
SANITARIAN EMERGENCY IN INTERNATIONAL LAW

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ABSTRACT

Prior to the outstanding need for man to live a happy life and to enjoy his rights given to him by some legal standards, such as the Universal Declaration of Human Rights and the United Nations Convention of the Rights of the Child, health is of paramount importance to him. Public health has increasingly become a global issue, faster, easier and cheaper transportation methods which have resulted in a phenomenal increase in the movement of people and goods, and new conservation technologies have improved the international trade of perishable goods, thus these developments have made it easier for diseases to spread faster and to more distant locations. This paper examines the laws and the institutions governing sanitarian emergency in international law. Although significant medical progress and efforts has been made over the last centuries, infectious diseases such as influenza or malaria and HIV/AIDS, still represents a considerable threat to society. While some are endemic to specific geographical regions, others can spread, becoming epidemics as is the case with Severe Acute Respiratory Syndrome (SARS), such as the Coronavirus and the Ebola virus. We suggest that these flaws could be addressed through the reinforcement of these institutions and the legal instruments.

Keywords: Sanitarian, International law, emergency

1. Introduction

Health is a fundamental human right, its importance is recognized in several international and regional instruments.¹ The United Nations Charter emphasized on the need to collaborate on health issues. It provides that: 'The economic and social council may make or initiate studies and reports with respect to ... health and related matters and may make recommendations with respect to any such matters to the General Assembly, to the members of the United Nations, and to the specialized agencies concern'.² The Universal Declaration of Human Rights also states that health is part of the right to an adequate standards of living.³ Several international organizations now include health-related mandated.⁴ The World Health Organization defines health as a state of complete physical, mental and social well-being. Public health has been increasingly becoming a global concern. Faster, easier and cheaper transportation methods which have resulted in a phenomenal increase in the movement of people and goods,⁵ and new conservation technologies have improved the international trade of perishable good, thus these developments have made it easier for diseases to spread faster and to more distant locations.⁶ Indeed, the movement of people and goods has not only spread infectious diseases, but also its emergence in both human and animals. Therefore, global health has become an essential concern for the international community.

Globalization has, to an extent, undermined the ability of a State acting alone to protect its population from the spread of infectious diseases. As a result, it has become clear that only collective efforts can efficiently address deadly diseases such as cholera, malaria, tuberculosis, which are still widespread in some parts of the world. Some of their pathogens are becoming drug-resistant and thus, more difficult to cure. More new infectious diseases such as the Severe Acute Respiratory Syndrome (SARS) like the Coronavirus, Ebola, haemorrhage fever, have transboundary effects thus, can only be properly handled by a coordinated actions of multiple international and national actors. A global health expert concludes that must public health

¹ For example, the Universal Declaration of Human Rights (UDHR) of 1948, the 1946 Constitution of the World Health Organization (WHO), the International Covenant on Economic, Social and Cultural Rights (ICESCR) 1966 and the United Nation Convention of the Right of the Child (CRC).

² See Article 62 of the Universal Declaration of Human Rights.

³ Ibid. Note 2. Article 25(1).

⁴ The World Health Organization (WHO) is the directing and coordinating authority for health within the United Nations system.

⁵ American Environmental history (2024). *Transportation Revolution*. Chapter 6. Minnesota Libraries Publishing Projects. Also, the World Trade Organization (WTO) reported that the total value of export increase to 18,323,000 million in 2012, from 2,034,000 million in 1980.

⁶ Ibid. Note 5.

experts agree that the distinction between national and international public health is no longer relevant because globalization has enabled pathogenic microbes to spread illness and death globally.⁷

The connection between national security and health has also become apparent.⁸ States have begun to identify diseases such as HIV/AIDS, and are advocating for a global response. For example, the United Nations World Summit Outcome Document 2005, states recognized the fact that HIV/AIDS, Malaria and other infectious diseases pose a severe risk and challenge for the world to achieve the development goals. This legal, security and policy development has made it clear that public health has become an important concern of the international community. Various international organizations, including the WHO and the United Nations Children's Emergency Fund have assumed coordination and facilitation roles in international public health matters.⁹ National, International and Non-Governmental Organization (NGO) have intervene in the support of national sectors during humanitarian crises, which often occur during diseases as national security threats, and have develop measures to halt and control the spread of these diseases as part of their foreign policies.¹⁰

However, there are currently no binding general agreements that addresses the problem of global health emergencies, and there are no specific actions in situations of transboundary health emergencies. Therefore, members of the international community have realized that this vacuum was potentially a problem during the game-changing 2002 SARS.¹¹ The Chinese authorities initially failed to report the new disease to the World Health Organization (WHO) and tried to concealed with it existence.¹² The new Coronavirus SARS-CoV-2, which began in

⁷ David Fidler (1997). The globalization of public health: Emerging infectious diseases and international relations. *Indiana Journal of Global Legal Studies*. No. 1. Vol. 5. P. 23.

⁸ Lincoln Chen, Jennifer Leaning, Vasant Narasimhan (Eds) (2004). *Global-health challenges for human security*. Global Equity Initiative. Harvard. P. 338. ISBN: 0674014537. See also David Heymann (2003). Evolving infectious disease threats: Implications for national and global security. *Journal of Human Development*. No. 2. Vol. 4. P. 191-207.

⁹ Epidemiologists from around the world meet periodically at the World Health Organization headquarters in Geneva to identify and recommend the most effective vaccine for the upcoming influenza season.

¹⁰ The Clinton administration for the first time in 2000 declare AIDS as a threat to the United States, global stability and national security and mandated the U.S National Security Council to develop an appropriate response. Following the same path, in 2003, the state of the union address, president Bush announced the emergency plan (a five-year plan of 15 billion USD initiative) for AIDS relief.

¹¹ it was a serious form of a highly contagious viral pneumonia which was first diagnose in South China in 2003 and eventually spread to 27 countries including, Canada, Hong Kong, Philippines, Russia and Spain, causing about 774 deaths.

¹² Yanzhong Huang (2004). The SARS Epidemic and its aftermath in China: A political perspective, in learning from SARS: Preparing for the next disease outbreak. *Political Science Medicine*. Available at: <http://www.bepress.com/yanzhong-huang/15/>. (Accessed 20th December 2024).

