HOW NIGERIA CONTAINED EBOLA:
LESSONS FOR INSTITUTIONAL REFORM

November, 2015

BPSR
BUREAU OF PUBLIC SERVICE REFORMS
THE PRESIDENCY

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Abbreviations & Acronyms

BIO	Bio-Resources Institutes of Nigeria
CDC	Centre for Disease Control
DRC	Democratic Republic of Congo
ECOWAS	Economic Community of West African States
EOC	Emergency Operational Centre
ERF	Emergency Restoration Facility
EVD	Ebola Virus Disease
FCT	Federal Capital Territory
FCMC	First Consultant Medical Centre
GCFR	Grand Commander of the Federal Republic
GCON	Grand Commander of the Niger
GORIN	Global Outbreak Alert and Response Network
LUTH	Lagos University Teaching Hospital
IEC	Information, Education and Communication
MSF	Médecins Sans Frontières
NCAA	Nigeria Civil Aviation Authority
NSFDAC	National Agency for Food and Drug Administration and Control
NIAD	National Institute of Allergies and Infectious Diseases (NIADS)
NCDC	Nigeria Centre for Disease Control
NGO	Non-Governmental Organization
SARS	Severe Acute Respiratory Syndrome
SCC	Strategic Command Centre
US	United States of America
USD	United States Dollar

UNICEF	United Nations International Children's Education Fund
WHO	World Health Organization

ACKNOWLEDGEMENTS

Those that follow a particular interpretation of institutional theory will have you believe that countries are slaves to their history and culture, and that the path that a country follows depends on the choices and decisions that it has made in the past. This fatalistic view of the world frequently writes off Africa, given its history of colonialism, civil wars, military dictatorships, high indebtedness and poverty. Tackling epidemics require strong institutions and good governance, which it is claimed are lacking in many African countries. Putting these two arguments together, the expectation was that in the case of an Ebola outbreak, Nigeria, Africa's most populous country, would be overrun with catastrophic consequences on a biblical scale.

But it wasn't! Why? Are the governance institutions in Nigeria stronger than many foreign commentators make out? Or were there other factors at play that ensured that Nigeria's containment of Ebola became an example of good practice for the rest of the world? Or were a combination of factors at work? That is the subject of this book.

We wish to pay tribute to former President Goodluck Jonathan, Governors Babatunde Fashola and Rotimi Amaechi, and Professor Onyebuchi Chukwu, former Minister of Health, for their leadership. We are also grateful to the doctors and nurses who gave their lives to protect their fellow citizens and the scores of healthcare professionals whose professionalism, dedication and patriotism ensured that Nigeria defeated the virus.

In compiling this book, we wish to thank Mr Oronto Douglas (Special Adviser to the President in Research, Documentation and Strategy), who unfortunately passed away recently, for the primary research he undertook. We are also grateful to the Permanent Secretary, Federal Ministry of Health, Mr Linus Awute, not only for his management of the crisis, but also for his editorial contributions to this work.

I am grateful for the support received from Dr. Ngozi Azodoh, Director, Health Planning Research and Statistics, and her staff member, Dr. Chima Elenwune, both of the Federal Ministry of Health, for their useful contributions. Mr James Nicholls of the DFID FEPAR programme assisted with editing. I am also grateful to, and proud of, Mr S. Inyang Anyang, my technical assistant and a civil servant, who wrote most of this book.

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EXECUTIVE SUMMARY

The largest Ebola Virus Disease (EVD) outbreak to date occurred in the West African sub-region - particularly in Guinea, Sierra Leone and Liberia - with a total of 7,178 reported cases, including 3,338 deaths, as of 1st October 2014.

A total of 20 Ebola cases (19 laboratory confirmed, one probable) were reported in Nigeria in 2014, with no new cases reported since the 5th of September of the same year. All 20 Ebola cases stemmed from a single importation by a Liberian diplomat, Patrick Sawyer, who was returning to Nigeria from Liberia. Patrick Sawyer had visited and cared for a sibling in Liberia who died from the disease on the 8th of July 2014. Despite being aware of his exposure to Ebola in Liberia, Patrick Sawyer flew from Liberia to Lagos, Nigeria, on a commercial airplane on the 20th July 2014 with a stopover in Lomé, Togo. Patrick Sawyer became symptomatic while flying and collapsed at Lagos International Airport upon arrival. A number of people were subsequently exposed to the Ebola Virus Disease. Epidemiological investigation revealed that Patrick Sawyer had contacted the virus in Liberia. He died on the 25th July 2014 at the First Consultant Medical Centre, Lagos.

A total of 898 contacts were subsequently linked to Patrick Sawyer, including 351 primary and secondary contacts and 547 tertiary and further contacts. Of note, a nurse who had cared for Patrick Sawyer became symptomatic and tested positive for Ebola after travelling to Enugu, generating at least 21 potentially infected contacts. A second primary contact travelled to Port Harcourt, Rivers State, at the end of July 2014 and was cared for by a healthcare professional who subsequently became infected and died on the 22nd August 2014. The deceased healthcare worker was in turn linked to a total of 526 contacts in Port Harcourt. As of the 1st October 2014, all contacts had completed the 21-day surveillance follow-up, including those under surveillance in Rivers State, with no new report of incident cases.

The Honourable Minister of Health, Prof. Onyebuchi Chukwu, officially announced Nigeria's first case on the 22nd July, 2014. In an effort to tackle the Ebola outbreak in Nigeria, the Federal Government, drawing on the experience of the Emergency Operation Centre's (EOC) work with polio, declared Ebola a public health emergency, and mobilized human, financial and material resources to contain the epidemic. The declaration of Ebola as a public health emergency empowered an Ebola crisis group comprised of Federal, States and international bodies and agencies with clear reporting lines to act swiftly and decisively. The Federal Government also moved swiftly to approve a special national intervention plan to contain and prevent the spread of Ebola. The plan was supported by the release of N1.9 billion (USD $11.5 million) by the Federal Government to support the plan's implementation. The funds were earmarked for the creation of additional

isolation centres, case management, contact tracing, deployment of additional personnel, screening at borders and procurement of required items and facilities.

On the 20th October 2014, Rui Gama Vaz, representative of the World Health Organization (WHO), officially certified Nigeria free of Ebola in a news conference in Abuja, Nigeria. He stated that, "This is a spectacular success story. It shows that Ebola can be contained." The Federal Government dedicated the certification to the many patriotic health workers, volunteers and ordinary Nigerians who worked tirelessly to contain the deadly disease. In total, there were 20 cases of Ebola across Nigeria, out of which 8 people died (two in Port Harcourt and 6 in Lagos) and 12 survived.

There has been much discussion as to why the 2014 Ebola epidemic in West Africa was on a larger scale than prior outbreaks. It has been suggested that since only one previously documented case of human infection with Ebola had occurred in the West African sub-region - historically, the virus has primarily affected Central and East Africa - healthcare workers in the sub-region had little experience in dealing with the Ebola Virus Disease.

This book, therefore, chronicles the events leading to the first index case of Ebola in Nigeria, and the response of both the Federal and State Governments, and Development Partners in the country. The book also identifies and describes the systems, activities, resources and timelines at national, state and LGA levels for the pre-outbreak, alert, response and post- outbreak phases required to mitigate and contain any re-introduction of EVD in Nigeria using our national health institute and effective public health measures.

But more importantly, Nigeria's successful response to the Ebola outbreak provides an opportunity to document the lessons learned, particularly for institutional reform purposes. This book, "How Nigeria Contained Ebola: Lessons For Institutional Reform", details Nigeria's successful response to the Ebola epidemic. The lessons learned serve three main purposes. Firstly, public health managers faced with similar challenges or outbreaks may use Nigeria's successful response as a guide. Secondly, a reading of this book will reveal that although there were challenges, those challenges were successfully overcome and offer lessons for the future. Finally, it provides lessons for institutional reform, particularly in the areas of leadership, teamwork, inter-governmental relations, collective will and national unity.

The thirteen key factors (summarised) which resulted in the containment of the 2014 outbreak in Nigeria were:

- The Federal and State Governments demonstrated strong decisive, and effective leadership at the critical moment, both coordinating efforts to contain Ebola.

- When the index case was confirmed, the Federal Government immediately declared the event a public health emergency problem and mobilized human, financial and material resources to contain the outbreak. The emergency declaration was very important since it empowered health professionals and personnel, as well as other critical stakeholders to quickly track and monitor those at risk of the Ebola virus disease.
- The establishment of the Ebola Emergency Operational Centre (EOC) by the Federal Government proved a decisive and timely decision. The EOC served as the engine room of the international response, providing the coordinating mechanism for prevention, surveillance, patient care, tracking, data analysis and containment. It also facilitated the coordination of international partners, as well as serving as a platform to link the medical community both countrywide and internationally, especially with the countries battling Ebola in the West African sub-region. This key decision highlights the importance of ownership, and of the necessity of close ties between technical processes and political oversight.
- The government at both national and sub-national levels and other critical stakeholders embarked on massive orientation programmes to sensitise the populace to the dangers presented by Ebola. Additionally, the use of social media as part of these efforts played an important preventive role in the anti-Ebola campaign.
- The prompt release of funds by the Federal Government to support implementation efforts at the national and sub-national levels was essential to the containment of Ebola in Nigeria.
- The containment of Ebola was a national effort involving all Nigerians who saw the virus as a common health challenge facing the country, irrespective of differences in tribe, religion and culture, and who rallied around both the Federal and State Governments efforts to contain the outbreak.
- When the first case of Ebola was confirmed, the Federal Government immediately repurposed polio technologies and infrastructures to conduct Ebola case-finding and contact-tracing. This strategy helped to quickly and successfully contain the further spread of Ebola in the country.
- Traditional rulers, religious and community leaders were engaged early on and played a critical role in sensitizing the public to the dangers posed by Ebola.

- Nigeria's containment strategy was supported by social mobilization experts from the UNICEF, CDC, and Médecins Sans Frontières, while staff from the WHO Nigeria Office, the Regional Office for Africa and headquarters

boosted outbreak investigation, risk assessment, contact tracing and clinical care.

- Nigeria did not close its borders in spite of strong repeated calls for the Federal Government to do so. This helped the country to track the spread of Ebola and assisted in contact-tracing.
- Furthermore, the meaningful autonomy given to middle level managers circumvented unwieldy bureaucracy which could have throttled the rapid response, instead it allowed for innovation solutions which helped catalyse an efficient response.
- Additionally, the utilization of existing assets and resources – organizational, infrastructural, human and fiscal - yielded rapid results while ensuring policy continuity.
- Employing data-driven decisions and relevant technical assistance prevented catastrophic mistakes and guided corrective actions.

PART ONE

INTRODUCTION

Background

On the 23rd July 2014, a laboratory test confirmed Nigeria's first Ebola case in Lagos. For the first time, the virus had spread to an urban-mega city. The worst cast scenario of an epidemic involving multi-mode cross border transmission, including via air transport, was of serious concern. The population of Lagos is estimated to be around 21 million, which is almost as large as the populations of Guinea, Liberia and Sierra Leone combined. When the first confirmed case was announced, the question of how to undertake contact tracing in such a populous and urban environment became urgent. Many anxieties were raised by both Nigerians and foreigners. As the United States Consul General in Nigeria Jeffery Hawkins said at the time of the outbreak, "The last thing anyone in the world wants to hear is the two words, 'Ebola' and 'Lagos' in the same sentence." As he noted, that "single juxtaposition" conjured up imagines of an "apocalyptic urban outbreak".

Fortunately, that nightmare scenario never took place. The Federal and State Governments, with assistance from the World Health Organization (WHO), the United States (US) Centres for Disease Control and Prevention (CDC), and other relevant stakeholders mobilized human, financial and material resources and successfully reached 100% of known contacts in Lagos and 99.8% of known contacts at the site of the second outbreak, in Port Harcourt, Rivers State. The rest is history.

On the 20th October 2014, the WHO officially certified Nigeria free from Ebola. The confirmation was made after the daily situation report sent to the UN apex health body by its office in Nigeria recorded no cases for 42 days. The declaration was made at the Shehu Musa Yar'Adua centre in Abuja by the WHO country representative in Nigeria, Dr. Rui Gama Vaz, on behalf of the Director-General, Dr. Margaret Chan. The ceremony included a moment of silence for victims of the disease and a testimony from Miss Enemuo, an Ebola survivor whose brother, Iyke Enemuo, succumbed to the disease. The Former Minister of Health, Onyebuchi Chukwu, took the stand to give an official statement regarding Nigeria's new Ebola-free status. In a statement entitled "Nigeria is Now Free of Ebola Virus Transmission" the WHO stated: "This is a spectacular success story that shows that Ebola can be contained".

Former Minister of Health, OnyebuchiChukwu, receiving a handshake from WHO country representative Dr Rui Gama Vaz at the Ebola certification ceremony.

The story of how Nigeria ended what many believed to be potentially the most explosive Ebola outbreak imaginable is worth telling in detail since the story can help many other developing countries that are deeply worried by the prospect of an outbreak and eager to ensure they are prepared in the event.

Many wealthy countries, with outstanding health systems, may also have something to learn. Told from start to finish, the whole story illustrates how Nigeria is verging on the successful interruption of wild poliovirus transmission throughout its vast and densely populated territory.

Survivor, Miss Enemuo, narrating her ordeal at the WHO Certification of Nigeria as Ebola-free

Since Nigeria was declared free of Ebola by the WHO, many questions have been asked about the successful containment of the disease, both within Nigeria and internationally. While some have heralded the containment of the disease "an act of God", others claim that the Federal and State Governments' responses to the Ebola outbreak demonstrated the power of good leadership. Another school of

thought attributed success to the national effort involving all Nigerians and the strength of a people united. The President emphasized this point, when he said, "If we are united, there is nothing we cannot conquer. Take the case of Ebola and this is good example that all Nigerians must learn … It was not just one person, or Mr. President or the Governors, or other officials, yes they did their work, but we defeated Ebola because all Nigerians agreed to fight the war against Ebola. That is the strength of our unity."

The successful containment is even more remarkable considering that Nigeria's public sector doctors were on national strike at the time of the outbreak, meaning that Nigeria's health care system during this period was in less shape than usual to respond to the emergency.

The biggest threat to public health in Nigeria started virtually unnoticed and in less than two months the virus was contained. By the third month, WHO had certified Nigeria Ebola free. What happened? How, for example, was the country able to record a far lower fatality rate (36.8% with only 8 deaths in 20 confirmed cases) than the global average of 70% recorded by the WHO?

As the curtain falls on the Nigerian Ebola 2014 outbreak, there are key lessons to be learned from the Nigerian response. The Nigeria public health success story is, therefore, worth telling in detail.

Methodology

This book uses both primary and secondary sources of data. First, it reviews the literature on Ebola Virus Disease (EVD) globally, particularly the four countries in the West Africa sub-region that have been afflicted with the Ebola Virus Disease, and analyses the dynamics and consequences of the disease. Secondly, the book draws on documentary sources to support and validate key evidence from primary sources.

Although this book primarily focuses on the lessons learned from Nigeria's strategy of containment, an overview of the Ebola virus disease is instructive for three reasons. Firstly, such an overview provides us with an insight into the science and epidemiology of Ebola. Secondly, it highlights the emergence of the West African Ebola epidemic and the challenge to contain it. Thirdly, it shows how, while other countries affected by Ebola struggled to respond effectively, Nigeria was able to rise to the critical challenge of containing it, irrespective of ethnic, religious, and political differences.

PART TWO

A Brief History of the Ebola Virus Disease

It was a Belgian scientist Peter Piot, now Director of the London School of Hygiene and Tropical Medicine, who played a leading role in discovering and naming Ebola. In 1976, Piot and his colleagues learned a lot about the virus during the three months they spent investigating the spread of the virus in the village of Yambuku, Zaire, now Democratic Republic of the Congo. Piot's priority was finding ways to stop the spread of the virus, which at that time lacked a name. After investigating and containing the outbreak in Yambuku, Piot and his colleagues did not want to name the virus after the village since this would stigmatise it.

Piot (second from left) on October 20 1976, the day of his arrival in Yambuku, together with fellow scientists

Therefore, the team chose to name the virus after a river. They had a map of what was then known as Zaire, although not a detailed one, and the closest river they could find was the Ebola River. From that point on the virus was known as the Ebola virus.

The Ebola River after which Peter Piot and his colleagues named the virus

The Ebola virus disease is one of two members of a family of RNA viruses known as *Filoviridae*. There are four identified Ebola virus subtypes, three of which have caused disease in humans, namely: Ebola-Zaire, Ebola-Sudan, and Ebola-Ivory Coast. The fourth Ebola virus subtype, Ebola-Reston, has caused disease in non-human primates, but not in humans. According to the WHO, between 1976 and 2012, Congo has seen the largest number of outbreaks and has the highest fatality rate for those who contract the disease (80% on average). Prior to 2014, Sudan, Gabon, Cote d'Ivoire and Uganda also had outbreaks of the deadly virus disease on more than one occasion.

The table below details the sporadic outbreaks of the Ebola virus since 1976.

Table 1: 1976-1979

Year	Ebola subtype	Country	No. of human cases	Percentage of deaths among cases	Outbreak details
1976	Ebola-Zaire	Zaire (Democratic Republic of the Congo [DRC])	318	88%	Occurred in Yambuku and surrounding area. Disease was spread by close personal contact and by use of contaminated needles and syringes in hospitals/clinics. This outbreak was the first recognition of the disease.
1976	Ebola-Sudan	Sudan	284	53%	Occurred in Nzara, Maridi, and the surrounding area. Disease was spread mainly through close personal contact within hospitals. Many medical care personnel were infected.
1976	Ebola-Sudan	England	1	0%	Laboratory infection caused by accidental contact with contaminated needle.
1977	Ebola-Zaire	Zaire	1	100%	Noted retrospectively in the village of Tandala.
1979	Ebola-Sudan	Sudan	34	65%	Occurred in Nzara. Recurrent outbreak at the

					same site as the 1976 Sudan epidemic.

There was one confirmed outbreak in the 1980s in the USA. This occurred when monkeys were imported to research facilities in the USA from the Philippines; the Ebola-Reston virus caused severe illness and death in the monkeys, and several research workers became infected with the virus but did not become ill.

In the 1990s, there were ten (10) confirmed Ebola outbreaks, as the following table explains:

Table 2: 1990-1996

Year	Ebola subtype	Country	No. of human cases	Percentage of deaths among cases	Outbreak details
1990	Ebola-Reston	United States	0	0%	Ebola-Reston virus was introduced once again into quarantine facilities in Virginia and Texas by monkeys imported from the Philippines. Four humans developed antibodies, but did not get sick.
1992	Ebola-Reston	Italy	0	0%	Ebola-Reston virus was introduced into quarantine facilities in Sienna by monkeys imported from the same export facility in the Philippines that was involved in the episodes in the United States. No humans were infected.
1994	Ebola-Zaire	Gabon	49	59%	Occurred in Mékouka and other gold-mining camps deep in the rainforest. Initially thought to be yellow fever; identified as Ebola haemorrhagic fever in 1995.
1994	Ebola-	Ivory Coast	1	0%	Scientist became ill after

	Ivory Coast				conducting an autopsy on a wild chimpanzee in the Tai Forest. The scientist was treated in Switzerland.
1995	Ebola-Zaire	Democratic Republic of the Congo (formerly Zaire)	315	81%	Occurred in Kikwit and surrounding area. Traced to index case-patient who worked in forest adjoining the city. Epidemic spread through families and hospitals.
1996	Ebola-Zaire	Gabon	31	68%	Occurred in Mayibout area. A chimpanzee found dead in the forest was eaten by people hunting for food. Nineteen people who were involved in the butchery of the animal became ill; other cases occurred in family members.
1996	Ebola-Zaire	Gabon	60	75%	Occurred in Booué area with transport of patients to Libreville. Index case-patient was a hunter who lived in a forest camp. Disease was spread by close contact with infected persons. A dead chimpanzee found in the forest at the time was determined to be infected.
1996	Ebola-Zaire	South Africa	2	50%	A medical professional travelled from Gabon to Johannesburg, South Africa, after having treated Ebola virus-infected patients and thus having been exposed to the virus. He was hospitalized, and a nurse who took care of him became infected and died.
1996	Ebola-Reston	USA	0	0%	Ebola-Reston virus was introduced into a quarantine

					facility in Texas by monkeys imported from the Philippines. No human infections were identified.
1996	Ebola-Reston	Philippines	0	0%	Ebola-Reston virus was identified in a monkey export facility in the Philippines. No human infections were identified.

