high deathrate and negative impacts on mental health. Therefore, the symptoms of distress, depression, anxiety, frustration and suicide cases increase during Covid-19 pandemic. Educational section was so much affected due to engagement and learning process through new educational technology. First low-income school have not been able to gain access to online education solution. Second the lack of follow up and supervision by some parents make learning more complicated in children, whose social and economic situation does not allow them to purchase online learning devices. Poor internet connectively creates big problem in communication between teachers and their students. The global health crises of covid-19 has created social isolation where citizen of different countries are prohibited from going out and carrying out their usual activities and harming the global economic situation.

**Conclusion:**

The Covid-19 pandemic dramatically changed people whole break down the back bone of any sector either it is Government level or at personal level. All the peoples suffer so much as social, economically, business, environment and communication, education, tourist acitivity, health problem, employment etc. The environmental situation have remarkably influence due to reductions in transport and mobility have reduce greenhouse gas emission.

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## **IMPACT OF COVID 19 ON THE EDUCATIONAL ECONOMY OF INDIA**

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### **Abstract:**

Education is very important in life. Education is also helpful in Economic development of India like in Human capital formation, Increase in productivity, employment rate, awareness, educational jobs and many more. Covid-19 results in the close down of schools and colleges in India which hampered Indian economy. This pandemic not effects India but all other countries of world is effected by this pandemic.

**Keywords:** Productivity, Human capital Formation, Unemployment, Less Technology in rural areas, Dropouts, Physical health, Impact on labor, Revenue

### **Introduction:**

These pandemic effects both developed and developing countries in world. Indian Government spend 3 to 4 percent of revenue to Indian education before COVID-19 situation. This revenue is decreased during COVID-19 situation by Indian Government. From education point of view Fiscal deficit was faced Indian Government during COVID-19. Now we will discuss the key words of impact of COVID-19 on economy Indian education.

- **Productivity of India**

In India every should get education through which people will be educated and produce for Indian economy for its development but in COVID-19 productivity leads to great fall down as students are not able to go school which leads to loss of education and less productivity in India which hampers Indian economy and education.

- **Human capital formation**

If students will get less education its leads to less formation of human capital. If there is a less formation of human capital it will effects the Indian education and the economy of India. If we want to develop our nation there is a need of Han capital formation but COVID-19 effects the formation of human capital.

- **Unemployment**

During the time of COVID-19 many private school teacher are not able to go schools and leave their job which effects the Indian economy. In COVID-19 the unemployment rate is 8-9 percent in India which effects the Indian education economy. Teachers who are new to schools leave the leave the school or jobs which effects the Indian education economy. The unemployment during graduate's students during COVID-19 is 17-18 percent in India.

- **Less Technology in rural areas**

Technology is very important in today's life. During the time of COVID-19 technology play's an important role for development of Indian economy. Technology is used during COVID-19 situation in education. In India people uses laptop and Mobile phones but students who have less access to technology are not able to get education which results in loss of education and leads to unemployment in Indian economy.

- **Dropouts**

COVID-19 situation leads to many dropouts of students which leads to loss of education. It happens because of financial condition of their parents. If there is more dropout it will impacts Indian economy because school are not able to get fees from students and impact Indian economy. In 2020-21 the dropouts of students is 19 percent in boys and in girls it is 15 percent.

### **Physical health**

Physical health is very important in life. It leads to fitness is person and have less stress to. Person will avoid many disease if he is physical fit and healthy. Due to COVID-19 people or students do less exercise through which they are not physical health . If teachers are not physically healthy then they will produce less for country and less human capital formation in Indian economy.

### **Impact on labor**

Due to the closer of schools in India it impact the productivity of labor. Females are participating or working in schools but it leads to decreased in female partycipation in schools and impact their children because they are not getting salary in schools.

### **Revenue**

Revenue is very important in education it leads to the development of schools and colleges. In COVID-19 Government of India is not able give revenue to schools as government is facing fiscal defecit.

### **Physical fitness**

Due to COVID-19 people are not physically fit. Laziness increased in students due to which they are not physically appearing in the schools and colleges which effects their education.

### **Conclusion:**

COVID-19 effects all the world through which the economy of the country come down. This shows the immediate great fall down in each sector of the economy and weak the economy of the country. Many people left their jobs in COVID-19 which effects them. Through this the people are not able to survive themselves also. Everything in the world is close down and online system starts which effects the physical fitness of the people. To overcome from COVID-19 people should follow guidelines as provided by government.

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## **IMPACT OF COVID-19 ON MENTAL HEALTH OF PRIMARY SCHOOL STUDENTS**

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### **Abstract:**

The paper presents the most comprehensive and large-scale study to date on how students perceive the impacts of the COVID-19 crisis in early 2020 on various aspects of their lives, particularly on mental health. With a sample of 120 primary school students from entire India, the study reveals that amid the worldwide lockdown and transition to online learning students were mostly not satisfied with the kind of environment they were forced to live in because of the pandemic. Still, some of the students were happy, especially those in urban areas who were staying home and were getting whatever they needed and were not forced to go to school. Students were mainly concerned about issues like physical fitness, playing and going for holidays, friends, classroom environment and studies, and they were even experiencing boredom, anxiety, and frustration. The pandemic has led to the adoption of particular hygienic behaviors (e.g., wearing masks, washing hands) and discouraged certain daily practices (e.g., leaving home, shaking hands). Students were also more satisfied with the role played by the schools for providing them whatever they could to a huge extent and were happy giving their exams in the online mode. The findings also show that some of the students were significantly less satisfied with their academic work/life during the crisis. The findings also show that female students were more willing to go to school and live their normal life i.e. before lockdown life.

Findings from the study show that the circumstances created by COVID-19 have caused a great deal of concern among students, parents and teachers about assessment, distance learning inadequacy, and student overload. Opportunities to advance the quality of education, the support of teachers, parents, and families, coupled with practical suggestions for parties involved in the field of education are also included.

**Sample:** 120 primary students from all over India both male and female.

**Keywords:** COVID-19, online learning Challenges, mental health, self esteem.

## **Introduction:**

Health is basically a condition of good physical, mental and social condition along with the absence of any disease. Good health is an important element of life for adequate and long lasting functioning of an individual and a society. Health is an important aspect in an individual's life so as to carry out day-to-day activities. If an individual is physically not well then it would be equally difficult for him or her to survive. In the 21st century, the medical team is focused on the health problems of a person as a whole. Good health is the main need for a balanced relationship between mind, body, and social and physical environment. There's a saying "A sound mind lives in a sound body" which clearly indicates that health is more valuable than wealth. A poor man with good health is much much happier than a rich man with poor health. It is not wrong when we say that physical fitness is the sole reason for staying healthy. Physical fitness contributes in both physical as well as mental wellbeing of an individual. It is equally important for us to maintain a healthy living by performing all those exercises, yoga, walk, etc. (here with exercise i doesn't mean intense gym workout etc.)

There's a direct relationship between a positive attitude and better relationships, superior health, and greater success. The positive thinking that typically comes with optimism is a key part of effective stress management. A positive attitude boost's our energy, heightens our inner strength and even inspires others. Positive and optimistic people tend to live healthier lifestyles, they do more physical activity, follow a healthier diet, and don't smoke or drink alcohol in excess.

Mental health is defined as the condition in which an individual knows his/her abilities, overcomes normal stress in his/her life, etc. High levels of mental health are associated with increased learning, creativity and productivity, more prosocial behavior and positive social relationships, and with improved physical health and life expectancy. Mental health challenges are often extensive, impacting many developmental outcomes. Poor mental health can have several detrimental effects on children and youth. Not only can it impact academic performance and success, but it may also interfere with social relationships and physical health. Mental health is important for our collective and individual's ability to think, interact, and enjoy a good and a healthy living.

Factors such as social, psychological, and biological factors are responsible for the level of mental health of an individual. For social factor whenever there is any kind of continuous excessive stress, social discrimination, etc. for psychological factor there may be some personality

triats etc., for biological factor genetics, are some of the reasons that lead to poor mental health of an individual.

According to one of the surveys conducted in America in 2015 found that students with psychological distress received lower grades, and even they felt it difficult to complete their course and many more. Students with poor mental health show some of the symptoms such as, restlessness, having short attention span, being distracted and facing difficulties in remembering simple normal information. Education professionals have recognized the impact that a student's mental health has on learning and achievement, and they realize that there's a great deal that can be done to help students with mental health issues. Poor mental health also leads to poor interpersonal skills, which makes it difficult for the student to interact with the people, with friends, with teachers and others.

This Covid-19 has affected the life of all the individuals whether that be a child or an adult. A businessman or a school going student. It has very badly affected our physical, mental health, which has led to a lot of psychological problems such as frustration, stress, depression, etc. socially students are also emotionally damaged because of the lockdown. Learning not only depends upon teaching, interaction is also an important part which is totally missing due to this pandemic. Many psychologists and behavioral therapists have emphasized depression, fear, panic, anger, isolation and so on caused by censorship and social distance.

In this research paper we'll analyze all the potential consequences of COVID-19 on the health of primary school students. From this paper first we'll be focusing on the impact of covid-19 on students as a whole and then later we will focus on its impact on education especially for the primary students. We will even analyze how to make students mentally and physically healthy and the ways to overcome them.

### **Mental health**

Mental health challenges are often pervasive, impacting many developmental outcomes. Poor mental health can have several detrimental effects on children and youth. Not only can it impact academic performance and success, but it may also interfere with social relationships and physical health.

Children who suffer from mental illnesses are at greater risk for adult onset physical health problems such as heart disease, diabetes, and cancer. They are also more likely to be involved in the criminal justice system. There is no health without mental health. That is, if our youth are not mentally well, they will not be physically well and their ability to positively impact our society will be impaired. Despite an increase in the availability of mental health resources

such as counseling and various treatment options, rates of mental health issues such as anxiety and depression continue to rise.

Mental health issues in children can be difficult for parents to identify. Not only do many parents not know the signs of mental illness, but changes in behavior are normal in growing children. It's difficult to say whether certain changes should be attributed to normal growth and development or whether they might.

Children can be affected by the same mental health issues as adults, though they typically express them in different ways. For example, an adult with depression may have trouble concentrating or enjoying activities they once enjoyed. In children with depression, irritability is a more common symptom than sadness. Children are also more likely to display behavioral changes as a manifestation of mental issues. For many children, these come out in the form of behavioral issues like oppositional defiant disorder (ODD), conduct disorder (CD), or obsessive-compulsive disorder (OCD).

