Capstone Project Report

COVID-19 Vaccine Administration

1.0 Introduction

COVID-19 is haunting the globe and the pandemic disrupted the humanity at large. Millions of people lost their lives. More many are suffering and fighting for their lives. The economy is shattered and paralysed. Many of the sectors are being directly impacted and hit by the pandemic. The GDP is in negative zone in every part of the world. People lost their jobs. Businesses are shut. The supply chain and the logistics are badly hit. The economy is hit due to supply shocks and demand issues.

1.1 Business Problem

Broadly the Impact of COVID-19 may be summarised as:

(a) Loss of human lives

(b) Sufferings (Physical and Psychological)

(c) Hurting and Pausing of economic activity

(d) Loss of Employment

(e) Closure / Suspension of Business

(f) Loss of hope and uncertainty

1.2 Interested Parties [Stakeholders]

(a) Public at Large

(b) Government

(c) Vaccine Manufacturers [Pharma Companies]

(d) Cold Storage and Logistics providers

(e) Doctors and Support Staff

The problem is discussed at the apex level i.e., the government as it has the mandate and responsibility towards the people at large.

2.0 Description of the data and how it will be used to solve the problem

There are two types of data required for the Project.

(1) COVID-19 Vaccine Data [Supply Side]

COVID-19 Vaccine Data is sourced from the respective company's public release. The data is pooled from the government health ministry/department for arriving at the aggregate data and for the corroboration. This data is crucial for ascertaining the likely the size of the supply.

Table 2.1
Dashboard for COVID-19 Vaccine Procurement Decision

Particulars	Pfizer	Moderna	Putnik	AstraZeneca
Annual Number of Vaccines	300 Million	400 Million	217 Million	400 Million
Required Temperature for Storage	-20^0	-10^0	0^0	$> 0^0$
Efficiency	95%	97%	90%	70%
Price / Dose	USD 20	USD 10 to 50	NA	USD 4

Source: Compiled from Publishes Sources

(2) Clustering and Profiling of People Data [Demand Side]

As a first step It begins with the clustering of the global population. WHO divides the countries in to three clusters, namely:

(a) Community Transmission

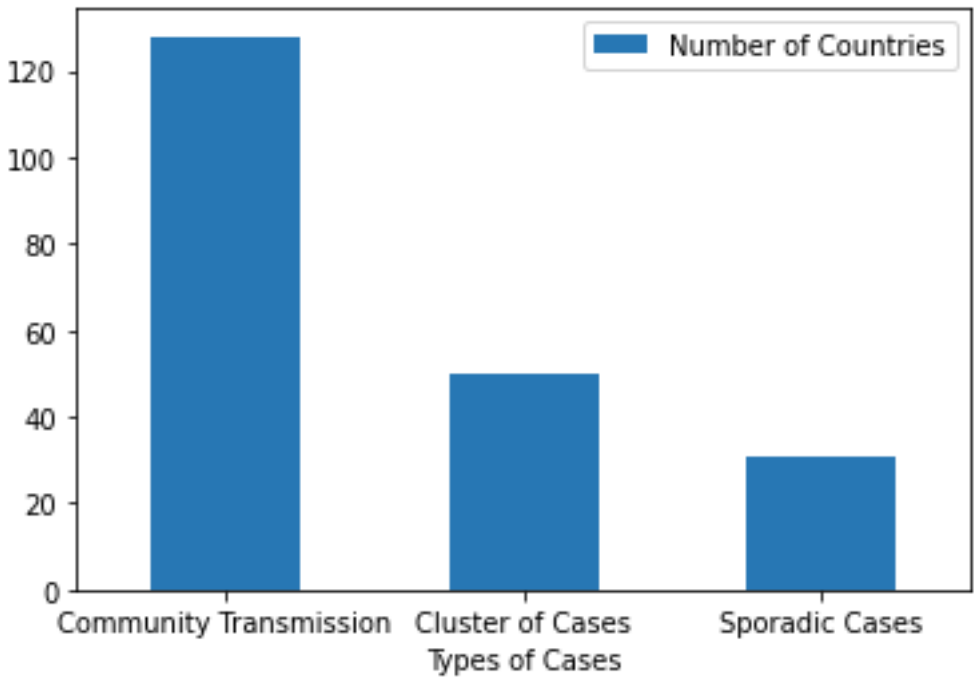
(b) Cluster of Cases and

(c) Sporadic Cases.

The raw data is taken from the https://Covid19.who.int/table.

The data is suitable manipulated to get the desired output. It is presented in the following chart.

Chart 2.1
Clustering Groups



Source: https://covid19.who.int/table

Within each cluster, the population is divided in to eight risk categories. It is presented in the following table.

