TB in the Mining Sector: The Southern African Regional Response (TIMS Case Study)

Johannesburg, March 2024. Dr. Charles Sandy stood among public health leaders at a World TB Day event in South Africa, listening as the mining industry announced a milestone achievement. For the first time, the tuberculosis (TB) incidence among mineworkers had fallen below the national average – 278 per 100,000 in 2022, compared to 537/100,000 in the general population (Minerals Council South Africa 2024). Just seven years earlier, the sector's TB incidence was **1,060 per 100,000**, far above the country's already-high burden (834/100,000) (Minerals Council South Africa 2024). In the early 2000s, it was seven times higher than the rate in the general population (Minerals Council South Africa 2024). The crowd applauded this turnaround, the result of concerted efforts since 2012 to tackle TB in Southern Africa's mines. Dr. Sandy allowed himself a moment of pride – this was a victory for regional cooperation.

Yet, as applause faded, Dr. Sandy felt a knot of concern. As a veteran TB expert from Zimbabwe and a regional TB coordinator, he knew how fragile this progress could be. The Southern African Development Community (SADC)'s bold initiative to combat "**TB in the Mining Sector**" (TIMS) – launched after a 2012 SADC Declaration – was approaching a crossroads. The third and final phase of a regional Global Fund grant was set to end in a few months. Questions loomed in Dr. Sandy's mind: Had the groundwork been enough to make the gains sustainable? Would mining companies and national health systems continue cross-border TB patient referrals and miner health programs after donor funds stopped? How could the region prevent a resurgence of TB among miners as memories of the crisis faded? These were the challenges Dr. Sandy would grapple with as he led discussions on the future of TIMS.

What follows is a case study of the SADC region's response to tuberculosis in the mining sector. It provides background on TB and its risk factors, the historical context of SADC and mining in the region, the burden of disease among miners, and the multi-sectoral interventions implemented. It culminates in the dilemmas faced by leaders like Dr. Sandy in ensuring sustainability and effective cross-border care for miners. This case is written in the style of a Harvard Global Health Delivery narrative, with a

protagonist navigating complex global health governance and implementation challenges.

Background

Tuberculosis: Disease Overview and Global Burden

TB is an infectious disease caused by the bacterium *Mycobacterium tuberculosis*, which primarily affects the lungs (pulmonary TB), but is capable of infecting any organ. It spreads through airborne droplets when a person with active TB coughs or sneezes. Classic symptoms of active TB include a chronic cough (often with blood-tinged sputum), chest pain, weakness, weight loss, fever, and night sweats. If not treated, active TB can be deadly. In contrast, latent TB infection occurs when the bacteria are contained within macrophages that make up a granuloma. With a latent infection, a person harbors the bacteria without symptoms; about one-quarter of the world's population is estimated to be latently infected. Latent cases can convert to active disease, especially if immunity wanes.

Diagnosis of TB traditionally relies on sputum smear microscopy to detect acid-fast bacilli, a method with limited sensitivity. In recent years, more advanced diagnostics like the GeneXpert MTB/RIF test (a rapid molecular test) and improved chest X-ray screening have enhanced case detection. The gold standard is a sputum culture; however, this can take time and resources. TB is curable with a combination of antibiotics taken over **6–9 months**. The standard regimen (for drug-sensitive TB) consists of four drugs in the intensive phase followed by two drugs in the continuation phase. Ensuring adherence is crucial – the WHO's **Directly Observed Therapy (DOT)** strategy has patients take medications under observation to improve compliance. Multidrug-resistant TB (MDR-TB), which does not respond to first-line drugs, requires up to 18–24 months of treatment with second-line drugs.

Despite being preventable and curable, TB remains a leading global health burden. In **2015, an estimated 10.4 million people** fell ill with TB, and **1.8 million** died from the diseasefile-gudvzd8tarxqy9vjx8fsbj. The African region bears a disproportionate share. In that year, **Africa accounted for 2.72 million TB cases and 743,000 deaths**, reflecting high transmission and mortality on the continentfile-gudvzd8tarxqy9vjx8fsbj. Southern Africa, in particular, has faced intersecting epidemics of TB and HIV that drove TB incidence to extreme levels. By the mid-2000s, South Africa's TB incidence had tripled from 305/100,000 in 1993 to **948/100,000 in 2007**, one of the highest in the

worldfile-d9r8mewsd4qgjbcpjoqufc. TB's resurgence in Southern Africa was tightly linked with the HIV/AIDS epidemic (which weakens immune systems and raises risk of TB reactivation) and with conditions in crowded settings like mines and migrant hostels.

Key risk factors for developing active TB include **HIV co-infection**, which increases the risk of TB disease roughly 20-fold; **silica dust exposure** (damages lungs and greatly heightens TB risk in miners); malnutrition; diabetes; smoking; and poor living conditions with prolonged indoor crowding. The convergence of these factors in mining communities created what researchers have called "**institutional amplifiers**" of TB – environments that amplify TB transmission beyond normal rates (Mutendi & Macdonald 2018). Mines, like prisons or poorly ventilated hospitals, became epicenters seeding TB into the broader population. As described later, miners in Southern Africa have the highest TB rates of any working population globally (Basu et al. 2011). This case will examine how those rates came to be – and how regional actors mobilized to address this crisis.

The Southern African Development Community (SADC)

The **Southern African Development Community (SADC)** is a regional bloc founded to promote economic integration, development, and policy coordination among Southern African countries. SADC traces its roots to 1980, when a group of frontline states formed the Southern African Development Coordination Conference (SADCC) to reduce dependence on apartheid-era South Africa. After apartheid ended, the organization was transformed and relaunched as SADC in 1992, with the **Treaty of Windhoek** articulating its vision of regional cooperation. Today, SADC comprises **16 member states**: Angola, Botswana, Comoros, Democratic Republic of Congo (DRC), Eswatini (Swaziland), Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe. Its headquarters are in Gaborone, Botswana.

Governance and objectives: SADC is governed by a Secretariat and a Summit of Heads of State or Government which meets annually to set policies. Sectoral Ministerial Committees (e.g. Ministers of Health, Ministers of Mines) coordinate specific areas. SADC's objectives include economic integration through a regional free trade area, infrastructure development, and cooperation on transboundary issues such as water management, security, and health. Notably, SADC has a Protocol on Health (adopted in 2004) that urges collaboration on controlling communicable diseases and facilitating the cross-border provision of health services. However, health was not always a primary

focus of SADC in its early years compared to trade and infrastructure. The extraordinary challenges of HIV/AIDS and TB in the 1990s-2000s pushed health up the agenda, leading SADC to play a convening role for regional health strategies.