Wuhan, China which later spread to other areas of Asia and then worldwide in the early 2020.¹³ The World Health Organization (WHO) declared the outbreak as a public health emergency of international concern and as a pandemic on the 11th of March 2020.¹⁴ The WHO confirmed a total of 191,127 cases of SARS-CoV-2 infections and 7807 deaths worldwide.¹⁵ Among them, 91,845 confirmed cases were distributed in the Western Pacific region and 74,760 were found in the European region and other regions in the world.¹⁶ Coronavirus are enveloped single-stranded positive-sense Ribonucleic Acid viruses (RNA) which can infect the respiratory, gastrointestinal, hepatic, central nervous systems of humans, other mammals and birds.¹⁷ Based on scientific principles and evidence, it is necessary and appropriate to support states parties in addressing the risk posed by COVID-19 during the transition from response to a public health emergency of international concern.¹⁸ However, we will be looking at the laws governing the aspect of sanitarian emergency in international law.

2. The International Health Regulation (IHR)

The IHR's origin can be traced to a series of sanitary conferences since 1851 to forge an international agreement to curb the problem of the spread of infectious diseases (which was originally cholera epidemic, followed by plague and yellow fever) entering Europe from Asia, particularly India.¹⁹ At the time, the concept of global health security meant protecting Europe without unduly hindering trade. The sanitary conference led to a binding agreement in 1892, the International Sanitary Convention (ISC) focused on quarantine for cholera.²⁰ Under the umbrella of the World Health Organization, the International Health Regulation is a law that governs the health sector. The international community acknowledged the potential spread of diseases in the 1800s across international borders.²¹ Quarantine was one of the means used to

¹³ Ying Yan and Le Chang, Lunan Wang. Laboratory testing of SARS-CoV-2 (2019-nCoV): Current status, challenges and countermeasures. 30(3). *National Centre for Biotechnology Information*. (2020) 21.

¹⁴ Hari Shanker Joshi et al. Investment in primary health care: Need of the hour. 10(8). *Journal of Family Medicine and Primary Care*. (2021) 3159-40.

¹⁵ Ibid. Note 13 above.

¹⁶ World Health Organization (WHO) (2020). *Corona disease (COVID-19) situation report*

¹⁷ Susan R and Julian L. Leibowitz (2011). Coronavirus Pathogenesis. 81. 81 *Advances in Virus Research*. (2011). 85-164.

¹⁸ On the 30th January 2020, the Director General of the WHO determined the worldwide spread of SARS-CoV-2 virus causing COVID-19 as a public health emergency of international concern after characterizing COVID-19 pandemic on 5 May 2023. The temporary recommendations issued on the 5 May 2023 expired in August 2023

¹⁹ Howard-Jones N. The scientific background of the international sanitary Conference, 1851-1938. Geneva, Switzerland. WHO, 1975. Available at: http://whqlibdoc.who.int/publications/1975/14549_eng.pdf. (Accessed 30 June 2024)

²⁰ Lawrence O. Gustin and Rebecca Katz. The International Health Regulations: The Governing Framework for Global Health Security. 94(2). *The Milbank Quarterly*. (2016) 264-313.

²¹ For example, the spread of Cholera and Yellow Fever

prevent the spread of these diseases across the international borders. This was built on the first international Sanitary Convention of 1892, which later became the International Sanitary Regulations. The WHO member states adopted this Convention in 1951.²²

The regulations were revised and renamed the International Health Regulations (IHR) in 1969. The IHR were used by the WHO to direct member states on international prevention and control of infectious diseases. The IHR required international passengers traveling from infected and non-infected areas to show a vaccination certificate to the airport health authorities. During this period, ships and aircrafts were also disinfected to ensure the protection of passengers against infectious diseases. Due to the increased risk of international spread of public health risks and hazards, the 1969 IHR was found insufficient in dealing with the rapid emergence of new diseases.²³ The regulations underwent several amendments in the periods of 1978 and 1981, with one of the revisions in 2005.²⁴ The regulations broadens the application of the IHR 2005 to reflect the global surveillance, of global diseases, alert, and response to the protection of public health and ensuring the smooth operation of international travel and trade. The IHR 2005 further emphasizes that member states should put in place core capacities so as to facilitate the smooth implementation. the core capacities include national legislations, policy and financial coordination and national focal points.

The designated Points of Entries (POEs).²⁵ The designated points of entry should have the stated core capacities at all times, for controlling and responding to events of public health emergency of international concern. For example, the Indian government instructed all Ports Health Officers to screen all international passengers and crews coming from into India. In case of a suspected passenger having a flu-like illness or infection, they should be isolated for further clinical medical examination.²⁶ All member states of the WHO agreed to implement the IHR, to develop and strengthen core capacities at chosen international ports, airports and ground crossing. This legal instrument contains rights and obligations or duties for countries

²² United Nations International Sanitary Regulations (1951). 175 UN treaty series 214.

²³ World Health Organization (WHO), International Health Regulations (IHR) (1969). 3rd Edition. Geneva: The Organization 1986.

²⁴ World Health Assembly, Revision of the International Health Regulations. WHA. 58.3. 2005. Available at: http://www.who.int/gb/ebwha/pdf_files/WHA58-RECI/english/Resolutions.pdf. (Accessed 10th January 2024).

²⁵ Points of Entries (POEs) are challenging places to work as they involve a variety of transportation of items and people from different areas of the world with their different cultures. This movement requires a 24 hours' health-related service in all times.

²⁶ See the International Health Regulation 2005. Article 5 and 13.

with regard to the prevention, surveillance and response to health measures applied to international travellers at the points of entry.

2.1. The Scope of the International Health Regulation

The revised IHR is aimed 'to prevent and protect against, to control and provide a public health response to the international spread of disease'.²⁷ International travel is a commonplace and diseases can travel at a speed of jetliners²⁸. The severe acute respiratory syndrome (SARS) was the first disease of the 21st century to expose our vulnerability. To meet these challenges, the regulations have a wide range of scope. They apply to diseases²⁹, irrespective of its origin or source, that present a significant harm to human. The IHR 2005 provide a framework for mobilizing support from governments and donors and for responding to an influenza pandemic. The implementation of these regulations is done at different states in various countries, which face different challenges with the implementation of the IHR.³⁰

Adopted at the 58th World Health Assembly in Geneva in 2005, the International Health Regulations became legally binding to the World Health Organization member states that do not reject this convention. Every country must designate or establish a national IHR Focal Point which is a national centre, and not an individual centre. This national, International Health Regulations Focal Point will be; accessible at all times, communicate with the World Health Organization (WHO) concerning the IHR implementation including, consultation, notification, verification and the assessment public health response and coordinate with other ministries and health sectors within the country. Each country is required or expected to respond to the WHO's request for the verification of information. Every country is to notify the WHO of all the events that may constitute a public health emergency of international concern within 24 hours of the assessment, by using a decision instrument, a flow chart that goes through the criteria for assessment.

