USAID
FROM THE AMERICAN PEOPLE

TECHNICAL BRIEF JULY 2015

EBOLA AND OTHER DISEASE OUTBREAKS:

IMPLICATIONS FOR ECONOMIC GROWTH AND TRADE

Monrovia from the air by Fred Hartman

Health is a driver of accelerated development, trade, and investment. The impact of disease outbreaks on economic growth and commerce demonstrate the need for stronger health systems and partnerships across multiple sectors that can develop measures to prevent, detect and effectively respond to outbreaks.

This brief discusses the impact of disease on trade, economic growth and commerce, with particular reference to the recent outbreak of Ebola Virus Disease (EVD) in West Africa. It examines the impact of disease on different economic sectors and discusses the importance of global health security and the strengthening of systems to reduce risk factors that amplify the spread of infectious diseases and debilitate sustained economic stability. There is a need to understand the role of regional and international cooperation mechanisms and policies, especially the role of trade agreements such as the African Growth and Opportunity Act (AGOA), in promoting economic trade and growth to assist in preventing the spread of various diseases.

Key Points

- Global trade generates economic growth and development, but this interconnectedness allows for the emergence, amplification, and spread of epidemic-prone diseases. The Ebola Virus Disease (EVD) outbreak stalled trade by influencing the movement of individuals and goods.
- The trade industry can take an active role in preventing, detecting, and responding to epidemic-prone diseases so as to mitigate their effects on productivity, competitiveness and commerce. This protection involves targeting diseases that can spread between humans and animals.
- Global health security initiatives, such as the Global Health Security Agenda, highlight key areas where government and industry can work together to protect trade and minimize the economic impact of infectious diseases. Protective interventions include implementing proper biosafety practices in food production and markets, reducing risk factors in the extractive and trade industries, and supporting outbreak preparedness plans.
- Resilient and viable health care systems are needed to improve early detection and rapid response to outbreaks.
- EVD highlights the need for the development of multi-sectoral regional and international cooperation mechanisms to mitigate disruptions to economic trade and growth caused by outbreaks.

Figure 1. Estimates of WHO confirmed cases as recently as July 29, 2015.[10]

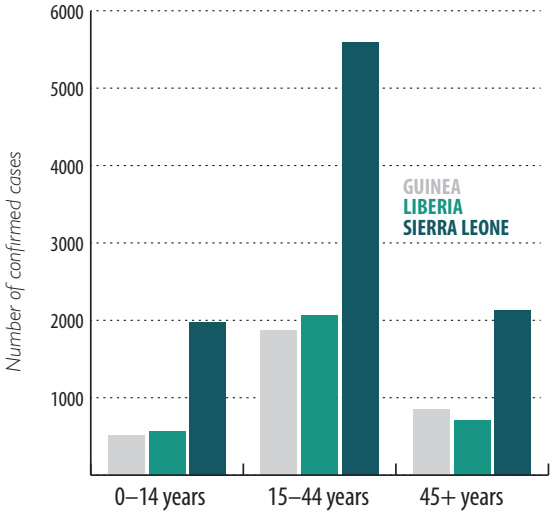
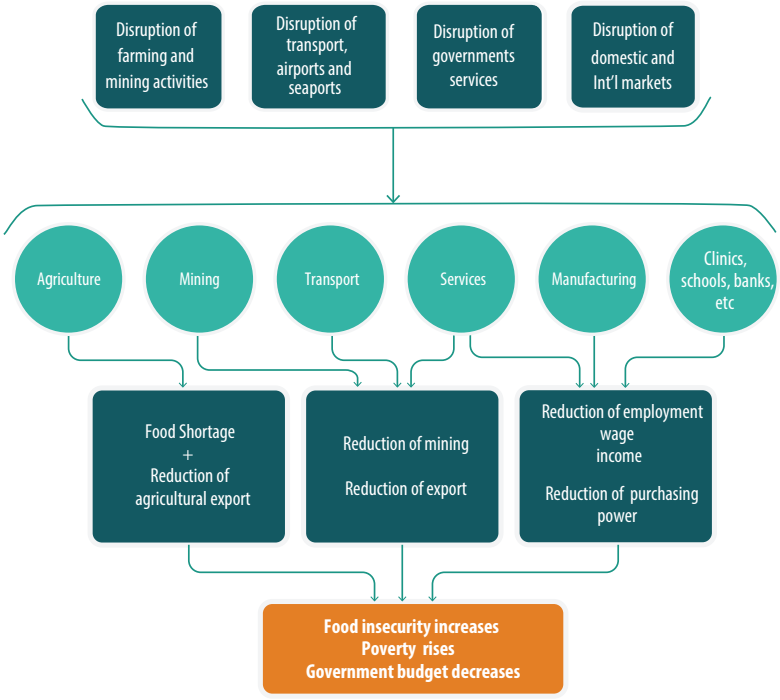


