

Stopping Future COVID-19 Like Pandemics from the Source- A Socio-Economic Perspective 'Re-inventing Zoonotic Virus Foodborne Diseases Inspection'

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Abstract Food-borne zoonotic diseases are caused by infections that spread between animals and people. Studies show that the severity of these diseases transmittance on humans varies from mild to life-threatening. These diseases now even becoming a source for global socio-economic instability with its repeated outbreaks, similar to the COVID-19 pandemic. This paper argues how such devastating viral hazards could be avoided if the zoonotic virus could be identified in the source before its breakout, through enhancement of the public health services. The researcher proposes a framework that would be universally suitable to all stakeholders regardless of their resources. The framework focuses on identifying all the potential zoonotic-virus markets in the world and then work on eliminating any potential outbreaks, taking into consideration the effectiveness of the services. The paper concludes with limitation and implications, besides clear recommendation to a mindset shift that would invest heavily in the side of discovering the potential zoonotic viruses sources rather than fighting its consequences once the breakout occurs.

Keywords COVID-19 Coronavirus, Epidemic, Pandemic, Zoonotic Viruses, Zoonotic Transmission, Foodborne Zoonotic Diseases, Public Health, Public Health Inspection, Socio-Economic Problem-Solving

1. Introduction

This research comes in the midst of enormous world turmoil about the coronavirus COVID-19 and where it might take the world from all the types of perspectives that one could think of. This turmoil should not leave us as problem solvers, future foresight experts, socio-economic researchers and scientists empty-handed, watching and praying for solutions that could come only from social distancing, isolation or from the research of the drug companies that are competing to offer the best vaccine.

Previous similar human experiences with recent epidemics as SARS and MERS suggest we humans did not learn to mitigate the threat of the viruses that come from similar animal origin virus that can be transmitted by different means including food. Jarvis (2020) confirmed that COVID-19 comes from a virus called SARS-CoV-2, which belongs to the same family of viruses as SARS-CoV and MERS-CoV, which first circulated in bats before transmitting via intermediate hosts to humans. McKinney

et al. (2006).

Studies on Coronaviruses shows that they need a host (animal or human) to grow. Safe hygiene and reliable public health practices and control are expected to strain such viruses. And since these viruses are going to be always present and around humans need to build innovative public health systems that could start with 'Intelligent Inspection' in relevant to animal farms, animal market and animal consumption. This intelligence-driven system could start by establishing trustworthiness program that does not jeopardize the development of the socio-economic, food services, local tourism and quality of life and surely does not increase the cost on the consumers, or burden the governments. McKinney et al. (2006).

In this paper, we shall review the uniqueness of the COVID-19 pandemic that is perceived to have started with a virus transmittance from animals or animals' food to humans and became a life-threatening outbreak. The routes of virus that causes such outbreaks are going to be investigated. Then, more focus would be given to the main scope of this research that is the viruses that come from animal food which cause the main threat for the Outbreak.

The research then goes into exploring the characteristics of food-borne viruses that lead to the incidences of the known viral diseases so far. Despite MERS-CoV and other coronaviruses have zoonotic links, they are not yet proven to cause food-borne outbreaks that disturb all the type of

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socio-economic activities in the globe.

Further review is done on the zoonotic virus transmissions literature along with the current methodologies for preventing them, including the monitoring stages from the animal farm till the fork. The researcher also investigates the role expected from the public health authorities in relevance to monitoring the animals and food handling, the decontamination procedures, and the dangers that might come from infected people before, during or after food handling. EFSA (2014)

Then types of outbreaks that public health inspectors supposed to be preventing and the methodologies they should use for detection of food-borne viruses, including the epidemiological surveillances are reviewed. Finally, a snap-shot about the situation of Wuhan livestock seafood market that triggered the incidence of this global Outbreak is illustrated, along with the socio-economic disturbances and chaos it created to all ways of life. EFSA (2020).

The research methodology targets to optimize the role of the public health authorities through the "Threshold Model" for the benefit of preventing such epidemic or pandemics from occurring in the future. Then a comprehensive framework would be recommended for future actions and research.

2. Literature Review

2.1. Uniqueness of Epidemics or Pandemics that Start from Animals as COVID-19

COVID-19 as a novel virus is now officially and scientifically a pandemic virus that came mainly from an animal source, similar to its sisters Avian Flu, H1 N1, MERS and SARS. SARS specifically also emerged 17 years ago from an animal market in China which have similar to Wuhan seafood and live animals market a combination of live, wild animals, raw food restaurants and poorly regulated animal husbandry and unsanitary butchery. This combination as per Campbell (2020a) is a perfect setup for the viruses epidemic breakout and to emerge later as a pandemic.

2.2. Lessons from How COVID-19 (Coronavirus) Started

Coronaviruses are most commonly passed between animals and people and from person to person. Despite the fact that the source of COVID-19 (coronavirus) is believed to be animals, the exact source is not yet confirmed till the time of writing this paper.

The lesson here today is that failure to monitor and control a specific market causes a coronavirus that is keeping and going to keep the world in chaos for more than 6-12 month with millions of lives put at risk.

2.3. Routes of Viruses that Cause Outbreaks

Food-borne viral outbreaks are investigated with varying degrees. The strength of the investigation depends on the

location of the event, the size and the scope of the Outbreak. The identification of the viruses related to the Outbreak depends on the capacity to trace it back, and then the quality of the epidemiological investigation. EFSA (2020)

There are mainly three routes of viruses related to animals' food and the contamination related to that. The first route is the viruses of food contaminated with sewage, or human faeces during primary production. The second route is the viruses that come from handling of food by an infected person. The last known type and the most dangerous is the viruses that come from the contamination of food with an animal origin that causes what is called (zoonotic infections).

