

Part-1

Impact of covid-19 and lockdown on environment

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Introduction

Covid-19 or Coronavirus disease-19 caused by SARS-CoV-2, a novel infectious disease originated from China became pandemic and to stop spread of corona virus total lockdown of India was imposed. As human activities were less, it showed positive impact on environment where NO₂ reduction leads to reduced air pollution and halted industrial work leads to reduced water pollution. During lockdown, animals spotted in roads freely where they never dared to go. Lockdown impacted negatively on human life like their health also their daily life and economy.

Objectives

- To study the impact of lockdown on positive and negative sides of environment.
- To know the impact on human health and their behavior.
- To understand the impact of lockdown on wildlife animals.
- To cover the impact on various economy factors due to covid-19 and lockdown.
- To know about the new normal and the learnings.

Methodology

Reading	Reading various articles about the impact of covid-19 and lockdown.
Gathering	Gathering information about the impact of covid-19 and lockdown on the environment, humans, animals and economics.
Summarizing	Summarizing collected information in an organized way.
Concluding	Concluding based on the collected information.

Impact of covid-19 and lockdown

On environment

"The most notable results are cleaner air, cleaner water, exceptionally low levels of rushing of people and visibility of hidden wildlife"

- Slow down of human activity shows a positive impact on the environment. Emissions and effluents from manufacturing and transportation have declined and observable evidence supports the elimination of air and water contaminants.
- Wildlife animals spotted on roads without human interference. They founded lockdown as peaceful one.

Impact of covid-19 and lockdown

On air pollution

Air standard in India was greatly improved due to the covid-19 lockdowns. Transport vehicles, industry, crop residues, waste burning and so on all contribute mainly to pollution. The amount of vehicles on the road was significantly reduced in the lockdown. The levels of nitrogen dioxide were also decreased drastically. In India, satellite data demonstrated a substantial decrease in particulate matter or aerosol (which are the major component of air pollution) after covid-19 lock-down over most parts of the world.

Impact of covid-19 and lockdown

On water pollution

“Water quality in India was greatly improved due to the covid-19 lockdown owing to reduced industrial effluents”

- **Status of rivers in India before lockdown:** Rivers in India are in a poor condition. Many rivers and lakes have been converted to sewage canals and are difficult to maintain in order to promote economic growth.
- **Status of Ganga river before lockdown:** The Ganga river became a wastewater and industrial waste disposal yard. Contribution of domestic sewages in the surroundings towns and villages in Ganga pollution is more than 80%. The treatment plant for wastewater does not meet the drainage requirements.

Impact of covid-19 and lockdown

On water pollution

- **Status of Ganga after lockdown:** The national lockdown was enforced where polluting industries were closed, the signs of improved water quality began to appear within 10 days. Based on real-time CPCB water monitoring data, water quality at some 27 different locations was found to be sufficient for bathing and fisheries out of 36 water quality monitoring stations established in different points of the Ganga river. Ganga water was confirmed to be suitable for drinking at Haridwar and Rishikesh due to reduced sewage and industrial wastewater.

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On human beings

“Covid-19: A global health crisis that is killing human beings, spreading human suffering, and reducing the lives of individuals”

- The covid-19 affects all sectors of the population and appears to be especially problematic for members of the most disadvantaged social classes, including people living in poverty, the elderly, disabled persons, youth and indigenous peoples. Early evidence indicates that poor people are suffering disproportionately from the health and economic effects of the virus.

Impact of covid-19 and lockdown

On human body

- The initially identified pneumonia-like virus is now known to cause significant damage to various vital organs and systems of the human body. The heart, brain, liver, lungs, olfactory system, toes and other things are included. The lung continues to be one of the most affected organ, and in many covid-19 patients, there are frequent irreparable lung damage that causes death.

Impact of covid-19 and lockdown

On human behavior and socialization

- Economic problems and job losses are one of the first human impacts of the pandemic. It impacted our economic, physical and mental health from family and friend's death to illness, emotional stress, anxiety, fear and mental trauma that almost all people are facing.
- The negative effect of individual isolation and social retrenchment are traumatic stress, confusion, and anger, all exacerbated by fear of infection, limited access to necessary supplies, insufficient information, or a risk of economic loss or stigma. Stress and anxiety can increase the consumption of alcohol as well as domestic violence.

