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Cross-Sectional In Silico Analysis of Covid-19 Pandemic

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ABSTRACT

A major problem with healthcare administration is the ability to accurately quantify threats to health security−in real time. Here, a cross-sectional risk analysis for Covid -19 was performed using an online biological defense, artificial intelligence (AI) algorithm. Risk of surviving SARS CoV 2 contagion was quantified and assigned a unit based on the Biological Agents index (BAI) using the following variables for Pareto analysis: morbidity, mortality, population density, viral infection dose in half the population (ID50), economic indicators and modes of transmission. Results show survival for SARS CoV 2 is independent of person to person and or environment to person transmission. Rather, survival is dependent on human behavior. The benefit here is that this protocol can provide evidence-based science needed to identify appropriate mitigation and benchmark for use by governments, non-governmental, humanitarian, international affairs, medical and public policy professionals, journalists, and scholars—at all levels, for use in planning, finance and evaluation of performance to justify budgets when combating global contagion.

KEY WORDS

Health Security, Public Health Policy, Computational Biology, Bioinformatics

BACKGROUND

With respect to Covid-19 pandemic, to identify appropriate mitigations and benchmarks, governments, non-governmental, humanitarian, international affairs, medical and public policy professionals, journalists, and scholars—at all levels, need evidence-based science to plan, finance and evaluate performance to justify budgets when combating SARS-CoV-2 pandemic. Evidently, on April 6th, 2020, Reuters reported that Boris Johnson—Prime Minister of UK's condition worsened after oxygen treatment. Later, on April 17th CNN reported Chinese government officials revised death tolls up by 50% adding 1,290 deaths and 325 new cases.

Finally, on April 19th during his daily briefing on MSNBC, Governor of New York Andrew Cuomo stated that 80% of people on ventilators in New York quote "do not make it."

METHOD

BiologicalAgents® [Index] software [*Olisa Foundation, Washington DC USA*] was used to perform cross-sectional *in-silico* analysis adopting Pareto Principles to quantify survivability for Covid-19 pandemic from open-source data (Wikipedia; New York Times) on morbidity (infection) and mortality (death) frequencies from SARS-CoV-2. Our model makes the following assumptions for SARs-CoV-2:

1. SARS CoV-2 is transmitted asymmetrically, i.e., no evidence of seasonal transmission currently.
2. SARS CoV-2 is transmitted *human-to-human.*
3. SARS CoV-2 transmission can be accelerated by *environment-to-human* transmission via animals (bats, birds, swine) and air pollutants (NO_2, SO_2), and PM particulates (pollen).
4. Mortality is *dependent* on viral transmission. Virus can be isolated postmortem.
5. Morbidity is *independent* of *human-to-human transmission.*
6. *Environment-to-human* transmission increases infection dose (ID_{50}) or number of viral particles capable of causing disease in half the population.
7. As (Ro) increases, viral transmission and attack rate increases proportionally. Consequently, term attack rate can be used synonymously with viral transmission and reproductive rate (Ro) for mathematical purposes.
8. Morbidity can be used to determine size for populations at risk of infection.
9. (Ro) is possible outside humans. Consequently, it can be characterized as follows:
    - Ro<1 = undetectable outbreaks.
    - Ro≤1 =outbreak
    - Ro≥1=Epidemic.
10. Logarithmically, (small) changes in (Ro) can cause exponential (large) outcomes.
11. Furthermore, (Ro) is impacted by multiple variables. In the order of magnitude, the following variables impact (Ro) over 80%
    - socioeconomic factors and human behavior i.e., knowledge and education levels, human Purchasing Power Parity (PPP); Gross Domestic Product (GDP) and or Gross National Product (GDP).
12. Collectively, the following mitigate variables impact (Ro) by as much as 15%
    - Environmental and epidemiological factors such as temperature, humidity, industrial hygiene, environmental sanitation, animal vectors, testing and surveillance.

Finally, other variables, like the following, can impact (Ro) by as much as 5%:

- vaccines and therapeutics,
- individual hygiene,
- individual sanitation,
- population demographics.

.

Achieving 100% human vaccinations will not eliminate (Ro) for influenza like viruses. To justify, despite having no treatments for the common cold and vaccines for influenza, both remain seasonal due to *environment-to-human* transmission. Mutations which create influenza-like viruses are triggered by environmental factors.

