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Research Article

The Mining Industry Role in Emerging Infectious Diseases Preparedness and Response "Outside the Fence"

Abstract

Introduction: Emerging Infectious Diseases (EIDs) such as Ebola are a significant threat to global health. It is unclear whether the mining industry has adequately considered EID risks, and more generally the challenge of communicable diseases. The objective of this project was to explore the acceptability of measures to assess and mitigate the risk of EIDs in the mining industry.

Methodology: The study followed a qualitative methodology. Using purposive and snowball sampling, 18 telephone interviews were completed, in four international mining companies based in the Democratic Republic of Congo. Data were analysed thematically and comparatively; interview results were triangulated with findings from a field visit conducted by the research team.

Results: Mining companies had adequate infection prevention and control measures (IPC) "inside the fence" but were vulnerable to disease outbreaks "outside the fence", in the surrounding communities. To reduce their exposure to disease outbreaks and thus productivity loss, mining companies implemented health programmes in the surrounding communities and supported them when an outbreak took place. This included capacity building, providing resources, and sharing epidemiological intelligence and public health advice. The main barriers for further collaboration between mining companies and local health systems identified related to financial and feasibility issues, as well as the poor infrastructure and state of the health system.

Conclusions: The potential contribution of the industry to EID preparedness and response has not yet been maximised. Collaboration between mining companies and other stakeholders (e.g. NGOs and the public sector) could help prevent and control future outbreaks in a coordinated, economical manner and thus reduce loss of productivity and, most importantly, loss of lives.

Introduction

Emerging Infectious Diseases (EIDs) remain a significant threat to global health. The scale and frequency of outbreaks have increased since the beginning of the 21st century [1], and pose a major cost to the global economy [2]. Of all EID outbreaks, 60% are zoonotic, and 72% of those are transmitted by wildlife [1].

The mining industry often operates in areas where public health systems and control of communicable diseases are weak. In addition, mining operations can contribute to the risk of EID emergence through altering land use and human-animal interaction [3-9]. Consequently, mining companies and their surrounding communities are especially vulnerable to EIDs. For example, the West African Ebola outbreak resulted in a significant downturn in mining activities, as the planned expansion of projects was halted, the production of several

mining companies was reduced, and some companies ceased their operations altogether (e.g. China Union) [10]. The Ebola experience highlighted both the vulnerability of the private sector to disease outbreaks and its potential to play a role in combatting future outbreaks. Following these events, there have been calls for more rigorous implementation of the International Health Regulations, and better collaboration between public and private sectors [11].

Against this backdrop, understanding the private sector's role and how it can fit in with the public sector is critically important. The objective of this qualitative study was to explore the acceptability of implementing measures to assess and mitigate the risk of EIDs in the mining industry. Taking current practices and the perceptions of sector employees into account through this study, we have made several recommendations as to how the potential of the mining sector can be better harnessed to prevent and respond to future EID outbreaks, including linking with the public sector.

Methods

A qualitative approach was chosen; these methods are well suited to examining people's perceptions of and attitudes toward new topics, as well as for understanding how local contexts can influence policy implementation [12].

Study setting

The study was conducted with four international mining companies operating in Katanga. These four mining companies work in partnership with international organisations working under the Infectious Diseases Risk Assessment and Management⁽¹⁾ (IDRAM) initiative. The IDRAM initiative is intended to facilitate dialogue between the extractive industry and international development actors, finance institutions, national governments and public health stakeholders in order to better understand the risks of EIDs associated with the activities of the extractive industry.

⁽¹⁾<https://www.chathamhouse.org/about/structure/global-health-security/extraction-industry-infectious-disease-risk-assessment-and-management-idram-project>

Sampling

The four mining companies were part of the aforementioned partnership; these were selected to include companies of different sizes, stages of the project cycle, management structure, and headquarters location. We recruited 3-4 employees per company using purposive and snowball sampling. The aim when sampling was to include respondents whose responsibilities and experiences allowed us to investigate a range of perceptions towards EIDs prevention and mitigation management strategies. This range of responsibilities and experience was reflected in the sample, which included:

International directors (n=3) who were responsible for policy formulation and adoption, setting standards and regulations, allocating resources and promoting international collaboration.

Staff on site (n=15) who were in charge of the day to day camp management and providing health services. This entailed implementing policy, upholding regulations, establishing operational norms, infrastructure maintenance, food safety and security, waste and water management, biodiversity maintenance, safety enforcement, workers' and community's health, and responding to outbreaks. A breakdown of respondents by type of role is included below (Table 1).

Table 1: Breakdown of respondent roles.

