COVID-19: The Analysis, Impact, and New specified Algorithms for COVID-19 Prevention, Cure and Possible Vaccination Path.

[1]Furqan Yaqub khan, [2]Irfan Ahmad, [3]Danish Muzzaffar.

[1]IIT Ropar, [2]CSIR IIIM, [3]CU Kashmir.

Corres. *furkaan309@gmail.com*

Abstract:

The first part of this study deals with the different variants of covid-19, its history and geography of its history then followed by its structure and mechanism of functioning and counter co-relative measures for its cure and containment aligned with its impact on the economy as well human health in relation to weather. Now comes the second part which includes an analysis of previous algorithms developed for viral spread patterns and their impact on different age groups. The most prominent among them is the SEIR algorithm[1-5]. What we provide is a possible algorithm particularly designed for the creation of the Covid-19 Vaccine.

KEYWORDS: Coronavirus, RT-PCR, ARDS, MERS.

Introduction:

Coronaviruses are enveloped virions, 120 nm in diameter having club-shaped glycoprotein with nucleocapsid protein shell known by the name capsid containing helical or tubular viral nucleic acids as a single strand of positive-sense RNA with a crown-like shape or corona shape [6]. In the 1960s a new virus strain **229E** was discovered in the human respiratory tract by D. Hamre and J. J. Procknow later on termed coronavirus.[7] but according to a journal of virology first human coronavirus strain (OC43) was discovered in 1965 and published in `1966 (B814) by Tyrell and Bynoe who used to work on a nasal swab.[8] In the Netherlands, an infant, seven month old was showing respiratory symptoms during the year 2004 and it was caused due to two strains of viruses NL63 and HKU1.

Since significant research was done on coronaviruses, it was discovered that these two strains belonged to the same. This was discovered in Hong Kong in 2005.[9-10] In 2003 SARS-Cov was discovered which is believed to spread from Civet cats who in turn may have inherited from Bats.[11] MERS was discovered in Saudi Arabia and transmission credit was taken by camels.[12] The present-day strain of corona SARS-CoV-2 emerged from the Wuhan area of China in 2019 of its source is not scientifically confirmed though believed to be emerged from Bats because of their genetic resemblance with bats coronavirus, infecting other animals and humans through them.[13-14] SARS-CoV-2 is an enveloped RNA virus with protein spikes on it.[15]Human-to-human interaction is the main method of its spreading. Its clinical symptoms include fever, cough, and fatigue and few patients may observe gastrointestinal infection. In aged patients, serious outcomes like respiratory distress syndrome (ARDS) and cytokine storm are also noticed.[16] It operates on human beings by binding some of its structural and non-structural proteins to porphyrin and at the

same instant three proteins ORF10, ORF3a, and orflab coordinate to attack the most vulnerable Deoxyhemoglobin and 1-beta chain of hemoglobin to dissociate iron from porphyrin leading to respiratory distress and obstruct normal heme pathway. On the other hand, viruses attack many organs and tissues leaving derivatives that cause toxicity and inflammation in affected areas which in turn leads to capillary cracks. These capillary cracks get filled by fibrinogen leading to the gathering of fibrin and thrombus in the lungs making the patient critically ill sometime after the infection. Thus leading to human illness[17] More the age more the fatality as it is seen there are no deaths among children below 10 years of age and then from 10-20, 20-30, 30-40, 40-50, 50-60, 60-70, 70-80 and