Impact of covid-19 and lockdown

On human life

- The first case of covid-19 in India was reported on 30 January 2020 in Kerala. As of 5 July 2020, the Ministry of Health and Family Welfare has confirmed a total of 673,165 cases out of which 409,082 recovered (including 1 migration) and 19,268 died in the country.
- Covid-19 generated consumer demand for masks, sanitizers and soaps. Because of high demand, earlier there was acute shortage in supply of masks and sanitizers. Demand for PPEs, ICUs, Ventilators are also very high with the increasing number of cases.
- Burden on doctors and other medical professionals is extremely high with the very high risk of getting infection. Overload on police and housekeeping staff is also very high. Healthcare sectors are facing challenges in the diagnosis, quarantine and treatment of suspected or confirmed cases.

Impact of covid-19 and lockdown

On Indian economy

- India was highly destructive in terms of its economic effects of the 2020 corona viral pandemic. Indian growth decreased to 3.1% for the fourth quarter of the 2020 fiscal year, the Ministry of Statistics says.
- India has also experienced a pre-pandemic decline. And the current pandemic "has increased pre-existing risks to India's economic outlook," says the World Bank.
- Even before the pandemic, Indian growth had dropped since FY 2018-19, 8% in FY18 Q4 to 4.5% in FY20 Q2, India had experienced a pre-pandemic slowdown.

Impact of covid-19 and lockdown

On animals

- Lockdown measures that stopped people from leaving and shutting down shops and other businesses have seen animals travel free where they would not otherwise go.
- Animals who usually stay away from urban areas now have space for roaming as people stayed in their homes.

Impact of covid-19 and lockdown

On global wildlife trade

- A market selling wild animals in China, which focuses on the global trade in wild animals, was supposed to have caused the pandemic. In the aftermath of a first outbreak in Wuhan China placed a ban on all cultivation and sale of live animals that was supposed to become law at the end of this year.

Impact of covid-19 and lockdown

On the global animal husbandry market

- The demand for chicken and meat has fallen dramatically since the outbreak, because rumors were that the virus can spread by animal meat and chicken among the people.
- The Animal husbandry industries are divided into milk, meat, poultry, aquaculture, and other (insects) by type. The covid-19 pandemic is anticipated to significantly affect meat and poultry.

Impact of covid-19 and lockdown

On companion and zoo animals

- The SARS-CoV-2 coronavirus causing covid-19 is capable of hijacking cells through interactivity with a cell surface protein called ACE2 in many animals, including cats and dogs, tigers and lions have also been tested positive.
- In zoos, attention of humans are missing but other animals are also using their privacy completely.

Impact of covid-19 and lockdown

On Ganges dolphins and birds

- Dolphins found in the vicinity of Kolkata Ghats. After 30 years in the Ganga River the South Asian River Dolphins, also called Ganges Dolphins, have been found because of reduced water pollution during lockdown.
- The number of flamingos increased in Mumbai. The covid-19 lockdown resulted in the collection in Navi Mumbai of tens of thousands of flamingos.

Findings



Air quality improved with reduction of NO₂ and PM concentration.



Water quality has improved because of no industrial and human activities over the ghats of Ganga which made its water to drink.



Not only nature bloomed during the lockdown, animals too recorded their happy time by enjoying without any human disruptions all over the places where they never dared to go.

Conclusions/ Suggestions

New Normal: It will take longer time to vanish fear of getting infection (even when the vaccine will be available) and living life with new norms.

- There will be more approaches for home schooling and for institutes there will be online approach.
- Industries will show more interest in work from home(WFH) policies.
- Digital transformation will accelerate in other sectors such as online shopping demand and deliveries.
- Coming to the medical front, there will be health checks besides security checks.
- Wearing masks while going out from home and when coming back home, people need to bathe and wash their clothes. Washing hands and using sanitizer frequently to maintain hygiene and maintaining social distance to reduce infection.

PART 2 – DATA ANALYTICS FOR LEAN SIX SIGMA





Introduction

The Lean Six Sigma methodology focuses on reducing and eliminating waste, lowering defects in products or methods by using a set of quality management and statistical tools and improving customer satisfaction.



Objectives

The fundamental objective of the Lean Six Sigma methodology is the implementation of a measurement-based strategy that focuses on process improvement and variation reduction.

Lean Six Sigma seeks to improve outputs by identifying and removing the causes of defects (e.g., errors) and minimizing variability by using a set of quality management and statistical tools.

Lean Six Sigma & DMAIC (a roadmap)

It is a stepwise method for running a Process improvement project.

