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VIRUS ORIGIN AND EVALUATION WITH DATA ANALYTICS

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Abstract: This research aims to understand COVID-19 genetics, origin, evolution, virus origin, and management measures at the human-animal interface. We used the data visualization method and researched multiple peer-reviewed journal articles to study and analyze the Covid origination, evolution, and spread of the virus and impact the livelihood around the globe, impacting economic and sociological and understanding the sustainable risk reduction strategies. SARS-CoV-2 or COVID-19 is a novel coronavirus that started from Wuhan City in China. Coronavirus extends mainly from person to person through respiratory droplets, touching surfaces with a virus on them, and then touching the face, nose, or eyes. Due to the spread of the virus, a global economic and sociological hit has changed people's lives worldwide. A few sustainable risk reduction strategies include wearing a mask, social distance, washing hands, and avoiding crowds. This study definitively answers the question relating to genetics, origin, evolution, and the management of COVID-19. Advance studies are needed to establish the proper action to stop a deadly virus from outbursts globally. The government, state, community, and individual need to learn and act from their level to prevent another pandemic.

Keywords– Covid-19, virus, origin, risk, data visualization, data analytics, spread, pandemic, evolution, footprints, world health organization (WHO), Sociological impact

1. INTRODUCTION

Human civilization is breaking barriers and leaping forward to new ways of thinking each day with ingenuity, advanced technology, and being human. A few days ago, NASA designed and landed a helicopter that could fly autonomously on Mars; if that is not amazing, what will be? With all the technology globally, globalization has become second nature people across the world are traveling quickly goods are moving across borders smoothly. Due to all the above statements, our world has become a global village. With this rapid lifestyle change, we humans are also changing the planet we live in by destroying the forest for more land, consuming more food than creates an imbalance in the ecosystem. We forget that this planet is home to other creatures, and if we try to go against the ecosystem, nature punishes us. Nature has shown her power to us on many occasions in the form of deadly pandemics, but we are still not learning. Severe acute respiratory syndrome (SARS) was discovered that was deadly, and infectious diseases spread to 26 countries around two decades ago. By the end of the pandemic, around 8099 cases and 744 deaths were reported by WHO. The SARS agent is an RNA coronavirus, never seen before in humans and SARS-CoV (1). SARS was also a deadly virus because of its changes in strain, resulting in increased virulence due to coughing and sneezing, which was the transfer method for the virus and to infect and reproduce, thus transferring to a vast pool of people. A short description of SARS was necessary because it leads us to this paper's core topic. One such pandemic occurred in recent years, which halted people all around the world, this virus is so dangerous that it locked the whole world for months and months, and still, the society is not fully functional. COVID-19, also known as SARS-CoV-2, is a novel virus that means it is a new strain that humans have not previously identified. COVID-19 RNA virus belongs to the same coronavirus family as SARS and shares 80% of the genome. We know that people's death rate was less than a thousand in the case of SARS, and it was affected in 26 countries with the case- fatality of 10.9%. However, according to Google's COVID-19 alert, to date, there are 111 million cases, 2.45 million death, and 62.4 million recovered patients around the whole world: Moreover, the incubation period for COVID-19 is slightly more extended than SARS. The reason for comparing two viruses is simple to show there had been a deadly virus that had affected people's lives around the world. Still, after 20 years, we did not learn from it to have another massive pandemic that will live long in people's hearts and minds. Understanding this virus is essential because we know how it has affected our lives economically, socially, and personally. There are various valid data on the internet to investigate the virus, but most of them are in written form, which is impossible to gather. In this research paper, we would like to explore and understand COVID-19 with the help of data visualization tools to bring a graphic representation of the data and get some insight into the issue's depth. To complete the paper's data visualization, we will focus on how COVID origination, evolution and spread, impacts on livelihood and temporally diverse, economic & sociological effects, and finally, risk reduction.

2. BRIEF INTRO OF DATA ANALYTICS

The concept of visualization and analytics can be traced back to the earliest humans' paintings in the cave or the first maps to explore the world; with advancements in technology, we have taken data visualization into another paradigm. In simple words displaying abstract things or processes into graphics and images is visualization. Data visualization is the theory, method, and technology that transforms data into graphics or scenes and interacts with computer graphics, graphics processing, and virtual reality. Data visualization enhances the traditional display ways of text, table, and icon; moreover, it also improves the processing and interpretation of data. In addition to that, we should understand that data visualization is a collection of algorithms and a

methodology. The data visualization method collects test data, test data transmission, test data analysis and processing, test data display (visualization), and test data storage. Various forms of data require a correct style of representation, and to complete that task, visualization techniques can be utilized. Some of the data visualization techniques are geometry-based technology, icon-based technology, pixel-based technology, hierarchical technology. Geometry-based technology represents the database's data by geometric painting or projection; likewise, icon-based uses a simple icon to represent the n-dimensional data attribute. Some examples include shape, coding, figures. Similarly, pixel-oriented technology where each data item's data value corresponds to a pixel with the color where various windows represent diverse data attributes. Like the word hierarchical, data are divided into sub-spaces according to the data structure and then organized and represented graphically.

3. WHAT IS A PANDEMIC/IMPACT AROUND THE WORLD?

According to World Health Organization (WHO), a pandemic is the worldwide spread of a new disease. Like seasonal flu, a pandemic can cause infection to all age groups across the globe. Moreover, pandemics' impact and severity are higher because many people are infected who lack pre-existing immunity to the new virus. The effect of a pandemic can be catastrophic initially. People are losing their loved ones, and, more importantly, people cannot visit the hospital of insufficient material to take care of people. Almost all the countries were in lockdown, which means people are out of jobs, food, and health conditions start to degrade. Developed countries struggled to provide health, financial, and daily living supply assistance; imagine countries not developed.

4. ORIGIN

The origins of the Covid-19 were noted when doctors identified human cases with severe flu symptoms in China in December. At that time, the authorities were not completely aware of the virus they were dealing with in their operations. In Wuhan, China, a food market was part of the retrospective investigation that China authorities had prioritized. Most of those identified and confirmed to have the virus were employees or workers at the market. The SARS-CoV-2 was identified as the cause. The location the virus first tested positive is believed Wuhan. The problem is identifying the source of the virus itself. Several sources have been identified.