80+ the mortality rate percentage among infected is 0.2, 0.2, 0.2, 0.4, 1.3, 3.6, 8.0, and 14.6 respectively.
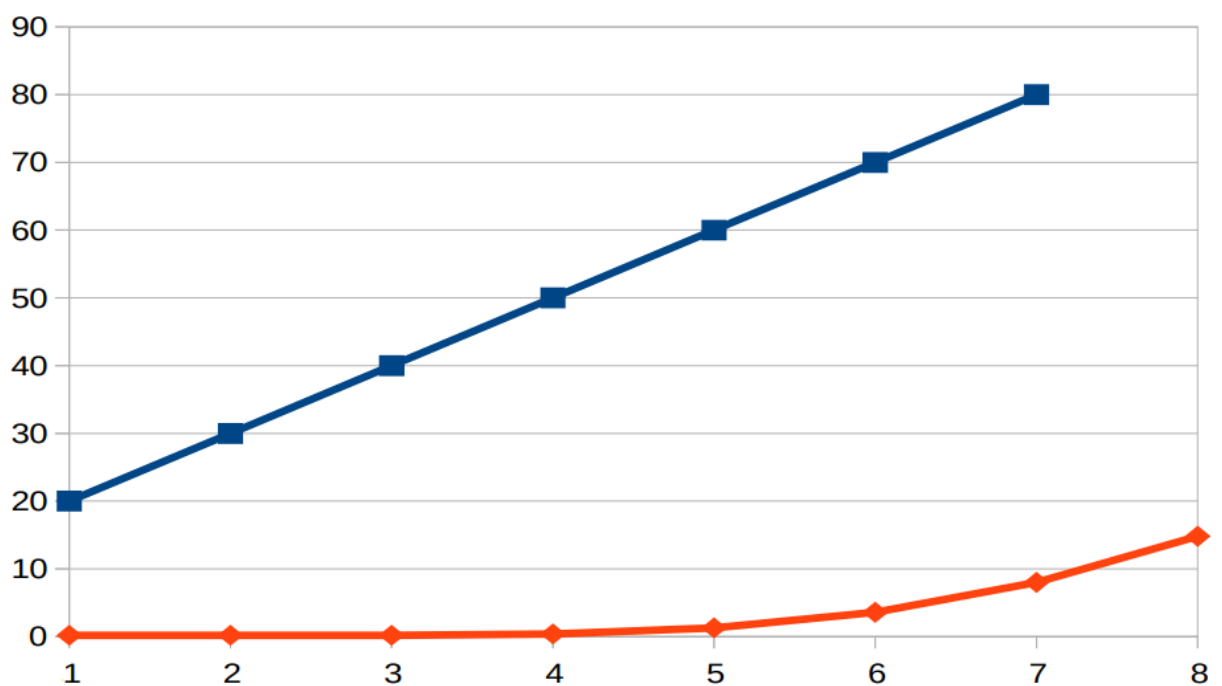
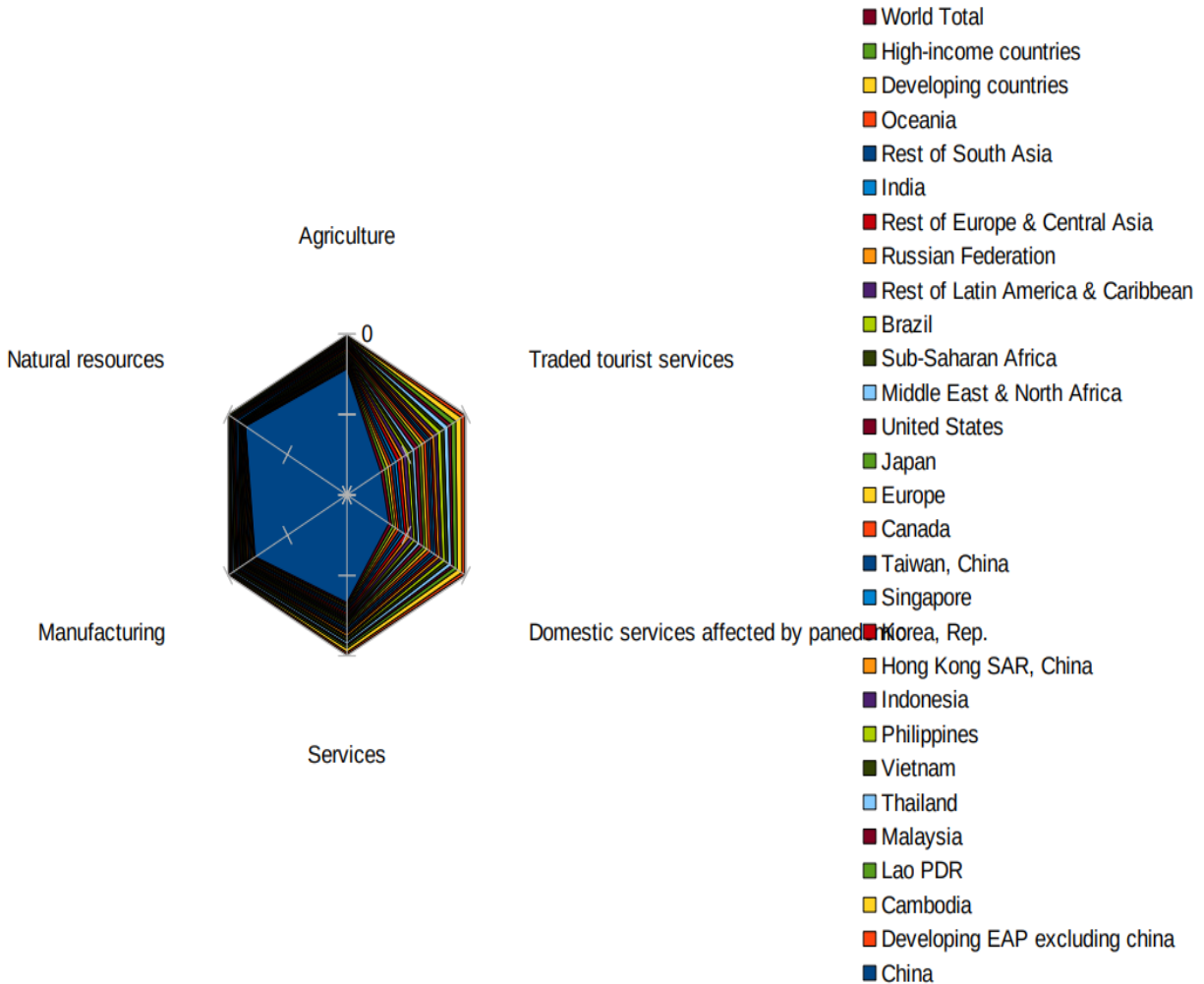1.   The Graph depicting death rate vs Age factor.
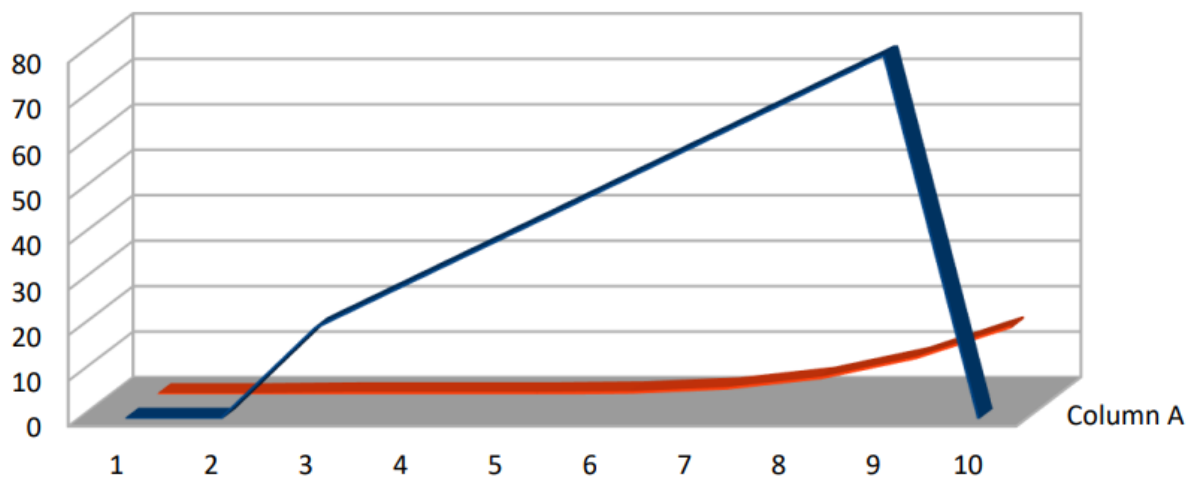
2. The Graph Depicting the Death Rate vs Age Factor and How it decreases down in the case of males after a certain age.

Column A

The fatality rate among men is more by 1.1 percent at 2.8 percent than females which is 1.7 percent.[18] With antibody-based techniques used as supplementary tools for analytical testing of SARS-CoV-2, the test of choice is RT-PCR (reverse transcription polymer chain reaction). The test results should be carefully interpreted in the post-analytical phase simultaneously using serological and molecular findings.[19] After analysis let's discuss how we approached the problem, that is prevention and proposed solutions. For restraining its pace and preventing its transmission we must not travel without need and shall stay away from large gatherings, restrain from smoking and not harm our lungs stay home if not well, not sneeze or cough in open, remain at a one-meter distance from the sneezing or coughing persons, not to touch the face and above all maintain sanitization by washing hands with soap and water or alcohol-based sanitizers as well infected persons should be treated properly. [20] There are many proposed solutions for the treatment of coronavirus and major ones are CTH by Isaac Holeman[21] , mHero by Wayan Vota[22], HealthBeats by Aileen Lai [23], WeiTel by Abdulaa Babili [24], Health Hero by Anthony Diaz [25], COMPASS by Catherine McGowan [26], Flare by Caitlin Dolkart[27], reah52 COVID-19 response by Logan Ansell [28], NaviHealth.ai by Imo Etuk [29], Digital Adherence Technology by Rachel Powers [30], TeleDr4You by Dr Zakiuddin Ahmed [31], Mobile WACh by Keshet Ronen [32], Logistimo SCM by Arun Ramanujapuram [33], OpenLMIS by Rebecca Alban [34], Product Catalog Management TOOL (PCMT) by Rabecca Alban [35]. Stasis Monitoring System by Micheal Maylahn [36] and Rocket Health by Davis Musinguzi [37] periodically. Discussing the strategies by different worst hit countries to overcome COVID-19 their results.

The estimated loss due to COVID-19 is predicted to be 8.8 trillion US dollars [38-39].