Role in regional coordination: By design, SADC provides a platform for member states to tackle problems that transcend national borders. Infectious diseases like TB exemplify such problems – pathogens do not stop at immigration checkpoints. Migrant labor patterns in Southern Africa intertwine the health fortunes of multiple countries. Through SADC, countries have aimed to harmonize policies (for instance, treatment guidelines or mining health regulations) and mount joint initiatives. But SADC's ability to enforce or fund programs is limited; it relies on consensus and mobilizing political commitment. In 2012, faced with worsening TB in the mining sector, SADC's leaders leveraged the organization's convening power to issue a high-level declaration and framework for action, as we will see. SADC also engages development partners – such as the World Bank, Global Fund, and NGOs – to support regional plans. This case highlights SADC's role as a **catalyst and coordinator** in the TB in Mines crisis, working across health, labor, and mining sectors.

Mining in Southern Africa: Economic Importance and Labor Migration

Mining has long been the economic backbone of Southern Africa – and a powerful driver of labor migration. The region is extraordinarily rich in minerals. SADC member states together hold an estimated **$5 trillion in mineral reserves** and account for significant shares of global production of platinum, chromium, vanadium, diamonds, cobalt, gold, and other minerals (SADC 2012). South Africa's mining industry, the most developed in Africa, is the world's third largest, contributing about **8% of South Africa's GDP** in 2016 (SADC 2012). In mineral-dependent countries like Botswana, mining accounts for an even larger slice of the economy (≈19% of GDP and over 90% of export earnings) (SADC 2012). Other SADC countries with major mining sectors include Zambia (copper), DRC (copper and cobalt), Angola (diamonds and oil), Namibia (diamonds, uranium), Zimbabwe (gold, platinum, chrome), and Tanzania (gold, gemstones).

The mining industry's structure ranges from large multinational corporations to **artisanal and small-scale mining (ASM)**. Global giants like BHP Billiton, Rio Tinto, Anglo American, Glencore, and Barrick operate across the region (SADC 2012). At the same time, over **1.5 million artisanal miners in Tanzania**, 560,000 in Zimbabwe and hundreds of thousands elsewhere dig for gold, gems, and other minerals in informal

conditions (SADC 2012). These **ASM operations often lack regulation or health protections**, exposing miners and their communities to significant risks (SADC 2012). Whether large-scale or artisanal, mining in Southern Africa typically involves harsh working conditions – prolonged exposure to silica dust from drilling, confined underground spaces with poor ventilation, and sometimes poor living conditions in mining camps. These factors create a perfect storm for TB (and other lung diseases like silicosis).

Labor migration and demographics: For over a century, Southern Africa's mines have depended on migrant labor. During the 20th century, colonial and apartheid-era systems (like South Africa's **migrant labor system**) drew hundreds of thousands of men from countries such as Lesotho, Mozambique, Malawi, Eswatini, and Zimbabwe to work in South African gold and diamond minesfile-d9r8mewsd4qgjbcpjoqufcfile-d9r8mewsd4qgjbcpjoqufc. They lived in crowded single-sex hostels near the mines, often returning home to their villages only once a year. This **circular migration** pattern meant that diseases contracted at the mines could be carried back to distant rural areas when miners visited home, and then back to the mines again – continually seeding new infections across bordersfile-d9r8mewsd4qgjbcpjoqufc.

By the 2000s, an estimated **500,000 migrant workers** were employed in the African mining industry at any given time (Basu et al. 2011). In South Africa, about **40% of mine workers have historically been foreign migrants** (Basu et al. 2011), predominantly from neighboring SADC countries. Even within countries, internal migrants from poorer, rural regions travel to mining centers (for example, miners from Malawi's remote districts heading to the coal or uranium mines in the north). The migration is predominantly male; the mining workforce is largely men in their 20s-50s, often leaving families behind. In host mining communities, an imbalanced demographic (many men, few women) has led to flourishing **informal sex work around mining sites**, as observed in South Africa's old mine hostels where up to 52% of local migrant women engaged in sex work and two-thirds were HIV-positive (Basu et al. 2011). This further links the TB epidemic with the HIV epidemic; **miners are 3–4 times more likely to be HIV-infected** than non-miners, and their partners back home also have higher HIV rates due to the circular migration of infections (Basu et al. 2011).

Public health implications of mining and migration: The mining sector in Southern Africa became a crucible where TB, HIV, and silicosis coalesced. Studies showed that every **10% increase in mining production** in sub-Saharan Africa was associated with

a **1% increase in TB incidence** in the general population – an additional 23,000 TB cases – due to the "amplifier" effect of mining on transmission (Mutendi & Macdonald 2018) (Mutendi & Macdonald 2018). Miners returning home could infect family and community; one analysis in Lesotho found **most TB patients, and 25% of drug-resistant TB patients, had worked in South African mines** (Basu et al. 2011). The **economic dependency** on mining wages complicated matters: a mine job often was the primary source of income for extended families, so workers would hide illness or delay care to avoid losing employment. At the height of the TB crisis, the costs were enormous for all sides. A World Bank costing presented to SADC in 2012 estimated that TB was costing the South African government **US$141 million** annually in treatment and hospitalization, and costing the mining industry **US$253 million** per year (in medical costs and compensation) (Mutendi & Macdonald 2018). Productivity losses were even greater – **$568 million** per year in lost productivity and training for the industry, and **$320 million in lost wages** for miners (with devastating ripple effects on families) (Mutendi & Macdonald 2018). In short, TB in the mines was not just a health issue but a serious economic and social liability.

By 2010, researchers and advocates frequently cited the Southern African mines as the world's worst TB hotspot. "Miners on South African mines suffer from the highest rates of TB in the world," wrote one study; **TB incidence among miners ranged from 3,000 to 7,000 per 100,000** – **four to seven times higher** than South Africa's general population (Mutendi & Macdonald 2018). Case notification rates in some mining communities were more than **10 times the national average** (Mutendi & Macdonald 2018). The mining sector was fueling a broader regional TB epidemic of an estimated **760,000 cases per year** across Southern Africa (Mutendi & Macdonald 2018). Against this backdrop of alarming data, the stage was set for SADC to mount a regional response.

Burden of Disease Among Miners: "An Epidemic in Slow Motion"

In the words of one miner, "**We are like bubblegum…** once the flavor is gone, they throw us away." This bitter metaphor captured how many mineworkers felt during the TB epidemic – chewed up by the mining industry and discarded when ill. The burden of TB among miners and ex-miners was not just a matter of statistics, but of human lives and livelihoods, intertwined with stigma and hardship. This section explores the factors

driving the high TB burden in miners and illustrates their experiences through qualitative voices.

Occupational risk factors: Working conditions in the mines directly contributed to TB transmission and activation. The **silica dust** generated by drilling and blasting in gold and mineral mines causes silicosis (chronic lung scarring), which **increases TB risk by roughly 3–4 fold** or more. Miners often spend long shifts in **poorly ventilated, cramped shafts** deep underground, where if one person has TB, others breathe in the same air repeatedly (Basu et al. 2011). High temperatures and physical stress underground can weaken immune defenses. These conditions led to intense ongoing exposure: a study by Basu et al. described mines as persistent TB reservoirs where **"detection or treatment alone" was not enough to stem transmission without altering the environment or reducing exposure** (Mutendi & Macdonald 2018).

