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Original article

Mining and emerging infectious diseases: Results of the Infectious Disease Risk Assessment and Management (IDRAM) initiative pilot

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ABSTRACT

Until recently the extractive industry has been largely unaware of the threat of emerging infectious diseases (EIDs), which have the potential to shut down entire operations. The 2014–15 West African Ebola outbreak changed this, drawing attention to the ramifications of disease outbreaks in terms of both human suffering and economic productivity. The Infectious Disease Risk Assessment and Management (IDRAM) pilot initiative in Katanga, Democratic Republic of Congo, has focused on an assessment of the kinds of risk reduction measures in place among selected companies; the industry's attitudes towards infectious disease control interventions, and; opportunities for collaboration among multiple stakeholders. The initiative found that despite having infection and prevention control measures in place for workers in camps, extractive companies cannot control outbreaks by themselves due to the close interactions with local communities and weak local health systems. Results also showed that EID prevention and control plans benefit both the company and the community and can be feasibly implemented. Consequently, companies should strengthen their risk reduction role by properly assessing the health consequences of their projects through an integrated Environmental Impact Assessment. Finally, partnering with health authorities, other companies, and external stakeholders could help to prepare and respond to infectious disease events.

1. Introduction

Despite progress during the 20th century in reducing the overall burden of infectious diseases worldwide (Lozano et al., 2012), they remain a significant public health challenge and place a major burden on global economies, especially in low and middle income countries (Dye, 2014; Forouzanfar et al., 2015). Beyond human suffering and community devastation, disease outbreaks have the potential to cause severe social, security, economic and development disruption for affected populations. The economic losses associated with SARS in 2003 amounted to at least US$80 billion (World Bank, 2012) and the economic impact of the deadly Ebola outbreak in the three most affected countries (Guinea, Liberia and Sierra Leone) is estimated to be at least $2.2 billion, over 12% of their combined GDP (World Bank, 2015). Indeed the World Economic Forum identified "spread of infectious diseases" as a serious risk factor worldwide in the report 'Global Risks 2015', due to its potentially dangerous and far-reaching consequences (World Economic Forum, 2015).

Extractive industry companies and their surrounding communities are especially vulnerable to such outbreaks. The 2014 Ebola outbreak resulted in a significant downturn in mining activities, as the planned expansion of ongoing projects was halted, the production of several mining companies was reduced, and some companies ceased their operations altogether (e.g. China Union) during the West African Ebola outbreak (World Bank, 2015). Ebola Virus Diseases (EVD) is an example of an Emerging Infectious Disease (EID). EIDs are diseases that have either appeared in a population for the first time, or that may have existed previously but are rapidly increasing in frequency or geographic range or – are old infections re-emerging as result of antimicrobial resistance. Although human history is shaped by infectious diseases emerging in new geographical areas and population groups (McNeill, 1976; Lederberg, 2000), the frequency of EID events over the past several decades has increased (Jones et al., 2008). The majority (60%) of EIDs are zoonoses (i.e. those infections originating from animal reservoirs) and three quarters of these come from wildlife (Taylor et al., 2001; Jones et al., 2008). The link between economic activities, environmental alteration and disease emergence has

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been demonstrated for EVD (WHO, 2015), but several other examples exist. For example, the initial outbreak of the Nipah virus in Malaysia (1998–1999) has been attributed to intensification of pig meat production in, or near to, orchards, coupled with deforestation of the natural habitat for fruit bats (the natural reservoir), increased agricultural production in orchards and climate change (Pulliam et al., 2011; Daszak et al., 2013). The bats passed the Nipah virus to pigs through urine, faeces, and saliva, contaminating the local pigsties (Field et al., 2001). The highly transmissible virus rapidly circulated among the pigs and then was transmitted to farmers and slaughterhouse workers (Chua, 2003, 2010). For these reasons the Institute of Medicine (Institute of Medicine, 2012) called for public–private partnerships between government and the industry to tackle the risks.

The risk of EIDs causing severe disruption is highest in low-income 'hotspots' (Jones et al., 2008), especially where surveillance and public health systems are weak; furthermore climate change is altering the geographical presence of vectors and its infectious diseases (Patz et al., 2008). Several of these areas, particularly in the tropics, have increasingly become important destinations for extractive industry operations. These areas are prone to zoonotic disease epidemics and their resultant devastation.