The Wuhan market's employees' symptoms included aches, sore throat, headaches, and severe diarrhea. In several cases, severe symptoms led to chest pains and increased difficulty in breathing. Many scientists believe that the virus had an intermediary host that provided favorable conditions to host it. At that point, it was released to humans. It is not yet clear whether the host was a live animal or the variety of foods traded internationally from Wuhan.

The international Food Safety Authority Networks believe food might have had a role in spreading the virus, but it is still debatable proof that it might have been a primary host. The virus's ability to survive in the cold and harsh conditions of up to -21 degrees makes it easy to host animal food products destined for international markets. Various domesticated animals are also believed to have hosted the SARS-CoV-2 such as cats and dogs.

The genetic sequence and origins of the virus are pinpointed to Bats. They are best suited to be ecological reservoirs. The continuous linkage of the virus to animals is a constant trend that scientists are studying. It is estimated that 75% of emerging infectious illness is associated with animals. A large colony of horseshoe bats was discovered in 2017 by researchers from Yunnan Province in China. Experts found the SARS virus genetics of humankind in them after evaluation. Their report suggested that there is a possibility that a disease associated with the virus will break out shortly. They are proven right.

Many scientists have helped eliminate conspiracy theories that pinpoint scientists in a laboratory made the virus. Some experiments point to the "zoonitic" animal origin that the SARS-CoV-2 has. Experts, therefore, eliminated any artificial association. The study of the "genome" of the Covid-19 does not show any manipulation or modification of the genetic elements that make up the disease's backbone. A search for a genetic signature that shows a human and mainly a laboratory origin does not exist.

The genome making up Covid-19 is like past coronaviruses associated with past cases such as the NL63(HCV-NL63) identified in 2004. Currently, scientists have identified only seven types of coronaviruses, all affecting either animals or humans. The remarkable comparison in the genomic architecture of Covid-19 and other bat viruses has led to the conclusion that they evolve from bats. They have discovered that an animal-specific coronavirus can become to attach and infect human beings. The current 2019-CoV identified in China has never been found before.

Therefore, it is likely that the cause of Covid-19 will point to the bats that have also caused known deadly viruses such as Ebola, Nipah, and Rabies. The continuous change of the strain and genetic makeup that caused Covid-19 has caused new scientific community challenges.

The spikes discovered on the surface vary in the seven different strains of the virus. Scientists have found a new tension in South Africa known as the B.1.351 independent of the standard B.1.1.7 discovered in October 2020 (Parida et al., 2020). It shows a challenge of mutation that might prolong the fight against the virus. The dominant cause of the virus that stands out is the bat theory, but it will remain a theory with the rest until proven comprehensively. Communities must continue to practice hygienic ways and wear a protective mask whenever they venture into the public until a reliable anti-virus is obtained.

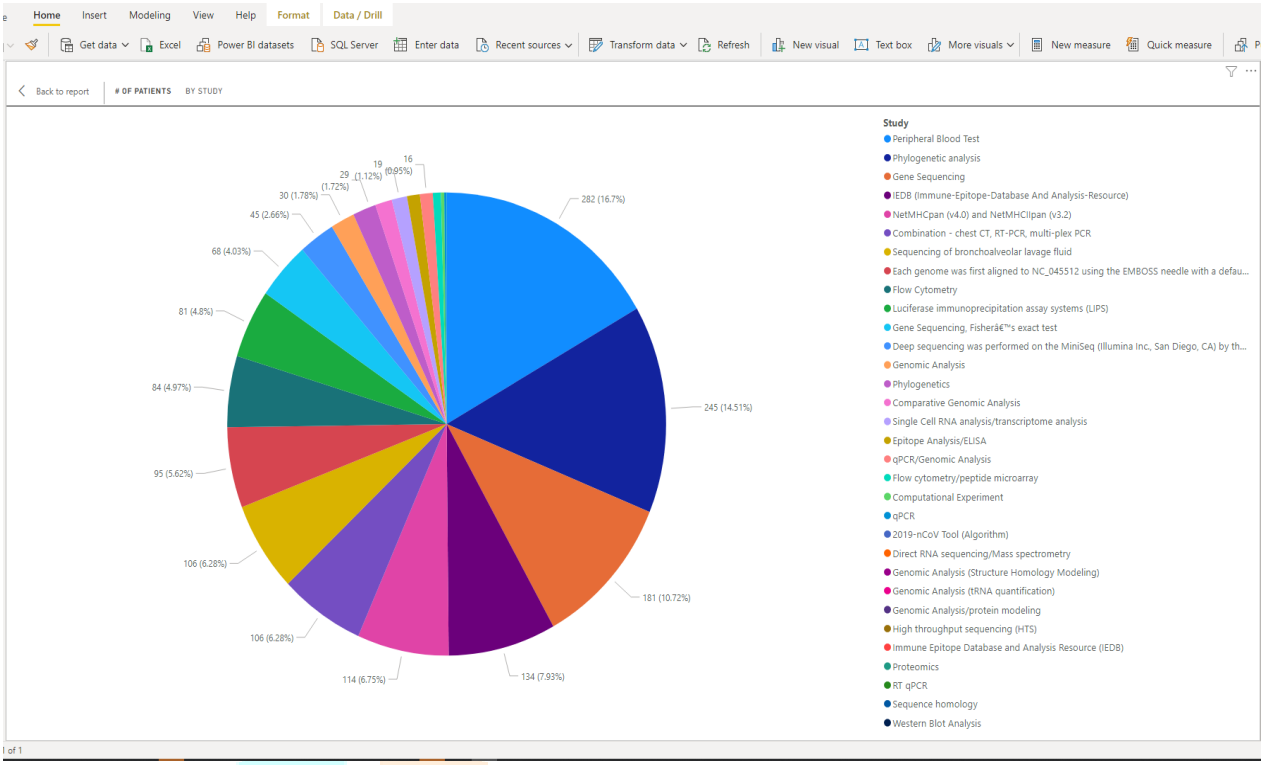

Fig Adaptions (mutations) of the virus among patients

5. Evolution and Spread

We know that the COVID-19 initially started from mainland China, but people's constant movement from one geography to another results in genetically distinct variants. According to the John Hopkins medicines, modification of viruses occurs when there is a mutation to the virus's genes. It is like the RNA viruses like coronavirus to evolve and change. It is familiar with the flu viruses; it gets recommended to take flu shots every year to change its structure. Moreover, the spread is rapid because each strain differs from another; for example, multiple SARS- CoV-2 coronavirus variants are different from those first detected in China.