²⁷ See Art 2 of IHR.

²⁸ Alexandra Mangili and Mark A. Gendreau. Transmission of infectious diseases during commercial air travel. 365(9463). *Lancet*. (2005) 989-996.

²⁹ particularly the outbreak of Cholera and yellow fever

³⁰ Some of these challenges is due to the lack of scientific knowledge and the capacity to enforce public health measures, this hinders the prevention and control of outbreaks in most developing countries.

2.2. The Implementation of the 2005 International Health Regulation in Africa

In 2005, the World Health Assembly (WHA) fundamentally revised the International Health Regulations,³¹ a global treaty meant to herald a new era of global cooperation to make the world more secured. Yet, in the aftermath of the West African Ebola epidemic, the IHR faced critical scrutiny. The WHO,³² Harvard and the London School of Hygiene and Tropical Medicine,³³ the National Academy of Medicine,³⁴ and the United Nations have all urged majors reforms. The IHR requires that all countries have the ability to detect, assess, report and respond to public health events. The notification, prevention and control of the spread of diseases and other public health risks across borders is a longstanding area of health diplomacy.

The 2005 International Health Regulations are global standards that became binding to states who have incorporated this law into their domestic public health law. The WHO member states, who are states parties to the International Health Regulations (IHR) were given up to 2007 for it to assess their capacity and develop a national action plan on the regulations. These countries were given up to 2012 to meet up with the requirements of the IHR regarding their national surveillance, reporting and response systems to public health risks and emergencies and to provide the mechanisms set for disease control at designated airports, ports and ground crossing. The progress towards attaining these measures is dependent on eight core capacities. General recommendations were issued by the Directorate of the WHO in accordance with the provisions of IHR.³⁵ These recommendations were standing COVID-19 in accordance with the IHR 2005, submitted to the health assembly of the WHO.³⁶ The policy brief outlines the content and context of the International Health Regulations.

³¹ World Health Organization. *International Health Regulations (2005)*. 2nd edition. Geneva, Switzerland: WHO 2008. Available at: http://whqlibdoc.who.int/publications/2008/9789241580410_eng.pdf. (accessed 30 July 2023)

³² WHO. Report of the Ebola interim Assessment Panel. July 2015.

Available at: <http://who.int/csr/resources/publications/ebola/report-by-panel.pdf>. (accessed 30 July 2023)

³³ Moon S et al. will Ebola change the game? Ten essential reforms before the next pandemic. The report of the Harvard-LSHTM Independent Panel on the Global response to Ebola. 386(10009). *Lancet*. (2015) 2204-2221.

³⁴ Commission on a Global Health Risk Framework for the Future. *The neglected dimension of global security: A framework to counter infectious disease crises*. Washington DC. National Academy of Medicine. (2016). Available at: www.nam.edu/GHRF. (Accessed 1 January 2024).

³⁵ See Article 16-18 and 50 -53 of the International Health Regulations

³⁶ World Health Organization (WHO) (2024). *Implementation of the International Health Regulations 2005 Report of the Director General*. 77th World Health Assembly Provisional agenda item 13.2. A77/8 Add.2. (23 April 2014).

2.2.1. The Reason for the Need of the International Health Regulations

The formal international cooperation to control the global health risk was initiated in the 19th centuries. European nations gathering at the first International European Conference discussed cooperation on cholera epidemic and yellow fever and other plague that they could not manage through national policies. Over a 100 years, international cooperation directed at preventing and controlling diseases evolved, culminating in the establishment of the World Health Organization and the International Sanitary Regulations in 1951. The International Sanitary Regulations were further amended by the World Health Assembly in 1969 and in 1981. The updated International Health Regulations were developed in the year 2000s by the World Health Assembly in 2005.

Public health situations have changed in the past years and communicable diseases have been significantly controlled in some parts of the world, though they still present as the most common disease problems in most developing countries. Vaccines and medical technology have contributed to the eradication of smallpox, and goals are set to eradicate poliomyelitis, measles and leprosy.³⁷ At the same time, new diseases have globally spread in recent years including, the HIV/AIDS, and Severe Acute Respiratory Syndromes (SARS) of 2003 and 2019. There were 539 cases notified to the World Health Organization of the Avian influenza and 318 deaths worldwide, even though only one case was reported in Sub-Saharan Africa.³⁸ The spread of the pandemic, crossing borders have raise the profile of health as a global foreign policy issue.³⁹ Fiddler noted that the international spread of diseases complicates and frustrates a state's pursuit of its material interest.⁴⁰ The threat of accidents or the intentional release of deadly biological chemicals or nuclear agents are regarded as in foreign policy as a threat that can only be addressed through international cooperation.

3. Declarations in Combating Epidemics

Frustration with the lack of progress on the IHR implementation has led member states to

³⁷ World Health Organization Afro (2004) regional consultation on the revised international Health Regulations. AFR/RC54/INF/DOC.4. See also World Health Organization (2024). A Report on the progress and gaps on the *Implementing health sector strategies on HIV, Viral hepatitis and sexually transmitted infections. 2022-2030*. 2nd Edition. WHO. P. 70.

³⁸ Seatini, Tarsc (2011). *Pandemic influenza preparedness: Sharing of influenza viruses and access to vaccines and other benefits*. Policy Brief No. 24. Harare.

³⁹ Flahault A, et al (2016). From global health security to global health solidarity, security and sustainability. *Bulletin of the World Health Organization*. 94: 863.

⁴⁰ Ibid. Note 7.

launch independent programs with strikingly similar aim. For example, the United States established the Global Health Security Agenda (GHSa) partnering with approximately 50 countries of the world to accelerate progress towards global capacity to prevent, detect, and respond to biological threats.⁴¹ Many declarations have been put in place to combat epidemics and secure global health. The United States National HIV/AIDS strategy sets out bold targets for ending HIV/AIDS in the United States by 2030 including, a 75 percent reduction in new HIV/AIDS infections by 2025 and a 90 percent reduction by 2030. The strategy focuses on four goals which are; to reduce the number of people infected with HIV, to increase access to health care and improve health outcomes for people living with HIV/AIDS, reduce HIV-related health disparities and to achieve integrated, coordinated efforts that address HIV among all partners and stakeholders.