Legend:
- World Total
- High-income countries
- Developing countries
- Oceania
- Rest of South Asia
- India
- Rest of Europe & Central Asia
- Russian Federation
- Rest of Latin America & Caribbean
- Brazil
- Sub-Saharan Africa
- Middle East & North Africa
- United States
- Japan
- Europe
- Canada
- Taiwan, China
- Singapore
- Korea, Rep.
- Hong Kong SAR, China
- Indonesia
- Philippines
- Vietnam
- Thailand
- Malaysia
- Lao PDR
- Cambodia
- Developing EAP excluding china
- China

Chart axes: Agriculture, Traded tourist services, Domestic services affected by panedmic, Services, Manufacturing, Natural resources

3. Figure to depict percentage losses in given six sectors in world states or countries.

It is clearly visible from the above chart that the right side markings are more affected due to the COVID-19 outbreak. The most affected area is traded tourist services followed by Domestic Services affected by the pandemic and then on by Services or regular services, Manufacturing, Agriculture, and Natural resources. The trend is somewhat the same in every country. Hence, deriving the results that Service based areas are more affected than others.

Total percentage loss in economy compared to total economy of country due to COVID-19. [30]
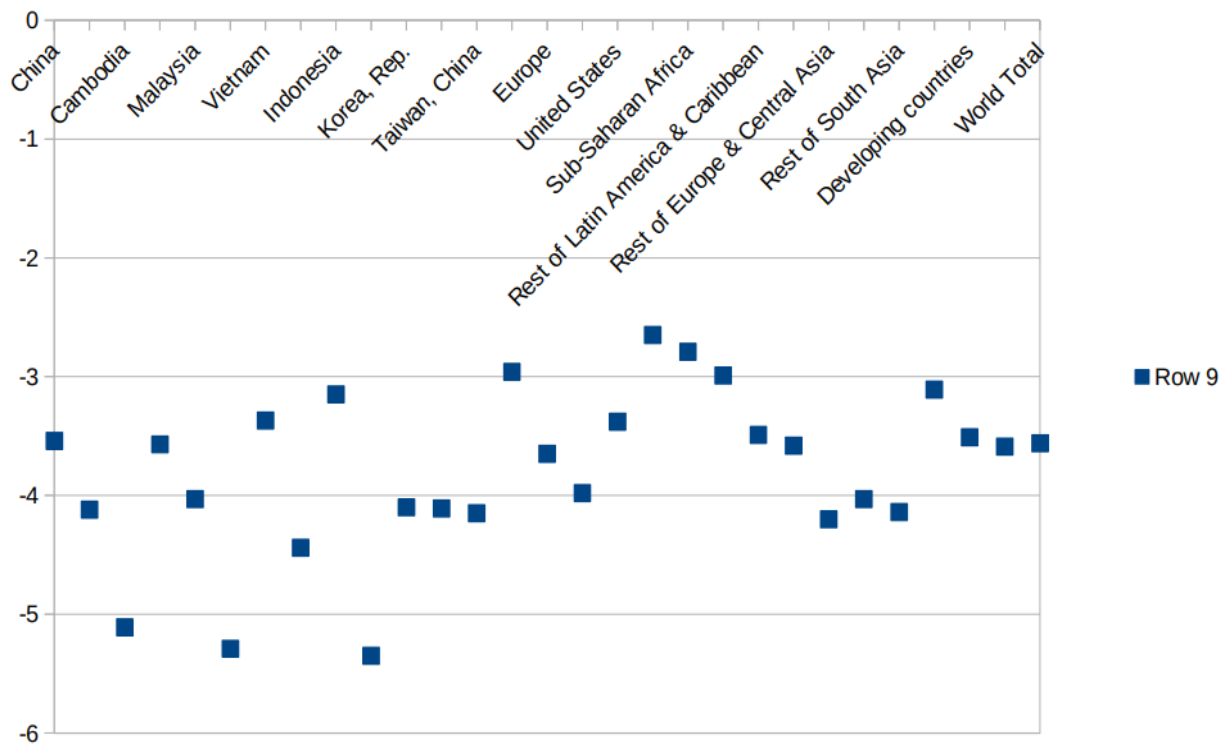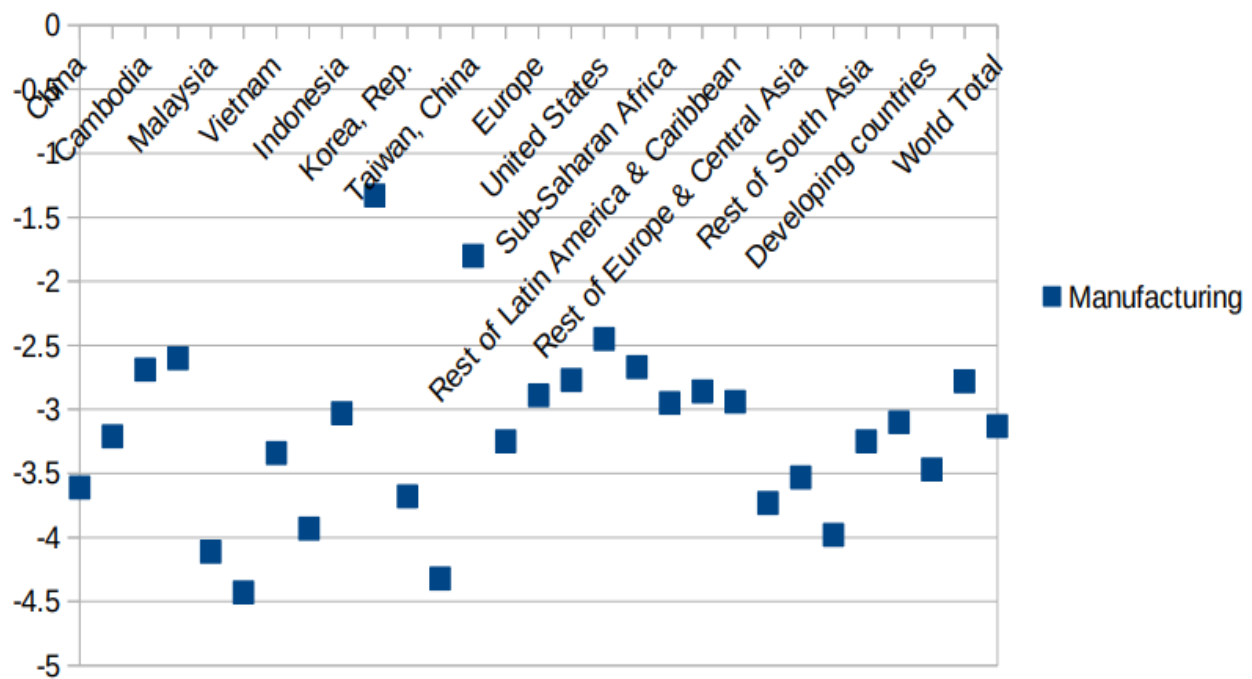