Moreover, a mutated version of the coronavirus caught in Southern England known as B.1.1.7 was standard in the UK. Various variants have emerged in South Africa, Brazil, California, and other areas. The mutant change in the virus from the UK has 17 genetic changes and is more contagious, even scarier B.1.1.7 affects the coronavirus spikes protein that covers the outer coating of COVID-19. These proteins help viruses attack the nose, lungs, and other body areas, causing COVID-19 illness. The John Hopkins study shows that it makes people sick, but there is no evidence to show that it can cause severe disease or death. We can learn that the strain of COVID-19 is dangerous, and its features are to change and evolve and create more damage. Reading various articles, the currently available data on the pandemic is subject to more considerable uncertainty. The virus spreads through drops in the air, sneezing, couching, and having close contact. The gestation time for the virus is five days and can stay on the surface for a more extended period.

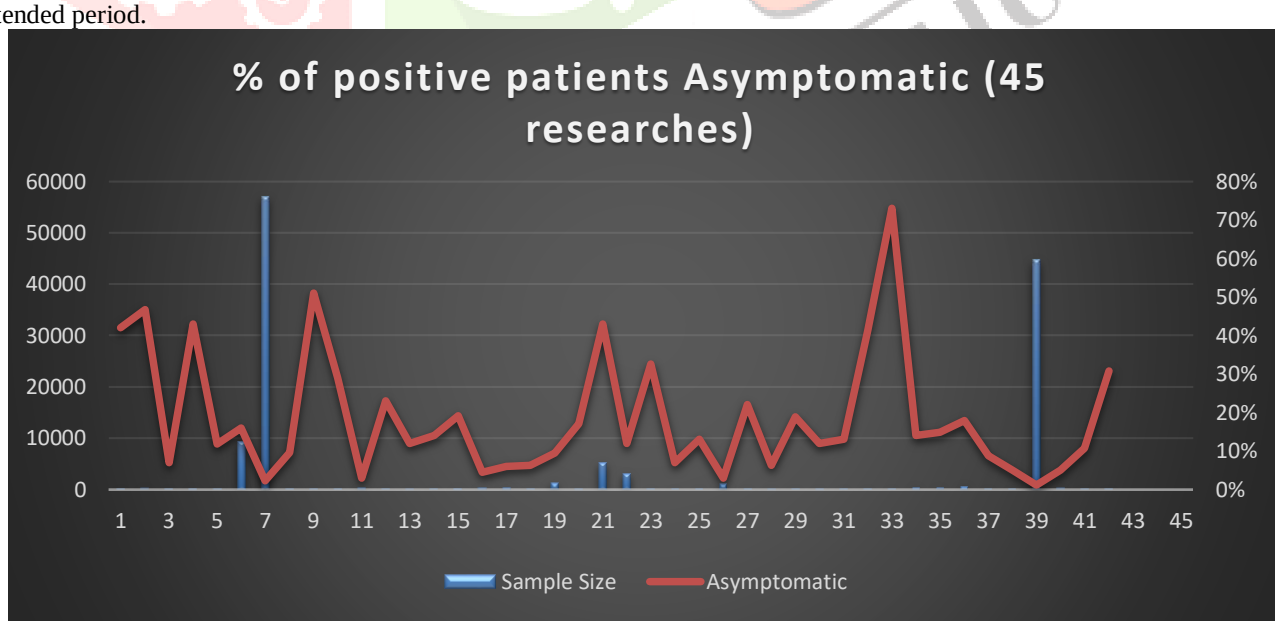

Fig Positive patients being asymptomatic

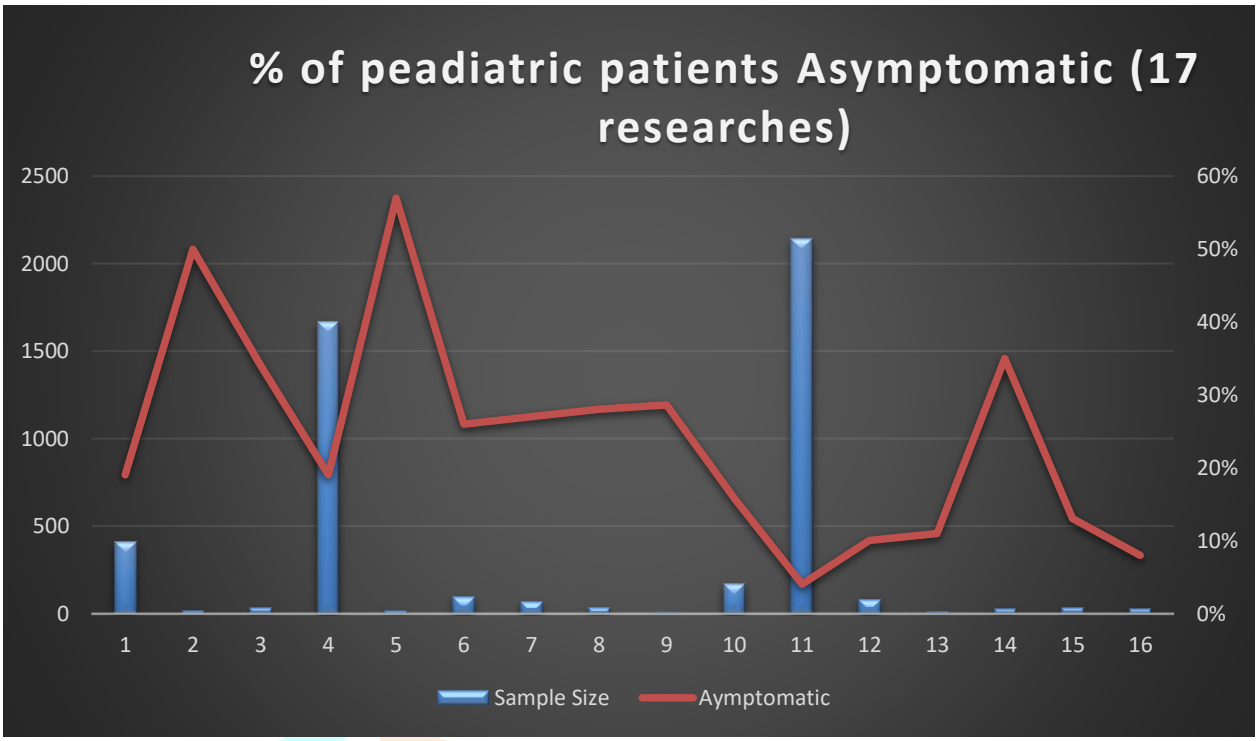

Fig Pediatric patients being asymptomatic

6. IMPACTS ON LIVELIHOOD AROUND THE GLOBE

The current pandemic has caused the world to lockdown. COVID-19 continues to impact people globally. It has been catastrophic to the lives of humans and animals alike. The widespread disease has taken a million lives globally and is continuing its variants from different countries. The fear of living in this environment has caused people to go into depression from hearing tragic news every day of death, and the number of cases spike. Life has not been the same ever as the inception of COVID- 19. The agriculture industry, like all the industries, has been badly affected by the pandemic. Since the food is necessary to survive and farmers testing positive from the COVID has resulted in the shortage of food supplies. The livestock sector and its related industries have been affected badly. Sanitary rules on animal care are taken critically, and that has lessened the supply of livestock. Economies and social demographics have been badly affected, and it continues to do so. Even after the pandemic is over, these impacts will remain for a few years at least. Since the livestock and the crops will be tested before they are sold for consumption, there is a shortage of supplies everywhere.

6.1 Evidence that livestock could be infected (e.g., field surveillance, genetic sequencing, receptor binding) and serve as a reservoir after the epidemic appears to be over

Covid has encompassed infections with a vast, single-abandoned RNA genome of positive polarity. Although various Covid's have been distinguished in creatures or people, two β-Covid's that arose in the previous 20 years are astounding: severe, intense respiratory disorder Covid (SARS-CoV); and Middle East respiratory condition Covid (MERS-CoV). Both infections began from bats, yet have adjusted to different creatures, for example, palm civets6 or dromedary camels, from which inconsistent or supported overflow contaminations happened, bringing about bountiful (on account of SARS-CoV) or restricted human-to-human disease chains (on a report of MERS-CoV).