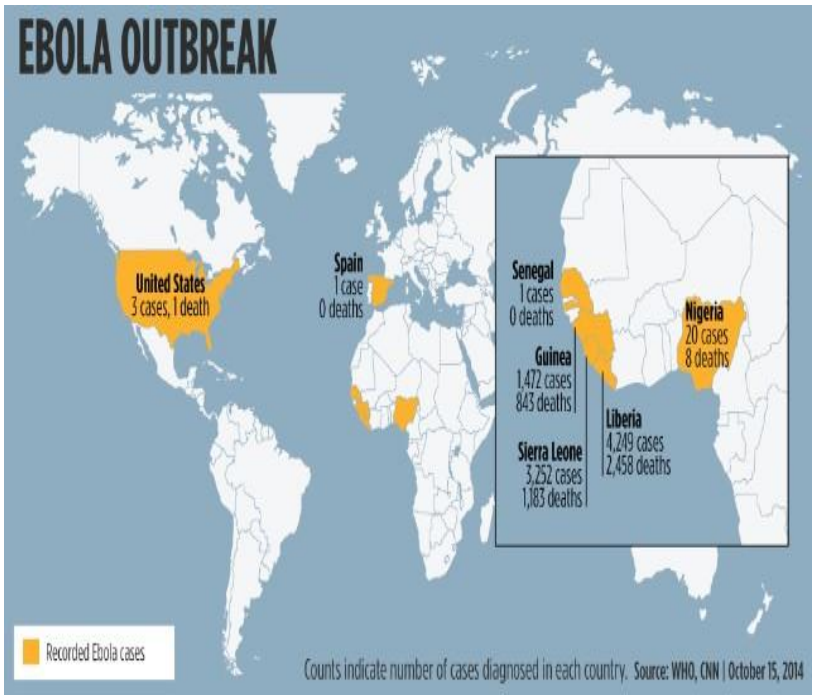
Similarly, there have been eight (8) confirmed outbreaks in the 2000s, as the following table shows.

Table 3: 2000-2008

Year	Ebola subtype	Country	No. of human cases	Percentage of deaths among cases	Outbreak details
2000-2001	Ebola-Sudan	Uganda	425	53%	Occurred in Gulu, Masindi, and Mbarara districts of Uganda. The three most important risks associated with Ebola virus infection were attending funerals of case-patients, having contact with case-patients in one's family, and providing medical care to Ebola case-patients without using adequate personal protective measures.
2001-2002	Ebola-Zaire	Gabon	65	82%	Outbreak occurred over the border of Gabon and the Republic of the Congo.
2001 - 2002	Ebola-Zaire	The Republic	57	75%	Outbreak occurred over the border of Gabon and

(Oct. 1 - March 2)		of the Congo			the Republic of the Congo. This was the first time that Ebola haemorrhagic fever was reported in the Republic of Congo.
2002 - 2003 (Dec. 2 - April 3)	Ebola-Zaire	The Republic of the Congo	143	89%	Outbreak occurred in the districts of Mbomo and Kéllé in Cuvette Ouest Département.
2003 (Nov. - Dec.)	Ebola-Zaire	The Republic of the Congo	35	83%	Outbreak occurred in Mbomo and Mbandza villages located in Mbomo district, Cuvette Ouest Département.
2004	Sudan	Ebola-Sudan	17	41%	Outbreak occurred in Yambio county of southern Sudan. This outbreak was concurrent with an outbreak of measles in the same area, and several suspected EHF cases were later reclassified as measles cases.
2007	Democratic Republic of Congo	Ebola-Zaire	264	71%	Outbreak occurred in Kasai Occidental Province. The outbreak was declared over on November 20. Last confirmed case on October 4 and last death on October 10.
2007/Jan. 2008	Uganda	Ebola	149	25%	Outbreak occurred in Bundibugyo District in western Uganda. First reported occurrence of a new strain.

Some Evolving Characteristics of the Ebola Virus



The typical groups at risk of contacting the Ebola epidemic have lived in rural remote areas inhabited by populations in contact with wildlife; now the disease has spread to new groups living in densely populated urban centres, including individuals working for governments who are infected with the virus through human-to-human contact. Occurring in areas with fluid population movements over porous borders and spreading to densely populated urban cities, responding to the epidemic is becoming increasingly difficult. As a consequence, the epidemic has been labelled as "outpacing control efforts" by the WHO and "out of control" by the NGO Médecins Sans Frontières and the US Centre for Disease Control.

Picture: Global overview of the 2014 Ebola outbreak

PART THREE

The Science and Epidemiology of Ebola

Causes of the Ebola Virus in Humans

Genus Ebola virus is one of three members of the Filoviridae family (filo virus), along with Genus Marburg virus and Genus Cueva virus. Genus Ebola virus comprises five distinct species: Bundibugyo Ebola virus (BDBV); Zaire Ebola virus (E BOV); Reston Ebola virus (RESTV); Sudan CEbola virus (SUDV); and Taï Forest Ebola virus (TAFV). Ebola-Zaire, Ebola-Sudan and Ebola-Ivory Coast have been associated with large Ebola outbreaks in Africa, whereas RESTV and TAFV have not. Ebola-Reston has caused disease in non-human primates, but not in humans. The three Ebola species that have caused illness in humans, E BOV, BDBV, and SUDV, have exceptionally high mortality rates, killing between 25% and 90% of those contracting the disease. There is only one cause of Ebola, which is infection with the Ebola virus, which is transmitted by direct contact with an infected person or his or her body fluids, for example blood or secretions.

Infection and Transmission

In Africa, it is believed that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys and forest antelopes. Human-to-human transmission occurs via direct contact (through broken skin or mucous membranes) with the blood, secretions, organs or other bodily fluids of infected people, and with surfaces and materials (e.g. bedding, clothing) contaminated with these fluids.

Fruit bats are believed to be a major carrier of the Ebola virus but do not show symptoms

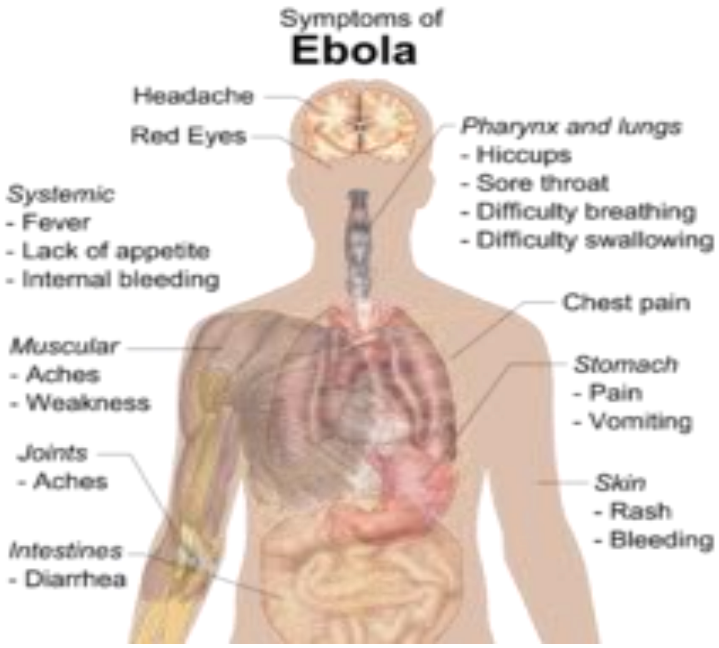
Health-care workers have frequently been infected while treating patients with suspected or confirmed Ebola virus disease. This has occurred when infection control precautions are not strictly practiced. Burial ceremonies in which mourners have direct contact with the body of the deceased person can also play a role in the transmission of Ebola. People remain infectious as long as their blood and body fluids, including semen and breast milk, contain the virus. Men who have recovered from the disease can still transmit the virus through their semen for up to 7 weeks after recovery from the illness.

Vendors offer bush meat and fish to clients. The virus can be spread to non-human primates and humans via infected meat.

Sign and Symptoms

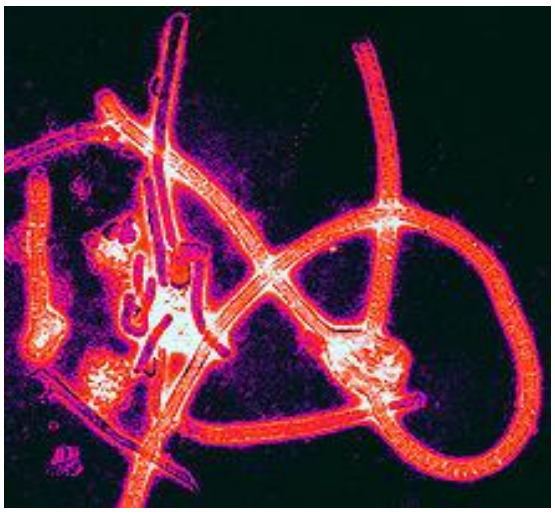
The Ebola virus disease is a highly-fatal acute viral illness often characterized by the sudden onset of fever, intense weakness, muscle pain, headache, nausea and sore throat. This is followed by vomiting, diarrhoea, impaired kidney and liver function, and in some cases, both internal and external bleeding. Laboratory findings frequently include low white blood cell and platelet counts and elevated liver enzymes. The incubation period - the time interval from infection with the virus to onset of symptoms - is put at 2 to 21 days. Humans are not infectious until they develop symptoms. People remain infectious as long as their blood and secretions contain the virus, a period that has been reported to be as long as 61 days after onset of illness.

Malaria, typhoid fever, shigellosis, cholera, leptospirosis, plague, rickettsiosis, relapsing fever, meningitis, hepatitis and other viral haemorrhagic fevers are alternative diagnoses to consider in patients presenting with symptoms indicative of Ebola.



Picture: Signs and Symptoms of Ebola

Diagnosis, Treatment and Vaccines



Definitive diagnosis of Ebola virus disease is made through laboratory testing. Because samples from patients are a source of infection risk for others, testing is conducted under maximum biological containment conditions.

Severely ill patients require intensive supportive care. Patients are frequently dehydrated and require oral rehydration with solutions containing electrolytes, or intravenous fluids. Supportive care in combination with oral or intravenous fluids to aid rehydration alongside treatment of specific symptoms improves chances of survival. There is as yet no proven treatment available for Ebola. However, a range of potential treatments including blood products, immune therapies and drug therapies are currently being evaluated. No licensed vaccine is available yet, but two potential vaccines are undergoing human safety testing.

Picture: Ebola virus particles using electron micrograph

Nigerian doctors receive training on how to use protective clothing by the WHO

Prevention measures and control

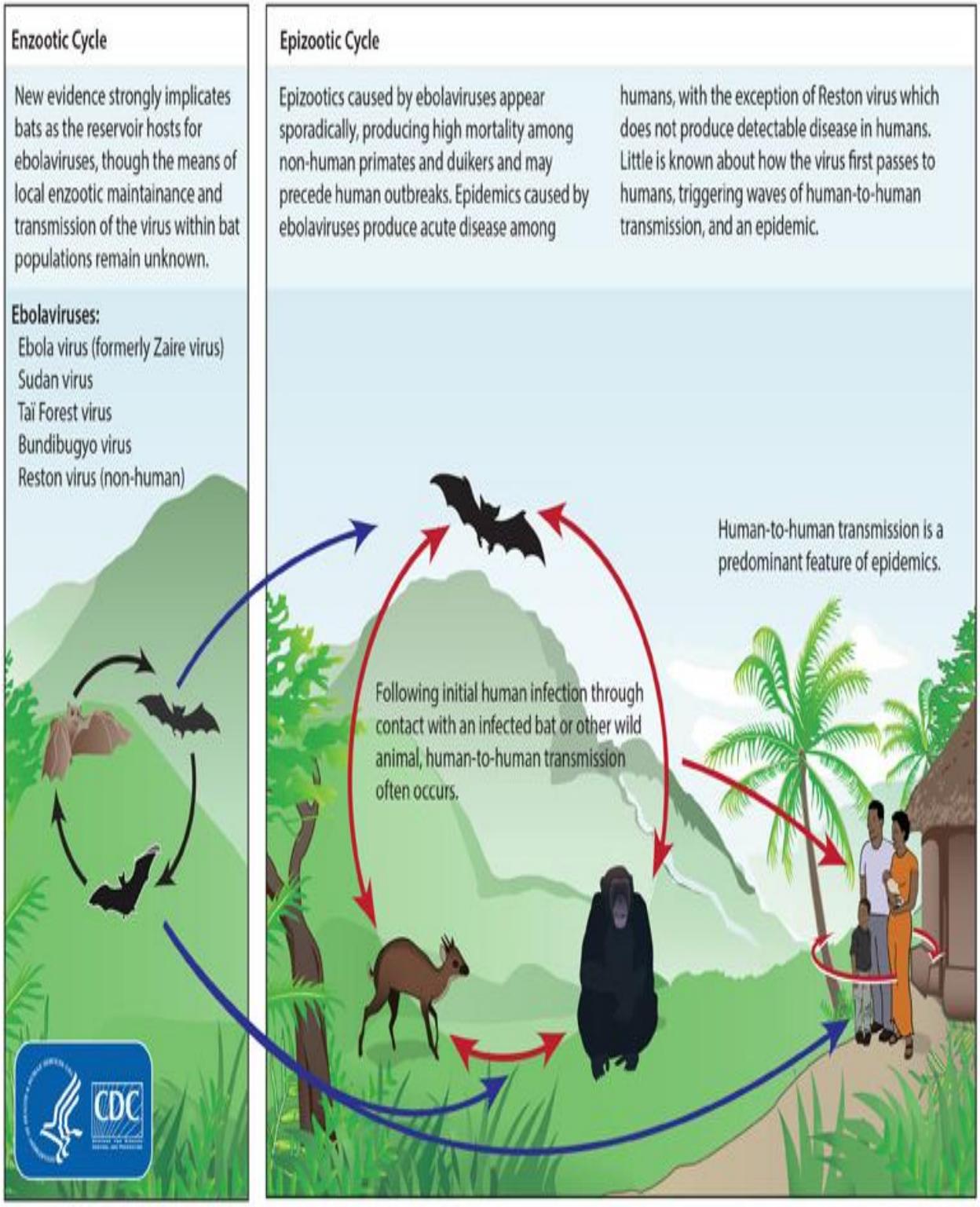
Good outbreak control relies on applying a package of interventions, namely: case management, surveillance and contact tracing, a good laboratory service, safe burials and social mobilisation. Community engagement is key to successfully controlling outbreaks. Raising awareness of both risk factors and the protective measures that individuals can take is an effective way of reducing transmissions. Risk-reduction messaging should focus on several factors:

- Reducing the risk of wildlife-to-human transmission from contact with infected fruit bats or monkeys/apes and the consumption of their raw meat. Animals should be handled with gloves and other appropriate protective clothing. Animal products (blood and meat) should be thoroughly cooked before consumption.
- Reducing the risk of human-to-human transmission from direct or close contact with people with Ebola symptoms, particularly with their bodily fluids. When taking care of ill patients at home, gloves and appropriate personal protective equipment should be worn. Regular hand washing is required after visiting patients in hospital, as well as in other care settings.
- Outbreak containment measures including prompt and safe burial of the dead, identifying those who may have been in contact with someone infected with Ebola, monitoring the health of contacts for 21 days, the importance of separating the healthy from the sick to prevent further spread of the disease, the importance of good hygiene and maintaining a clean environment.

Controlling Infection in Health-Care Settings

Health-care workers should always take standard precautions when caring for patients, regardless of their presumed diagnosis. These include basic hand hygiene, respiratory hygiene, use of personal protective equipment (to guard against splashes or other contact with infected materials), safe injection practices and safe burial practices. Health-care workers caring for patients with suspected or confirmed Ebola should apply extra infection control measures to prevent contact with the patient’s blood and body fluids and contaminated surfaces or materials

such as clothing and bedding. When in close contact (within 1 metre) of patients with EBV, health-care workers should wear face protection (a face shield or a medical mask and goggles), a clean, non-sterile long-sleeved gown, and gloves (sterile gloves for some procedures). Laboratory workers are also at risk. Samples taken from humans and animals in connection with Ebola should be handled with extreme care by trained staff and processed in suitably equipped laboratories.

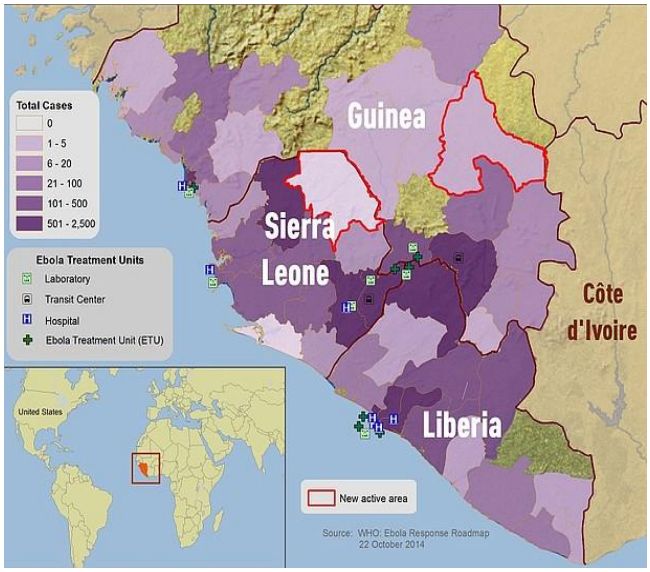


The Ebola Cycle

PART FOUR

The Emergence of Ebola in West Africa

Studies conducted on the outbreak of Ebola in the West African sub-region, revealed that the outbreak stemmed from the infection of a 2-year old boy from Guinea. The child died on the 6th December 2013, just a few days after falling ill. Some of the boy's family members were infected with Ebola, and then mourners at his funeral transmitted the virus to a nearby village. The boy's pregnant mother was infected, and in turn infected a midwife, who treated her when she miscarried. By the time the outbreak was confirmed as Ebola on the 22nd March 2014, 49 people were infected with the virus, and 29 people had died. Four health workers were among the dead. By the end of March 2014, the Ebola virus disease had spread to Liberia and Sierra Leone and then to other parts of the West African sub-region.



According to the World Health Organization (WHO), the recent outbreak of Ebola in West Africa is the largest, longest and most severe since the disease was first identified in humans in the Ebola River region in the Democratic Republic of Congo in 1976. It is also said to be the largest and most complex Ebola outbreak since Ebola was first discovered. There have been more cases and subsequent deaths in this outbreak than all others combined. It has also spread across borders. Having started in Guinea, the outbreak spread across land borders to Sierra Leone, Senegal and Liberia, and by air to Nigeria.

Challenges of Ebola Control in West Africa

Ranked lowest in global development, the affected countries in West Africa, particularly Sierra Leone, Liberia and Guinea, do not have the basic infrastructure to contain the Ebola virus disease. In these countries, core capacities for essential public health functions in disease control and prevention are lacking. Some of the main challenges in the affected countries include lack of laboratory capacity for rapid virology tests, health worker shortages and an insufficient number of trained personnel to conduct diagnosis, logistic management and contact-tracing.

All the three countries at the centre of the epidemic have a history of fragility, civil conflict, weak state-society relations and governance deficit, on-going insecurity and weak institutional capacity at national and regional levels. Their unpreparedness to tackle the spread of Ebola can also be attributed to the urbanization of a once rural disease.

Other challenges include traditional West African burial services which pose a major transmission risk since loved ones come in close contact with the deceased, including ritual touching and bathing of the body. Burials, which often bring family members and friends together, create ideal conditions for transmission of the Ebola virus, which can then spread throughout the community. As traditional caregivers, more often it is women who come into close contact with those affected, and thus are more likely to contract the virus. Common misperceptions about Ebola abound, with public education neglected, and governments curtailing accurate news reporting. Epidemic control requires trust and an informed public, so risk communication is a basic yet vital public health tool.

Ebola has had a negative socio-economic impact on the West African sub-region. Since the outbreak, economic activity has been increasingly disrupted and reduced in the affected countries. Measures such as the closure of schools, sealing of national borders and targeted travel restrictions, while crucial to preventing the spread of the virus to other regions, contributed to a disruption of normal social economic activities.