Job type	Number of respondents
Medical/nursing	4
General management (senior/camp/country management)	7
Health and Safety	4
Community development	3

Data collection

Semi-structured telephone interviews were used to collect data. Participants were asked about current IPC measures at their mining-site, as well as their views on the barriers and facilitators to introducing new IPC measures. All interviews were carried out in English, lasting between 30-60 minutes, and were digitally recorded. Notes were taken in the absence of permission to record.

Data analysis

Transcripts were analysed by the research team using thematic and comparative analysis. Deviant cases were analysed to maximise the rigour of analysis [12], and interpretation disagreements were resolved by consensus. Interview results were triangulated with findings from a field visit conducted by the research team, and focused on comparing participants' reports on current IPC measures with observed practices at mining sites.

Ethics

The study was approved by FHI 360 and Lubumbashi University ethical review boards. Respondents received information about the study and they provided informed consent.

Results

Existing IPC measures

Our results indicate that the mining companies studied had good IPC measures in place "inside the fence"; that is, within the area controlled by the mining company. Broadly, these included measures to limit contact between humans and animals to avoid disease transmission, and measures to promote worker and community health in order to reduce the risk of EIDs occurring. For example, workers' accommodation and camp facilities were kept clean, rubbish was collected regularly, and food was kept in locked containers to avoid attracting nuisance animals. Safe food and water were available in camp and kitchen staff were regularly tested for infectious diseases. Hunting was strictly forbidden, whilst adequate nutrition for workers was ensured and efforts were made to preserve the little biodiversity remaining in the locality.

Simultaneously, respondents were aware of the vulnerability of mining-sites to the external environment in which they operated ("outside the fence"). Respondents considered the main source of risks to be located within the surrounding communities, where conditions were ideal for outbreaks due to weak health systems, poor infrastructure, poverty, and population movement and growth.

Roughly 70 per cent of the population has malaria and so in order to operate we have implemented a very extensive malaria control program to reduce those rates (...). That's a big challenge because you have to build an island essentially around your facilities and then spray the surrounding communities, but you can't spray all of the DRC. [Interview 2.3 HSE officer].

The environment “outside the fence” had negative implications for workers’ health and reduced the overall efficiency of the mining operation. For respondents, investing in developing health programmes in community settings and preventing workers from falling sick made “economic sense”. As one respondent put it:

Run of the mill exposures to different infectious diseases do cost the company a lot of money. From a financial aspect you can't afford the company to lose continuously hours and hours of man hours because of curable diseases. [Interview 4.2 Camp Manager]

According to respondents, mines not only invested in IPC measures to reduce the sickness rate among workers and thus improve the bottom line, but also in order to meet international industry standards and corporate social responsibility (CSR) commitments. Respondents mentioned adherence to international standards and CSR as an important factor in their company’s approach to health programming, which exceeded “anything that [was] demanded under the mining agreements with the Congolese government”. Compliance with regulations and standards was driven by both company performance and reputation. The latter was particularly important for international companies listed on stock exchanges in developed countries and dependant on international capital.

It's really been in the last ten years or so that the mining industry has tried to turn itself around and develop a better public impression, a better image with the public. A big company like this one is also a member of organisations like International Council of Mining and have subscribed to all kinds of international agreements and programmes. I mean we want to be seen to be doing the right thing. [Interview 1.1 Community Development Manager]

Addressing vulnerability to infectious diseases “outside the fence”

Implementing health programmes: Health programmes inside and outside the fence were designed based on the epidemiological profile of the area and addressed HIV/STIs, malaria, water, sanitation and hygiene (WASH), health care, occupational injuries, and health promotion on a wide range of issues. Respondents indicated that such programmes had led to long-standing and close relationships between companies and communities. For example, respondents stated that mines were supporting health services by building local capacity. This involved providing training and supervision for local health services. As a respondent stated:

We have someone in my team, a doctor with a background in public health, he has been recruited to assist the health zone so he spends I can say more than 50 per cent of his time with the team, just to identify their needs and he can correct on the spot. [He] also assists the local team to organise a proper training and supervises HIV and TB and STIs [activities]. [Interview 1.2 Medical Professional]

Since EIDs are not highly prevalent, these were not seen initially as a priority for intervention. However, the study took place as the 2014–16 Ebola outbreak was unfolding, bringing

into sharp focus the devastating consequences of EIDs for the mining industry. As one respondent commented:

We're very focused also on what's happening with Ebola; we're just about to send out to our people procedures and processes for how we're going to manage in our operation and reduce our exposure to it. [Interview 4.1 Senior Manager]

Providing disease outbreak response

Our results indicate that mining companies had significant experience in preventing and controlling disease outbreaks such as malaria and cholera within camps. Respondents acknowledged that, as the Ebola outbreak had demonstrated, outbreaks in the surrounding community also had the potential to bring mining operations to a halt. Thus, most respondents agreed that collaborating with other stakeholders and strengthening local health services was in “everyone’s best interest”. This involved capacity building and providing resources, and sharing epidemiological intelligence and public health advice.