2.4. Viruses in Foods

2.4.1. Food Viruses as a Threat for Outbreak

In recent years viruses have been increasingly recognized as important causes of outbreaks of food-borne disease. While noroviruses are currently recognized as the most critical food-borne viruses' outbreaks related to contamination of the food.

Contamination with viruses depends on the primary production environment. Then, these viruses pass on to humans in different ways, but the major way via infecting the gastrointestinal tract and are excreted in faeces and, in some cases, in the vomitus. Noroviruses (NoV) are the most common cause of food-borne viral gastroenteritis worldwide, and Hepatitis A virus (HAV), which can also be transmitted by food-borne routes, continues to pose an international health threat. Common symptoms of viral gastroenteritis include vomiting and diarrhoea. Asymptomatic infections of such food-borne virus are common. EFSA (2020)

2.4.2. Characteristics of Food-borne Viruses

Food-borne viruses tend to survive for prolonged periods at pH values as low as 3 to 4 and as high as 9 to 10. However, differences are observed among the different viruses. Significant differences in virus survival have been reported under different processing and substrate conditions.

Higher resistance to environmental or food processing conditions is not the only factors contributing to the probability of food-borne transmissions. Viruses found to infect food at the end of the food chain, when they develop acid resistance and have the ability to infect the gastrointestinal tract. Thus, some viruses have the potential for food-borne transmissions such as avian influenza viruses and Coronaviruses. (Luby et al., 2006).

2.4.3. Incidence of Viral Disease

Before the Outbreak of the COVID-19, it was estimated that viral illnesses attributed to food are in the range of around (5%) for HAV to 12–47% for NoV. This translates to estimated numbers of food-borne viral illness cases ranging from approximately 13 000 per million to 30 000 per million persons. Almost no information is available for rates of hospitalization or death associated with these agents.

Estimates provided by Mead et al. (1999) suggested that, in the USA, two-thirds of all food-borne illnesses, one-third of hospitalizations for food-borne disease and 7 per cent of deaths from the food-borne illness were viral, predominantly NoV. EFSA (2020).

2.4.4. Persistence of Food-borne Viruses

A factor affecting overall disease risk is the stability of some of the food-borne viruses in the environment. For example, HRV in aerosols, generated while vomiting, and thought to play a role in the transmission of those viruses, were found to survive in the air for up to 9 days at 20 °C. Viruses may also persist for extended periods (1 to 60 days for 100- fold reduction in infectivity) on several types of materials commonly found in institutional and domestic environments, such as paper, cotton cloth, aluminium, china, glazed tile, and latex (Sattar et al., 2002).

2.5. Dangers of Zoonotic Transmission

2.5.1. Defining Zoonotic Transmission

Zoonotic infection refers to an animal virus infecting a human. For example, when animal meat acts as a passive carrier of human enteric viruses that cause infection in consumers, that animal would be considered a vehicle of infection. If that animal accumulates a virus from another animal due saying that animal faeces that came from the contaminated environment and subsequently transmitted to the human, this would be considered to be a zoonotic infection. Similarly, the transmission of an animal virus to humans by consumption of infected meat or other animal product would be regarded as a zoonotic infection. EFSA (2014)

One of the recent examples of zoonotic transmissions that caused a world epidemic was SARS. SARS Coronavirus transmission started by faecal spread in a faulty sewage system in one of the housing complexes in Hong Kong. Then people got infected by either oral consumption or through inhaling the virus-aerosols (McKinney, Gong and Lewis, 2006).

Zoonotic viruses, unlike bacteria, cannot replicate in food or water and cannot increase during processing, transport or storage. The tricky part also the contaminated viral products will look, smell and taste normal. These viruses are also more resistant to heat, disinfection and pH extremes than are most vegetative bacteria. Consequently, even low levels of virus contamination may persist in a product to the point of consumption. Additionally, many of the food-borne viruses require only a low infectious dose to cause disease.

2.5.2. Transmission of Zoonotic Viruses

Viruses transmitted by food-borne contamination, is common and often results in larger prolonged outbreaks which might be similar to the COVID-19.

Since viruses frequently cause extensive secondary spread, the characteristics of food-borne viruses' present new

challenges for public health inspectors. It is important to note that there are apparent differences in morphology, infectivity, persistence and epidemiology between viruses and the common food-borne bacteria.

Jarvis (2020) mentioned how a new zoonotic outbreak starts with a transmission of the infection from its primary animal carrier to an intermediate host species, which then transmits the virus to humans. Identifying intermediate host species enable public health officials to take the proper risk-mitigation programs, if there is an appropriate resource for realizing the disease evolution.

2.6. Current Methodologies for Preventing from Zoonotic Virus

2.6.1. Monitoring Stages from the Farm to the Fork

Virus contamination as a consequence of human handling can occur at virtually any stage of the farm-to-fork continuum. The health inspectors should see the interconnection between the health of an animal and a human, besides the contamination of their environment. Persistence of viruses in a contaminated environment, and their resistance to cleaning and disinfection are factors that may contribute to this mode of transmission.

2.6.2. Monitoring Danger coming from Food Handlers

It is possible that infected food workers could introduce a virus to the food they are working on, or onto surfaces within the food business, by coughing and sneezing, or through hand contact, unless they strictly follow good personal hygiene practices. The World Health Organisation (WHO) advises that food handling be monitored for proper hand hygiene, cough/cold hygiene practices, safe food practices, avoiding close contact, when possible, with anyone showing symptoms of respiratory illness. Sattar et al. (2002), Mead et al. (1999).

The zoonotic viruses of the potential risk to human health may enter the food chain through animal products, as well as when virus-laden animal manure contaminates food. Once such viruses have entered the human population, the further spread may occur between humans. Animal viruses with the potential for food-borne transmission may include HEV, HPAI virus H5N1, SARS CoV and Nipah virus. Luby et al. (2006).