Some of the most common signs of mental health issues in children-

- Changes in mood (ex: feelings of sadness, withdrawal, or mood swings).
- Intense emotions (ex: overwhelming fear, angry outbursts, extreme anxiety).
- Changes in behavior (ex: out of control behavior, frequent fighting, using weapons).
- Difficulty concentrating decreased performance in school.
- Unexplained weight loss or changes in appetite.
- Physical symptoms such as frequent headaches or stomach aches.
- Self-injury or self-harm, such as cutting or burning and attempted suicide.
- Substance abuse, using or abusing drugs and alcohol.

Unfortunately, these signs are not always easy to identify. In fact, your child could hide some of these symptoms from you if they are worried or ashamed. It is then your job to read between the lines and to see what is really happening.

### **Research analysis**

A survey was conducted where almost 120 primary school students from all the states of India volunteered. Female participation was more i.e. 72% approximately as compared to the male participation i.e. 28% approximately. A set of questions were prepared using the Google form and was circulated amongst the students of the required age group. Some telephonic interviews were also taken of approximately 12-15 students. Most of the participants were from urban areas i.e. 70.8% and others 29.2% were from rural areas.

From the survey it was found that most of the students i.e. 56.6% didn't feel sick (i.e. suffering from any of the disease like cold, cough, fever, etc.) during the pandemic whereas 17% did feel sick and the remaining 26.4% were not sure about the same. Which shows that the physical health of some of the students was good and were even taking healthy diet and proper precautions whereas others they might not be doing as exercise or anything so as to make them fit and engaged which made them more sick and might be suffering from the mental health issues and won't be able to co-operate with sudden lockdown or they might be too much busy and were very much burdened with the in their online classes because of which they weren't able to take care of their daily routine.

Students were forced to have a sitting of about 4-5 hours and to attend their respective classes as mentioned in the timetable. Earlier during the traditional teaching days, they were asked to sit but at the same time they were provided with the free extra activity period like dance, music, painting, IT, skating, etc. Which was very much helpful for the students so as to make them relaxed. Whereas during the pandemic they weren't able to do as such. Students started spending most of their time watching television, playing mobile games, and video games. The students were not able to sit and concentrate for more time. Approximately 67% of the students agreed that they were facing a lot of problems concentrating while studying. They were easily distracted.

Whereas on the other hand the students were very much concerned about the COVID pandemic as well. They followed all the protocols, rules, and even asked their family members to do the same. They tried to help the needy and were even contributing a lot in the household chores. They obediently agreed to whatever they were asked to do.

The study also showed that some of the students were not social and didn't make or meet any of their friends. They didn't have any friends. During the pandemic everyone was asked to stay home students, business men, etc. they all were forced to stay home isolated. This has contributed a lot to the mental health problem which is faced by every 2nd person we meet.

Friends, society, environment, parents, etc contribute a lot in the children's upbringing. Each and everything is important so as to make them a good human being. Students with no friends are likely to be more prone to stress, depression etc.

Staying at home made the students more bored and lonely so as to come out of this boredom they started indulging in elderly talks. The students started showing more interest and were interfering in the elderly talks which is not a good thing.

It was also found that some of the students started showing more aggression, they started fighting, shouting, screaming, etc. this may be because of loneliness, stress, depression. The students have started making a negative image of themselves in their mind. They have developed a very low self-esteem because of the pandemic, isolation, etc. Approximately 40-45% of students were having very low self-esteem. Which creates anxiety, stress, loneliness, and increased likelihood of depression and even seriously impair academic performance. Self-esteem impacts our decision-making process, your relationships, your emotional health, and our overall well-being. It also influences motivation, as people with a healthy, positive view of themselves understand their potential and may feel inspired to take on new challenges.

### **Steps to overcome the mental illness**

Here are some of the most effective treatment options for children with mental health issues:

- 1. Psychotherapy** – Also known as talk therapy, psychotherapy is one of the most effective forms of treatment for mental health issues in general, not just for children. The goal is to teach your child how to understand their mental challenges and to teach them helpful ways of dealing with those challenges. Even if you don't directly participate in your child's sessions, your child's therapist will want to work with you to make sure your child is getting what they need.
- 2. Medication** – Medication is not the preferred first option for the treatment of mental health disorders in children, but it is warranted in some cases. Depending on what your child is struggling with, your pediatrician may prescribe antidepressants, stimulants, mood stabilizers, or something else. It is your job to make sure your child takes the medications in the proper dose at the proper times, though you should also teach your child how to manage the medication.
- 3. Family Counseling** – Even though your child is the one dealing with mental health challenges, it can have an impact on the entire family. Family counseling can help you learn what is going on with your child and how you can help. It is also a great way to learn what not to do – things that could set your child back or keep him from getting the support he needs.
- 4. Support for Parents** – Being a parent means putting your child's needs before your own, but you can't give your child everything he needs if you don't have to support yourself. Support groups and various resources are available to help you relieve stress, seek

individualized help, and learn new strategies for helping your child with their mental health issues.

**Reviews:**

- Miraz Uddin *et al.* (2021) has studied the perception of 250 Bangladeshi students towards the Impact of Covid-19 on students' mental health. The structural questionnaire was prepared to collect the data using the personal interview. The research found that economic factors, social factors, and educational factors have a significant impact on the students' mental health during the Covid-19 pandemic situations.
- Chaturvedi *et al.* (2020) conducted a perception study on psychological impacts of Covid-19 upon 1182 students from different age groups in Delhi (NCR).  
As a result it was found that there is a huge impact on the various aspects of life including sleeping patterns, workout habits, etc. even there was found the increased involvement of students in various social media, of different age groups.
- Xiong *et al.* (2020) had made a systematic search on impacts of Covid-19 using various web links. As a result of that, they were able to conclude that during that time a lot of people were having high rates of stress, depression, etc. seen in the people of different age groups and of different countries.
- Zamina Hyseni Duraku *et al.* (2021) has conducted a semi structured interview of 13 parents and 11 teachers from pre university public institutions within 14 municipalities, from 7 regions of Kosovo on the topic The impact of COVID-19 on education and on the well being of teachers, parents, and students: Challenge related to remote learning and opportunities for advancing the quality of education. As a result of this research paper it was found that there is a great deal of concern amongst the students, teachers, and parents' on various topics like assessment, distance learning inadequacy, student overload, etc.
- Silvana Galderisi *et al.* (2015) has conducted research on the topic Towards the new definition of Mental health. He had used various general, books, articles, so as to write this paper. With this research paper he tried to give a definition and to explain the concept of mental health.
- Claire Henderson, *et al.* (2013) have prepared a research paper on Mental Illness Stigma, Help Seeking, and Public Health Programs. In this research paper the writer has provided us with the various ways to overcome mental illness.

- Nader Salaria *et al.* (2020) has done research work on the topic Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. In this research paper to perform a meta-analysis of the collected studies, the random effects model was used, and the heterogeneity of studies was investigated using the I2 index. Moreover, data analysis was conducted using the Comprehensive Meta-Analysis (CMA) software. As a result of this study paper it was found that COVID-19 not only causes physical health concerns but also results in a number of psychological disorders. The spread of the new coronavirus can impact the mental health of people in different communities. Thus, it is essential to preserve the mental health of individuals and to develop psychological interventions that can improve the mental health of vulnerable groups during the COVID-19 pandemic.
- Amy Dawell *et al.* (2020) has conducted research work by conducting surveys on the topic The Effect of COVID-19 on Mental Health and Wellbeing in a Representative Sample of Australian Adults. They have suggested that minimizing disruption to work and social functioning, and increasing access to mental health services in the community, are important policy goals to minimize pandemic-related impacts on mental health and wellbeing. Innovative and creative strategies are needed to meet these community needs while continuing to enact vital public health strategies to control the spread of COVID-19.
- Mark E. Czeisler *et al.* (2020) has conducted research on the topic Mental Health During the COVID-19 Pandemic: Challenges, Populations at Risk, Implications, and Opportunities. Research was conducted.
- Jennifer A. Sumner *et al.* (2020), have conducted research on the topic The Long Arm of Mental Health: New Urgency With the COVID-19 Pandemic. A lot of research using the articles and survey was conducted.

### **Research gaps**

From the above mentioned review papers, a lot of points were mentioned by the literature writers. They have undergone a lot of research to find out the impact of COVID-19 on the mental health of the people. Main focus on higher education students, employed persons with less or zero information about primary school students. The writer has mentioned almost all the people of different age groups but less data was found on the primary school students. Which I feel should also be given more importance because childhood is a very crucial stage and the children

should also be given more importance. A daily check on the health of primary school students should also be done by the parents as well as the teachers.

Whereas in some of the research papers problems were given but no solution was provided. They have written that people are having mental health issues with proper data but they haven't provided how we can overcome that issue.

**Significance:**

The topic which I chose for the seminar is “the impact of covid-19 on the mental health of primary school students”. The reason why I chose this topic is not only because this is the present situation but also because every individual is affected by the pandemic from small school going kids to big business men. But the students according to me are most affected. The study, sports, physical health, mental health, social interaction, etc. are somewhere lost nowadays. Kids are not at all focusing on their health, studies. Most of the time they are seen either playing video games or using other apps available.

**Research Methods:**

- Methods- Descriptive, Questioner, Personal Interview, survey
- Sample- 120 students of different primary schools from all-over India.
- Tool- questioner was made and circulated amongst the students on the impact of mental health on primary school students.

**Objective of this survey is**

1. To explore the effects of COVID-19 on the mental health of primary school students.
2. To explore the effect of COVID-19 on primary school students with respect to gender, locality.

**Conclusion:**

With this research paper following were the problems faced by the people during the COVID-19 pandemic. Many of the researchers from different countries have taken the survey of different people from different age groups. With this research we came to a conclusion that the people either the students or the big business men, all had suffered a lot not only on the basis of physical health, business, studies etc. but also mental health. This contagious virus has not only raised concerns over general public health, but has also caused a number of psychological and mental disorders. It has very badly affected our physical, mental health, which has led to a lot of psychological problems such as frustration, stress, depression, etc. not only socially students are also emotionally damaged because of the lockdown. The findings are concerning, suggesting markedly increased rates of depression and anxiety, even among individuals with no

current diagnosis. This worsening of mental health may also have been shown. Overall, the findings suggest that interventions to counteract the social, financial and role disruptions induced by COVID-19, particularly among people with existing health conditions, are likely to have the greatest impact on community mental health and wellbeing. According to various analyses, it can be concluded that the COVID-19 pandemic can affect mental health in individuals and different communities. Therefore, in the current crisis, it is vital to identify individuals prone to psychological disorders from different groups and at different layers of populations, so that with appropriate psychological strategies, techniques and interventions, the general population's mental health is preserved and improved.