From the above chart, Indonesia has faced the highest percentage loss in the economy followed by Malaysia and the least percentage loss in the economy is that of the United States. The sector-wise losses are represented on the following charts.
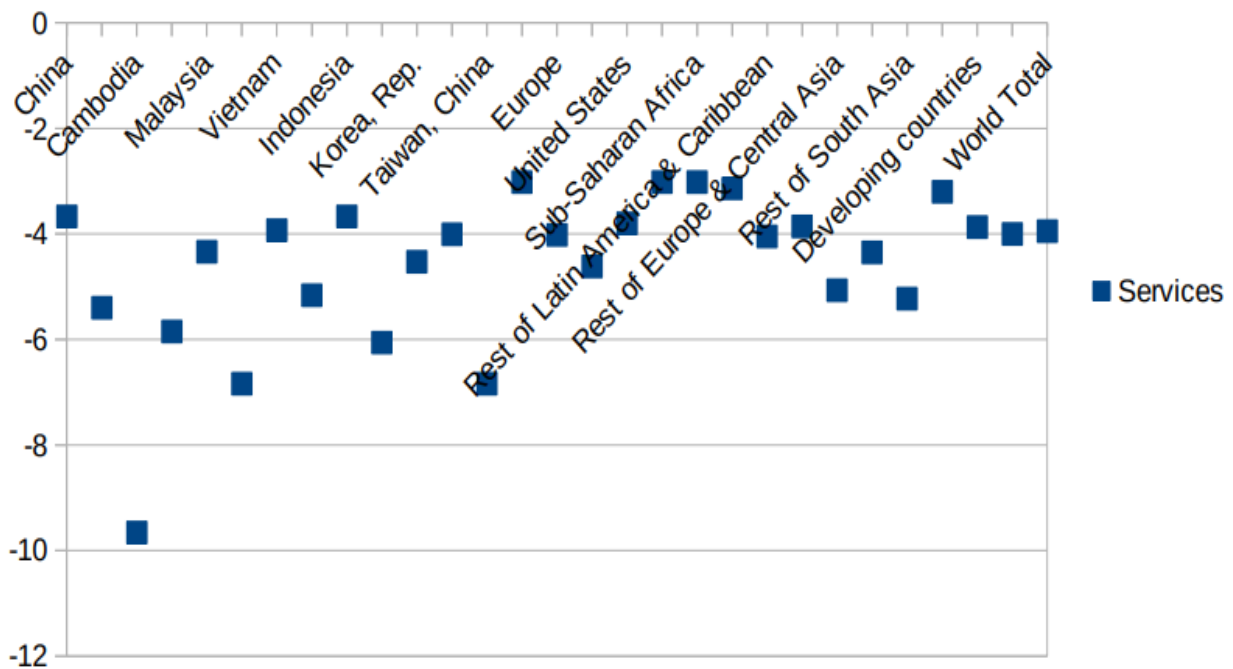
PERCENTAGE LOSS IN NATURAL RESOURCES DUE TO COVID-19
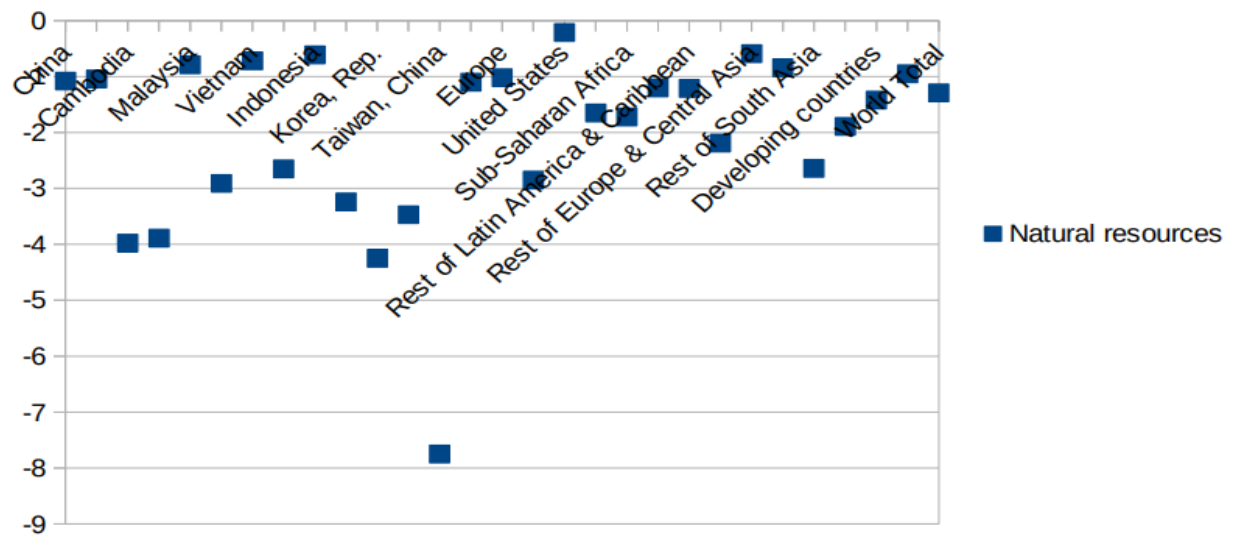
PERCENTAGE LOSS IN MANIFACTURING DUE TO COVID-19

PERCENTAGE LOSS IN SERVICES DUE TO COVID-19

PERCENTAGE LOSS IN DOMESTIC SERVICES DUE TO COVID-19

■ Domestic services affected by panedemic
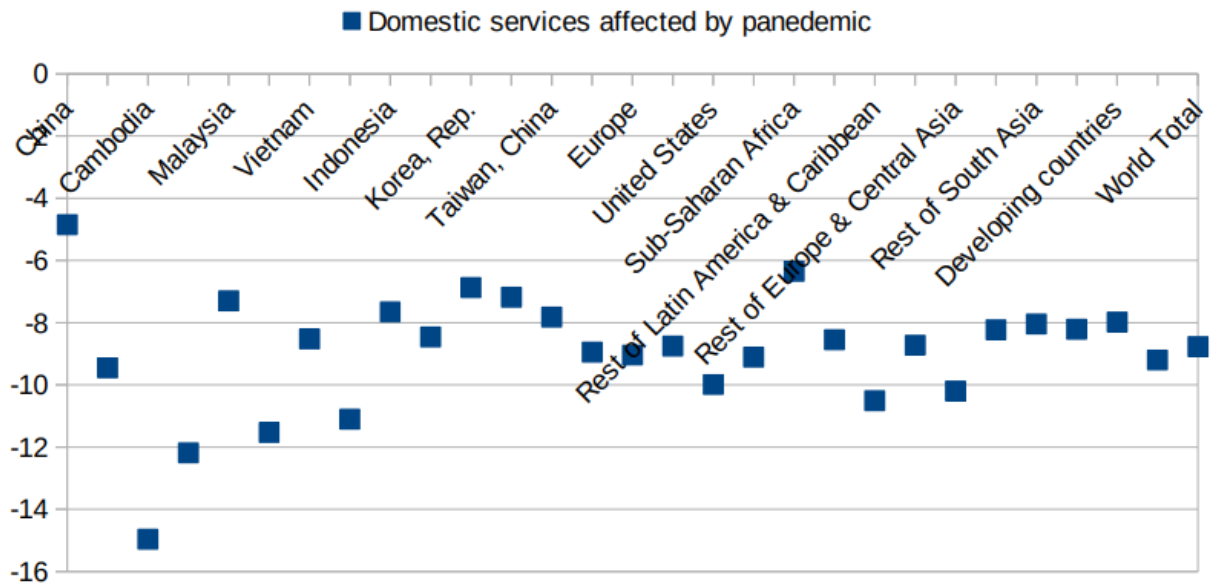
PERCENTAGE LOSS IN TRADED TOURIST SERVICES DUE TO COVID-19