2.6.3. Monitoring Decontaminations and Infections

It is conceivable that considerable numbers of infective viruses will remain when hand sanitizers are used instead of proper handwashing. There are no convincing data to support the advice to use alcohol-based hand disinfectants instead of traditional hygienic handwashing with streaming water and towel drying. Sattar et al. (2002).

Most of the guidelines and practices all over the world of public health inspection focus on food hygiene guidelines which may help in preventing bacterial infections, may not be effective for viruses. Environmental persistence is likely

to be an important consideration for food-borne virus outbreaks. The survival and transferability of human enteric viruses on environmental surfaces depend on several factors, including temperature, relative humidity, type of surface and virus type. Although data differ based on experimental design and the virus type, enteric viruses can generally persist on surfaces under ambient conditions of temperature and moisture for a period of days to weeks. Todd and Grieg (2015).

The presence of related virus strains replicating in a single host may provide an environment conducive to the evolution of new virus strains. The unpredictable behaviour of recombinant zoonotic viruses is a potential concern to the world today. These animal rotaviruses into the human population (zoonosis) may contribute to the diversity of virus strains individually and they cause the asymptomatic infections which are quite common in COVID-19 first wave. EFSA (2014)

Asymptomatic food handlers may be another source for shedding the second wave of COVID-19 if their hands become contaminated with human enteric viruses. The food handlers might continue to be a source for shedding viruses if they are not practising high personal hygiene. These same viruses can be readily transmitted from human skin (hands) to foods and inanimate surfaces and become a secondary source of food contamination.

2.7. Current Prevention Methods Before Food Viral Outbreak

2.7.1. Types of Outbreaks that Public Health Inspectors Are Preventing

Any public health inspector should know, appreciate and believe that they are preventing different types of outbreaks: outbreaks caused by infected food handlers; outbreaks due to contaminated animals' meat; and outbreaks due to contaminated produce.

Food-borne transmission through consumption of raw or undercooked meat has been documented, but it is unclear how important this mode of transmission is in the epidemiology. The presence of HEV RNA and infectious HEV, is now followed by emerging viruses. The COVID-19 is one of the long recent emerging viruses proceeding the Highly Pathogenic Avian Influenza (HPAI) virus, and the SARS. Todd and Grieg (2015).

The potential for food-borne transmission is a concern to all over the world with every new emerging infection as they are likely to spread in particular conditions for the primary respiratory pathogens Nipah virus, HPAI virus and SARS-CoV. Luby et al. (2006).

The European Food Safety Authority (EFSA, 2020) is one of the few entities in the world that are striving to analyse and monitor data on zoonotic diseases, zoonotic microorganisms in humans and animals and in food and feed as well as foodborne outbreaks. However, their capacity to eliminate an outbreak is not yet seen.

2.7.2. Methodology for the Detection of Food-borne Viruses

Recently, the number of available detection methods for food-borne viruses in other food matrices has been increasing, reflecting the recognition of the significance of food-borne zoonotic viral disease.

Since COVID-19 genome, which was released in January 2020, enables us to compare the human version of the coronavirus to coronavirus strains already isolated in animals, one could say that epidemiological surveillances is now highly essential in all the countries. The availability of epidemiological surveillance would ensure the data would be sufficient for a more reliable estimation of the zoonotic viruses. This would ensure the readiness of all the stakeholder for the secondary spread of viruses which would have further complications. Jarvis (2020)

2.8. What was the inspection in Wuhan Livestock Market?

Campbell reported in Jan (2020a) how the Hubei province Wuhan's Huanan Seafood Wholesale Market, where both live animals and seafood, could be linked to the coronavirus outbreak in December 2019. Wuhan, became the epicentre where police tapes and white hazmat suits dressed public health workers were called to collect bundles of evidences about the possibility of a coronavirus outbreak, which create mysterious pneumonia for patients. This was the start of a real story that led to the most chaos status in recent mankind history.

Campbell (2020a) questioned whether the Outbreak was a failure of control of the Chinese public health authorities, failing to take adequate measures to curb the possibility of a dangerous food-borne virus. This was confirmed by Page (2020) who mentioned about uncomfortable questions that Beijing is facing over its failure to clean up wildlife trade and public calls for a permanent ban on wild meat.

The World Health Organization considered this Outbreak to be of a "novel coronavirus" dubbed 2019-nCoV, belonging to the same family as severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) and then declared an international health emergency, followed by a pandemic alert. Symptoms of fever and respiratory problems like coughing and shortness of breath, while serious cases can lead to pneumonia, kidney failure and death. McKinney et al. (2006).

Now the suspected source of coronavirus outbreak in Wuhan is doubted to be vendors of live specimens of dozens of wild animals in the Huanan food market, which is stuff with thousands of people buying seafood to their household and restaurants. So, it is common sense to have this zoonotic virus presence. EFSA (2014)

2.9. The Socio-Economic Impact of Failing to Prevent COVID-19 Zoonotic Virus Outbreak

Economists could not really precisely estimate the socio-economic damage from COVID-19 even though we

are approaching four months since the start of this pandemic outbreak. The OECD (2020) forecasts that the Coronavirus would trim 2% - 5% of USA GDP growth, Cohan (2020). Mitchell and Zumbun (2020) reported that the Wall Street Journal sees that the worst case scenario would lead to a drop of 7% of the USA 2020 GDP and besides the loss of 5 million jobs, sending the unemployment rate soaring from 3.5% to north of 10%; after surveying 34 economists.

