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# Public health governance and mining in Africa:

## Leveraging Africa's critical minerals boom for public health and sustainable development

**By Connor Gregory, Ciara M. Weets, and Rebecca Katz**

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### Cover

Artisanal miners work at a cobalt mine-pit in Tulwizembe, Katanga province, Democratic Republic of Congo, November 25, 2015. Picture taken November 25, 2015.

Source: Reuters/Kenny Katombe


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## Bottom lines up front

- Surging global interest in critical minerals presents a rare opportunity to fully embed public health protections into mining operations.
- Mining companies that invest in disease surveillance, health infrastructure, and pandemic preparedness protect their bottom line and their social license to operate.
- Development corridors like the Lobito Corridor can serve as testing grounds for cross-border health cooperation and integrated approaches to mining regulation.

# Introduction

As the global critical minerals race heats up, resource-rich African countries once again face a double-edged opportunity to harness a wave of investment and economic opportunity in the mining sector, while avoiding resource-curse pitfalls and advancing public health. The continent is home to vast reserves of critical minerals essential to myriad technological applications, including the manufacturing of clean energy technologies and the production of weapons systems critical to national security.

The Democratic Republic of the Congo (DRC), Zambia, South Africa, and Zimbabwe are among the continent's prominent players in the global critical minerals market, while smaller countries like Gabon, Madagascar, and others are also home to reserves of minerals that will power the green energy transition.[1] These and other African countries hold significant reserves of cobalt, copper, lithium, manganese, graphite, and rare earth metals, resources that are indispensable to electric vehicle batteries, renewable energy storage, semiconductor production, and defense applications. As demand for these resources could rise by a factor of between two and three by 2030 and continue to increase through 2050, Africa is positioned to harness a once-in-a-generation opportunity to achieve sustainable growth and development.[2]

However, mining—in both its large-scale (LSM) and artisanal, small-scale (ASM) forms—has long been associated with poor public health outcomes and environmental degradation. Infectious disease outbreaks and zoonotic spillover events have been linked to mining areas, and mining activities often involve occupational injuries, exposure to toxic substances, respiratory illness from dust and emissions, and waterborne diseases from contaminated runoff. Moreover, the in-migration to a region that often accompanies new extraction projects can lead to stressed infrastructure and social changes that contribute to increased rates of HIV and other sexually transmitted infections (STIs). Mining also poses unique challenges to children's and women's health.[3]

Meanwhile, there has been little or no institutionalization of health impact assessments (HIAs) in the African mining sector to mitigate these impacts. For their part, industry associations like the Initiative for Responsible Mining Assurance (IRMA) and the International Council on Mining and Metals (ICMM) have developed standards and guidance on occupational safety and environmental protection.[4] Mining companies often voluntarily implement corporate social responsibility (CSR) programs that include community health initiatives, disease control partnerships, and investments in local clinics or infrastructure.

1 Wenjie Chen, Athene Laws, and Nico Valckx, "Harnessing Sub-Saharan Africa's Critical Mineral Wealth," International Monetary Fund, April 29, 2024, https://www.imf.org/en/News/Articles/2024/04/29/cf-harnessing-sub-saharan-africas-critical-mineral-wealth.

2 International Energy Agency, Global Critical Minerals Outlook 2024 (Paris: IEA, 2024): 93, https://iea.blob.core.windows.net/assets/ee01701d-1d5c-4ba8-9df6-abeeac9de99a/GlobalCriticalMineralsOutlook2024.pdf.

3 See the Public health and mining in Africa section and box 4 below.

4 See box 2 below.

However, these efforts can be fragmented, reactive, and implemented primarily to satisfy compliance or public relations requirements.[5] Examples of successful public health interventions by private mining companies exist, but CSR programs often do not meaningfully engage with broader public health systems, long-term, cross-border disease surveillance, or preventive care.

But investment in mining can and has produced public health benefits, too. In some contexts, mining companies provide healthcare services directly to miners and surrounding communities.[6] Along with the oil and gas industry, more than half of total direct financing and in-kind donations for malaria control programs in low- and middle-income countries have been provided by minerals companies.[7] More broadly, increased income and economic activity resulting from mining operations can help reduce poverty and expand access to essential services, two key social determinants of health.[8]

Global demand for cobalt, copper, lithium, and other transition minerals is soaring.[9] As a result, Africa is central to the global push for cleaner energy and supply chain diversification. But realizing the full potential of this moment requires more than just mineral extraction: It requires intentional and creative solutions that elevate public health as a strategic priority for investors, mining companies, and African governments.

The global race to secure critical mineral supply chains has drawn strategic attention and investment from both established powers and new entrants. China remains the dominant incumbent across the African critical minerals supply chain,[10] while the United States and the European Union have accelerated efforts to diversify supply and reduce strategic vulnerabilities.[11] Gulf States like Saudi Arabia and the United Arab Emirates (UAE) have also emerged as key players entering the market for critical minerals in Africa.[12] Amid this shifting geopolitical landscape, public health represents one potential avenue through which new entrants might differentiate themselves from incumbents. Doing so may improve a company's bottom line (and investors' return on investment) through healthier, more stable workforces, while also affirming its social license to operate in a host country.

This report explores the intersection of mining and public health in Africa. While ASM is prevalent across the continent, the report focuses on the public health opportunities and challenges posed by large-scale mining. LSM projects are industrial operations managed by large multinational or state-owned companies and often involve heavy machinery, extensive extraction, and long-term infrastructure investment. As such, both the scale of and stakeholders involved in LSM make it a strong platform for adopting and operationalizing the public health recommendations outlined here. The report also spotlights the Lobito Corridor, which links Angola, the DRC, and Zambia. It then discusses other prominent mining-driven development corridors, development corridors generally, and their implications for public health.

To ensure such projects deliver on their full promise, public health should be prioritized as a core consideration, not a peripheral concern. To that end, this paper concludes with recommendations for key stakeholders. The analysis and recommendations are aimed at a range of actors:

- Investors, who can emphasize that managing the public health risks of mining activities is not only a humanitarian imperative, but a strategic choice for safeguarding returns on investment;
- Mining companies, whose respective abilities to operate depend on a healthy workforce and whose social licenses in an area are influenced by public health performance;

5 Afua Hirsch, "Mining Firms Fret as Ebola Hits West," Guardian, August 15, 2014, https://www.theguardian.com/sustainable-business/2014/aug/15/mining-ebola-africa-nigeria-liberia-guinea-riotinto-vale; Abigail Hilson, Gavin Hilson, and Suleman Dauda, "Corporate Social Responsibility at African Mines: Linking the Past to the Present," Journal of Environmental Management 241 (July 1, 2019): 340–52, https://doi.org/10.1016/j.jenvman.2019.03.121; and Ralph Hamann and Paul Kapelus, "Corporate Social Responsibility in Mining in Southern Africa: Fair Accountability or Just Greenwash?," Development 47, no. 3 (September 2004): 85–92, https://doi.org/10.1057/palgrave.development.1100056.

6 Patrick Osewe, "Better Health in Mines and Mining Communities: A Shared Responsibility," Investing in Health, World Bank (blog), March 6, 2015, https://blogs.worldbank.org/en/health/better-health-mines-and-mining-communities-shared-responsibility.

7 National Academies of Sciences, Engineering, and Medicine, "Addressing Continuous Threats: HIV/AIDS, Tuberculosis, and Malaria," Global Health and the Future Role of the United States (Washington: National Academies Press, 2017): 122, https://www.ncbi.nlm.nih.gov/books/NBK458475/.

8 Raina M. Maier et al., "Socially Responsible Mining: The Relationship between Mining and Poverty, Human Health and the Environment." Reviews on Environmental Health 29, no. 1–2 (January 1, 2014), https://doi.org/10.1515/reveh-2014-0022.

9 IEA, Global Critical Minerals Outlook 2024, 6.

10 Kris Cooper, "A Deep Dive into China's Role as 'Critical Mineral Monolith,' " Mining-Technology.com, October 2024, accessed July 8, 2025, https://www.mining-technology.com/features/a-deep-dive-into-chinas-role-as-critical-mineral-monolith/#:~:text=China's%20share%20of%20the%20critical,chain%20end-to-end.

11 Landry Signé, "A New U.S.–Africa Blueprint for Trump amid China's Rise," Brookings Institution (blog), May 27, 2025, accessed July 8, 2025, https://www.brookings.edu/articles/a-new-us-africa-blueprint-for-trump-amid-chinas-rise/; and "Critical Minerals and EU-Africa Strategic Partnerships: Where Do We Stand?," Webinar, Chaired by Ludivine Wouters, European Council on Foreign Relations, September 25, 2024, https://ecfr.eu/event/critical-minerals-and-eu-africa-strategic-partnerships-where-do-we-stand/.

12 Chloe Cornish and Harry Dempsey, "How Gulf States Are Putting Their Money into Mining," Financial Times, April 1, 2024, https://www.ft.com/content/59298650-540a-43cd-86f8-a6c6db0aa906.


People are seen walking in the compound of Kabgayi hospital, south of Rwanda capital Kigali where Zipline, a California-based robotics company delivered their first blood to patients using a drone October 13, 2016. Picture taken October 13, 2016.Source: REUTERS/James Akena

- African ministries of health (MOH), particularly those in resource-rich regions, and other regional health organizations like the Africa Centres for Disease Control and Prevention (Africa CDC), which have an opportunity to leverage global demand for critical minerals by advocating for public health advancements in the mining sector; and

- Each of the above stakeholders, who have an opportunity to use the boom in mining activity to support innovative cross-border disease-control and data-sharing programs.

First, all stakeholders should utilize development corridor projects, including the Lobito Corridor, as opportunities to implement innovative cross-border disease surveillance and data-sharing programs. Second, African countries, but particularly those facing decades of forecasted demand for their critical minerals, should institutionalize One Health-integrated HIA requirements in national mining codes and regulatory frameworks to ensure that occupational and public health impacts are considered from the initial visioning of a mining project to its implementation and later monitoring and evaluation. (Figure 1 below describes the One Health framework.) Third, mining companies and industry associations should integrate public health considerations more fully into their CSR frameworks and best practices guidance, respectively. Fourth, all stakeholders should find opportunities to integrate and elevate public health considerations more centrally into the ongoing discourse on mining. Fifth, mining companies and investors should be encouraged to purchase pandemic insurance or reinsurance to mitigate risk and reinforce the importance of epidemic preparedness. Sixth, the direct provision of healthcare and public health services to mine workers and surrounding communities should be promoted more widely across the sector. Finally, stakeholders should support mechanisms for robust information-sharing and coordination among mining companies, African ministries of health, Africa CDC, and other regional and subregional health bodies.