Hear, calculations for change in (Ro) started on 27th March 2020 after 14-day accelerations to obtain a global estimate, and after 3-days to obtain continental estimates. Significantly, at this time, US morbidity rates exceeded similar rates in China. Second, Chinese morbidity rates ceased to increase three days consecutively. Randomly, we started collecting data on March 11, 2020, to coincide with World Health Organization (WHO) Covid-19 pandemic declaration. Effectively, test populations had adopted, to some extent, similar mitigations across the board. Based on estimates 1 through 12 outlined **concepts, emergency performance budgets** may look as follows:

Mitigation	**Transmission Impact**	**[1](%) [2,3]Budget**	**Size Pop. at Risk**
[1,3]Socioeconomic [1,3]Behavioral [1,3]Outreach	Human-to-Human Environment-to Human	80%	See table 1. Column E
[1,3]Industrial Hygiene [1,3]Sanitation [1,3]Medical Devices [1,3]Testing [1,3]Surveillance	Human-to-Human Environment-to Human	15%	See table 1. Column E
[1,2,3]Vaccines [1,2,3]Therapeutics	Human-to-Human	5%	See table 1. Column E

Notes: -
[1]Manpower and logistics in budget.
[2]Timeline, unlike other mitigations, requires long (aggregative) term financing.
[3]Based on Pareto analysis

RESULTS

Table 1 and **Figure 1A, B**, and **C** show the following ratios for (Ro) variables that impact their formulation based on assumptions, and calculated survivability. *Unit for contagion survivability is (BAI) and can be expressed in terms (%) of population that theoretically survive the (ICU) once infected.*

Figure 1A shows cross sectional analysis for acceleration of (Ro) from March 11, 2020, through March 27, 2020, in the US (Ro=5; BAI=25%) results show US disease transmission (cumulative 16-day velocity) rates were significantly increasing at about 5-times the rate in Asia. At the same time, mortality frequencies in the US were significantly lower. Interestingly, in order of decreasing velocities, scores recorded in the EU were as following: UK (Ro=3.55; BAI=20%); Spain (Ro=3.5; BAI =19.7%); Germany (Ro=3.4, BAI =19.5); France (Ro=2.79, BAI =16) and Italy (Ro=2.13, BAI =12).

Conversely, mortality frequencies in Iran (Ro=1.55; BAI =7), Japan (Ro=1.34, BAI =5); South Korea (Ro=1, BAI =1) trended with China (Ro=1; BAI =0.000001%). Data in **Figure 1B** show, after sampling 10 US states, between March 23, 2020, and March 27,2020 we found (BAI) values in WA (Ro=1.19, BAI=2.6), CA (Ro=1.21, BAI=2.9); NY (Ro=1.24. BAI=3.4) and DC (Ro=1.34, BAI=3.9) were lower than USA (Ro=1.31, BAI=4.32). Accordingly, BAI index can rank contagion clusters for survivability- in this case compared to US average for that time frame.

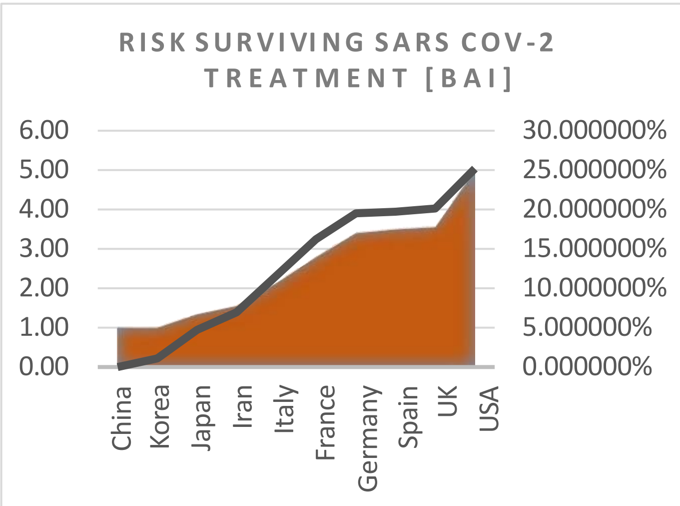
Furthermore, focusing on the US, in this study, FL (Ro=1.32, BAI=4.35); CO (Ro=1.38, BAI=4.7); LA (Ro=1.45, BAI=5.9); and AL (Ro=1.57, BAI=7.16) ranked higher than the US average for Covid-19 survivability. Notably, Alabama had the highest Covid-19 survivability of the 10 states sampled. Interestingly, some countries and other US states sampled like NM, WV, Kenya, Ethiopia, and Plateau State (Nigeria) with elevations rising ≥5000 feet above sea level recorded (Ro) values ≤1. This begs the question. Do Oxygen levels impact SARS CoV-2 transmission? and the Covid-19 pandemic? Also, does ventilating with oxygen worsen its pathology? These are legitimate questions to ask. Worthy to note, BAI algorithms cannot score (Ro) values ≤1 or Ro <1 indicative that transmission is too low.