Economists envision that COVID would create an economic contraction much more than the housing collapse in 2007/2008, Cohan (2020). Job losses are likely to be concentrated differently in the COVID-19 collapse. Mitchell and Zumbun (2020) reported after Rajeev Dhawan, director of the Economic Forecasting Center at Georgia State University, told the 2008 recession "killed jobs across all industries, from construction and manufacturing to banking and law." He expects the current decline to cost lower-wage employees their jobs in industries such as restaurants, hotels, airlines and real estate.

In Buheji and Ahmed (2019) we called for an urgent global framework for mitigating the coming foresighted socioeconomic crisis, and we emphasised both that we need to proactive not to allow such crisis to happen, besides being ready for the socio-economic challenges that would be hitting different aspects in lives.

As the travel ban and most of the world cities go into lockdown, we can see how the failure of preventing the zoonotic virus, COVID-19, has already disrupted many socio-economic activities and might even make it difficult to come back to norm soon. With the dramatic surge in the confirmed cases every day and especially in recent weeks, it is very difficult to see how the socio-economic life would coop. The pandemic has created relation tensions between nations and separated families, besides created panic and psychological depression and anxiety throughout the world.

The Italian Prime Minister Giuseppe Conte called the COVID-19 effect on Europe as "socioeconomic tsunami" and said no country would go untouched by the virus. While the United Kingdom, Prime Minister Boris Johnson kept saying that people have to prepare to 'lose the loved ones', 'before their time'. Taking all these reports in mind and besides visualising their perspective, one wonders what could have been the return of collaborative global program let by international and local public health authorities, that would prevent any zoonotic outbreak anywhere in the world.

Buheji (2020).

3. Methodology

3.1. Dealing with Zoonotic Virus Outbreak as the Source of COVID-19 Pandemic

The researcher uses the Inspiration Economy mindset to identify the problem, frame it and explore its opportunities, to come with an effective solution. Based on the synthesis of the literature review, and away from the media and mostly world reaction to COVID-19 spread, we need to go to the source of this Outbreak to prevent its occurrence again and again. There are lots of opportunities for an effective solution if we calibrate our intention about this pandemic and go deeper into the causes of the problem, rather than trying to treat the effect through the development of vaccinations. Once the source of the problem is identified, the total transformation could be easily recognized. Buheji and Ahmed (2017).

The increase of food contamination, poisoning, or all the type of infections that causes the transfer of the viruses from animals to human, is one of the main challenges that are going to face the humanity in this and coming generations. The challenge of this problem is how it can be done with minimal disruption where food outlets and restaurants are one of its main economic constructs of the hospitality industry all over the world today.

3.2. Re-Defining the Source of the COVID-19 Outbreak Problem through the "Threshold Model."

The threshold model that was developed by Stephen Pauker and Jerome Kassirer in the 1980s provides a framework for self-controlled thinking and helps to rule out when to stop ordering a test, or even begin treatment. Hence, this model aids each investigator to interpret the tests and to act differently in different scenarios. The model is known to challenge evidence-based practice by moving from implicit to explicit decision-making. Buheji and Ahmed (2017).

The researcher uses the threshold scale to investigate the gap that often faces the public health inspector or even the food handlers in deciding when to start taking samples and when to start making judgements about special actions and thus eliminating the consequences that lead to outbreaks. Figure (1) shows the Threshold Model Scale.

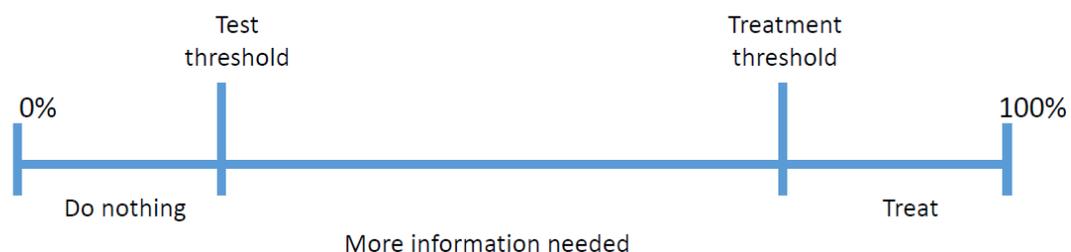


Figure (1). Threshold Model Scale

Hoekzema and Palmer (2015) give examples about how to optimize the use of the scale. For example, the probability known as the scale test causes the treatment threshold to move. So, if a public health inspector has a probability of more than 60% that the food inspected has a zoonotic virus, then the diagnosis would be followed directly by treatment. However, if the likelihood of getting the zoonotic virus were less than 10%, then the inspector would no longer view this as a diagnosis. In the middle of the COVID-19 outbreak season, if a food handler presents possible flu-like symptoms, the "pretest probability" then would jump to be about 30%.

Therefore, the threshold model would be beneficial in setting better control of food-borne diseases or animal virus transmittance prevention program. This should help to mitigate the possibility of zoonotic pandemics or discovering its potential Outbreak too late.

3.3. Development of Zoonotic Viruses Framework

Based on above 3.1 and 3.2, the researcher proposes a framework that would be both maintain the overall productivity, i.e. does not affect the economic development and ensure self-sustenance, so that to cater for optimizing the output and control of the public health inspectors and authorities to avoid having any other zoonotic virus outbreak from anywhere in the world in future.

The framework would use what the author calls in the handbook of Inspiration Economy an 'appreciative enquiry' approach, where the zoonotic virus prone animals, or food handlers would self-assess their practices to maintain a Green Certificate. i.e. a Certificate representing that these mediators have a zoonotic-free practice. Such a mindset would help the whole world feel more assured that the minimum zoonotic virus inspection is met regardless of area and type of resources. Buheji (2016).

Putting the concept of the 'appreciative enquiry' would make any global or local public health authority inspector/officer focus on a low however selective sampling of the zoonotic virus prone markets, with a mindset of closing the gaps, not 'fault finding'.