Figure 2. Socio-economic relationships as a result of the EVD outbreak



Adapted from: United Nations Economic Commission for Africa, 2015

The Economic Effects of Ebola Virus Disease on Trade, Economic Growth, and Commerce

Historically, international trade has greatly benefited from increasing globalization. Seven of the ten fastest-growing economies of the world are in Africa, and increased regional and international trade have been the key drivers of Africa's annual Gross Domestic Product (GDP) growth rate of 5.1% over the last decade.[1] Increasing interconnectedness similarly allows contagious, epidemic-prone diseases to cross borders sub-regionally, regionally and across distant continents, threatening economic stability and growth.

Despite the recent economic slow-down, projected estimates of growth in Sub-Saharan Africa were 5.2% in 2014 and 5.7% in 2015—up from 4.9% in 2013.[2] However, at a time when Africa was beginning to consolidate its growth, the EVD outbreak derailed the course of the three most affected countries—Guinea, Liberia, and Sierra Leone.

The outbreak impacted trade and economic activity in the agriculture, mining, services, informal and tourism sectors by reducing the labor supply and the quantity and quality of goods produced. Accounting for more than half of EVD infections, the labor force was most heavily affected by EVD (Figure 1).[7] The most economically active segments of the population (15-44 years) make up 59% of total infections, followed by the age group 45 and above (23% overall infections). It also affected the availability and use of health services, contributing to further impact on the labor force. In Guinea, Liberia and Sierra Leone, malaria has now been reported as the top cause of morbidity in health facilities, accounting for almost 30-40% of all health care visits.[8] A strong fear of EVD dissuaded many from seeking

- **As of July 29th, 2015, EVD has caused 11,294 documented fatalities among 27,784 cases.[3]**
- **The 2015 estimates for economic growth in Guinea, Liberia and Sierra Leone were 4.3%, 6.8% and 8.9% respectively, but dropped to -0.2%, 3% and -2.0% after the Ebola outbreak.[4]**
- **The macro-economic impacts for the region are modeled to be nearly $3.6 billion and $4.9 billion per year for low and high EVD containment scenarios respectively.[5]**
- **Recent World Bank Group estimates have quantified the GDP losses for the three most affected countries to be almost $2.2 billion in 2015.[6]**

medical attention when needed, and it is estimated that 74,000 malaria cases in Guinea went untreated in 2014 due to the EVD outbreak.[9] The outbreak provides a stark example of the high costs of having weak health institutions in fragile situations, both in terms of the human and economic loss. Figure 2 explores the socio-economic relationship and impact of EVD.

Photo by Fred Hartman

Economic Impact by Sector

AGRICULTURAL SECTOR

The agriculture sector, which employs over two-thirds of the rural populations across Guinea, Liberia and Sierra Leone, has been hit the hardest. The EVD outbreak affected agriculture in all three countries, primarily by influencing production volumes, exports and prices, leading to tighter supplies and increasing food prices. Agricultural exports account for 57% of GDP in Sierra Leone, followed by 39% in Liberia and 20% in Guinea.[11] All three countries are net food importers, implying that slowed food trade with neighbors creates local food shortages.