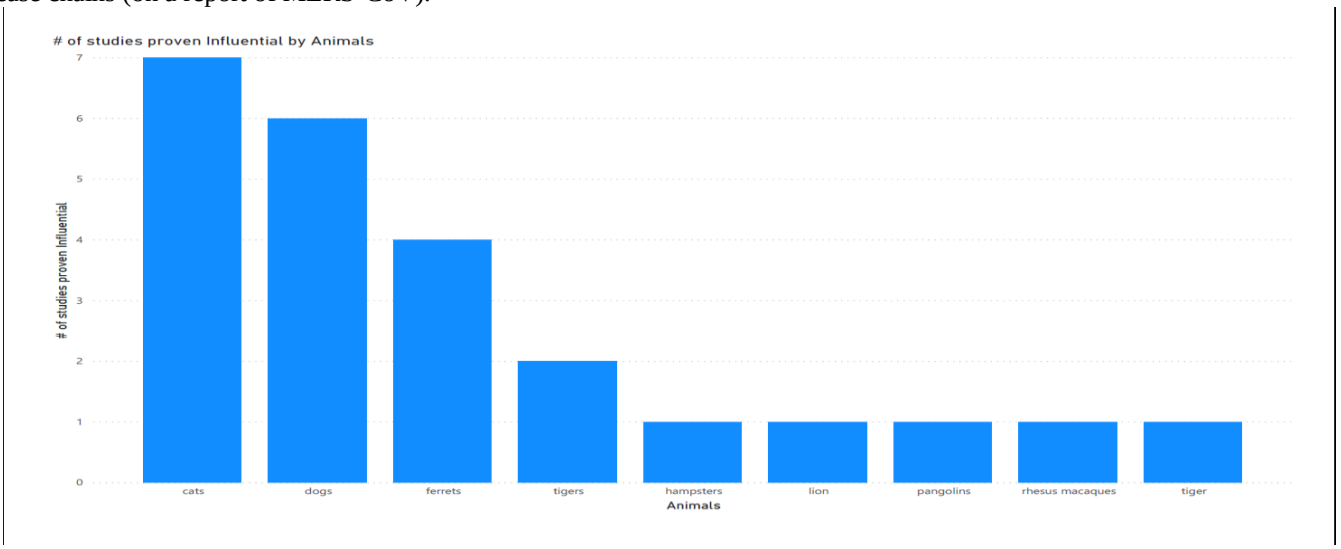

Fig Evidence that farm animals can be infected and maintain transmissibility (76 animal species)

A few inquiries concerning creatures' powerlessness emerge from the probable bat repository given the zoonotic beginning of SARS-CoV-2. To begin with, how defenseless are putative supply has like bats? Second, what is the danger of conceivable overflow

diseases from people to cultivated creatures? Lastly, what animal would fill in as appropriate creature models of human contamination to examine antivirals and immunization models?

Given sub-atomic examination discoveries, the ACE2 proteins of non-human primates, pigs, felines, and ferrets intently take after the human ACE2 receptor. This way, these species may be defenseless to SARS-CoV-2 disease, as has been appeared for SARS-CoV.12, Bats, as a significant repository host of β-Covid's and particularly SARS-CoV-related infections, should be additionally concentrated to see better widespread replication, shedding, and transmission or steadiness in a putative supply have animal categories.

6.2 Evidence of whether farmers are infected and whether farmers could have played a role in the origin

The agribusiness says fears are misrepresented, while analysts say organizations are imperiling general well-being. Numerous scientists stress, and the discoveries add new criticalness to their interests, that the bountiful utilization of anti-toxins on homesteads is disentangling our capacity to fix bacterial diseases. This most recent exploration, researchers presently say, shows protection from medications can spread more generally than recently suspected and solidifies joins in the obstruction chain driving from animal homestead to the human table.

The legitimate and illicit exchange of natural life for food, medication, and different items is an internationally critical danger to biodiversity, liable for the rise of microorganisms that undermine human and animal well-being and our worldwide economy. Trade-in wildlife probably assumed a part in the inception of COVID-19, and infections firmly identified with SARS-CoV-2 have been recognized in bats and pangolins, both exchanged broadly.

6.3 Surveillance of mixed wildlife- livestock farms for CoV-2 and other coronaviruses in Southeast Asia

Branch of Wildlife and National Parks Peninsular Malaysia, or Sabah Wildlife Department at the hour of testing or Sabah Wildlife Department at examining. Most seizures happened close to public lines or ports and were accounted for to be bound for other Southeast Asian nations in transit to China and were generally found in sacks or cases in transitory holding offices or vehicles. The wild-safeguarded Sunda pangolins were given up by open individuals who discovered them in their local environments.