Finally, according to **Figure 1C**, despite higher (Ro) velocities in WA, BAI shows Covid-19 survivability is still significantly improved compared to Russia (Ro=1.17, BAI=2.26); Mexico (Ro=1.145, BAI=2.15); South Africa (Ro=1.103, BAI=1.55); Saudi Arabia (Ro=1.101, BAI=1.45); Egypt (Ro=1.079, BAI=1.21); and Israel (Ro=1.078, BAI=1.2).

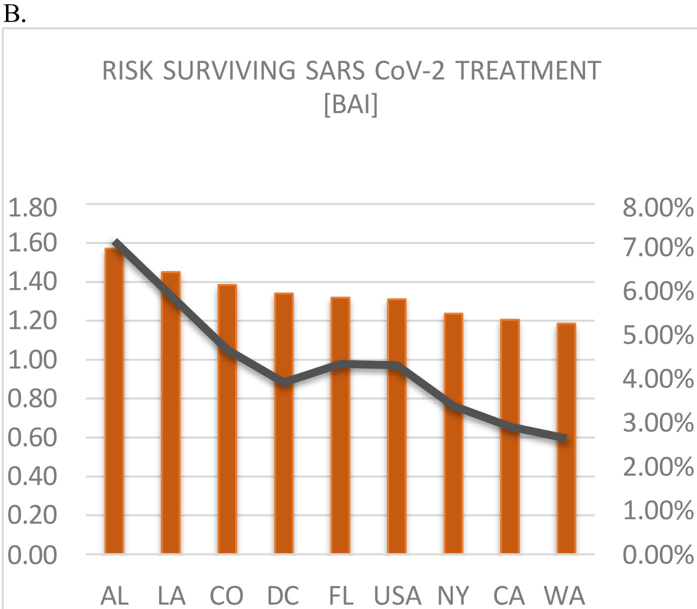
Collectively, results from table 1 and Figures 1 A, B, and C suggest survivability for contagion is independent of (Ro) but dependent on human behavior. Additionally, (Ro) values significantly depend on the environment which too, depends on human behavior.

Fig. 1 ABC: Covid-19 pandemic survivability [BAI] output.

A.



B.

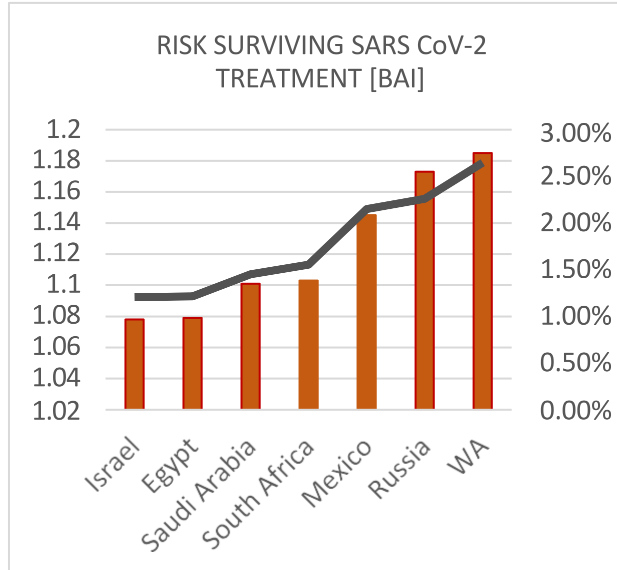


Notes:
WA= Washington State
CA=California
NY=New York
FL= Florida
DC= Washington DC
CO= Colorado
LA= Louisiana
AL= Alabama

Red = SARS CoV-2 Attack Rate

Green = Risk Surviving SARS CoV-2 Treatment.

C.



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1. Ro (Attack Rate) is defined as proportional to both microbial reproductive and transmission rates.
2. When:
   - when Ro ≥ 1= Epidemic
   - When Ro ≤ 1= Outbreak
   - When Ro < 1= No epidemic.
3. **Ro** =

$$\left(\frac{\text{Morbidity [Real-Time]}}{\text{Morbidity [Day-1]}}\right)^{\wedge exp\,[\text{Relative Risk}]}$$

Ro depends on the following:

- Air humidity (Absolute Humidity),
- Air Temperature,
- Air Oxygen levels,
- Climate,
- Sociodemographic factors,
- Spatiotemporal dynamics,
- Population density,
- Purchasing Power Parity (PPP).