Vulnerable segments of society, in particular women who operate a majority of agricultural small businesses, have been severely affected. In Liberia, the loss in overall informal trade has affected the livelihoods of female traders, who represent nearly 70% of the informal traders and breadwinners in rural households.[12]

ILLUSTRATIVE STATISTICS [13]

GUINEA	LIBERIA	SIERRA LEONE
*Production decreases**	*Production decreases***	*Price increases**
Coffee ▼ 50%	Rice, Cassava, Rubber, Coffee, Cocoa ▼	Rice ▲ 30%
Palm Oil ▼ 75%	*Export decreases**	Fish ▲ 40%
Rice ▼ 10%	Rubber ▼ 20%	
*Export decreases**		
Coffee ▼ 58%		
Cocoa ▼ 24%		

*projected **data unavailable at this time

MINING SECTOR

While mining export volumes were not severely affected in Liberia, Sierra Leone and Guinea, reductions in foreign investment and declining commodity prices are widening trade deficits in the mining sector. In 2012, natural resource export revenues including those for mineral exports accounted for 26%, 8% and 30% of GDPs across Liberia, Sierra Leone and Guinea respectively.[14] The EVD outbreak disrupted the production capacity of various mines and slowed down the mining sector's forecasted growth. As a result, mining exports fell 30% in 2014.[15]

The large artisanal and small-scale gold and diamond mining industry in the informal economy has nearly ceased operations in the affected countries. This industry contributes an estimated $13.5 million in revenue to local economies in Liberia.[16] Border closures and restrictions on people's movement for fear of EVD have forced informal sector mine-workers, often women, to abandon their jobs.

ILLUSTRATIVE STATISTICS [13]

GUINEA	LIBERIA	SIERRA LEONE
*Revenue decreases**	*Export decreases**	*Tax revenue decreases**
▼ 1.2% of GDP in one year	Overall mining ▼ 30%	Iron ▼ $291 m
	*Revenue decreases**	Diamonds ▼ $29 m
	Iron ore ▼ $43.8 m to $28.1 m	Royalties ▼ $15.1 m from mining

*projected

OTHER EFFECTS

Disruption of transport, and export difficulties have impacted a number of sectors that contribute to trade in the region. In particular, trade in the informal sector has been affected regionally, given the wide-reaching effects of the EVD outbreak. Trade in the informal sector is estimated to account for 20-72% of GDP in West African countries.[17] Expensive marine insurance costs, compounded by air travel bans, contributed to the instability associated with shipping goods to and from the affected areas. Travel limitations for passengers to and from West Africa have impeded international businesses to conduct their operations as before.

Transport closures resulting in lost jobs and underemployment have contributed to a sharp drop in income, as was recorded from 12-35%[18] across the three countries. Quarantines and border closures have resulted in panic buying, supply reductions, and skyrocketing inflation. Livelihoods have become affected, and the markets have responded with rising prices fuelled by speculation, lack of supply of goods, and currency fluctuations, thereby affecting regular domestic production patterns.

ILLUSTRATIVE STATISTICS

GUINEA	LIBERIA	SIERRA LEONE
*Household income**	*Hotel occupancy**	*Hotel occupancy**
▼ 13% in one year	▼ 57% in one year	▼ from 70% to 13% in one year

*projected

Photo by Angie Lee

Is EVD's Impact on Economic Growth Unique?

The direct and indirect effects of the EVD epidemic have had a negative influence on economic well-being, consumption of health care resources and have caused reductions in labor productivity. Behavioral changes associated with the fear of contagion led to the closure of businesses, borders and commerce, and played a role in the wide-ranging socio-economic impacts of the EVD outbreak.