# Public health and mining in Africa

Over the past two decades, a growing body of literature has documented the health impacts of mining in Africa. Much of this research highlights patterns of disproportionate and preventable harm to miners, as well as to surrounding communities and ecosystems. These impacts align with the principles of One Health, which recognize the interconnectedness of human, animal, and environmental health (see figure 1). The consequences of mining to human health can be broadly categorized into direct health impacts and indirect health externalities driven by environmental and ecological changes.

Insufficient regulations across sectors and fragmented health systems are major obstacles to addressing the health risks of mining. This review synthesizes ongoing work to illustrate these challenges and underscore the need for coordinated, multisectoral approaches to health governance in resource-rich African countries.

## Direct health risks associated with mining in Africa

Mining poses significant direct health risks to active and ex-miners, as well as members of surrounding communities. Studies in sub-Saharan Africa show that miners face substantially higher mortality risks compared to nonmining community members.[13] Similarly, mortality rates among ex-miners are approximately 20 percent higher than those of nonminers within comparable demographic groups.[14] These disparities for active and ex-miners are primarily driven by injuries and illnesses resulting from inadequate personal protective equipment (PPE) and insufficient mine infrastructure. Additionally, individuals who have engaged in mining activities and those in the surrounding communities are at increased risk for disease associated with prolonged heavy metal exposure.

Inadequate PPE and insufficient mine infrastructure increases the risk of morbidity and mortality associated with mining injuries and diseases related to particulate inhalation. Landslides, mine collapses, and falls are among the leading causes of morbidity for active miners. However, long-term health risks are primarily driven by the inhalation of respirable crystalline silica, a fine particulate matter released during the disturbance of rock or stone. Exposure to this particulate matter is associated with an increased risk of lung cancer, chronic obstructive pulmonary disease (COPD), and kidney disease in both current and former miners.[15] Prolonged exposure can also lead to silicosis, a progressive and potentially fatal lung disease characterized by extensive pulmonary fibrosis and respiratory failure.[16] In addition to chronic respiratory illnesses, long-term exposure to silica and other dust particles also heightens susceptibility to pulmonary tuberculosis, compounding the disease burden among active and former miners.[17]

Beyond diseases caused by respirable particulates, miners and surrounding communities also face serious health risks posed by direct exposure to heavy metals. Such exposure can have broad physiological and developmental effects on human populations. Many of the metals targeted by ASM (e.g., gold and copper) tend to be found alongside hazardous materials, including arsenic, mercury, and lead, or are themselves potentially harmful to exposed populations (e.g., cobalt, uranium). Exposure to these heavy metals has been associated with increased risks of cancer affecting multiple organ systems, as well as progressive damage to the cardiovascular and central nervous systems, including the onset of serious neurological

13 Kate Bloch et al., "Precarious Transition: A Mortality Study of South African Ex-Miners," BMC Public Health 18, no. 1 (July 11, 2018): 862, https://doi.org/10.1186/s12889-018-5749-2.

14 Bloch et al., "Precarious Transition."

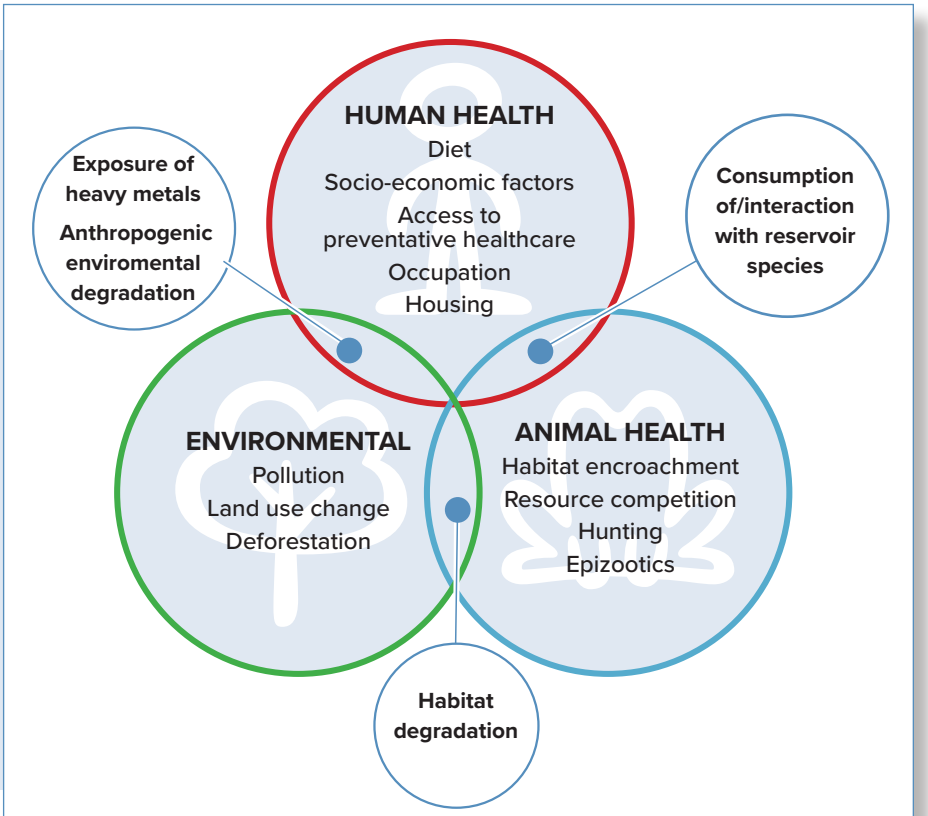
15 Occupational Safety and Health Administration (OSHA), "Silica, Crystalline – Overview," OSHA, US Department of Labor, accessed July 1, 2025, https://www.osha.gov/silica-crystalline.

16 National Institute for Occupational Safety and Health, "Mining and Silicosis," US Centers for Disease Control and Prevention, US Department of Health and Human Services, October 9, 2024, https://www.cdc.gov/niosh/mining/topics/silicosis.html.

17 Alon Unger and Patrick Zimble, "Public Health and Public Order: The Law Enforcement Role in Emergency Medical Services," Prehospital and Disaster Medicine 23, no. 1 (2008): 42–49, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2078150/; and Nathan Cortez, "Patients Without Borders: The Emerging Global Market for Patients and the Evolution of Modern Health Care," Indiana Law Journal 83, no. 1 (2008): 71–132, https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3036676/.

FIGURE 1: **Select impacts of mining viewed through the one health framework**

One Health is an integrated approach to understanding and managing health risks at the interface of human, animal, and environmental systems. It emphasizes that the health of people is inherently connected to the health of animals and the ecosystems they share. This framework encourages cross-sector collaboration to prevent, detect, and respond to health challenges. Applying a One Health approach is essential for addressing both the direct and indirect health impacts of activities such as mining, where changes to ecosystems and the environment have broad consequences for human health.




**Select impacts of mining viewed through the one health framework**

disorders.[18] Lead exposure, in particular, has been strongly associated with cognitive and developmental impairments in children living near mining sites or exposed in utero.[19] Additionally, paternal exposure to cobalt has been associated with elevated risks of birth defects, underscoring the intergenerational consequences of mining-related contamination.[20]

## Indirect health risks associated with mining in Africa

Mining has significant environmental impacts that in turn have significant effects on human health. Access to clean water, a critical but often limited resource, is further strained by ASM, which is highly water-intensive. As mining operations consume local water supplies, communities are forced to rely on increasingly scarce and contaminated resources. The use of unsafe water increases the risk of water-borne diseases, such as cholera and typhoid. In addition, the excavation process exposes heavy metals that leach into surface and groundwater, contaminating drinking sources and increasing the risk of toxic exposure.[21] Mining also reduces soil fertility and undermines food security by degrading soil quality. Resulting undernutrition weakens immune defenses, making affected populations more susceptible to infectious diseases.

Mining may also increase the risk of emerging infectious disease (EID) events and has been linked to several recent outbreaks (see figure 2 below). As a major driver of land use

18 Philip Landrigan et al., "Reducing Disease and Death from Artisanal and Small-Scale Mining (ASM): The Urgent Need for Responsible Mining in the Context of Growing Global Demand for Minerals and Metals for Climate Change Mitigation," Environmental Health 21, no. 1 (2022): 78, https://ehjournal.biomedcentral.com/articles/10.1186/s12940-022-00877-5.

19 World Health Organization (WHO), Regional Office for Africa, Lead Exposure in African Children: Contemporary Sources and Concerns, 2015, https://apps.who.int/iris/bitstream/10665/200168/1/9780869707876.pdf.

20 Daan Van Brusselen and Tony Kayembe-Kitenge, "Metal Mining and Birth Defects: A Case-Control Study in Lubumbashi, Democratic Republic of the Congo," Lancet Planetary Health 4, no. 4 (2020): e164–e171, https://www.thelancet.com/journals/lanplh/article/PIIS2542-5196(20)30059-0/fulltext.

21 George Ofosu and David Sarpong, "Beyond the Doom: Sustainable Water Management Practices of Small-Scale Mining Operations," Resources Policy 77, no. 102649 (2022): 1, https://doi.org/10.1016/j.resourpol.2022.102649.

change, mining contributes to widespread deforestation and the loss of farmland.[22] Displaced farmers often exacerbate deforestation by moving deeper into forested areas, accelerating biodiversity loss and increasing the likelihood of human-wildlife interactions.[23] Likewise, declining soil fertility reduces crop yields, driving some populations toward hunting and consuming wild animals, commonly referred to as bushmeat.[24] Biodiversity loss, closer contact with wildlife, and bushmeat consumption have all been linked to increased spillover events, which refer to instances where pathogens circulating in animal populations jump species into humans.[25] By driving ecological degradation and risky human-wildlife interactions, mining creates conditions that are increasingly recognized as high-risk pathways for the emergence of future epidemics.[26]

To combat the risks associated with mining, many companies have implemented infection prevention and control practices in mining and surrounding communities. They have done so primarily as a means of bolstering the health of their employees. For example, some companies have utilized training protocols to ensure safe mining practices and proper use of PPE to decrease the direct health risks of miners, instituted rules to decrease interactions between wildlife and miners, and improved water and sanitation practices in communities near the mines.[27] In addition, miners and their dependents often have access to healthcare that is not available to the broader population.[28] While these actions have had demonstrable health benefits for miners and surrounding communities, they are typically voluntary and company-driven.[29] Strongly encouraging engagement with public health authorities, for example to share disease surveillance data, should be considered a best practice.