4. **Survivability** [BAI]=

$$\frac{Log\,[\text{Ro}]}{exp\,[\text{Relative Risk}]}$$

Table 1: March 27, 2020, Biological Agents INDEX [BAI] computations for Covid-19 Pandemic

Real-Time [Start]	Real-Time [End]	Cluster [3]Elevation ≥5000 ft. above sea level	Viral Attack Rate [Ro] (Δmorbidity)^(ExpRiskmortality (real-time) R<1.0=undetectable [1]R≤1.0=outbreak [2]R≥1.0=epidemic	A Ro [5][Log Infection Transmissio (real-time) 0= undetectable frequency	B Mortality Frequency [5][Exponential] (real-time) 0=no death in pop.	C Morbidity Frequency [5][Exponential] 0= undetectable frequen	D Survival Ratio (A/B) 0=unsurvivable *=undetectable	E Population at Risk [5][Infection] (C*I)	F Population at Risk [death] ratio (B*E)	G Total Lives Saved [intervention] (D*F)	H BAI [per capita.] (G/I)*100	I Population Size [estimate.wikipedia	J Pop. Density Sq/Km.wikipedia
02/11/2020	03/27/2020	[1]China	1.00	0.001750118	0.6531069920	0.0000053104	0.002679680	7,382	4,821	13	0.000001%	1,390,000,000	148
02/11/2020	03/27/2020	[1]Korea	1.00	0.029550842	0.3675801180	0.3672767900	0.080392928	18,822,512	6,918,781	556,221.08	1%	51,248,859	510
02/11/2020	03/27/2020	[2]Japan	1.34	0.128641767	0.3678794400	0.3672794830	0.349684579	46,571,038	17,132,527	5,990,980.62	5%	126,800,000	899
02/11/2020	03/27/2020	[2]Iran	1.55	0.189161196	0.3678794410	0.3678794410	0.514193442	30,166,114	11,097,493	5,706,258	7%	82,000,000	50
02/11/2020	03/27/2020	[2]Italy	2.13	0.316580596	0.3682386470	0.3655409660	0.859715835	22,224,890	8,184,063	7,035,969	12%	60,800,000	205
02/11/2020	03/27/2020	[2]France	2.79	0.446354819	0.3678794400	0.3633459100	1.213318197	24,340,542	8,954,385	10,864,518	16%	66,990,000	122
02/11/2020	03/27/2020	[2]Germany	3.4	0.534385089	0.3678794220	0.3652173360	1.452609353	30,287,473	11,142,138	16,185,174	19.5%	82,930,000	240
02/11/2020	03/27/2020	[2]Spain	3.5	0.54394968	0.3678794400	0.3627158800	1.478608535	16,958,581	6,238,713	9,224,615	19.7%	46,754,448	93
02/11/2020	03/27/2020	[2]UK	3.55	0.549548571	0.3678794380	0.3658460870	1.493827907	24,352,106	8,958,639	13,382,665	20%	66,490,000	274
02/11/2020	03/27/2020	[2]USA	5	0.699744265	0.3647368860	0.3599342410	1.918490539	117,759,686	42,951,301	82,401,665	25%	327,170,000	93
03/23/2020	03/27/2020	[2]AL	1.57	0.196154484	0.366724353	0.364916643	0.534882623	1,789,253.81	656,163	350,970.16	7.16%	4,903,185	248
03/23/2020	03/27/2020	[2]LA	1.45	0.161464754	0.367010834	0.366123838	0.43994547	7,267,558.18	2,667,273	1,173,454.49	5.91%	19,850,000	419
03/23/2020	03/27/2020	[2]CO	1.38	0.141160265	0.367845721	0.33095289	0.383748558	1,905,936.51	701,091	269,042.50	4.7%	5,758,936	20
03/23/2020	03/27/2020	[2]DC	1.34	0.129030051	0.356384159	0.304204681	0.362053272	214,692.15	76,513	27,701.74	3.9%	705,749	12
03/23/2020	03/27/2020	[2]FL	1.32	0.120145173	0.367872396	0.361800162	0.326594695	7,770,647.64	2,858,607	933,605.81	4.35%	21,477,734	121
03/23/2020	03/27/2020	[2]USA	1.31	0.119975318	0.367879438	0.359934241	0.32612673	117,759,685.63	43,321,367	14,128,255.73	4.32%	327,170,000	93
03/23/2020	03/27/2020	[2]NY	1.24	0.09255591	0.367879431	0.36612348	0.251593055	7,267,551.08	2,673,583	672,654.80	3.4%	19,850,000	419
03/23/2020	03/27/2020	[2]CA	1.21	0.08092843	0.367876902	0.360365554	0.219987799	14,238,844.13	5,238,142	1,152,327.30	2.9%	39,512,223	98
03/23/2020	03/27/2020	[2]WA	1.19	0.075759956	0.36787674	0.349306686	0.205938424	2,659,933.04	978,527	201,516.41	2.6%	7,614,893	40
03/23/2020	03/27/2020	[1,3]NM	1.00	0	0	0	*	_	_	_	_	2,968,290	7
03/23/2020	03/27/2020	[1,3]WV	1.00	0	0	0	*	_	_	_	_	1,820,000	30
03/23/2020	03/27/2020	[1,3]Ethiopia	1.00	0	0	0	*	_	_	_	_	10,922,000	93
03/23/2020	03/27/2020	[1,3]Kenya	1.00	0	0	0	*	_	_	_	_	51,300,000	78
03/23/2020	03/27/2020	[1,3]Nigeria [Plateau State]	1.00	0	0	0	*	_	_	_	_	197,870,000	201
03/23/2020	03/27/2020	[2]Israel	1.078	0.032844622	0.367387821	0.366779154	0.08940041047	3,366,867.58	1,236,946	110,583	1.20%	9,179,550	416
03/23/2020	03/27/2020	[2]Egypt	1.079	0.033104413	0.36710494	0.366628376	0.09017697501	21,183,787.54	7,776,673	701,277	1.21%	57,780,000	42
03/23/2020	03/27/2020	[2]Saudi Arabia	1.101	0.042095371	0.3496725	0.3222691	0.12038513466	11,027,459	4,119,359	495,910	1.45%	34,218,169	15
03/23/2020	03/27/2020	[2]South Africa	1.103	0.042656986	0.366363518	0.363847509	0.11643349816	21,023,109.07	7,702,100	896,782	1.55%	57,780,000	42
03/23/2020	03/27/2020	[2]Mexico	1.145	0.058662062	0.367324689	0.366635685	0.15970084167	46,526,068.43	17,090,174	2,729,315	2.15%	126,900,000	201
03/23/2020	03/27/2020	[2]Russia	1.173	0.069247241	0.35127015	0.3261743	0.19713386122	47,001,716.63	16,510,300	3,254,739	2.26%	144,100,000	8