But this impact is not unique to EVD. During the past few decades, various pathogens with pandemic potential have emerged. The majority of these emerging infectious diseases are zoonotic in nature, that is, they are passed between animals and humans. The recent appearance of H5N1 avian flu, H7N9 avian flu, severe acute respiratory syndrome (SARS) and Middle East Respiratory Syndrome (MERS) pose similar risks to economic growth as those seen by the EVD outbreak. Every year, an estimated 2.3 billion human infections occur in developing countries by zoonotic diseases, and 2.2 million people die as a result.[23] Most of these losses are indirectly linked to the disease, and are exacerbated by weaknesses in the economic and financial sectors.[24]

The recent outbreak of MERS in South Korea has begun to show similar economic consequences for regional trade and has reduced economic growth.[25] Similar outcomes were seen with the SARS outbreak in 2003, the impact of which was estimated to reach $40 billion and which could have increased to $54 billion had SARS recurred in later years.[26] Similarly, the resurgence of the highly pathogenic avian influenza strain H5N1 caused financial losses from the culling of poultry, the decrease in related sales, and continued fixed costs. For example, Thailand spent a significant amount of financial resources towards

cleaning and disinfection, surveillance, and public awareness campaigns.[27] The drop in demand for various goods and services caused by consumer anxiety about the risks of SARS, MERS and H5N1, led to a severe depression of prices, and affected industry through the combined effect of lower volumes and prices.

Experiences from these epidemics illustrate the co-dependence of national and global health security, and the increased need to have a multi-sectoral response to counter the spread of infectious diseases. The economic impacts of infectious diseases pose threats to the development of global economies. It is therefore vital that policy design for improved trade and economic growth prioritizes epidemiological considerations within economic decision-making models.

The Cost of Epidemics

A SEVERE FLU EPIDEMIC is estimated to potentially cost $3 trillion in global economic losses related to indirect causes related to the disease, such as labor shortages and cascading failures in economic and financial sectors.[19]

AN OUTBREAK OF SARS cost the global economy $40 billion in 2003.[20]

THE H5N1 STRAIN OF AVIAN INFLUENZA cost Thailand $12.5 million and $26 million over two waves of outbreaks in 2004.[21]

MERS is expected to reduce overall economic growth by 0.8 percentage points in South Korea, and will contribute to a 7% reduction in the number of tourists.[22]

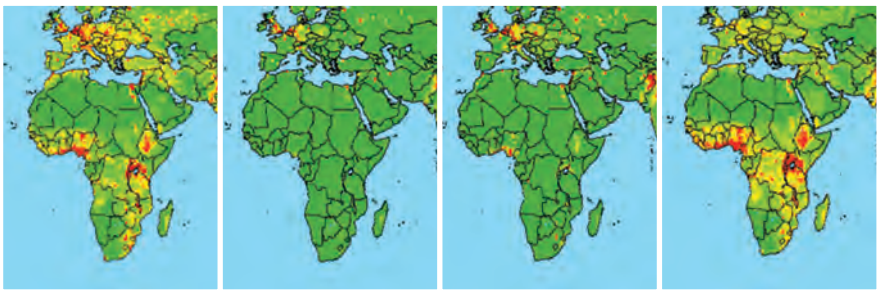
A Multi-Sectoral Approach to Reducing Disease Outbreaks:
An Imperative for Expansion of Trade, Commerce and Economic Growth

Multiple socio-economic, environmental and ecological issues drive emerging infectious diseases. In this regard, a multi-sectoral approach is needed in order to reduce risk factors, tackle the pandemic potential of these diseases, and ensure growth in trade and commerce. As shown in Figure 3 below, emerging infectious diseases are increasingly caused by wildlife pathogens, therefore warranting the engagement of robust policies guiding the public health, private sector and trade industries.

Public Health systems that address both animal and human health are important for early detection and response, in order to shorten outbreaks, treat those that are affected, and reduce the burden of infection. The private and trade sectors may not only be affected by outbreaks, but also have an impact on how infectious diseases with pandemic potential emerge and spread. Contact rates among people, livestock, and wildlife have risen due to increasing urbanization, animal production, and accompanying land-use change and deforestation. Agriculture and mining sectors, in particular, are entering areas where the threats of emerging new diseases are high. It is therefore essential to have an inclusive global health security approach across sectors, to reduce pandemic potential, while increasing opportunities for expansions in trade, commerce and economic growth.