Accra Special Ministerial Meeting

On the 8th August 2014, the WHO Director-General declared the Ebola epidemic a Public Health Emergency of International Concern. In an effort to rapidly prevent the further spread of Ebola in the West African sub-region, the WHO convened a special ministerial meeting on possible impact response to the outbreak in Accra, Ghana on the 2nd and 3rd July 2014.

Dr. Margaret Chan Director-General, World Health Organization (WHO)

Ministers of Health and critical stakeholders from the health sectors of eleven African countries, including donors, survivors, representatives of airlines and mining companies, were brought together to obtain consensus from member states and partners on the optimal way to halt Ebola transmission in West Africa, and reduce the human, social and economic impact of current and future outbreaks.

The meeting focused on attaining a clear understanding of the current situation and response, including gaps and challenges; developing a comprehensive operational response plan for controlling the outbreak; implementing priority preparedness activities by countries considered to be at risk; and engaging with national authorities to optimally respond to the Ebola outbreak. Finally, a "Strategy for Accelerated Response to the Ebola Outbreak in West Africa" was developed to serve as a blueprint for a collective response to the epidemic. The goals of the strategy were to:

- Stop transmission of Ebola in the affected countries through scaling up effective, evidence-based outbreak control measures.
- Prevent the spread of Ebola to neighbouring at-risk countries through strengthening epidemic preparedness and response measures.

Based on the then-current epidemiological profile of Ebola outbreak, and the technical and operational knowledge available, the strategy was founded on three main pillars. They were:

- Immediate outbreak response interventions to include assessment and effective measures to interrupt the transmission of Ebola.

- To enhance coordination and collaboration, namely by building on local, regional and national coordination.

- To galvanise the whole of society to respond (including potential legislative action, involvement of the military, public order maintenance, etc.).

Further strategic priorities included:

- Proactive preparedness promotion in neighbouring countries – including through social mobilization and training
- Scaling–up of the mobilization of human and financial resources, including:
- Communication and public engagement (e.g., sharing responsibility for preparedness and response, communicating to the general public, sharing of data and information)
- Linking health and social-care responses

Response Plans of WHO and Affected Countries

Following the Accra Ministerial meeting, the WHO and the affected countries developed response plans based on policy objectives, roles and responsibilities. The Accra Ministerial Meeting also recognized a number of gaps and challenges in the Ebola outbreak response, such as coordination issues, financing, communications, cross-border collaboration, logistics, case management, infection, prevention and control, monitoring of contacts, case follow-up, community participation and research.

WHO Strategic Action Plan for Ebola Response

The Accra meeting called on the WHO to:

- Provide leadership in coordinating the international partners at global, regional, and country levels in support of national plans;
- Urgently establish a sub‑regional operations coordination centre located in Guinea to act as a coordinating platform to consolidate and harmonize the technical support to West African countries by all major partners and assist in resource mobilization;
- Mobilize and deploy the required WHO staff, experts, and consultants, in collaboration with the technical institutions and networks of the Global Outbreak Alert and Response Network (GOARN) to support the response to the on-going Ebola outbreak;
- Regularly disseminate updated information and risk assessments on the Ebola outbreak to stakeholders;
- Develop and disseminate information, education, and communication materials to the public and additional training materials for health professionals;
- Facilitate cross-border and inter‑country collaboration;

- Continue to provide the necessary support to strengthen core capacities that are most essential in responding to serious public health events; and
- Work closely with all involved parties and lead an international effort to identify and prioritize key gaps and promote the required research to address Ebola and other haemorrhagic fevers.

The WHO Strategic Action Plan is based on lessons learnt from WHO's collective experience responding to SARS, pandemic influenza A (H1N1), and Middle East Respiratory Syndrome Corona Virus (MERS-CoV); other activities set out are based on the ERF. It should be noted, however, that Professor Peter Piot, Director of the London School of Hygiene and Tropical Medicine, who was a leading figure in the discovery of Ebola, criticized the World Health Organisation for their delay in declaring a state of emergency in response to the outbreak in the West African sub-region. Professor Piot said it took "1,000 dead Africans" before the WHO took the Ebola outbreak seriously, wasting precious time before taking appropriate action. The Belgian microbiologist stated that the WHO knew about the outbreak three months after it began, but it took them a further two months to declare a state of emergency.

In an interview with Talk to Al Jazeera, Piot said: "It took three months for the WHO to find out if there was an Ebola outbreak … Guinea had a poor laboratory infrastructure, but I have much more of a problem with the fact that it took five months for WHO, for the international health regulations committee…to declare this a state of emergency. It took 1,000 dead Africans and two Americans who were repatriated to the US because they were infected. There's no excuse for that. It took too long; we wasted too much precious time."

Having waited too long to act, he believes the international community has then over-reacted in unhelpful ways. He added: "There is an epidemic of Ebola in West Africa and then there is a second epidemic, an epidemic of mass hysteria that we saw particularly in North America. It was really out of proportion with the issue."In October 2014, at a seminar at Oxford University, Professor Piot warned that the Ebola crisis had spiralled "out of control" and that the crisis was unlikely to come to a halt until a vaccine was available to immunise the population. "In theory Ebola is very easy to control, but it has got completely out of hand. This is no longer an epidemic, it is a humanitarian crisis.'" While he predicted the epidemic could be over by late 2015, he

Picture: Professor Peter Piot, Director, London School of Hygiene and Tropical Medicine

said it would take years to help reconstruct the countries devastated by the virus.The WHO recently claimed that around 6,000 people had died of the virus since the outbreak began. All but around 15 of those deaths have occurred in the three countries at the heart of the crisis in West Africa - Guinea, where the outbreak began in December 2013, Sierra Leone and Liberia.

According to Professor Piot, solutions need to address not just the lack of healthcare systems in place in these countries but the local population's cultural habits and belief systems. He highlights that in some parts of West Africa there is a tradition of touching the dead at funerals, while in some places belief in 'witchcraft' persists: "The concept of an infectious agent is not always there. People may think it is witchcraft or a case of 'someone wanted me to die'. You need people who speak the language, understand the culture, know what people think and feel."

The Index Case

Lagos State Hub

According to WHO, the Ebola virus disease entered Lagos, Nigeria on the 20th July 2014 through an infected Liberian diplomat, Patrick Sawyer. Patrick Sawyer was on his way to Calabar, Cross River State, for a conference of the Economic Community of West African States (ECOWAS). In the departure hall of the Liberian International Airport, Patrick Sawyer was visibly ill, lying on the floor of the departure lounge while awaiting the flight. He vomited during the flight, on arrival at the Murtala Muhammed International Airport, Lagos and again in the private car that drove him to a private hospital, the First Consultant Medical Centre, at Obalende, Lagos.

At the First Consultant Medical Centre, Patrick Sawyer told staff that he had malaria and denied having any contact with an Ebola patient. Since malaria is not transmitted from person to person, staff at the First Consultant Medical Centre did not take protective precautions. When doctors took his blood to test for Ebola, Patrick Sawyer insisted on being discharged. But a doctor, Stella Ameyo Adadevoh, who had spent 21 years at the hospital, realised that his symptoms suggested something much more serious than malaria. She and her colleagues had to physically stop Patrick Sawyer from leaving the hospital to attend the ECOWAS conference in the face of threats of legal actions by the patient. Dr. Adadevoh's quick action in identifying Patrick Sawyer as a serious threat is credited with helping to nip Nigeria's potential Ebola crisis in the bud.

The Chief Medical Director of the First Consultant Medical Centre, Lagos, Dr. Benjamin Ohiaeri, confirms that it was necessary to confine Sawyer to the hospital on public health grounds, in spite of allegations of human rights abuses made by Patrick Sawyer against the hospital. According to Ohiaeri, Sawyer, "became very agitated, indeed violent. He pulled off his intravenous fluid and let the blood splash everywhere." It took three days for Ebola to be diagnosed and Sawyer placed in isolation, during which time nine of the medical staff nursing him became infected, of whom four died later.

Viral DNA from Patrick Sawyer underwent preliminary laboratory investigation at the NCDC AI virology laboratory of the Lagos University Teaching Hospital and the World-Bank Funded African Centre of Excellence for Genomics of Infectious Diseases (ACEGID) Redeemers' University. Both blood and urine samples obtained

Picture: Former Governor of Lagos State, Babatunde Fashola.

from the patient tested positive for the Ebola Zaire MGB Virus. Samples were also sent to the WHO Collaborating Laboratory for Ebola in Dakar for further testing. Dr. Ohiaeri recalls how, alongside doctors Adadevoh and Stella Abaniwo, he had held a clinical meeting prior to the diagnosis in which Adadevoh insisted that Sawyer had Ebola. She was correct.

Patrick Sawyer died as a result on Ebola on the 24th July 2014. Mrs. Evelyn Ukoh, a nurse, died of Ebola on the 8th August 2014. The ECOWAS Protocol Officer, Jatto Abdulqudir, who had received Patrick Sawyer at the Lagos International Airport and escorted him to the hospital also died of Ebola on the 12th August 2014. Dr. Amos Abaniwo, one of those who had attended to Patrick Sawyer at the hospital, became the first doctor to die of Ebola on the 13th August 2014. On the 15th August 2014, a nurse, Justina Obi Ejelonu, who had participated in the management of Patrick Sawyer's treatment, also passed away.

The late Liberian diplomat, Patrick Sawyer

Dr. Stella Ameyo Adadevoh, credited with preventing Patrick Sawyer from leaving the hospital and halting the spread of Ebola in Nigeria, also died of Ebola on the 19th August 2014. As it was later learned, Patrick Sawyer's sister was a confirmed case of Ebola who had died from the disease. Patrick Sawyer visited his sister while in hospital and attended her traditional funeral and burial ceremony in Liberia. In the process, Patrick Sawyer was infected with the Ebola virus disease and imported it to Lagos, Nigeria.

Picture: The late Dr. Ameyo Stella Adadevoh,

Port Harcourt Hub

The Ebola virus disease entered Port Harcourt, Rivers State on the 1st August 2014 when a close contact of the index case flew there seeking care from a private physician. The medical doctor, Iyke Enemuo, who attended to the Ebola-positive patient, died of Ebola on 28th August 2014. Laboratory tests conducted had confirmed the city's first case one day earlier, on the 27th August 2014. An investigation undertaken by a team of epidemiologists from the Nigerian Centre for Disease Control (NCDC), the Nigeria Field Epidemiology and Laboratory Training Programme, and the Rivers State Ministry of Health, assisted by the WHO, revealed an alarming number of high-risk and very high-risk exposures.

Again, all the ingredients for a spiralling outbreak were in place. Dr Rui Vaz, the head of the WHO's country office in Nigeria, visited Rivers State to assess the situation. He informed the State Governor, Rotimi Amaechei, of the potentially explosive situation and made his advice crystal clear: "All required resources must be immediately mobilized to stop this outbreak." Fortunately an epidemic in Rivers State did not occur, largely because the State Governor heeded the World Health Organization's advice and ensured that all relevant resources needed to contain Ebola were made available. However, on 4th September 2014, an unnamed female patient who was admitted to the same Port Harcourt hospital with Dr. Iyke Enemuo, also passed away.

PART FIVE

The Containment of Ebola in Nigeria

Before the Nigerian Outbreak – March to June, 2014:

On the 24th March 2014, at the first notification of Ebola Virus Disease (EVD) in Guinea, the Nigerian Federal Ministry of Health, through the National Centre for Disease Control and Prevention (NCDC), took necessary steps to prevent the spread into Nigeria by putting in place the necessary machinery to contain the disease. All 36 States and the Federal Capital Territory (FCT) were alerted to the outbreak in Guinea and advised to maintain vigilance, strengthen disease surveillance mechanisms for haemorrhagic fevers and other related symptoms, and promptly report suspected cases.

Thereafter, the following actions were taken:

- Training of Health care personnel on EVD surveillance and medical procedures were carried out on a zonal basis across the country
- Port Health Officers and Disease Surveillance Units across the country were placed on red alert
- A detailed Action Plan produced jointly with multi-sectoral collaborators was developed
- Public awareness measures were carried out including the airing of jingles in English and three (3) Nigerian languages, distributions of posters and fliers, and engagement in media talk programmes on electronic media outlets on the subject
- All fifty-nine (59) Federal Tertiary Hospitals were alerted and directed to prepare isolation wards in case of an outbreak in Nigeria
- Commenced strengthening of the existing NCDC reference Virology Laboratories at Asokoro, Abuja, UCH Ibadan, LUTH, Lagos and Institute of Lassa Fever, Specialist Hospital, Irrua, and Central Public Health Laboratory, Lagos
- Strengthening of Emergency Operational Centres at Asokoro, Abuja and Lagos
- National pandemic preparedness and response, and National contingency plans were activated and used, under which Nigeria had command structure
- Presidential waiver was granted to the Federal Ministry of Health to recruit relevant health personnel to cover the human resource gap in public health, especially in Port Health Services, and NCDC
- Preparation of an intervention work plan with detailed budget

Picture: Mr Linus Awute, Former Permanent Secretary, Federal Ministry of Health.

Critical Success Factors (in no order):

A number of success factors contributed to the containment of the Ebola Virus Disease in Nigeria. Success factors are those inputs to the management system that lead directly or indirectly to the success of a project. If these factors are not explicitly identified and recorded, they will not become part of the formal management reporting process, nor be included in historical project data.

Strong Leadership

The Federal and State Governments provided strong and decisive leadership at both the national and sub-national level when it mattered most. The President at the time, President Goodluck Ebele Jonathan, the former Governors of Lagos and Rivers State, Babatunde Fashola and Amachei, and the then Minister of Health, Prof. Onyebuchi Chukwu, demonstrated excellent leadership at the critical moment, implementing the relevant strategic intervention activities vital to containing the Ebola epidemic.

Former President Goodluck Ebele Jonathan, who was on an official assignment in New York, USA, when the outbreak in Nigeria occurred, cut short his trip and returned home to deal with the crisis. On his return, the President swiftly co-ordinated the national response by holding emergency meetings with the State Governors and strategizing with them on how best to contain the outbreak. He also personally led advocacy efforts, including demonstrating hand hygiene. Teams were despatched to Enugu and Abia States after suspected Ebola cases were reported. This immediate intervention and support was critical.

Not only did Mr. President provide national leadership by declaring Ebola a National Emergency, he also established the Presidential Steering Committee on EVD co-chaired by the Ministers of Health and Information, and mobilized all State Governors to rise to the challenge and fight the disease. This resulted in a massive increase in media attention which was accompanied by significant financial support for the control and containment of EVD in Nigeria.

Similarly, the Lagos State Governor, Babatunde Fashola, who was on a pilgrimage to Mecca, also cut short his trip and returned home to handle the crisis in Lagos State.

The magnanimity of the Federal Government was also extended to the African Union through financial support to the regional body and the dispatch of over 200 Nigerian Medical and Health workers to serve as volunteers in Sierra Leone and Liberia. This mission coordinated by the Nigeria Centre for Disease Control (NCDC) has yielded positive results in these countries via the national public health institute.

The harmonious cooperation between the Federal Government and the opposition-led government in Lagos and River States, contrasted sharply with the situation in the United States, where bickering between the Republican and Democrat lawmakers over Ebola response issues eroded public trust in the USA leadership's management of the domestic Ebola outbreak.

Former Governor of Lagos State, Babatunde Fashola, using Ebola hand sanitizer at the State House, with former President Goodluck Jonathan watching, before the commencement of a meeting on Ebola with State Governors at the State House, 13th August, 2014.

Rapid Action on the Part of Federal and State Governments

Following the confirmation of the index case, rapid action was taken by both the Federal and Lagos State Governments. First, the President immediately declared the event a public health emergency and mobilized human, financial and material resources to contain the outbreak. The declaration of Ebola as a health emergency, gave health agencies and personnel legal powers to track calls and trace movement, in addition to tracing persons who needed to be placed under quarantine having made primary and secondary contacts with Ebola patients. The government's response plan, included identifying and monitoring 74 close contacts of the (first infected) patient, prompt testing of all suspected cases, stepping-up surveillance activities at the country's many entry points, and instituting nationwide awareness campaigns. A nurse who fled to Enugu State was traced and brought to Lagos State under the emergency powers, thereby curtailing the spread of Ebola to other parts of the country.

Secondly, the Federal Government moved swiftly to approve a special intervention plan. The plan was made possible by the release of N1.9Bn (USD $11.5 million) by the Federal Government to fund the response and support implementation efforts. The Federal Government approved a grant of N200m to each state to combat Ebola. The funds were intended to create additional isolation centres, case management, contact tracing, deployment of additional personnel, screening at borders and procurement of required items and facilities.

Establishment of a centralized Ebola Emergency Operational Centre

An Emergency Operational Centre (EOC) was established and coordinated by the Federal Ministry of Health and Lagos State Ministry of Health on the 20th July 2014 as an operational organ of the Nigeria Centre for Disease Control (NCDC) and proved an essential resource. The EOC was kept functional by a 7-man inter-agency team drawn from the Nigeria Institute of Research (NIMR), National Primary Health Care Development Agency (NPHCDA), US CDC, WHO, UNICEF, Dangote Foundation, and Bill and Melinda Gates Foundation. The team was supported by the NCDC, Lagos State Government, Federal Tertiary Hospitals, including LUTH and Federal Medical Centre, Ebute Metta, Red Cross of Nigeria, and CDC, Médecins Sans Frontières (MSF).

Many of the Nigerian public health personnel in the EOC were health experts who had garnered valuable experience working on polio eradication efforts which they brought to bear on the Ebola epidemic. The EOC participated in joint strategizing, agreed on a unified plan and implemented a unified containment strategy plan in a way that accentuated efficiency, personal integrity and accountability using a war-room approach. The EOC also had a first class virology laboratory affiliated to the Lagos University Teaching Hospital that assisted it to turn around testing and diagnoses within 24 hours. Nigeria reassigned 40 doctors trained in epidemiology from its polio response team to the centre.

(From left to right) Abdulsalami Nasidi, Director of the Nigeria Centre for Disease Control (NCDC), former Lagos State health commissioner Jide Idris and Lagos Special Advisor on Health Yewande Adesina, speak about Ebola during a news conference in Lagos, July 2014

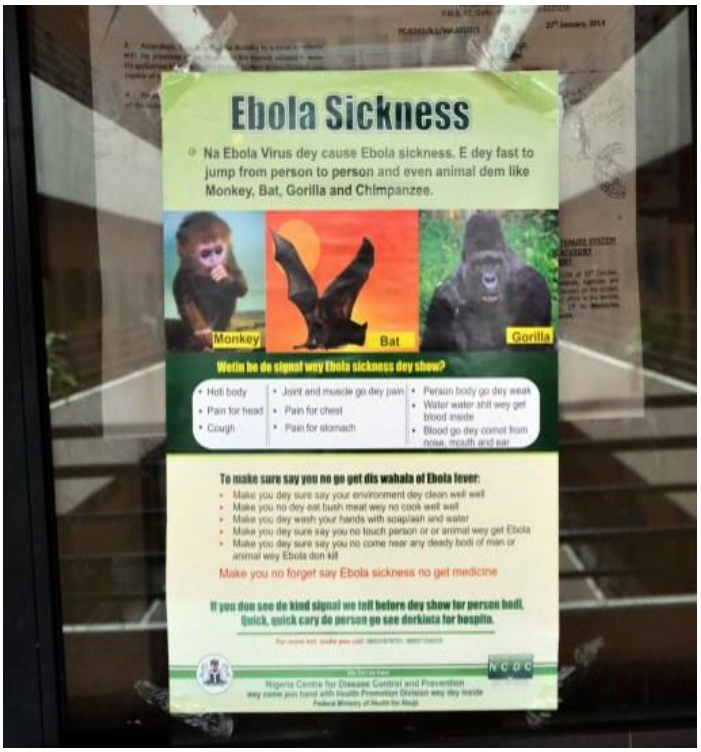
The Ebola EOC's architecture consisted of six important pillars. Of these, four proved crucial because they were directly involved in the technical aspects of the control of Ebola. They were:

Epidemiology/Surveillance Unit: This unit analyses and maps chains of transmission with the objective of ending them. The unit also conducts a tracing exercise of everyone who comes in contact with a suspected/confirmed case of the disease, and list all contacts as indicated. The contact tracers, largely drawn from residents of the Nigeria Field Epidemiology and Laboratory training programme, conduct daily assessments of each contact's symptoms including temperature monitoring. The latter group also coordinates the management of rumours and alerts through proper investigation, etc.