Capacity building and providing resources: Respondents stated that mines supported and collaborated closely with local health zones and NGOs by building local capacity. This entailed providing training and supervision for local health services. As one respondent stated:

We have a doctor [in the team] with a background in public health, he has been recruited to assist the health zone so he spends [over] 50% of his time with the team, just to identify their needs and he can correct on the spot. [He] also assists the local team to organise proper training and supervises HIV, TB and STIs [activities]. [Interview 1.2 Medical Professional]

Another respondent described his company’s response to a cholera outbreak originating in two nearby communities; the mine worked in partnership with the health zone authority and Medecins Sans Frontieres (MSF) to address the epidemic. In this case, the mine had built an area adjacent to the community clinic for treatment tents, and provided fencing, electricity and equipment.

We assisted [MSF] and the health zone to ensure that those [cholera] outbreaks were controlled and provided them with the resources so that they could respond quickly to curtail or to control the outbreak [Interview 2.3 HSE Officer]

Sharing epidemiological intelligence and public health advice: Mines shared epidemiological intelligence during disease outbreaks. According to respondents, mines were required to register the occurrence of notifiable diseases in camp and report these to the Ministry of Health (MOH) in DRC. Mines had resources and procedures in place to fulfil this obligation including health facilities and qualified health workers in camp, as well as some diagnostic capability in their labs. Interview results also indicate that mines had good links with surrounding communities due to the health programmes they supported and through local workers embedded in these communities. These links meant they could investigate outbreak rumours and conduct health promotion activities.

For example, one respondent stated that in 2009, his mine identified the first case of H5N1 in DRC. The mine reported it to the MOH, as well as the WHO, and collaborated with these parties in the management of the outbreak response. Another respondent mentioned collaboration between mining companies, the government and NGOs to provide polio and measles vaccinations.

We've had a recent polio epidemic that affected large parts of Katanga. We arranged a mass polio vaccination campaign, organized partly through the government, provincial medical services and other NGOs, MSF etc. We have occasionally measles epidemics. Again, these [outbreaks campaigns] were organized. A lot of these sorts of things are due to failures in the national vaccination programme [Interview 2.2 Medical advisor]

An important finding is that mining companies had access to public health advice. Medical services in the mines had been issued with updated guidelines to manage potential Ebola cases by public health experts from ISOS. Public health experts were also drafted in to provide regular supervision or advice to local teams in specific circumstances. Thus, several respondents reported being well-supported and informed about new outbreak guidelines (e.g. Ebola).

From International SOS we have a link that is regularly updated and I'm getting additional information [about Ebola] from CDC and WHO websites [Interview 1.2. Medical Professional]

Barriers to strengthening local health services

Whilst respondents agreed that strengthening the local health system was in everyone's interest, this motivation was moderated by respondents' concerns over financial and feasibility issues. Health was neither considered core business nor expertise to the mining industry. Furthermore, respondents argued that mining companies were already providing more than local legislation currently requires and feared over-investing in community health programmes in case the Government relinquished responsibility altogether. For respondents, mining companies could not and should not replace government institutions, as ultimately it was the role of the state to provide services for communities.

I think people will say, 'Look, I'm here to mine, I'm not the government. I can't control, regulate, every animal and every person. People are responsible for themselves and there's the government here that should step up.' [Interview 5.3 Community development director]

Elaborating on this, other respondents noted that health issues were beyond their scope and expertise, which limited their involvement in EIDs control and prevention (e.g. health promotion).

There's a tremendous amount of work that's needed in just educating the public and the mining companies do not do that very effectively. We are miners, not communicators. [Interview 2.3 HSE Officer]

A major theme to emerge from the interviews was a sense of despair about the state of health systems and infrastructure

in Katanga Province, and DRC in general. Respondents mentioned poor transport infrastructure; long distances and a shortage of laboratories to process test results; and the lack of isolation facilities, healthcare workers and equipment. Several respondents drew comparisons between the measures recommended for dealing with a suspected Ebola outbreak and the reality of the situation in Katanga Province:

If we have an outbreak like Ebola there would be a problem of analysing the samples in Lubumbashi which is the second largest town in the country - they don't have the [necessary] reagents. They have to send them to Kinshasa which is over 2000 kilometres away. There are only regular scheduled flights, so if you miss the flight to Kinshasa there won't be another before two or three days while the disease keeps on spreading [Interview 1.4 Medical Professional]

Discussion

While we cannot make assumptions about the wider mining industry based solely on this study, our research has revealed important findings. We found that companies were aware of the ways in which mining operations can increase transmission of infectious diseases and were already implementing a comprehensive package of IPC measures "inside the fence". Our respondents were also aware that mining companies remain vulnerable to disease outbreaks, mostly due to the conditions "outside the fence". The recognition of the impact of a high burden of infectious diseases "outside the fence" on the health of the workforce "inside the fence" and, consequently, on the profitability of the mining operation, had contributed to the rationale for developing programmes to improve health and address infectious disease in the surrounding communities. This finding is consistent with research elsewhere [13].