There are numerous signs which they show which we as an adult are not able to get. We should take care of them. Although they are at a growing age, they should not be exposed to a lot of burden. As they were having during the pandemic period. A lot of students have developed low self-esteem and a negative image of themselves in their own mind. They started showing anger, frustration and many more changes can be seen in the students. They started showing more interest in the elderly talks, they started spending more time playing video games, and watching television. Although they co-operated a lot in the pandemic times. One should take care of the children. If ever felt a slight change in the behavior they should immediately consult the therapist, should be supported by the parents not scolded, they should do meditation, and play games etc. to stay happy and healthy.

In the period of just a few months, the COVID-19 pandemic caused by a novel coronavirus has radically transformed the lives of masses of people around the globe, including higher education students. The lack of computer skills and the perception of a relatively higher workload prevented students from perceiving a higher performance while adapting to the 'new normal' namely, education from a distance. During the lockdown, students primarily raised concerns about their future professional career and study issues and were mainly bored, anxious, and frustrated. They also changed some of their hygienic behaviours such as regularly wearing masks and washing hands, and daily routine habits like leaving home and shaking hands. While the role of both hospitals and universities appears to be positive, governments and banks did not meet the students' expectations during the pandemic.

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## **HISTORY OF EPIDEMIC DISEASES AND COVID -19**

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### **Abstract:**

A pandemic is an epidemic of an infectious disease that has spread across a large region, for instance multiple continents or worldwide, affecting a substantial number of people. A widespread endemic disease with a stable number of infected people is not a pandemic. Widespread endemic diseases with a stable number of infected people such as recurrences of seasonal influenza are generally excluded as they occur simultaneously in large regions of the globe rather than being spread worldwide. Throughout human history, there have been a number of pandemics of diseases such as smallpox and tuberculosis. The most fatal pandemic in recorded history was the Black Death (also known as The Plague), which killed an estimated 75–200 million people in the 14th century. Other notable pandemics include the 1918 influenza pandemic (Spanish flu).

Current pandemics include COVID-19 and HIV/AIDS.

In the realm of infectious diseases, a pandemic is the worst-case scenario. When an epidemic spreads beyond a country's borders, that's when the disease officially becomes a pandemic. The communicable diseases existed during humankind's hunter-gatherer days, but the shift to agrarian life 10,000 years ago created communities that made epidemics more possible. Malaria, tuberculosis, leprosy, influenza, smallpox and others first appeared during this period.

### **Pandemic history**

#### **1. Athens**

The earliest recorded pandemic happened during the Peloponnesian War. After the disease passed through Libya, Ethiopia and Egypt, it crossed the Athenian walls as the Spartans laid siege. As much as two-thirds of the population died.

#### **2. Antonine Plague**

The Antonine plague was possibly an early appearance of smallpox that began with the Huns. The Huns then infected the Germans, who passed it to the Romans and then returning troops spread it throughout the Roman empire. Symptoms included fever, sore throat, diarrhea

and, if the patient lived long enough, pus-filled sores. This plague continued until about 180 A.D., claiming Emperor Marcus Aurelius as one of its victims.

### **3. Cyprian Plague**

Named after the first known victim, the Christian bishop of Carthage, the Cyprian plague entailed diarrhea, vomiting, throat ulcers, fever and gangrenous hands and feet. City dwellers fled to the country to escape infection but instead spread the disease further. Possibly starting in Ethiopia, it passed through Northern Africa, into Rome, then onto Egypt and northward. There were recurring outbreaks over the next three centuries.

### **4. Justinian Plague**

First appearing in Egypt, the Justinian plague spread through Palestine and the Byzantine Empire. The plague changed the course of the empire, squelching Emperor Justinian's plans to bring the Roman Empire back together and causing massive economic struggle. It is also credited with creating an apocalyptic atmosphere that spurred the rapid spread of Christianity.

### **5. 11<sup>th</sup> Century: Leprosy**

Though it had been around for ages, leprosy grew into a pandemic in Europe in the Middle Ages, resulting in the building of numerous leprosy-focused hospitals to accommodate the vast number of victims. A slow-developing bacterial disease that causes sores and deformities, leprosy was believed to be a punishment from God that ran in families. This belief led to moral judgments and ostracization of victims.

### **6. The Black Death**

Responsible for the death of one-third of the world population, this second large outbreak of the bubonic plague possibly started in Asia and moved west in caravans. Dead bodies became so prevalent that many remained rotting on the ground and created a constant stench in cities. England and France were so incapacitated by the plague that the countries called a truce to their war. The British feudal system collapsed when the plague changed economic circumstances and demographics. Ravaging populations in Greenland, Vikings lost the strength to wage battle against native populations, and their exploration of North America halted.

### **7. The Columbian Exchange**

The arrival of the Spanish in the Caribbean, diseases such as smallpox, measles and bubonic plague were passed along to the native populations by the Europeans. With no previous exposure, these diseases indigenous people, with as many as 90 percent dying throughout the north and south. In 1520, the Aztec Empire was destroyed by a smallpox infection. The disease

killed many of its victims and incapacitated others. It weakened the population so they were unable to resist Spanish colonizers and left farmers unable to produce needed crops.

Research in 2019 even concluded that the deaths of some 56 million Native Americans in the 16<sup>th</sup> and 17<sup>th</sup> centuries, largely through disease, may have altered Earth's climate as vegetation growth on previously tilled land drew more CO<sub>2</sub> from the atmosphere and caused a cooling event.

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### **1665: The Great Plague of London**

As human death tolls mounted and mass graves appeared, hundreds of thousands of cats and dogs were slaughtered as the possible cause and the disease spread through ports along the Thames. The worst of the outbreak tapered off in the fall of 1666, around the same time as another destructive event—the Great Fire of London.

### **1817: First Cholera Pandemic**

The first of seven cholera pandemics over the next 150 years, this wave of the small intestine infection originated in Russia, where one million people died. Spreading through feces-infected water and food, the bacterium was passed along to British soldiers who brought it to India where millions more died. The reach of the British Empire and its navy spread cholera to Spain, Africa, Indonesia, China, Japan, Italy, Germany and America, where it killed 150,000 people. A vaccine was created in 1885, but pandemics continued.

### **1855: The Third Plague Pandemic**

Starting in China and moving to India and Hong Kong, the bubonic plague claimed 15 million victims. Initially spread by fleas during a mining boom in Yunnan, the plague is considered a factor in the Parthay rebellion and the Taiping rebellion. India faced the most substantial casualties, and the epidemic was used as an excuse for repressive policies that sparked some revolt against the British. The pandemic was considered active until 1960 when cases dropped below a couple hundred.

### **1875: Fiji Measles Pandemic**

After Fiji ceded to the British Empire, a royal party visited Australia as a gift from Queen Victoria. Arriving during a measles outbreak, the royal party brought the disease back to their island, and it was spread further by the tribal heads and police who met with them upon their

returna and spreading quickly, the island was littered with corpses that were scavenged by wild animals, and entire villages died and were burned down, sometimes with the sick trapped inside the fires. One-third of Fiji's population, a total of 40,000 people, died.

### **1889: Russian Flu**

The first significant flu pandemic started in Siberia and Kazakhstan, traveled to Moscow, and made its way into Finland and then Poland, where it moved into the rest of Europe. By the following year, it had crossed the ocean into North America and Africa. By the end of 1890, 360,000 had died.

### **1918: Spanish Flu**

The avian-borne flu that resulted in 50 million deaths worldwide, the 1918 flu was first observed in Europe, the United States and parts of Asia before swiftly spreading around the world. At the time, there were no effective drugs or vaccines to treat this killer flu strain. Wire service reports of a flu outbreak in Madrid in the spring of 1918 led to the pandemic being called the "Spanish flu." By October, hundreds of thousands of Americans died and body storage scarcity hit crisis level. But the flu threat disappeared in the summer of 1919 when most of the infected had either developed immunities or died.

### **1957: Asian Flu**

Starting in Hong Kong and spreading throughout China and then into the United States, the Asian flu became widespread in England where, over six months, 14,000 people died. A second wave followed in early 1958, causing an estimated total of about 1.1 million deaths globally, with 116,000 deaths in the United States alone. A vaccine was developed, effectively containing the pandemic.

First identified in 1981, AIDS destroys a person's immune system, resulting in eventual death by diseases that the body would usually fight off. Those infected by the HIV virus encounter fever, headache, and enlarged lymph nodes upon infection. When symptoms subside, carriers become highly infectious through blood and genital fluid, and the disease destroys t-cells. AIDS was first observed in American gay communities but is believed to have developed from a chimpanzee virus from West Africa in the 1920s. The disease, which spreads through certain body fluids, moved to Haiti in the 1960s, and then New York and San Francisco in the 1970s.

### **2003: SARS**

First identified in 2003 after several months of cases, Severe Acute Respiratory Syndrome is believed to have possibly started with bats, spread to cats and then to humans in

China, followed by 26 other countries, infecting 8,096 people, with 774 deaths. SARS is characterized by respiratory problems, dry cough, fever and head and body aches and is spread through respiratory droplets from coughs and sneezes. Quarantine efforts proved effective and by July, the virus was contained and hasn't reappeared since. China was criticized for trying to suppress information about the virus at the beginning of the outbreak.

### **2019: COVID-19**

On March 11, 2020, the World Health Organization announced that the COVID-19 virus was officially a pandemic after barreling through 114 countries in three months and infecting over 118,000 people. And the spread wasn't anywhere near finished. COVID-19 is caused by a novel coronavirus—a new coronavirus strain that has not been previously found in people. Symptoms include respiratory problems, fever and cough, and can lead to pneumonia and death. Like SARS, it's spread through droplets from sneezes. The first reported case in China appeared November 17, 2019, in the Hubei Province, but went unrecognized. Eight more cases appeared in December with researchers pointing to an unknown virus.

Many learned about COVID-19 when ophthalmologist Dr. Li Wenliang defied government orders and released safety information to other doctors. The following day, China informed WHO and charged Li with a crime. Li died from COVID-19 just over a month later. Without a vaccine available, the virus spread beyond Chinese borders and by mid-March, it had spread globally to more than 163 countries. On February 11, the infection was officially christened COVID-19.