Notes:

[4] **Olisa, NR. 2008.** Estimating Infection Surge. Biological Agents Index: Risk Management Strategies for Contagion, American Journal of Biological Defense Press. pp 136-144

[5] **Olisa NR. 2008** Infections Disease Surveillance. Biological Agents Index: Risk Management Strategies for Contagion, American Journal of Biological Defense Press. pp 145-146

DISCUSSION

The origin and evolution of SARS Cov-2 is certain. However, less certain are the circumstances around its outbreak. We know viral S-proteins have been linked to SARS—bat like coronavirus identified and published by the Chinese military institute (Fan Wu, et al. 2020; Zhang Liang sheng, et al. 2020; Huang Chaolin, et al. 2019; Hu Dan, et al. 2018). Furthermore, currently a definitive treatment for SARS CoV-2 remains elusive with antibiotics and antivirals (Cao, B, et al. 2020). Nonetheless, it appears there are promising synergistic treatments with *anti-infective antibiotics.*

For example, Azithromycin and Quinine analogs like Chloroquine (Hydroxychloroquine) work by antagonizing (inhibit) the polymerization of heme (hemagglutinin) during viral infection (Schrezenmeier E. 2020; Tran D.H et al, 2019). The former has been used for over 70 years in developing countries—prophylactically to treat malaria with limited side effects with exception of a hypersensitivities. Its use was discontinued when drug-resistance issues started developing in the 1980s. Similarly, IV vitamin C antagonizes viral reproductive proteins by enzyme activity (Magareet C. et al 2020).

With respect to economic impact of Covid-19.
Recently, on March 23, 2020, US government embarked on an economic scheme to sell US bonds publicly. Historically, in 1928 ten years after about 13 million WWI soldiers returned with influenza, US government embarked on a similar economy boosting programs that initiated a "buy stock culture" following the 1918 Influenza pandemic. That effort led to the crash of US stock markets and the great depression. Lesson here? improper administration of government relief programs can cause harm to its economy and lead to the conundrum of if "the pill is worse than the cure" regarding economic impact of pandemics and decisions of when to start and end mitigations.