Whilst respondents acknowledged the need to intervene in community settings, our findings indicate uncertainty around the role of mining companies in addressing community level health issues, which, for some respondents, is not considered a core part of the 'traditional' mining business [14]. This attitude may be changing though. Our research coincided with the Ebola outbreak in West Africa, emphasizing the catastrophic consequences of EIDs for the extractive industry. This increased respondents' awareness about the risks of EIDs for mining companies and highlighted that operations can do little to control outbreaks "outside the fence" while working in isolation.

Attempts have already been made by mining companies (both those in this study and elsewhere) to join forces with other actors (e.g. NGOs and government) in order prevent and control outbreaks of EIDs and other infectious diseases. For example, during the 2014 Ebola outbreak an informal network of private companies operating in West Africa was formed and became involved in a range of aspects of the response (e.g. data sharing, deployment, management of donations and advocacy) [15,16].

While the Ebola outbreak instigated collaboration between the private and public sector, this was unprecedented. Mining

companies have generally tended to work individually, focusing on short-term fixes rather than on sustainable improvements; for example by providing personal protective equipment or deploying logistical support, rather than strengthening the state health system) [17].

Overall, the potential contribution of the mining industry to EID preparedness and response has not yet been fully harnessed – neither in DRC nor elsewhere. This gap represents a wasted opportunity and several actions can be taken to encourage better coordination and cooperation between the mining industry and the public sector.

First, our results show that medical staff working for the mines had access to current guidelines and relevant information through ISOS (and other websites) and were already conducting some capacity building activities. Sharing information could be critical during an outbreak; local health workers in low-resource settings often lack up-to-date information and training, which negatively impacts on outbreak management. We suggest that longer term, coordinated investment in capacity building, such as joint training, should be conducted in partnership across mining companies and local health systems.

Second, mining companies could improve disease outbreak response and strengthen local health services by better sharing epidemiological data as has been done elsewhere [18,19]. Companies in our study reported that they already collect regular epidemiological data for the MOH. Our study could not determine how the MOH used this information, but given the weak infrastructure of the health system, it is likely that epidemiological data were not sufficiently exploited to prepare for and respond to disease outbreaks. Often located in remote locations where health services tend to be minimal, mining companies could act as a sentinel surveillance system for diseases occurring “inside” and “outside” the fence. Furthermore, the mining companies in our study appeared to have good access to surrounding communities through their workforce, dependants, and the existing support provided to community health programmes, and are thus in a good position to investigate rumours of disease outbreaks in the community.

Third, mining companies’ access to communities puts them in a unique position to play a major role in disease outbreak management: during the Ebola outbreak communities’ lack of trust in authorities, poor knowledge of the disease and socio-cultural factors were all identified as major drivers in spreading the epidemic, complicating the implementation of control interventions [20,21]. Mining companies could potentially provide more sustained support to local and international health authorities with effective community health promotion campaigns to encourage early referrals to care, adoption of preventive strategies and to address cultural practices that increase the transmission risk (e.g. burial practices).

However, the challenges of collaboration between the extractive industry and the public sector to strengthen health systems are substantial. Mining companies do not have the mandate, and neither are all sufficiently large or well-resourced to take on such responsibility [17]. Consequently,

our fourth recommendation is that a network should be established to pool resources and promote greater integration and coordination, comprising all relevant stakeholders: mining companies, MOHs, veterinary services, NGOs, WHO, research institutions, and UN bodies. Given the mining sector’s uncertainty around intervening in communities and lack of trust in national health systems, combined with a desire to act unilaterally, establishing such a network could be complex. [17]. Consequently a network would require clearly defined and agreed roles and responsibilities, raised awareness amongst staff at all levels, and the establishment of realistic plans to build capacity of health workers, health managers and public health staff. For example, mining companies operating in an area could share their financial and human resources to improve laboratory capacity and efficient sample processing to allow early disease diagnosis.

In conclusion, our study has indicated that while mining companies are currently aware of the risks of disease outbreaks, the potential contribution of the industry to EID preparedness and response has not yet been maximized. Although there are many actions that individual companies can take to reduce risk, collaboration between mining companies and other stakeholders (e.g. NGOs and the public sector) presents a win-win situation: effective partnerships have the potential to prevent and control future outbreaks in a coordinated, economical manner, in order to reduce loss of productivity and, most importantly, loss of lives.

Following the Ebola outbreak we face a significant opportunity to change perceptions around the role of the private sector in public health, and it is one that we must work together to bring about.

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