A process improvement is required to:

- Find biggest problems
- Diagnose current process
- Investigate effect of improvements

Define	Select project and establish objectives
Measure	Make the problem quantifiable and measurable
Analyze	Analyze the current situation and make a diagnosis
Improve	Develop and implement improvement actions
Control	Control the improved process performance and close the project.

NUMERICAL AND CATEGORICAL DATA

Why make the distinctions between Numerical and Categorical data?

- **Information Density:** Numerical data contains more information than categorical data. For categorical data, more observations are required than numerical data.
- It determines which tool one should use.

Numerical (quantitative) data:

Real-valued or whole numbers: 85.3 °C (temperature), 2.12 mm (dimension), 14 people (counts)

- *Discrete:* Variables that can only take integer values, such as counts (number of people, number of mistakes). Variables can also be discrete because of rounding.
- *Continuous:* Values not limited to integers, such as a distance or temperature.

Categorical (qualitative) data:

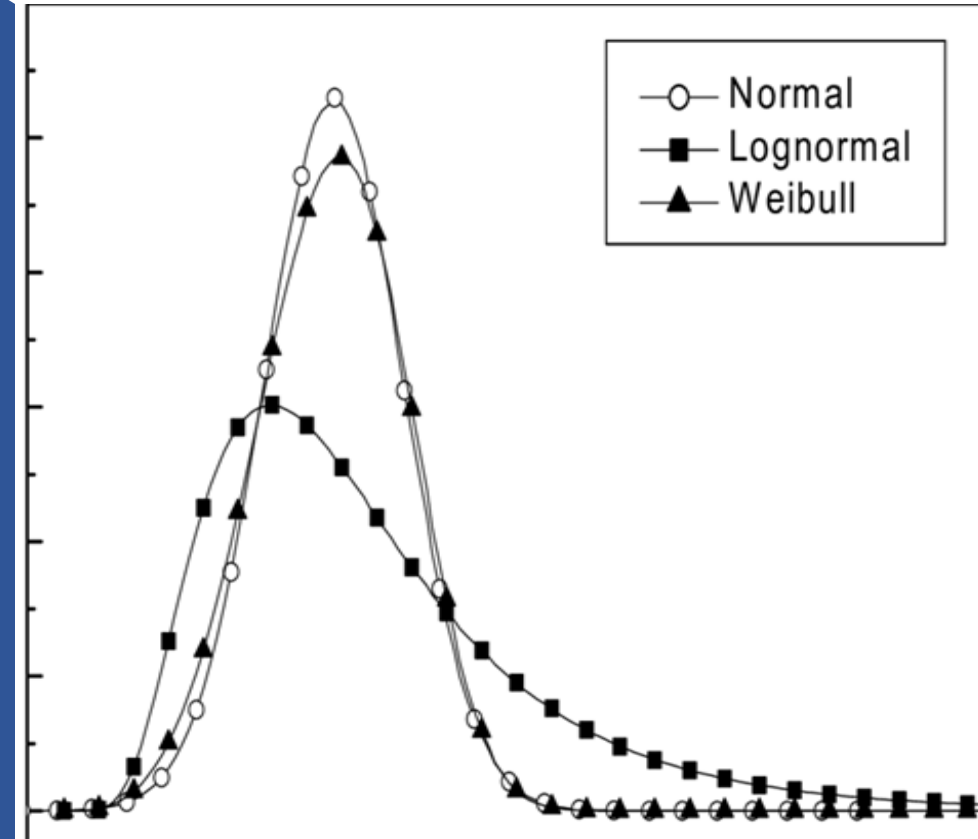
Subtraction and addition have no meaning

- *Ordinal data (order):* there is a well-defined order among categories. Example: good, acceptable, critical, reject.
- *Nominal data (nomen = name):* unordered categories; merely labels. Example: type XO, MM, SW, LS.
- *Binary data (bi = 2):* Example: pass/fail, positive/negative, ok/nok.