4. Analysis

4.1. What are the Challenges of Controlling Zoonotic Outbreaks today?

Control of viral hazards often requires measures different from those typically employed to combat bacterial hazards. Most of the guidelines and practices all over the world of public health inspection focus on food hygiene guidelines which may help in preventing bacterial infections, may not be effective for zoonotic viruses.

So far now, highly reliable studies that emphasis the negative socio-economic impact of each zoonotic outbreak. Having such studies would emphasis discovering the source of the zoonotic viral outbreak problem and putting enough

efforts in eliminating in the right time with high availability of the public health inspectors. Most recent outbreaks, like SARS and recently COVID-19 were observed in the hospital rather than in the source, i.e. in markets like Wuhan's. Thus, we find that the world has to manage a complicated zoonotic reported outbreak associated with healthcare infections rather than food-borne infections from a risk source that could have been mitigated much earlier.

Williams (2020) mentioned that the main challenge of the COVID-19 is that it cannot be treated with SARS vaccines and therapies that have been developed and it works, and this would be even more complicated if this coronavirus truly came from the bats.

4.2. Transmission Routes

The viruses that cause the last two main outbreaks SARS and COVID-19 have the causality, i.e. the effectiveness of identification of viruses that come from a food safety hazards that came from the faecal-oral route. As such, humans become infected following a type of ingestion or inhalation of viruses that entered the gastrointestinal tract, surviving the acidic conditions in the gut, and initiate an infection.

Another important factor affecting zoonotic virus transmission is the stability of viruses outside the host for a long time. Certainly, this is the case of the COVID-19. Also, it is reported that such viruses may show varying resistance to different environmental stresses such as acid, heat, drying, pressure, and disinfectants. There is, therefore, the considerable potential for food contamination along the food chain continuum. Again, this gives even more importance for putting more efforts for eliminating such virus from the source.

4.3. Evaluating the 'Overall Productivity Outcome' of Public Health Inspectors all over the world

4.3.1. Contemporary Issues of Monitoring, Inspection and Control by Public Health Authorities

The main contemporary issue facing public health authorities' inspectors is the huge demand for effective monitoring, inspection and control with the rapid increase of zoonotic virus outbreak sources like Wuhan's live animals and seafood markets and other hospitality industries.

To be realistic about this challenge, this problem is missing to address the problem without demanding an increase in resources, such as the number of inspectors. Currently, no clear global efforts that focus on raising the capacity of discovering, mitigating or eliminating the potential risks of the zoonotic viruses with minimal resources, so that the procedures could be implemented globally regardless the economic status of the country or the public health authority.

There is a clear gap in the literature about the change required in the mindset of the public health authority inspectors and how they could innovatively enhance their

capacity for monitoring sources of zoonotic viruses without counting on the availability of high resources or have a dependency on technology as a total solution.

4.3.2. Understanding the Overall Productivity Needed

The overall productivity for any function can be achieved through improving the capacity of this function to be: 1) available in the right and right place, 2) available with minimal cost (called efficiency), 3) the availability and efficiency would help to create an effective outcome that emphasis the differentiation and the importance of the role of this function. Buheji (2016).

Hence, if we apply this formula to raise the overall productivity of the public health inspections with minimal resources we need to specify the areas in the country or the community that have more red zones or high calculated risks of zoonotic virus transmittance, i.e. high probability and high hazard for such viruses transfer, or cross-contamination, or food-borne diseases illnesses. This also opens a door for questioning the availability the type of training needed for the mediators, the animals or the food handlers in the specified area.

4.3.3. Evaluating Availability according to Threshold Model

If we evaluate the global availability readiness, i.e. the readiness of the whole world countries to control any potential source of zoonotic viruses anywhere and anytime and according to both the overall effectiveness formula and the Threshold Model we would find it very low. Currently, the world in bad shape in preventing another outbreak similar to COVID-19 with its current way of delivery of public health field visits and services that is full of corruption or hide and seek mentality, or overstretched low resources compared to the demands.

5. Setting Up Zoonotic Virus Free Public Health Framework

5.1. Introduction to the Zoonotic Virus-Free Framework

Large-scale outbreaks often originate from a combination of several transmission routes; especially if the zoonotic virus is introduced in a sensitive population by food, water or an asymptomatic shedder, which is followed by the efficient spread of the virus through the susceptible population by direct person-to-person contact or via a contaminated environment.

The issue is even is more important if we realize that this Outbreak might come next time from a low developing country that doesn't have the resources of the Chinese who managed the COVID-19 Outbreak efficiently. Hence, based on this fact, synthesized from the literature review and the analysis, we need to establish a zoonotic virus-free public health framework.

5.2. Main Characteristics of the Proposed Zoonotic Virus-Free Framework

The purpose of the proposed 'Zoonotic Virus-Free Framework' is to enhance the availability of the inspection team and thus improve their throughput and yield with minimal resources, taking into account the availability of minimal resources public health services, as in sub-Saharan African countries.

The proposed framework helps to raise the capacity of the availability of public health despite limited field visits availability, as done in developed countries. The framework targets to raise the capacity of having the public health available so that to protect our socio-economic life. This can be achieved by introducing self-inspector core services, i.e. self-inspection and coaching for mitigation of zoonotic virus threats. The higher the availability and the effectiveness of this self-inspection, would lead to a reduction of the number of the visits needed in all the outlets annually, with a focus only on those that need to reach a better a status due to previous violations, incidents, or accidents near miss.

5.3. Description of the Zoonotic Virus-Free Framework

This framework can be adopted both internationally, with the strong leadership of the WHO, and in worse scenarios could be adopted by the countries that want to avoid to have their reputation for Outbreak similar to Wuhan COVID-19 incidence and global crisis.

