

A HANDBOOK ON

OCCUPATIONAL HEALTH PRACTICE IN THE SOUTH AFRICAN MINING INDUSTRY

CHAPTER 9

Author
Dr Nomonde Buyisiwe Mabuya

Copyright © MHSC
First edition,
first impression 2001
Second edition 2026

© All rights reserved. Apart from any fair dealing for the purpose of research, criticism, or review as permitted under the Copyright Act, no part of this book may be reproduced or transmitted in any form or by any means, electronic or mechanical, including photocopying and recording, without permission in writing from MHSC.

Chapter 9

HIV/AIDS and the Mines

This chapter provides an overview of human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS), with a particular focus on their impact in the South African mining industry. It also highlights common comorbidities among people living with HIV, the role of workplace wellness programmes, and the importance of timely treatment, monitoring for side effects, referral for antiretroviral therapy, and fitness-for-work assessments. In the occupational health setting, the emphasis is on workplace-based screening, diagnosis, initiation of treatment, and infection prevention – rather than on managing advanced clinical complications or antiretroviral therapy-related adverse events. This second edition of the Handbook has been revised to align with these occupational health priorities.

Dr Nomonde Buyisiwe Mabuya
Occupational Medicine Specialist

9.1 Introduction

9.1.1 HIV/AIDS global perspective

Since its emergence in the 1980s, the human immunodeficiency virus (HIV) has remained a major global health challenge. According to the World Health Organization (WHO), an estimated 3.5 million people acquired HIV and viral hepatitis in 2023, and 2.5 million people died from HIV, viral hepatitis, and sexually transmitted infections (STIs).

To curb the epidemic, global agencies have implemented a range of coordinated interventions. The WHO leads the global health sector strategy to eliminate HIV as a public health threat, while the Joint United Nations Programme on HIV and AIDS (UNAIDS) coordinates the international response. The International AIDS Society (IAS) also provides a professional network to advance research and care.

The 90-90-90 targets were set by UNAIDS for 2020, which has since advanced these to the 95-95-95 targets, aiming that by 2025:

- 95% of people with HIV know their status;
- 95% of those diagnosed are on treatment; and
- 95% of those on treatment achieve viral suppression.

Global interventions to achieve these targets include:

- Biomedical interventions: antiretroviral therapy (ART) to reduce viral load and transmission; pre-exposure prophylaxis (PrEP); voluntary medical male circumcision (VMMC); and condom use
- Testing and diagnosis: expanded access to HIV testing, including rapid and self-testing, to enable early diagnosis and linkage to care
- Structural interventions: addressing inequality, stigma, and legal barriers; promoting community engagement; and integrating services for vulnerable populations
- Behavioural interventions: reducing high-risk behaviours and promoting harm-reduction strategies, such as clean needle programmes

These efforts have led to measurable progress. In 2023, 77% of people living with HIV (PLHIV) were receiving ART, and 93% of those on treatment (72% of all PLHIV) had achieved viral suppression. Additionally, 19 countries have been validated for eliminating mother-to-child transmission of HIV and/or syphilis, supported by the rollout of dual HIV/syphilis rapid tests in antenatal care.

9.1.2 HIV/AIDS in South Africa

South Africa continues to carry one of the world's heaviest HIV/AIDS burdens, with an estimated 7.7 million people aged 15–49 years living with HIV in 2023 – representing approximately 18.8% of adults in this age group. Of these, 5.9 million were receiving ART, enabling them to lead healthier, more productive lives.

Despite significant progress, numerous challenges persist. These include disparities in access to healthcare, particularly in rural and underserved areas, due to infrastructure limitations, transport barriers, and shortages of healthcare professionals. Gaps remain in expanding HIV prevention and ensuring universal ART access. Strengthening condom promotion, rolling out PrEP, and addressing high-risk behaviours are critical to halting new infections.