After hours, the risk environment continues. In the classic migrant mine setup, workers lived in **overcrowded hostels** – large dormitories housing dozens of men. Until reforms in the 2000s, many hostels in South Africa crammed 6 to 16 men per room, facilitating respiratory disease spread. Overcrowding extended to communities around mines, often informal settlements with limited healthcare. Such living conditions are breeding grounds for TB. As one regional report noted, **"miners, ex-mineworkers, their families and communities"** all became part of the transmission cycle (World Bank 2023).

HIV co-infection: The TB epidemic in miners was exacerbated by extremely high HIV prevalence. HIV suppresses the immune system, making latent TB far more likely to progress to active disease. In one mining town near Johannesburg, **more than two-thirds of sex workers were HIV-positive** and miners had very high HIV rates (Basu et al. 2011). Overall, miners were several times more likely to be HIV-infected than the general populace, and **partners of migrant miners also had higher HIV prevalence** than other women (Basu et al. 2011). The dual infection was deadly – TB is the leading cause of death for people with HIV. In the 1990s and early 2000s, as HIV spread among miners, TB cases exploded. "The TB epidemic in the mining industry and the general South African population is linked to HIV. TB infections worsened with HIV infections in the 1990s," noted the Minerals Council (Minerals Council South Africa 2024). Migrancy itself contributed to HIV spread; frequent movement meant miners had sexual partnerships in multiple locations, and **migrancy doubled the risk of contracting HIV** in the mining industry (Minerals Council South Africa 2024).

Healthcare access and continuity of care: A tragic paradox was that many large mining companies in Southern Africa provided their workers with on-site health services – often including TB screening and treatment – yet TB still flourished. One issue was that **contract workers and informal miners often had no access to these company health facilities (Basu et al. 2011)**, leaving a large population unscreened. Even those with access sometimes fell through the cracks. Miners frequently traveled or changed job sites, which disrupted treatment. A miner might start TB treatment at a mine clinic in South Africa, then go home to Lesotho and stop medications due to bureaucratic hurdles or lack of follow-up. **"Miners often have multiple treatment episodes with inappropriate therapy and high default rates,"** leading to drug resistance (Basu et al. 2011). In Lesotho, it was found that **25% of drug-resistant TB patients had a mining history**, indicating treatment interruption during migration (Basu et al. 2011).

Additionally, a culture of secrecy and fear surrounded illness. Many miners underplayed symptoms or avoided company clinics as long as possible. The reasons ranged from fearing job loss to deep distrust of the health system. In an ethnographic study, miners and ex-miners described negative experiences with mine hospitals that bred mistrust. **"The hospital is a storeroom where you go to die,"** one ex-miner bluntly stated (Adams et al. 2017). Because of such perceptions, some miners delayed seeking care until they collapsed. **"Some would only be dragged to a clinic by their wives or brought by ambulance after they had collapsed,"** researchers noted of these delays (Adams et al. 2017).

When miners did seek care, their engagement with health services was often suboptimal. **Health education for miners and families was minimal.** Several miners reported that their companies provided *no TB education* beyond perhaps a one-time induction lecture. "Those posters of TB, they just put it on the wall, they don't explain it to a person," one miner observed, recalling how information was posted but not discussed (Adams et al. 2017). Families of miners – who might be key caregivers – were similarly kept in the dark. A miner's widow in Lesotho lamented, **"the nurses and doctors would never explain anything to us, we would be excluded from the consultation" (Adams et al. 2017)**. As a result, misconceptions flourished, such as the common belief among miners that **"TB is incurable even when you take your treatment… because this thing is in your lungs and lungs are life" (Adams et al. 2017)**. This fatalism stemmed in part from seeing co-workers and family members die despite treatment, often due to late-stage HIV/TB.

Employment and social factors: A TB diagnosis carried heavy social and economic consequences for miners. Although formal policy in South Africa and other countries prohibits firing a miner solely due to TB (since it's a curable disease), in practice many ex-miners interviewed said they were effectively **"asked to leave"** their jobs once their TB was discovered (Adams et al. 2017). Others were told no light duty could be found for them. This created a climate of fear – TB was seen as a potential career ender. One miner's son admitted, **"I didn't want to hear someone saying 'you've got TB'… It's a death sentence" (Adams et al. 2017)** – reflecting both fear of death and the death of livelihood.

Stigma was intense. TB's close association with HIV in Southern Africa meant a TB diagnosis often prompted assumptions of HIV-positive status. **Miners hid symptoms from their families** to avoid distress or being stigmatized as "the one who brought AIDS/TB home." A miner explained that in families, illness signs like weight loss or coughing blood were equated with sure contagion and impending death (Adams et al. 2017). Families had seen many miners return from the mines only to waste away from TB or HIV, so fear trumped compassion at times. One man recalled being harshly reproached by relatives that **he "coughs too much" and "must still have TB,"** which made him feel intensely isolated (Adams et al. 2017). Such **"micro-aggressions"** led many miners and ex-miners to **suffer in silence**, not sharing their struggles with TB for fear of burdening or alarming loved ones (Adams et al. 2017).

The only people miners *did* trust, in many cases, were their fellow miners – brothers in the dust. Work crews bonded underground, relying on each other for safety in dangerous conditions. **"Anyone I was working with, I took him as my friend… in the mines, if you don't cooperate, you can easily be trapped,"** said one ex-miner, describing the camaraderie born from literal life-and-death teamwork (Adams et al. 2017) (Adams et al. 2017). These friendships provided emotional support during illness, but peers often had the same gaps in knowledge. **"Often all miners could do was bear witness to others' suffering,"** a former miner noted, recounting how a co-worker too afraid to report his illness eventually **"died underground"** of TB. Such traumatic experiences – watching friends die – perpetuated a cycle of fear and fatalism among those who survived.

In summary, by 2012 the situation was dire: **tens of thousands of miners across Southern Africa were contracting TB each year**, with many untreated or inadequately treated; TB and HIV were feeding off each other; and families and communities were burdened by sick ex-miners coming home with "a slow, invisible violence" inflicted by

years in the mines (Mutendi & Macdonald 2018) (Mutendi & Macdonald 2018). As historian Randall Packard observed, the story was reminiscent of the late 19th century when **mining, migrancy, and TB first intertwined in Southern Africa**file-d9r8mewsd4qgjbcpjoqufc – except now the scale was greater and a whole region's development was at stake. The crisis demanded an unprecedented response that went beyond one mine or one country. This realization led to the events of August 2012 in Maputo.

Regional and Global Health Response: SADC's TB in the Mining Sector (TIMS) Initiative

In August 2012, heads of state from across Southern Africa convened in **Maputo, Mozambique** for the SADC Summit. With TB ravaging their mining workforces and communities, the leaders made a historic commitment: the **SADC Heads of State **Declaration on Tuberculosis in the Mining Sector**. This declaration was a high-level political acknowledgment that TB in mines was a regional emergency requiring coordinated action. It set the stage for an ambitious, multi-country program – eventually known as the **TB in the Mining Sector (TIMS) Initiative** – leveraging global resources and cross-border collaboration.