■ Traded tourist services
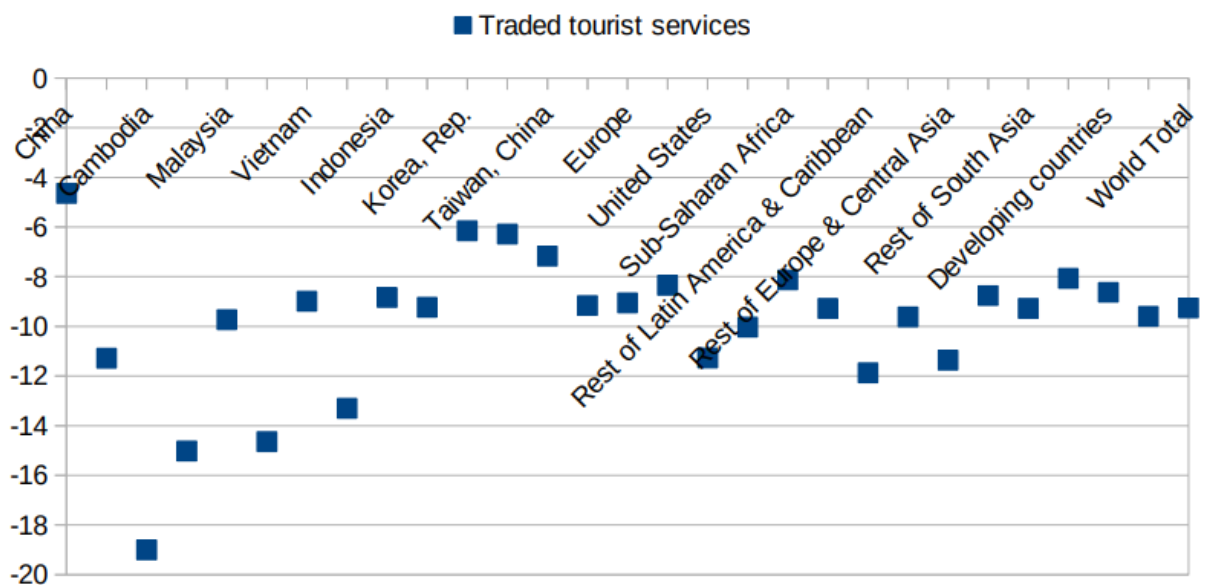
Methodology:

Here we will discuss three algorithms one for the prevention strategy of COVID-19 at Macro-level and one at the micro level and the third a possible strategy for vaccine production.