To accomplish these goals there was need for a more coordinated national response to the epidemic. The first cases of human immunodeficiency virus garnered the world's attention, and ever since then, over 575000 Americans have lost their lives due to HIV/AIDS and more than 56000 people in the United States became infected.⁴² Americans have devoted in fighting against the HIV pandemic and success will require the involvement of every sector in the fight against this epidemic. People with HIV/AIDS have transformed how USA engaged community members in setting out their policies, conducting research, and providing services. Successful prevention efforts have averted more than 350000 new infections in the United States.⁴³ Health Care and other services providers have taught Americans how to provide quality services in different or diverse settings and develop medical homes for people with HIV/AIDS. For a better understanding of the United States National HIV/AIDS strategy, we shall be looking at the increasing access to health care and the improving health outcome for people living with HIV. With the emergence and pandemic and the potential HIV/AIDS, the spread of endemic diseases to new parts of the world, and the outbreaks of viral haemorrhagic fever, it became clear that the IHR were insufficiently flexible to respond to new infectious disease threats.

⁴¹ White House. *Global Health Security Agenda: Towards a world safe and secured from infectious disease threats*. (2014).

Available at: <http://www.globalhealth.gov/globalhealth-security/GHS%20Agenda.pdf>. (Accessed 25 February 2024).

⁴² Centre for Disease Control and Prevention (CDC). *Estimated HIV incidence and prevalence in the United States 2015-2019*. HIV Surveillance Supplemental Report 2021. No. 1. Vol.26.

⁴³ Centre for Disease Control and Prevention (CDC) (2011). *Vital signs: HIV prevention through care and Treatment-United States*. Morb Mortal Wkly Report. Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6047a4.htm>. (Accessed 24th September 2024)

3.1. Increasing Access to Care and Improving Health Outcome of People with HIV/AIDS

As a result of an increasing investment in research and years of improved clinical experience, people living with HIV/AIDS can enjoy a long and healthy lives. For this to be a reality, it is very important to get an early care after infection, to protect their health and reduce the potential of transmitting the virus to others. For this reason, it is important to support people with HIV in a regular system of care. The Affordable Care Act which greatly expand access to insurance coverage for people living with HIV/AIDS. It has also provided a platform for improvements in health care coverage and quality. A high risks pool is immediately available to uninsured people with chronic conditions in every state to provide coverage. Medicaid was expanded to all lower income individuals in 2014.⁴⁴ Disparities in essential health care and services for people living with HIV/AIDS will need to be continuously addressed along with the unique biological, psychological and social effects of living with HIV/AIDS. Therefore, the Ryan White HIV/AIDS Program and other federal and state HIV focused programs will continue to make efforts in the implementation of these laws to protect public health, and this will require a continuous investment in research to develop safer, cheaper and a more effective treatment.

3.2. Development of the National HIV/AIDS Strategy

The former United States president (president Barack Obama) administration worked to engage the public to evaluate what is right and identify new approaches that will strengthen the response to domestic epidemic. The White House Office of National AIDS Policy (ONAP), a component of the Domestic Policy Council has been tasked with leading the efforts to develop a national strategy. Throughout the process, the Office of National AIDS Policy has taken steps to engage as many Americans as possible to hear their ideas for making progress in the fight against HIV. ONAP's outreach included hosting 14 HIV/AIDS community discussions with thousands of people across the United States, reviewing opinions from the public through the White House website, conducting a series of expert meetings on several HIV-specific topics, and working with federal and community partners who organized their own meetings to support the development of a national strategy. A report summarizing public recommendations

⁴⁴ About 15000 dollars for a single individual or below 133 percent of the federal poverty level.

for the strategy which was entitled 'Community Ideas for Improving the Response to the Domestic HIV Epidemic'.⁴⁵

To develop a strategy, the Office of National HIV/AIDS Policy convened a panel of federal officials from across the government to assist in reviewing the public recommendations, assessing the scientific evidence for or against various recommendations for the strategy. ONAP also has contact with the Institute of Medicine to examine several key policy issues. This document provides a roadmap to move the nation forward in responding to the domestic HIV/AIDS epidemic. It is not intended to be a comprehensive list of all activities needed to address the HIV/AIDS in the United States, but is intended to be a concise plan that identifies a set of priorities and strategic action steps tied to a measurable outcome.

3.3. The Abuja Declaration on AIDS, Tuberculosis and Other Related Infectious Diseases

The Abuja declaration was in two phases, the first phase took place on the 24-27 of April 2001 and the second took place from the 12-16 of July 2013. It is worth noting that though focused on the same agenda, they had different discussions. Head of States and governments of the African Union meeting at the special summit of the African Union on HIV and AIDS, tuberculosis and Malaria in Abuja, Nigeria 2013 focused on tuberculosis (TB), and Malaria response in Africa.⁴⁶ This summit was to evaluate the progress made and the challenges faced in implementing the Abuja declaration and plan of action on Roll Back Malaria (RBM) of 2000 on the topic: The Abuja Declaration and plan of action on HIV and AIDS, Tuberculosis and other Infectious Diseases (ORID) of 200, and the Abuja declaration called for an accelerated action towards a universal access to HIV and AIDS in Africa by 2010. There has been a tremendous progress in the fight against HIV/AIDS, TB and Malaria since 2000 till now though much still has to be done

Mindful of the need to accelerate the implementation and enforcement of the protection in law for people affected by HIV, particularly women, youths, the vulnerable such as children, displaced persons and refugees remains a challenge, as does limited provisions in policy and restrictive laws targeting key populations at high risk of exposure to HIV. With this, there is an

⁴⁵ The community ideas for improving the response to the domestic HIV epidemic was published in April 2010. Available at: <https://www.whitehouse.org/ONAP>. (Accessed 2nd January 2024)

⁴⁶ The African Union Special Summit (2013). *Ownership, Accountability and Sustainability of HIV/AIDS, Future*. Abuja. Nigeria. This summit focused on HIV and other related infectious diseases.

effective positive position on the overall maternal and child mortality rates, and could help African countries reach the Millennium Development Goals (MDGs),⁴⁷ of reducing child mortality rate, improving maternity health respectively by 2015, and to reach the Sustainable Development Goals (SDGs).⁴⁸ There is need to strengthen the preventive measures required to mitigate exposure to HIV/AIDS by the vulnerable groups and the population at risk, and to create an African Centre for Disease Control (CDC), which will have as function to conduct life-saving research on priority health problems in Africa and to serve as a platform to share knowledge and build capacity in responding to public health emergencies and threats.