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## COMMONLY USED HERBAL MEDICINES, ITS USES IN COVID-19 AND IMPACT ON CONSUMPTION AND TRADE OF TURMERIC

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### Abstract:

Covid-19 has emerged as a pandemic of 21<sup>st</sup> Century which taken toll of millions of lives globally and impacted every sector of the World. One of the mostly impacted sector was Health. The health burden on the present health care system was extremely high and it somewhat shattered the system. The initiatives from traditional health care systems of India and other countries has played a pivotal role to balance the extra load on the Contemporary health care system. Traditional System of Medicine of India has also emerged in the course of Covid-19. Indian System of Medicine has advocated the role of both herbal and herbo-mineral medicines for treatment of almost of all the diseases. But the more formulations are purely of herbal origin. In the course of Covid-19, many of the people took the herbal medicines as a first choice as a preventive medicine. Prime Minister of our country also appealed to use of AYUSH measures in 7 directives addressed by him to the nation. The Ministry of AYUSH has also stepped in and released advisory for the general public of the nation. Other National Institutes of Ayurveda has also participated in the campaign and devised the kits for distribution among the Front-line workers. Along with the Herbal Medicines, Spices also played a crucial role in the preventive aspect of Covid-19, in mild cases even it proved to be an effective treatment. Spices are nature's boon to the South East Asia esp. India. The Western Ghats of India is the Spice Hub, giving boost to the local economy and adding a worth in export trade of nation.

Herbal medicines like, *Haridra* (Turmeric), *Ashwagandha*, *Dalchini* (Cinnamon), *Guduchi*, *Tulsi*, *Pippali* (Long Pepper), *Maricha* (Black Pepper) are commonly used in the

clinical symptoms like, fever, malaise, cold with cough and respiratory illness. The Covid-19 had the almost same set of clinical symptoms. So the Practitioners of AYUSH system of Medicine widely used these plant products in preventive care, mild cases of Covid-19. The home remedies taken by the people had also extensively utilized the medicinal properties of these herbs.

The trade of Herbal Medicine almost got doubled after Covid-19. This has given a new height the AYUSH Pharmaceutical Industry. The Trade of AYUSH and Herbal medicinal products was 3,033.04 Crores in Apr-Mar 2020. It showed growth of 31.78 % in Apr-Mar 2021 with an export 3,997.05 Crores. In Year 2022 it grew with a 14.17 % accounting an export of 4,563.52 Crores. The Trade of Spices was 25,642.04 Crores in Apr-Mar 2020. It showed growth of 15.16 % in Apr-Mar 2021 with an export 29,529.39 Crores. In Year 2022 it declined with a 1.66 % accounting an export of 29,039.27 Crores. The global herbal medicine market size was estimated to be US\$ 83 billion in 2019 and is expected to reach US\$ 550 billion by 2030 at a CAGR 18.9% through 2030.

**Keywords:** Herbal, Herbo-mineral, Spices, AYUSH, Trade, Covid-19.

### **Introduction:**

Covid-19 began in late December 2019 in China and spread very fast in more than 200 countries and effected millions of individuals worldwide. The World Health Organization (WHO) On March 11, 2020, declared the COVID-19 outbreak as pandemic (World Health Organization, 2020) and it is a serious public health problem. Evidences from all over the world suggested that it was highly infectious disease. Various measures and actions were taken by Government of India, like lockdown in country, quarantine guidelines for suspicious case, treatment guidelines for COVID-19 etc for prevention of COVID-19. Subsequently many governments and private offices asked all its employees to 'work from home' except those providing essential or emergency services. Many countries like China, Korea, India etc have used herbal based medicine and validated the efficacy of their traditional medicines on COVID 19 (Ng, 2020). Ayurveda, Yoga, Naturopathy, Unani, Siddha, and Homeopathy are five traditional medical system of India that were widely used in COVID-19 (Thakar *et al.*, 2021). Based on the fundamentals of traditional medicine, various natural Herbal based drugs have been identified to be helpful for COVID 19. Various herbal drugs like *Ashwgandha* (*Withania somnifera*), *Maricha* (*Piper nigrum*), *Haridra* (*Curcuma longa*), *Tulshi* (*Ocimum sanctum*), and *Amalaki* (*Phyllanthus emblica*) are found to be effective and helpful in COVID-19 related complications (Singh *et al.*, 2021). Various dietary supplements like Vitamin D, Vitamin

C etc. were found to boost the immune system and were also recommended during the COVID 19 pandemic and help for prevention of disease (Infusino *et al.*, 2020)

### **Maricha (Black Pepper)**

Maricha has increase bioavailability due to its Yogvahi guna described in Ayurveda. Due to tihis property it enhances the therapeutic action of many drugs, vaccines and nutrients. Pipili have many therapeutic actions like immune-modulatory, hepatoprotective, anti-ulcer, anti-thyroids, anti-apoptotic, anti-metastatic, anti-oxidant, antiplatelets, antihypertensive, anti-asthmatic, antipyretic, analgesic, anti-carcinogenic, anti-inflammatory, anti-diarrheal, antifungal and anti-amoebic properties antispasmodic, anxiolytic, antidepressants, hepatoprotective, anti-ulcer, anti-thyroids, anti-apoptotic, anti-metastatic, antimutagenic, antibacterial (Damanhour *et al.*, 2014).

The interaction analysis of *Piper nigrum* has performed on 12 major phytochemicals out of 10 phytoconstituents docked inside the binding site the protein with less affinity as compared with HCQ. The alkaloids molecules showed an affinity of  $-20.379$  kcal/mol because of forming two conventional hydrogen bonds with the Lys<sub>417</sub> and Gln<sub>409</sub>, which has lesser than the HCQ and Remdesivir. (Navabshan *et al.*, 2021).

The extract of *Piper nigrum* and its phytoconstituents regulate the balance of the cytokines Th1, Th2, Th17 production, and Treg cells, reduce accumulation of inflammatory cells, inhibit GATA3, IL-4, IL-6, IL-1 $\beta$ , ROR $\gamma$ t, IL-17A and TNF- $\alpha$  and increase INF- $\gamma$  and IL-10 secretions in BALF (Broncho-alveolar lavage fluid) and macrophage activation and T and B cell proliferation (Balkrishna *et al.*, 2020; Gautam *et al.*, 2020).

Piperine is very effective against proliferation of viral particles. Inside the capsid protein piperine can be block RNA Packaging (Choudhary *et al.*, 2020). Computational Study found that Piperine found in black pepper can inhibit SARS-CoV-2 virus. The phenolic compounds Kadsurenin L and methysticin isolated from in *Piper nigrum* was found inhibiting protease in COVID-19 (Davella *et al.*, 2022).

### **Ashwagandha**

It is a *Withania somnifera*. It is one of the potent anti-stress, immunomodulatory and aphrodisiac medicine of Ayurveda. The study conducted by Chandrasekhar *et al.* (2012) shows that high-concentration full-spectrum Ashwagandha root extract decreases levels of serum cortisol, major stress hormone which elevates in stressful conditions. They also found that an analysis of the adverse events recorded in this study indicates that high-concentration full-spectrum. Ashwagandha root extract is safe and well tolerated as there were no serious adverse

events. The side effects that were observed were mostly mild in nature and no known causal mechanisms relate them to the study drug. An animal study conducted by Singh N.*et al.*, (2011) showed that *Withania somnifera* treatment prevents, decrease of adrenal cortisol and ascorbic acid which occurs due to swimming stress. A RCT conducted by (Lopresti *et al.*, 2019) had shown a promising Anti-stress effect of *Withania somnifera*, this action may be through its action on hypothalamus-pituitary axis.

As per the Systemic review and meta-analysis conducted by Cheah *et al.* (2021) found that Ashwagandha extract appears to has a beneficial effect in improving sleep in adults.

A study conducted by Devis and Kuttan (2002), *Withania somnifera* root extract inhibited delayed-type hypersensitivity reactions and enhanced phagocytic activity of macrophages when compared to a control group. An immunomodulatory study conducted by Ziauddin, M. *et al.*, (1996) showed that root extract of *Withania somnifera* acts as myelosuppressor in all the three animal models treated with cyclophosphamide, azathioprin, or prednisolone.

### **Haridra/Haldi**

It is a *Curcuma longa*. Prasad and Aggarwal (2011), the use of turmeric dates back nearly 4000 years to the Vedic culture in India, where it was used as a culinary spice and had some religious significance. Ruby *et al.* (1995), more than 100 components have been isolated from turmeric. A volatile oil, containing turmerone is extracted from root and there are other coloring agents called curcuminoids in turmeric. Curcuminoids comprising of curcumin demethoxycurcumin, 5'-methoxycurcumin, and dihydrocurcumin, are proved to be natural antioxidants. Ethanolic extracts of *C. longa* have shown good antifungal activity against *Trichophyton longifusus* (Khattak *et al.*, 2005). The agar disc diffusion method used for testing the antifungal activity showed that a crude ethanolic extract of turmeric killed all 29 tested clinical strains of dermatophytes with an inhibition zone range of 6.1–26.0 mm (Wuthi-udomlert *et al.*, 2000). A hydro-ethanolic extract of turmeric was recently found to inhibit activation of human dendritic cells in response to inflammatory cytokines (Krasovsky *et al.*, 2009). Turmeric increased apoptosis (increased expression of Bax, caspase-3, and apoptotic index), decreased inflammation (levels of cyclooxygenase [COX]-2, the downstream target of activator protein-1/nuclear factor KB [NF-KB], and PGE2), and induced aberrant expression of well-known differentiation markers, that is, cytokeratins (Garg, Ingle, and Maru 2008). A turmeric extract had shown inhibitory role on membrane phospholipid peroxidation and increased liver lipid metabolism, which indicates turmeric extract has the ability to prevent the deposition of triacylglycerol in the liver. Dietary supplementation for one week (1% w/w of diet)

with a turmeric extract showed lower phospholipids hydro-peroxide level in mice red blood cells (RBC). Suppression of the liver lipid peroxidizability induced with Fe<sup>2+</sup>/ascorbic acid was effectively suppressed by dietary supplementation with turmeric (Asai, Nakagawa, and Miyazawa 1999). Turmeric is proved to be an effective hepatoprotective drug. Turmeric extract rich diet has suppressed increases in lactate dehydrogenase (LDH), alanine aminotransferase (ALT), and aspartate aminotransferase (AST) levels caused by D-galactosamine-induced liver injury in rats (Miyakoshi *et al.*, 2004).