Investments in Global Health Security:

The aftermath of the EVD epidemic helps demonstrate the importance of ensuring resilient institutions and public health surveillance systems and infrastructure. These systems, normally vested in public health systems for humans and veterinary or agricultural sectors for animals, are necessary in order to avert the numerous effects of epidemics. Nigeria, for example, was able to quickly identify and isolate EVD and effectively stop the



MAPS ARE DERIVED FOR EMERGING INFECTIOUS DISEASE EVENTS CAUSED BY:

a. zoonotic pathogens from wildlife

b. zoonotic pathogens from nonwildlife*

c. drug-resistant pathogens

d. vector-borne pathogens

Figure 3.
Distribution of relative risk of an emerging infectious disease event[28]

The relative risk is calculated from regression coefficients and socio-economic, environmental and ecological variable values, categorized by standard deviations from the mean and mapped on a linear scale from green (lower values) to red (higher values).

**Zoonotic emerging infectious disease event caused by a pathogen with no known wildlife origin.*

Photo by Angie Lee

Adopting a Multi-Sectoral Approach to Strengthen Global Health Security

- **Through the International Health Regulations, WHO keeps countries informed about public health risks, and works with partners to build the capacity to detect, report and respond to public health events.**
- **The One Health concept recognizes that the health of humans is connected to the health of animals and the environment. Many pandemic prone diseases have been the result of spillover from animals across the human, livestock, and wildlife interface.**
- **The Global Health Security Agenda seeks to accelerate progress toward a world safe and secure from infectious disease threats and to promote global health security as an international security priority.**
- **Engagement with multiple industries in the private sector to lead and drive risk reduction strategies is a critical component of global health security. This includes building a shared understanding of the risks associated with disease outbreaks through better programming.**

disease from spreading by employing the surveillance system it had in place for tracking cases of polio.[29] Ebola preparedness plans were developed by other countries in the region, including Senegal, Côte d'Ivoire, Ghana and Mali, and address the need for rapid response measures to prevent the transmission of EVD across borders.

The impact of disease outbreaks on global trade focuses attention towards the Global Health Security Agenda (GHSA), launched in 2014 by the U.S. alongside 28 partner countries and international agencies. The GHSA can advance the implementation of global health security frameworks that strengthen core capacities in the prevention, detection and rapid response to outbreaks. These frameworks include the International Health Regulations, the policies of the Organization for Animal Health, and the Performance of Veterinary Services Pathway, among others. The use of the "One Health" approach by the World Health Organization (WHO) and its partners helps build holistic systems and tools to reduce health risks at the animal-human-environment interfaces.[30]

Investments in Trade Safety and Engagement with the Private Sector

Countries must invest in systems aimed at preventing epidemic threats, detecting disease outbreaks in real-time, collecting and sharing information about the outbreak, and responding effectively. Engagement with the private sector can help mitigate the emergence, amplification, and spread of infectious diseases, in particular by addressing risk factors in food market value chains, and the livestock and extractive industries.

As economic growth increases in many Sub-Saharan African countries, other factors such as increased trade and livestock intensification may contribute to an increased risk of zoonotic disease spillover from domesticated animals and wildlife to humans. The Africa Livestock Futures Study has estimated that demand for livestock and livestock-related products will increase several fold by 2050, likely to stimulate growth in livestock production and related trade.[31] An intensification of the commercial livestock sector, through intensive feeding and confinement of animals, may increase animal health-related problems and the risk of zoonotic disease spillover into human populations. These risks may fall on producers, traders and consumers alike. Measures such as improved veterinary surveillance and government regulation of livestock intended for trade and commerce need to be adapted to ensure reduction in spillover or emergence of disease through these pathways. Further, the use of proper biosafety practices in food production, changes in informal bushmeat trade practices, as well as added support for veterinary services and animal health, can influence the spread of these pandemic prone diseases. If investments in animal health are made, and appropriate mapping of high-risk human/animal interfaces are conducted in partnership with the private sector livestock industries, the potential for disease spillover into human populations can be decreased.