Case Management: This team is responsible for the strict implementation of standard operating procedures for assessing, treating and caring for suspected and confirmed cases of Ebola. They ensure management of other illnesses that are presented during the time of Ebola clinical management, as well as conducting decontamination of homes and other facilities, ensuring the collection of clinical specimens from suspected and confirmed patients and conducting counselling of all patients suspected or confirmed as carrying Ebola.

Point of Entry: This team ensures screening of all arrivals/departures in and out of the country by land, air and sea to prevent importation/exportation of Ebola. Screening includes temperature monitoring and analysis of the entrant's contact with cases of Ebola. They also ensure that capacity is available at all border points to properly manage passengers with symptoms of Ebola, including the ability to isolate them.

Communication and Social Mobilisation Coordination



The communication approach targets risky behaviours that can lead to contracting Ebola. The team conducts house-to-house interpersonal communication; it also enables the implementation of community mobilisation strategies that use the leadership and influence of religious, traditional, informal and professional bodies to prevent the spread of Ebola. Furthermore, the teams develops and disseminates information, education and communication (IEC) materials that build awareness and knowledge around Ebola. The team developed the social media platforms e.g. Facebook, Twitter and Ebola Alert website that were an integral part of the outbreak response.

Social Media Strategy

Social media in Nigeria played a significant role in the anti-Ebola campaign. The

combined use of Facebook and Twitter and an Android app were instrumental in Nigeria's fight to contain Ebola. The phone app helped to reduce reporting times of infections by 75 per cent. Test results were scanned to tablets and uploaded to emergency databases and field teams received text message alerts on their phones informing them of the results.

Mobile phone technology accelerated access to health information as millions of Nigerians besieged social media sites such as Facebook, Twitter, You Tube, and Google+ via their mobile phones to learn more about the deadly disease. In addition, many Nigerians used mobile messaging apps such as WhatsApp, BlackBerry Messenger, WeChat, PalmChat, as well as Bulk SMS, to spread information about how to avoid infection.

A team of volunteers consisting of doctors, donor partners (i.e., Federal Ministry of Health, Lagos State, WHO, UNICEF, CDC, and Médecins Sans Frontières) and

other health professionals created the EbolaAlert twitter feed, and used it to actively engage Nigerians during the period. There were also various online chat sessions such as StopEbola and EbolaChat that were initiated to keep Twitter users abreast of developments in Nigeria. Nigerians also used hashtags such as #Ebola, #EbolaFacts and #EradicateEbola to figure out what Ebola was and how they could protect themselves against the disease. Others include:

Toll free hotlines: 0800EBOLAHELP or 0800326524357

Website: www.ebolaalert.org

FaceBook: fb.com/ebolaalert

Twitter Account: @ebolaalert, @ebolainfoFmohNg

Availability of Human Capacity

The availability of adequate human capacity at all levels of the health profession was critical. Adequate health personnel and professionals with the requisite skills and capacity were located within the Nigeria Centre for Disease Control, Port Health Services, State Ministries of Health of Lagos, Enugu and Rivers, the WHO, UNICEF, the US Centres for Disease Control and Prevention (CDC), MSF and other partners. By the end of the Ebola epidemic, it was evident that Nigerian health professionals have the requisite capacity and capabilities to perform effectively when given the necessary resources and authority.

Re-Assignment of Polio Technologies and Infrastructures for Ebola control

Nigeria is well known for implementing one of the world's most innovative polio eradication campaigns using the very latest satellite-based cutting-edge GPS technologies to ensure that no child misses out on a polio vaccination. When the first Ebola case in Nigeria was confirmed in July 2014, health officials immediately repurposed polio technologies and infrastructures to conduct Ebola case-finding and contact-tracing cases, and to track potentials chains of transmission of the Ebola virus disease in the country. The use of these cutting-edge technologies, developed with guidance from the WHO polio programme, put GPS systems to work as support for real-time contact tracing and daily mapping of links between identified chains of transmission.

Picture: Former Minister of Health, Prof. Onyebuchi Chukwu, who led the team of health professionals and personnel to contain Ebola.

Taking a Community Approach

Nigeria took a "whole community" approach to the problem, engaging community leaders and military officials to discuss the response to the virus. Essentially, the approach was based on raising the awareness of both risk factors and the protective measures that individuals should take to effectively reduce transmissions. The messages were aimed at:

- Reducing the risk of wildlife-to-human transmission from contact with infected fruit bats or monkeys/apes and the consumption of their raw meat
- Reducing the risk of human-to-human transmission from direct or close contact with people with Ebola symptoms, particularly with their bodily fluids
- The importance of good hygiene and maintaining a clean environment

De-stigmatization

Efforts were also made to encourage people to be forthcoming about their contacts and the status of their health. A campaign was undertaken to make people feel like they were doing something good for their country by being honest and reporting to health officials. As one person who helped with the Ebola response in Nigeria put it, Nigerian officials sent a message to citizens to "really make them look like heroes". The Federal Government rolled out a massive public information campaign via SMS, radio, television, billboards, posters and social media platforms in order to enlighten Nigerians.

High Vigilance

The Nigerian Government and health officials, including staff in the WHO country office, are well aware that the country will remain vulnerable to another imported case as long as intense transmission continues in other parts of West Africa. The surveillance system has remained on guard, at a level of high alert. Body temperature screening continues at Nigerian entry and exit points.

Prompt Release of Funds

Success was achievable because the Federal Government promptly released the funds necessary to allow for rapid intervention in investigating, accurately diagnosing and managing all infected persons, as well as preventing further transmissions. The Federal Government approved a grant of N200 million to each State, totalling N1.9 billion, in order to combat the Ebola virus disease. The funds were earmarked for creating additional isolation centres, case management, contact

tracing, deployment of additional personnel, screening at borders and procurement of required items and facilities.

Banning transportation of corpses

While burial ceremonies bring family members and friends together, they also create the necessary conditions for transmitting the Ebola virus disease, particularly since some funeral traditions involve close contact with the departed. As part of the measures to combat the spread of Ebola during burials, the Federal Government banned the transportation of corpses during the peak period of the Ebola crisis in Nigeria, both internationally and interstate. Bereaved families who planned to bury their beloved ones during the crisis period were advised to get clearance from the Federal Ministry of Health to do so. This assisted in curbing interstate movement of corpses, and also significantly reduced burial ceremonies during the crisis period.

Striking the Balance between Individual Rights and Public Health matters

In an effort to combat Ebola, there were times when health authorities had to make difficult choices and strike a balance between fundamental individual rights and the public health in order to implement quarantine measures. That was the case with Patrick Sawyer, the Ebola index patient. It was necessary to confine Patrick Sawyer to the hospital on public health grounds in spite of allegations of human rights abuses made by Sawyer against the hospital. Had this decision not been taken, it is likely that Sawyer would have gone on to spread the disease much further among the Nigerian populace with unthinkable results. As the number of confirmed cases rose, health authorities came under greater pressure to balance public health and human rights issues. Ultimately, the health authorities made the right decision by safeguarding public health for the greater good of Nigerians.

Delaying the Re-Opening of Schools

Since Ebola can quickly spread through large gatherings, and in order to avoid a serious Ebola crisis in public and private schools, the Federal Government directed that all public and private primary and secondary schools should remain closed till the 13th October 2014. This was to ensure that adequate measures were put in place by the school authorities before allowing students' to report back to school for the new academic year. In addition, the Federal Government directed school authorities to organise training programmes for at least two members of staff in each public and private school. The training was to be delivered by appropriate

health personnel and include information on how to handle any suspected case of Ebola in the schools.

Additionally, all State Ministries of Education established a Working and Monitoring Team and appointed a designated Desk Officer on Ebola. The Desk Officers reported on a daily basis to the State Commissioners of Education. All tertiary institutions were advised to suspend, until further notice, the exchange of staff and student programmes, visits, and major international seminars and workshops. All on-going summer classes conducted by private schools were also suspended.

A secondary school principal checks a student's temperature for Ebola symptoms during an assembly in Abuja, October 2014.

Role of Private Sector Players

Partnership with the private sector was yet another lesson that brought in substantial resources to help scale up control measures that eventually stopped the EVD in its tracks. Nigeria's effort received considerable support from private sector organizations such as the Dangote Foundation. On the 14th August 2014, Alhaji Aliko Dangote contributed the sum of N152,956,250 from the Dongote Foundation for the establishment of the National Ebola Emergency Operation Centre (EOC) at Yaba, Lagos.

Picture: Alhaji Aliko Dangote

Another example of the role played by the private sector is that of Green Pharmacy (an NGO) in Abuja, which provided a tap in a public place for people to wash their hands as part of the hand-washing and sanitation campaign for improvement in personal hygiene

Training of Nigeria Health Workers

Médecins Sans Frontières (MSF) and World Health Organization officials conducted the essential work of offering training programmes to Nigerian Health Workers on Ebola containment in order to equip workers with the requisite capacity and knowledge to combat the Ebola epidemic.

Provision of Protective Equipment (PPE) and Insurance to Health workers

Successfully preventing Ebola transmission necessitates taking measures to avoid contact with blood and body fluids of infected individuals and with objects contaminated by those fluids. For health personnel working to control the Ebola epidemic and treat patients, the WHO recommends the wearing of personal protective equipment for most activities. In recognition of this requirement, the Federal Government provided adequate insurance cover, Personal Protective Equipment (PPE) and resources to health workers to secure their safety. Personal protective equipment provided by the Federal Government included:

- Impermeable gloves
- Impermeable footwear
- Eye and face protection
- Protective clothing

- Fluid resistant mask or respirator

No Travel Restrictions

Tracking the spread of Ebola is exceptionally important in terms of preventing a disastrous outbreak. This is achieved by determining where infected people have travelled and those they have come in contact with. Accomplishing this becomes much more difficult when a country closes its borders or issues travel restrictions. People continue to cross borders in the face of such bans, and it is much easier to track someone if he or she travels through airports. There is widespread evidence that travel bans don't work, as they have habitually failed to prevent the spread of disease in the past. In light of this evidence, the Federal Government chose not to close Nigeria's borders to Liberia, Guinea and Sierra Leone, or to citizens from the West African sub-region.

Establishment of the Treatment and Research Group on Ebola

The efforts to contain Ebola have not been restricted to the field. Across the world, concerted efforts on the part of governments and international agencies have been stepped up towards finding a vaccine or cure for the Ebola Virus Disease. In Nigeria, the Federal Government established the Treatment and Research Group on Ebola virus in August 2014 and tasked it with the responsibility of collating and analysing research findings on the treatment of Ebola in Nigeria. Since it was commissioned, Nigerian scientists and researchers have submitted over 15 claims. Prominent among such research findings is that of Professor Maurice Iwu, a pharmacologist and a leading member of the group, whose research centres on bitter kola as a possible cure for the Ebola virus disease.

Recently, both the Federal Government and the US have shown interest in Professor Maurice Iwu's research. This prompted the professor's parent company, Bio-Resources Institute of Nigeria (BION) to sign a cooperative research agreement with the US National Institute of Allergy and Infectious Diseases (NIAD) on the 5th September 2014 for the evaluation of components submitted by BION for activity against Ebola. The agreement covered pre-clinical and non-clinical tests, and has already been registered

with the National Agency for Food and Drug Administration and Control (NAFDAC).

Apart from the BION research, the Treatment and Research Group on Ebola has also begun the evaluation of local and international experimental drugs for treatment of Ebola. The experimental drugs under consideration include ZMapp from tobacco plants, Metallic Nano Particles, Nano Silver, Favipiravir, and Lamivudine (Epivir), Brincidofovir, Chloroquine, Crofelemer and dietary supplements.

In addition, the Nigerian National Health Research Ethics Committee waived the regular administrative requirements that limit the international shipment of any biological samples out of Nigeria. The Committee also supported the use of non-validated treatments without prior review and approval by a health research ethics committee, all in an effort to find a cure for Ebola.

Suspension of Airline Operations

The Nigerian Civil Aviation Authority (NCAA) suspended ASKY Airlines' operations to Nigeria; ASKY is the airline that flew the late Patrick Sawyer into the country. The agency took the action in order to further protect Nigerians from the Ebola virus disease. The suspension was lifted when the airline proved that it was capable of adequately screening passengers at all their points of operation, including profiling of each passenger.

ASKY Airline, an Ethiopian Airlines' feeder airline with a hub in Lome, Togo, is an important player in the West, East and Central Africa region, operating 80 flights into Lagos and Abuja weekly. NCCA took this action because the airline representatives could not offer any conclusive or substantial evidence that demonstrated a capacity to prevent a recurrence of importing Ebola carriers to Nigeria. The airline's inability to give the needed assurance was contrary to the provision of Article 14 of the Chicago Convention, 1944, which states that, "Each contracting State agrees to take effective measures to prevent the spread by means of air navigation, of cholera, typhus (epidemic), smallpox, yellow fever, plague and such other communicable diseases as the contracting State shall from time to time decide to designate…".

Similarly, during the Ebola crisis period Arik Air also suspended its flights to Monrovia and Freetown. The Nigeria Civil Aviation Authority advised the airline to maintain the cessation of flights to the two countries until it was cleared by NCAA to resume.

Increasing Laboratory Capacity

Considering the central and important role laboratories had to play in the control and management of EVD in Nigeria, virology laboratories for blood sample diagnosis of EVD were identified and quickly strengthened at the following locations:

- NCDC laboratory of the College of Medicine, Lagos University Teaching Hospital, Idi-Araba, Lagos - the laboratory is a first class virology centre which turned around testing and diagnoses in record time
- Redeemer's University Reference Laboratory, Ogun State
- Virology Department, University College Hospital, Oyo State
- National Influenza Reference Laboratory, Asokoro General Hospital, Abuja

Requisitioning of Drugs and Other Consumables

In preparation for an eventual outbreak, considerable quantity of drugs and medical consumables were procured.

Lessons Learned for the Future

During a visit to Nigeria in August 2014, the Special Envoy of the UN Secretary General on Ebola, David Navarro, hailed Nigeria's successful containment of the Ebola outbreak. He said, "The Secretary-General asked me to come here…not because you have an Ebola problem, but because you have tackled it in an exemplary fashion". Later, during an official meeting, Navarro went on to tell President Goodluck Ebele Jonathan, "Your personal leadership on the matter has been key. There may still be some work to be done before the virus is completely cleared out from here, but other countries can learn from your fine example."

Indeed, Nigeria record in tackling the disease was exemplary: there were only eight deaths (including the index case, Liberian Patrick Sawyer) out of the 20 confirmed cases in Lagos and Port Harcourt. Though Nigeria's health authorities had no access to the experimental drug Zmapp, which was successfully used to treat Americans who became infected in the affected West African nations, doctors were able to creatively manage infected patients to achieve a lower than usual rate of fatalities.

The success recorded by Nigeria is even more remarkable when it is put in context: at the epicentre of the disease - Guinea, Liberia and Sierra Leone - 3,300 plus deaths have been recorded out of over 7,000 cases. Many desperate people in the West African sub-region believe that Nigeria must have some especially effective – possibly even "magical" – treatments on offer, so that WHO experts perceive a real risk that patients and their families living outside Nigeria could attempt to enter the country in their quest for first-rate, live-saving care.

While it is to be hoped that future outbreaks will be avoided, and the development of vaccines and life-saving treatment for Ebola are quick to emerge, the lessons learned from Nigeria's successful stemming of its 2014 Ebola outbreak serve as a warning and an example. The key lessons are summarised here in no particular order:

1. Strong Leadership and Coordination

The willingness by top echelon of government to demonstrate strong, effective and decisive leadership at the crisis moment is vital. In Nigeria, the leadership at the top echelons of government built public trust and upheld it throughout the Ebola epidemic period. The leadership coordinated a joint response at the national and

sub-national levels, and ensured that all relevant stakeholders supported the strategy containment plan.

2. Establishment of Strategic Command Centre and Project Team

The establishment of a Strategic Command Centre (SCC) with a Project Team (in the case of Nigeria, the Ebola Emergency Operational Centre) to serve as an engine room for the national response is key. In addition to providing the coordinating mechanism for prevention, surveillance, patient care, tracking, data analysis, and containment of the spread of the virus, a Strategic Command Centre also facilitates the coordination of partners, serving as a platform to connect the medical community, both across the country and internationally. The SCC consisted of health professionals and personnel with the requisite capacity and capabilities that formulated and led implementation efforts from the outset and for the whole of the Ebola response period. The centre had a strong and focused team leader who engendered trust and cohesion in the team. The team met regularly to jointly strategize, agree on a single containment work plan, and implemented it in a way that achieved the overall objectives of the Ebola response plan. More importantly, the team was given protected authority and operational space to implement the strategies required to contain Ebola. All members of the team were committed to the success of the project and the overall mission of government.

3. Utilising Existing Skills, Systems and Expertise

It is important to take advantage of existing skills, systems and expertise. For some time now, Nigeria has been implementing one of the world's most innovative polio eradication campaigns, using the very latest satellite-based GPS technologies to ensure that no child misses out on polio vaccination. During the Ebola outbreak, the use of cutting-edge technologies, developed with guidance from the WHO polio programme, put GPS systems to work as support for real-time contact tracing and daily-mapping of links between identified chains of transmission.

4. Development of a National Epidemic Preparedness Plan

No country should be without a national preparedness strategy plan. In the event of an outbreak, the plan will engage all the critical stakeholders to activate incident managements system, strengthen national preparedness, ensure a prompt response and ultimately contain the disease. In Nigeria, the Ebola Virus Disease intervention work plan was prepared after the diagnosis of the index case. However, after the successful control and containment of the first ever outbreak of EVD in Nigeria, Nigeria has taken steps to strengthen the national EVD preparedness plan. The plan identifies and describes systems, activities, resources and timelines at the national, State and LGA levels for pre-outbreak, alert, response and post-outbreak phases required to mitigate and contain any re-introduction of EVD in Nigeria using the proven existing incident management system. The preparedness plan has leveraged the lessons learned from the response to the Lagos

and Port Harcourt outbreaks, as well as the gap analysis conducted to clearly itemize objectives, main activities, implementation strategies and budget covering the key operational areas. The overall goal of this plan is to ensure that capacity is in place for rapid detection, investigation, response and effective containment of an Ebola outbreak and to minimize the associated health consequences and the negative socio-economic impact.

5. Existence of Strong Health Care Strategies

In Nigeria's case, the existence of a strong primary health care strategy which was swiftly and effectively deployed to contain the Ebola epidemic proved crucial. Strong leadership from the top integrated with routine governance of society and the active participation of the people themselves are core components.

6. Existence of Good Virology Medical Facility and Capacity

The laboratory should be staffed, resourced and equipped to quickly and reliably diagnose health problems, including Ebola. This facility will facilitate containment measures beginning with the shortest possible delay. Nigeria's first-rate virology laboratory affiliated with the Lagos University Teaching Hospital was a key asset. That laboratory was staffed and equipped to quickly and reliably diagnose a case of EVD, which ensured that containment measures could begin swiftly. In addition, high-quality contact tracing by experienced epidemiologists expedited the early detection of cases and their rapid movement to an isolation ward, thereby greatly diminishing opportunities for further transmission.

7. Effective Communication and Information Management

It is impossible to stress too highly the importance of effective communication. Misconceptions surround Ebola which can lead to panic in the event of an outbreak. Therefore an effective communication strategy should be used to rally communities to support containment measures. House-to-house information campaigns and local radio broadcasts in all local languages/dialects are essential. The public needs to know the level of risk, what effective personal preventive measures they can take, and the actions being taken by the authorities to control the outbreak. Because Ebola evokes fear in individuals and communities, public trust has to be won. In order to win public trust in Nigeria, epidemic status updates were issued via daily press statements daily in five Nigerian languages (English, Pidgin, Igbo, Hausa and Yoruba), and the leadership actively engaged with all critical stakeholders on a continuous basis. In Nigeria, the full range of media opportunities were exploited – from social media to television – and well-known and respected individuals were used to front the anti-Ebola campaign. The Honourable Ministers of Health and Information, among others, held press briefings on the status of the Ebola outbreak at the Federal Ministry of Health Conference Hall with the full participation of both local and foreign media. Press briefings on EVD were also held in strategic government institutions across the

country. The Honourable Minister of Health also briefed all Foreign Missions about the efforts of the Federal Government to contain EVD in Nigeria. The establishment of an Ebola virus information desk at the Federal Ministry of Health provided daily information and responded to questions from the general public.