Table 2.2
Risk Profiling

Category	Risk	Priority
Health Workers	Very High	1
60 Years or Above	High	1
Vulnerable	High	1
Infants	High	1
Essential workers outside health sector	Moderate	2
Personnel needed for vaccines, therapeutics, diagnostics production	Moderate	2
Government leaders and administrative and technical personnel	Low	3
Others	Least	4

Source: Compiled from WHO and other Publishes Sources

Data pertaining to the number of People to be vaccinated is collected through census records. This helps in ascertaining the demand for vaccine.

3.0 Methodology

The required data is taken from WHO, Corporates, Government through the websites, print and press media. The study is exploratory in nature. WHO's data is taken as the chief source. The Top down approach is adopted. The capstone project revolves around the supple side, logistics and the demand side dynamics of the COVID-19 administration.

4.0 Results

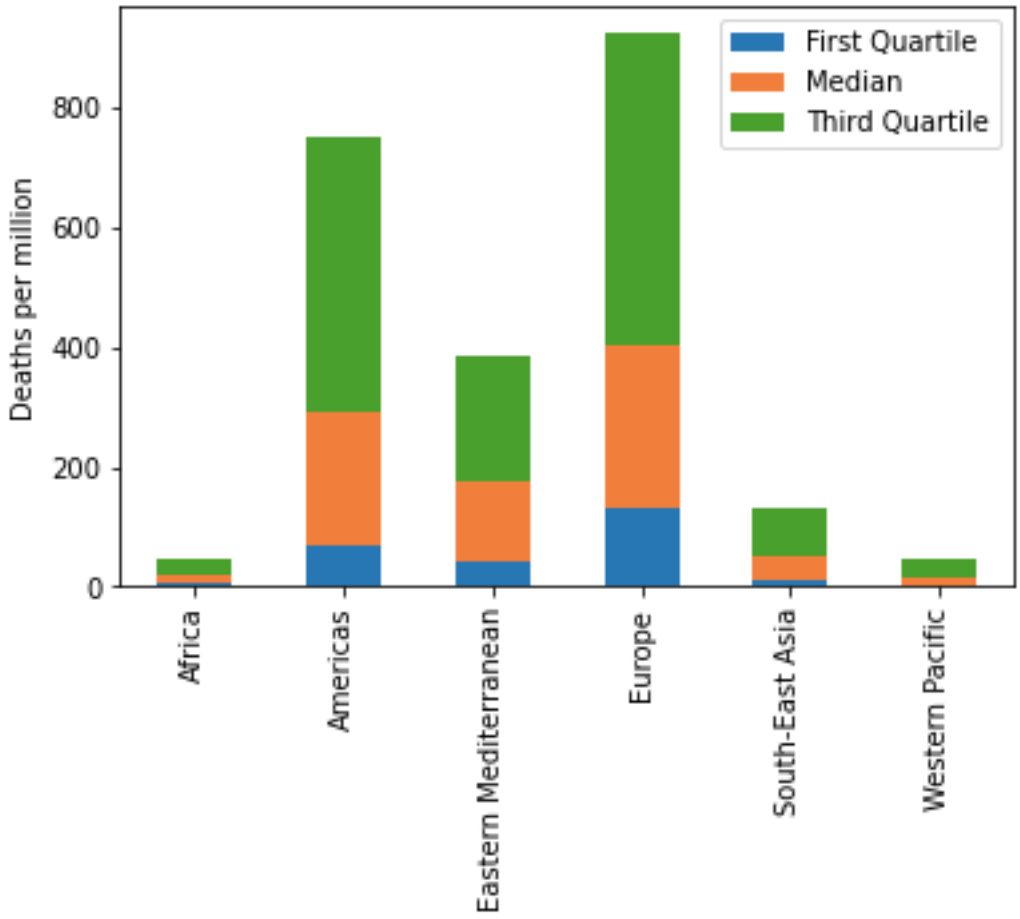
The results show that the pandemic, COVID-19 is devastating and disrupted the entire human community across the length and breadth of the globe.

AS the human life is critical, the COVID-19 vaccination needs to be effectively administered and managed.

The strategies are built from the top down approach.

The first step in the Top down approach is to consider the globe and cluster it in to various clusters depending on the transmission of COVID-19.