Collaborations with the private sector may be achieved through specific activities with the extractive industries as well. As shown through the EVD outbreak, the mining sector was negatively impacted through productivity losses. To counter these effects, policy measures can be identified to decrease the risk of

By investing in systems that can prevent, detect, and respond to outbreaks, global health security frameworks and partnerships across multiple sectors can protect trade from the threat of outbreaks, mitigate pandemic potential, and safeguard the individuals and institutions that are most vulnerable.

zoonotic disease transmission; these may emphasize biodiversity conservation, waste management, and worker and community health. Practical examples of collaboration with the private sector can include the strengthening of diagnostic capacities in laboratories for agreed-upon priority zoonotic diseases. Collaborative partnerships with mining, oil, and agribusiness focus on identifying effective risk reduction measures that can be adopted in the design and management of leading extractive industry operations. The Infectious Disease Risk Assessment and Management initiative is currently evaluating the economic impact of the EVD outbreak on select mining companies, and is building an evidence base for investments in controlling and preventing outbreaks of emerging infectious diseases.[32] A multi-sectoral approach with these industries is essential in preparedness and response planning, increasing understanding of resource availability, and developing mutually agreed-upon roles and responsibilities.

The Opportunity for AGOA to Strengthen Global Health Security

Sound policies and trade frameworks such as AGOA improve the business environment, commerce and promote good governance. They are also central in reducing risk factors related to emerging infectious diseases. By investing in systems that safeguard individuals and institutions that are most vulnerable to trade, global health security frameworks and multi-sectoral approaches can protect trade from the threat of outbreaks and mitigate pandemic potential. Frameworks including the GHSA and the One Health Approach can help prioritize the need to strengthen existing health systems. Trade safety measures and partnerships with the private sector can promote risk reduction measures on a broader scale.

AGOA serves as a key example of a regional and international cooperation mechanism that relies on strengthened local health systems and multi-sectoral partnerships for improved global trade and commerce. The recent reauthorization of AGOA for a ten-year period is a unique opportunity to promote a policy environment that allows for investments in resilient systems with improved detection and response capacity against future disease outbreaks. This opportunity will also provide the basis for policies that can reduce the risk factors produced by trade and private industry, and help prevent disease emergence. AGOA has transformed interactions on trade and economic issues, and has led to numerous economic successes for Africa; exports from Sub-Saharan Africa to the U.S. have more than doubled, and non-oil, non-mineral exports have increased fourfold under preferential trade between the African continent and United States over the last 14 years.[33] A focus on improving coordination at various levels of government, and an emphasis on stronger global health security, trade and multi-sectoral partnerships, can ultimately generate income, taxes, and increased private and public goods and services. These elements are essential for decreasing the chances of new disease outbreaks of pandemic potential, and for reversing the downward trajectory of economic growth caused by epidemics such as the EVD outbreak.

Acknowledgements: *This technical brief was prepared by the USAID-funded African Strategies for Health (ASH) project, implemented by Management Sciences for Health, in collaboration with the U.S. Agency for International Development's Africa Bureau. Valuable inputs were provided by Uzaib Saya, Rudi Thetard and JoAnn Paradis (all ASH), Ishrat Z. Husain and Andrea Long-Wagar (USAID Africa Bureau), Lindsay Parish (USAID Bureau for Food Security), Shana Gillette (USAID Bureau for Global Health) and Alicia Kimbrel (US Department of Health and Human Services).*