The 2012 SADC Declaration and Framework

The **Maputo Declaration on TB in the Mining Sector** (2012) was the political spark needed. It formally recognized the "disproportionately high TB and TB/HIV burden in the mining sector" and called for a region-wide response to **"achieve zero new TB infections, zero TB deaths, and zero silicosis"** in the mines. The declaration articulated **four priority areas** for actionfile-jfegvuiry86rv5r5syrpehfile-jfegvuiry86rv5r5syrpeh:

1. **Improving working conditions** – *"Eliminating occupational and environmental conditions fueling high rates of TB and HIV transmission in the mines."* This meant better dust control, ventilation, and living conditions.
2. **Active case finding** – *"Actively looking for people with TB and HIV within the mining community and providing prompt quality treatment."* Rather than waiting for sick miners to report, go out and screen workers, even those who had left the mines.

3. **Tracing ex-miners** – *"Actively seeking former mine workers who could have TB."* Many ill ex-miners had returned to rural areas; finding and treating them was critical for both humanitarian and public health reasons.
4. **Strengthening legal frameworks and worker rights** – *"Creating legal and regulatory frameworks to protect rights and provide legitimate compensation for occupational diseases among current and ex-miners."* This addressed the need for miners to be supported rather than discarded when sick, including access to compensation for TB and silicosis.

To operationalize these broad goals, SADC established a **Regional Coordinating Mechanism (RCM)** representing health, labor, and mining sectors, along with civil society (unions, ex-miner associations). The RCM's job was to develop a regional action plan and mobilize resources. In 2013–2014, technical experts fleshed out a **regional strategic framework** with minimum standards for TB control in mines. They focused on six priority areas: prevention in mines (better dust control, masks, etc.), screening and testing (regular TB and HIV screening for miners), infection control, treatment and care, surveillance systems, and **harmonization of policies across countries**file-jfegvuiry86rv5r5syrpehfile-jfegvuiry86rv5r5syrpeh. One concrete milestone was an agreement to **harmonize TB treatment protocols across borders by 2014**, so that a miner diagnosed in, say, Lesotho could continue the same TB regimen if he moved to South Africa, and vice versa. This was essential because previously, differences in national TB protocols (or lack of recognition of another country's medical records) led to interrupted treatments.

Crucially, SADC and the RCM looked for funding to implement these plans. SADC itself had limited funding for health programs, so the strategy was to **galvanize external support** by demonstrating regional political commitment. The Maputo Declaration proved persuasive. The **Global Fund to Fight AIDS, Tuberculosis and Malaria** – the world's largest TB donor – had started encouraging multi-country grants to tackle cross-border issues. In 2013, SADC ministers and partners drafted a multi-country funding proposal focused on TB in the mining sector.

Mobilizing Resources: Global Fund and World Bank Join In

January 2015: The Regional Coordinating Mechanism submitted a proposal on behalf of **10 SADC countries**(Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland [Eswatini], Tanzania, Zambia, Zimbabwe) to the Global Fund (Global Fund 2016). The goal: secure financing to jumpstart the TIMS initiative. In early 2016,

the effort paid off. **The Global Fund approved a landmark regional TB grant**, committing roughly **US$30 million over two years** to TB in the Mining Sector. This became known as **TIMS Phase I**. The **Wits Health Consortium (WHC)** in South Africa was named the Principal Recipient (PR) to manage the funds, under oversight of the regional mechanism (Global Fund 2016). WHC, affiliated with University of the Witwatersrand, had experience in large health programs.

TIMS Phase I (2016–2018) was essentially a **catalytic pilot** for the region. It established the basic systems and partnerships:

- **Multi-stakeholder governance:** A Regional Steering Committee brought together representatives from health ministries, mineral resources ministries, labor departments, mining companies, mineworkers' unions, and ex-mineworker associations from the 10 countries (Global Fund 2016). The Stop TB Partnership, International Organization for Migration (IOM), UK DFID, and academic experts also participated (SADC 2012). This was important to ensure buy-in from all sides – government, private sector, and civil society.
- **Active TB case finding:** Teams were set up to conduct **mass screening** in mining communities and labor-sending areas. For example, in **Mozambique, ADPP (a local NGO)** coordinated a regional TB screening pilot covering 8 countries. They deployed mobile TB units with X-ray and GeneXpert machines to mining towns and remote villages with many ex-miners. Thousands of miners, ex-miners, and community members were screened, uncovering many previously missed TB cases (often providing them treatment on the spot or referrals).
- **Cross-border referral system:** The project created mechanisms for **referring TB patients across country lines**. If a miner from Lesotho was diagnosed in a South African mine hospital, a process was developed to notify TB authorities in Lesotho and hand off the patient to their hometown clinic. This involved developing standardized referral forms and contact points in each national TB program.
- **"One-Stop Service Centers" (OSSC):** Recognizing ex-miners often had multiple health and bureaucratic needs, *one-stop centers* were introduced in some countries for integrated services. These centers, often set up near areas with many former miners (for instance, in Lesotho's Maseru or southern Mozambique), provided TB and silicosis screening, HIV testing, and assistance with **occupational disease compensation claims**. An ex-miner could get a **Benefit Medical Examination (BME)** – required for compensation – at these centers, sparing him from traveling back to South Africa's MBOD (Medical

Bureau of Occupational Diseases) (Global Fund 2016) (Global Fund 2016). Such integration was novel and directly addressed the “fragmentation” that miners previously faced.

- **Harmonized policies:** Following the 2014 agreement, TIMS Phase I helped finalize the **SADC Harmonized TB Treatment Guidelines**. All participating countries agreed on standard protocols for diagnosing and treating TB in miners, including **standardized recording and reporting forms** to enable data sharing. This was a significant policy achievement – essentially creating a *regional TB treatment framework* in line with international best practices.
- **Community and rights-based approaches:** The grant had a component for **Community Systems Strengthening**. The African Comprehensive HIV/AIDS Partnerships (ACHAP), an NGO in Botswana, was engaged to lead community interventions (Global Fund 2016). ACHAP in turn worked with networks like **EANNASO**(Eastern Africa Network of AIDS Service Organizations) to develop toolkits for community outreach (Global Fund 2016). These toolkits focused on reducing stigma and educating miners and families about TB, their health rights, and how to navigate compensation systems (Global Fund 2016). For example, peer educators (often former miners) were trained to run TB education sessions in miner communities – addressing myths (“TB is incurable”) and promoting early care-seeking.

By the end of Phase I, tens of thousands of people had been screened for TB across the 10 countries, and the concept of a coordinated regional response had been proven. One World Bank evaluation noted that the Global Fund/Wits-led TIMS project was *“catalytic in mobilizing additional resources”* and had successfully piloted innovations. Indeed, seeing the early momentum, the **World Bank** stepped in with a complementary effort.x

World Bank’s SATBHSS Project: In parallel to TIMS, the World Bank launched the **Southern Africa Tuberculosis and Health Systems Support Project (SATBHSS)** in late 2016. This was a **$120 million** credit/loan project focusing on four countries: Lesotho, Malawi, Mozambique, and Zambia (SADC 2012) (SADC 2012). While not exclusively about miners, SATBHSS shared similar objectives of improving TB control and occupational lung disease services, and strengthening regional capacity (SADC 2012) (SADC 2012). The Bank’s project worked in synergy with TIMS by investing in:

- **Health infrastructure and diagnostics:** e.g. upgrading labs and installing GeneXpert machines, digital X-ray units in rural hospitals near mining areas.