The head of states and government of the Organization of the African Union met in Abuja to undertake a critical review and assessment of the situation and the consequences of these disease in Africa, and to reflect on new ways to strengthen current successful intervention and developing new and more appropriate implementing measures and concrete monitoring structure at the national, regional and the international level, with the view of ensuring adequate and effective control of HIV/AIDS, Tuberculosis and other related infectious diseases in Africa. Despite efforts made by countries to control and reduce the spread of these diseases, Africa remain one of the highly affected region. Poverty, poor nutritional conditions and under development have greatly played a role in increasing vulnerability. The world is concern about the millions of children and population in general who have died from HIV/AIDS and the other preventive infectious diseases, and the impact of these diseases on the population.

They were particularly concerned about the high incidence of mother to child transmission especially, giving the challenge of infant breast-feeding in the context of HIV infection on the continent. It was realized that special efforts were required to ensure that African children are protected from these pandemics and their consequences, and the full and effective participation of young people in the prevention and the control of these pandemics. During this conference, it was discovered that the practice of injectable drug such as marijuana and the abusive consumption of alcohol and other mind-altering drugs is on an increase among the youths further enhances their vulnerability to HIV/AIDS. Forceful migration due to war, conflicts, natural disasters and economic factors led to an increased vulnerability and the spread of

⁴⁷ See goal 4 and 5 of the Millennium Development Goals

⁴⁸ See goal 3 of the Sustainable Development Goals.

diseases. Stigma and discrimination against the people living with HIV/AIDS, increase the impact of the epidemic and constitute a measure concern in response to it.

The world leaders recognize that the epidemic of HIV/AIDS and other related diseases constitute not only a major health crisis but also a threat to the development of Africa, social cohesion, political stability, food security as well as the greatest global need to the survival and life expectancy of the African people. These diseases which are themselves exacerbated by poverty and conflicts in the continent, also entails a devastating economic burden, through the loss of human capital, reduces productivity and the diversion of human and financial resources to care and treatment.

4. Institutions Involve in Fighting Against World Epidemics

Institutions are organs or organigrams in charge of carrying potential, beneficial and profitable activities with a lucrative or non-lucrative goal. There exist several institutions at the international, regional and the national level. Focalizing in the domain of epidemics, some international institutions such as the World Bank (WB) and the International Monetary Fund (IMF) have been making positive efforts in the fight against epidemics as a result of sanitarian emergency in the world. This means that the international community either directly or indirectly contribute in one way or the other in the eradication of diseases in the world and in particular Africa, where more that 27 percent of the European Union budget are diverted in Africa in the form of aid to fight against deathly epidemics in Africa.

The World Health Organization convened an emergency meeting in July 2014, with the health ministers from eleven countries and announced collaboration on a strategy to coordinate technical support to combat the epidemics, and in August 2014, they declared the outbreak an international public health emergency,⁴⁹ and published a roadmap to guide and coordinate the international response to the outbreak, aiming to stop the Ebola transmission worldwide.⁵⁰ The United Nation Security Council (UNSC) declared the Ebola virus outbreak in West African sub region as a threat to international peace and security and adopted a resolution urging United

⁴⁹ United Nations (UN) (18th September 2014). *Security Council Press Statement on United Nations Office for West Africa*. SC/11466-AFR/2930. United Nations

⁵⁰ Sinead Walsh and Oliver Johnson (2018). *Getting to Zero: A Doctor and a Diplomat on the Ebola Frontline*. London. UK, Zed Books.

Nations member states to provide more resources to fight the outbreak.⁵¹ This Resolution laid the groundwork for the unanimous adoption of the of the United Nations General Assembly Resolution 69/1 the following day which, welcomed the Secretary General's decision to set up a special United Nations Mission for Ebola Emergency response (UNMEER).⁵² Therefore, financial institutions have greatly contributed in combating epidemic in the world and Africa.

4.1. The World Bank (WB)

The World Bank is an international financial institution which has as goal to fight poverty and to reduce the spread of diseases in the world especially in the developing world.⁵³ The World Bank Group (WBG) is a family of five international organizations that make leverage loans to developing countries.⁵⁴ It is the largest and famous development bank in the world, and it is an observer at the United Nations Development Group. It provided around 61 billion dollars of loan and assistance to developing and transition countries in the 2014 fiscal year.⁵⁵ The World Bank's activities that is; the International Bank for Reconstruction and Development (IBRD) and the International Development Association (IDA) are focus on developing countries in fields such as human development (for example, education and health), agriculture, rural development, and environmental protection (for example, the reduction of pollution), infrastructure such as roads, large industrial construction projects and governance.

The IBRD and IDA are responsible for providing loans as well as grants to the poorest countries⁵⁶. Loans and grants for specific projects are often link to a wider policy changes in the sector or the country's economy. For example, a loan to improve coastal environmental management maybe link to the development of new environmental institution at the national level and local level, and the implementation of new regulations to limit pollution such as, the

⁵¹ United Nations (UN) (2014). With the spread of Ebola outpacing Response, Security Council adopted resolution 2177urging immediate action

⁵² Oliver Johnson, Sinead Walsh and Funmi Olonisakin (2022). The role of the UN Security Council in health emergencies: Lessons from Ebola response in Sierra Leon. *Australian Journal of International Affairs*. No. 1. Vol. 76. P. 11-16

⁵³ The World Bank (WB) is a financial institution which was formed in 1945 based in Washington DC

⁵⁴ The five organizations of the World Bank are: The International Bank of Reconstruction and Development (IBRD), THE International Development Association (IDS), The International Financial Corporation (IFC), the Multilateral Investment Guarantee Agency (MIGA), AND THE International Centre for Settlement of Investment Disputes (ICSID)

⁵⁵ World Bank. *The World Bank: Promoting Opportunity, Growth and Prosperity*. 28. The WB Annual Report (2014)