ENDNOTES

1. "Investing in African Trade for our Common Future". Accessed 4/26/2015 from https://www.whitehouse.gov/the-press-office/2014/08/04/fact-sheet-investing-african-trade-our-common-future
2. Vera Songwe, "Fighting Ebola: A Strategy for Action". Africa Growth Initiative The Brookings Institution. January 2015. Accessed 4/22/2015 from http://www.brookings.edu/~/media/Research/Files/Reports/2015/01/foresight-africa/fighting-ebola-songwe.pdf?la=en
3. Ebola Situation Report – 29 July 2015. Accessed 08/04/2015 from http://apps.who.int/ebola/current-situation/ebola-situation-report-8-july-2015
4. "Ebola: Most African Countries Avoid Major Economic Loss but Impact on Guinea, Liberia, Sierra Leone Remains Crippling". World Bank. January 20 2015. Accessed 6/3/2015 from http://www.worldbank.org/en/news/press-release/2015/01/20/ebola-most-african-countries-avoid-major-economic-loss-but-impact-on-guinea-liberia-sierra-leone-remains-crippling
5. "Socio-Economic Impact of Ebola Virus Disease in West African Countries: A call for national and regional containment, recovery and prevention". United Nations Development Program (UNDP) – Western and Central Africa. February 2015
6. ACAPS Ebola Situation Update 14-20 April. Accessed 4/22/2015 from http://acaps.org/img/documents/e-acaps-ebola-situation-update-week-14-20-april-2015.pdf
7. Ebola Data and Statistics. World Health Organization. Geneva, Switzerland. Accessed 07/08/2015 from http://apps.who.int/gho/data/node.ebola-sitrep
8. ACAPS Ebola in West Africa: Impact on Health Systems. Briefing paper February 26, 2016. Accessed 4/23/2015 from http://acaps.org/img/documents/b-20150226_ebola_health_system.pdf
9. "Ebola Crisis in Guinea has set back malaria fight". BBC World News. 24 June 2015
10. Ebola Data and Statistics. World Health Organization. Geneva, Switzerland. Accessed 08/04/2015 from http://apps.who.int/gho/data/node.ebola-sitrep.quick-downloads?lang=en
11. "Socio-economic impact of the Ebola Virus Disease in Guinea, Liberia and Sierra Leone". United Nations Development Program. Policy Notes Volume 1, Numbers 1-5. October-November 2014. Available at http://www.africa.undp.org/content/dam/rba/docs/Reports/UNDP%20Policy%20note%20EN_web.pdf
12. "Socio-economic impacts of the Ebola Virus Disease on Africa". United Nations Economic Commission for Africa. December 2014.
13. "Socio-economic impacts of the Ebola Virus Disease on Africa". United Nations Economic Commission for Africa. December 2014.
14. Vera Songwe, "Fighting Ebola: A Strategy for Action". Africa Growth Initiative The Brookings Institution. January 2015. Accessed 4/22/2015 from http://www.brookings.edu/~/media/Research/Files/Reports/2015/01/foresight-africa/fighting-ebola-songwe.pdf?la=en
15. "Socio-economic impacts of the Ebola Virus Disease on Africa". United Nations Economic Commission for Africa. December 2014.
16. "Socio-economic impacts of the Ebola Virus Disease on Africa". United Nations Economic Commission for Africa. December 2014.
17. Kenya.Sy, Amadou, and Amy Copley. "Understanding the Economic Effects of the 2014 Ebola Outbreak in West Africa". Africa in Focus., 1 October 2014, Brookings Institution, Washington, DC. Accessed 06/15/2015 from http://www.brookings.edu/blogs/africa-in-focus/posts/2014/10/01-ebola-outbreak-west-africa-sy-copley
18. "Socio-economic impact of the Ebola Virus Disease in Guinea, Liberia and Sierra Leone". United Nations Development Program. Policy Notes Volume 1, Numbers 1-5. October-November 2014. Available at http://www.africa.undp.org/content/dam/rba/docs/Reports/UNDP%20Policy%20note%20EN_web.pdf
19. "Pandemic Risk and One Health". The World Bank Group. October 23, 2013. Accessed 06/12/2015 from: http://www.worldbank.org/en/topic/health/brief/pandemic-risk-one-health