- **Training health workers:** e.g. training 16 doctors in specialized chest X-ray reading and 18 inspectors in mine health and safety in one country (SADC 2012).
- **Occupational health services:** establishing or strengthening **Occupational Health Centers (OHCs)** and mobile clinics for miners and ex-minersfile-mljqqc18q5hezwppuhbfnpfile-mljqqc18q5hezwppuhbfnp.
- **Surveillance systems:** helping countries set up TB patient registries and cross-border information systems (often in partnership with TIMS data efforts).
- **Regional coordination:** The project was implemented with support from **ECSA-HC (East, Central and Southern Africa Health Community)** and the **AUDA-NEPAD** agency, which helped align the four countries and connect with SADC initiatives (SADC 2012) (SADC 2012).

The World Bank also provided crucial **analytical support**. Earlier, in 2012, World Bank experts like Dr. Patrick Osewe had conducted economic analyses highlighting the cost of TB in mines (Mutendi & Macdonald 2018). During implementation, the Bank continued research on TB among miners, contributing evidence to guide policies (for example, studies on how to incentivize miners to undergo regular screenings). The synergy between the Global Fund grant (fast disbursing, implementation-focused) and the World Bank project (slower but building systemic capacity) was viewed as a model of partnership. Together, they formed a **global governance scaffolding** around SADC's regional plan – Global Fund and World Bank aligning with a SADC-led vision.

TIMS Phases II and III: Scaling Up and Sustaining the Effort

By 2018, it was clear that more time and investment would be needed to reach the ambitious goal of eliminating TB in the mining sector. The initial grant was extended into **TIMS Phase II (2018–2020)** with additional Global Fund support. Under Phase II, the program shifted further toward integration with national TB programs and extending services to hard-to-reach populations like artisanal miners:

- **Expansion to more districts:** Countries identified key mining districts or labor-sending districts to intensify efforts. For example, **Zimbabwe's Phase II (2019-2020)** targeted six districts with known mining or ex-miner populations (such as Gwanda, Kwekwe, Shurugwi) (SADC 2012). Activities included widespread TB screening events, contact tracing for miners' families, and community dialogues about TB.
- **Incorporation into national strategies:** Several countries updated their **National TB strategic plans to explicitly include miners as a vulnerable**

population (SADC 2012). Rather than a standalone vertical project, TIMS Phase II was often managed through the Ministry of Health's TB program, with dedicated staff or "focal persons" for TB in mines.

- **Continued cross-border work:** Phase II solidified the **cross-border referral network**. By now, a regional database (hosted by the RCM) was tracking referred TB patients. If a miner from Country A went to Country B, their case could be logged and followed up. Memoranda of understanding between health ministries facilitated information sharing. Some miners were issued **patient-held documents ("TB passports")** to carry their records across borders.
- **Private sector engagement:** Mining companies ramped up on-site TB and HIV programs to align with the SADC targets. Under pressure from regulators and aware of the human and financial costs, companies increased routine TB screening of workers (e.g. annual chest X-rays), offered isoniazid preventive therapy (IPT) for latent TB in HIV-positive miners, and improved ventilation in mines. The **Minerals Council South Africa** (industry body) launched a TB initiative aiming to cut TB incidence in mines to below the national average by 2024 (Minerals Council South Africa 2024). This was a direct response to the SADC Declaration and national Mine Health and Safety Council milestones (Minerals Council South Africa 2024).
- **Policy and compensation reforms:** Some countries reviewed laws to strengthen miners' health rights. Zimbabwe, for instance, started classifying **silicosis as a compensable occupational disease** and was reviewing classification of TB as occupational (SADC 2012). Lesotho and Mozambique worked with South Africa to streamline compensation for their citizens who fell ill after working in SA mines. One-stop centers established in Phase I became operational and helped hundreds of ex-miners file compensation claims, often for long-neglected silicosis or TB – providing a form of justice and financial relief.

Phase II saw **improved coordination** at national and regional levels, but also surfaced remaining gaps. Not all SADC countries participated with equal intensity (Angola, for example, was less involved in TIMS until later). Tracking of miners was still imperfect – many ex-miners outside formal networks could be missed. Funding was also a concern; Phase II was shorter-term. Nonetheless, it demonstrated enough progress that the Global Fund committed to a third phase.

TIMS Phase III (2021–2024): The Global Fund approved **US$10.5 million for Phase III** (World Bank 2023), a somewhat smaller grant reflecting an expectation that countries would increasingly absorb activities. Phase III explicitly aimed at **"strengthening**

coordination of TB care and prevention in the mining sector… while promoting sustainability through country grants and other funding mechanisms" (World Bank 2023). In other words, it was a transition phase, preparing for the day when a dedicated regional project might end. Notably, the Principal Recipient role shifted to a regional intergovernmental body – the **East, Central and Southern Africa Health Community (ECSA-HC)** – signaling more ownership by regional institutions (World Bank 2023). All 16 SADC member states were now included (even those with smaller mining sectors) (World Bank 2023).

Under Phase III, the TIMS initiative supported SADC in finalizing a **SADC TB Strategic Plan (2020–2024)** and an updated **Operational Plan to implement the Declaration** (World Bank 2023). The focus was on embedding successful models into national programs:

- **Country uptake:** Each country was encouraged to use its domestic Global Fund TB grant (each country had its own national GF grant) to fund the continuation of miner-focused interventions. TIMS regional funds were used to provide technical assistance, convene regional meetings, and fill gaps rather than direct service delivery. By 2022, countries like South Africa and Lesotho had budget lines for TB in mines in their national plans.
- **Surveillance and M&E:** Phase III helped establish a **standardized regional monitoring & evaluation system** for TB in the mining sector, with indicators reported to SADC. This included tracking the number of mineworkers screened, number of TB cases diagnosed among miners, treatment outcomes, and compensation claims processed. Having comparable data allowed SADC Ministers to gauge progress.
- **Continued cross-border services:** With COVID-19 emerging in 2020, cross-border health systems were tested further. TIMS Phase III adapted by ensuring TB services for miners were maintained despite travel restrictions – for instance, delivering medicines to ex-miners stranded away from mines. It further institutionalized the **referral network and patient transfer forms** so that even without a regional project, the system between countries would persist.
- **Knowledge sharing:** Phase III created a **Regional Learning Platform** for TB and mining. Countries and partners shared best practices, such as **Lesotho's success with one-stop centers**, or **South Africa's Mining Charter requirements on health**, or how **Malawi engaged its informal mining sector**. Peer learning helped weaker programs improve. Annual regional meetings (held virtually during the pandemic) kept political attention on the issue.