### **Guduchi/Giloy**

*Tinospora cordifolia* of family Menispermaceae commonly named as “Guduchi” in Sanskrit. It is a large, deciduous climbing shrub with greenish yellow typical flowers, found at higher altitude (Rana *et al.*, 2012). *Tinospora* has active compounds 11-hydroxymustakone, N-methyl-2-pyrrolidone, N-formylannonain, cordifolioside A, magnoflorine, tinocordiside and syringin which has shown potential immunomodulatory and cytotoxic effects (Kapil and Sharma 1997). Aqueous extract of *Tinospora* have influence on the cytokine production, mitogenicity, stimulation and activation of immune effector cells (Upadhyaya *et al.*, 2011). Aqueous extracts of *Tinospora* contains active ingredients like alkaloids, di-terpenoid lactones, glycosides, steroids, sesquiterpenoid, phenolics, aliphatic compounds or polysaccharides. The compounds have cytotoxic action when tested on experimental rat model (Jahfar, 2003).

### **Pippali**

It is *Piper longum*. Commonly called as long pepper. The interaction analysis of *Piper nigrum* has performed on 12 major phyto-compounds out of 10 phyto-constituents docked inside the binding site the protein with less affinity as compared with HCQ. The alkamides molecules showed an affinity of – 20.379 kcal/mol because of forming two conventional hydrogen bonds with the Lys417 and Gln409, which has lesser than the HCQ and Remdesivir.

*Pippali* has increase bioavailability due to its *Yogvahi guna* described in Ayurveda. Due to this property it enhances the therapeutic action of many drugs, vaccines and nutrients. *Pippali* have many therapeutic actions like immune-modulatory, hepatoprotective, anti-ulcer, anti-thyroids, anti-apoptotic, anti-metastatic, anti-oxidant, anti-platelets, antihypertensive, anti-asthmatic, antipyretic, analgesic, anti-carcinogenic, anti-inflammatory, anti-diarrheal, antifungal and anti-amoebic properties antispasmodic, anxiolytic, antidepressants, hepatoprotective, anti-ulcer, anti-thyroids, anti-apoptotic, anti-metastatic, anti-mutagenic, antibacterial.

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Peperine isolated from black pepper is very effective against proliferation of viral particles. Inside the capsid protein peperine can be block RNA Packaging. Computational Study conducted from IIT, Dhanbad found that Piperine found in black pepper can inhibit SARS-CoV-2 virus. The phenolic compounds Kadsurenin L and methysticin isolated from in *Piper nigrum* was found inhibiting protease in COVID-19.

### Dalchini/ Twak

Cinnamon (*Cinnamomum zeylanicum* and *Cinnamon cassia*), the eternal tree of tropical medicine, belongs to the Lauraceae family (Rao and Gan, 2014). Cinnamaldehyde and trans-cinnamaldehyde (Cin), are the alkaloids which are present in the essential oil, thus giving a characteristic fragrance to cinnamon showing various biological activities (Yeh *et al.*, 2013).

Cinnamon is an anti-mycotic (Bandara T. *et al.*, 2012). Its In-vitro studies have shown anti-inflammatory effects by inhibiting IL-1beta and IL-6 production (Chao L.K. *et al.*, 2005). Cinnamon bark contains procyanidins and catechins (Nonaka *et al.*, 1983). The components of procyanidins include both procyanidin A-type and B-type linkages (Peng *et al.*, 2008). These procyanidins extracted from cinnamon and berries also possess antioxidant activities (Määttä-Riihinen *et al.*, 2005).

**Table 1: showing details of Anti-Viral Activity of Cinnamon parts**

Sr. No.	Extract /Main component	Part used	Model	Design	Dosage/ Duration of treatment	Mechanism/outcome
1	Water extract /cinnzeylanine	Bark	In-vitro and In vivo	By Vero cells and silkworm infection model	0.5 m/ Once	Cinnzeylanine inhibits the proliferation of herpes simplex virus type 1
2	NM	Bark	In-vitro	-	-	1.Pepsin enzymatic activity was inhibited.
						2.The activity of HIV protease was also inhibited.

<b>3</b>	Type-A procyanidin polyphenol (IND02)	Bark	In-vitro	HIV-1 primary patient isolates	–	1.HIV-1 Replication was blocked.
						2.HIV-1 was inhibited, and T cell exhaustion markers, Tim-3, and PD-1 were down-modulated.
<b>4</b>	Procyanidin type A (IND02)	NM	In-vitro	Cell culture-derived HCV	–	1.No effect on HCV replication
						2.blockade of HCV entry, dose-dependently, occurring at a post binding step
						3.Inhibiting HCV entry demonstrates the functional impact in the most physiological cell-based system for studying HCV–host interactions.
<b>5</b>	Hydro-alcoholic extract	wood	In-vitro	HSV-1	–	1.Attachment of HSV-1 onto host cells was inhibited.
						2.The viral titer of herpes simplex type 1 was reduced before, during, and after inoculation of herpes virus
<b>6</b>	Essential oil	Bark and leaf	In-vitro	cytopathic effect reduction method for anti-influenza (A/WS/33 virus) activity	–	No significant effect on influenza A/WS/33 virus activity

## Trade of Haldi (Turmeric) in Europe

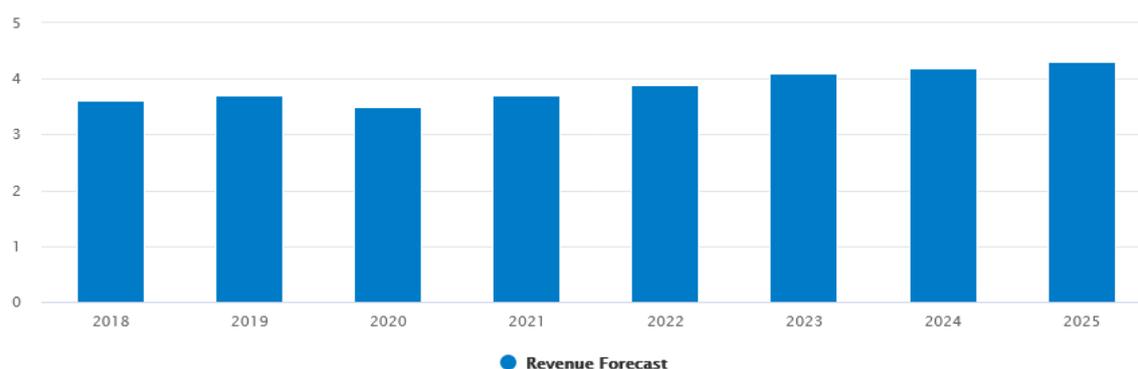
There are usually two grades of turmeric on the European market. Food-grade turmeric is sold as a spice in retail. Pharmaceutical-grade turmeric is sold in the form of supplements. Food-grade turmeric is more common in Europe because of the high demand from the retail and food sectors.

Preventive health care services have increased demand in today's Era. The rising demand for nutritional supplements and vitamins in Europe has provided a significant trade benefit to cultivation of medicinal herbs and spices in India. This trend is driven by rising consumer awareness. Consumers are taking the Nutraceuticals and spices for improvement in their health and immune system

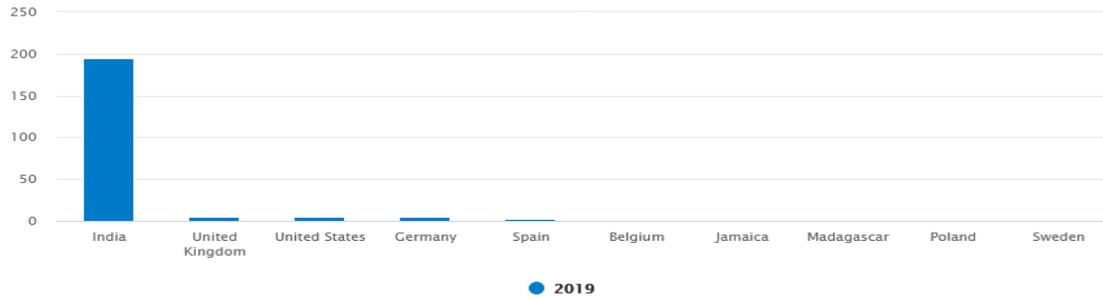
Turmeric is acquiring its popular space in the European market. It is used in nutritional supplements because of its numerous beneficial properties. Turmeric is commonly used in types of complementary and alternative medicine.

The Global Turmeric Market size was estimated at USD 161.59 million in 2021 and expected to reach USD 175.12 million in 2022, and is projected to grow at a CAGR 8.49% to reach USD 263.57 million by 2027.

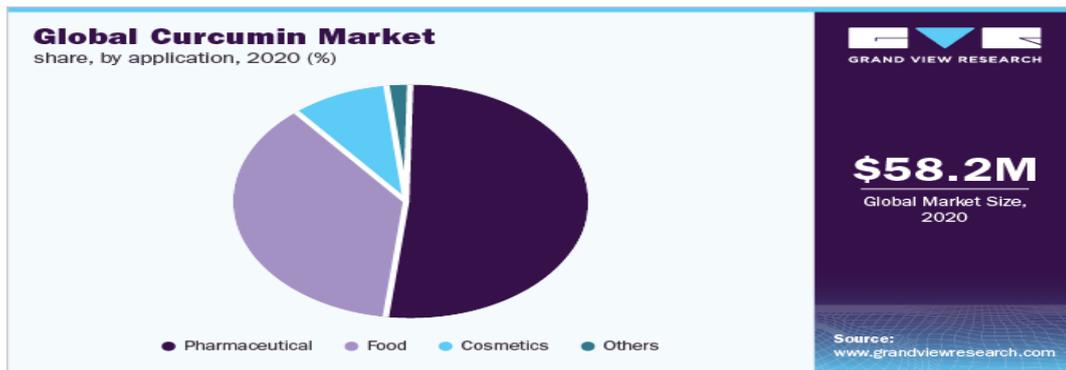
Turmeric is exported to over 132 countries. In the year 2020-2021 (Apr-Nov), India has exported Turmeric worth of 119.25 USD million. In 2020-21, India had exported 1.71 lakh tonnes of turmeric compared to 1.37 lakh tonnes of the previous year. Major turmeric importing countries from India are Bangladesh (49,522 tonnes), UAE (12,182 tonnes), Iran (10,964 tonnes), USA (9,712 tonnes) and Morocco (8,522 tonnes).