⁵⁶ David Goldsbrough(CDG) (2007). "Does the International Monetary Fund constrain health spending in poor countries? Evidence and an agenda for action". *Report of the Working Group on IMF Programs and Health Spending*

finance of construction by the World Bank of a paper mills along the Rio Uruguay in 2006.⁵⁷ The World Bank is a major source of funding to fight against HIV/AIDS and other infectious diseases. In recent years it has committed about two billion dollars through loans, grants and credits for programs to fight HIV/AIDS.⁵⁸

4.1.1. The Organization for Economic Development and Cooperation (OECD)

The Organization of Economic Development and Cooperation (OECD) provides fiscal and socio-economic policy analysis and advise member states. The member states of the OECD are restricted to the richest countries of the world.⁵⁹ The OECD was concerned in health policy in the 1970s as it realizes that health care had become a major public spending category. Under the leadership of Jean-Pierre P, the OECD created the health data base, the first collection of statistical data about spending, health input and other core statistics on health and health care. Within few year, the health database became the most important source of international comparative research by the OECD staff and external experts. As an effect, the availability of an easily accessible statistical data transformed the statistics from objective to normative data: the statistical average of the number of physicians per 100.000 became a norm for national policy makers comparing their position to that of others.

The OECD also reported on international experience with health reforms, by the mid-1990s, the OECD had gained a leading role in comparing health care and health policies across the industrialized world, but that changed when the board of OECD decided not to allocate money for international comparison in health care policy in the 2000s. However, the OECD continue to expand its health database, collaborating with the World Health Organization to create a worldwide statistical data.

4.1.2. The Role of Non-Governmental Organization and International Organizations (IOs) in the Fight Against Epidemics

Health policies are often considered as the responsibility of the government, but other stakeholders play an important role in the health policy arena. The four groups commonly depict as the main stakeholders in health care are; the patients and the general population as

⁵⁷ Lehtinen, Ari Aukusti (2008). Lessons from fray Bentos: Forest industry, overseas investments and discursive regulation. Fennia 186; 2. P. 69-82.

⁵⁸ The world bank global HIV/AIDS Program, the world bank global HIV/AIDS Program of Action 2012

⁵⁹ See the Organization of Economic Development and Cooperation of 1992 and 1995

tax payers, physicians, hospitals and other health care that is the providers, public and private health care insurance agencies as third payers for medical care, and the government. Other groups such as the media, academics and multilateral agencies play an important role in health policy. Multilateral agencies act in different capacities as funding agencies, policy advisors, health care providers or advocates. The International Organisations (IOs) and NGOs realize their goals in diverse way such as raising funds for specific activities and financing programs, and managing projects to support particular communities or strengthen the health care system.⁶⁰ Many NGOs take a more activist stance on issues such as HIV/AIDS, women's reproductive health for which the pharmaceutical industry or company has no commercial interest. While the international organizations have to work with governments, the smaller NGOs often seek to establish direct ties with the population and the group they support. But for the larger NGOs, that independence is harder to maintain. The bigger their role on the national policy making, the harder it is to remain entirely independent from government.

International Organizations serve in different or several functions for example, they provide governments with advice and financial aid for fiscal activities, economic, and social policies, they collect statistical data, publish annual reports and other studies, channel and coordinate development aid to low and middle income countries, and monitor the results. Their annual meetings and standing committee serve as platforms for discussions where head of governments and national experts meet to exchange their experience and discuss future policy direction. The United Nations established after the World War II (WWII) is the largest group of worldwide international organization almost all countries of the world are members of the United Nations. The UN succeeded the League of Nations after the World War I (WW1). Between the 1950s and 1970s, international organizations largely worked under the aegis of the UN. The United Nations family include political bodies,⁶¹ several economic and social committees.⁶² and a wide range of specialized agencies, special programs as well as the Breton Woods Organizations.⁶³

⁶⁰ Sara E. Davies. Global Politics of health. 21(3). *Critical Public Health*. (2011) 383-384; Jeremy Youde. *Global Health Governance*. Jeremy Youde Polity Press. (2012). P. 188.

⁶¹ Political bodies such as the United Nations Security Council (UNSC)

⁶² United Nations Committee on Economic, Social and Cultural Rights.

⁶³ The Bretton Woods institutions are the World Bank and the International Monetary Fund, which were set up at the 43 countries in Bretton Woods, New Hampshire, USA in July 1944. Their aims were to help rebuild the shattered post war economy and to promote international economic cooperation.

As a United Nations agency, the World Health Organization have played a supporting role in sanitarian emergency. Other organizations are involved in one way or the other in health care in the low and middle income countries. For example, the United Nations Children's Emergency Fund (UNICEF), United Nations Development Programme (UNDP), United Nations Population Fund (UNFPA), or the Joint Monitoring Programme (JMP) on HIV/AIDS (UNAIDS), Food and Agricultural Organization (FAO). These United Nations agencies played an important role in emergency situations.

4.1.3. The Role of Other groups in combating Epidemics

The number of NGOs active in the health and health care grew dramatically, and several international organizations expanded their activities in this domain. The WHO and the World Bank (WB) became the dominant agencies. Also the OECD and the World Trade Organization (WTO) had a growing influence in health care issues. The share of health in the official development (directly by the national government or through International Organizations and NGOs) rose substantially from 4.4 to 18.4 percent between 2002 and 2010 of all financial aid. This growth was due to the creation of a financial mechanism such as the Global Alliance for Vaccinations and Immunization (GAVI), The Global Fund to fight HIV/AIDS, Tuberculosis and Malaria,⁶⁴ the Bill and Melinda Gates Foundation and the United States President's Emergency Plan for AIDS Relief (PEPFAR). The US has been the greatest donor for health care in developing world with about 40 percent funding, and other countries such as the United Kingdom, Germany and Canada followed. The Asian Development Bank also played a great role in supporting health care activities. Most of the health support is channelled to the low and middle income countries

The Global Fund serves as a major funding mechanism for global health concerns.⁶⁵ The Global Fund raised 21 percent of all funding worldwide for HIV/AIDS, 82 percent for Tuberculosis and 50 percent for Malaria.⁶⁶ This also popularized the Public-Private Partnership (PPP) as vehicles for other global policy issues such as the climate change and biodiversity conservation.⁶⁷ The Global Fund operates as a financial instrument, it provides support and

⁶⁴ Global Fund is a Public-Private Partnership (PPP) created in 2002. It invests more than five billion USD a year to defeat HIV, TB, and Malaria and ensure a healthier, safe, more equitable future for all.