22 Bismark Mensah-Brako et al., "Satellite Remote Sensing and GIS based Watershed Analysis: Implications for Soil and Water Conservation Practices in the Denkyira Watershed, Ghana," American Scientific Research Journal for Engineering, Technology, and Sciences 83, no. 1 (2021): 142–154, https://asrjetsjournal.org/index.php/American_Scientific_Journal/article/view/7133; Divine Gbedzi, "Impact of Mining on Land Use Land Cover Change and Water Quality in the Asutifi North District of Ghana, West Africa," Environmental Challenges 6, no. 100441 (2022), https://doi.org/10.1016/j.envc.2022.100441; Aboka Yaw Emmanuel et al., "Review of Environmental and Health Impacts of Mining in Ghana," Journal of Health & Pollution 8, no. 17 ( 2018): 43–52, https://doi.org/10.5696/2156-9614-8.17.43; and Ofosu and Sarpong, "Beyond the Doom."

23 Vivian Schueler et al., "Impacts of Surface Gold Mining on Land Use Systems in Western Ghana," Ambio 40, no. 5 (2011): 528–539, https://doi.org/10.1007/s13280-011-0141-9.

24 Björn Schulte-Herbrüggen et al., "The Importance of Bushmeat in the Livelihoods of West African Cash-Crop Farmers Living in a Faunally-Depleted Landscape," PLOS ONE 8, no. 8 (2013): e72807, https://doi.org/10.1371/journal.pone.0072807; and María Cruz López-Benítez and Miguel A. Araújo, "Edge Effects on the Persistence of Wildlife Populations in Remnant Forest Patches," Biological Conservation 214 (2017): 11–17, https://doi.org/10.1016/j.biocon.2017.08.018.

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26 Michael B. Mahon et al., "A Meta-Analysis on Global Change Drivers and the Risk of Infectious Disease," Nature 629, no. 8013 (2024): 830–836, https://doi.org/10.1038/s41586-024-07380-6.

27 Ana Llamas et al., "The Mining Industry Role in Emerging Infectious Diseases Preparedness and Response 'Outside the Fence,' " Open Journal of Tropical Medicine 1, no. 1 (2017): 1–6, https://doi.org/10.17352/ojtm.000001.

28 T. M. Balfour, "Health Services in the South African Mining Industry," Occupational and Environmental Medicine 75, Suppl. 2 (2018): A175, https://oem.bmj.com/content/oemed/75/Suppl_2/A175.1.full.pdf.

29 Dominik Dietler et al., "Impact of Mining Projects on Water and Sanitation Infrastructures and Associated Child Health Outcomes: A Multi-Country Analysis of Demographic and Health Surveys in Sub-Saharan Africa," Globalization and Health 17, no. 70 (2021), https://doi.org/10.1186/s12992-021-00723-2.

FIGURE 2: **Select disease outbreaks and linkages to mining in Africa**


| DISEASE OUTBREAK | LOCATION OF OUTBREAK OR TRANSMISSION HOTSPOT | YEAR(S) | CONFIRMED OR PROBABLE CASES | CASE FATALITY RATE (CFR) | INDEX CASE OR SIGNIFICANT IMPACT ON MINING SECTOR |
|---|---|---|---|---|---|
| **Mpox Clade 1b**[1] | South Kivu Province, DRC | 2023-2025 | ~25,000 | 2.5% | Index case |
| **Marburg Virus Disease**[2] | Kigali, Rwanda | 2024 | 66 | 23% | Index case |
| **Ebola Virus Disease**[3] | North Kivu Province, DRC | 2019 | ~3,300 | 66% | Significant impact |
| **Marburg Virus Disease**[4] | Ibanda District, Uganda | 2007 | 4 | 25% | Index case |
| **Marburg Virus Disease**[5] | Haut Uélé Province, DRC | 1998-2000 | 150 | 83% | Index case |
| **Ebola Virus Disease**[6] | Makokou, Gabon | 1994 | 49 | 57% | Significant impact |

Sources:


1 Center for Health Security. *Situation Update September 16, 2024: Mpox Clade I and Clade II*. Johns Hopkins University, 2024. https://publichealth.jhu.edu/sites/default/files/2024-09/mpox-su-91624.pdf; https://pmc.ncbi.nlm.nih.gov/articles/PMC12092280/

2 Butera, Y., L. Mutesa, E. Parker, et al. "Genomic and Transmission Dynamics of the 2024 Marburg Virus Outbreak in Rwanda." *Nature Medicine* 31 (2025): 422–426. https://doi.org/10.1038/s41591-024-03459-9.

3 Shears, P., and C. Garavan. "The 2018/19 Ebola Epidemic in the Democratic Republic of the Congo (DRC): Epidemiology, Outbreak Control, and Conflict." *Infection Prevention in Practice* 2, no. 1 (January 24, 2020): 100038. https://doi.org/10.1016/j.infpip.2020.100038.

4 Adjemian, J., E. C. Farnon, F. Tschioko, J. F. Wamala, E. Byaruhanga, G. S. Bwire, E. Kansiime, A. Kagirita, S. Ahimbisibwe, F. Katunguka, B. Jeffs, J. J. Lutwama, R. Downing, J. W. Tappero, P. Formenty, B. Amman, C. Manning, J. Towner, S. T. Nichol, and P. E. Rollin. "Outbreak of Marburg Hemorrhagic Fever among Miners in Kamwenge and Ibanda Districts, Uganda, 2007." *Journal of Infectious Diseases* 204, Suppl. 3 (November 2011): S796–99. https://doi.org/10.1093/infdis/jir312.

5 Towner, J. S., T. K. Sealy, M. L. Khristova, C. G. Albariño, S. Conlan, S. A. Reeder, P. L. Quan, et al. "Marburg Virus Infection Detected in a Common African Bat." *New England Journal of Medicine* 352, no. 24 (2005): 2419–2430. https://doi.org/10.1056/NEJMoa051465.6 https://pmc.ncbi.nlm.nih.gov/articles/PMC7165779/

6 Stein, R. A. "What Is Ebola?" The International Journal of Clinical Practice, December 11, 2014. https://doi.org/10.1111/ijcp.12593.

# Public health governance and mining in Africa

In mining (as in any human capital-intensive and externality-producing industry), legal and regulatory frameworks can be critical mediators between wealth creation and the public interest. Despite the public health implications described above, African mining codes largely have not imposed public health-oriented requirements on companies and have lacked adequate enforcement capacity for the protections that do exist. Where mining codes include health considerations, they are often in the context of environmental regulation or refer to occupational health and safety rather than policing mining activities' potential impacts on public health in the region or country more generally.

African mining codes and regulations have evolved with the sector over the last several decades. The sector is currently experiencing a "fourth generation" of African mining codes since the 1980s.[30] The first generation of mining codes emerged in the 1980s during a period of economic liberalization and emphasized attracting foreign investment. These codes significantly reduced the state's role in the mining sector. The second and third generations of mining codes, spanning the 1990s, introduced nominal environmental and social safeguards. These frameworks shifted responsibility for social and environmental protections to private actors. African governments, particularly after relinquishing much oversight to private actors with earlier codes, often lacked the regulatory capacity or political leverage to enforce these safeguards.

The fourth generation is associated with reforms made since the 2000s. The revised or new mining regulations in this generation have reflected a growing emphasis on transparency, accountability, and sustainable development.[31] This generation of codes has been characterized by the rise of voluntary transnational governance instruments like the Extractive Industries Transparency Initiative (EITI) and the 2009 Africa Mining Vision, which have informed and been incorporated into mining codes across the continent. While these instruments have encouraged greater self-regulation by mining companies,[32] the 2023 EITI Standard—the "global benchmark for transparency and accountability" in the mining sector—makes no mention of health.[33]

The fourth generation also reflects a shift toward multistakeholder governance, with mining companies, host governments, civil society organizations, and international institutions playing active roles. Additionally, mining companies increasingly use voluntary initiatives and CSR frameworks to address environmental, social, and governance concerns. However, mining companies' respective CSR policies have been criticized as focusing more on managing reputation and financial benefits than on effectiveness.[34]

The World Health Organization's 2003 Extractive Industry Report strongly supported the idea of companies providing access to health services for local communities, yet the health impacts of mining have rarely been at the center of reforms.[35] Instead, common objectives emphasized in African nations' mining codes over their evolution include: regulating ASM; strengthening local capacity for mineral development; promoting private-sector participation; developing and strengthening local capacity for mineral development; addressing child labor in the mining sector; promoting gender equality in the mining sector; and increasing value addition and revenue generation.[36] But public health remains weakly integrated. For instance, while mining codes contain references to occupational health and safety, no African country's mining codes actively promotes or requires the use of HIAs.[37] Acknowledging this gap, policy leaders in Africa have recognized the need for a multisectoral approach to protecting public health and, in 2023, aimed for all African member states to have institutionalized and integrated

30 Bonnie Campbell, "Mining Codes in Africa: Emergence of a 'Fourth' Generation?," Review of African Political Economy 40, no. 137 (2013): 483–500, https://doi.org/10.1080/09557571.2013.840823.

31 Victoria R. Nalule, "Modernisation of the Mining Laws and Key Issues for Consideration in Africa," in Mining Law and Governance in Africa, 1st ed. (Abingdon, UK: Routledge, 2023): 3–21.

32 Nalule, "Modernisation."

33 "EITI Standard 2023," Extractive Industries Transparency Initiative, June 1, 2023, https://eiti.org/eiti-standard.

