Ebola

Ebola is a highly pathogenic virus. Evidence suggests that wild animals transmit the virus to humans and spreads in the human population through human-to-human transmission. Ebola virus disease (EVD), formerly known as Ebola Haemorrhagic fever, is an acute disease in humans, which is responsible for an average of 50% case fatality rate (1). The 2014–2016 outbreak in West Africa was the largest and most complex Ebola outbreak since the virus was first discovered in 1976 in DRC.

As of 27 March 2016, a total of 28,646 (confirmed, probable and suspected) Ebola cases and 11,323 deaths have been recorded in the three most affected countries, including Guinea (3811 cases and 2543 deaths), Liberia (10675 cases and 4809 deaths), and Sierra Leone (14124 cases and 3956 deaths) (2). Nigeria, Senegal and Uganda, however, successfully contained the spread of the virus. The worst affected countries are also among the poorest in the world, with healthcare systems that are not equipped to handle a health crisis of such magnitude. In 2010, Guinea, Liberia and Sierra Leone respectively had 10, 1.4 and 2.2 physicians and 4.3, 27.4 and 16.6 nurses per 100,000 people. The outbreak took a toll in the health sector, as many health workers have been infected or died in these countries. As of late May, 2015, Guinea, Liberia, and Sierra Leone, respectively, had lost 78, 83, and 79 doctors, nurses, and midwives to Ebola (3). The fact that health-care workers are at greater risk of contracting Ebola will exacerbate existing skill shortages in countries that had few health personnel.

The outbreak had immense economic and social impact. According to the World Bank’s estimates on GDP loss due to the Ebola Epidemic was US $ 7.4 billion in 2014 in West Africa. The outbreak also led to lower levels of employment, decreased demand for goods and services and business closures. Furthermore, schools were shut down in Sierra Leone, which means, students in those affected areas were more likely to lag behind in the educational levels.

Evidence suggests poor control precautions and burial practice with direct contact with the body of the deceased contribute in the transmission of Ebola. Ebola is spread through direct contact with blood and body fluids (urine, feces, saliva, vomit, sweat, and semen), broken skin or mucous membranes and contaminated objects (like needles). Ebola is not spread through the air, water, or food.

There's currently no licensed treatment or vaccine for Ebola, although potential new vaccines and drug therapies are being developed and tested. Therefore, it is important to understand the factors associated with the spread which will enable us to prepare better for the future outbreaks.

This pilot aims to understand the factors affected the spread of the 2014-2016 Ebola outbreak in West Africa. This pilot also attempts to understand whether we can build a data integration model to support prediction of the path of future outbreaks.

Ebola patient data (individual-level clinical data, WHO case report data); operational response (personnel, treatment units, cremation policy); rainfall; transport routes; census (population density and demographics of at risk populations); rumour datasets (social media); internet coverage; perceptions on Ebola can be used to better understand the spread of Ebola.

Reference:

1. Kucharski, A. J. & Edmunds, W. J. Case fatality rate for Ebola virus disease in West Africa. Lancet 384, 1260 (2014).

2. World Health Organization (2018). Ebola Operational Readiness and Preparedness. Available at: <http://apps.who.int/ebola/ebola-situation-reports>. [Accessed 10 Sep. 2018].

3. Evans, D.K., Goldstein, M. and Popova, A., 2015. Health-care worker mortality and the legacy of the Ebola epidemic. *The Lancet Global Health*, *3*(8), pp.e439-e440.