6.4 Experimental infections to test host range for this pathogen

Multi-host infections have a more confined host range than multi-host microbes. Various analyses of microorganism wealth variables per have species and the microbe qualities related with a more impressive host range and zoonotic potential. Many critical human microbes are multi-host microorganisms ready to taint other pathogens. Portraying the overall examples of host-pathogen relationships across microorganism taxa is imperative to comprehend hazard factors for human sickness development. Notwithstanding, there is an absence of far-reaching curated information bases for this reason, with most past endeavors zeroing in on infections.

6.5 Animal host(s) and any evidence of continued spill-over to humans

Arising, reappearing, and endemic zoonotic illnesses proceed to generously trouble worldwide wellbeing, especially where thick human populaces and pressing factors on ecological and monetary assets are most prominent. More than one billion instances of human zoonotic sickness are assessed to happen yearly, and novel arising zoonoses have brought about many billions of dollars in monetary losses. Given the wide variety of creature life on our planet, it isn't astounding that creatures are the wellspring of most human irresistible illnesses, with hundreds of years of personal contact with trained species encouraging the early transmission of the most versatile microorganisms to humans.

7. ECONOMICAL AND SOCIOLOGICAL IMPACTS

Impacts on the economy happen due to various reasons. Everything that happens at a high level will directly impact the economy and society. These at times made extensive support and benefit to the economy through its research to the community and its positive economic impact.

It has turned out to be a pandemic; there has been an enormous impact on the market and the countries' economies because they are still struggling to come back to normal. The COVID strain spread like anything, and it started to impact the nations, and people are fighting for their lives. People who encounter others are getting affected and flattening the rise of the curve of the COVID impacted people. Countries came together and shut down for two weeks resulting in the loss of jobs for many people. Eventually, moved the organizations, social enterprises, co-operatives, and associations.

Some of the features of the best economic practices to handle situations at these times are to maintain the knowledge exchange in both ways between the users and researchers to collaborate to share ideas, experiences, and evidence. By building on the local roots and making the use of democratic governance with the help of participation.

On the other hand, due to the Covid-19 pandemic, it was time to reconsider the economy's re-balancing resilience and efficiency. Before the economic and social impact of the pandemic, the social economy was diverse back then. Still, after that, it was evident that social-economic can play a better role in getting around the economy and social norms with a more sustainable economy. In the survey on the foreign direct investment on some accounts, the information has clearly shown that the equity has a positive response and enough loyalty to the relationships and the charges.

Several industries have been impacted, such as food and beverages, metal industries, oil and gas industries, and some manufacturing industries across the globe. And demand has wholly shifted from focused things to the pharmacy, medical, and some manufacturing industries. There are some positives to be remarked here that due to the low economy and revenue flow has been paused, the banking sector organizations have provided a low rate of interest to the people based on their needs. Furthermore, there

was a very high imbalance of the demand and need during the initial phase of the pandemic. After a decade, this has been the income inequality period, and this has slowly started to turn towards global poverty.

Due to the pandemic, 32 percent of trading declined, and countries are doing their best. Airline industries have gotten the worst impact out of all the industries, and the government has come together to save them from bankruptcy. The other positive note is that the world has become better at breathing air and recovering the ozone layer with the shutdown of cars and power plants that produce much pollution.

From various surveys, the pandemic due to COVID-19 has resulted in the massive compound of job loss, scarcity of food due to lockdown, insecurity in the houses due to multiple reasons, and debt accrual started to grow. Some racial differences have lit up fire among the racists, and people came out to let racists hear their voices. This can quickly spread the COVID strain due to large gatherings, even though it was in an open area.

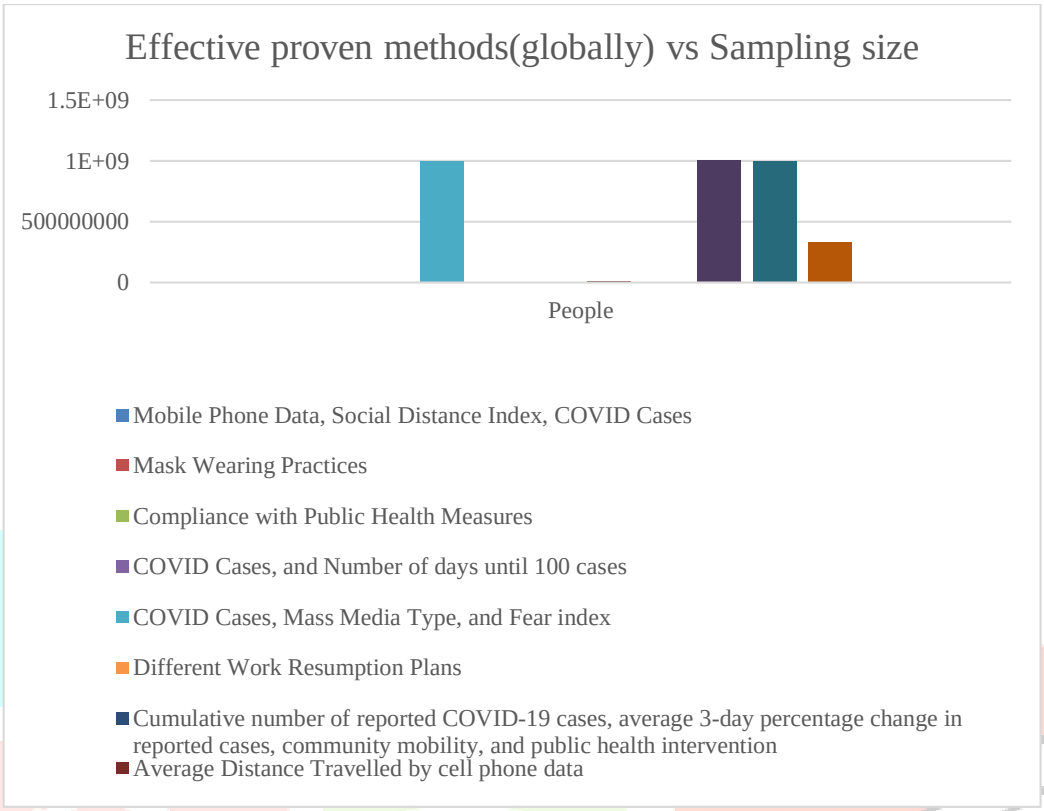

Fig. Effective methods change the scale

8. DESIGNATED AS A "PANDEMIC" OF 21ST CENTURY -FOOTPRINT OF COVID PRESENCE/ CASE STATS/DEATHS VS. RECOVERIES

Pandemic is the large scale of infectious diseases which increase over the world in the 21st century. It affects the economy, society, and politics on the planet widely. The consequence of the pandemic extended impact on the community and economy of the world. World health organization (WHO) declared the coronavirus as a pandemic on March 13, 2020. Pandemic pushed humans into the global crisis. In current history, the pandemic has a spatial extent, rapid onset, and complexity in travel, food, economy goes down. Until 29, April 2020 the pandemic spread around 213 countries, territories, and five various WHO regions. As a result, the death ratio went high. The prevention of pandemics also becomes a high priority. Considering the significant impact on all the components earth system, escalating and assumptions related to the changes and consequences of the Covid-19 are still under study.