⁶⁵ Global Fund (2007),

⁶⁶ Global Fund (2013)

⁶⁷ Benjamin Sachs. The liberty principle and universal health care. 18(2). *Kennedy Institute of Ethics Journal*. (2008) 149-172.

leverage for additional financial resources, and supports programs based on national plans and priorities. It evaluates proposals through independent reviews processes and it operates with transparency and accountability.⁶⁸ The Global Fund aims to adhere to the best practices by funding interventions that work at the local level and can be scaled up to the regional or national levels to directly reach people affected and infected by HIV/AIDS Tuberculosis, Malaria and other infectious diseases. The grants of the Global Fund have greatly supported the treatment of 3.6 million individuals affected with HIV/AIDS, 9.3 million with Tuberculosis and the disbursement of more than 270 million anti-malaria bed nets.⁶⁹

The United States Agency for (USAID) and the Swedish International Agency for Development, and the Médecins Sans Frontières (MSF) (Doctors Without Borders) are international humanitarian organizations which have been playing an important role in the fight against infectious diseases. More than 27000 people in the world work for the MSF projects as physicians, nurses, other health professionals, logistics experts, administrative support. MSF has donors worldwide who contribute over 15 percent of its revenues.⁷⁰ The goal of MSF is to provide rapid emergency medical care to victims of man-made disaster, natural disaster and during crisis. MSF also became active in the treatment of hepatitis and other chronic diseases, and in 2010, it gave its support to the eradication of polio by launching a campaign for routine vaccination and lower vaccines prices. The MSF publication edited by Magone and others clearly described some of the dilemma such as using the more of its leverage and engage directly in policy making,⁷¹ and some argued that the focus should remain on answering the field's needs.

4.2. At the Regional Level

The prevention and granting of aid to combat world epidemics is not only supported at the international level but also at the regional level. The European Commission provided 660 million Euro in development and early recovery assistance to Liberia, Guinea and Sierra Leon to reinforce the capacity of governments to deliver vital public services and facilitate a smooth

⁶⁸ Ibid. Note 64

⁶⁹ Ibid. Note 65.

⁷⁰ Médecins Sans Frontières (MSF) (Doctors Without Borders) was founded in France in 197. It has 23 national associations. See also the MSF annual report

⁷¹ Claire Magone, Michael Neuman and Fabrice Weissmanet. Humanitarian negotiations revealed: the MSF experience (2011).

Available at: <http://msf-crash.org/en/blog/war-and-humanitarianism/humanitarian-negotiations-revealed-msf-experience>. (Accessed 2nd December 2023)

transition to recovery. The nature of the sickness itself has made an objective of controversies and has raise panic in the countries where it is existing.⁷² An author argued that the sickness is spreading in a rapid manner and on the 13th of April 2016, 28,652 cases were registered of the Ebola disease in the 2014-2015 West African epidemic, in which 11,325 cases were fatal.⁷³ This was the first outbreak of Ebola in West Africa, and the most significant Ebola epidemic that has occurred worldwide since the virus was first described.⁷⁴ The European Union supports the African Union's medical mission in West Africa.⁷⁵ The European Union has also supported neighbouring countries in the region to strengthen their preparedness and awareness against potential outbreaks. As part of its coordinated response, the EU provides emergency supplies and expertise to the affected countries. The European Union launch an Ebola autumn 2014 with a total budget of nearly 240 million Euro from horizon 2020, and 101 million Euro from the pharmaceutical industry and tackle a wide range of challenges including vaccines development.

The outbreak of epidemics in Africa have drawn the awareness of the African Union (AU) to fight against these epidemics. The West African Ebola crisis has unearthed and still continue to unearth more inadequacies of humanitarian assistance and response strategies among governments and organizations. The AU came out with the Ebola task force in which the African Union support to Ebola outbreak in West Africa (ASEOWA). It called upon all African to continue supporting the AU as it seeks to improve on interventions.

5. Conclusion and Recommendation

Sanitarian emergency is a delicate exercise in international law, but with the help of the International Health Regulations, there is no need of fear of the danger of deadly diseases. With the coming of this legislation, quarantine is used as one of the means to prevent the spread of

⁷² In August 2014, the *La Pravda* news said that 'it seems as if there existed a vaccine against the Ebola virus ... two Americans medical doctors infected received the injection of the vaccine and immediately started spreading the illness'. It was made known to the world that Russian is accusing the United States of America of haven created the Ebola virus

⁷³ Jolie Kaner and Sarah Schaack. Understanding Ebola: The 2014 epidemic. 12(53). *Globalization and Health*. (2016) 23. See also Centre for Disease Control and Prevention. *2014 Ebola Outbreak in West Africa-Case Count*. (2016). Available at: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case/counts.html>. (Accessed 25 March 2024).

⁷⁴ WHO Ebola Response Team. Ebola virus disease in West Africa-The first nine months of the epidemic and forward projections. 371(16). *The New England Journal of Medicine*. (2014) 1481-1495. Dio: 10.1056/NEJMoa1411100.

⁷⁵ The European Union financially supported the African Union medical mission with a 15.1 million Euro in West Africa.

these diseases across the international borders. This was built on the first international sanitary Convention of 1892, which later became the International Sanitary Regulation. The World Health Organization member states adopted this convention in 1951. The 1969 IHR were used by the WHO to direct member states on international prevention and control of infectious diseases. The World Health Organization member states were also supposed to inform the WHO of plague, yellow fever and cholera outbreaks in their areas of jurisdiction. It is worth noting that due to this regulation, States have been able to draw out national policies on the detection, prevention and the control of diseases in their national territory. Pandemics can never be effectively controlled when there is no finance to back it up. Financial institutions such as the World Bank, International Monetary Fund, African Development Bank Have contributed hugely to fight against the spread of epidemics in Africa and the world at large. The outbreak of Ebola, Coronavirus in Africa was sponsored by many financial institutions and international organizations in the world.

We will recommend that legislations and institutions responsible for governing the international health sector be reinforced without which the world will still be in a drill of panic and psychological trauma due to difficulties in handling epidemics. This regulation needs to be more effective and the re-establishment of new legal instruments that will support the already existing ones to govern the health arena. For the IHR metrics to be meaningful, valued and utilized they should undergo rigorous external evaluations. An independent evaluation system should be establishing by the WHO with a continuous quality improvement. At the national level, states should put in place emergency health district everywhere even in rural areas. Medical staffs should be dispatch and national health code with penal sanctions should be put in place.