The framework focus on identifying all the potential zoonotic-virus markets in the world, if the United Nations, or the WHO would lead this effort, or identifying such market by the public health authorities of the country. A guideline for self-sustenance and self-monitoring should be enforced in either case. Hopefully, the WHO or the concerned regional public health authorities would produce guidelines that are suitable for all the countries or the authorities, or even the level of the education of the inspectors. i.e. the guidelines would work regardless of the resources available.

The guidelines similar to what WHO (2020) called for when COVID-19 was epidemic 'Find-Test-Isolate-Treat' till early March 2020, or later changed to be 'Isolate- Test-Treat- Trace' when a pandemic was declared; however, at much earlier stage than both. As shown in Figure (2), the deployment of the self-sustenance guideline would be inspected based on the history of incidents, or accidents near-miss and not in the same style of policing or seek and hide that public health inspectors are using today in most of the world countries.

The framework in Figure (2) proposes that international or local public health authority need first to identify the potential zoonotic-virus markets and then set a training program, preferably produced and led by the WHO, which should focus on self-inspection sustenance guidelines. Each potential zoonotic-virus market should be expected to apply and self-assess annually that they are zoonotic virus-free to

maintain the 'zoonotic virus-free certificate'. In turn, the international and in hopefully with the local public health authorities could do selective sampling based on incidents/near-miss accidents history for those applied or certified. Here it is very important to see an apparent transformation of the public health officer's mindset to be like an inspector that works like coaches and try to close the gaps, i.e. 'Appreciative Enquiry Inspectors' rather than fault-finding inspectors. However, in cases where there are a zoonotic-virus alert or threat due to the sampled inspection, the certificate can be cancelled, and more monitoring would

apply on that defined market spot.

Using the concept of 'appreciative enquiry' would make the food and animal handlers improve the self-assessment their practices to maintain a 'Green Certificate'. i.e. a Certificate representing that these mediators have a zoonotic-free practice. Such a mindset would help the whole world feel more assured that the minimum zoonotic virus inspection is met, regardless of area and type of resources available. Thus we enhance the entire world capacity for the elimination of future outbreaks similar to the COVID-19 pandemic.

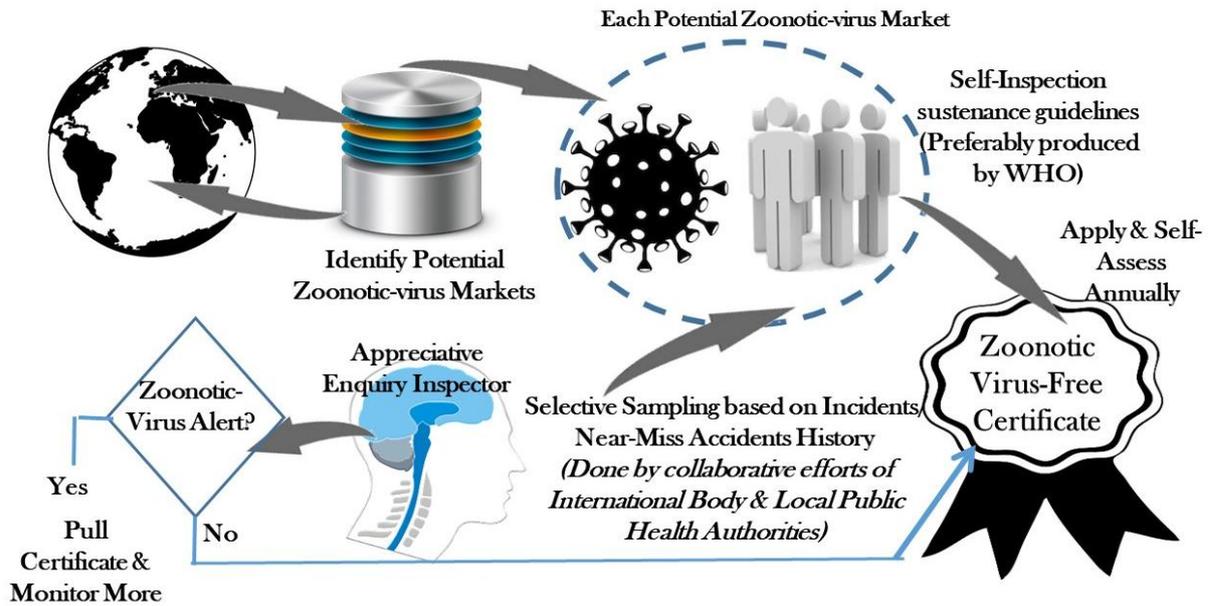


Figure (2). Zoonotic-Virus Free Public Health Framework



Figure (3). Area of Proactive Public Health that Eliminates the Zoonotic Viruses from the Source

6. Discussion and Conclusions

6.1. Re-Evaluating the ways we Deal with Potential Large-scale Outbreaks

In order to activate the way we think about risks of transmittance of animal virus-related diseases; we need to study the repeated incidents of outbreaks, especially those come previously hosting animals. We need to understand the mentality of the food, animal and livestock handlers or caretakers vs the working styles of inspectors. Also, we need to realise and appreciate the load and psychology of health and food inspectors themselves.

This means the concern international and local public health authorities need to shift from their current reactive focus, i.e. focusing the efforts to deal with zoonotic virus pandemic, as COVID-19, on vaccination, isolation and treatment to more initiatives that raise the capacity of the proactive public health where most of the world and WHO efforts should be focusing on to eliminate any future potential COVID-19 like, zoonotic viruses pandemic. Similar to what illustrated in Figure (3), we need to cater also for improving the awareness about the dangers of eating a specific type of wild animals and way of maintaining the environmental and occupational health and safety hygiene practices to avoid being a zoonotic transmittance source.