COVID-19 is a contagious infection caused by a newly discovered virus. Highly people infected with the COVID-19 virus will experience mild to moderate respiratory illness and recuperate with no particular demanding medication. Adult people with underlying medical problems like cardiovascular disease, diabetes, chronic respiratory disease, and cancer are more likely to develop severe illnesses.

The best route to avoid and reduce speed down communication is to be notified appropriately on the COVID-19 virus, the illness it causes, and how it spreads. Keep by hand and others from infection by washing your hands. Also using an alcohol-based rub frequently and not touching your face.

The COVID-19 virus spreads primarily through droplets of saliva or discharge from the nose when an infected person coughs or sneezes, so it's essential that you also practice respiratory etiquette, for example, by coughing into a flexed elbow.

Footprints of COVID-19 presence are as follows. Early in March, WHO (world health organization) declared the Covid-19 as a pandemic and requested the world follow the social distancing until there is no vaccine or medicate available. As per WHO, at the primary level, social distancing is only the source to save the people from Covid-19.

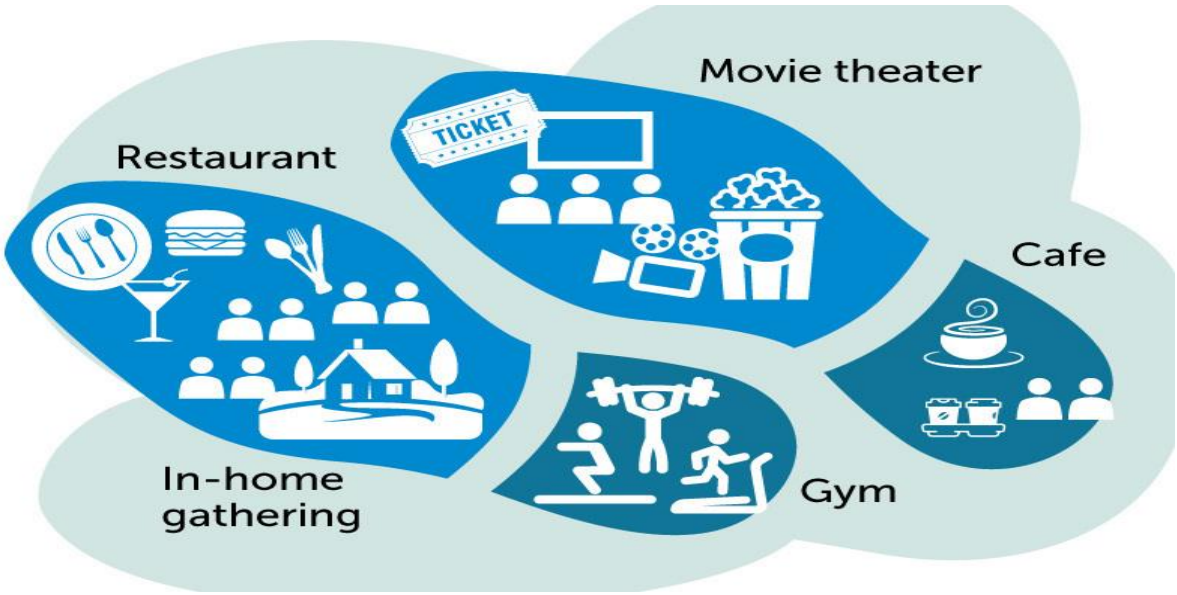

Fig Footprints of Covid

- Daily publication location pointed as a leading resource of the virus to spread among the people.
- There was no travel ban in the countries of the primary origin of Covid-19 like China, Italy. There was no ban for international or domestic traveling until the end of March 2020. People are continuing to travel into the flight, metro, and subways.
- People are gathering into the movie theatre, restaurant, café, or gym, which folks can skip for few times. Offices, schools, banks are continuing to work, ignoring the seriousness of Covid-19.
- People had to get together in-home for the party, birthday, or anniversary celebration. As a result, the pandemic ratio goes high, and it's spread around the world very quickly. It has spread rapidly worldwide to various countries like Italy, the USA, Canada, United Kingdom, India, etc.
- The graph shows that the total cases per 19, February 21 real cases reported are 110,841,374, recoveries are 85,789,877, and total death cases worldwide are 2,452,625.