REFERENCES

- 1-African Union Special Summit (2013). *Ownership, Accountability and Sustainability of HIV/AIDS, Future*. Abuja. Nigeria.
- 2- Alexandra Mangili and Mark A. Gendreau. Transmission of infectious diseases during commercial air travel. 365(9463). *Lancet*. (2005) 989-996.
- 3- Benjamin Sachs. The liberty principle and universal health care. 18(2). *Kennedy Institute of Ethics Journal*. (2008) 149-172.
- 4- Centre for Disease Control and Prevention (CDC) (2011). *Vital signs: HIV prevention through care and Treatment-United States*. Morb Mortal Wkly Report.

Available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6047a4.htm>. (Accessed 24th September 2024)
- 5- Centre for Disease Control and Prevention (CDC). *Estimated HIV incidence and prevalence in the United States 2015-2019*. HIV Surveillance Supplemental Report. (2021). No. 1. Vol.26.
- 6- Centre for Disease Control and Prevention. *2014 Ebola Outbreak in West Africa-Case Count*. (2016).

Available at: <http://www.cdc.gov/vhf/ebola/outbreaks/2014-west-africa/case/counts.html>. (Accessed 25 March 2024).
- 7- Claire Magone, Michael Neuman and Fabrice Weissmanet. Humanitarian negotiations revealed: the MSF experience (2011).

Available at: URL: <http://msf-crash.org/en/blog/war-and-humanitarianism/humanitarian-negotiations-revealed-msf-experience>. (Accessed 2nd December 2023)
- 8- Commission on a Global Health Risk Framework for the Future. *The neglected dimension of global security: A framework to counter infectious disease crises*. Washington DC. National Academy of Medicine. (2016).

Available at: www.nam.edu/GHRF. (Accessed 1 January 2024).
- 9- David Fidler. The globalization of public health: Emerging infectious diseases and international relations. 5(1). *Indiana Journal of Global Legal Studies*. (1997) 23.
- 10- David Goldsbrough(CDG) (2007). “Does the International Monetary Fund constrain health spending in poor countries? Evidence and an agenda for action”. *Report of the Working Group on IMF Programs and Health Spending*.

11- David Heymann. Evolving infectious disease threats: Implications for national and global security. 4(2). *Journal of Human Development*. (2003) 191-207.

12- Flahault A, et al (2016). From global health security to global health solidarity, security and sustainability. *Bulletin of the World Health Organization*. 94: 863.

13- Hari Shanker Joshi, Anand Dixit, Anil Koparkar, Rama Shankar Rath, Pradip Kharya. Investment in primary health care: Need of the hour. 10(8). *Journal of Family Medicine and Primary Care*. (2021) 3159-40.

14- Howard-Jones N. The scientific background of the international sanitary Conference, 1851-1938. Geneva, Switzerland. WHO, 1975.

Available at: http://whqlibdoc.who.int/publications/1975/14549_eng.pdf. (Accessed 30 June

15- Jeremy Youde. *Global Health Governance*. Jeremy Youde Polity Press. (2012). P. 188.

2024)

16- Jolie Kaner and Sarah Schaack. Understanding Ebola: The 2014 epidemic. 12(53). *Globalization and Health*. (2016) 23.

17- Lawrence O. Gustin and Rebecca Katz. The International Health Regulations: The Governing Framework for Global Health Security. 94(2). *The Milbank Quarterly*. (2016) 264-313.

18- Lehtinen, Ari Aukusti (2008). Lessons from fray Bentos: Forest industry, overseas investments and discursive regulation. *Fennia* 186; 2. P. 69-82.

19- Lincoln Chen, Jennifer Leaning, Vasant Narasimhan (Eds) (2004). *Global-health challenges for human security*. Global Equity Initiative. Harvard. P. 338. ISBN: 0674014537.

20- Moon S et al. will Ebola change the game? Ten essential reforms before the next pandemic. The report of the Harvard-LSHTM Independent Panel on the Global response to Ebola. 386(10009). *Lancet*. (2015) 2204-2221.

21- Oliver Johnson, Sinead Walsh and Funmi Olonisakin. The role of the UN Security Council in health emergencies: Lessons from Ebola response in Sierra Leon. 76(1). *Australian Journal of International Affairs*. (2022)11-16.

22- Sara E. Davies. Global Politics of health. 21(3). *Critical Public Health*. (2011) 383-384;

23- Sinead Walsh and Oliver Johnson (2018). *Getting to Zero: A Doctor and a Diplomat on the Ebola Frontline*. London. UK, Zed Books.

24- Seatini, Tarsc (2011). *Pandemic influenza preparedness: Sharing of influenza viruses and access to vaccines and other benefits*. Policy Brief No. 24. Harare.

25- Susan R, Julian L. Leibowitz. Coronavirus Pathogenesis. 81 *Advances in Virus Research*. (2011) 85-164.

26- United Nations (UN) (18th September 2014). *Security Council Press Statement on United Nations Office for West Africa*. SC/11466-AFR/2930. United Nations

27- WHO Ebola Response Team. Ebola virus disease in West Africa-The first nine months of the epidemic and forward projections. 371(16). *The New England Journal of Medicine*. (2014) 1481-1495.Dio: 10.1056/NEJMoa1411100.

28- World Health Organization (WHO) (2020). *Corona Disease (COVID-19) Pandemic Situation Report*.

29- World Health Organization (2024). A Report on the progress and gaps on the *Implementing health sector strategies on HIV, Viral hepatitis and sexually transmitted infections. 2022-2030*. 2nd Edition. WHO. P. 70.

30- World Health Organization. *International Health Regulations (2005)*. 2nd edition. Geneva, Switzerland: WHO 2008.

Available at: http://whqlibdoc.who.int/publications/2008/9789241580410_eng.pdf. (accessed 30 July 2024)

31- Yanzhong Huang (2004). The SARS Epidemic and its aftermath in China: A political perspective, in learning from SARS: Preparing for the next disease outbreak. *Political Science Medicine*.

Available at: <http://www.bepress.com/yanzhong-huang/15/>. (Accessed 20th December 2024).

32- Ying Yan, Le Chang, Lunan Wang. Laboratory testing of SARS-CoV-2 (2019-nCoV): Current status, challenges and countermeasures. 30(3). *National Centre for Biotechnology Information*. (2020) 21.