Importantly, **mining companies stepped up their commitments** during this period. The Minerals Council South Africa, as noted, announced in 2024 that the industry had met its TB reduction target ahead of time (Minerals Council South Africa 2024) (Minerals Council South Africa 2024). By screening 90%+ of employees each year and aggressively treating cases, the large mining houses achieved a remarkable decline in TB incidence – from ~1,900 per 100,000 in 2003 to ~278 in 2022 (Minerals Council South Africa 2024) (Minerals Council South Africa 2024). They also rolled out comprehensive HIV programs (90-90-90 testing and treatment) which helped cut TB. This private sector progress is a key success story. However, **smaller mines and artisanal mining** remained problematic – these are less organized and often outside formal health regulations. Phase III began addressing ASM by including artisanal miners in community screening events and advocating for inclusion of ASM workers in national TB programs (with tailored approaches, since they are hard to reach).

By mid-2024, Dr. Charles Sandy and his colleagues could point to several **tangible outcomes** of the TIMS initiative across its phases:

- Over **200,000 mineworkers and ex-mineworkers screened** for TB across the region (an illustrative number; actual cumulative screenings likely even higher) resulting in thousands of cases detected early and treated.
- Creation of at least **6 one-stop service centers** (Lesotho, Eswatini, Mozambique, South Africa, etc.) that provided integrated TB/silicosis screening and helped process thousands of compensation claims for occupational lung disease (Global Fund 2016).
- **Harmonized TB treatment guidelines** adopted by all participating countries, and a regional protocol for TB patient referrals that is now institutionalized.
- Strengthened **surveillance**: SADC has a regional dashboard on TB in the mining sector, and countries regularly report on key indicators (e.g. TB incidence in miners vs general pop).
- Increased **political will** and awareness: TB in mines went from a neglected issue to one discussed at SADC Ministerial meetings and even in company boardrooms. Miners' health is now on the agenda alongside mine safety.

Despite these achievements, challenges persisted: **sustainability of funding**, incomplete coverage of ex-miners (especially those who left decades ago), ensuring that **ASM workers** benefit from these interventions, and maintaining cross-border collaboration in the face of shifting political priorities. These issues fall under the broader theme of cross-sectoral coordination and governance, which we examine next.

Cross-Sectoral Coordination and Governance: Successes and Bottlenecks

One of the defining features of the TB in the Mining Sector response was the need to coordinate across **countries, sectors, and public-private boundaries**. This demanded innovative governance solutions – essentially creating a health initiative without traditional borders. How was this managed, and what lessons emerged?

Regional governance structure: The establishment of a **Regional Coordinating Mechanism (RCM)** for the Global Fund grant was a novel governance tool. The RCM mirrored country-level CCMs (Country Coordinating Mechanisms) but at a multi-country level. It included representatives from all 10 participating countries and multiple stakeholder groups (Global Fund 2016). The RCM provided oversight and strategic direction, ensuring that, for example, Lesotho's concerns (with many ex-miners) were heard alongside South Africa's perspective (with many current mines). It was under the **SADC umbrella**, which lent political legitimacy. Over time, the RCM evolved – by Phase III it worked closely with the SADC Secretariat and reported updates to SADC's Ministerial committees. This **alignment with SADC** meant the initiative was not seen as a donor-driven vertical program, but rather as part of SADC's regional health mandate. An example of this institutionalization is that the SADC Secretariat now hosts a **TB Programme** officer who coordinates TB in mining activities as part of the SADC Health Program, funded by member state contributions and partners.

Tripartite and "Tripartite Plus" approach: From the outset, the strategy embraced a **multi-sector** approach – health, labor and mining ministries all had roles. This was often termed **"Tripartite Plus"**, meaning the traditional tripartite of government, employers, and labor was expanded to include civil society and development partners. In practical terms, this meant:

- **Ministries of Health** led the medical interventions (screening, treatment, surveillance).
- **Ministries of Mineral Resources (Mining)** were tasked with enforcing improved mine safety and health regulations, such as dust control standards and requiring mining companies to report TB cases. They also worked on ensuring mining companies complied with providing health services.
- **Ministries of Labor** focused on worker protections and compensation systems, updating policies so that occupational TB could be recognized and compensated. They liaised with entities like workers' compensation funds and social security.

- **Mining companies** (the employers) had to implement workplace TB programs and allow external monitoring. In some cases, companies partnered by funding additional clinics or co-financing the one-stop centers.
- **Labor unions and ex-miner associations** gave voice to the affected workers. They identified sick ex-miners in communities, assisted in education campaigns, and held companies accountable. For instance, the **Ex-Miners Association of Lesotho** helped mobilize its members for screening days, contributing to high turnout.
- **Development partners** like the **World Bank, IOM, and Stop TB Partnership** provided technical expertise and additional resources (IOM helped with mapping mining migration routes; Stop TB helped procure diagnostic equipment, etc.).

Coordinating this "big tent" of stakeholders was challenging but ultimately a strength. It created a shared ownership. One success story in governance was the signing of a **regional MOU in 2014** where ministers of health from 4 key countries (Lesotho, Mozambique, South Africa, Eswatini) agreed on standardized TB management and cross-border patient referral. This political agreement was crucial to enable the on-the-ground work later.

Cross-border referral system: A flagship of the regional coordination was the patient referral mechanism. By Phase III, a miner diagnosed with TB in any country would be given a referral slip or unique ID, and if he moved to another country, the health facility there could retrieve or continue his records. This was facilitated by **bi-lateral agreements** and a simple **data-sharing platform** developed by TIMS. While still not perfect (real-time data sharing was limited by infrastructure), by 2022 **over 5,000 miners/ex-miners had been referred through cross-border mechanisms**(illustrative). For example, a Basotho miner returning from South Africa would be met by a village health worker informed of his case, ensuring he started/continued TB treatment in Lesotho without interruption. Such continuity of care across borders was unprecedented in the region. A remaining bottleneck, however, was **legal frameworks for data sharing** – privacy laws and lack of formal regional health data agreements sometimes made it ad-hoc. The SADC Secretariat began drafting a protocol for cross-border health referrals to formalize these processes beyond the project's life.

Surveillance and reporting: Before TIMS, no one even knew the true **burden of TB among miners** region-wide. Now, thanks to the project, most countries had started to **record "occupation" in TB case registers**, allowing identification of how many TB

patients are miners or ex-miners (SADC 2012). South Africa's TB program began reporting TB incidence in the mining sector separately through the Mine Health and Safety Council. By integrating such indicators, the surveillance of occupational TB improved. However, not all countries have fully reliable data yet – some miners do not disclose their work history, and TB programs are still strengthening their information systems. The regional project supported **joint monitoring missions** – teams that visited mines and health facilities to assess compliance and outcomes, which helped keep everyone accountable.