In Nigeria's case, the response to anti-Ebola sensitisation was overwhelming: hand sanitizers became a must-have item for individuals and corporate organisations; banks provided their workers with gloves; churches and mosques joined the crusade; and thermal thermometers for measuring body temperature became a critical piece of equipment in both offices and public places such as airports, shopping malls and at border crossings.

8. Role of Social Media

Social media can play a robust preventive role in the anti-Ebola campaign allowing essential information to be shared and spread at great speed. The establishing of an Android app, Facebook page, Twitter feed and other social media sites/platforms to keep the public updated and informed about the outbreak must be undertaken as early as possible. In Nigeria, social media platforms using bulk SMS played an important role.

Early messaging using local social media outlets made a significant difference to the public perception of risk. The earlier patients with symptoms of Ebola report to a health facility, the greater their chances of surviving the disease become. By widely disseminating this fact, the public was not only reassured but outbreak containment opportunities were improved.

9. Surveillance Systems

In Nigeria, the government and health officials recognize that the country will remain vulnerable to another imported case of Ebola as long as intense transmission continues in other parts of West Africa. The surveillance systems remain on guard and at a level of high alert. Based on the experience gained from the response in Lagos and Port Harcourt, the national preparedness plan and response plan have also been revised and refined.

10. Quarantine and Diagnosis

The lesson of effective contact tracing is essential. Once the first case of the virus has been identified, health officials must immediately isolate the patient and confirm the diagnosis. In Nigeria, health officials quickly issued notifications and begin tracking down each and every person who may have had contact with the Index Patient. Nigerian official's response plan included identifying and monitoring close contacts of the index case and prompt testing of all suspected cases. Every close contact was required to provide twice-daily updates to health officials on their well-being.

11. Open Borders

There is concrete evidence that travel bans don't work, and they have failed to prevent the spread of Ebola in the past. Furthermore, closing borders tends to provoke panic and make people feel helpless. Individuals cross borders regardless of whether they are permitted to do so, and it is much easier to track people if they travel through official exit points, such as airports or border crossings. Nigeria did not close its borders in spite of the repeated calls for the Federal Government to do so, and this helped Nigeria to track the spread of Ebola, allowing officials to determine which individuals had travelled and who they had come into contact with. To maintain the confidence of citizens and travellers alike, screening of all arriving and departing travellers by air, land and by sea is recommended.

12. Clear Management Structure

It is imperative to establish a clear management structure. Drawing on its experience of responding to polio outbreaks, the Nigerian government established an incident management structure that included state officials, national officials, and international partners such as the CDC and the WHO. Early coordination with a central point of response leadership was critical. As part of the response plan, a large number of health personnel were grouped in teams and tasked with patient care, decontamination, communications, tracing contacts, and other related activities. The team leaders reviewed action items in the evening, and the structure assured efficient time management and accountability.

13. Preparing for a Potential Outbreak

It is important to prepare for a potential health crisis when the signs are there. Nigeria knew that its location in the West African sub-region, made it vulnerable to the spread of the Ebola virus disease, so it was prepared for a potential outbreak of the virus. The government remained vigilant and its preparedness plan included stepping up surveillance at the country's many entry points and initiating a nation-wide public awareness campaign.

14. The Availability of Funds for Quick Disbursement

Funds should be available for rapid disbursement. Training health workers, creating isolation centres, case management, contract tracing, deployment of personnel, screening at borders and procurement of Personal Protective Equipment (PPE) requires adequate funding. In Nigeria, the Federal Government approved a grant to each sub-national government and ensured the timely release of funds to the State Governments.

15. Temperature Screening and Early Detection

The compulsory screening of body temperature of travellers at entry and exit points is essential. In Nigeria, this became a mandatory and suspected cases

underwent proper screening and isolation. In addition, early detection aides were put in place. The lesson here is that the sooner Ebola is detected and the faster the victim can be isolated, the lower the subsequent number of infections.

16. Involving the Public

Key to ending the Ebola epidemic is the participation of all citizens, irrespective of political persuasion, religion, and ethnicity; therefore it is crucial that leaders gain and maintain public trust through policies of openness and accountability.

In Nigeria, the Federal and State Governments reached out to the public via information campaigns, appealing for a cessation in hand-shaking and the implementation of other prevention measures. The President personally led advocacy efforts including demonstrating hand cleaning, appealing to religious groups to suspend mass gatherings, and dispelling false rumours. Nigerians united to fight Ebola, contributing to its successful containment.

17. Community Engagement

Traditional, religious and community leaders were engaged early on and played a critical role in influencing the public. The strategy drew on good practices from the polio eradication programme. The awareness campaigns that worked so well to create public acceptance of polio immunization were repurposed to encourage early reporting of symptoms, backed up by the message that early detection and supportive care greatly increase an Ebola patient's prospects of survival.

Challenges

A vital part of the lessons learnt in containing the Ebola outbreak in Nigeria were the challenges that had to be faced. They included:

- Stigma relating to Ebola can make those at risk reluctant to report contact with an infected person, or seek to conceal it, or hide the fact they have received treatment, all of which hampers containment.
- Panic among health workers.
- Difficult, evasive, and hostile contacts meant that contact tracers were forced to use innovative ways to reach them – SWAT, Special teams, SSS, Telecoms.
- Misinformation/Concealment of information by contacts.
- Community resistance due to misconceptions and incorrect messaging.
- Late receipt of donor funds.

PART SIX: EXTRACTS ON EBOLA

VIRUS DETECTIVE: THE STORY OF SCIENTIST PETER PIOT WHO DISCOVERED EBOLA IN 1976

Peter Piot, second from left, on site in Yambuku during the first Ebola outbreak in 1976

Nearly 40 years ago, a young Belgian scientist travelled to a remote part of the Congolese rainforest, his task to help find out why so many people were dying from an unknown and terrifying disease. In September 1976, a package containing a shiny, blue thermos flask arrived at the Institute of Tropical Medicine in Antwerp, Belgium. Working in the lab that day was Peter Piot, a 27-year-old scientist and medical school graduate training as a clinical microbiologist. "It was just a normal flask like any other you would use to keep coffee warm," recalls Piot, now Director of the London School of Hygiene and Tropical Medicine. But this thermos wasn't carrying coffee, inside was an altogether different cargo. Nestled amongst a few melting ice cubes were some vials of blood along with a note.

The note was from a Belgian doctor based in what was then Zaire, now the Democratic Republic of Congo and his handwritten message explained that the blood was that of a nun, also from Belgium, who had fallen ill with an unidentifiable and mysterious illness.

This unusual delivery had travelled all the way from Zaire's capital city Kinshasa, on a commercial flight, in one of the passengers' hand luggage. "When we opened the thermos, we saw that one of the vials was broken and blood was mixing with the water from the melted ice," says Piot. He and his colleagues had no idea of the danger they were in. As the blood leaked into the icy water so too did a deadly unknown virus. The samples were treated like numerous others the lab had tested before, but when the scientists placed some of the cells under an electron microscope they saw something completely unexpected. "We saw a gigantic worm

like structure - gigantic by viral standards," says Piot. "It's a very unusual shape for a virus, only one other virus looked like that and that was the Marburg virus."

The Marburg virus was first recognised in 1967 when 31 people became ill with haemorrhagic fever in the cities of Marburg and Frankfurt in Germany and in Belgrade, the capital of Yugoslavia. This Marburg outbreak was associated with laboratory staff who were working with infected monkeys imported from Uganda. Seven people died. Piot knew how serious Marburg could be, but after consulting experts around the world he got confirmation that what he was seeing under the microscope wasn't Marburg. This was something else, something never seen before.

"It's hard to describe but the main emotion I had was one of real, incredible excitement," says Piot. "There was a feeling of being very privileged, that this was a moment of discovery." News had reached Antwerp that the nun, who was under the care of the doctor in Zaire, had died. The team also learnt that many others were falling ill with this mysterious illness in a remote area in the north of the country; their symptoms included fever, diarrhoea and vomiting followed by bleeding and eventually death.

Two weeks later Piot, who had never been to Africa before, was on a flight to Kinshasa. He remembers, "It was an overnight flight and I couldn't sleep. I was so excited about seeing Africa for the first time, about investigating this new virus and about stopping the epidemic."

The journey didn't end in Kinshasa. The team had to travel to the centre of the outbreak, a village in the equatorial rainforest, about 1,000km (620 miles) further north. "The personal physician of President Mobutu, the leader of Zaire at that time, arranged a C-130 transport aircraft for us," recalls Piot. They loaded a Landrover, fuel and all the equipment they needed on to the plane.

When the C-130 landed in Bumba, a river port situated on the northernmost point of the Congo River, the fear surrounding the mysterious disease was tangible. Even the pilots didn't want to hang around for long and they kept the airplane's engines running as the team unloaded their kit. "As they left they shouted 'Adieu,'" says Piot. "In French, people say 'Au Revoir' to say 'See you again', but when they say 'Adieu' - well, that's like saying, 'We'll never see you again.'" Standing on the tarmac watching the plane leave, facing a deadly unknown virus in an unfamiliar place,

some people might have regretted the decision to go there. "I wasn't scared. The excitement of discovery and wanting to stop the epidemic was driving everything. We heard far more people were dying from the disease than we originally thought and we wanted to get to work," Piot says.

The curiosity and sense of adventure that brought Piot to this point had been ignited many years earlier when he was a young boy growing up in a small rural village in the Flanders region of Belgium. A museum near Piot's home was dedicated to a local saint who worked with leprosy patients, and it was here that he got his first glimpse into the world of disease and microbiology. "I decided one day to cycle to the museum. The old pictures I saw there of those suffering from leprosy fascinated me," he says. "That sparked my interest in medicine - it gave me a thirst for scientific knowledge, a desire to help people and I hoped it would give me a passport to the world." Years later, it did just that.

The team's final destination was the village of Yambuku, about 120km (75 miles) from Bumba, where the plane had left them.

Yambuku was home to an old Catholic mission. It had a hospital and a school run by a priest and nuns, all of them from Belgium. "The area was beautiful. The mission was surrounded by lush rainforest and the earth was red - the nature was incredibly rich but the people were so poor," says Piot.

"Joseph Conrad called that place 'The Heart of Darkness', but I thought there was a lot of light there." The beauty of Yambuku belied the horror that was unfolding for the people that lived there.

When Piot arrived, the first people he met were a group of nuns and a priest who had retreated to a guesthouse and established their own cordon-sanitaire, a barrier used to prevent the spread of disease. There was a sign on the cord, written in the local Lingala language that read, "Please stop, anybody who crosses here may die." "They had already lost four of their colleagues to the disease," says Piot. "They were praying and waiting for death." Piot jumped over the cordon and told them that the team would help them and stop the epidemic. "When you are 27, you have all this confidence," he says. The nuns told the newly arrived scientists what had happened, they spoke about their colleagues and those in the village who had died and how they tried to help as best they could. The priority was to stop the epidemic, but first the team needed to find out how this virus was moving from person to person - by air, in food, by direct contact or spread by insects. "We had to start asking questions. It was really like a detective story," Piot recalls.

To investigate the spread of the virus, the team drew maps and plotted each village they visited. These were the three questions they asked: *How did the epidemic evolve?* Knowing when each person caught the virus gave clues to what kind of infection this was and from here the story of the virus began to emerge. *Where did the infected people come from?* The team visited all the surrounding villages and mapped out the number of infections. It was clear that the outbreak was closely related to areas served by the local hospital. *Who gets infected?* The team found that more women than men caught the disease, particularly women between 18 and 30 years old. It turned out that many of the women in this age group were pregnant and had attended an antenatal clinic at the hospital.

The mystery of the virus was beginning to unravel. The team then discovered that the women who attended the antenatal clinic all received a routine injection. Each morning, just five syringes would be distributed, the needles would be reused and so the virus was spread between the patients. "That's how we began to figure it out," recalls Piot. "You do it by talking, looking at the statistics and using logical deduction." The team also noticed that people were getting ill after attending funerals. When someone dies from Ebola, the body is full of the virus. Any direct contact, such as washing or preparation of the deceased without protection is a serious risk.

The next step was to stop the transmission of the virus. "We systematically went from village to village and if someone was ill they would be put into quarantine," says Piot. "We would also quarantine anyone in direct contact with those infected and we would ensure everyone knew how to correctly bury those who had died from the virus." The closure of the hospital, the use of quarantine and making sure the community had all the necessary information eventually brought an end to the epidemic, but only after nearly 300 people died.

Piot and his colleagues had learned a lot about the virus during three months in Yambuku, but it still lacked a name. "We didn't want to name

it after the village, Yambuku, because it's so stigmatising. You don't want to be associated with that," says Piot. The team decided to name the virus after a river. They had a map of Zaire, although not a very detailed one, and the closest river they could see was the Ebola River. From that point on, the virus that arrived in a flask in Antwerp all those months earlier would be known as the Ebola virus.

First Consultants Medical Centre:

Press Statement on Patrick Sawyer

The First Consultants Medical Centre released a statement regarding their first contact with the index patient, Liberian Patrick Sawyer. The statement below comes from the management of the hospital:

In the interest of our patients, staff, the general public and the nation at large we state the following:

A 40-year old gentleman came into the hospital with symptoms suggestive of malaria (fever, headache, extreme weakness) on Sunday night (20th July 2014). He was fully conscious and gave us his clinical history and told us he was a Senior Diplomat from Liberia. Laboratory investigations confirmed malaria whilst other test for HIV, Hepatitis B&C were negative. He was admitted and treatment commenced.

However, due to the fact that he was not responding to treatment but rather was developing haemorrhagic symptoms we further questioned him. He denied having been in contact with any persons with EVD (Ebola Virus Disease) at home, in any hospital or at any burial. In spite of this denial we immediately decided to take the following steps:

1. To conduct further tests for possible Infectious Haemorrhagic Disease, especially Ebola Virus Disease, based on the fact that he was a Liberian citizen and the recent outbreak of Ebloa in that country.

2. We immediately isolated/quarantined the patient, commenced barrier nursing and simultaneously contacted the Lagos State Ministry of Health and the Federal Ministry of Health to enquire where further laboratory tests could be performed as we had a high index of suspicion of possible Ebola.

3. We refused to release him from the hospital despite intense pressure: we were told that he was a senior ECOWAS official and had an important role to play at the ECOWAS convention in Calabar, Cross River State.

4. The initial test results from LUTH laboratory indicated a signal of possible EVD, but required confirmation.

5. We then took the further step of reaching out to Senior Officials in the office of the Secretary of Health of the United States of America who promptly assisted us with contacts at the Centres for Disease Control (CDC) and World Health Organisation Regional Laboratory Centre in Senegal.

6. Working jointly with the State, Federal Agencies and International Agencies, we were able to obtain confirmation of Ebola Virus Disease (Zaire Strain), (W.H.O. Regional Center Lab-Senegal/Redeemes lab/LUTH Laboratory).

7. Patrick Sawyer subsequently died on Friday at a 6.50 (25th July, 2014).

8. All agencies were promptly notified and in consultation with WHO, the Regional Ebola Virus Disease Centre in Conakry, Guinea, and best practices, the following was commenced:

a. Orderly temporarily shut down of the hospital with immediate evacuation of in-house patients.

b. The appropriate and professional removal of the body and its incineration under WHO guidelines, witnessed by all appropriate agencies.

9. Having concluded the above, it is now appropriate to give this press release in the interest of our patients, staff, the general public and the nation at large.

10. In keeping with WHO, guidelines, the hospital is shut down briefly as a full decontamination exercise is currently in progress in accord with WHO guidelines.

In conclusion, working with the state, federal and international agencies, we were able to identify and confirm the diagnosis of the Ebola Virus Disease. We hope that by our action of preventing this gentleman from being extracted from our hospital and traveling to Calabar, we have been able to prevent the spread of Ebola in Nigeria. The Board and Management of the Hospital wish to thank all our staff members for their diligence and professionalism.

The Impact on the First Consultant Medical Centre (FCMC)

The following provides some background information relation to the FCMC:

- Established as a 16 bed specialist hospital in 1982
- Located in Obalende, the bustling hub of Lagos State, Nigeria
- Expanded to 40 beds in 1990

- Employs over 120 staff including 20 doctors, 30 certified nurses, 18 nurse aids, 14 lab specialists
- Started with core specialty in Ob/gyn, neonatal and paediatric services
- Expanded its services to several other specialties
- Completed a hospital refurbishment and equipment upgrade in June 2014
- Medical training center for students, interns and medical officers

A Chronology of the Ebola Outbreak relating to the FCMC

July 20th 2014

Patrick Sawyer arrives Lagos from Liberia

Medical doctors in Nigeria are on strike

Sawyer is brought to FCMC for treatment and tests positive for malaria

July 21st 2014

Patient reviewed by Dr. Stella Adadevoh

Aggressive treatment for malaria continued

Patient does not respond to treatment and displays haemorrhagic symptoms

July 22nd 2014

Incident management committee meeting triggered by Dr. Adadevoh

Assignment of responsibility to FCMC committee members

Patient placed in isolation and confined to the hospital despite pressure from patient and others for his release

Blood taken for Ebola test

Lagos State MoH, US DHHS, CDC and WHO contacted

Patient starts declining treatment

Dr. Amos Abaniwo tries to persuade patient to continue treatment

July 23rd 2014

Signal test for EVD positive from LUTH lab

Patient continues to demand to be released

Discussions commenced with Lagos State on next steps

Governor of Lagos and Commissioner of Health Lagos State is travelling

US DHSS and CDC protocols received

July 24th 2014

Press conference held by Lagos State to inform the public about the EVD patient

Lagos State requests the FCMC keep patient as the isolation center is not ready

Confirmation of EVD virus from LUTH lab, and Redeemers Lab, assisted by WHO lab in Senegal

Multi-agency inspection of FCMC

July 25th 2014

Patient dies in FCMC

All agencies notified, Local, State and Federal.

DHHS notified and monitoring of implementation of protocols commenced via WHO command center

All other patients evacuated

FCMC shut down

July 26th 2014

Patient body cremated under all agency supervision according to WHO guidelines

WHO senior staff dispatched to plan decontamination process

Contact list compiled by Dr. Adadevoh and CDC protocol shared with other agencies

21 day surveillance of FCMC staff and contacts commences

Negative Consequences of the Ebola Outbreak on the First Consultant Medical Center

Loss of Staff

Dr. Stella Adadevoh

Senior Consultant Physician and Endocrinologist. In charge of the management of the index case and physician at the FCMC for 21 years, member of FCMC Incident Management Committee. Dr. Stella Adadevoh made the clinical diagnosis and triggered the Incident Management Committee meeting.

Dr. Amos Abaniwo

Senior Consultant Anaesthetist and Dean of Clinical Studies. Pleaded with patient to accept treatment and became infected. Physician at the FCMC for 15 years and member of FCMC Incident Management Committee.

Nurse Evelyn Ukoh

Certified nurse aide who contracted EVD caring for index patient and had worked at the FCMC for 30 years.

Nurse Justina Ejelonu

Certified nurse who had worked at the FCMC for one month prior to the outbreak. She was pregnant with twins and contracted EVD when patient pulled out his IV cannula and spilled blood over nurse.

Equipment Loss

All equipment in the ER, laundry, nursing station, in-patient room, including laboratory equipment, was discarded or burnt

Most of the plumbing system in the hospital ripped out and replaced

Stigmatization

Text messages were circulated advising people to avoid FCMC

Clinic closed for 2 months

Psychotherapists hired for 2 months to counsel staff to accept losses and to be able to return to work

As of today FCMC is at 37.5% of pre-Ebola patient volumes

Significant loss of revenue: pre-ebola monthly revenue of approximately N60million has been eroded, and market share and new business lost

Significant cost of hiring staff to replace those lost, or those who did not return to work

Families of the Deceased and Repercussions arising from Ebola Outbreak

Dr. Stella Adadevoh

Husband, Mr. Folabi Cardoso

Son, Mr. Bankole Cardoso

Dr. Amos Abaniwo

Wife, Mrs. Abaniwo - who contracted ebola virus from him and survived

3 children

Due to stigma the family had to be relocated. The FCMC has taken responsibility for the children's education.