Comorbidities such as tuberculosis (TB) and mental health conditions (e.g., depression, anxiety) further complicate treatment adherence and overall health outcomes. Structural and social determinants – such

as poverty, unemployment, violence, and gender inequality – continue to shape the landscape of HIV vulnerability and hinder prevention and care efforts.

In response, South Africa has adopted comprehensive national strategies, notably the 2023–2028 National Strategic Plan (NSP). (1) for HIV, TB and STIs, which serves as a roadmap to reduce new infections, improve treatment outcomes, and address the broader determinants of health.

9.1.2.1 National Strategic Plan

The 2023–2028 NSP for HIV, TB and STIs is a roadmap and blueprint for a multi-sectoral, people-centered approach to eliminate these diseases as public health threats, focusing on reducing barriers, maximising access to services, and building resilient systems

Key objectives and priorities of the 2023–2028 NSP include:

- Eliminating HIV, TB, and STI diseases as public health threats by 2030 – sets the overarching goal, aiming to reduce the burden of these diseases to a manageable level
- Setting comprehensive multi-sectoral strategic objectives and priority interventions – outlines a range of interventions, across various sectors, to address the epidemics
- Reducing barriers and enhancing access to prevention and treatment services – aims to improve access to services for all, including key and vulnerable populations
- Addressing social and structural drivers – acknowledges the role of social and structural factors in the spread of HIV, TB, and STIs, and aims to address them
- Focusing on human rights principles – emphasises a human rights-based approach in its response to the epidemics
- Strengthening strategic information – aims to improve the collection, analysis, and use of data to inform the response to the epidemics

The NSP also includes specific goals related to:

- Reducing new HIV infections – aims to reduce new HIV infections to less than 100 000 by 2022 (from the previous NSP, according to a document from the South African National AIDS Council (SANAC))
- Reducing TB incidence – aims to reduce TB incidence by at least 30% by 2022
- Reducing STI incidence – aims to reduce syphilis, gonorrhea, and chlamydia infections, significantly
- Addressing key and vulnerable populations – focuses on reaching key and vulnerable populations with tailored interventions
- Linking HIV, TB, and STI responses to the National Development Plan (NDP) – aims to align its efforts with the broader development goals of the country

9.1.2.2 Access to treatment

The South African Government provides free ART at public healthcare facilities nationwide, making treatment accessible to all who test positive, regardless of their CD4 count.

9.1.2.3 Testing and counselling

There are several testing and counselling initiatives in South Africa, including the ‘test and treat’ strategy, testing and counselling initiated by service providers or the patient, and self-testing, which are all aimed at promoting early diagnosis and linkage to healthcare.

9.1.2.4 HIV prevention

9

HIV prevention in South Africa focuses on a combination of biomedical and behavioural strategies, including distributing condoms, promoting VMMC, providing PrEP, preventing mother-to-child transmission, and managing STIs.

9.1.3 HIV/AIDS in the South African mining industry

In the South African mining industry (SAMI), HIV is often co-linked with TB in terms of its prevalence, and compared to the national prevalence. See Chapter 8 of this Handbook (Occupational Lung Diseases).

Health and general wellbeing are key factors, as the nature of mining requires peak physical fitness; yet, mining is also associated with the risk of severe occupational illnesses, such as pneumoconiosis, asbestosis, silicosis, and TB. Respirable crystalline silica (RCS) dust exposure and silicosis are substantial risk factors for TB, as is HIV infection. Sexually transmitted infections are an important cofactor for HIV transmission, and the rates of other STIs have, in many instances, been found to be higher amongst mineworkers than in the general population (2).

There are a number of other risk factors that contribute to mineworkers' vulnerability to HIV. These specific vulnerability factors are listed and described in **Table 9.1**.