20. Lee J, "Estimating the Global Economic Costs of SARS". Learning from SARS: Preparing for the Next Disease Outbreak: Workshop Summary. Accessed 6/3/2015 from http://www.ncbi.nlm.nih.gov/books/NBK92473/
21. J. Otte et al. "Impacts of Avian Influenza Virus on Animal Production in Developing Countries". CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources. 2008, 3 No. 080. Accessed 06/14/2015 from http://www.fao.org/docs/eims/upload//251044/aj201e00.pdf
22. Alastair Gale. "Fear of MERS Poses Risks to South Korea's Economy". Wall Street Journal. June 10, 2015. Accessed 06/19/2015 from http://www.wsj.com/articles/fear-of-mers-risks-infecting-south-koreas-economy-1433928403
23. "Pandemic Risk and One Health". The World Bank Group. October 23, 2013. Accessed 06/12/2015 from: http://www.worldbank.org/en/topic/health/brief/pandemic-risk-one-health
24. "Pandemic Risk and One Health". The World Bank Group. October 23, 2013. Accessed 06/12/2015 from: http://www.worldbank.org/en/topic/health/brief/pandemic-risk-one-health
25. Alastair Gale. "Fear of MERS Poses Risks to South Korea's Economy". Wall Street Journal. June 10, 2015. Accessed 06/19/2015 from http://www.wsj.com/articles/fear-of-mers-risks-infecting-south-koreas-economy-1433928403
26. Lee J, "Estimating the Global Economic Costs of SARS". Learning from SARS: Preparing for the Next Disease Outbreak: Workshop Summary. Accessed 6/3/2015 from http://www.ncbi.nlm.nih.gov/books/NBK92473/
27. J. Otte et al. "Impacts of Avian Influenza Virus on Animal Production in Developing Countries". CAB Reviews: Perspectives in Agriculture, Veterinary Science, Nutrition and Natural Resources. 2008, 3 No. 080. Accessed 06/14/2015 from http://www.fao.org/docs/eims/upload//251044/aj201e00.pdf
28. Adapted from Jones KE, et al. "Global Trends in Emerging Infectious Diseases". Nature. 451, 21st February 2008. Accessed 08/04/2015 from http://www.ecohealthalliance.org/writable/publications/nature06536.pdf
29. David Heymann et al. "Global Health Security: the wider lessons from the West African Ebola virus disease epidemic". Lancet. Vol 385. May 9th, 2015.
30. "One Health". UN System Influenza Coordination (UNSIC) Office. Accessed 06/12/2015 from: http://www.un-influenza.org/?q=content/one-health
31. Herrero, M., Havlik, P., McIntire, J., Palazzo, A. and Valin, H. 2014. African Livestock Futures: Realizing the Potential of Livestock for Food Security, Poverty Reduction and the Environment in Sub-Saharan Africa. Office of the Special Representative of the UN Secretary General for Food Security and Nutrition and the United Nations System Influenza Coordination (UNSIC), Geneva, Switzerland, 118 p.
32. Infectious Disease Risk Assessment and Management (IDRAM). Chatham House, the Royal Institute of International Affairs. London. UK. Accessed 8/5/2015 from http://www.chathamhouse.org/about/structure/global-health-security/extraction-industry-infectious-disease-risk-assessment-and-management-idram-project
33. "Investing in African Trade for our Common Future". Accessed 4/26/2015 from https://www.whitehouse.gov/the-press-office/2014/08/04/fact-sheet-investing-african-trade-our-common-future

Additional information can be obtained from:
African Strategies for Health 4301 N Fairfax Drive, Arlington, VA 22203 • +1.703.524.6575 • AS4H-Info@as4h.org
www.africanstrategies4health.org

This publication was made possible by the generous support of the United States Agency for International Development (USAID) under contract number AID-OAA-C-11-00161. The contents are the responsibility of the authors and do not necessarily reflect the views of USAID or the United States Government