Nurse Evelyn Ukoh (widow)

Children were expelled from their homes as soon as mother was positive for Ebola and the FCMC had to relocate them. The FCMC has taken responsibility for the their education.

Nurse Justina Ejelonu

Husband was stigmatized and fired from his job.

Dr. Ohiaeri (CEO) with **First Consultant Medical Center** Ebola Survivors

Lessons Learnt and Recommendations from the FCMC

- Collaboration is key to the successful containment of an Ebola outbreak
- The development and dissemination of Infectious Disease Management Protocols is vital
- Establishment of a Nigerian Public Health Compensation Fund recommended
- Infectious disease treatment centres should be established nationwide
- Law and responsibility should become a key part of the medical curriculum
- Ebola survivors must be empowered
- A campaign against stigmatization should be undertaken

EBOLA SURVIVOR: DR. ADA IGONOH

Dr. Ada Igonoh was one of the attending doctors at First Consultants Medical Center and had treated Patrick Sawyer, while being monitored and overseen by Dr Ameyo Adedovoh, her consultant. Dr Adedovoh died several weeks later from Ebola, having been infected by Patrick Sawyer. Dr Ada Igonoh was also infected but survived. The emotional story of her recovery is added to the record as essential witness testimony and an important addition to the lessons learned. Here is Dr. Ada Igonoh's story:

"On the night of Sunday July 20, 2014, Patrick Sawyer was wheeled into the Emergency Room at First Consultants Medical Centre, Obalende, Lagos, with complaints of fever and body weakness. The male doctor on call admitted him as a case of malaria and took a full history. Knowing that Mr. Sawyer had recently arrived from Liberia, the doctor asked if he had been in contact with an Ebola patient in the last couple of weeks, and Mr. Sawyer denied any such contact.

He also denied attending any funeral ceremony recently. Blood samples were taken for full blood count, malaria parasites, liver function test and other baseline investigations. He was admitted into a private room and started on antimalarial drugs and analgesics. That night, the full blood count result came back as normal and not indicative of infection. The following day however, his condition worsened. He barely ate any of his meals. His liver function test result showed his liver enzymes were markedly elevated. We then took samples for HIV and hepatitis screening.

At about 5pm, he requested to see a doctor. I was the doctor on call that night so I went in to see him. He was lying in bed with his intravenous (I.V.) fluid bag removed from its metal stand and placed beside him. He complained that he had stooled about five times that evening and that he wanted to use the bathroom again. I picked up the I.V. bag from his bed and hung it back on the stand. I told him I would inform a nurse to come and disconnect the I.V. so he could conveniently go to the bathroom. I walked out of his room and went straight to the nurses' station where I told the nurse on duty to disconnect his I.V. I then informed my consultant, Dr. Ameyo Adadevoh of the patient's condition and she asked that he be placed on some medications.

The following day, the results for HIV and hepatitis screening came back negative. As we were preparing for the early morning ward rounds, I was approached by an ECOWAS official who informed me that Patrick Sawyer had to catch an 11

o'clock flight to Calabar for a retreat that morning. He wanted to know if it would be possible. I told him it wasn't, as he was acutely ill. Dr. Adadevoh also told him the patient could certainly not leave the hospital in his condition. She then instructed me to write very boldly on his chart that on no account should Patrick Sawyer be allowed out of the hospital premises without the permission of Dr. Ohiaeri, our Chief Medical Consultant. All nurses and doctors were duly informed.

During our early morning ward round with Dr. Adadevoh, we concluded that this was not malaria and that the patient needed to be screened for Ebola Viral Disease. She immediately started calling laboratories to find out where the test could be carried out.

She was eventually referred to Professor Omilabu of the LUTH Virology Reference Lab in Idi-Araba whom she called immediately. Prof. Omilabu told her to send blood and urine samples to LUTH straight away. She tried to reach the Lagos State Commissioner for Health but was unable to contact him at the time. She also put calls across to officials of the Federal Ministry of Health and National Centre for Disease Control.

Dr. Adadevoh at this time was in a pensive mood. Patrick Sawyer was now a suspected case of Ebola, perhaps the first in the country. He was quarantined, and strict barrier nursing was applied with all the precautionary measures we could muster. Dr. Adadevoh went online, downloaded information on Ebola and printed copies which were distributed to the nurses, doctors and ward-maids.

Blood and urine samples were sent to LUTH that morning. Protective gear, gloves, shoe covers and facemasks were provided for the staff. A wooden barricade was placed at the entrance of the door to keep visitors and unauthorized personnel away from the patient. Despite the medications prescribed earlier, the vomiting and diarrhea persisted. The fever escalated from 38 degrees to 40 degrees centigrade.

On the morning of Wednesday 23rd July, the tests carried out in LUTH showed a signal for Ebola. Samples were then sent to Dakar, Senegal, for a confirmatory test.

Dr. Adadevoh went for several meetings with the Lagos State Ministry of Health. Thereafter, officials from Lagos State came to inspect the hospital and the protective measures we had put in place. The following day, Thursday 24th July, I was again on call. At about 10pm, Mr. Sawyer requested to see me. I went into the newly created dressing room, donned my protective gear and went in to see him. He had not been cooperating with the nurses and had refused any additional treatment. He sounded confused and said he received a call from Liberia asking for a detailed medical report to be sent to them. He also said he had to travel back to Liberia on a 5am flight the following morning and that he didn't want to miss his flight. I told him that I would inform Dr. Adadevoh. As I was leaving the room, I met Dr. Adadevoh dressed in her protective gear along with a nurse and another doctor. They went into his room to have a discussion with him and as I heard later

to reset his I.V. line which he had deliberately removed after my visit to his room. At 6:30am, Friday 25th July, I got a call from the nurse that Patrick Sawyer was completely unresponsive. Again I put on the protective gear and headed to his room. I found him slumped in the bathroom. I examined him and observed that there was no respiratory movement. I felt for his pulse; it was absent. We had lost him. It was I who certified Patrick Sawyer dead. I informed Dr. Adadevoh immediately and she instructed that no one was to be allowed to go into his room for any reason at all. Later that day, officials from W.H.O came and took his body away. The test in Dakar later came back positive for the Zaire strain of the Ebola virus. We now had the first official case of Ebola virus disease in Nigeria.

It was a sobering day. We all began to go over all that happened in the last few days, wondering just how much physical contact we had individually made with Patrick Sawyer. Every patient on admission was discharged that day and decontamination began in the hospital. We were now managing a crisis situation. The next day, Saturday 26th July, all staff of First Consultants attended a meeting with Prof. Nasidi of the National Centre for Disease Control, Prof Omilabu of LUTH Virology Reference Lab, and some officials of W.H.O. They congratulated us on the actions we had taken and enlightened us further about the Ebola Virus Disease. They said we were going to be grouped into high risk and low risk categories based on our individual level of exposure to Patrick Sawyer, the "index" case. Each person would receive a temperature chart and a thermometer to record temperatures in the morning and night for the next 21 days. We were all officially under surveillance. We were asked to report to them at the first sign of a fever for further blood tests to be done. We were reassured that we would all be given adequate care. The anxiety in the air was palpable.

The frenetic pace of life in Lagos, coupled with the demanding nature of my job as a doctor, means that I occasionally need a change of environment. As such, one week before Patrick Sawyer died, I had gone to my parents' home for a retreat. I was still staying with them when I received my temperature chart and thermometer on Tuesday 29th of July. I could not contain my anxiety. People were talking about Ebola everywhere – on television, online, everywhere. I soon started experiencing joint and muscle aches and a sore throat, which I quickly attributed to stress and anxiety. I decided to take malaria tablets. I also started taking antibiotics for the sore throat. The first couple of temperature readings were normal.

Every day I would attempt to recall the period Patrick Sawyer was on admission – just how much direct and indirect contact did I have with him? I reassured myself that my contact with him was quite minimal. I completed the anti-malarials but the aches and pains persisted. I had loss of appetite and felt very tired. On Friday the 1st of August, my temperature read a high 38.7 degrees centigrade. As I type this, I recall the anxiety I felt that morning. I could not believe what I saw on the thermometer. I ran to my mother's room and told her. I did not go to work that day.

I cautiously started using a separate set of utensils and cups from the ones my family members were using.

On Saturday 2nd of August, the fever worsened. It was now at 39 degrees and would not be reduced by taking paracetamol. This was now my second day of fever. I couldn't eat. The sore throat was getting worse. That was when I called the helpline and an ambulance was sent with W.H.O doctors who came and took a sample of my blood. Later that day, I started stooling and vomiting. I stayed away from my family. I started washing my plates and spoons myself. My parents meanwhile, were convinced that I could not have Ebola.

The following day, Sunday 3rd of August, I got a call from one of the doctors who came to take my sample the day before. He told me that the sample which they had taken was not confirmatory, and that they needed another sample. He did not sound very coherent and I became worried. They came with the ambulance that afternoon and told me that I had to go with them to Yaba. I was confused. Couldn't the second sample be taken in the ambulance like the previous one? He said a better-qualified person at the Yaba centre would take the sample. I asked if they would bring me back. He said that they would.

Even with the symptoms I did not believe I had Ebola. After all, my contact with Sawyer was minimal. I had only touched his I.V. fluid bag just that once without gloves. The only time I actually touched him was when I checked his pulse and confirmed him dead, and I wore double gloves and felt adequately protected. I told my parents I had to go with the officials to Yaba and that I would be back that evening. I wore a white top and a pair of jeans, and I put my iPad and phones in my bag. A man opened the ambulance door for me and moved away from me rather swiftly. Strange behaviour, I thought. They were friendly with me the day before, but that day, not so. No pleasantries, no smiles. I looked up and saw my mother watching through her bedroom window.

We soon got to Yaba. I really had no clue where I was. I knew it was a hospital. I was left alone in the back of the ambulance for over four hours. My mind was in a whirl. I didn't know what to think. I was offered food to eat but I could barely eat the rice.

The ambulance door opened and a Caucasian gentleman approached me but kept a little distance. He said to me, "I have to inform you that your blood tested positive for Ebola. I am sorry." I had no reaction. I think I must have been in shock. He then told me to open my mouth and he looked at my tongue. He said it was the typical Ebola tongue. I took out my mirror from my bag and took a look and I was shocked at what I saw. My whole tongue had a white coating, looked furry and had a long, deep ridge right in the middle. I then started to look at my whole body, searching for Ebola rashes and other signs as we had been recently instructed.

I called my mother immediately and said, “Mummy, they said I have Ebola, but don’t worry, I will survive it. Please, go and lock my room now; don’t let anyone inside and don’t touch anything.” She was silent. I cut the line. I was taken to the female ward. I was shocked at the environment. It looked like an abandoned building. I suspected it had not been in use for quite a while.

As I walked in, I immediately recognized one of the ward maids from our hospital. She always had a smile for me but not this time. She was ill and she looked it. She had been stooling a lot too. I soon settled into my corner and looked around the room. It smelled of faeces and vomit. It also had a characteristic Ebola smell to which I became accustomed. Dinner was served – rice and stew. The pepper stung my mouth and tongue. I dropped the spoon. No dinner that night.

Dr. David, the Caucasian man who had met me at the ambulance on my arrival, came in wearing his full protective ‘hazmat’ suit and goggles. It was fascinating seeing one live. I had only seen them online. He brought bottles of water and ORS, the oral fluid therapy which he dropped by my bedside. He told me that 90 per cent of the treatment depended on me. He said I had to drink at least 4.5 litres of ORS daily to replace fluids lost in stooling and vomiting. I told him I had stooled three times earlier and taken Imodium tablets to stop the stooling. He said it was not advisable, as the virus would replicate the more inside of me. It was better he said to let it out. He said good night and left.

My parents called. My uncle called. My husband called crying. He could not believe the news. My parents had informed him, as I didn’t even know how to break the news to him.

As I lay on my bed in that isolation ward, strangely, I did not fear for my life. I was confident that I would leave that ward someday. There was an inner sense of calm. I did not for a second think I would be consumed by the disease. That evening, the symptoms fully kicked in. I was stooling almost every two hours. The toilets did not flush so I had to fetch water in a bucket from the bathroom each time I used the toilet. I then placed another bucket beneath my bed for the vomiting. On occasion I would run to the toilet with a bottle of ORS, so that as I was stooling, I was drinking.

The next day Monday 4th of August, I began to notice red rashes on my skin particularly on my arms. I had developed sores all over my mouth. My head was pounding so badly. The sore throat was so severe I could not eat. I could only drink the ORS. I took paracetamol for the pain. The ward maid across from me wasn’t doing so well. She had stopped speaking. I couldn’t even brush my teeth; the sores in my mouth were so bad. This was a battle for my life but I was determined I would not die. Every morning, I began the day with reading and meditating on Psalm 91. The sanitary condition in the ward left much to be desired.

The whole Ebola thing had caught everyone by surprise. Lagos State Ministry of Health was doing its best to contain the situation but competent hands were few. The sheets were not changed for days. The floor was stained with greenish vomitus and excrement. Dr. David would come in once or twice a day and help clean up the ward after chatting with us. He was the only doctor who attended to us. There was no one else at that time. The matrons would leave our food outside the door; we had to go get the food ourselves. They hardly entered in the initial days. Everyone was being careful. This was all so new. I could understand, was this not how we ourselves had contracted the disease? Mosquitoes were our roommates until they brought us mosquito nets.

Later that evening, Dr. David brought another lady into the ward. I recognized her immediately as Justina Ejelonu, a nurse who had started working at First Consultants on the 21st of July, a day after Patrick Saywer was admitted. She was on duty on the day Patrick reported that he was stooling. While she was attending to him that night, he had yanked off his drip, letting his blood flow almost like a tap onto her hands. Justina was pregnant and was brought into our ward bleeding from a suspected miscarriage. She had been told she was there only on observation. The news that she had contracted Ebola was broken to her the following day after results of her blood test came out positive. Justina was devastated and wept profusely – she had contracted Ebola on her first day at work.

My husband started visiting but was not allowed to come close to me. He could only see me from a window at a distance. He visited so many times. It was he who brought me a change of clothes and toiletries and other things I needed because I had not even packed a bag. I was grateful I was not with him at home when I fell ill or he would most certainly have contracted the disease.

My retreat at my parents' home turned out to be the instrument God used to shield and save him. I drank the ORS fluid like my life depended on it. Then I got a call from my pastor. He had been informed about my predicament. He called me every single day morning and night and would pray with me over the phone. He later sent me a CD player, CDs of messages on faith and healing, and Holy Communion packs through my husband. My pastor, who also happens to be a medical doctor, encouraged me to monitor how many times I had stooled and vomited each day and how many bottles of ORS I had consumed. We would then discuss the disease and pray together. He asked me to do my research on Ebola since I had my iPad with me and told me that he was also doing his study. He wanted us to use all relevant information on Ebola to our advantage.

So I researched and found out all I could about the strange disease that has been in existence for 38 years. My research, my faith, my positive view of life, the extended times of prayer, study and listening to encouraging messages boosted my belief that I would survive the Ebola scourge. There are five strains of the virus and the deadliest of them is the Zaire strain, which was what I had. But that did not

matter. I believed I would overcome even the deadliest of strains. Infected patients who succumb to the disease usually die between 6 to 16 days after the onset of the disease from multiple organ failure and shock caused by dehydration. I was counting the days and keeping myself well hydrated. I didn't intend to die in that ward. My research gave me ammunition. I read that as soon as the virus gets into the body, it begins to replicate really fast. It enters the blood cells, destroys them and uses those same blood cells to aggressively invade other organs where they further multiply. Ideally, the body's immune system should immediately mount up a response by producing antibodies to fight the virus. If the person is strong enough, and that strength is sustained long enough for the immune system to kill off the viruses, the patient is likely to survive. If the virus replicates faster than the antibodies can handle however, further damage is done to the organs.

Ebola can be likened to a multi-level, multi-organ attack but I had no intention of letting the deadly virus destroy my system. I drank more ORS. I remember saying to myself repeatedly, "I am a survivor, l am a survivor." I also found out that a patient with Ebola cannot be re-infected and they cannot relapse back into the disease as there is some immunity conferred on survivors. My pastor and I would discuss these findings, interpret them as they related to my situation and pray together. I looked forward to his calls. They were times of encouragement and strengthening. I continued to meditate on the Word of God. It was my daily bread.

Shortly after Justina came into the ward, the ward maid, Mrs Ukoh passed on. The disease had gotten into her central nervous system. We stared at her lifeless body in shock. It was a whole 12 hours before officials of W.H.O came and took her body away. The ward had become the house of death. The whole area surrounding her bed was disinfected with bleach. Her mattress was taken and burned. To contain the frequent diarrhoea, I had started wearing adult diapers, as running to the toilet was no longer convenient for me. The indignity was quite overwhelming, but I did not have a choice.

My faith was being severely tested. The situation was desperate enough to break anyone psychologically. Dr. Ohiaeri also called us day and night, enquiring about our health and the progress we were making. He sent provisions, extra drugs, vitamins, Lucozade, towels, tissue paper; everything we needed to be more comfortable in that dark hole we found ourselves. Some of my male colleagues had also been admitted to the male ward two rooms away, but there was no interaction with them. We were saddened by the news that Jato, the ECOWAS protocol officer to Patrick Sawyer who had also tested positive, had passed on days after he was admitted. Two more females joined us in the ward: a nurse from our hospital and a patient from another hospital. The mood in the ward was solemn. There were times we would be awakened by the sudden, loud cry from one of the women. It was either from fear, pain mixed with the distress, or just the sheer oppression of our isolation.

I kept encouraging myself. This could not be the end for me. Five days after I was admitted, the vomiting stopped. A day after that, the diarrhoea ceased. I was overwhelmed with joy. It happened at a time I thought I could no longer stand the ORS. Drinking that fluid had stretched my endurance greatly.

I knew countless numbers of people were praying for me. Prayer meetings were being held on my behalf. My family was praying day and night. Text messages of prayers flooded my phones from family members and friends. I was encouraged to press on. With the encouragement I was receiving I began to encourage the others in the ward. We decided to speak life and focus on the positive. I then graduated from drinking only the ORS fluid to eating only bananas, to drinking pap and then bland foods. Just when I thought I had the victory, I suddenly developed a severe fever. The initial fever had subsided four days after I was admitted, and then suddenly it showed up again. I thought it was the Ebola. I enquired from Dr. David who said fever was sometimes the last thing to go, but he expressed surprise that it had stopped only to come back on again. I was perplexed. I discussed it with my pastor who said it could be a separate pathology and possibly a symptom of malaria. He promised he would research if indeed this was Ebola or something else. That night as I stared at the dirty ceiling, I felt a strong impression that the new fever I had developed was not as a result of Ebola but malaria. I was relieved.

The following morning, Dr. Ohiaeri sent me antimalarial medication, which I took for three days. Before the end of the treatment, the fever had disappeared. I began to think about my mother. She was under surveillance along with my other family members. I was worried. She had touched my sweat. I couldn't get the thought off my mind. I prayed for her. Hours later on Twitter I came across a tweet by W.H.O which said that the sweat of an Ebola patient cannot transmit the virus during the early stages of the infection. Sweat could only transmit it in the later stages. That settled it for me. It calmed the storms that were raging within me concerning my parents. I knew right away it was divine guidance that caused me to see that tweet. I could cope with having Ebola, but I was not prepared to deal with a member of my family contracting it from me.

Soon, volunteer doctors started coming to help Dr. David take care of us. They had learned how to protect themselves. Among the volunteer doctors was Dr. Badmus, my consultant in LUTH during my housemanship days. It was good to see a familiar face among the care-givers. I soon understood the important role these brave volunteers were playing. As they increased in number, so did the number of shifts increase and subsequently the number of times the patients could access a doctor in one day. This allowed for more frequent patient monitoring and treatment. It also reduced care-giver fatigue. It was clear that Lagos State was working hard to contain the crisis. Sadly, Justina succumbed to the disease on the 12th of August. It was a great blow and my faith was greatly shaken as a result. I commenced daily Bible study with the other two female patients and we would encourage one another to stay positive in our outlook although it was grim and

very depressing. My communion sessions with the other women were very special moments for us all.