Flowchart of Algorithm 1: First, we will start with the beginning cases and then increase them on an hourly basis and see the trend of dispersal of this virus to date. It will give us the pattern of its spreading and how quickly it is spreading and with what conditions. Based on the above information we shall frame a policy or controlling strategy to stop its dispersal. If this policy is giving us results according to our expectations then we shall continue it and exit on the termination of the virus. But if it went unsuccessful then we must change it with another and then another loop till we get a successful control strategy to change the existing one.
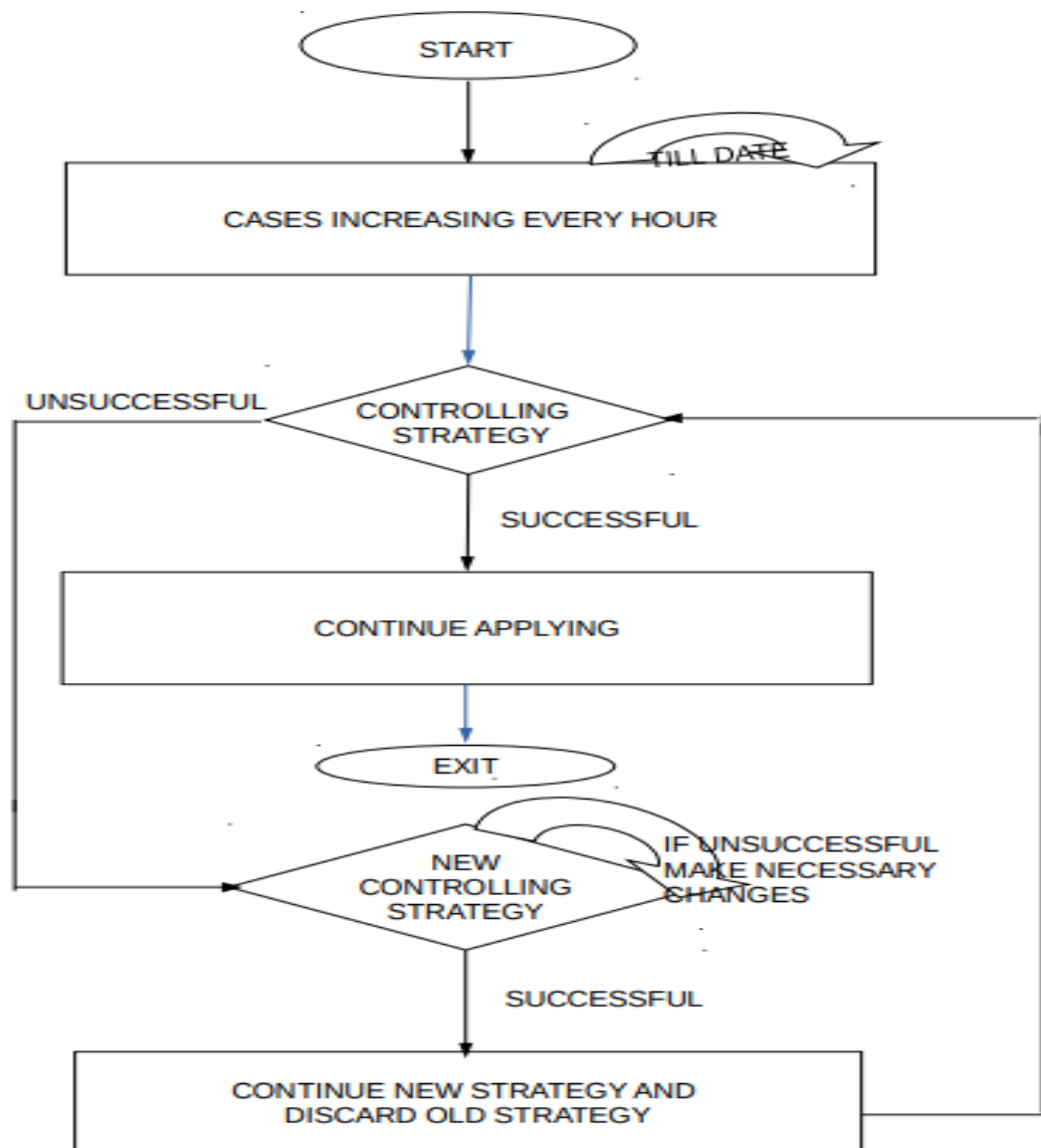
Flowchart of Algorithm 2:
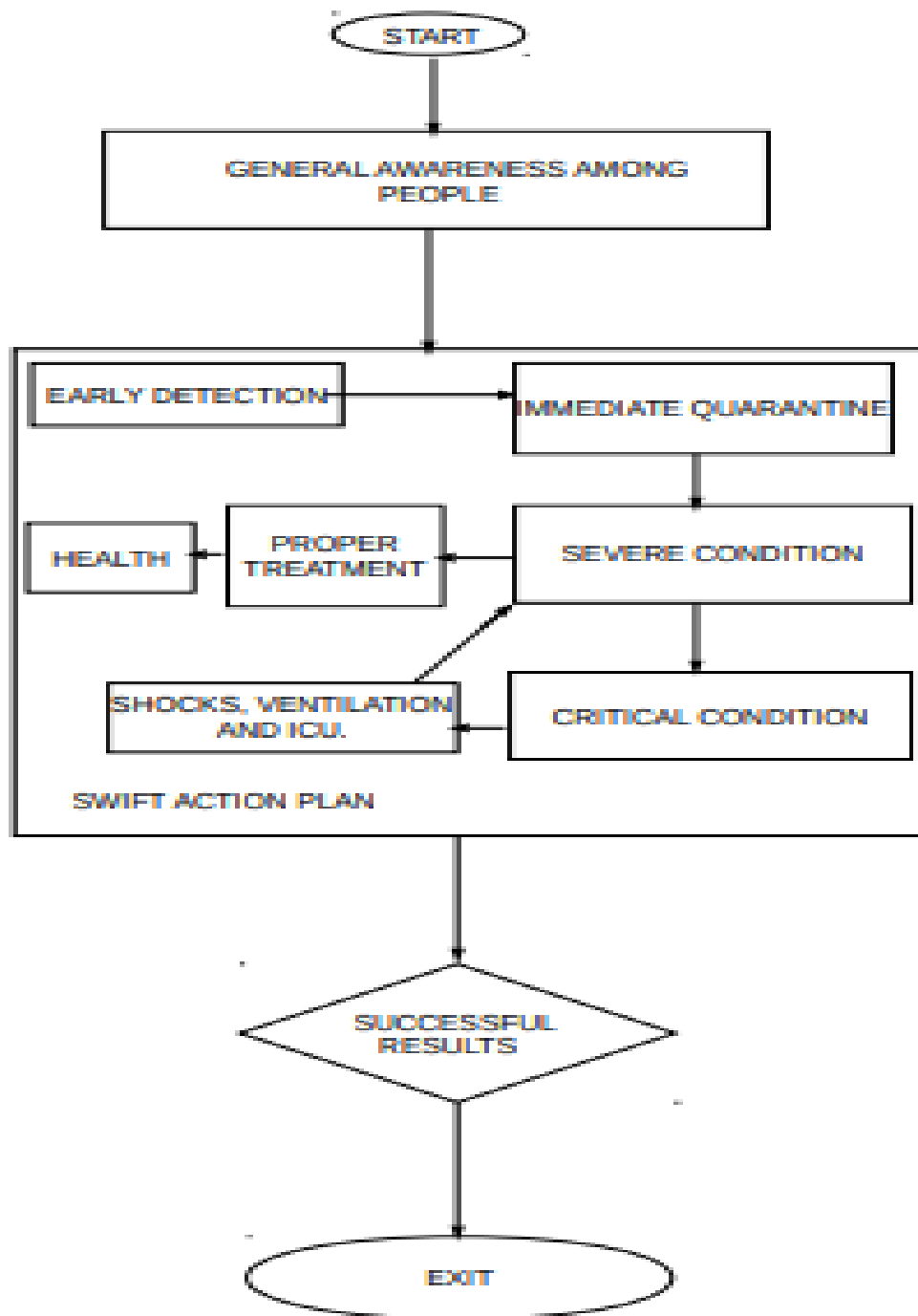
This algorithm deals with the Patient care plan or COVID-19 at the micro-level. In this algorithm after we start we shall make the general public aware of COVID-19, its methods of dispersal, its effects as well as prevention and measures taken to control it.
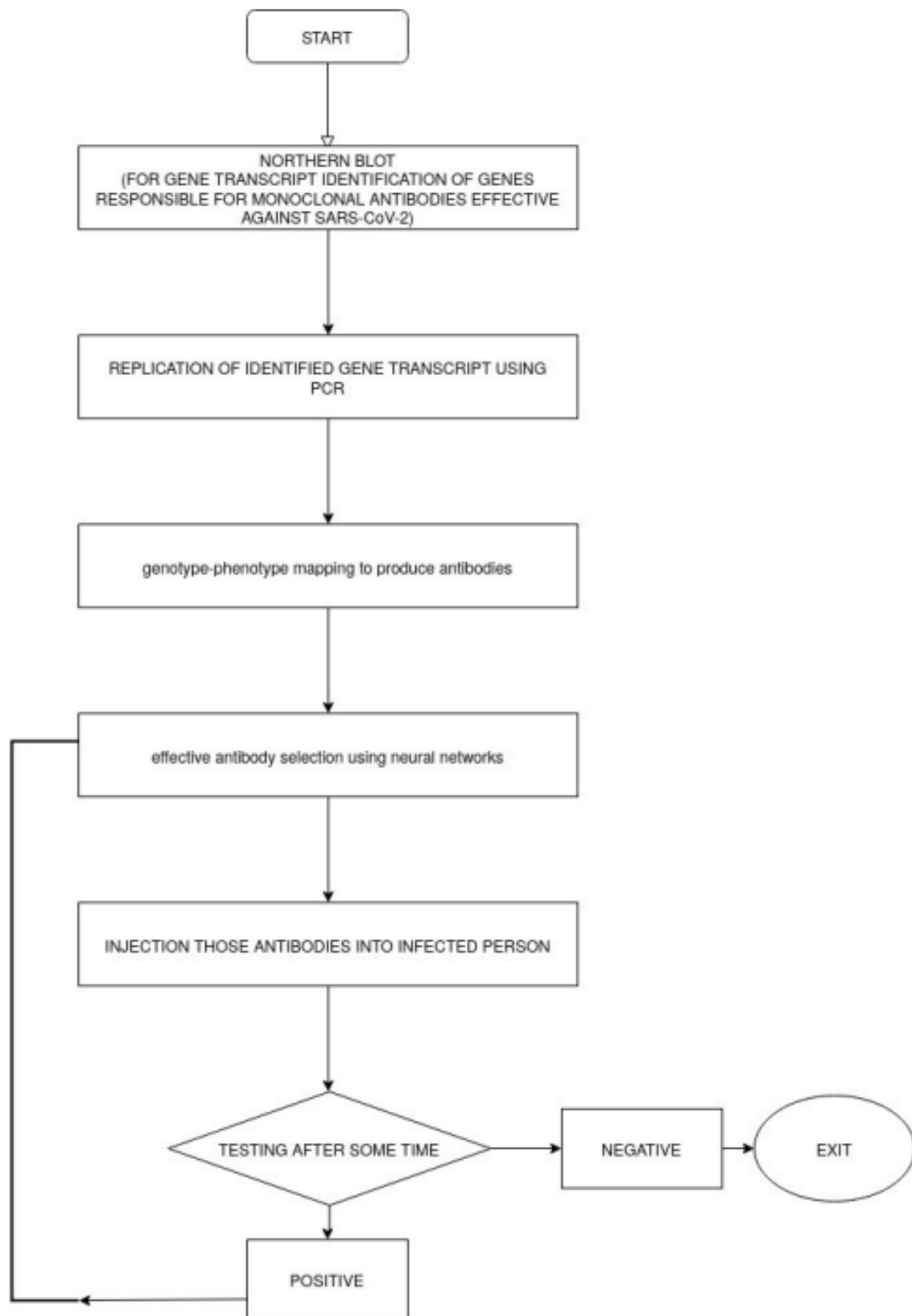
After this comes the swift action plan. Why I named it so because it must be rapid and effective. In this plan, we start with early detection because early detection is necessary for saving lives. If an infection is not detected early then people have very less chance of survival. As soon as the infection is detected we must proceed with immediate quarantine to save others from infection.