The extractive industry therefore can play a key role in the proactive management of EIDs, not only because of the risk posed by EIDs to their operations (as demonstrated during the Ebola in West Africa) but also because activities associated with extractive industries generate significant environmental, social, demographic, health, and economic changes – all of which are key drivers for disease emergence and outbreaks (Walsh et al., 1993; Morse 1995; Smolinski et al., 2003; Morens et al., 2004; Patz et al., 2004; Wilcox and Ellis 2006; Heymann and Dixon, 2012). These changes put extractive companies on the frontline of such outbreaks. For example, there is evidence pointing to association between the emergence of EVD and forest fragmentation and land clearing (Environmental Foundation for Africa and Foundation, 2015). Forest fragmentation and land clearance can bring potentially infected wild animals, including the bat reservoir for infections like Ebola, into closer contact with human settlements thus causing transmission to people, as occurred in Guinea in December 2013 (WHO, 2015). Current knowledge on the links between biodiversity, ecosystem services, socioeconomic and political factors, and human and animal health is far from complete (Sandifer et al., 2015); however, greater interactions between all these factors appears to increase the likelihood of infectious disease emergence (Weiss and McMichael, 2004).

The Infectious Disease Risk Assessment and Management (IDRAM) initiative was set up as a response to the challenges outlined above and is the first collaborative partner project between industry, academia and the public sector examining these issues.[1] IDRAM has a dual goal to: 1) Increase awareness of EIDs in the extractive industry, framing the issue in terms of business continuity and risk management and strengthening industry resilience in the face of disease outbreaks, and; 2) Facilitate the extractive industries contribution to national preparedness and response capabilities for EIDs and pandemics, thereby contributing to health system strengthening and improving the sustainability and coordination of disease control efforts in countries where they operate. This paper describes the initiative's pilot phase which involved a series of activities carried out in Katanga, Democratic Republic of Congo (DRC) in 2014. The pilot was developed as a proof of concept (Thabane et al., 2010; Institute of Medicine, 2012) to explore the feasibility of establishing collaborations among multiple stakeholders to manage EID risks. As such, the pilot included different research, operational, and joint dialogue components, including: a field assessment of preventive measures already in place among selected companies; a qualitative research study explored the industry's attitudes towards infectious disease control interventions, and; a joint simulated outbreak exercise to foster dialogue among multiple stakeholders. The pilot was based on the 'One Health' approach; defined as a collaborative effort of multiple disciplines to attain optimal health for people, animals, and the environment (FAO, OIE et al., 2008). Described is the methodology adopted, key findings for each of the three components, with recommendations for future activities.

2. Methodology of the pilot project

The pilot project carried out in Katanga, DRC in 2014 was conceived as a proof of concept study (Thabane et al., 2010; Institute of Medicine, 2012) exploring the feasibility of collaborations among public and private stakeholders, with a focus on extractive industries, to manage EID risks. The pilot was therefore conceptualised as a simultaneous operational and research project. The objectives were:

1) To assess what kind of preventive measures targeting disease transmission at the animal/human interface were already in place at selected mining sites comparing them against international best practices (USAID, 2012a,b). This allowed the team to assess the real practice of infectious disease control in mining operations located in EID hotspots and assess the desirability of partnering with operators for EID management.
2) To ascertain the level of awareness about EID risks within the mining sector through a qualitative study. This allowed the team to examine miners' perceptions of and attitudes toward this new topic and to confirm the interest of mining companies in being a partner in EID management.
3) To identify opportunities for collaboration between the mining sector and other stakeholders involved in outbreak preparedness and response. This was done through a series of desktop exercises and ongoing engagement with the industry.

The overall pilot project obtained support from the Katanga Governor and National and Provincial authorities. Four companies with headquarters located in different countries and in different phases of the mining project cycle were chosen for the pilot.

2.1. Field assessment of existing preventive measures at mining sites

Field work was conducted in June 2014 by a team of three experts (two international and one national) to assess the kind of preventive measures targeting disease transmission at the animal/human interface already in place at selected mining sites, and to compare these against international best practices (USAID, 2012a, b). The team visited five projects sites (one mining company was

[1] The partners involved in the pilot phase were Chatham House, Centre for Global Health Security (London) who convened the first meeting, engaged the partners in the dialogue and lead the initiative; USAID who was the project's principle funding agency and provided the overall framework of reference; International SOS managed the pilot project and provided technical expertise; Freeport McMoran – TenkeFungurume Mine, Tiger Resources – Kipoi Mine, MMG – Kinsevere Mine, and Mawson West – Dikulushi and Pweto Mine: Four mining companies operating in Katanga; Australia-Africa Mining Industry Group (AAMIG) as the industry association that facilitated scaling-up recommendations to its mining company members; FHI 360 and Ecology and Environment, providing subject matter and technical expertise; Provincial government and health authorities in the relevant countries; Provincial and regional academia and professional bodies from Lubumbashi University; National representatives of UN agencies and other international organizations with presence and partners in Katanga, and; the London School of Hygiene and Tropical Medicine and Public Health England as the leading research and public health institutes.

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