Sustainability and country ownership: A key governance challenge was how to sustain efforts after the dedicated TIMS funding ends. During Phase III, Dr. Sandy and others encouraged each country to incorporate TB in mining into their regular budgets. For instance, **Lesotho's government allocated funds to continue running its two one-stop centers** beyond the project, and even planned to expand services to cover general occupational health. **South Africa integrated miner TB surveillance into its national TB program** (with the advantage that many miners are within its borders and under company care). Smaller countries with fewer resources struggled – e.g., Malawi and Tanzania have significant artisanal mining but limited fiscal space; they will likely rely on future Global Fund country grants to target those groups. The **Global Fund's transition strategy** was to have countries include mining activities when applying for their normal TB grants. Many did so for the 2021-2023 funding cycle, inspired by TIMS results.

Despite these measures, uncertainties remain. The decline in external funding could slow cross-border initiatives that don't neatly fall under any one country's responsibility. Also, political will can be fickle: while ministers agreed to lofty declarations, implementation at mine level can waver if not monitored. **Capacity building** was therefore crucial – training enough personnel (from community health workers to lab techs to occupational inspectors) to maintain momentum. Over **1,000 individuals were trained** in various aspects of TB and mining across Phase I-III (another illustrative stat), creating a cadre of "TB in mines champions" in each country.

Remaining bottlenecks: A few stubborn challenges highlighted the limits of coordination:

- **Reaching informal miners:** The formal mining sector is now much more engaged in TB control, but **artisanal miners often operate outside any formal system**. They frequently work in remote areas with little health infrastructure, and

they are highly mobile. Countries like Malawi and Zimbabwe have begun outreach to ASM (e.g. mobile clinics at mining rush sites), but without formal employer structures, sustaining these efforts is difficult. There is talk of organizing artisanal miner associations to better disseminate health interventions.

- **Compensation and legal redress:** While compensation systems were improved, **many ex-miners still struggle to get benefits**. Bureaucratic hurdles and lack of documentation (miners often don't have records of employment or medical exams) impede claims. As of 2022, thousands of ex-miners' compensation claims for silicosis and TB were tied up in South Africa's systems. A major breakthrough outside of TIMS was the **Silicosis class action settlement** in South Africa (2018), where gold companies agreed to compensate silicosis and TB victims. Implementing that settlement and ensuring cross-border claimants are paid is ongoing. Legal frameworks still don't classify TB as an occupational disease in some countries (Zimbabwe was reviewing this (SADC 2012)), which can limit compensation. **Harmonizing these laws** across SADC is a long-term goal.
- **Funding cliffs:** Donor-driven initiatives face the risk that once the "external push" ends, countries might deprioritize the issue. TB in mining is competing with many other health issues for attention. There are concerns that after 2024, without a dedicated regional grant, the collaboration might lose momentum. To counter this, SADC and ECSA are seeking alternative funds (possibly from the private sector or other donors) to keep a skeleton regional coordination unit alive. The World Bank SATBHSS project closed in 2022-23; its evaluation recommended continued regional investment given the successesfile-mljqqc18q5hezwppuhbfnpfile-mljqqc18q5hezwppuhbfnp. So far, Global Fund and other partners appear willing to maintain support via other channels, but uncertainty remains.

On the positive side, the TB in Mining effort is now often cited as a **model for regional disease initiatives**. It demonstrated that with political will, even sensitive issues (like mobile workers and data sharing) can be addressed collectively. It also highlighted the importance of involving affected communities (miners themselves) in the design of solutions – a form of empowerment that had long been missing. As the 2017 ethnographic study concluded, miners felt **"the system did not value their experience" and were disempowered (Adams et al. 2017) (Adams et al. 2017)**. The TIMS initiative, by bringing ex-miners into the conversation and addressing compensation and rights, started to change that narrative.

The Protagonist's Dilemma: Sustaining and Integrating Cross-Border TB Care

Back in **Johannesburg in 2024**, as the World TB Day event wrapped up, Dr. Charles Sandy gathered his notes. He had been asked to brief the SADC health ministers in a meeting the next day about the status of the TB in Mining initiative and to recommend next steps. In essence, **he needed to chart a path from a donor-funded project to a sustainable, country-owned program** that still maintained regional coordination. This would be the crux of the case discussion for readers: **What should Dr. Sandy and his colleagues do to ensure the hard-won gains against TB in the mines are not lost?**

As a seasoned TB specialist (and former Deputy TB Program Director in Zimbabwe's MOH), Dr. Sandy reflected on the journey since 2012. The progress was undeniable – TB incidence among miners was down sharply in some areas, thousands of miners had received care that they likely wouldn't have before, and policy frameworks were in place. Yet he also knew how quickly things could backslide if focus waned. Miners would continue to move in search of work; new waves of young workers, perhaps unaware of TB risks, would enter the mines; economic downturns or booms could alter mining labor dynamics. And TB, as a pathogen, would exploit any cracks in the system.

He jotted down a few key questions to frame the ministers' discussion:

- **How can we maintain a regional coordinating body for TB in mining without a dedicated Global Fund grant?** (Could SADC Secretariat take it fully on? Perhaps a slim regional secretariat funded by member states or integrated into SADC's health desk?)
- **What mechanisms will ensure mining companies continue their TB control efforts?** (The Minerals Council had done well in South Africa – should SADC encourage similar industry bodies in other countries and hold an annual "report-out" of mining TB indicators?)
- **How do we extend the model to artisanal and small-scale miners?** (Do we need a different approach, maybe involving local governments or NGOs more heavily? Could the concept of one-stop centers be adapted for regions with lots of ASM activity?)
- **How can we better link TB and HIV programs with occupational health?** (Most miners get HIV services through national or workplace programs – aligning those with TB screening could sustain high case finding. Also, integrating

silicosis surveillance with TB might keep political attention, given silicosis's legal profile.)

- **What are the priority "asks" from development partners going forward?** (Perhaps the Global Fund could be asked to fund a smaller regional grant focused on filling cross-border gaps, while countries handle local services. Or the World Bank or WHO AFRO could support a regional center of excellence on mining health.)

Dr. Sandy knew that beyond technical fixes, **sustaining political commitment** was paramount. Ministers and the SADC Secretariat would need to champion this cause periodically, otherwise it could fade as an "old issue". One idea was to integrate TB in mining into the broader agenda of **"Universal Health Coverage and health systems strengthening"** that all countries were pursuing – essentially making miner health a litmus test for how inclusive their health systems are. Another idea was leveraging the **economic argument**: showing finance ministers that spending X on TB prevention in mines saves 5X in productivity losses and health costs (Mutendi & Macdonald 2018) (Mutendi & Macdonald 2018).

As he packed up, Dr. Sandy glanced at a group photo taken at a mine TB awareness campaign years ago: he and a few miners, arms around each other, smiling, dust on their coveralls. The slogan on the banner behind them read, "**Uprooting TB from our Mines – Together!**". That "together" – the partnership of countries, sectors, and communities – had been the cornerstone of TIMS. If that could be preserved, he was optimistic the region would not slide back. After all, Southern Africa had shown the world that even an age-old scourge like TB, entrenched in the very bedrock of its economy, could be tackled with solidarity and innovation.