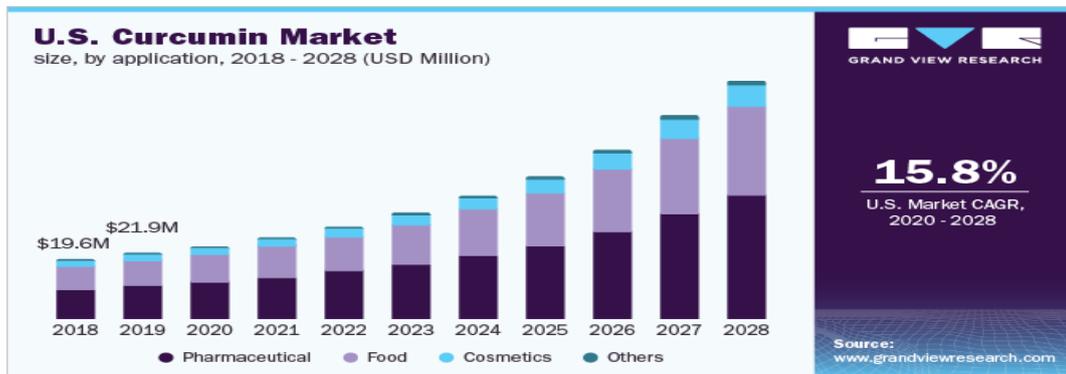
**Figure 1: shows the revenue stats (in euro) of turmeric trade in Europe (Source: CBI Ministry of Foreign Affairs)**



**Figure 2: shows the leading turmeric export globally**  
(Source: CBI Ministry of Foreign Affairs)



**Figure 3. Showing Global Turmeric Market (Source: Grand View Research)**



**Figure 4: Showing Turmeric Market in U.S. (in US Dollar) (Source: Grand View Research)**

### Regional insights

Europe has highest expected CAGR of 16.7% during the forecast period 2020-2028. This is due to well established personal care and cosmetic industry in Western European countries, such as Italy, Germany, and Spain.

North America is hub of Nutraceutical Industry and have accounted for the highest revenue share in 2020 due to the high product demand. This in turn, provides growth opportunities to the market.

Asia Pacific is estimated to register the second-fastest CAGR over the forecast period. The low consumer awareness regarding health and personal care is the main reason behind this. An awareness of Good Agricultural Practices along with Good Manufacturing Practices can make a difference in Trade of Turmeric in this region. New product development can be possible with Turmeric and its extracts.

### **Trade of Black Pepper**

Black Pepper is exported to over 103 countries. In the year 2020-2021 (Apr-Nov), India has exported Black Pepper worth of 15.24 USD million.

### **Conclusion:**

Covid-19 being the pandemic has impacted all the sectors of Global economy. The treatment of it has been done by all the system of medicines. The world has experienced the crucial role of traditional medicines in the treatment of mild to moderate cases and prevention of Covid-19. The major herb used in the treatment and prevention is *Haldi* (Turmeric). The global reports of turmeric trade also suggest that it has surely helped in the treatment of Covid-19. The US and European markets, both has experienced the surge in the Trade of Turmeric. The markets also have high anticipated CAGR growth in the trade of Turmeric. The same is with the Blackpepper.

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<https://www.grandviewresearch.com/industry-analysis/turmeric-extract-curcumin-market>  
[https://www.reportlinker.com/p06088569/Turmeric-Market-Research-Report-by-Origin-by-Type-by-Distribution-Channel-by-End-User-by-Region-Global-Forecast-to-Cumulative-Impact-of-COVID-19.html?utm\\_source=GNW](https://www.reportlinker.com/p06088569/Turmeric-Market-Research-Report-by-Origin-by-Type-by-Distribution-Channel-by-End-User-by-Region-Global-Forecast-to-Cumulative-Impact-of-COVID-19.html?utm_source=GNW)
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## CONSUMER BEHAVIOUR TRENDS IN THE POST-COVID ERA

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### Introduction:

Consumer behaviour refers to the study of how individuals and groups recognise their needs and the process they use during searching, selecting, evaluating, securing, consuming, and disposing of products and services to satisfy their needs. Consumer behaviour is a better understanding of terms like awareness, perception, and attitude of the consumer. It includes various elements of the purchase and experience process, such as:

**What to buy, Where to buy, Who to buy from, How much to buy, How to use, How to dispose.**

The study of consumer behaviour is beneficial to marketers. Consumer behaviour and marketing are so closely related that it helps in the development of successful marketing strategies. Marketers depend heavily on the study of consumer behaviour in predicting market trends, developing more relevant marketing programmes over time. It also helps marketers in the process of segmentation, targeting and positioning. (Assael, 2009; Raju *et al.*, 2005; Schiffman *et al.*, 2019)

Consumer behaviour is a dynamic process. It is a relative concept. It keeps on changing over time. A consumer acts differently in different situations. It differs from individual to individual, place to place and time to time due to several factors. There are several factors that influence the consumer behaviour; some of the major factors are as follows:

**1. Psychological factors:** The entire process of buying usually happens in a mind i.e. what goes on inside the head of an individual when they identify their needs, select a product or decide to purchase. Therefore, the deep study of psychology is needed to determine consumer behaviour. Some of the psychological factors are motivation, perception, attitude and beliefs (Psychological Factors That Influence Consumer Buying Behavior, n.d.).

**2. Social drivers:** Human beings are social animals; they love to live with many people in a society. They always seek validation and wish to be surrounded by near and dear ones and love

to be socially accepted in the whole community. Therefore, the purchasing behaviour of a consumer is greatly influenced and affected by other individuals around them such as family, reference groups, role and status they hold in the society (Social Factors Affecting Consumer Behaviour, n.d.).

**3. Cultural determinants:** Culture refers to a set of values, ideas, beliefs that belong to a particular society. A consumer always belongs to a certain community and his/her behaviour is highly influenced by the basic values, preferences, perceptions and behaviour relating to that particular community (Akdogan *et al.*, 2021).

**4. Personal factors:** The personal factors are those factors that are personal to the consumer and differ from person to person, thereby producing different perceptions. These factors can be the age of a person, income and occupation, education level, lifestyle, etc.

**5. Economic factors:** It refers to the economic situation of a country or a Market. The positive economic environment of a consumer encourages him/her to make more purchases and vice versa. Economic factors consider the personal or family income of a consumer, access to credits and savings, etc. (Economic Factors That Affect Consumer Behavior, n.d.).

Besides the above factors, there are many other reasons that can influence and shape consumer behaviour. The consumers belonging to a certain generation show similar kinds of traits. These generations can be stated as:

### The generations defined

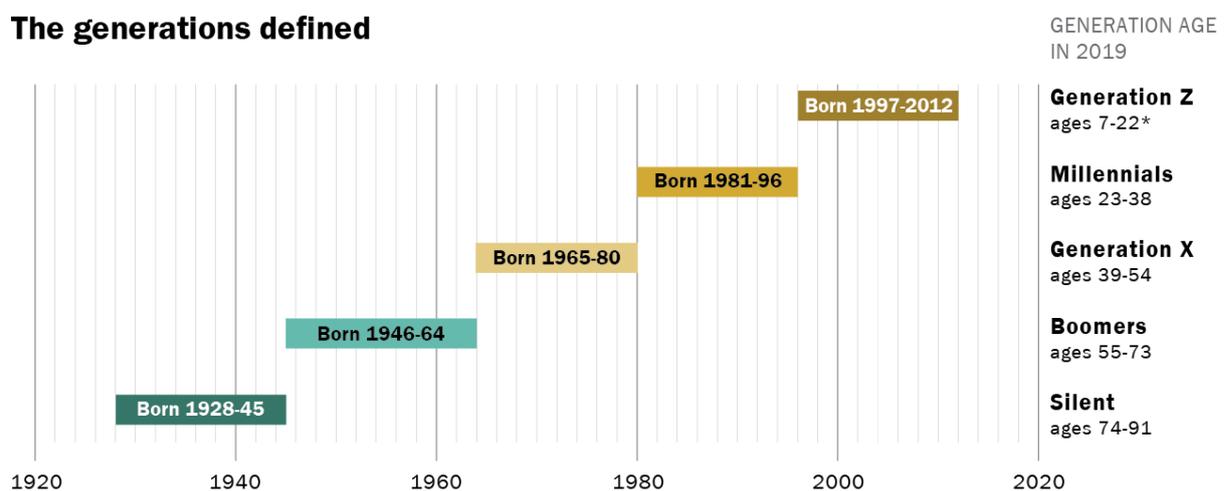


Figure 1: Generations

Source: (Where Millennials End and Generation Z Begins | Pew Research Center, n.d.)

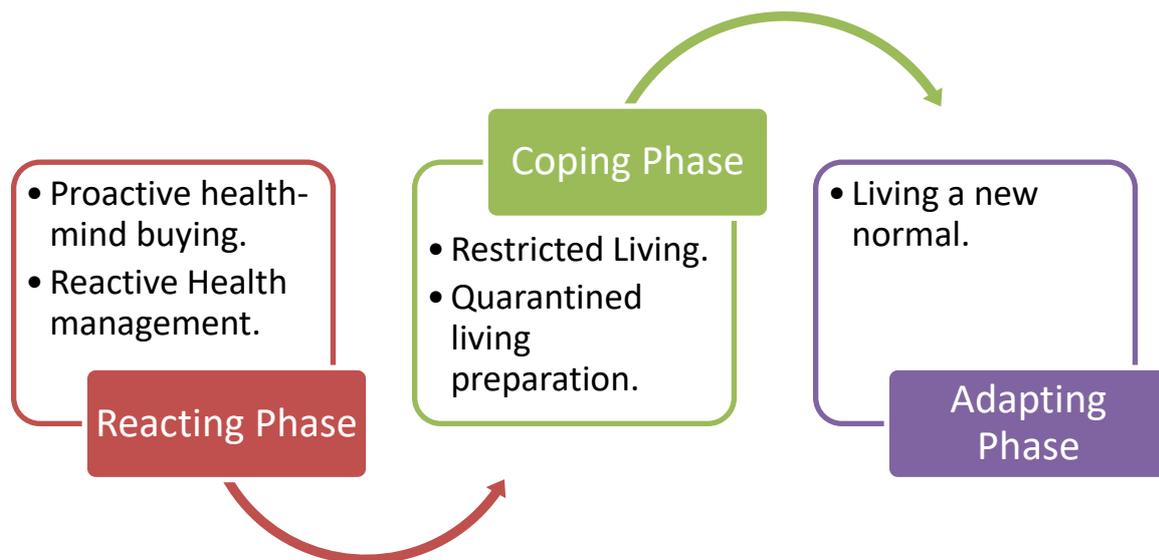
Changes in consumer behaviour can also be seen during certain events such as during the times of recession, natural disasters, rising terrorism, war situations, epidemics, and pandemic.

Likewise, during the pandemic of COVID-19 resulted in the long term behavioural shifts in consumer behaviour (Zwanka and Buff, 2021).