34 Leigh Stringer, "Mine Industry Scrambling to Cope with Ebola Crisis," Guardian, August 15, 2014, accessed July 2025, https://www.theguardian.com/sustainable-business/2014/aug/15/mining-ebola-africa-nigeria-liberia-guinea-riotinto-vale; Abigail Hilson et al., "Corporate Social Responsibility at African Mines: Linking the Past to the Present," Journal of Environmental Management 241 (2019): 340–52, https://doi.org/10.1016/j.jenvman.2019.03.121; and Hamann and Kapelus, "Corporate Social Responsibility in Mining in Southern Africa."

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36 Victoria R. Nalule, Mining Law and Governance in Africa: Transformation and Innovation for a Sustainable Mining Sector (London: Routledge, 2024), 17.

37 Ofosu and Sarpong, "Beyond the Doom."

**Box 1: Two mining-sector organizations offer good-governance approaches**

The Initiative for Responsible Mining Assurance (IRMA) and the International Council on Mining and Metals (ICMM) are two leading examples of voluntary governance initiatives in the mining sector. IRMA is a third-party certification system designed to assess industrial-scale mine sites against a comprehensive standard of best practices. IRMA certification is granted at the mine site, rather than at the company level, but encourages companies to enter its mines at any stage of performance and pursue improvement over time. IRMA spans twenty-six topics and includes a robust set of health-related provisions. For example, IRMA certification requires that companies implement health and safety management systems, conduct ongoing risk assessments based on recognized methodologies, and maintain accurate records of workplace monitoring, health surveillance, and incident reporting.

IRMA's guidance recognizes that mining's health impacts extend beyond a particular mine site and its workers. To this end, IRMA requires companies to engage local stakeholders like public health officials, health service providers, and community representatives in identifying and mitigating health risks. Notably, the IRMA framework explicitly addresses emerging infectious diseases, imposing specific requirements on companies operating in areas with significant risks of community exposure to HIV/AIDS, tuberculosis, malaria, and other emerging infectious diseases related to mining activities.

Meanwhile, the ICMM, whose company members represent one-third of the global mining and metals industry, sets expectations through its Mining Principles: They are developed "collaboratively with associations and stakeholders to maximise the mining and metal industry's contribution to sustainable development." ICMM's principles address environmental, social, and governance performance across the sector.

One of the core principles is health and safety. This principle calls for member companies to pursue continual improvement in occupational safety, including by implementing recognized health and safety management systems, conducting occupational health surveillance, and providing training for workers. Beyond occupational health, ICMM principles expect companies to pursue improvements in environmental and social outcomes, as well.

Both organizations' guidance recommends fostering constructive relationships with artisanal, small-scale (ASM) operations. Companies can do so by encouraging approaches that support human rights, occupational and public health, and environmental protection in the ASM sector.

While IRMA and ICMM differ in scope and enforcement, they offer frameworks for integrating health considerations into mining. Their respective guidance documents not only encourage best practices by mining companies, but also offer governments and investors benchmarks for assessing whether mining companies are aligning their operations with responsible, public health-conscious practices.

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Sources: "Introduction to IRMA," Initiative for Responsible Mining Assurance (IRMA), April 17, 2025; IRMA, IRMA Standard for Responsible Mining: IRMA-STD-001, June 2018, 86–98 and 111-14, https://responsiblemining.net/wp-content/uploads/2018/07/IRMA_STANDARD_v.1.0_FINAL_2018-1.pdf; and "Our Story," International Council on Mining and Metals (ICMM), accessed July 2025, https://www.icmm.com/en-gb/our-story.

One Health-aligned impact assessments into project risk-assessment protocols by 2030.[38] The East, Central, and Southern Africa (ECSA) Health Community also urged member states to institutionalize HIAs in its 2024 Health Ministers Conference resolutions.[39]

This moment of heightened global demand for critical minerals presents African governments with a powerful opportunity to align mining-sector governance with public health goals. By embedding stronger health protections into mining laws and regulations through, for example, the institutionalization of HIAs, African states can help ensure that the mineral wealth fueling the global energy transition also delivers health dividends for their populations. The recommendations offered in this report are timely and actionable steps toward realizing that potential.

### Box 2: Six-step HIA process focuses on minimizing negative impacts of mining

Health Impact Assessment (HIA) is a tool used to examine the potential health effects of a policy or project, like the establishment of a new mine or the impact of a public health intervention in a mining area. HIAs originated in the 1990s when it became clear that large development projects could have negative health consequences, like the construction of irrigation schemes creating breeding grounds for anopheles mosquitoes (i.e., those capable of transmitting malaria to humans). HIA is a decision-support process that, in the context of natural resource extraction projects like critical minerals mining, "aims to minimize negative consequences on the environment, society, and public health, while promoting sustainable development," according to a 2006 International Association for Impact Assessment study. HIAs may be conducted as stand-alone assessments or integrated into other forms of impact assessments, such as environmental impact assessments (EIA) or social impact assessments (SIA).

Conducting an HIA typically follows a six-step process: screening, scoping, assessment, recommendations, reporting, and monitoring and evaluation. HIAs are guided by four core values: democracy (inclusive participation), equity (fair distribution of impacts), sustainable development (long-term well-being), and ethical use of evidence (transparent, data-driven analysis).

Research regarding the use of HIAs in the African mining sector suggests, however, that current practices do not live up to these values. For example, impact assessments for natural resource extraction projects, like mining operations, often fail to mention health at all. HIAs remain largely underinstitutionalized in the region, with South Africa as the only country with formal guidelines that integrate HIA into environmental assessment processes. Transparency regarding impact assessments in the mining sector is another challenge, with many companies unwilling to share their impact assessment reports. In some cases, impact assessments that incorporate health do so only narrowly, and exclude consideration of zoonoses, noncommunicable diseases, mental health, and malnutrition.

Sources: Theodore H. Tulchinsky et al., "Health Impact Assessment," in New Public Health, 4th ed. (2023): 551–55, https://www.sciencedirect.com/topics/biochemistry-genetics-and-molecular-biology/health-impact-assessment; R. Quigley et al., "2006 Health Impact Assessment: International Best Practice Principles," Special Publication Series No. 5, International Association for Impact Assessment, 2006, https://activelivingresearch.org/sites/activelivingresearch.org/files/IAIA_HIABestPractice_0.pdf; WHO, "Health Impact Assessment," accessed July 2025, https://www.who.int/health-topics/health-impact-assessment#tab=tab_1; Andrea Leuenberger et al., "Health Impacts of Industrial Mining on Surrounding Communities: Local Perspectives from Three Sub-Saharan African Countries," PLOS ONE 16, no. 6 ( 2021): e0252433, https://doi.org/10.1371/journal.pone.0252433; and Dominik Dietler et al., "Inclusion of Health in Impact Assessment: A Review of Current Practice in Sub-Saharan Africa," International Journal of Environmental Research and Public Health 17, no. 11 (2020): 4155, https://doi.org/10.3390/ijerph17114155.

38 WHO Regional Committee for Africa, "Regional Multisectoral Strategy to Promote Health and Well-Being, 2023–2030 in the WHO African Region: Report of the Secretariat," Document AFR/RC73/10, 2023, 4, https://www.afro.who.int/sites/default/files/2023-11/AFR-RC73-10%20Regional%20multisectoral%20strategy%20to%20promote%20health%20and%20well-being%20in%20the%20WHO%20African%20Region.pdf.

39 ECSA Health Community, Resolutions of the 73rd ECSA-HC Health Ministers' Conference, Arusha, Tanzania, June 20–21, 2024, 18-19.

# Leveraging Africa's critical minerals boom for public health and sustainable development

## A geopolitical opportunity with public health stakes

As global demand grows, African countries with reserves of cobalt, copper, lithium, and other critical minerals and rare earth metals face an inflection point. The continent's mineral wealth has attracted a wave of geopolitical interest and international investment, but the boom's implications for public health—both positive and negative—remain underappreciated. Mining in Africa has long been associated with significant harms to human and environmental health; without intentional, sustainable approaches and policies, today's international rush to extract the minerals that will power the green transition threatens to repeat destabilizing patterns of the past. But with improved regulatory frameworks and integrated planning approaches by governments, a recognition from mining companies and investors that promoting public health serves the bottom line, and a clear set of actionable strategies, like those recommended in this report, this convergence of strategic and commercial interest in Africa offers opportunities to embed public health in the foundation of mining-driven development, serving as a model for development projects of all kinds.

Substantial attention and capital from key geopolitical actors are focused on and flowing into critical mineral-rich African countries. China remains deeply entrenched in Africa's critical minerals supply chain. The United States and the EU are increasing investments through initiatives like the Partnership for Global Infrastructure and Investment (PGII), a direct response to China's Belt and Road Initiative that aims to mobilize up to US$600 billion in public and private investments from Group of Seven (G7) countries into partner countries by 2027.[40] Gulf states, too, are positioning themselves in the African mining sector with emerging economic relations between African governments and the Gulf Cooperation Council (GCC), which includes the UAE, Saudi Arabia, Qatar, Kuwait, Bahrain, and Oman.[41] GCC countries announced seventy-three foreign direct investment (FDI) projects in Africa valued at more than US$53 billion in 2023 alone.[42]

## Cobenefits of mining infrastructure and corridor development

The critical minerals race offers a window of opportunity for gains in public health infrastructure, innovation, and, most importantly, outcomes. Broadly, the development of LSM projects, especially in previously unexplored or undeveloped areas, may yield cobenefits like investments in transport, energy, and logistics infrastructure. These can be leveraged to develop and expand access to healthcare services for miners and surrounding communities.[43]

As demand intensifies, governments of African countries with significant reserves of critical minerals are in a position of strategic leverage.[44] They can and should demand meaningful public health commitments from investors and mining companies. Implementation of such commitments should operate in coordination with Africa's ecosystem of public health institutions. Regional and subregional entities like the Africa CDC, the WHO Regional Office for Africa (AFRO), the West African Health Organization (WAHO), and the Southern African Development Community (SADC) all offer expertise and platforms related to disease surveillance, data sharing, and health system coordination that can be aligned with new mining and corridor developments. This kind of public-private collaboration between companies, African MOH, and regional health bodies can facil-

40 "EU Contribution to the Partnership for Global Infrastructure and Investment," International Partnerships, European Commission, accessed June 2025, https://international-partnerships.ec.europa.eu/policies/global-gateway/eu-contribution-partnership-global-infrastructure-and-investment_en; and Cornish and Dempsey, "How Gulf States Are Putting Their Money into Mining."