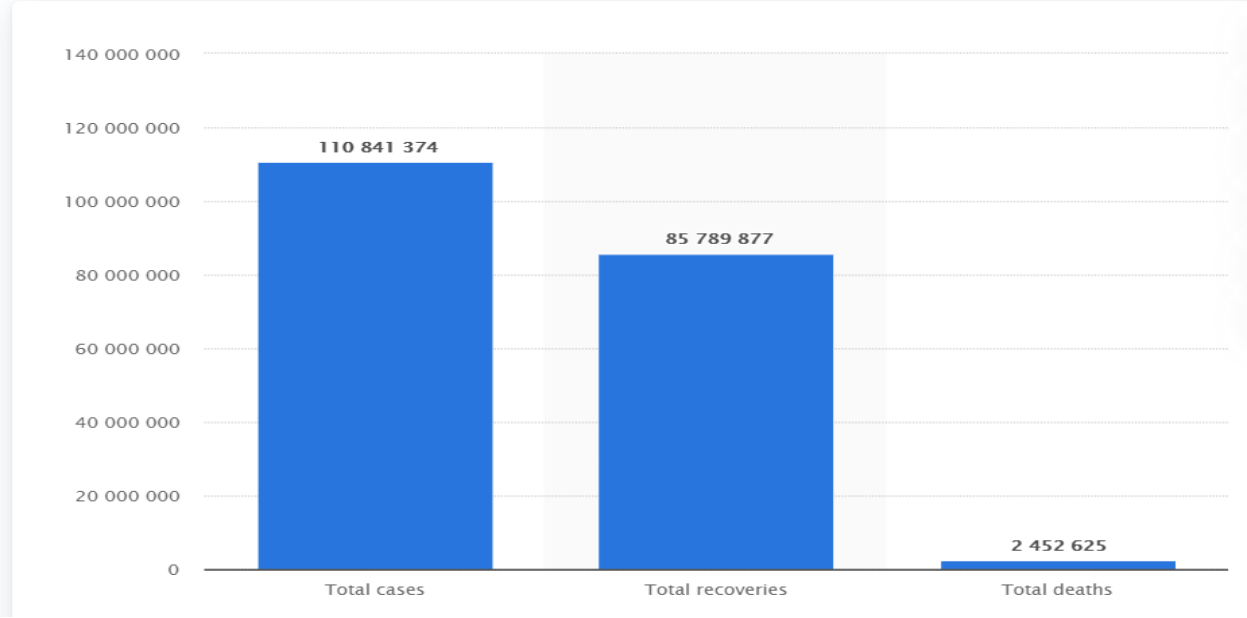

Fig Risk reduction or sustainable risk reduction strategies

The following fig represents various ways how to reduce the risk from Covid-19. The image moves from safe to high risk. The figure below represents some information we must keep in mind while moving outside for groceries or medicine. Some additional information informs through examples. As shown in the above graph, the number of pandemic patients' recoveries, several effective ways to help the folks save themself from encountering the pandemic. Mask is mandatory in a public place. Especially in the grocery store. In a public place, and only a limited amount of people allow to be gathered. First, of only five to six, the ratio went up as the number changes in pandemics. Social distancing is another effort to save yourself from the virus. Keep the least amount of six feet of distance from others. Try to breathe normally to avoid coughing and sneezing in public. The outdoor location is the best for fresh air. If the site is indoor, avoid staying in a small indoor room with poor air circulation. Only bring and touch your food; avoid sharing the plate, utensils, and cups. Try to eat fresh and hot food. Lastly, prevent the gathering. Only household members gather for the party, birthday, or family function. Try to join with others using social media.

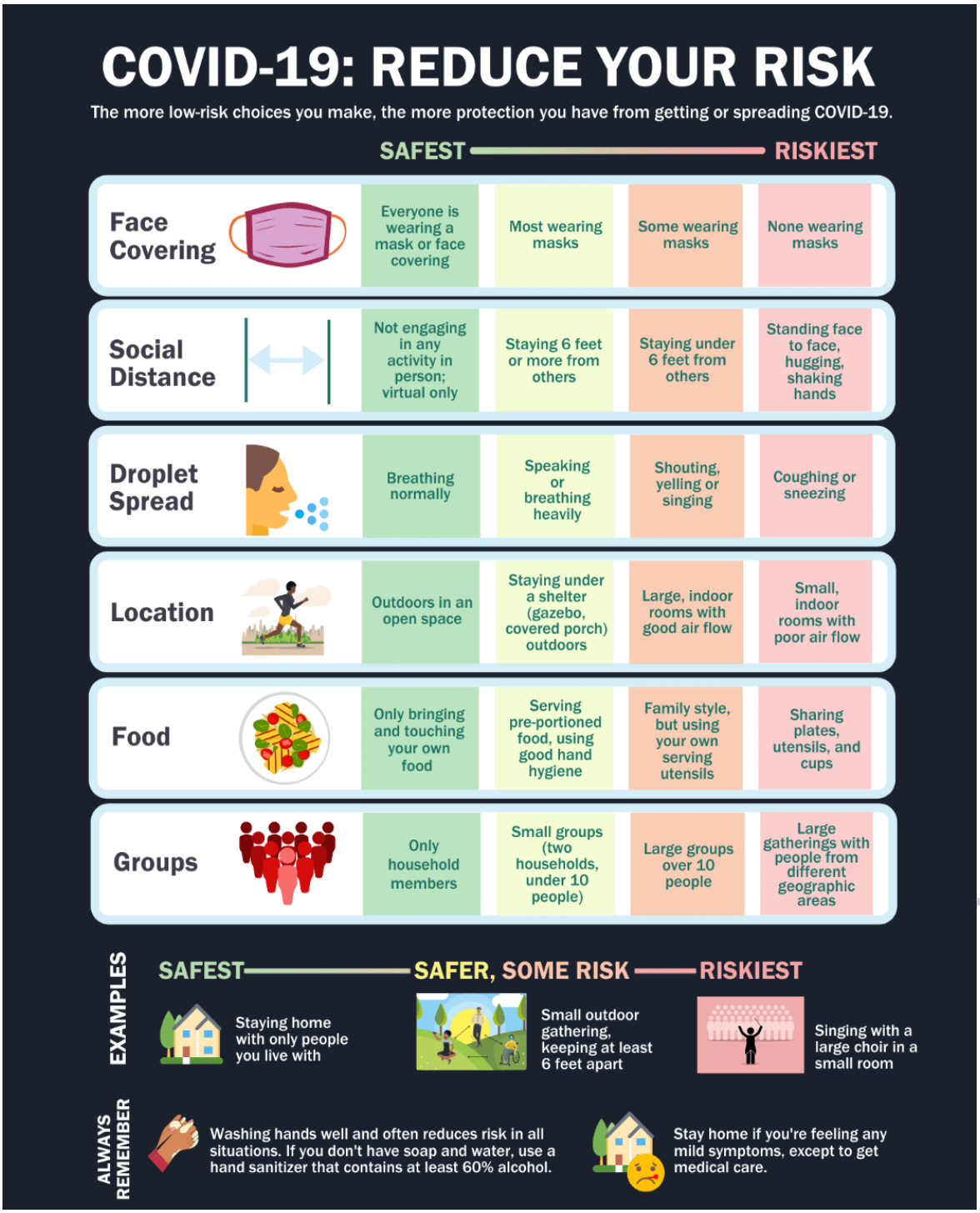

Fig Reduce the risk guideline

- As shown in the figure covering, social distance, droplet spread, location, food, and groups are the main categories that reduce the risk from Covid-19.
- Besides, do not go outside without need; use the online system to buy groceries and isolate yourself if you have symptoms resembling Covid-19 symptoms.
- Get the vaccine, flu shot, drink hot water regularly, sanitize your hand often or wash your hands for 20 seconds can reduce the risk of Covid-19.