Enthusiastically, ever wondered why protagonists in a Zombie movie do not use flame throwers? Zombies, like all organic matter, burn with enthusiasm. It would make sense. 3-guys with flame throwers can decimate millions of Zombies in a few hours. This euphemism illustrates key tenants of Sun Tzu in the art of war—deception and knowledge of one's enemy! Sadly, SARS and influenza viruses have the edge of deception. We, however, must be content with increasing our knowledge on the virus. Consonantly, SARS CoV- 2 evolved from the influenza virus (Zhang Liang sheng. et al 2020; Hu Dan et al. 2018), then it depends on hemagglutinin- esterase receptors for infection—the Achilles heels.

Significantly, reports by physicians of adverse effects caused by oxygen therapy for flu-like diseases have been reported and are well documented by Centers for Disease Control and Prevention (CDC). See Vaudry W, et al 2009.Not surprising since influenza hemagglutinin receptors target human iron binding proteins in the lungs and nasopharyngeal regions associated with oxygen absorption. Since Iron is the key molecule needed in our lungs to oxygen absorption, the more exposure our lungs have for oxygen, the greater effort per surface area our body makes to increase absorbing oxygen. Precisely, for this reason, it may be a bad idea to treat Covid-19 cases with pure oxygen.

Speculatively, "cold arrest techniques" like bathing in "wet" sauna for 10-20 min at 50ºC may, or may not kill corona viruses but evidently, SARs CoV-2 does not (cannot) replicate above 57ºC (Casanova L, et al. 2010). This maybe the anecdotal reason why Germanic and Scandinavia countries with "wet sauna" cultures, including Russia, record very low mortality rates from Covid 19. Accordingly:

1. *Environment-to-human* mitigations can have greater impact on (Ro) than *human-to-human* one (Blut A. 2009). Feasibly, destroying its environmental habit can limit its contagion.
2. SARs CoV-2 is airborne for the following reasons. First. It has a density of about 1.15 (Sharp D.G, et al. 1945); and a spiked hydrophobic NH2-terminal (Bos T.J. et al. 1984). Consequently, its morphology supports buoyancy i.e., grips to, and or bounces off particulate matter (PM) like pollen and automobile pollutants suspended in air and fog (Wu X, et al. 2020; Sloan C, et al. 2011). Additionally, pollen, as an aerosol particle, can ably assist in seasonal distribution by mechanically suspending flu-like viruses in spring and fall. Accordingly, wearing respiratory masks can help reduce morbidity.
3. Recently, during the Covid-19 response in China, an early detection method favored by doctors was the use of chest x-rays which are sensitive to detection of lung tissue damage from (PM). Furthermore, correlations between allergy, (PM) and influenza pathology caused by severe pneumonia were, and still are the anecdotal basis for rapid Covid-19 detection with X-ray machines (Fajuta J. et al. 2007). Accordingly, X-rays can be used in early initial detection.
4. Finally, with respect to home ventilating, tearing down old buildings to improve ventilation may not be realistic in some parts of the world. Sadly, inability to do so may explain increases in morbidity and mortality in some parts of Europe were improving home and office ventilations using HIPA filters and better air flow may conflict with antiquated government policies for preserving historical buildings and structures.

With respect to saving lives the question can be asked. When laboratory detection is available, which situation is riskier for Covid-19 transmission, or even death:

- First group: Reside in a densely packed, *well-ventilated* room with 1,000 individuals. With 100 tests positive.
- Second group: Reside in a room the same size with 10 people-except that there is *limited ventilation*. With one test positive.

We can "simulate" this situation further. First and second groups previously mentioned can be situated to bargain (purchase) ventilation upgrades assuming both have "limited ventilation" in which case size of test positives would not matter over purchasing power and or access to ventilation. Additionally, we can ask the following question to:

- Third group: With two test-negative individuals. If you had to choose which of either group one or two, would you join?

These scenarios underscore numerous nuanced variables that impact morbidity and mortality. Furthermore, even with adequate testing, these nuances compound difficulties encountered when calculating for, and selecting appropriate mitigations for reducing (Ro) during pandemics. Here, knowledge of who's test positive for SARS CoV-2 won't matter for the group without ventilation. The issue here is "risk" so knowledge that approximately 70% test positive people survive infection but yet transmit disease to others while asymptomatic suggests risk of surviving hinges on proper ventilation. Thus, mitigating the environment without knowledge of who's positive or negative maybe more impactful and cost effective when no vaccines or therapeutics are available.