41 Chido Munyati, "A New Economic Partnership Is Emerging between Africa and the Gulf States," World Economic Forum, April 28, 2024, accessed July 2025, https://www.weforum.org/stories/2024/04/africa-gcc-gulf-economy-partnership-emerging/.

42 Juliya Arbisman et al., "Investment in Africa: Free Trade Area Agreement Powers Continent's Energy Future," Reuters, January 17, 2025, accessed July 2025, https://www.reuters.com/legal/legalindustry/investment-africa-free-trade-area-agreement-powers-continents-energy-future-2025-01-17/#:~:text=The%20Gulf%20Cooperation%20Council%20(GCC,%2453%20billion%20in%202023%20alone.

43 "2025 Annual Meetings: Regional Corridors as Drivers of Continental Integration," African Development Bank, accessed July 2025, https://am.afdb.org/en/news/2025-annual-meetings-regional-corridors-drivers-continental-integration.

44 Richard Dion, "Negotiating Development Corridor Projects in Africa," Brookings, May 6, 2024, https://www.brookings.edu/articles/negotiating-development-corridor-projects-in-africa/.


An injured patient is wheeled out of the out-patient ward of the National Orthopaedic Hospital, as Nigerian nurses begin a strike over poor support from the government, in Lagos, Nigeria, July 30, 2025. Source: REUTERS/Sodiq Adelakun

itate direct communication, surveillance and data-sharing, and coordination across borders and along emerging development corridors like the Lobito Corridor.

## Private-sector engagement is crucial

LSM operations can be reimagined as platforms for strengthening health systems. In addition to companies' direct provision of health services to miners and surrounding community members, mining sites offer strategic venues for delivering vaccinations, conducting public health outreach and education, and implementing surveillance programs aligned with the One Health approach. The entrance of deep-pocketed, multinational companies will continue to introduce digitalization and automation into the African mining sector. Digitalization and automation can reduce the health and social impacts of mining by, for example, using robots to perform particularly hazardous tasks.[45]

For private actors, contributing to the realization of these public health opportunities is not merely philanthropic; it is strategic. Engaging in public health can improve productivity, secure a company's social license to operate and benefit community relationships, and reduce insurance risk.[46] Mining companies can protect themselves and the countries in which they operate by investing in pandemic insurance and reinsurance policies, developing outbreak response protocols, and contributing to shared learning about effective health interventions. Prominent forums driving ongoing discourse related to critical minerals mining in Africa, like the Future Minerals Forum, the African Critical Minerals Forum, and the Organisation for Economic

45 Christel Füllenbach, "Digitisation in the Mining Industry: Networked Machines Making for Greater Efficiency," Mining Report Glückauf 154, no. 4 (2018): 154, https://mining-report.de/wp-content/uploads/2018/08/MRG_1804_Epiroc_Certiq_Fuellenbach_180810.pdf.

46 Elizabeth Majestic, "Public Health's Inconvenient Truth: The Need to Create Partnerships with the Business Sector," Preventing Chronic Disease 6, no. 2 (2009): A39, https://pmc.ncbi.nlm.nih.gov/articles/PMC2687845/.

Co-operation and Development (OECD) Forum on Responsible Mineral Supply Chains, among others, offer vehicles for promoting best practices around public health investment as a component of responsible mining.

## Private mining companies' engagement with health yields results

Several examples show that private mining companies benefit from investing in public health interventions at their LSM sites. At the start of the 2014 Ebola outbreak in West Africa, mining giant Rio Tinto responded with a measured approach in Guinea, where it was developing a large-scale iron ore project.[47] Upon reports of an outbreak, the company activated its business resilience and recovery protocols, which the company established to manage security risks, major environmental mishaps, pandemics, and other threats.[48] The company worked closely with the WHO and Guinea's MOH by participating in weekly coordination meetings to discuss data and reflect on progress. In addition to financial donations to WHO operations in the area, Rio Tinto distributed 10,000 hygiene kits containing soap and chlorine, built latrines, and ran public awareness campaigns.[49] The company's evidence-based management—described at the time as "the sort of internal calm you would expect from a business populated by engineers"—demonstrated how major extractive firms can leverage their operational systems, resources, and local footprint to support public health response.[50]

In 2004, the AngloGold Ashanti mining company named malaria as the most significant public health threat facing its operations in Ghana, Mali, Guinea, and Tanzania.[51] The company's 24 percent malaria incidence among its workforce posed serious costs due to absenteeism and low productivity.[52] In 2005, the company implemented a comprehensive and integrated malaria control program at its Obuasi mine in Ghana. The program consisted of vector control (i.e., indoor residual spraying), distribution of insecticide-treated nets, larviciding of breeding areas, environmental management, surveillance, monitoring, evaluation and research, insecticide-resistance management, information campaigns, education, communication, and diagnosis and treatment. Within two years, the program achieved a 72 percent reduction in disease burden at the mine. By 2013, the programs saved the company around US$600,000 per year.[53]

AngloGold Ashanti partnered with the National Medical Research Institute of Tanzania and international development organizations to expand the program to Tanzania. After an initial phase focusing only on employees reduced malaria by 50 percent, the company expanded it to other mining operations. Ultimately, the Tanzanian program covered more than 90 percent of AngloGold Ashanti's employees and 100,000 community members.[54]

As traditional sources of global health funding contract, capitalizing on these opportunities will require the sort of engagement by private actors described above and more. Global development assistance for health declined from US$84 billion in 2021 to US$65 billion in 2023.[55] Since early 2025, funding for global health initiatives has declined sharply, driven by cuts to official development assistance from the United States and European governments.[56] For example, in June 2025, US Health and Human Services announced that the United States would no longer contribute to Gavi, the Vaccine Alliance,[57] a public-private partnership that helps vaccinate over half of the world's most vulnerable children.[58] This loss of US funding could delay rollouts of lifesaving vaccines, reduce childhood vaccination rates,

47 Matthew Stevens, "Rio Tinto Takes Guinea's Health Scare in Its Stride," Australian Financial Review, August 2, 2014, accessed July 2025, https://www.afr.com/companies/mining/rio-tinto-takes-guinea-s-health-scare-in-its-stride-20140802-j6ysp. en.wikipedia.org+4.

48 Stevens, "Rio Tinto."

49 Stevens, "Rio Tinto"; and Sam Walsh AO, interview by Evan Davis, Corporate Leaders Series, Chatham House, February 19, 2015, https://www.chathamhouse.org/sites/default/files/field/field_document/20150219Walsh.pdf.

50 Stevens, "Rio Tinto"; and Walsh interview.

51 "AngloGold Ashanti Malaria Control Ltd (AGA Mal): Integrated Malaria Control Programme in Obuasi Municipality," Ghana Country Coordinating Mechanism (CCM) of the Global Fund to Fight AIDS, Tuberculosis and Malaria (website), accessed July 2025, https://www.ccmghana.net/index.php/2018-2020/malaria/anglogold-ashanti-malaria-control/.

52 National Academies of Sciences, Engineering, and Medicine, "Smart Financing Strategies," in Global Health and the Future Role of the United States (Washington: National Academies Press, 2017): 254, https://www.ncbi.nlm.nih.gov/books/NBK458486/.

53 National Academies, "Smart Financing Strategies."

54 National Academies, "Smart Financing Strategies."

55 Institute for Health Metrics and Evaluation, Financing Global Health 2023: The Future of Health Financing in the Post-Pandemic Era (Seattle, WA: Institute for Health Metrics and Evaluation, 2024): 45, accessed July 2025, https://www.healthdata.org/research-analysis/library/financing-global-health-2023-future-health-financing-post-pandemic-era.

56 Kumanan Rasanathan et al., "Navigating Health Financing Cliffs: A New Era in Global Health," Lancet 405, no. 10493 (2025), https://doi.org/10.1016/S0140-6736(25)00720-2.

57 Claudia Chiappa, "RFK Jr. Says U.S. Won't Donate to Global Vaccine Effort," Politico, June 25, 2025, https://www.politico.com/news/2025/06/25/rfk-vaccine-donations-gavi-00422705.

58 "About Our Alliance," Gavi, the Vaccine Alliance, accessed July 2025, https://www.gavi.org/our-alliance/about.

### Box 3: Artisanal and small-scale mining have distinct effects on public health

Artisanal and small-scale mining (ASM) plays an important role in mining in Africa and has distinct effects on public health. In some cases, the cumulative amount of mineral output by ASM in an area or country can surpass the amount produced by a single LSM operation. ASM is characterized by the extraction of low-grade or marginal mineral deposits that are not profitable to mine on a large scale. ASM occurs in informal and formal settings, often using rudimentary tools and often without basic occupational safety measures. Informal ASM especially is associated with poor public health outcomes because it is often illegal and poorly regulated or not at all.

Still, ASM activities can enhance workers' socioeconomic status and thus reduce poverty, increase access to education, and improve housing conditions (which may contribute to reduced transmission of vector-borne diseases). ASM is especially prevalent in gold mining, and its role may expand in the critical minerals market, particularly for lithium, graphite, and cobalt.

ASM in Africa has both direct and indirect public health effects that are distinct from those associated with LSM. ASM may involve biomechanical and physical hazards due to vibration, loud noise, heat and humidity, exposure to radiation, strenuous and repetitive labor, extended working hours, and the use of unsafe equipment. Additionally, mercury and cyanide, toxic substances harmful to human health, are widely used to amalgamate and extract gold, respectively. Gold ASM also involves silica dust, a lung carcinogen that causes scarring of airways when inhaled, is toxic to the lungs and immune system, and increases susceptibility to respiratory diseases like tuberculosis. ASM operations in Africa, especially informal ones, often lack adequate water and infrastructure. In some mining areas, toilets may be uncommon or shallow and can contaminate other water sources, increasing the risk of waterborne diseases. ASM operations are often seasonal and migratory in nature. This increases high-risk behaviors, particularly among men, that can facilitate the spread of STIs, including HIV. Several studies have observed drug and alcohol abuse in adult and child miners, believed to result from the migratory nature of and difficult circumstances involved in ASM. Violence and prostitution also occur, particularly in areas surrounding illegal ASM activities.