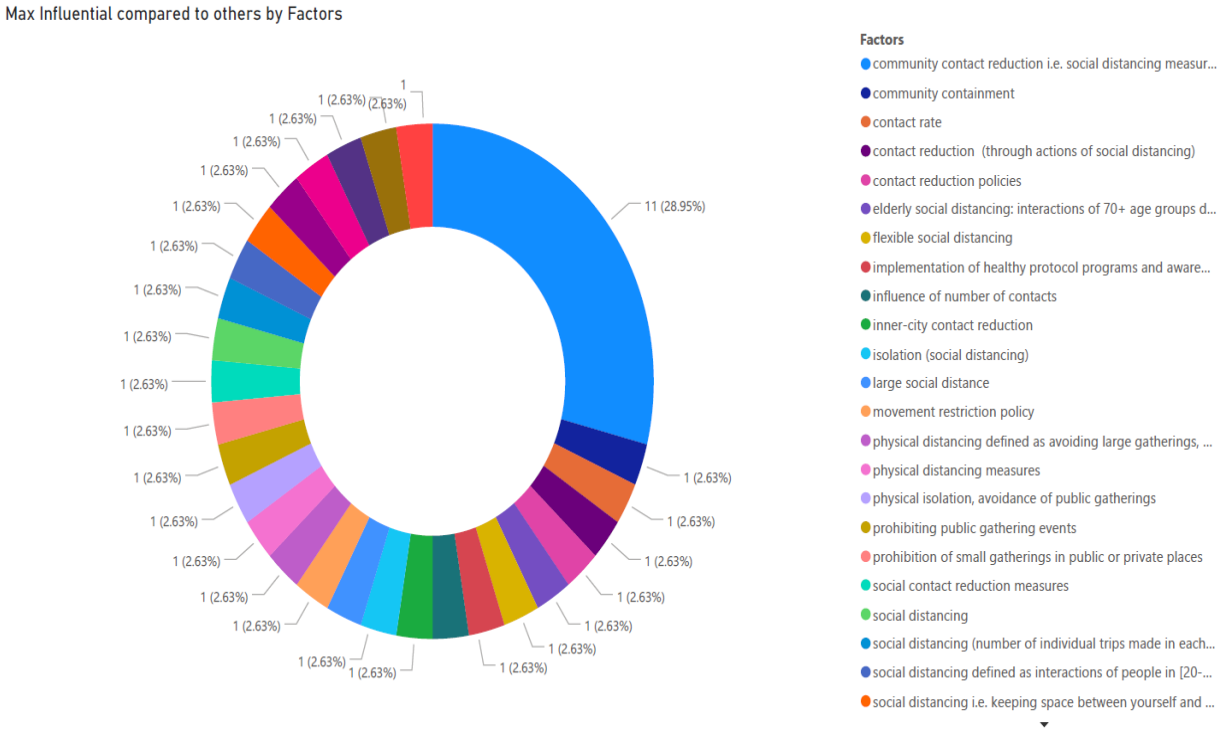

Fig Effective methods to contain community spreading

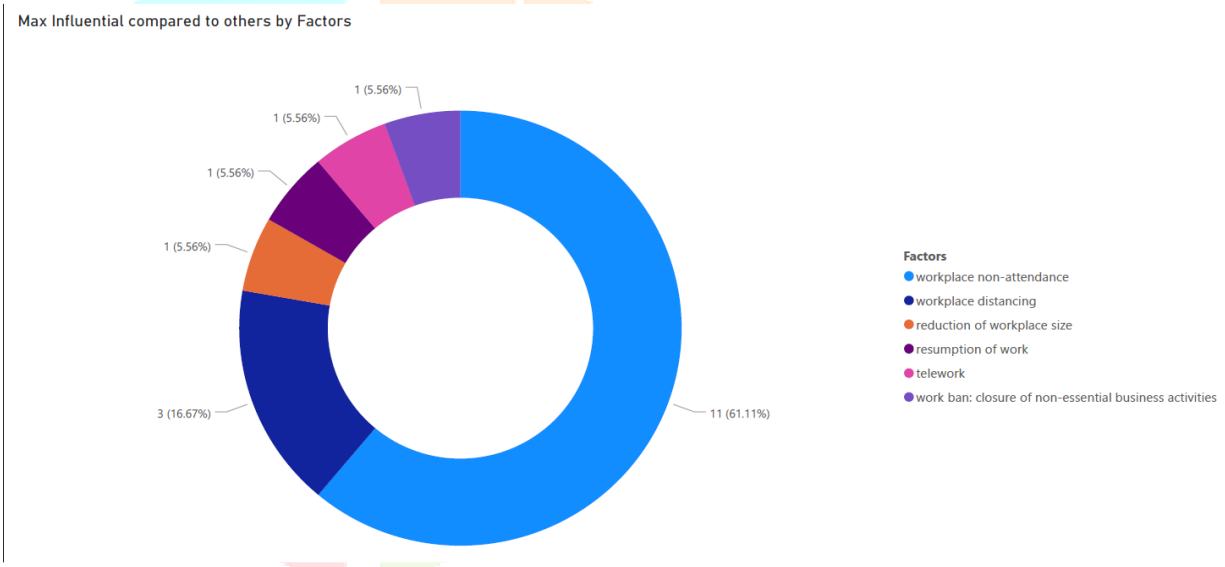

Fig Effective workplace distancing to contain spreading

8.1 Further Recommendations

While many factors are influencing Covid, and constraints are being discovered in various geographic locations. The ability to contain the mutation and spread has been challengeable ever before. Thanks to the proven effective vaccinations, the further recommendation of this research is to look deeper into how something like COVID-19 can be detected in its earlier stages, effective methods to contain before it could become a global pandemic. Besides, it almost took more than 15 months to produce a vaccine, so there is a big room for improvement in this space as every life matter.

9. CONCLUSION

This research can provide inputs on Covid origin, mutations in existence, and evolution as part of this research. The paper also efforts to shed light on the current demographics on the Covid spread by various data visualizations built on the real-time Covid dataset provided online to all the data enthusiasts. With data visualizations in place, one can easily intercept the footprint of the virus, mutations, risk factors, and how effective are the containment techniques currently being adapted.

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