Finally, our study shows that by calculating ratios between attack rates and relative risk and quantifying impact with Pareto graphing, a performer can determine contagion survivability for analytics and benchmarking. Accordingly, as a diagnostic device, our algorithm shows that *per capita*, BAI can detect nuanced impact variables have on morbidity and mortality—to include human behavior. For example, based on results in **Table 1** New York recorded the most cases and deaths from SARs CoV-2. It may be due to poor or untimely mitigation policies rather than viral attack rates. In fact, Washington and California recorded lower viral attack rates during this time while actual mortality was reduced. However, frequencies between mortality are greater suggesting that mitigation practices may have resulted in death. In this case, certain treatments in ICUs may be harmful to patients.

Additionally, perhaps environmental transmission factors in the West Coast like its location between the Pacific Ocean and Sierra mountains prevent fresh highly oxygenated, low humidity, and often polluted air from circulating. This kind of condition is ideal for Covid-19 contagion. Also, New York may have more cases due to its higher population density. In summation, we find that lower morbidity and mortality cases in California and Washington compared to New York maybe from having one of the highest earnings and purchasing power parities (PPP) in the US. West coast communities may be able to better afford and finance best lifestyle practices for mitigation which in turn has rewarded California and Washington with fewer casualties—at this time.

CONCLUSION

Overwhelmingly, our findings show, humans—not the virus—can control (Ro) with adequate behavior modifications facilitated by a "productive" socioeconomic agenda. Regardless of transmission, people are known to test positive and remain asymptomatic, more so most people "ride the disease out" which is a function of one's immune system and or previous exposure. Collectively, most of these categories infected are "productive" members of the community. *Fundamentally, based on Epidemiologic Transition Theory its widely accepted by epidemiologists and macro-economists that unproductive socioeconomic situations like job loss and poverty—over long periods of time, lead to mental disease, increase in vices like prostitution and lapses in education, crime, and drug addiction. Conversely, productive socioeconomic agendas—by proxy, significantly reduce infectious disease in the same time frame.* Consequently, it can be argued that returning to "economic productivity" during a pandemic can diminish morbidity and mortality from infectious disease like Covid-19.

Furthermore, *in-silico* analysis is based on mathematical relationships— a form of anecdotal evidence. Nonetheless, it can drive and influence future research. Consequently, more research is needed to quantify relationship between (Ro), human behavior and socioeconomic factors. BAI analysis can help identify and select appropriate mitigation practices for cost-efficiencies.

Clearly, when saving lives and improving an economy are desired goals, ratio of Ro (attack rates) and frequencies (relative risk) for mortality and or morbidity can be used to quantify pandemics. High (Ro) values and low risk values measure the best efficiency. Conversely, low (Ro) values and high-risk values measure the worst efficiency. Furthermore, we observe that clusters recording low Ro (values of Ro $<$ 1) experience outbreaks that do not advance to epidemics. Alternatively, clusters recording Ro $\geq$ 1 values advance to epidemics. Additionally, we find there are inverse proportional, but yet independent relationships between (Ro) and mortality frequencies. This finding is called survivability and unit for measurement called BiologicalAgents Index (BAI).

Based on estimates, mitigations that increase human survival during pandemic. We find that (Ro) is independent of survivability even when environmental and biological factors favor (Ro). Accordingly, we find that humans can survive high (Ro) when socioeconomic standards are high and preventive

behaviors are observed. Consequently, as is best practice, contact tracing when Ro≥1 (epidemic level contagion) can be cost-ineffective and cost-inefficient. Alternatively, other mitigates changing behavior like social distancing, use of masks, increasing purchasing power parity in combination can be used— short term to reduce (Ro) to values ≤1 (outbreak level contagion), at which point contact tracing can be implemented cost-effective and cost-efficiently.

Accordingly, anecdotally—we find that improper ventilating in homes, offices or hospital intensive care units (ICU), i.e. respirators, ventilating in buildings, and **inspiring ventilators in hospitals with ≥21%-100% oxygen levels may be detrimental and averse to human life**. Theoretically, use of 16.6% oxygen and nitric oxide (NO) may be more beneficial in hospital settings. We base this finding on our analysis showing that in appearance, attack rates in clusters located along coastal wetlands with 21% oxygen, wildlife, vegetation, pollution and pollen show remarkably high values for (Ro). See **Figure 1B**. Washington, California, New York, Florida, and Louisiana). Other clusters are located at elevations
≥5000 feet above sea level with thin air record lower (Ro) values independent of population densities. See. **Figures 1 B**, and **C** for West Virginia, New Mexico, Ethiopia, Kenya and Nigeria. Interestingly, despite high values in (Ro), clusters with higher purchasing power parities (PPP) and or (GDP) appear to mitigate mortality incidence better that cluster with low (PPP) or (GDP). See **Figure 1C**.