On my 10th day in the ward, the doctors having noted that I had stopped vomiting and stooling and was no longer running a fever, decided it was time to take my blood sample to test if the virus had cleared from my system. They took the sample and told me that I shouldn't be worried if it comes back positive as the virus takes a while before it is cleared completely. I prayed that I didn't want any more samples collected from me. I wanted that to be the first and last sample to be tested for the absence of the virus in my system. I called my pastor. He encouraged me and we prayed again about the test. On the evening of the day Justina passed on, we were moved to the new isolation centre. We felt like we were leaving hell and going to heaven. We were conveyed to the new place in an ambulance. It was just behind the old building.

Time would not permit me to recount the drama involved with the dynamics of our relocation. It was like a script from a science fiction movie. The new building was cleaner and much better than the old building. Towels and nightwear were provided on each bed. The environment was serene. The following night, Dr. Adadevoh was moved to our isolation ward from her private room where she had previously been receiving treatment. She had also tested positive for Ebola and was now in a coma. She was receiving I.V. fluids and oxygen support and was being monitored closely by the W.H.O doctors. We all hoped and prayed that she would come out of it. It was so difficult seeing her in that state. I could not bear it. She was my consultant, my boss, my teacher and my mentor. She was the imperial lady of First Consultants, full of passion, energy and competence. I imagined she would wake up soon and see that she was surrounded by her First Consultants family but sadly it was not to be.

I continued listening to my healing messages. They gave me life. I literarily played them hours on end. Two days later, on Saturday the 16th of August, the W.H.O doctors came with some papers. I was informed that the result of my blood test was negative for Ebola virus. If I could somersault, I would have but my joints were still slightly painful. I was free to go home after being in isolation for exactly 14 days. I was so full of thanks and praise to God. I called my mother to get fresh clothes and slippers and come pick me. My husband couldn't stop shouting when I called him. He was completely overwhelmed with joy. I was told, however, that I could not leave the ward with anything I came in with. I glanced one last time at my cd player, my valuable messages, my research assistant a.k.a. my iPad, my phones and other items. I remember saying to myself, "I have life; I can always replace these items."

I went for a chlorine bath, which was necessary to disinfect my skin from my head to my toes. It felt like I was being baptized into a new life as Dr. Carolina, a W.H.O doctor from Argentina, poured the bucket of chlorinated water all over me.

I wore a new set of clothes, following the strict instructions that no part of the clothes must touch the floor and the walls. Dr. Carolina looked on, making sure I did as instructed. I was led out of the bathroom and straight to the lawn to be united with my family, but first I had to cut the red ribbon that served as a barrier. It was a symbolic expression of my freedom. Everyone cheered and clapped. It was a little but very important ceremony for me. I was free from Ebola!

I hugged my family as one who had been liberated after many years of incarceration. I was like someone who had fought death face to face and come back to the land of the living. We had to pass through several stations of disinfection before we reached the car. Bleach and chlorinated water were sprayed on everyone's legs at each station. As we made our way to the car, we walked past the old isolation building. I could hardly recognize it. I could not believe I slept in that building for 10 days. I was free! Free of Ebola. Free to live again. Free to interact with humanity again. Free from the sentence of death.

My parents and two brothers were under surveillance for 21 days and they completed the surveillance successfully. None of them came down with a fever. The house had been disinfected by Lagos State Ministry of Health soon after I was taken to the isolation centre. I thank God for shielding them from the plague. My recovery after discharge has been gradual but progressive. I thank God for the support of family and friends. I remember my colleagues who we lost in this battle. Dr. Adadevoh my boss, Nurse Justina Ejelonu, and the ward maid, Mrs. Ukoh were heroines who lost their lives in the cause to protect Nigeria. They will never be forgotten.

I commend the dedication of the W.H.O doctors, Dr. David from Virginia, USA, who tried several times to convince me to specialize in infectious diseases, Dr. Carolina from Argentina who spoke so calmly and encouragingly, Mr. Mauricio from Italy who always offered me apples and gave us novels to read. I especially thank the volunteer Nigerian doctors, matrons and cleaners who risked their lives to take care of us. I must also commend the Lagos State government, and the state and federal ministries of health for their swift efforts to contain the virus. To all those prayed for me, I cannot thank you enough. And to my First Consultants family, I say a heartfelt thank you for your dedication and for your support throughout this very difficult period.

I still believe in miracles. None of us in the isolation ward was given any experimental drugs or so-called immune boosters. I was full of faith yet pragmatic enough to consume as much ORS as I could, even when I wanted to give up and throw the bottles away. I researched on the disease extensively and read accounts of the survivors. I believed that even if the mortality rate was 99%, I would be part of the 1% who survive. Early detection and reporting to hospital is key to patient survival. Please do not hide yourself if you have been in contact with an Ebola patient and have developed the symptoms. Regardless of any grim stories one may

have heard about the treatment of patients in the isolation centre, it is still better to be in the isolation ward with specialist care, than at home where you and others will be at risk.

I read that Dr. Kent Brantly, the American doctor who contracted Ebola in Liberia and was flown out to the United States for treatment, was being criticized for attributing his healing to God when he was given the experimental drug, Zmapp. I don't claim to have all the answers to the nagging questions of life. Why do some die and some survive? Why do bad things happen to good people? Where is God in the midst of pain and suffering? Where does science end and God begin? These are issues we may never fully comprehend on this side of eternity. All I know is that I walked through the valley of the shadow of death and came out unscathed.

A year or so after the tragic incident, precisely on Tuesday, 3rd November 2015, Dr. Ada Igonoh gave birth to a certified Ebola-free baby girl at the greater El-Monte Community Hospital, California, USA.

According to the management of the FCMC, Dr. Igonoh was under medical surveillance during her pregnancy and delivery to ensure that her child was born free of the viral infection as the virus can stay in a victim's semen or body system many months after contracting the disease. Igonoh is the only female medical doctor to have survived the deadly disease after seven other officials in the hospital – First Consultant Medical Centre - had primary contact with the index patient, Patrick Sawyer.

Picture: Dr. Ada Igonoh, with her new born baby girl, in California, USA.

NIGERIA IS EBOLA FREE

OFFICIAL STATEMENT BY THE WORLD HEALTH COUNTRY REPRESENTATIVE, RUI GAMA VAZ

"Nigeria is Ebola free."

"Today 20th October, 42 days (twice the incubation period) after the last confirmed case of Ebola Virus Disease was discharged from the isolation ward having tested negative for Ebola virus, the chains of transmission have been broken.

"WHO officially declares that Nigeria is now free of Ebola virus transmission. The virus is gone for now. The outbreak in Nigeria has been contained. But we must be clear that we only won a battle. The war will only end when West Africa is also declared free of Ebola.

"While the outbreak is now officially over, Nigeria's geographical position and extensive borders makes the country vulnerable to additional imported cases of Ebola Virus Disease. It is, therefore, critical to continue vigilance for any suspected cases by strict compliance with the WHO preparedness guidelines. Therefore, there is need to continue to work together with States to ensure adequate preparedness to rapidly respond, in case of any potential re-importation."

The Federal Government's Response to the Certification of Nigeria as Ebola-Free

The Federal Government welcomed the declaration by WHO, which heralded the containment of the outbreak a globally-acclaimed success. Briefing State House correspondents in Abuja the following Monday, the then Special Adviser to the President on Media and Publicity, Dr Reuben Abati, said the President had dedicated the certification to the "many patriotic health workers, volunteers and

ordinary Nigerians, who worked tirelessly, some of them paying the ultimate price, to stop the deadly virus in its tracks, after it entered the country in July". The Federal Government reiterated its appreciation of the contributions of State Governments, WHO and other international health organisations, relatives of infected persons and other Nigerians, who either courageously underwent the rigours of being quarantined or complied with all directives issued by health authorities to defeat the virus.

"As the nation applauds the success of its collective effort to stop the transmission of the Ebola virus within Nigeria, the President warns that the entire country must remain fully alert and vigilant against the re-entry of the virus."

The Federal Government urged all Nigerians to continue to follow the anti-Ebola advisories on sanitation and personal hygiene, issued by Federal and State health authorities.

EXTRAORDINARY LIVES

The Guild of Medical Directors, FCT, Abuja, chose its 18th Annual, General Meeting and Scientific Conference, 2014 to honour some extraordinary people. The Guild awarded the 'Distinguished Service Award' to the following deserving recipients.

The Management and Staff of First Consultants Hospital, Obalende

First Consultant Hospital, Obalende, Lagos, was honoured for exemplary courage and dedication to the service of humanity. The award recognises the professionalism and ultimate sacrifice made by the hospital and staff to save Nigeria from the ravages of the Ebola virus in 2014.The hospital was where the index case of Ebola in Nigeria, the Liberian Diplomat, Patrick Sawyer, was first seen, diagnosed, treated and ultimately died. Before his death, tremendous pressure was brought to bear on the hospital management and staff to release him into the community on account of his status as a diplomat.

Fortunately, the hospital's overriding concern for public safety created a strong resolve which rebuffed the entreaties and eventual legal threats levelled against it. The hospital demonstrated the highest level of safe containment in protecting the nation. Of the eight people killed by Ebola in Nigeria, four were clinical staff of the hospital. Their dedication and sacrifice will be remembered.

The Late Dr. Ameyo Adadevoh

Dr. Adadevoh was the lead clinician who treated Patrick Sawyer in the First Consultant Hospital, Lagos, when the Liberian diplomat was admitted to the hospital. The award recognises both her strength of character and the ultimate sacrifice made by Adadevoh in fulfilling her calling.

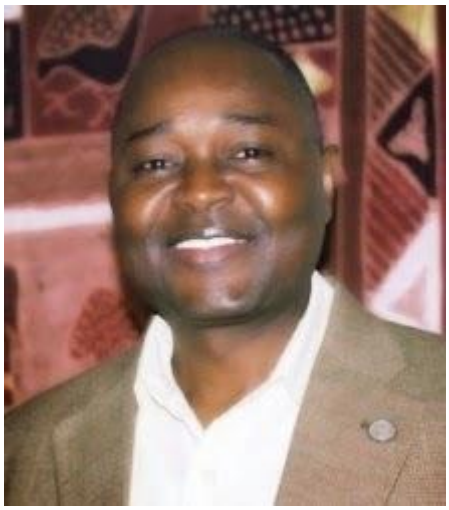
Dr. Adadevoh worked for more than three decades doing what she loved best: healing the sick. Since her death, there have been many tributes to her and stories about what an amazing person she was, which only serve to further illustrate the magnitude of the irreplaceable loss that has left a huge void in her family, among her friends, patients and colleagues, and in her community. Nigeria owes her a huge debt of gratitude and the Guild salutes her bravery.

She was a member of the Nigerian Medical Association, Medical Women Association of Nigeria, British Nigerian Association and National Postgraduate Medical College. The late Dr Adadevoh also served as a Non-Executive Director

of Learn Africa and a writer for the first ever "Ask the Doc" column in Today's Woman Magazine

She is survived by a son, Mr. Cardoso, who has set up a legacy in the form of a trust in her memory.

Honouring Extraordinary Contributions



The Guild honours the death and sacrifices made by the staff of First Consultants Hospital. In addition to Dr. Adadevoh, three others died. Dr. Amos Abaniwo, a veteran anaesthetist left behind a wife and three children; nurse Justina Ejelonu was in her first month of a new job at the hospital; and finally, nurse aide Evelyn Ukoh who had worked in the hospital for 31 years, died leaving behind four children. The World Health Organisation declared Nigeria free of Ebola on Monday, October 14 2014, at which time the outbreak had killed more than 4,500 in West Africa. To date, it remains unchecked in Liberia, Sierra Leone and Guinea.

Dr. Amos Abaniwo

In memory of the brave health worker victims who died on the front line fighting the disease, we vow to remain prepared and alert and to continue their work.

Nurse Justina Ejelonu

Extract from a Letter by Sawyer's Widow

"In spite of my anger and disappointment with him, I don't believe that he did this with evil intent (I could be wrong). I believe his actions were those of a desperate man. And I am sad for everyone involved, Nigeria was closer than the U.S. This is just my take on what he could have been thinking (of course, I could be wrong).

"My regret is that I was so caught up in my own pain and frustration, I neglected to see the pain of the innocent people both in Liberia and Nigeria who are affected by Patrick's actions. For that, I am deeply sorry. The last thing I wanted to do was to cause them pain. Going to Nigeria was one of them. His act was one of a desperate man. Many Nigerians and Liberians are affected because of that act of desperation."

My Husband took Ebola to Nigeria – Patrick Sawyer's wife, Decontee Sawyer

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CONCLUDING PART

TRIBUTE TO DR. AMEYO STELLA ADADEVOH AND THE HEROES NIGERIA LOST TO EBOLA

Dr. Ameyo Adadevoh, 1956-2014

Dr. Ameyo Adadevoh laid down her life for the greater good of Nigeria. Dr. Ameyo Adadevoh, who was the lead consultant physician at First Consultants Medical Centre, Obalende, Lagos, prevented Ebola-infected patient, Patrick Sawyer from leaving the hospital, after he ripped his IV from his arm. It was Dr Adadevoh's sharp eyes and many years of experience that led to her realisation that Sawyer was not suffering merely from malaria, as had been previously suspected. She alerted the Nigerian health ministry, and then prevented Sawyer leaving the hospital to attend an ECOWAS retreat in Calabar, Cross River State, Nigeria. When he got angry, she and her colleagues had to physically restrain him – which may be when she contracted Ebola herself. Had she not prevented Patrick Sawyer from leaving the hospital, he would almost certainly have infected many more people. By identifying the index patient in the August 2014 Ebola outbreak in Nigeria, Dr Adaevoh prevented a national catastrophe without regard for her own personal risk.

Through this book, we honour not just Dr. Adadevoh but also all the other brave doctors and nurses: Mrs. Evelyn Ukoh, Dr. Amos Abaniwo, Justina Obi Ejelonu, and Iyke Enemuo, all of whom died while trying to contain the spread of Ebola and save Ebola patients. Nigerians honour their heroic actions and remember them with gratitude.

This book also celebrates the healthcare personnel who continue to care for those afflicted by the disease in the West Africa sub-region, and who work so tirelessly to bring the epidemic to an end.

CONCLUSION

Ebola arrived in Nigeria on the 20th July 2014 like the Biblical thief, creeping in silently and unannounced. By the time the outbreak had been defeated, it had left in its trail not only blood, tears and sorrow, but indelible memories and lessons the country is not likely to forget.

That Nigeria was able to contain the Ebola virus disease using local expertise, with international partners taking mainly advisory roles, is worthy of note. It speaks volumes for what the country can do when there is focus and seriousness on the part of its leaders. It shows that Nigeria has what it takes to take on its numerous challenges - from the dearth of political leadership to issues of poor infrastructure, corruption, etc., - if the right people are assembled and allowed to work, as was the case with the Ebola epidemic.

If Nigerians can unite to defeat Ebola, then the same unity of purpose applied to other issues that bedevil the country today will achieve worthy results. Nigeria's rapid containment of the Ebola epidemic was a national effort involving all Nigerians. As former President Goodluck Jonathan rightly summed up, "We defeated Ebola because all Nigerians agreed to fight the war against Ebola. This is the strength of our unity".

Picture: The Ebola Virus Disease (EVD) was the top story in Nigeria's newspapers between July and October 2014

The important lessons learned include the effectiveness of high-level advocacy when it includes the personal involvement of the Presidency, a well-coordinated response and the existence of a national public health infrastructure with the necessary systems and tools to take effective action. With this experience, Nigeria can now respond effectively to possible future outbreaks and to work towards eliminating polio and other diseases targeted for eradication. Our success combatting Guinea Worm Disease, Polio and the 2014 outbreak of Ebola are only the beginning.

The confidence and experience gained from the successful containment of the first ever Ebola outbreak in Nigeria has strengthened the resolve of the Federal Government to ensure adequate preparedness measures are in place, in order to quickly, effectively and efficiently respond to any potential re-introduction of EVD in any part Nigeria.

However, while Nigeria has been able to contain Ebola, the response to the epidemic in other West Africa countries has met with much less success, primarily due to the weak capacity and poor public health infrastructure systems. Significant deficits in human, financial and material resources have hampered efforts to contain the escalating Ebola outbreak in Guinea, Liberia and Sierra Leone. It must be recognised that the regional nature of this epidemic calls for regional solutions, systems strengthening, improved governance, communication, coordination and community involvement.

ADDITIONAL MATERIAL

International Media Coverage

The following pages contain a number of contemporaneous reports relating to the 2014 Ebola outbreak in order to give a sample of the reporting at the time.

Nigeria was celebrated worldwide for its successful containment of the Ebola virus. The international media, including *The Washington Post, Reuters, Al Jazeera, BBC, Time, USA Today, The New York Times, The Guardian of London, Wall Street Journal, ABC News* and many more accorded Nigeria's Ebola success story prime time coverage. In its commentary on Nigeria's certification as Ebola-free, the *USA Today* reported that, "…as the United States and Spain deal with their first diagnosed cases of Ebola and fears that the virus could spread, the U.S. Centres for Disease Control and Prevention is sending researchers to Lagos to study how Nigeria was able to contain the disease."

A sample of the international media's coverage of Nigeria's Ebola success story is offered in the following pages.

BBC WORLD NEWS

Ebola Crisis: Nigeria declared free of virus

Nigeria has been declared officially free of Ebola after six weeks with no new cases, the World Health Organization (WHO) says.

WHO representative Rui Gama Vaz, speaking in the capital Abuja, said it was a "spectacular success story".

Nigeria won praise for its swift response after a Liberian diplomat brought the disease there in July.

The outbreak has killed more than 4,500 people in West Africa, mostly in Liberia, Guinea, and Sierra Leone.

An estimated 70% of those infected have died in those countries.

The WHO officially declared Senegal Ebola-free on Friday.

Meanwhile, European Union foreign ministers are meeting in Luxembourg to discuss how to strengthen their response to the threat posed by Ebola.

Speaking on the sidelines, French Foreign Minister Laurent Fabius said he expected the meeting to appoint a co-ordinator to galvanise the EU's response to the epidemic.

"My colleagues are unanimous in saying that this idea of a European co-ordinator for the fight against Ebola is a good idea. The name will be chosen in the coming days. I think it's a very important step."

European countries have committed more than 500m euros (£400m; $600m) but the UK is pressing to double that amount.

The money is being sought to help reinforce over-stretched healthcare systems in Liberia, Sierra Leone and Guinea and to mitigate the damage Ebola is doing to their economies.

Earlier, the Spanish government said a nurse who became the first person to contract Ebola outside West Africa had tested negative for the virus

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Nigeria declared EBOLA-free, holds lessons for others

(Reuters) - Nigeria was declared free of the deadly Ebola virus on Monday after a determined doctor and thousands of officials and volunteers helped end an outbreak still ravaging other parts of West Africa and threatening the United States and Spain.

Caught unawares when a diplomat arrived with the disease from Liberia, authorities were alerted by Doctor Ameyo Adadevoh, who diagnosed it, kept the patient in hospital despite protests by him and his government and later died from Ebola herself.

They then set about trying to contain it in an overcrowded city of 21 million where it could easily have turned a doomsday scenario if about 300 people who had been in direct or indirect contact with the index case not been traced and isolated.

"This is a spectacular success story," Rui Gama Vaz from the World Health Organization (WHO) told a news conference in the capital Abuja, where officials broke into applause when he announced that Nigeria had shaken off the disease.

"It shows that Ebola can be contained, but we must be clear that we have only won a battle, the war will only end when West Africa is also declared free of Ebola."

This year's outbreak of the highly infectious haemorrhagic fever thought to have originated in forest bats is the worst on record.

The virus has killed 4,546 people across the three most-affected countries, Liberia, Guinea and Sierra Leone and travellers have from the region have infected two people in Texas and one in Madrid.

It was imported to Nigeria when Liberian-American diplomat Patrick Sawyer collapsed at the main international airport in Lagos on July 20.

Airport staff were unprepared and the government had not set up any hospital isolation unit, so he was able to infect several people, including health workers in the hospital where he was taken, some of whom had to restrain him to keep him there.

Lagos, the commercial hub of Africa's most populous nation, largest economy and leading energy producer, would have been an ideal springboard for Ebola to spread across the country.

"Nigeria was not really prepared for the outbreak, but the swift response from the Federal Government, State Governments (and) International Organizations...was essential," said Samuel Matoka, Ebola operations manager in Nigeria for the International Federation of Red Cross and Red Crescent Societies (IFRC).