If the patient's condition is severe we must give him proper treatment to restore to health. The patient can be critical on arrival at the treatment center or may turn so later if the patient's condition is critical we may need to give him shocks, get him on a ventilator, and drive him to ICU. As soon as the patient comes out of the critical section we shall give him proper treatment and restore him to health. Good food is equally important.

After receiving the successful results we must exit. This algorithm may totally fail with the death of patients but deaths are less so by applying the above algorithms death rate due to COVID-19 would be decreased more and more as algorithm one is based on a greedy approach and wont be stuck in local minima.

Flowchart of Algorithm 3:

The proposed algorithm depicts a process from antibody gene detection to antibody therapy for COVID treatment using neural networks. Let's discuss its major steps, It was Kohler and Milstein who first time produced mouse monoclonal antibodies(MABs) using hybridoma technology [40] and successfully obtained various antigen-specific antibodies.[41] and the same has been achieved in humans since then using Northern blotting and PCR. The PCR can do site-directed mutagenesis for replication of identified gene transcript [42]. The produced antibodies can be checked for effectiveness and compatibility using a novel intelligent biological network (bio-net) by learning the relationship between antibody surface pattern and body receptors (lock and key theory) as well the good health and functioning of antibodies, This bio-net usually contains B-T cells[43]. First used in the 1930s, plasma therapy is of essential use against COVID-19. Antibodies that can fight covid can be prepared and given to newly infected human beings [44-45]. then after a certain period, the patient will recover or we may need to give him another dose.

```
                    ┌─────────────┐
                    │    START    │
                    └─────────────┘
                           │
                           ▽
    ┌──────────────────────────────────────────────────┐
    │                  NORTHERN BLOT                     │
    │  (FOR GENE TRANSCRIPT IDENTIFICATION OF GENES      │
    │  RESPONSIBLE FOR MONOCLONAL ANTIBODIES EFFECTIVE   │
    │            AGAINST SARS-CoV-2)                      │
    └──────────────────────────────────────────────────┘
                           │
                           ▼
    ┌──────────────────────────────────────────────────┐
    │   REPLICATION OF IDENTIFIED GENE TRANSCRIPT USING  │
    │                       PCR                          │
    └──────────────────────────────────────────────────┘
                           │
                           ▼
    ┌──────────────────────────────────────────────────┐
    │     genotype-phenotype mapping to produce antibodies│
    └──────────────────────────────────────────────────┘
                           │
                           ▼
    ┌──────────────────────────────────────────────────┐
    │      effective antibody selection using neural networks│
    └──────────────────────────────────────────────────┘
                           │
                           ▼
    ┌──────────────────────────────────────────────────┐
    │   INJECTION THOSE ANTIBODIES INTO INFECTED PERSON  │
    └──────────────────────────────────────────────────┘
                           │
                           ▼
              ◇ TESTING AFTER SOME TIME ◇ ──────▶ ┌──────────┐      ⬭
                           │                      │ NEGATIVE │ ──▶ │ EXIT │
                           ▼                      └──────────┘      ⬭
                    ┌──────────┐
                    │ POSITIVE │
                    └──────────┘
```

The third algorithm depicts a process of producing antibodies artificially against SARS-CoV-2.

RESULTS AND CONCLUSION.

- The history of COVID-19 depicts that it was already there in nature and some other organisms live with it which could be beneficial for its treatment in humans.

- The losses caused by a given virus are enormous and hence need a very efficient aftermath strategy.

- Sanitation and prevention are the best strategies right now.

- An account of how to deal with the situation is given in Algorithm 1 and Algorithm 2.

- The possible pathway for Vaccine creation is given in Algorithm 3.

- In view of the future, we need an immediate dispersal and action algorithm covid specific to COVID-19 like state of art SEIR Model[1-5].

References:

1. van den Driessche, P., Watmough, J.: A simple sis epidemic model with a backward bifurcation. J. Math. Biol. 40, 525–540 (2000) **Article** **MathSciNet** **Google Scholar**

2. Liu, J., Paré, P.E., Du, E., Sun, Z.: A networked sis disease dynamics model with a waterborne pathogen. 2019 American Control Conference (ACC), pp. 2735–2740 (2019)

3. Cai, Y., Kang, Y., Wang, W.: A stochastic sirs epidemic model with nonlinear incidence rate. Appl. Math. Comput. 305, 221–240 (2017) **MathSciNet** **MATH** **Google Scholar**

4. Al-Rahman El-Nor Osman, M., Adu, I.K., Yang, C.: A simple seir mathematical model of malaria transmission. Asian Res. J. Math. 7, 1–22 (2017) **Article** **Google Scholar**

5. Almeida, R.: Analysis of a fractional seir model with treatment. Appl. Math. Lett. 84, 56–62 (2018) **Article** **MathSciNet** **Google Scholar**

6. Britannica, The Editors of Encyclopaedia. "coronavirus". Encyclopedia Britannica, 27 May. 2022, https://www.britannica.com/science/coronavirus-virus-group. Accessed 8 February 2023.

7. D Hamre and JJ Procknow "A new virus isolated from the human respiratory tract", published in Experimental Biology and Medicine. 1960.