In other words, it is theoretically possible for economic activities to progress in communities with high (Ro) provided access and affordability to acquire mitigation best practices are available. This can only be sustained by improving economic productivity activities—continuously. One possible explanation could be that increases with socioeconomic standing can bring increased access to the following: quality in testing; ventilating and treatment. Collectively, this ability to acquire and mitigate—with human understanding, can account for over 80% impact and diminish (Ro) to value <1. These conclusions were made based on Pareto graphing inbuilt in algorithms of the BHI.

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REFERENCE:

1. Wu X, et al. Exposure to air pollution and COVID-19 mortality in the United States. *MedRxiV*. **2020**. doi: https://doi.org/10.1101/2020.04.05.20054502
2. Wu Fan. et al. A new corona virus associated with human respiratory disease in China. *Nature*. **2020**. 579,265-269.
3. Schrezenmeier E and Dorner T. Mechanisms of action of Hydroxychloroquine and chloroquine: implications for rheumatology. *Nature Reviews Rheumatology* . **2020.** Vol. 16, pages155–166.
4. Cao B; Wang D, et al. A trial of Lopinavir-Ritonavir in adults hospitalized with severe Covid-19. *New England Journal of Medicine*. **2020** DOI**:** .10.1056/NE/Moa2001282.
5. Zhang Liang sheng. et al. Origin and evolution of the 2019 novel corona virus. *Clinical Infectious Disease*. **2020**. DOI: https: doi.org/10.1093/cid/ciaa112
6. Huang Chaolin, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan China. *The Lancet.* **2019.** DOI: https://doi.org/10.1016/SO140-6736(20)30183-5
7. Tran D.H et al. Azithromycin, a 15-membered macrolide antibiotic, inhibits influenza A(H1N1) pdm09 virus infection by interfering with virus internalization process. *The Journal of Antibiotics*. **2019**. Vol **72**, pages759–768(2019).
8. Hu Dan et al. Genomic characterization and infectivity of a novel SARS-like coronavirus in Chinese bats. *Emerging Microbes and Infections*. **2018** 154. DOI 10.1038/s41426-018-0155-5.
9. Magareet C, et al. Potential Mechanisms of Action for Vitamin C in Cancer: Reviewing the Evidence. *Front Physiol* 9. **2018**.: 809.
10. Sloan C: Moore, M. et al. Impact of Pollution, Climate, and Sociodemographic factors on spatiotemporal dynamics of seasonal respiratory viruses. *Clin Trans Sci* **2011**. Vol.4:48-54.
11. Casanova L, et al. Effects of Air Temperature and Relative Humidity on Coronavirus Survival on Surfaces. *Applied and Environmental Microbiology*. **2010** 76(9): 2712–2717.
12. Olisa N.R. Biological Agents Index: Risk management strategies for contagion. *American Journal of Biological Defense.* Fourth Edition. **2010**
13. Blut A. Influenza Virus. *Transfus Med Hemother*. **2009.** 36(1): 32–39.
14. Shaman, J; Kohn, M. Absolute humidity modulates influenza survival, transmission, and seasonality. PNAS. **2009**. Vol 106 No.9 3243-3248.
15. Vaudry W, et al. Respiratory distress and the flu: What should a physician know? *Paediatr Child Health*. **2009**. 14(9): 571-572.
16. Olisa N. Biological Agents Index: Quality Management of infectious disease intervention programs. *American Journal of Biological Defense*. Third Edition. **2008.**
17. Zeng Q, et al. Structure of coronavirus hemagglutinin-esterase offers insight into corona and influenza evolution. **2008**. PNAS 105(26): 9065-9069.
18. Fajuta J. et al. Chest CT findings of influenza virus-associated pneumonia in 12 adult patients. 2007. Influenza Other Respir Viruses. **2007** Sep; 1(5-6): 183–187
19. Bos T.J, et al. NH2-terminal hydrophobic region of influenza virus neuraminidase provides the signal function in translocation. Proc Natl Acad Sci U S A. **1984** Apr;81(8):2327-31.
20. Sharp D.G, et al. Densities and sizes of influenza virus A (PR8) and B (Lee Strain) and the swine influenza virus. Journal of Biological Chemistry. **1945**. By guest April 2020.