Even how restaurants, and especially those serving wild or raw, or semi-cooked animal food, play an important role today in threatening the quality of life of their communities and the rest of the world. We need to understand the challenges of covering a specific amount of such food or life animal stock supply outlets compared to the quality of work expected. This is the level of quality of work should be to the extent that no wild animal market, or restaurants would have cases of food poisoning after inspection.

6.2. Eliminating Virus Exposure through Innovative Public Health Practices

In all countries of the world, an essential component of virus exposure or protection is the human factor. In most countries, there are guidelines for the safe production, processing and preparation of foods. However, access to and compliance with these guidelines differ by country, and to a certain extent by facility (farm, processor, retail establishment) and the individual worker.

It is very important that more research focuses on the socio-economic value of the good public health practices to ensure that both governments and the public collaborate on reporting about them at the right time. For example, bare hand contact (gloving) recommendations are only as good as compliance with those recommendations. Field workers can only practice good personal hygiene if they are provided access to adequate facilities to do so. These factors need to be considered in exposure assessment. For the developed world, a limited number of studies are available in this regard; virtually nothing is known about compliance rates nor access to adequate hygiene facilities in the developing world.

6.3. Improving the Global Communication Model according to the Proposed Framework

In order to improve the communication model of inspection officers and their teams, as well as ways of receiving calls 24x 7 throughout the year, we need to build up a self-monitoring default system that supports countries that have a high risk of zoonotic Outbreak, but do not have the resources to depend totally on the public health officials to avoid any breakout or to mitigate its risks.

Hence, this communication model demands the development of training kit for and by the inspectors supposed to self-sustainable, to the extent it can be used by any type of cluster or areas of prone zoonotic virus risk, similar or even more than Wuhan live animal market situation in early December 2019.

6.4. Expected Results of the Proposed Zoonotic Virus-Free Framework

The proposed framework in this paper would help to keep the world focus on socio-economic development, rather than going through corrective measures. The results of the proposed framework would help on shifting the paradigm of the inspectors through 'learning by doing' and site visits that look only for the missed 'black spot', i.e. those spots that were not detected by self-inspection. The identified high calculated risk areas prone to zoonotic virus outbreak should help to show the difference between being "policing" and "coaching" inspectors.

Therefore, it is highly recommended that each country starts immediately in setting a program that focuses on 'blackspots' areas (i.e. areas, market spots, restaurants, animal farms, etc. of repeated incidents or accidents). Hence, we need to diversify the types of training programs in relevance to the kind of group of food or animal handlers, besides realizing their level of education, language and their number of staff. Then, a more in-depth initiative to 'train the trainer' can be established to emphasis self or internal inspection programmes built into the mindsets of the food and animal handlers in the 'black spot' areas.

6.5. Recommendations for Overall Productive Public Health

For public health inspectors and team to be transformed towards being overall productive and available for straining any certain zoonotic viruses, they need to have the mindset of the problem solvers and epidemiologist, besides appreciating the socio-economic value and contribution to the rest of the world. Thus requires more research and innovative implementation approaches that focus on enhancing the capacity of the public health inspectors for monitoring sources of zoonotic viruses which focus on the probability of incidents, or near-miss accidents, i.e. potential zoonotic Outbreak, that would give the feeling and understanding of the minimize late responses similar to COVID-19 pandemic.

All food handlers and animal careers with symptoms of

infection with flu viruses as COVID-19 need to stay off work or to remain separate from other people. They should be trained appropriately about food and animal handling hygiene. Adequate supervision of staff is needed to reinforce hygienic practices. More safety and health facilities, e.g. hand washing, toilets, to enable staff to practice good hygiene.

6.6. Limitations of This Paper

This paper did not take into consideration the different virus-commodity combinations. This due that zoonotic viruses' threats vary from country to country, market to market, community to community. Thus, the risk of the novel viruses, the HAV, NoV, and HRV, and especially the latest emerging viruses as HEV, HPAI-H5N1 virus, SARS-CoV and Nipah virus; should be of different level of concern depending on the conditions of the community or the market that would be identified as per the framework proposed. Luby et al. (2006).

The other limitations of this research are that it considered estimating the socio-economic impact of the COVID-19 is a bit risky at the time of writing this paper, despite the early attempt of the author, since the pandemic situation is dramatically changing day by day and hour by hour. Also, it was decided it is not advisable to expand the scope of the paper and do a comparative study of the socio-economic impact of the previous zoonotic breakouts.

6.7. Implications of Proposed Framework

The proposed 'zoonotic virus-free' framework builds a strong link between assuring the world of food safety and effective monitoring suitable to be implemented by almost all the countries and the communities of the world. The framework work on both the mindset of the inspector and the potential zoonotic virus spreader. The design of the framework applied simple models of systems design thinking and threshold model scale to ensure self-sustained monitoring and sustainability. The paper also tried to open a new line for research that links the socio-economic perspective and value to the public health inspectors availability.

The other implication of the framework is that it helps to raise the occupational health awareness of food and animal handlers while reducing their violations and complaints. Such a framework helps to improve the maturity of both the seller and the consumers, while not undermining the role of tourism and the rising of the national economy. Finally, such framework would help us at the end of the day to reduce the potential of any world crisis that comes from similar viruses as COVID-19 and its political, economic, social, technological and legal burdens, in both the near or foresighted future.

6.8. A Final Word for WHO

The WHO calls for 'Find-Test-Isolate-Treat', which is part of the WHO Guidelines should be implemented before the

Outbreak. Even the WHO (2020) later new slogan message on 19th of March of 2020, 'Isolate- Test- Treat- Trace', could have been done in Wuhan Market in early December 2019, by the public health inspectors. Anyway, one hopes the message of this paper is as clear as a whistle, because we might not have many chances to call such whistles again.