Sources: Tawanda Zvarivadza, "Artisanal and Small-Scale Mining as a Challenge and Possible Contributor to Sustainable Development," Resources Policy 56 (2018): 49, doi:10.1016/j.resourpol.2018.01.009; Nicole M. Smith et al., "Human Health and Safety in Artisanal and Small-Scale Mining: An Integrated Approach to Risk Mitigation," Journal of Cleaner Production 129 (2016): 43–52, https://doi.org/10.1016/j.jclepro.2016.04.124; Hermínio Cossa et al., "Health Studies in the Context of Artisanal and Small-Scale Mining: A Scoping Review," International Journal of Environmental Research and Public Health 18, no. 4 (2021): 2, https://doi.org/10.3390/ijerph18041555; Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development, Artisanal and Small-Scale Mining of Critical Minerals (International Institute for Sustainable Development, 2024): 10, https://www.iisd.org/system/files/2024-12/artisanal-small-scale-mining-critical-minerals.pdf; WHO, Environmental and Occupational Health Hazards Associated with Artisanal and Small-Scale Gold Mining, 2016): 11–12, https://iris.who.int/bitstream/handle/10665/247195/9789241510271-eng.pdf?sequence=1; WHO, Artisanal and Small-Scale Mining, 20, https://iris.who.int/bitstream/handle/10665/247195/9789241510271-eng.pdf?sequence=1; Nuril Hidayati, Titi Juhaeti, and Fauzia Syarif, "Mercury and Cyanide Contaminations in Gold Mine Environment and Possible Solution of Cleaning Up by Using Phytoextraction," HAYATI Journal of Biosciences 16, no. 3 (September 2009): 88, https://doi.org/10.4308/hjb.16.3.88; Neela Guha et al., "The IARC Monographs on the Carcinogenicity of Crystalline Silica," Med Lav 102, no. 4 (2011): 310–2, https://mattioli1885journals.com/index.php/lamedicinadellavoro/article/view/1290; David Rees and Jill Murray, "Silica, Silicosis and Tuberculosis," International Journal of Tuberculosis and Lung Disease 11, no. 5 (2007): 474–84, https://www.researchgate.net/publication/233583178; Perry Gottesfeld et al., "Silica Exposures in Artisanal Small-Scale Gold Mining in Tanzania and Implications for Tuberculosis Prevention," Journal of Occupational and Environmental Hygiene 12, no. 9 (2015): 647–653, https://doi.org/10.1080/15459624.2015.1029617; Republic of Malawi Ministry of Natural Resources, Energy and Mining, ASM Handbook for Malawi, 2019, 84; Centre for Development Studies, Livelihoods and Policy in the Artisanal and Small-Scale Mining Sector: An Overview (Centre for Development Studies: University of Wales, 2004), https://assets.publishing.service.gov.uk/media/57a08cd4e5274a31e0001498/C391.pdf; A. M. Donoghue, "Occupational Health Hazards in Mining: An Overview," Occupational Medicine 54, no. 5 (2004): 283–289, https://doi.org/10.1093/occmed/kqh072; International Labour Office, Minors Out of Mining! Partnership for Global Action Against Child Labour in Small-Scale Mining (Geneva: International Labour Office, 2006): 14, https://www.ilo.org/sites/default/files/2025-05/2006_mining_globalaction_en.pdf; Jennifer Hinton et al., "Women, Mercury and Artisanal Gold Mining: Risk Communication and Mitigation," Journal de Physique IV 107 (2003): 617–620, https://doi.org/10.1051/jp4:20030379; and Dorte Thorsen, Children Working in Mines and Quarries: Evidence from West and Central Africa (UNICEF: West and Central Africa Regional Office, 2012), https://hdl.handle.net/10779/uos.23392889.v1.

and potentially lead to renewed outbreaks and rising child mortality in regions already vulnerable due to weak health systems. Compounding the crunch, financing projections expect 2027 African domestic health spending to contract or stagnate in thirty-five countries (including critical mineral-rich nations like Angola and Zambia) compared to prepandemic levels.[59] These cuts and contractions, along with the dissolution of the United States Agency for International Development (USAID) in the United States and a pivot from health to defense spending by several European nations, may significantly undermine infectious disease surveillance and response efforts across sub-Saharan Africa.

Against this backdrop, private LSM companies have both a compelling business case and a unique window of opportunity to increase their community engagement. Mining companies depend on healthy, stable workforces and resilient local communities to maintain uninterrupted operations. Public health threats like infectious disease outbreaks and inadequate, strained infrastructure pose direct risks to productivity, supply chains, and investor confidence. For example, the 2014 West African Ebola outbreak stalled mining projects and delayed the rollout of thousands of jobs across Guinea, Liberia, and Sierra Leone.[60] The epidemic caused mining company Rio Tinto to stop work on a US$20 billion iron ore mine in Guinea and led ArcelorMittal to freeze investments in mining production in Liberia.[61] By investing in health systems, mining firms can simultaneously reduce operational risk, reinforce their social license to operate in host countries, and contribute meaningfully to regional health security in Africa.

To meet the moment, mining companies can engage in more strategic and sustained investments in public health than the sometimes-superficial CSR policies many companies promote. Increased engagement by the private mining sector may include innovative approaches to financing public health. For example, pandemic insurance and reinsurance mechanisms can help mitigate economic and operational shocks associated with future outbreaks. Public-private cofinancing arrangements, health resilience bonds, and other risk-sharing mechanisms also offer instruments to build durable public health capacity in ways that align with business incentives. By leveraging this convergence of commercial and humanitarian interests, private mining companies can embed public health as a core element of sustainable development and responsible mining.


A general view shows the exterior of the Kitengela Sub-County Hospital that was attacked by unidentified people who demanded for the treatment of their colleagues during anti-government protests dubbed "Saba Saba People's March", in Kitengela, Kajiado County, Kenya July 8, 2025. Source: REUTERS/Thomas Mukoya

59 Christoph Kurowski et al., From Double Shock to Double Recovery: Implications and Options for Health Financing in the Time of COVID-19. Technical Update 2: Old Scars, New Wounds, Health, Nutrition, and Population Discussion Paper (Washington: World Bank, September 2022), accessed July 2025, https://documents1.worldbank.org/curated/en/099403409202225273/pdf/IDU0dddbd1eb0a51804f44085dd0edb18e41ff8f.pdf; Africa CDC, Africa's Health Financing in a New Era (Addis Ababa: Africa CDC, 2025), https://africacdc.org/download/africas-health-financing-in-a-new-era-april-2025/; and Nanthalile Mugala, "Africa Charts New Course on Health Security Financing," PATH (blog), July 3, 2025, https://www.path.org/our-impact/articles/africa-charts-new-course-on-health-security-financing/.

60 Patrick McGroarty, David Gauthier-Villars, and Alex MacDonald, "West African Mining Projects Take Hit from Ebola Crisis," Wall Street Journal, November 18, 2014, accessed July 2025, https://www.wsj.com/articles/west-african-mining-projects-take-hit-from-ebola-crisis-1416346636.

61 World Bank, The Economic Impact of the 2014 Ebola Epidemic: Short and Medium Term Estimates for Guinea, Liberia, and Sierra Leone, report no. 90748, September 17, 2014, accessed July 2025, https://documents1.worldbank.org/curated/en/627851468102871113/pdf/907480REVISED.pdf; and Mercy Corps, "Chapter 4: How Does Ebola Affect the Economy?," Ebola Outbreaks in Africa — A Guide, March 5, 2019, https://www.mercycorps.org/blog/ebola-outbreaks-africa-guide/chapter-4.

# Development corridors, mining, and public health in Africa

Across Africa, development corridors have emerged as a central strategy for promoting economic growth, regional integration, and access to global markets. As of March 2023, the African Development Corridors database identified seventy-nine ongoing or planned corridors across Africa. Development corridors are geographic zones prioritized for investment in hard infrastructure like railways, pipelines, and transmission lines and soft infrastructure like financial services, policy, and regulatory frameworks. Often driven by mining activity, corridors help overcome barriers to trade posed by the continent's challenging geography, thus unlocking Africa's vast natural resource wealth. Development corridors, however, also have the potential to threaten ecosystem integrity, disrupt livelihoods and communities, and facilitate the spread of infectious diseases by connecting previously remote populations. These dynamics are particularly salient in the case of the Lobito Corridor.

The Lobito Corridor will be a key transport and logistics route that connects the port of Lobito in Angola to the Katanga province in the DRC and the Copperbelt province in Zambia. Angola is one of Africa's largest and most diversified mining reserves in Africa. Typically associated with diamond mining—the country accounts for around 8 percent of global production—Angola is also home to underexplored areas estimated to contain vast reserves of critical minerals like copper, cobalt, manganese, and lithium. These resources are gaining attention from international investors. Africa's second-largest country, the DRC is home to tremendous natural resources. It is endowed with some of the world's richest copper deposits and is home to four of five of the world's largest cobalt mines. As a result, the DRC attracted the most mineral exploration investment in Africa in 2024. At the heart of the Copperbelt, Zambia has a long-established mining sector and its ambition to quadruple copper output by 2031 will benefit significantly from the Lobito Corridor.

The Lobito Corridor connects these mineral-rich regions to international markets via Atlantic ports for export to the United States, European Union, and other importing countries. The project is a collaboration between the governments of Angola, the DRC, Zambia, the United States, the European Union, the African Development Bank, and the Africa Finance Corporation. In recent years, the United States has invested US$4 billion in the infrastructure initiative. The project reflects the US focus on counteracting China's incumbent dominance of the global supply chain for critical minerals. When finished, the corridor promises these critical mineral-rich countries expanded export opportunities, increased regional trade, and improved transportation costs.

Transportation networks can be key determinants of health in a region. Beyond the economic development possibilities expected upon the Lobito Corridor's completion, it presents public health challenges and opportunities relevant to investors looking to diversify supply chains and form partnerships in the region. "On the one hand, the upgraded infrastructure and improved socioeconomic conditions could foster a range of positive health outcomes, including reduced childhood mortality, enhanced public infrastructure, and increased wealth indices," a WHO report explains. "On the other hand, potential adverse impacts on the environment, society[,] and public health must be carefully managed to ensure sustainable development." Public and private stakeholders alike should be attuned to these challenges and opportunities to avoid the adverse public health impacts described above and ensure health remains prioritized—not only out of humanitarian concern, but as an acknowledgment that equitable, sustainable, and positive public health outcomes mean stronger economies, more stable workforces, and a higher return on investment, particularly in the mining sector.