8. **OC43:** Discovered in according to the Journal of Virology. However, a paper in Virology Journal has described it as the first human coronavirus to be discovered in 1965, citing a 1966 paper written by Tyrrell and Bynoe who worked with the nasal swab titled B814. 1967

9. Lim, Yvonne Xinyi; Ng, Yan Ling; Tam, James P.; Liu, Ding Xiang (2016-07-25). "Human Coronaviruses: A Review of Virus–Host Interactions". Diseases. **4** (3): 26. doi:10.3390/diseases4030026. ISSN 2079-9721. PMC 5456285. PMID 28933406. See Table

10. Woo, P. C. Y.; Lau, S. K. P.; Chu, C.-m.; Chan, K.-h.; Tsoi, H.-w.; Huang, Y.; Wong, B. H. L.; Poon, R. W. S.; Cai, J. J.; Luk, W.-k.; Poon, L. L. M.; Wong, S. S. Y.; Guan, Y.; Peiris, J. S. M.; Yuen, K.-y. (2004). "Characterization and Complete Genome Sequence of

a Novel Coronavirus, Coronavirus HKU1, from Patients with Pneumonia". Journal of Virology. **79** (2): 884–95. doi:10.1128/JVI.79.2.884-895.2005. PMC 538593. PMID 15613317.

11. Yang Y, Peng F, Wang R, Yange M, Guan K, Jiang T, Xu G, Sun J, Chang C. The deadly coronaviruses: The 2003 SARS pandemic and the 2020 novel coronavirus epidemic in China. J Autoimmun. 2020 May;109:102434. doi: 10.1016/j.jaut.2020.102434. Epub 2020 Mar 3. Erratum in: J Autoimmun. 2020 Jul;111:102487. PMID: 32143990; PMCID: PMC7126544.

12. Aisha M. Al-Osail and Marwan J. Al-Wazzah "**The history and epidemiology of Middle East respiratory syndrome corona virus** Multidiscip Respir Medicine. 2017; 12: 20. Published online 2017 Aug 7. doi: 10.1186/s40248-017-0101-8 PMCID: PMC5545842 PMID: 28794876

13. Solodovnikov, Alexey; Arkhipova, Valeria (29 July 2021). "Достоверно красиво: как мы сделали 3D-модель SARS-CoV-2" [Truly beautiful: how we made the SARS-CoV-2 3D model] (in Russian). N+1. Archived from the original on 30 July 2021. Retrieved 30 July 2021.

14. Jump up to:[a] [b] Coronaviridae Study Group of the International Committee on Taxonomy of Viruses (April 2020). "The species Severe acute respiratory syndrome-related coronavirus: classifying 2019-nCoV and naming it SARS-CoV-2". Nature Microbiology. **5** (4): 536–544. doi:10.1038/s41564-020-0695-z. PMC 7095448. PMID 32123347.

15. Mousavizadeh L, Ghasemi S. Genotype and phenotype of COVID-19: Their roles in pathogenesis. J Microbiol Immunol Infect. 2021 Apr;54(2):159-163. doi: 10.1016/j.jmii.2020.03.022. Epub 2020 Mar 31. PMID: 32265180; PMCID: PMC7138183.

16. **Yan-Rong Guo, Qing-Dong Cao, Zhong-Si Hong, Yuan-Yang Tan, Shou-Deng Chen, Hong-Jun Jin, Kai-Sen Tan, De-Yun Wang & Yan Yan** Military Medical Research **volume 7**, Article number: 11 (2020) a part of springer BMC journals.

17. Wenzhong Liu 1,2, *, Hualan Li 2 "COVID-19:Attacks the 1-Beta Chain of Hemoglobin and Captures the Porphyrin to Inhibit Human Heme Metabolism" 2020.

18. Niall McCarthy How the fatality rate of Coronavirus changes with age Mar 3, 2020

19. Yi-Wei Tang, Jonathan E. Schmitz, David H. Persing, Charles W. Stratton Alexander J. McAdam, "Laboratory Diagnosis of COVID-19: Current Issues and Challenges" **DOI:** 10.1128/JCM.00512-20

20. Covid and Habits, world health organization. 2019.

21. Isaac Holeman, "Medic Mobile" 2019-20 https://communityhealthtoolkit.org

22. Wayan Vota, "mHero" IntraHealth International, 2019-20. https://www.mhero.org/

23. **AILEEN LAI** et.al., Health Heat Beats, 2019. https://www.healthbeats.co

24. Abdulaa Babili, "Weitel" 2019 http://www.weltelhealth.com/Home

25. **Anthony Diaz** Health Hero Patient Engagement + SdoH, 2019. https://www.youtube.com/watch?v=wmFIUmlmaKA

26. Catherine McGowan, Compass for Health, Nutrition and WASH, 2019. https://compass.savethechildren.org.uk/

27. Caitlin Dolkart, "Flare the life saver", 2019.

28. **Logan Ansell, "Reach 52", 2019.** http://www.reach52.com

29. Imo Etuk, "mDoc, NaviHealth". https://navihealth.ai

30.   Rachel Powers, "Digital Adherence Technology, Atlassian", 2020. https://kncvtbc.atlassian.net/wiki/spaces/ADHERENCE/overview

31. Dr. Zkiuudin Ahmad, TeleDr4You. Tele Medic Faster Access to Care, https://teledr4you.com/root/login/#/login

32.   **Keshet Ronan,** "Mobile WACh, Web Factorial" , 2019. Whttp://demo.uwkrg.webfactional.com

33.   **Arun Ramanujapuram** Logistimo SCM, 2019. https://logistimo.com

34.   **Rabeccea Alban, "**OpenLMIS", 2019. https://openlmis.org/

35.   **Rabaccea Alban,** "Product Catalog Management Tool" 2019. https://gitlab.com/pcmt/pcmt/-/wikis/home

36.   **Micheal Maylahn,** "STASIS monitoring system, Powering Care Intelligence", 2019. https://www.stasislabs.com/

37. Josh Zamor, Compass, Save the Children Initative, 2019. https://compass.savethechildren.org.uk/

38.   **Davis Mosinguzi, Rocket Health is a service of The Medical conceirge Group, a Licnesed and Registered Clinic, Laboratory and Pharmacy,** 2019. https://www.rockethealth.shop/

39.   Maryla Maliszewska, Aaditya Mattoo, Dominique van der Mensbrugghe, "The Potential Impact of COVID-19 on GDP and Trade A Preliminary Assessment" 2019

40.   Akihiko Muto, Ken-ichi Arai in Encyclopedia of Immunology (Second Edition), 1998.

41. G. Köhler, C. Milstein, "**Continuous cultures of fused cells secreting antibody of predefined specificity"** Nature, 256 (1975), pp. 495-497 CrossRefView Record in Scopus Google Scholar

42. E.P. Altshuler, D.V. Serebryanaya, A.G. Katrukha, "**Generation of recombinant antibodies and means for increasing their affinity"** Biochemistry, 75 (2010), pp. 1584-1605. View Record in ScopusGoogle Scholar

43. Karim Kadri, Polymerase Chain Reaction (PCR): Principle and Applications. InTechOpen, Chapter, Synthetic Biology, New Interdisplinary Science.

44. **Huan Liu et.al.** Stereo Matching Based on Immune Neural Network in Abdomen Reconstruction, Artificial Intelligence and It's Applications 2014. Volume 2015 | Article ID 242794 | https://doi.org/10.1155/2015/242794

45. Venkat Kumar G, Jeyanthi V, Ramakrishnan S. A short review on antibody therapy for COVID-19. New Microbes New Infect. 2020 Apr 20;35:100682. doi: 10.1016/j.nmni.2020.100682. PMID: 32313660; PMCID: PMC7167584.