The world does not need a WHO that analyses and monitor pandemics or epidemics, the expectation now is that we need to consider zoonotic diseases, zoonotic microorganisms' outbreaks as a defined hazardous spot for human existence and development that could be repeated. Our collective efforts start with focusing on raising our observation capacity for the source of the problem. This mindset could help us avoid another series of global disasters that we most probably fail to manage. Let us visualise this scenario and work eliminating its possibilities.

REFERENCES

- [1] Buheji, M (2020) Optimising the 'Economics of Curiosity' for Better Future Foresight. Tracking how Curiosity Can Solve Future Socio-Economic Challenges. *American Journal of Economics*, 10(1): 21-28.
- [2] Buheji, M and Ahmed, D (2019) Framework for Mitigating Coming (Foresight) Socioeconomic Crisis, *American Journal of Economics*; 9(6): 320-327.
- [3] Buheji, M and Ahmed, D (2017) *Breaking the Shield- Introduction to Inspiration Engineering: Philosophy, Practices and Success Stories*, Archway Publishing, USA.
- [4] Buheji, M (2016) *Handbook of Inspiration Economy*. Bookboon.
- [5] Campbell, C (2020a) Don't Blame China. The Next Pandemic Could Come From Anywhere, March 10, Time, <https://time.com/5797739/wild-animals-markets-coronavirus/>. Accessed: 10/3/2020.
- [6] Campbell, C (2020b) Here's What It's Like in Wuhan, the Chinese City at the Center of the Deadly Coronavirus Outbreak, Time, January. <https://time.com/5769323/wuhan-coronavirus-outbreak/>. Accessed: 1/2/2020.
- [7] Cohan, P (2020) COVID-19's Worst Case? 10.6% Jobless Rate, \$1.5 Trillion GDP Drop, Forbes, 21 March. <https://www.forbes.com/sites/petercohan/2020/03/21/covid-19s-worst-case-106-jobless-rate-15-trillion-gdp-drop/#380ed3610a2>.
- [8] EFSA (2020) Foodborne zoonotic diseases, European Food Safety Authority. <https://www.efsa.europa.eu/en/topics/topic/foodborne-zoonotic-diseases>. Accessed: 1/2/2020.
- [9] EFSA (2014) The European Union summary report on trends and sources of zoonoses, zoonotic agents and food-borne outbreaks in 2012. *European Food Safety Authority Journal*; 12:1–312.
- [10] Hoekzema, G and Palmer, E (2015) Mercy Family Medicine Residency. <http://documentslide.com/documents/copd-differential-diagnosis-grant-hoekzema-md-program-director-mercy-family-medicine-residency-st-louis-mo-elissa-j-palmer-md>

- faafp-professor.html. Accessed: 1/2/2020.
- [11] Jarvis, C (2020) Which Species Transmit COVID-19 to Humans? We're Still Not Sure. Preliminary modeling studies provide a shortlist of potential coronavirus intermediate host species. *The Scientist*, March 16. <https://www.the-scientist.com/news-opinion/which-species-transmit-covid-19-to-humans-were-still-not-sure-67272>. Accessed: 16/3/2020.
- [12] McKinney KR, Gong YY, Lewis TG (2006) Environmental transmission of SARS at Amoy Gardens. *J Environ Health*; 68(9): 26-30.
- [13] Mead, P.S., Slutsker, L., Dietz, V., McCaig, L.F., Bresee, J.S., Shapiro, C., Griffin, P.M. & Tauxe, R.V. (1999) Food-related illness and death in the United States. *Emerging Infectious Diseases*, 5: 607–625.
- [14] Mitchell, J and Zumbun, J (2020) Coronavirus-Triggered Downturn Could Cost Five Million U.S. Jobs, *Wall Street Journal*, 21 March. https://www.wsj.com/articles/coronavirus-triggered-downturn-could-cost-5-million-u-s-jobs-11584783001?mod=article_inline.
- [15] Luby, S.P., Rahman, M., Hossain, M.J., Blum, L.S., Husain, M.M., Gurley, E., Khan, R., Ahmed, B.N., Rahman, S., Nahar, N., Kenah, E., Comer, J.A. and Ksiazek, T.G. (2006) Food-borne transmission of Nipah virus, Bangladesh. *Emerging Infectious Diseases*, 12: 1888–1894.
- [16] Todd E, Grieg J. (2015) Viruses of food-borne origin: a review. *Virus Adaptation and Treatment*; 7: 25-45. <https://doi.org/10.2147/VAAT.S50108>. Accessed: 1/2/2020.
- [17] Page, J (2020) Virus Sparks Soul-Searching Over China's Wild Animal Trade, Jan. 26, <https://www.wsj.com/articles/virus-sparks-soul-searching-over-chinas-wild-animal-trade-11580055290>. Accessed: 1/2/2020.
- [18] Sattar, S.A., Springthorpe, V.S., Tetro, J., Vashon, R. & Keswick, B. (2002) Hygienic hand antiseptics: should they not have activity and label claims against viruses? *American Journal of Infection Control*, 30: 355–372.
- [19] WHO (2020) Coronavirus disease 2019 (COVID-19): Situation Report – 38. 27 February. World Health Organization. www.who.int/docs/default-source/coronavirus/situation-reports/20200227-sitrep-38-covid-19.pdf?sfvrsn=9f98940c_2. Accessed on: 12/3/2020.
- [20] Williams, S (2020) Where Coronaviruses Come From, EcoHealth Alliance President Peter Daszak speaks with *The Scientist* about how pathogens like 2019-nCoV jump species, and how to head off the next pandemic. *The Scientist*, Jan 24. <https://www.the-scientist.com/news-opinion/where-coronaviruses-come-from-67011>. Accessed: 1/2/2020.