Capitalizing on the public health opportunities (described above) that are created by the mining boom and corridor development projects may serve as a model for similar and future resource-driven investments, including the several "strategic corridors" aligned with the EU-Africa Programme for Infrastructure Development in Africa.[62]

The public health challenges and opportunities presented by development corridor projects, typically driven by mining, are not unique to Angola, the DRC, Zambia, and the Lobito Corridor.[63] Regional development corridors in Africa have become a strategic focus of the African Development Bank Group, gaining significant private and institutional investment in recent years.[64] Across Africa, dozens of development corridors are reshaping regional landscapes by driving continental integration,

62 Claudia Baranzelli et al., "EU–Africa Strategic Corridors and Critical Raw Materials: Two-Way Approach to Regional Development and Security of Supply," International Journal of Mining, Reclamation and Environment 36, no. 9 (2022): 607–23, https://doi.org/10.1080/17480930.2022.2124786.

63 Dion, "Negotiating Development Corridor Projects."

64 "2025 Annual Meetings," African Development Bank.

**Box 4: Public health challenges and opportunities to countries along Lobito Corridor**

All the countries traversed by the Lobito Corridor face specific public health risks; at the same time, the corridor itself presents opportunities to address them. The recommendations in this report offer actionable pathways relevant to each country's situation.

## Angola

**Key public health risks:** The five Angolan provinces adjacent to the Lobito Corridor lack the infrastructure and capacity to deliver essential health services including for infectious diseases and maternal-child health. For example, only one of these provinces report having more than one hospital bed per 10,000 inhabitants.

**Opportunity:** New investment flows present a chance to embed health infrastructure, staffing, and data systems alongside corridor development. Angola's 2019 Joint External Evaluation (JEE) identified weak coordination across health sectors; the corridor could serve as a pilot for operationalizing the One Health approach.

**Relevant actions:** Stakeholders of mining activities in Angola should give particular consideration to recommendations #1 (cross-border surveillance), #2 (institutionalize One Health in mining HIAs), and #3 (direct provision of healthcare).

## DRC

**Key public health risks:** Mining activities in the DRC have been linked to multiple major spillover events: Ebola (2018–2019), Marburg virus disease (1998–2000), and mpox (2023–2024). Cobalt extraction poses direct toxic exposure risks to miners and surrounding communities. The DRC also has gaps in technical abilities related to prevention, detection, and response to diseases.

**Opportunity:** The DRC has deep experience in epidemic response and has made progress by developing its Integrated Disease Surveillance and Response System. These can be scaled and adapted to future corridor- and mining-linked outbreaks.

**Relevant actions:** Stakeholders of mining activities in the DRC should give particular consideration to recommendations #1 (cross-border surveillance), #5 (pandemic insurance/reinsurance), and #7 (coordination between mining companies and regional health bodies).

## Zambia

**Key public health risks:** Despite relatively strong and improving baseline public health capabilities, Zambia has faced regulatory lapses (e.g., recent toxic mining waste spills into the Kafue River). A surge workforce plan and essential health services guidelines are lacking, posing challenges for managing in-migration caused by increased mining activities and corridor development.

**Opportunity:** Zambia's 2023 JEE praised its capacity for vaccine coverage and its International Organization for Standardization-accredited lab network. The Zambian government has shown a willingness to engage in sustainable mining reform, including regulation of ASM operations.

**Relevant actions:** Stakeholders of mining activities in Zambia should give particular consideration to recommendations #2 (integrate HIAs into regulatory frameworks), #3 (integrate public health into CSR frameworks), and #7 (coordination between mining companies and regional health bodies).

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Sources: WHO Regional Office for Africa, Potential Health Impacts of the Lobito Corridor on Local Communities, 3; WHO, Joint External Evaluation of IHR Core Capacities of the Republic of Angola: Mission Report 18–22, November 2019, March 2021 Country Report, 11, https://www.who.int/publications/i/item/9789240018266; Oluwayemisi Ajumobi, "Safeguarding Global Health Security amidst a Scramble for Africa's Minerals for the Clean Energy Transition," Globalization and Health 21, no. 24 (2025): 3, https://doi.org/10.1186/s12992-025-01102-x; WHO, Évaluation externe conjointe des capacités essentielles du RSI (2005): République Démocratique du Congo, WHO-WHE-CPI-2018.28, 2018, https://iris.who.int/bitstream/handle/10665/274352/WHO-WHE-CPI-2018.28-fre.pdf?sequence=1&isAllowed=y; Business & Human Rights Resource Centre, "Zambia: Foreign Copper Mining Companies Accused of Dumping Toxic Waste into Key Kafue River, Causing Environmental Disasters; Civil Society Calls for Increased Oversight and Corporate Accountability," Business & Human Rights Resource Centre, April 7, 2025, https://www.business-humanrights.org/en/latest-news/zambia-foreign-copper-mining-companies-accused-of-dumping-toxic-waste-into-key-kafue-river-causing-environmental-disasters-civil-society-calls-for-increased-oversight-and-corporate-accountability/; and WHO, Joint External Evaluation of the International Health Regulations (2005) Core Capacities of Zambia, Mission Report 2–6 October 2023, published 2024, iv, https://iris.who.int/bitstream/handle/10665/381244/9789240094222-eng.pdf.

supporting economic development, and linking mining areas and other natural and agricultural resources to global markets.

For example, an EU-Africa partnership has identified and recommended developing eleven "strategic corridors" that, together, traverse thirty-six African countries, many of which possess significant reserves of critical minerals.[65] Five of the corridors feature relatively high concentrations of mining properties in adjacent territories.[66] The corridors "will facilitate trade and mobility [and] support investment in sustainable, efficient, and safe connectivity" within Africa and between Africa and Europe.[67]

Another prominent example is the Central Corridor, the development of which began through a 2006 agreement between Burundi, the DRC, Rwanda, Tanzania, and Uganda, and eventually Malawi and Zambia.[68] In addition to the DRC's and Zambia's vast reserves (described above), Tanzania's mining sector is a leading industrial sector and the country has ambitions to grow mineral exports;[69] Rwanda recently signed a US-backed peace deal with the DRC that envisions a jointly governed and transparent minerals corridor;[70] and Uganda has significant reserves of copper, lithium, cobalt, and rare earth elements.[71]

As mining-driven corridor development projects proliferate across the continent, they present not only economic and logistical transformation, but also significant domestic and cross-border health implications. This report supports embedding public health into all phases and by all key stakeholders of mining and corridor projects. Doing so can mitigate risks while creating shared regional benefits. For example, a potential corridor running along the Gulf of Guinea coastline connecting Dakar, Senegal, and Lagos, Nigeria, would traverse several countries with under-resourced health systems and recurring infectious-disease outbreaks.[72] Such a corridor designed with public health in mind from its inception could catalyze long-term improvements in regional health security.

The ever-expanding global demand for critical minerals is driving increased mining activity and demand for transport infrastructure and export routes. These trends are likely to accelerate the growth of development corridor projects across Africa, particularly those tied to mining activities. This reality makes it all the more important that all stakeholders—including private mining companies and their investors, African governments and MOH, and international partners—consider seriously the recommendations that follow.

65 "EU-Africa Strategic Corridors," International Partnerships, European Commission, accessed July 2025, https://international-partnerships.ec.europa.eu/policies/global-gateway/transport/eu-africa-strategic-corridors_en .

66 Baranzelli et al., "EU–Africa Strategic Corridors."

67 Baranzelli et al., "EU–Africa Strategic Corridors."

68 "Overview," Central Corridor Transit-Transit Facilitation Agreement (Central Corridor T-TFA), Central Corridor Transit-Transit Facilitation Agency, accessed July 2025, https://centralcorridor-ttfa.org/overview/.

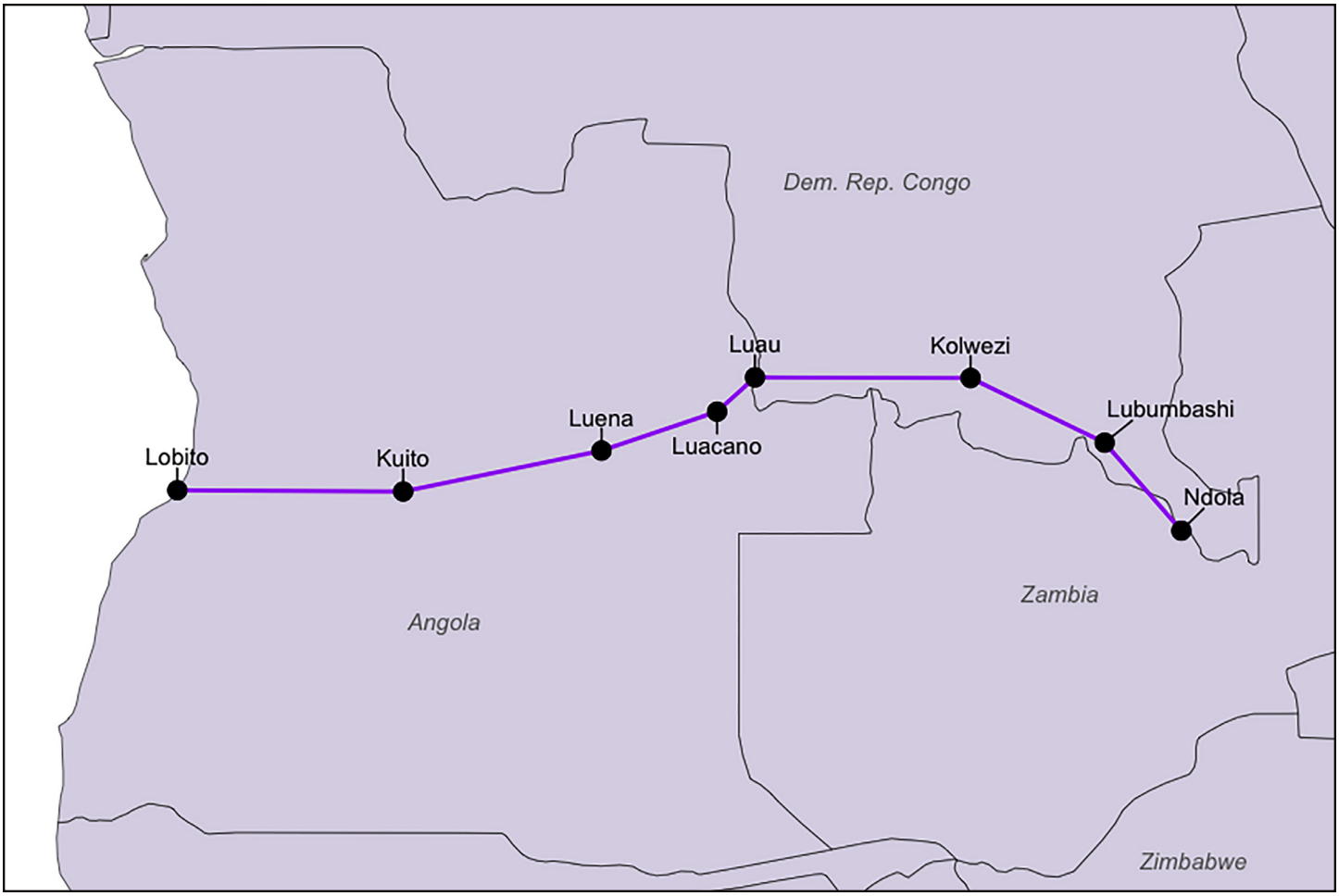
69 "Tanzania—Rare Earth and Critical Minerals," US International Trade Administration, July 10, 2023, accessed July 2025, https://www.trade.gov/market-intelligence/tanzania-rare-earth-and-critical-minerals.

