COVID-19 RISK MODEL: LINES OF RESEARCH AND PUBLIC POLICY DEVELOPMENT

By Francisco Zuluaga

Bogota, April 12, 2020

Abstract

A natural consequence of the paper titled "CORONAVIRUS: THE WORST PANDEMIC OF THE LAST 100 YEARS - Multiple Unresolved Questions that have Humanity in Check - The Enigma Finally Deciphered" is the proposal of a Risk Model useful for the Development of Public Policies aimed at optimizing the containment, mitigation, and control mechanisms of this pandemic.

Additionally, this Risk Model illustrates the perspectives toward the different Lines of Research that must be opened as soon as possible in order to achieve complete control over this enemy that is destroying our society.

---

1. Introduction: The Governmental Crossroads

The worst place to be in this pandemic is definitely in the governmental area. All governments of the world find themselves at an unprecedented crossroads, faced with an enemy they cannot see, of which they do not know for certain its specific characteristics, its potential capabilities, and how to defeat it.

The vast majority of public policies have focused on Social Isolation and the implementation of Quarantines. However, it is worth asking if this model of action is the most effective. Answering this questioning requires a Superior Understanding of the problem.

Traditionally, epidemiological models have been employed to determine the speed of contagion. It is key to complement these models with a Risk Model that allows us to understand all the implications.

2. (A) The Risk Model

The proposed model for understanding this pandemic is defined by the following structural equation:

$$ELV = IF \times EAI \times LGI$$

Where:

- **ELV (Expected Lethal Victims):** Expected Fatal Victims.
- **IF (Immunity Factor):** Immunity Factor.
- **EAI (Exposure at Infection):** Exposure to Infection.
- **LGI (Lethality Given Infection):** Lethality given Infection (Mortality).

The conceptual interpretation is direct: The number of fatal victims is a function of the proportion of the susceptible population (without immunity), the level of exposure, and the severity (lethality) with which the virus attacks the individual.

A.1 Immunity Factor (IF)

It is defined as the proportion of the world population susceptible to suffering from the disease. Being expressed as a percentage, the Immunity Factor varies in the interval [0, 1].

$$IF = \frac{\text{Susceptible Population}}{\text{Total Population}}$$

Immunity can be:

1. **Natural:** Genetic factors.
2. **Acquired:** By vaccination, by consumption of chemical elements in water/food, or by previous infection (total recovery without relapse).

A.2 Exposure at Infection (EAI)

Exposure is composed of two sub-factors:

$$EAI = EL \times ER$$

Where:

- **EL (Exposure Level):** Level of Exposure. Defined by the amount of population exposed as a function of the degree of Social Distancing and Quarantine.
- **ER (Exposure Risk):** Risk of Exposure. The probability of coming into contact with the virus (air, surfaces, people).

A.3 Lethality Given Infection (LGI)

This indicator expresses the severity of the disease in infected patients. It is the critical point of the model and is made up of three factors:

$$LGI = PDG \times ARF \times ISG$$

Where:

- **PDG (Periodontal Disease Grade):** Degree of Periodontal Disease. A scale [0, 1] that measures the gravity of oral health, a high-impact trigger on severity.
- **ARF (Associated Risk Factors):** Associated Risk Factors. Probability of pre-existing conditions (diabetes, hypertension, etc.).
- **ISG (Immune System Grade):** Level of the Immune System. Efficiency of the patient's immune system at the moment of contagion.

3. (B) Public Policy Development

Based on the model, we analyze the efficacy of current policies:

B.1 On the Exposure Factor (EAI)

Governments have focused on minimizing this factor (Quarantines). However, under this logic, all of humanity would have to be lucky 24 hours a day, while the virus only needs to get lucky for one second.

It is impossible to achieve an Exposure Level (EL) of zero. Prolonged confinement is economically and socially unsustainable.

- **Recommendation:** Release confinement while maintaining physical protection measures (face masks) for psychological effect and barrier purposes, but understanding that contagion is, in the long run, inevitable.

B.2 On Lethality (LGI) - The Path to Victory

Here lies the key. Victory is not identifying the largest amount of infected people (indiscriminate mass testing); Victory is identifying all those people who are potentially lethal victims.

Recommended Short-Term Actions:

1. **Focus on Oral Health:** Communicate the existence of Periodontal Disease (PDG) as a severity trigger.
2. **New Triage:** Include periodontal review as a fundamental criterion for resource allocation in hospitals.
3. **Prevention Brigades:** Instead of mass contagion tests (which generate panic and false positives/negatives), allocate resources to brigades for identifying patients with high PDG, ARF, or low ISG to treat them proactively before they contract the virus.

4. (C) Lines of Research

The model suggests immediately opening the following scientific lines:

C.1 Research on Immunity (IF)

- Identification of genetic markers of Natural Immunity.
- Econometric models to identify substances in water/food that generate acquired immunity.
- Study of recovered patients to determine non-reinfection time windows.

C.2 Research on Exposure (EAI)

- Models regarding the Life Expectancy of the Virus on different surfaces (wood, metal, plastic) under environmental variables (Humidity, Temperature, Pressure).
- Geographic Risk Maps based on climatic conditions.

C.3 Research on Lethality (LGI)

- **High Priority:** Construction of models to predict the propensity for Periodontal Disease and its direct correlation with COVID-19 mortality.
- Development of home tests for oral health self-diagnosis.
- Treatments to increase the efficiency of the Immune System (ISG) in vulnerable populations.

5. Conclusion

Panic and indefinite confinement are not viable solutions. The strategy must shift from "avoiding contagion at all costs" (which is impossible) to "managing lethality".

By focusing resources on mitigating the factors that make up Lethality (LGI)—specifically periodontal health and the immune system—we can return to social and economic normality while protecting the vulnerable.

> "Contagion is Inevitable... The Unnecessary Loss of Lives, the Destruction of Social Order and the Economy are Optional."