The U.S. Center for Disease Control and Prevention which was involved in managing the outbreak, said officials and volunteers reached more than 26,000 households of people living around the contacts of the Ebola patients.

President Goodluck Jonathan urged Nigerians to "replicate the unity of purpose and all-hands-on-deck approach adopted against Ebola in other areas of national life".

"Nigeria’s globally-acclaimed success against Ebola is a testimony to what Nigerians can achieve if they set aside their differences and work together," a presidential statement said.

"STAND YOUR GROUND"

Adadevoh, doctor on call at the First Consultants hospital in Lagos where Sawyer was brought, prevented the dying man from spreading it further, Benjamin Ohiaeri, a doctor there who survived the disease, told Reuters.

Ebola is much more contagious once symptoms become severe.

"We agreed that the thing to do was not to let him out of the hospital," Ohiaeri said, even after he became aggressive and demanded to be set free.

"If we had let him out, within 24 hours of being here, he would have contacted and infected a lot more people."

Sawyer was reported only to have malaria, Ohiaeri said. But Adadevoh noticed he had bloodshot eyes and was passing blood in his urine – tell-tale signs of hemorrhagic fever. She left instructions by his bed that under no circumstances should anyone let him leave.

At one point, Sawyer ripped off his intravenous tube and a nurse had to put it back, according to a source close to the hospital staff. She later got infected and died. Sawyer then became aggressive and had to be physically restrained.

Ohiaeri said a Liberian government official on the phone had even threatened negative consequences if they did not release Sawyer, saying that holding him was tantamount to kidnapping.

"The lesson there is: stand your ground," he said.

Once the hospital contacted the ministries of health in the state of Lagos and the Federal Ministry in Abuja, authorities quickly set up and equipped an isolation unit.

Lagos State Governor Babatunde Fashola rushed back from a pilgrimage to Mecca to handle the crisis, Ohiaeri said.

Nigeria used an existing health surveillance system for Polio for contact tracing, so was able to trace and isolate Sawyer's primary and secondary contacts quickly. Mobile technology meant live updates could be made to the contact list.

"Everyone played their part. We're so proud," Ohiaeri said.

IFRC's Matoka said contact tracing of suspected cases was key to preventing the disease from spreading into communities where it would have been harder to control.

"It was effective in identifying all suspected cases and keeping watch on them before they developed symptoms and infect other people. We were able to remove people from communities once they showed symptoms and (before they) infect many others," he said.

Even when the virus found its way to the oil hub of Port Harcourt in the southeast, authorities were able to quickly contain it, an example WHO said others should be able to follow.

"If a country like Nigeria, hampered by serious security problems, can do this ... any country in the world experiencing an imported case can hold onward transmission to just a handful of cases," WHO Director Margaret Chan said in a statement.

For the three impoverished countries at the epicentre of the crisis it is a different matter. According to consultancy DaMina Advisors, Nigeria has one doctor per 2,879 people compared with one per 86,275 in Liberia.

Nigeria's success in preventing the spread of the disease contrasts with its slower and more fractious response to crises such as the kidnapping in April of more than 200 girls still being held by Islamist militant group Boko Haram.

"The approach to Ebola was pragmatic, patriotic and non-partisan," said Lagos-based political analyst and lawyer Emekanka Onyebuchi.

"They put the nation first and this is what we should have done in other areas, like the (kidnapped) girls."

The cooperation between the central government in Nigeria and the opposition-led administration in Lagos state contrasts with the United States, where bickering between Republican and Democrat lawmakers over Ebola has eroded public trust.

Alex Okoh, Nigeria's director of Port health services, said the lesson the United States and other countries can learn from Nigeria is to "put aside the political barriers and focus on the issues at hand".

Senegal, where one case was imported from Guinea, was declared Ebola-free on Friday.

Officials hope such success stories will change the way the West, where many are currently in the grip of a panic about a disease brought to their shores from "Africa", sees the crisis.

"There is focus on the worst-case scenarios, which again perpetuate the wrong, negative image of Africa as opposed to looking at some of the areas where there has been success," said Abdul Tejan-Cole, a Sierra Leonean who is executive director of the Open Society Initiative for West Africa.

(Additional reporting by Pascal Fletcher in Johannesburg, Tim Cocks and Bate Felix in Lags; writing by Tim Cocks; editing by Bate Felix and Philippa Fletcher)

The Washington Post

Nigeria declared Ebola-free; Africa's most populous nation given all-clear by World Health Org

The World Health Organization has declared Nigeria Ebola-free — after more than six weeks without a new case of the disease that has claimed the lives of more than 4,500 people in West Africa, mainly in Liberia, Sierra Leone and Guinea.

"Nigeria is now free of Ebola," WHO Representative, Rui Gama Vaz told a news conference in the capital Abuja, Reuters reported. "This is a spectacular success story … It shows that Ebola can be contained but we must be clear that we have only won a battle. The war will only end when West Africa is also declared free of Ebola."

The last reported case in Nigeria was confirmed Sept. 8. The nation's response to Ebola is being held out as an example to the still-stricken West African nations, as well as to Texas.

Ebola hit Nigeria in July when an American-Liberian citizen, Patrick Sawyer, was diagnosed in Lagos with the disease — and Nigerian officials quickly declared a public health emergency. Sawyer later died.

It was a nightmare scenario with the potential to spiral out of control, given the bustling city of Lagos, Africa's largest, is a major transportation hub.

In total, Nigeria reported 20 people with Ebola, according to WHO. Eight of them died. But John Vertefeuille, with the U.S. Centers for Disease Control and Prevention, said Nigeria took the right steps to stop it.

"Nigeria acted quickly and early and on a large scale" Vertefeuille told Agence France-Presse. "They acted aggressively, especially in terms of contact-tracing."

Last week, WHO announced Senegal was free of the disease. The infection was brought to Senegal in August by a man who had travelled by road from Guinea to Dakar. The government of Senegal identified more than 70 people who had come in contact with the man and began testing anyone considered at high risk. On Sept. 5, the man tested negative, recovered and later returned to Guinea, according to a statement from WHO.

According to WHO, the success of Nigeria — Africa's most populous nation — was attributable to ample funding, quick action and assistance from the WHO, the U.S. Centers for Disease Control and the non-profit "Doctors Without Borders".

Unlike the situation in Guinea, Liberia and Sierra Leone, "all identified contacts were physically monitored on a daily basis for 21 days. The few contacts who attempted to escape the monitoring system were all diligently tracked" by special teams and returned to observation.

The organization noted Nigeria had resources unavailable to the poorer nations of West Africa, including experienced epidemiologists and a virology lab associated with a teaching hospital at Lagos University.

Officials conducted house-to-house information campaigns, explaining the risks and the preventive measures necessary to keep control of the situation.

UN: Nigeria is Ebola-free

Africa's most populous country has been declared free of Ebola after six weeks without new cases of the disease, public health leaders said Monday.

Nigeria has gone 42 days without an Ebola diagnosis, which the World Health Organization (WHO) has hailed as "spectacular success story that shows that Ebola can be contained."

The country, the most populous in Africa, reported its first case of Ebola in July.

“If a country like Nigeria, hampered by serious security problems, can do this ... any country in the world experiencing an imported case can hold onward transmission to just a handful of cases,” Dr Margaret Chan, the head of WHO, wrote in a statement.

Public health experts feared that Ebola would spread rapidly in Nigeria's crowded capital city, Lagos, which is also Africa's largest city.

Nigeria reported a total of 20 cases of Ebola, eight of which claimed lives. A majority of cases were healthcare workers.

In each case, the Centers for Disease Control and Prevention and the WHO reached nearly all contacts and began isolating people who were potentially exposed. All contacts were monitored daily for the incubation period of 21 days.

The country's strategy for containing Ebola was largely a repurposed polio eradication campaign.

"This strengthened response plan further boosts confidence that Nigeria’s well-oiled machinery has a good chance of working miracles again should another traveller — by land, air or sea — carry the Ebola virus across its borders again," according to the WHO.

Nigeria pledges 600 volunteers as Africa steps up Ebola fight

Nigeria pledged on Thursday to send a contingent of 600 volunteers to help fight the worst ever outbreak of Ebola on record which has killed nearly 5,000 people in West Africa.

With financial pledges flowing in from around the world but trained doctors and nurses scarce in the three worst effected countries -- Liberia, Guinea and Sierra Leone, the African Union appealed last week to member states to urgently fill the gap.

African nations' response to the crisis has drawn criticism, with officials in Liberia bemoaning a lack of African solidarity. The World Health Organization (WHO) has rebuked some African countries for closing borders to Ebola-hit states, saying this worsened their suffering by cutting off supplies.

Nigeria, the continent's largest economy and top oil producer, gained experience in containing Ebola after an air traveller imported the virus from Liberia in July, infecting 20 people and killing 8.

"Nigeria has 600 health workers who have been trained in the field of Ebola containment who are ready to go to other affected African countries to help them in containment of Ebola spread," acting health minister Khaliru Alhassan told Reuters.

"The first contingent of 250 Nigeria experts will be deployed soon," he said but did not provide a date.

Nkosazana Dlamini-Zuma, Chairperson of the African Union Commission, told reporters in the Sierra Leone capital Freetown that countries in East Africa had responded with a pledge of 600 health workers.

Democratic Republic of Congo, which has suffered six outbreaks of Ebola since the disease was first detected there in 1976, had also pledged to train 1,000 volunteers, she said.

The WHO originally appealed for 12,000 local staff and 750 foreign experts but has raised those targets to 20,000 and 1,000 respectively. WHO assistant director general Keiji Fukuda said there were now only 600 foreign experts.

AU STILL WAITING FOR RESPONSES

The WHO declared Nigeria Ebola-free on Monday but Alhassan said the outbreak remained a threat to the country until it was completely neutralized.

The international community has ramped up aid including sending some medics and supplies to Sierra Leone, Guinea and Liberia, where the epidemic has crippled, poor and under-equipped health systems.

The United States is deploying a 3,000-strong military mission to build up to 17 Ebola Treatment Units (ETUs) and train local doctors, while Cuba has dispatched hundreds of medical personnel.

Alhassan said the Nigerian Center for Disease Control would also support Sierra Leone, Liberia and Guinea in training their health workers. "What we are waiting for now is that the request has to come through (West African regional bloc) ECOWAS and has to be coordinated by WHO," he said.

Speaking in Freetown, Dlamini Zuma said the AU had felt obliged to make a direct plea to members in mid-October because it realized that appealing for volunteers to come forward individually was not enough for the scale of the crisis.

"We wrote to all our heads of state asking them to give us health workers who would be deployed here in these three countries... We are still waiting for responses," she said.

"East Africa has responded and they have pledged more than 600 health workers, DRC has also pledged about 1,000 but they will bring them in phases," she said. "They say they will start probably with about 200. So we are waiting for those to come and also pledges to come from other countries."

Congo Health Minister Felix Kabange told Reuters in mid-October the government aimed to train more than 1,000 volunteers to fight Ebola, which he hoped would inspire "African solidarity". He invited other countries to send volunteers to new training centers in the capital Kinshasa.

WHO: Ebola contained in Nigeria, Senegal

Two countries appear to manage the spread of Ebola; Sierra Leone records 130 new cases during three-day lockdown

Two of the five countries affected by the world's worst-ever Ebola outbreak are managing to halt the spread of the disease, the World Health Organization said on Monday, although the overall death toll rose over the weekend.

“On the whole, the outbreaks in Senegal and Nigeria are pretty much contained,” a WHO statement said, adding that there were no new deaths in Guinea, but four in Sierra Leone and 39 in Liberia.

To date, a total of 2,793 people have died from 5,762 recorded cases in the outbreak. A separate Ebola outbreak has killed 40 people in the Democratic Republic of Congo, where there have been 71 cases as of Sept. 18, the WHO said.

Sierra Leone recorded 130 new cases of the virus during a three-day lockdown and it is waiting for test results on a further 39 suspected cases, Stephen Gaojia, head of the Ebola Emergency Operations Center, said on Monday.

The country had ordered its six million citizens to stay indoors until Sunday night in the most extreme strategy employed by a West African nation since the start of an epidemic that has infected thousands of people since March.

"The exercise has been largely successful … The outreach was just overwhelming. There was massive awareness of the disease," Gaojia said, noting that authorities reached more than 80 percent of the households they had intended to target.

Sierra Leone now needs to focus on treatment and case management, and it urgently needs treatment centres in all its 14 districts as well as "foot soldiers" in clinics and hospitals, he said.

"We need clinicians, epidemiologists, lab technicians, infection-control practitioners and nurses," he said.

The lockdown was intended to allow 30,000 health workers, volunteers and teachers to visit every household. Some argued it might have a negative impact on Sierra Leone's poor.

Joe Amon, director of health and human rights for Human Rights Watch, said there was little reason to believe the lockdown had been effective in ending transmission since such measures are so hard to enforce. Frustrated residents complained of food shortages in some neighbourhoods.

"You could argue that it's strictly necessary not because it's an effective way to break transmission but because it's necessary to reach people with communication messages," he said.

Teams carrying soap and information about Ebola reached about 75 percent of 1.5 million households in this nation, the health ministry said. Some residents

complained of food shortages, as others sat out on verandas. Rumours that the soap being distributed had been poisoned called into question the education efforts.

More than 560 people are believed to have died from the disease in Sierra Leone, a nation of 6 million people. Ebola has also spread rampantly through Liberia and Guinea, and a limited number of cases have been reported in Nigeria and one in Senegal.

Treatment centres are overwhelmed with patients almost as soon as they are built and health workers struggle to keep up with monitoring the contacts of thousands of sick people. So the hardest-hit countries have resorted to extraordinary measures. Liberia has cordoned off entire towns or neighbourhoods, and Sierra Leone's nationwide shutdown was a first.

WHO has not said clearly whether it supports such measures, saying they should only be undertaken if people's rights are protected and the measures are proportionate and evidence-based. But so much in this outbreak is new — from its large geographic spread to the number of people infected to the government response — that evidence on the best way to contain it is scarce.

The U.N. health agency has, however, repeatedly said that the border closures and flight bans many countries have put in place to protect themselves from Ebola are counterproductive.

"Flight cancellations and other travel restrictions continue to isolate affected countries, resulting in detrimental economic consequences, and hinder relief and response efforts risking further international spread," the statement said.

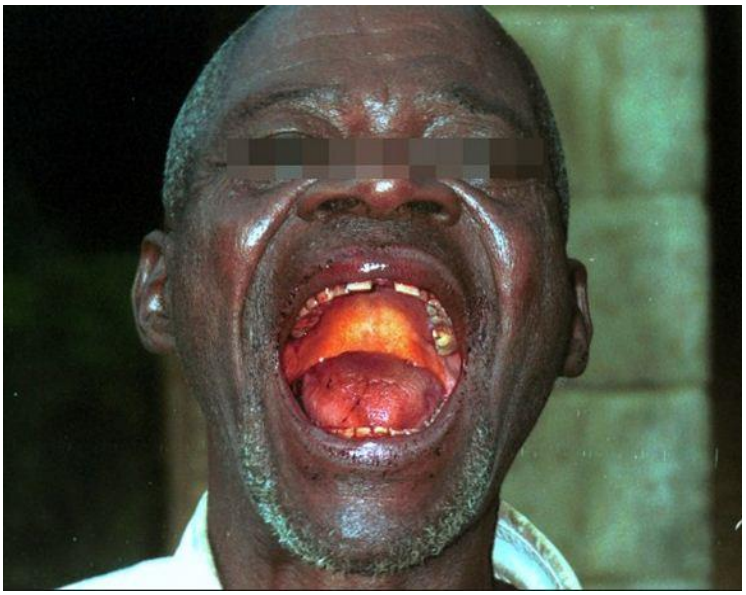
An independent panel advising the WHO urged authorities in the affected countries — Guinea, Liberia, Nigeria, Senegal and Sierra Leone — to work with the aviation and maritime sectors to resolve differences and "develop a coordinated response" to transport issues.

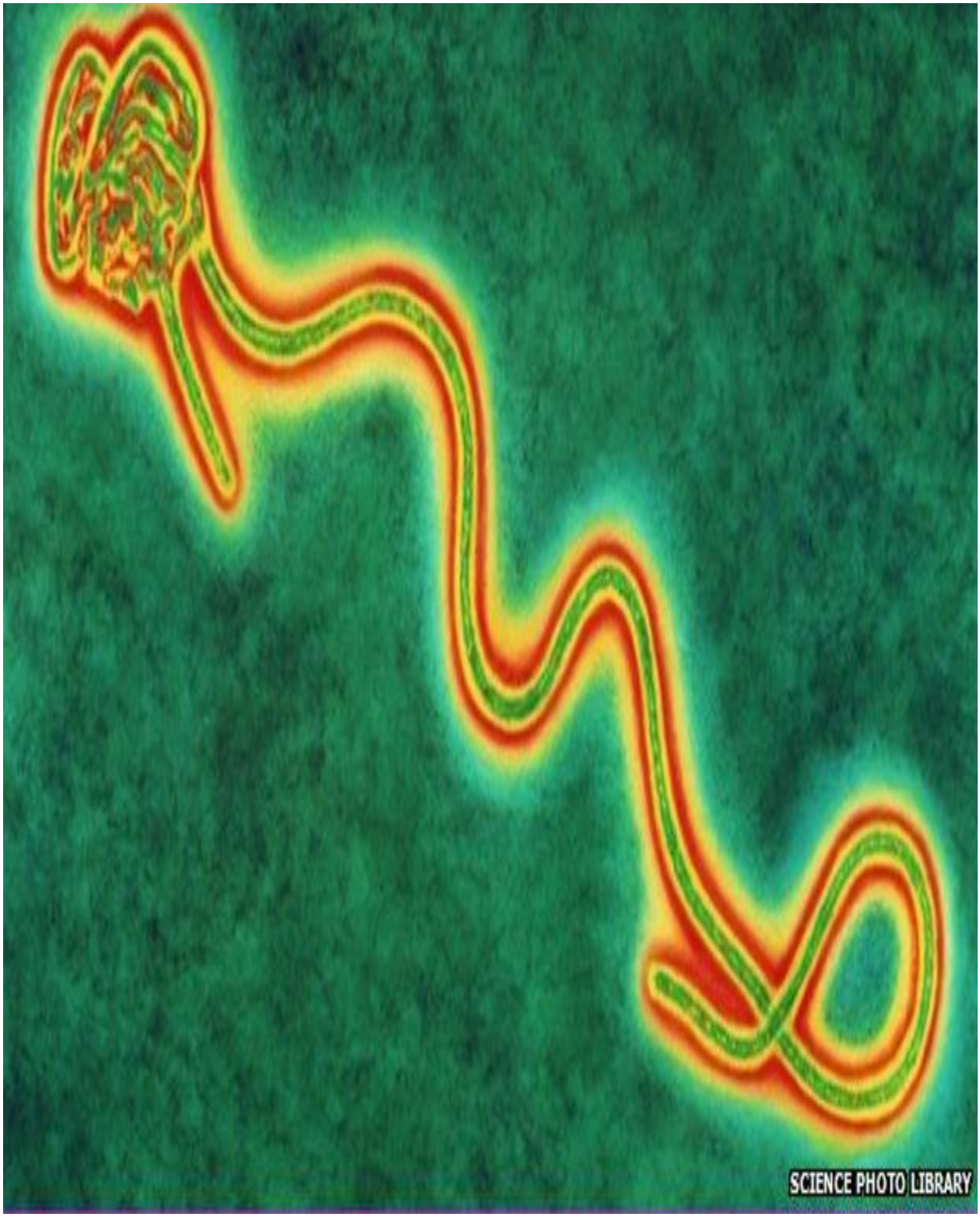
Quarantines may be deemed necessary in areas of intense and widespread transmission of the deadly virus, the committee statement went on.

The committee, composed of some 20 experts who advise WHO Director-General Margaret Chan, declared on Aug. 8 that the epidemic constituted a public health emergency of international concern. The medical charity “Doctors Without Borders” (MSF) has warned since late March that the outbreak, which began in the remote Gueckedou area of south eastern Guinea, is "unprecedented.”

Ebola Up Close: Photographic Evidence

Images are important. Not only are they proof that events actually happened, they keep memories alive. Photographs reveal what may otherwise remain unseen and bring events to global attention. Witnessing the face of Ebola is important, and the following pages show the grim reality of the Ebola outbreak in the West African sub-region.

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