The pandemic of COVID-19 had a huge impact on the behaviour of consumers. Consumer's behaviour changed drastically, and those changes were very sudden and unusual. Consumers reacted in a very different way and some of those habits they have adopted in their behaviour even in the post pandemic period. Those changes and reasons behind those changes can be understood by considering certain frameworks such as RCA (React-cope-adopt) model and SOR (stimulus-organism-response) framework.

### **React-Cope-Adopt:**

Consumers developed a pattern in their behaviour i.e. initially they reacted to a situation created by a new restraint, after that they developed coping strategies to work within the restraint. Lastly, they adopted their consumption behaviour and became less reactive and more flexible (Hamilton *et al.*, 2019). This framework is called the RCA model.



**Figure 2: R-C-A Framework**

**Source: (Guthrie *et al.*, 2021; Nielsen Tracks Impact of COVID-19 Outbreak on Consumer Behavior - IFT.Org, n.d.)**

**Reacting phase:** Hoarding behaviour was the instant effect of pandemic. This behaviour has shown the signs of pantry preparation i.e. stockpile of food and health safety products. At these stages two more key behaviours have been observed were proactive health minded buying and

reactive health management. In proactive health minded buying consumers interest increases in the purchase of health and wellness products and in reactive health management, consumer prioritise the products related to public safety and health (Nielsen Tracks Impact of COVID-19 Outbreak on Consumer Behavior - IFT.Org, n.d.).

**Coping phase:** Coping is the second stage of response in which consumers adjust their thinking and attitude in such a way that helps them in coping with restraint. Coping can be of two types i.e. problem focused and emotion focused (Guthrie *et al.*, 2021).

Problem focused coping involves those activities that directly focus on solving a problem. For ex: During lockdown consumers adopted online purchases of daily needs as well. Emotion focused coping involves one's own feeling and sentiments and often seeks to distract mind away from the problem. For ex: Consumers purchased pets during lockdown and also such products related to personal care which allow them to focus on themselves.

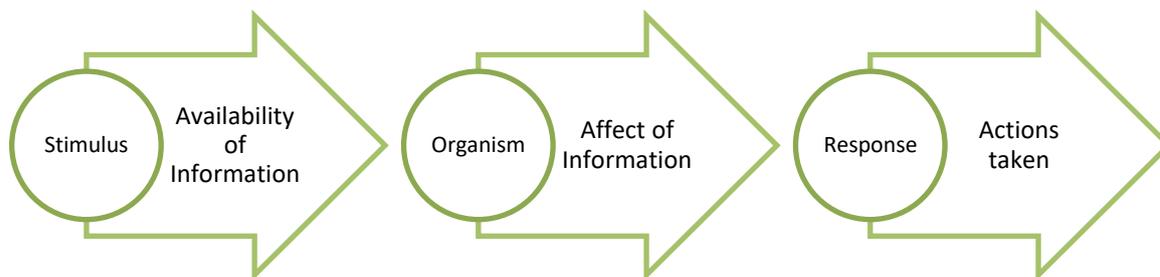
Another coping strategy was quarantined living preparation and restricted living in which consumers increased online shopping, Restricted trips, seek out social connections through online mode, increased involvement in DIYs etc. (Guthrie *et al.*, 2021).

**Adapting phase:** Consumers have adapted the habit of online shopping during the pandemic, they have realised that it is practical and cheaper (Hazée and Van Vaerenbergh, 2021). One major behavioural change brought by the pandemic was that it motivated “late adopters” to buy online. Late adopter’s (typically old consumers) learned the process of shopping online and its convenience and safety have motivated them to buy online after the pandemic ends (Wanying *et al.*, 2019).

**Stimulus-Organism-Response:**

Availability of information plays a very important role in shaping consumer behaviour. A Consumers purchase decision mainly relies upon the type of information he/she possess regarding availability of certain products, prices, prevailing market conditions etc. Likewise during COVID-19 availability and sources of information played a significant role in shaping consumer behaviour (Laato *et al.*, 2020).

The information based changes in consumer behaviour can be analysed with the help of stimulus organism response framework (Mehrabian and Russell, 1974).



**Figure 3: S-O-R Framework (Source: Authors)**

**1. Stimuli:** A stimuli is something that causes a person to respond. During COVID-19 stimuli is the online source of information consumers used to obtain insights about the virus. During the pandemic people searched a lot about the virus online. There was fake information floating among people as no one was much aware about the virus. Some of the information involved imaginary symptoms of virus, government is planning to close production units, transportation will be disrupted etc. All such information created anxiety and the problem of information overload among consumers which resulted in the hoarding of goods, irrational buying decisions, unusual purchases etc. (Miri *et al.*, 2020).

**2. Organism:** It relates to the effect of information on the people. Certain information developed fear among the people. Such as fear of losing life, employment, supply shortages etc. (Laato *et al.*, 2020).

**3. Response:** It relates to the actions consumers have taken after obtaining the information. Consumers responded in a very unusual Manner such as hoarding toilet papers, engaged in voluntary isolation made unusual purchases, etc. (Farooq *et al.*, 2020).

#### **Immediate impact of COVID-19 on consumer behaviour:**

##### **1. Stock-up mentality:**

As Covid 19 pandemic approached, the general population of every country reacted within a few weeks of being aware about the virus. The buying pattern turned to pantry stocking up lots of certain medical supplies such as sanitizers, antiseptics, cold and flu remedies etc and ready to eat food (opposed to fresh fruit and vegetables) such as powdered milk, processed food, dried beans, canned meat etc.

##### **2. “You live only once”:**

COVID-19 pandemic caused a wave of stress among people. Stress of losing their jobs, life, loved ones, social separation etc. Therefore, the attitude like “I could die tomorrow” or “You

only live once" has been observed. Their attitude increased the businesses of liquor stores during the pandemic (Zwanka and Buff, 2021).

### **3. Improvisation:**

Consumers have improvised due to lockdown and social distancing tradition bound activities such as wedding and funeral services have taken place through zoom meetings. It leads to innovative practices such as tele-health and the online education industry has seen tremendous growth.

### **4. Postponed demand:**

The general tendency of consumers during such crises is to postpone purchase. Many consumers have postponed their demand for durable goods such as automobiles, homes due to fear of losing their jobs so they saved money. Many other consumers postponed their demand as a fear of getting exposed to virus such as parks, movies and entertainment.

### **5. Embracing digital technology:**

During the pandemic consumers have adopted several new technologies. The obvious examples are zoom, Google meet etc. To keep in touch with family and friends, people adopt zoom meetings. To avoid physical touch people adopted online payment services such as BHIM, Phonepe and Paytm etc. To avoid social gatherings people adopted OTT platforms for their entertainment such as Netflix, Amazon prime etc.

### **6. Store comes home:**

Consumers habit of going to brick and mortar stores have been changed to "in homes everything". This has increased the in-home delivery of almost everything including groceries, medicines, plants etc. This has reversed the flow for work, health, education, etc.(Sheth, 2020)

### **Trends in consumer behaviour: Post-covid era**

1. Consumers are settling into a "temporary normal" i.e. they are avoiding unnecessary purchases and adapted the habit of online shopping.
2. During COVID-19 government has promoted home grown brands and start-ups due to which consumer behaviour has changed i.e. brand loyalty is of low priority and home country origin and availability is of high importance.
3. Use of social media has increased, greater media consumption is staying in power in post pandemic period, such as YouTube, Netflix, amazon prime, Twitter, educative apps, gaming apps and so on.
4. Consumers have shifted to online food delivery and grocery items. Some consumers are still sticking to this habit in post pandemic.

5. People are spending more on health-related items, such as masks, sanitizers, hand wash etc.
6. Hobbies of consumers are rising in the post pandemic period such as cycling, joining online courses, art and craft, having pets etc. (Hiral and Vank, 2022).

**Consumer behaviour and marketing action:**

Consumer behaviour is the key element while formulating marketing strategies. Business houses and marketers have considered the changes in consumer behaviour and formulated their strategies accordingly in the post pandemic period.

1. In post pandemic marketers emphasized more on digital marketing such as content marketing, twitter, Facebook, LinkedIn marketing and so on. Many brick and mortar businesses made an online presence in the post pandemic period keeping in view the increasing trend of online shopping.
2. Marketers adopted new promotion techniques such as offering a free mask or sachet of sanitizers with every purchase to create an image in mind of consumers that their brand cares for them.
3. Many companies extended their product line and started manufacturing masks and sanitizers keeping in view the changing trends and needs of the market.

For ex: Raymond added sanitizer in their product group.

4. One of the major changes in marketing strategies includes "emotional appeal" and "fear appeal" in advertisement of products.

For ex: ICICI prudential life insurance in its advertisement projects the glimpse of life in COVID-19 and makes an appeal that "The last few months have made us realise how uncertain life can be. Today we ensure extra safety. For the extra safety of the future: life insurance".

**Conclusion:**

Consumer behaviour evolved during COVID-19 era in both positive and negative ways. The positive side includes the increasing usage and adoption of digital platforms and the negative side includes certain behaviour such as hoarding and isolation (avoiding social gatherings). In this chapter, the immediate impact of COVID-19 on consumer behaviour has been highlighted such as stock-up mentality, improvisation, postponed demand, etc. Some of those immediate impacts have been adopted by the consumers even after COVID-19 and they have settled into a "temporary normal". The process of adoption of such behaviour has been explained with the help of RCA (react-cope-adopt) & SOR (stimulus-organism-response) framework. Such changes have

been addressed by the marketers positively & they have formulated their marketing strategies accordingly.

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## **CLINICAL MANAGEMENT OF PATIENTS IN DENTAL PRACTICE**

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### **Current scenario: COVID 19**

Covid infection 2019 (COVID-19) is an acute respiratory disease caused by a novel coronavirus and was first recognized in December 2019 in Wuhan, China. Since then, it has rapidly spread to more than 200 countries and has been proclaimed a worldwide pandemic by the World Health Organization (WHO).

Covid virus disease 2019 (COVID 19), is a novel disease of worldwide concern and has developed quickly into a public health crisis. Since its beginning it has spread universally at an outstanding rate and is a reason for serious morbidity and mortality around the world. It is brought about by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which is a single-stranded RNA virus of 60–140 nm, belonging to the  $\beta$ -Coronavirus genus. It is known, to exploit angiotensin- converting enzyme 2 receptor (ACE2), which is found in the lower respiratory tract.

The infection is transmitted through droplets, and the spread for the most part happens through coughing, sneezing, and salivary contamination. The spread of contaminated droplets happens through contact with tainted subjects, with or without clinical indications of COVID 19. Past observational examinations have revealed that even an asymptomatic patient in the incubation phase or healthy carriers can transmit the virus.