Chart 4.1
Deaths per Million by Regions

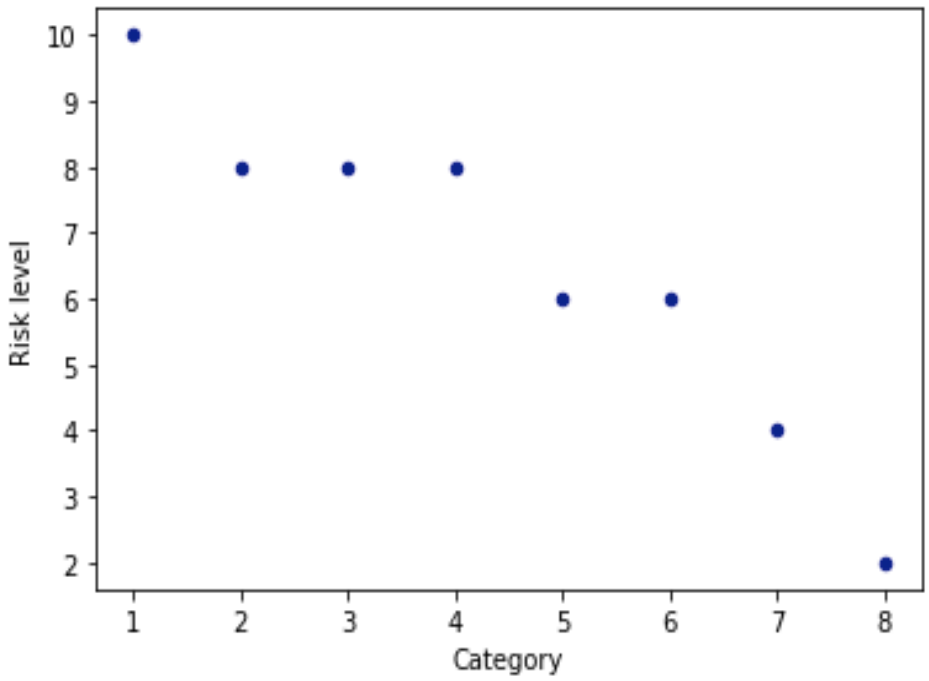


Source: https://covid19.who.int/table

The study captures the vaccine development, distribution and administration. The dashboard for the decision [Table 2.1] making helps the government to take appropriate calls.

The bottom most analysis is at the borough level.

Chart 4.2
Risk Profiling



Legend:
X-Axis:
1 = Health Workers;
2 = 60 Years or Above;
3 = Vulnerable;
4 = Infants;
5 = Essential workers outside health sector;
6 = Personnel needed for vaccines, therapeutics, diagnostics production;
7 = Government leaders and administrative and technical personnel;
8 = Others

Source: Compiled from WHO and other Published Sources

5.0 Discussion

This data when compared with the supply data, the gap between the demand and supply may be ascertained. Action plan may be taken up for ramping up the supply and meeting the schedule following the rationing approach.

Profiling of People Data is the derived or processed form of data from the previous data set. This helps in planning for administering the vaccine.

Logistics Data includes cold storage facilities, supply chains, inward and outward movement of vaccines. This helps in planning the procurement schedule and vaccination schedule.

The entire value chain of the vaccine administration is crucial and be planned appropriately. Apart from keeping in mind the principles as laid down by the WHO, the governments, the Pharma companies and the public at large need to be taken on the same page.

Principles: [Sourced from WHO Document]

Human Well-Being: Protect and promote human well-being including health, social and economic security, human rights and civil liberties, and child development.

Equal Respect:

Recognize and treat all human beings as having equal moral status and their interests as deserving of equal moral consideration.

Global Equity:

Ensure equity in vaccine access and benefit globally among people living in all countries, particularly those living in low-and middle-income countries.

National Equity:

Ensure equity in vaccine access and benefit within countries for groups experiencing greater burdens from the COVID-19 pandemic.

Reciprocity:

Honor obligations of reciprocity to those individuals and groups within countries who bear significant additional risks and burdens of COVID-19 response for the benefit of society.

Legitimacy: Make global decisions about vaccine allocation and national decisions about vaccine prioritization through transparent processes that are based on shared values, best available scientific evidence, and appropriate representation and input by affected parties.

The priority for allocation COVID-19 vaccine must be based on the stage to which the country or the region belongs to.

Table 5.1
Road Map for Prioritisation of Allocation of COVID-19 Vaccine

Stages	Scenario
Stage I	very limited vaccine availability, ranging from 1-10%
Stage II	limited vaccine availability, ranging from 11-20%
Stage III	moderate vaccine availability, ranging from 21-50%

Source:
https://www.who.int/immunization/sage/meetings/2020/october/Session03_Roadmap_Prioritization_Covid-19_vaccine.pdf

6.0 Conclusion

The present work goes a long way in appreciating the ecosystem and the value chain of the vaccine administration. It has to balance the priorities, preferences, disadvantaged section, logistics landscape, supply and the demand, gaps thereof, safety of the front line health workers, vulnerable section of the people, efficacy and pricing, subsidizing, documenting to capture the population vaccinated and left over, and to cover the end to end of the vaccine administration.

Sources:

https://www.raps.org/news-and-articles/news-articles/2020/3/covid-19-vaccine-tracker

https://www.who.int/publications/m/item/draft-landscape-of-covid-19-candidate-vaccines

Documents:

1. novel-coronavirus-landscape-covid-19-(7).pdf

2. WHO SAGE values framework for the allocation and prioritization of COVID-19 vaccination, September 2020. pdf