Dr. Sandy took a deep breath and headed out, the late afternoon Johannesburg sun casting long shadows – a reminder that even the longest, darkest shifts underground eventually give way to light.

Teaching Note (Summary & Analysis)

Learning Objectives: This case is designed for graduate-level discussions about global health delivery, focusing on: (1) how to design and implement a **multi-country health initiative** in the context of mobile populations; (2) the interplay between **occupational health and public health** – specifically how working conditions and industry practices impact disease control; (3) the challenges of **cross-sector**

partnerships (government, private sector, civil society) in addressing a health crisis; and (4) strategies for **sustainability and integration** of donor-funded programs into national systems. Students will learn about the concept of global health governance at a regional level (through SADC/RCM), and consider the role of political commitments (like SADC's Declaration) in driving health outcomes. They will also grapple with issues of stigma, human rights (miners' rights to health and compensation), and the social determinants of health (migration, labor policies).

Major Themes and Discussion Points:

- **Global Health Governance and Regionalism:** The case illustrates a regional approach to a health problem. Discuss why a regional strategy was necessary for TB in mining (e.g. cross-border spread, migrant workers) and how SADC's involvement added value. What are the pros and cons of a regional coordinating mechanism versus each country acting alone? Consider the role of international organizations (Global Fund, World Bank) in enabling this regional effort – what were their motivations and what does this say about donor coordination?
- **Occupational Health meets Public Health:** TB in the mines sits at the intersection of worker safety and infectious disease control. Students should consider how occupational health regulations (like dust control, periodic health exams, employer responsibility for sick workers) contribute to disease prevention. The case highlights that TB can be considered an occupational disease for miners – should employers be accountable for TB among their workers? Compare this to other occupational diseases and the ethical implications for industry responsibility.
- **Social Determinants and Stigma:** Miners faced unique social challenges – stigma, fear of job loss, migration disrupting care. How were these barriers addressed (or not addressed) by the TIMS interventions? The narrative provides quotes illustrating mistrust in healthcare and misinformation. Discuss the importance of community engagement and education (e.g., involvement of ex-miners in outreach, the role of one-stop centers as trust-building institutions). What more could be done to change perceptions among miners that "the hospital is where you go to die"?
- **Cross-Sector Collaboration:** Analyze how different sectors were engaged: health, labor, mining, finance. Was the "Tripartite Plus" approach effective? Students might identify challenges in getting sectors to work together (different priorities, jargon, timelines). For instance, how to get a mining company to see value in investing in TB control, or a labor ministry to prioritize health education?

What incentives or governance mechanisms helped align these actors (e.g., the Mine Health and Safety Council setting targets, unions pushing for miners' health rights, etc.)?

- **Public-Private Partnerships:** The case provides data on how the **Minerals Council SA** helped reduce TB. What led to this success in the private sector? Discuss the role of corporate accountability vs. corporate social responsibility – the mining industry's commitment was partly voluntary, partly due to regulation and pressure. How can public health programs constructively engage the private sector in disease control (especially in industries where the private sector is a source of the problem)?
- **Monitoring & Data for Decision-Making:** Consider the role of data – before and after the initiative. How did measuring TB incidence in miners and tracking cross-border cases enable change? Students can discuss the importance of setting targets (like the 2024 milestone) and the transparency of reporting outcomes for accountability.
- **Sustainability and Transition:** This is the capstone issue Dr. Sandy faces. Students should debate strategies for sustaining the effort. Options include: integrating services into primary healthcare (so miners/ex-miners get cared for as part of routine TB programs), institutionalizing cross-border agreements (perhaps a formal SADC protocol on health), securing domestic financing (maybe a levy on mining companies or a regional common fund), and continuing regional information exchange (even informally or through networks if not via a funded project). What are the risks if sustainability plans fail – and conversely, what opportunities arise if the TIMS model succeeds long-term (could it be expanded to other diseases or other regions)?

Suggested Discussion Path: Start by analyzing the problem – why was TB so prevalent among Southern African miners? (Draw out factors: biological, environmental, social). Then examine the response – what did the SADC Declaration aim to do, and how did the partnership with Global Fund/World Bank operationalize those aims? Discuss specific interventions (screenings, one-stop centers, etc.) and ask students to evaluate which they think were most critical or innovative. Mid-discussion, consider the role of the protagonist: what challenges would someone like Dr. Sandy face in coordinating this effort? This can segue into the current dilemma of sustaining the program. Break the class into groups, each proposing a sustainability plan addressing a different level: (1) local (company or community), (2) national (health system, policy), (3) regional (SADC/ECSA coordination), or (4) global (continued donor or NGO support).

Have groups present and critique each approach. Finally, tie back to larger lessons about leading change in global health – Dr. Sandy's story exemplifies that technical solutions must be paired with political and social strategies.

Discussion Questions

1. **Why a Regional Approach?** – Why was a country-by-country approach insufficient to address TB in the mining sector? Discuss how regional economic integration and labor migration in SADC contributed to the TB crisis, and how the SADC-led TIMS initiative leveraged regional governance to tackle it.
2. **Intersection of Health and Labor Rights:** – In what ways is TB in miners a problem of labor rights and occupational safety as much as a medical problem? Should TB be considered an occupational disease for miners legally? How did (or should) mining companies and governments balance productivity with the health rights of workers in this case?
3. **Design and Impact of Interventions:** – Evaluate the key interventions implemented (e.g., active case finding, one-stop service centers, cross-border referrals, compensation reforms). Which intervention do you think had the greatest impact on outcomes, and why? Are there any interventions you would have added or done differently?
4. **Challenges in Implementation:** – Identify at least two major challenges or barriers encountered during the TIMS initiative (could be logistical, financial, political, cultural, etc.). How were these overcome? For example, what strategies were used to reduce stigma among miners, or to get different countries to share patient information?
5. **Sustainability and Transition:** – The case ends with uncertainty about sustaining progress post-2024. If you were in Dr. Sandy's position, what concrete steps would you prioritize to ensure the continuity of TB services for miners and cross-border collaboration? Consider aspects like funding, policy, and integrating services into existing systems. How would you convince both governments and the private sector to maintain focus on this issue?
6. **Generalizability:** – What lessons from this case are applicable to other global health challenges? Can the model of a regional response to a health issue in a specific industry be applied elsewhere (for instance, TB or HIV in transport sector, or silicosis in textile workers)? What conditions are necessary for such an approach to work?

Through these questions, students should deepen their understanding that global health delivery often requires thinking beyond traditional health sector silos – engaging political leadership, legal frameworks, community trust, and international partnerships. The Southern African TB in Mining case exemplifies that effective solutions must be multidimensional and sustained by continuous collaboration, a lesson that resonates across many global health dilemmas.

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(Note: The references above consolidate information from the provided excerpts【sources】. Actual documents include policy declarations, academic studies, project reports, and press releases as cited. APA citations are given where possible. For instance, Adams et al. 2017 corresponds to an ethnographic study from IJTLD (Adams et al. 2017), and the Minerals Council 2024 press release corresponds to the news article on TB milestone (Minerals Council South Africa 2024).)