The human-to-human transmission of COVID 19 made an alert with the expanding number of cases detailed around the world. The basic concept in method of viral transmission is chiefly through inhalation/ingestion/direct mucous contact with saliva droplets, respiratory liquids and aerosols; they can likewise survive on surfaces, objects that are presented to tainted body liquids. Since the viral burden contained in the human saliva is high, it might fill in as a possible wellspring of disease.

Inferable from the idea of the dental systems and medicines, dental office is by all accounts at high danger for this nosocomial contamination and dental specialist are considered at high risk. Dental specialists are often the first line diagnosticians for oral sicknesses, and are in close contact with patients. To take significant actions against this awful illness, Centre for

Disease Control and American Dental Association has raised an alert and recommended a several interim guidelines to be followed in dental practice. Dental specialists have been recommended to take a few individual protection measures and stay away from or limit airborne creating activities as a stage to control the spread of disease.

In India, several active cases and deaths has been accounted for and the information is changing at a disturbing rate each day. The current technique for infectious prevention depends on control measures. In this manner, a few nations, including India have executed lockdown approach for movement control order (MCO) to forestall the infection spread and break the chain of quick transmission from people to people. The critical impediments of clinical exercises and lockdown in dental area has addressed an effective measure on economy of the area. In any case, overall, this extraordinary mediation has made it conceivable to ensure the wellbeing and security of residents and contain the exponential spread of the Covid.

Contemplating the seriousness of the COVID 19 pandemic, and the interim guidelines by health authorities and dental associations, it is essential that dental specialist may practice carefully and be arranged once the training resumes. Execute sound avoidance measures in dental centers and enhance their clinical practice to the changing patterns to guarantee safe and hazard free practise.

### **Clinical management during and after COVID 19 pandemic:**

#### **a. Before dental procedure**

1. Ensure security of staff by getting them inoculated, flu shots, and furthermore orchestrate PPE for them.
2. Office set up – Remove all the messiness and things from the training that can't be cleaned effectively, like magazines, reading materials and different items.
3. Ensure that there is adequate amount of PPE kit and sanitizers important for cleanliness care.
4. Print and spot signage in dental office for teaching patients on standard proposals for respiratory hygiene and social distancing.
5. Schedule appointments with no less than 30 mins between patients to limit conceivable contact with different patients in the lounge area and sanitize the whole working region.
6. Request patients to come alone and accompanied only if the patient is a youngster/compromised/older patient who can't come alone.
7. History of movement or any exposure or symptoms with COVID-19 should be talked about on telephone or text before the patients comes into the clinic.

8. Train patients to brush their teeth just before they show up for their arrangements.
9. Train patients to update their Arogya Setu App at home before appearance for arrangement.

### **OPD**

- Call just those whom you have screened and spoken on telephone.
- Appointments to be planned and divided to abstain from swarming the holding up region.
- For walk in patients - Ask them to call first on your telephone from outside the facility and asses them as you would have in telephonic appraisal prior to giving them access.
- For an emergency guest - Arrange your staff to triage them at the door with some actual obstruction like glass or plastic if conceivable. The staff should wear a decent quality cover, gloves and keep a separation of no less than 2 meters at the passage.
- Allow only one relative stringently inside the premises and stay away from that as well if possible.
- Ensure all strolling inside the center are wearing surgical mask or furnish them with one. Ensure cough and sneeze etiquettes are followed.
- Prepare your waiting area in such a manner where dividing for various patients can be kept up with without any problem.
- Remove all pointless things in the rooms like magazines, books and so forth
- Ensure hand disinfection of every one of those coming in.
- Avoid all pointless guests including Medical Reps.
- Keep facility all around ventilated consistently.
- Ensure more successive surface cleaning of waiting area with sodium hypochlorite solution particularly surfaces which are all more frequently contacted, for example, gathering table top, entryway handles, and so on.

### **b. Patient arrival**

1. Ask patients to wait outside the clinic or in their own vehicles and we will reach them when to come in.
2. Online enlistment form.
3. All patients if sitting in the waiting area should be wearing a mask and request that they utilize a sanitizer on appearance.
4. Disposable shoe covers should be set in the sitting area and all patients should take off shoes and wear them prior to entering the operatory.

5. Supply of tissues and no touch containers for removal in the sitting area.
6. Insist the patient to keep up with the appointment time stringently.
7. No handshakes with patient.
8. Record point by point history in waiting area.
9. Consent form for general and COVID19 to be taken in waiting area.
10. Front Desk/Staff ought to be isolated from sitting area utilizing transparent glass or barrier.

### **c. During the dental procedure**

#### **Hand Hygiene**

1. As a part of essential quality requirements, training in hand hygiene ought to be important for staff enlistment and be given to all applicable staff inside dental practices periodically throughout the year.
2. Hand cleanliness ought to be practised at the accompanying key stages in the sterilization interaction in order to limit the danger of tainting:
  - before and after every treatment session
  - before and after the expulsion of PPE
  - following the washing of dental instruments; need to utilize mechanical or ultrasonic washer/sanitization
  - before contact with instruments that have been steam-sterilized (regardless of whether these instruments are wrapped)
  - after cleaning or maintaining decontamination devices utilized on dental instruments; toward the finish of sterilization work.
3. Gentle cleanser ought to be utilized when washing hands
  - Bar cleanser ought not be utilized.
  - Apply the fluid cleanser to wet hands to lessen the danger of disturbance, and perform hand-washing under running water. Customarily, the hand-wash rubbing activity ought to be kept up with for around 20 seconds. After the activity, the hands should be visibly clean. Where this isn't the situation, the hand cleanliness method ought to be rehashed.
  - Drying of hands: Effective drying of hands subsequent to washing is significant on the grounds that wet surfaces transfer microorganisms more effectively than when they are dry, and deficiently dried hands are inclined to skin harm.

- To forestall recontamination of washed hands, expendable paper towels ought to be utilized.
- Skin care: Hand cream, ideally water-based, ought to be utilized to keep away from dried out or breaking skin. Common containers of hand cream are not alluring as the substance may become tainted and therefore become a disease hazard. Ideally, wall mounted hand-cream dispensers with expendable cartridges ought to be utilized. Any staff who creates skin inflammation, dermatitis or some other skin condition should look for guidance from general professional (GP) at the earliest opportunity.
- Fingernails ought to be kept clean, short and smooth. When seen from the palm side, no nail ought to be noticeable past the fingertip. Staff undertaking dental systems ought not wear nail polish and false fingernails.
- Rings, arm bands and wristwatches ought not be worn by staff undertaking clinical methodology. Staff should eliminate rings, arm bands and wristwatches preceding completing hand cleanliness. A wedding band is allowed yet the skin underneath it ought to be washed and dried completely, and it is desirable to remove the ring preceding to doing dental procedures.

**d. The patient treatment area**

1. Ought to be cleaned after each meeting utilizing disposable cloth or clean microfibre materials regardless of whether the region seems uncontaminated.
2. Areas and things of equipment local to the dental seat that should be scrubbed between every tolerant with 1% sodium hypochloride or 70% alcohol include: nearby work surfaces; dental seats; restoring lights; assessment lights and handles; hand controls including substitution of covers; streetcars/conveyance units; spittoons; suction tools; X-ray units.
3. Areas and items of equipment that should be cleaned after every meeting include: taps; waste focuses; splashbacks; sinks. Also, cabinet doors, other uncovered surfaces, (for example, dental assessment light fittings) and floor surfaces, and washrooms, including those far off from the dental seat, ought to be cleaned every day with wet wiping containing a sanitizer. Spittoons and suctioning units should be sanitized completely toward the finish of a meeting as per manufacturers' instructions.
4. Things of furniture that should be scrubbed at week-by-week spans include: window blinds; available ventilation fittings; other open surfaces, for example, racking, radiators

and racks in cabinets. Disposable single-use covers are accessible for a considerable lot of the gadgets referenced above, including review light handles and headrests.

5. For disease control reasons, in clinical regions, covers ought to be given over PC consoles.
6. Intra-oral radiology film and gadgets utilized in digital radiology imaging are likely cause of cross-infection. In like manner, where reusable gadgets are utilized, they ought to be disinfected as per the manufacturers' instructions. For intra-oral holders, this will require the utilization of steam cleansing after washing and sterilization.
7. For blood spillages, care ought to be taken observe a protocol that ensures protection against infection. The utilization of hypochlorite at 1000 ppm available chlorine is suggested. Hypochlorite ought to be made up either freshly using hypochlorite-creating tablets or if nothing else week after week in clean holders. Contact times ought to be sensibly delayed (at the very least five minutes). A higher available chlorine concentration of 10,000 ppm is valuable, especially for blood tainting. The cycle ought to be started rapidly and care ought to be taken to stay away from destructive harm to metal fittings and so forth. The utilization of alcohol inside a similar purification measure isn't encouraged. The utilization of these is supported yet ought not be taken as a substitute for standard cleaning. Covers ought to be taken out and surfaces ought to be cleaned after every patient contact.
8. Keep the Airconditioning vent confronting upwards, utilization of airpurifiers with HEPA channels is suggested.
9. In the event that the dental seats are not six feet separated, 2 patients ought not be treated at the equivalent time.

**e. How to use / remove Personal Protective equipment (PPE)**

Surging global demand-driven not only by the number of COVID-19 cases yet additionally by misinformation, panic buying, and stockpiling— will bring about deficiencies of PPE internationally. The ability to extend PPE creation is restricted, and the current interest for respirators and covers can't be met, particularly if far and wide improper utilization of PPE proceeds.

In the event that essential PPE, including careful facemasks are not accessible, don't continue with any dental system, paying little heed to emergency/urgent patients.

**f. Patient precaution before starting dental treatment on the chair**

1. Request that patient flush the mouth with 1.5% hydrogen peroxide or 0.2% povidine iodine mouthwash for 1 minute.

2. ii. Decrease aerosol production by utilizing rubber dam for all systems.
3. iii 4 handed dentistry with high vacuum suction.
4. iv Anti- retraction hand pieces may give extra security against cross-contamination.
5. Autoclave handpiece for each patient (Prescribed to keep 5-6 extra handpieces autoclaved).

**g. After dental care**

1. In the middle of patients – cleaning and disinfecting surfaces and changing PPE as given previously.
2. Postoperative directions for patients-it is suggested that NSAIDS in combination with acetaminophen can in any case be utilized for the management of pulpal and periapical related dental pain and intraoral swelling.
3. Dental health care providers (DHCP's) should change from scrubs to personal clothing prior to getting back. After showing up home, DHCP's should take off shoes, remove and wash clothing (independently from other family inhabitants) and promptly shower.

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