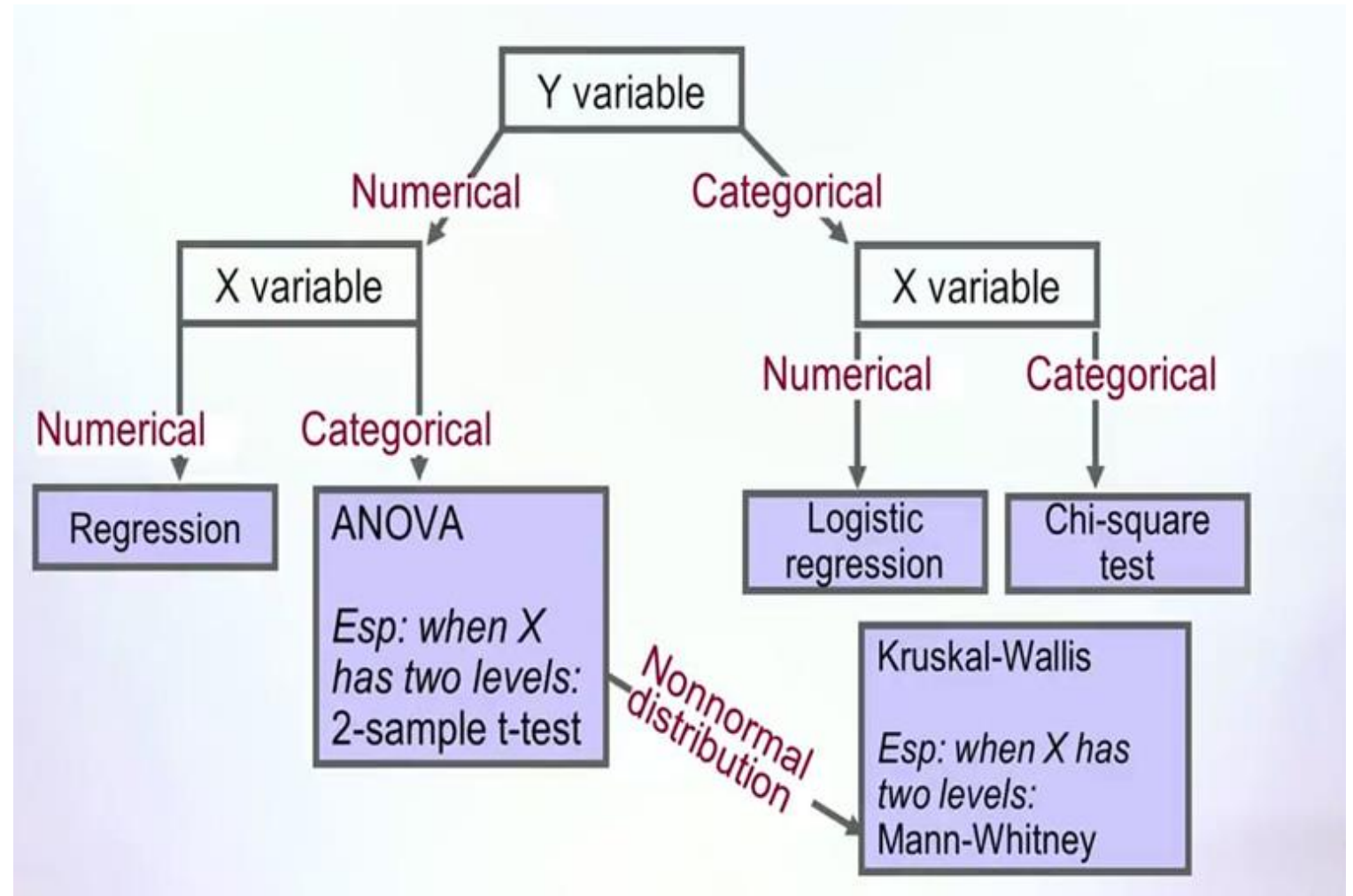
PROBABILITY DISTRIBUTION GRAPHS

There are three types of distributions:

- Normal Distribution
- Weibull Distribution
- Log-Normal Distribution



DATA ANALYSIS



Testing: Numerical Y and Categorical X – ANOVA

Organize Data -
Organize the data such
that the Y and X
variables are in the
columns

ANOVA - Are the
groups means identical
for each of the levels of
the X variable?

Residuals - Is the
random scatter
normal? Are there
outliers or
irregularities?

Testing: Numerical X and Numerical Y



Correlation: It is an index that expresses how strong a relationship between two numerical variables is.



Regression: Regression analysis is about finding the best fitting linear line.



A line can be described mathematically by the formula $y = a + bx$

Testing: Categorical Y

- **Chi-square analysis** – It is commonly used for testing relationships between categorical variables. The first step is to make a cross-tabulation. The second step is to look at the p-value and check if the results are significant.
- **Logistic Regression** – Logistic regression is used to describe data and to explain the relationship between one dependent binary variable and one or more nominal, ordinal, interval or ratio-level independent variables.



Thank You