70 "Experts React: The DRC and Rwanda Agreed to a U.S.–Backed Peace Deal. Can Critical Minerals Help End This Conflict?," New Atlanticist, Atlantic Council (blog), June 27, 2025, https://www.atlanticcouncil.org/blogs/new-atlanticist/experts-react-the-drc-and-rwanda-agreed-to-a-us-backed-peace-deal-can-critical-minerals-help-end-this-conflict/.

71 "Unlocking Mineral Value Addition: Support Uganda's Ten-fold Growth Strategy," Natural Resource Governance Institute (event webpage), accessed July 2025, https://resourcegovernance.org/events/unlocking-mineral-value-addition-support-ugandas-ten-fold-growth-strategy.

72 "African Critical Minerals Roadmap: Eight Investment Priorities for the US Government in 2025," Atlantic Council Africa Center, May 15, 2025, https://www.atlanticcouncil.org/programs/africa-center/critical-minerals-task-force/.

FIGURE 3**: Map of the Lobito Development Corridor**




# Recommendations

### Utilize the Lobito Corridor and other development projects as opportunities to implement cross-border disease surveillance and data-sharing programs.

The regular movement of people and goods facilitated by corridor projects like the Lobito Corridor makes it critical to identify emerging infectious diseases through surveillance to enable rapid response. Cross-border infrastructure projects already require high levels of bilateral and multilateral coordination. This coordination can be expanded to incorporate sharing of disease surveillance information both with private-sector partners and African ministries of health. Successful implementation of disease surveillance systems in the context of the Lobito Corridor may serve as a model for regional health cooperation in future African mining operations and corridor development projects.

### Encourage information-sharing and coordination with MOH, Africa CDC, and other regional health organizations.

As traditional sources of global health funding contract, the growing ownership of African public health by MOH and regional bodies like the Africa CDC provides an opportunity to develop relationships between these public health bodies and mining companies to enable improved health information-sharing and public health program coordination. Specifically, companies should be strongly encouraged to conduct disease surveillance for both their workers and surrounding communities. While some do so already, the information is often not shared or publicly available. This report recommends implementing systems that protect privacy while ensuring disease information is shared with MOH and regional health entities as part of corridor cross-border surveillance.

TABLE 1: **Epidemic Readiness Indicators from Top 10 Mined Resources Producing Countries in Africa (listed in order of productivity).**

Joint External Evaluation capacities are voluntarily evaluated by a team of domestic and international experts on a scale of 1 (no pertinent capacity) to 5 (sustainable capacity).

| | OUTBREAK PREPAREDNESS INDICATORS | | | POPULATION HEALTH INDICATORS | | |
|---|---|---|---|---|---|---|
| **COUNTRY** | **JEE D2.2. score. Event investigation and verification (year)** | **JEE R4.1. score. IPC** | **WHO disease outbreak news events since 1996** | **Life expectancy at birth (years) (2021)** | **Infant mortality rate (per 1,000 live births)** | **IHME UHC effective coverage index (2021)** |
| **South Africa** | 4 (2024) | 2 (2024) | 44 | 61.5 | 35 (2023) | 71 |
| **Nigeria** | 4 (2023) | 3 (2023) | 52 | 53.5 | 68.50 (2022) | 38.34 |
| **Algeria** | 3 (2022) | 4 (2022) | 7 | 77.1 | 18.7 (2024) | 74 |
| **Angola** | 3 (2023) | 1 (2023) | 56 | 64.6 | 55.6 (2024) | 37 |
| **Libya** | N/A | N/A | None Reported | 77 | 10.7 (2024) | 62 |
| **Egypt** | N/A | N/A | 112 | 75 | 16.8 (2024) | 70 |
| **Ghana** | 3 (2025) | 1 (2025) | 13 | 65 | 31.2 (2024) | 48 |
| **DRC** | 3 (2023) | 2 (2023) | 163 | 60 | 57.4 (2024) | 42 |
| **Gabon** | 2 (2019) | 1 (2019) | 39 | 69.7 | 28.6 (2024) | 49 |
| **Zimbabwe** | 3 (2018) | 1 (2018) | 10 | 63 | 33.4 (2024) | 55 |
| **Zambia** | 3 (2023) | 3 (2023) | 10 | 66 | 35.6 (2024) | 56 |

### Institutionalize One Health-integrated HIA requirements in national mining codes and regulatory frameworks.

There is currently no widely used framework for integrating One Health requirements into health impact assessments for national mining codes and regulatory frameworks. This report recommends collaboration between One Health experts, mining health experts, mining companies, and African MOH to develop generic One Health-aligned requirements in mining HIAs. These can serve as a basic framework that can be adapted for specific regional considerations. Institutionalizing HIAs at the policy level will create a regulatory environment where sustainable and public health-conscious mining becomes the norm rather than the exception.

### Integrate public health into CSR frameworks using IRMA or ICMM guidance.

We recommend mining companies and industry associations integrate public health considerations into existing CSR frameworks. This can be achieved using IRMA or ICMM guidance. Companies should ensure CSR frameworks are aligned with national and regional health priorities and monitored using publicly available data. Greater transparency and intentionality will help move CSR from reactive or ad hoc philanthropy to accountable public health engagement.

### Integrate public health considerations more centrally into ongoing discourse on mining.

There are several prominent forums discussing African mining. These include the Future Minerals Forum, Mining Indaba: The Future of African Mining, African Critical Minerals Summit, and the OECD Forum on Responsible Mineral Supply Chains. Organizers of major mining forums should establish dedicated public health panels and invite African MOHs, regional health entities, and local health experts to discuss the intersection of mining and public health. Attendance of public health professionals and inclusion of public health-related programming at these conferences should be encouraged to ensure public health is sufficiently prioritized and to share best practices.

### Encourage purchase of pandemic insurance/reinsurance.

Mining companies and investors should be encouraged to purchase pandemic insurance and reinsurance policies as part of their broader risk-mitigation strategy. These instruments can help absorb the economic shock of future infectious disease outbreaks, protecting both companies' ability to operate and the broader economic and social ecosystems in which they operate. Pandemic coverage can also incentivize companies to invest in preventive health measures like cross-border disease surveillance and health infrastructure.

### Encourage provision of healthcare and public health services to workers.

While some mining companies provide their workers with sufficient healthcare and public health infrastructure, promoting broader provision will improve health outcomes and productivity. These services should be designed in coordination with national health authorities to ensure they align with broader public health strategies. Additionally, expanding access to healthcare for surrounding communities will yield stronger community relations for mining companies.

# Conclusion

As Africa's mineral-rich regions attract increasing global investment, mining-driven development must be recognized not solely as an economic endeavor but one that is inextricably linked to public health. From occupational hazards to infectious disease outbreaks, the African mining sector has a checkered public health legacy. But, as this report showed, the current wave of geopolitical attention and capital investment presents opportunities to strengthen health systems, surveillance, and regional cooperation across the continent. Realizing these benefits will require deliberate action. Stakeholders should seriously consider the recommendations outlined in this report to ensure that the critical minerals boom contributes to a healthier, more resilient Africa.

# Appendix: Acronym list

| | |
|---|---|
| **Africa CDC** | African Centres for Disease Control and Prevention |
| **AFRO** | World Health Organization Regional Office for Africa |
| **ASM** | Artisanal and small-scale mining |
| **COPD** | Chronic obstructive pulmonary disease |
| **CSR** | Corporate social responsibility |
| **DRC** | Democratic Republic of the Congo |
| **ECSA** | East, Central, and Southern Africa Health Community |
| **EIA** | Environmental impact assessment |
| **EID** | Emerging infectious disease |
| **EITI** | Extractive Industries Transparency Initiative |
| **FDI** | Foreign direct investment |
| **HIA** | Health impact assessment |
| **ICMM** | International Council on Mining and Metals |
| **IRMA** | Initiative for Responsible Mining Assurance |
| **JEE** | Joint External Evaluation |
| **LSM** | Large-scale mining |
| **MOH** | Ministry of Health/ministries of health |
| **OECD** | Organisation for Economic Co-operation and Development |
| **PGII** | Partnership for Global Infrastructure and Investment |
| **PPE** | Personal protective equipment |
| **SADC** | Southern African Development Community |
| **SIA** | Social impact assessment |
| **STI** | Sexually transmitted infection |
| **UAE** | United Arab Emirates |
| **USAID** | United States Agency for International Development |
| **WAHO** | West African Health Organization |
| **WHO** | World Health Organization |

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