Table 9.1. Risk factors impacting HIV in the South African mining industry

Risk factor	Risk Factor Description
Social economic factors	Migrant labour The mining industry heavily relies on migrant workers, often from rural areas, who are temporarily separated from their families and communities to live in single-sex hostels. Even if there are facilities in the mining community, miners or family members do not often use these, as they are in isolated environments. Poverty and limited access Poverty and limited access to resources around mining communities can contribute to risky behaviours, such as trading sex for money or drugs. Lack of education and awareness Mining communities are often populated with workers and their spouses who tend to be poorly educated, with only a basic knowledge of HIV and STIs. Moreover, many misconceptions and myths exist, resulting in denial and reluctance to access HIV counselling and testing (HCT) and low awareness of ART, which can lead to risky sexual practices and delayed testing and treatment.

Risky behaviour	Availability of sex and alcohol Typically, informal settlements emerge in mining communities to accommodate the influx of sub-contracted workers and those seeking opportunities to service the mineworkers. Such settlements are overcrowded and dirty, with a highly fluid social environment. Many young women find no opportunities available to them other than sex work, transactional sex, or opening an informal drinking establishment. The ready availability of sex workers in and/or around mining sites, coupled with the availability of disposable cash, which they can use to pay for sex and buy alcohol, places mineworkers at risk of contracting STIs/HIV. Unprotected sexual activities Traditionally, condom use by mineworkers was found to be low because of the stigma attached to condoms in rural communities, from whence they came. Gender inequality also hinders spouses of miners from accessing and negotiating condom use. Even where education and information are relatively available, misconceptions exist about condom use. Dangerous working conditions Faced daily with difficult and dangerous working conditions, occupational hazards, and risk of physical injury, mineworkers tend to be preoccupied with other immediate challenges, which can result in them not taking the risk of HIV seriously. Boredom, loneliness, and social exclusion There is limited availability of recreational activities, such as sports or entertainment facilities, in mining communities, resulting in significant boredom among mineworkers. Also, being away from families, traditional norms, and support systems that regulate behaviour in stable communities produces a feeling of loneliness as well as social exclusion. This may lead to risky sexual behaviour among workers, who may use sex and alcohol as coping mechanisms. Masculine identity and gender inequality Among the mineworkers, there exists an exaggerated form of masculine identity that advocates for high levels of sexual activity and substance abuse. Furthermore, traditional gender norms that relegate women to a lower status heighten vulnerability, particularly for partners of mineworkers. It is considered acceptable for men to have multiple sexual partners, and women cannot negotiate for safe sex.
Limited access to healthcare	Lack of comprehensive programmes Some mining companies lack comprehensive HIV/AIDS prevention and treatment programmes, leaving workers vulnerable. In cases where comprehensive programmes do exist, workers employed directly by the mine company may have access to healthcare, while those who are employed by contractors are less likely to have these benefits. Distance to healthcare The remote location of some mines can make it difficult for workers to access healthcare services, including HIV testing, treatment, and prevention programmes. The health facilities in the vicinity of the mining sites are not necessarily adequately equipped; logistical difficulties may be encountered in implementing interventions due to the geographical remoteness of the mining sites. Stigma and discrimination Stigma and discrimination surrounding HIV/AIDS can prevent people from getting tested, seeking treatment, and accessing support services.

Source: Adapted from Dietler et al. (2022) (2)

9.1.4 Legislative and policy framework for HIV in the South African mining industry

In the SAMI, employers are obligated under the Mine Health and Safety Act No. 29 of 1996 (MHSA) to ensure a safe and healthy working environment (3). This responsibility extends to the management of HIV/AIDS and TB, through comprehensive and integrated programmes that include prevention, voluntary testing, counselling, treatment, and psychological support – while upholding employee rights and confidentiality. The Employment Equity Act No. 55 of 1998 (EEA) further reinforces these protections by prohibiting unfair discrimination based on health status, including HIV (4). It restricts medical testing, unless required by law or justified on specific grounds, and prohibits HIV testing in the workplace unless authorised by the Labour Court.

The South African National Health Act No. 61 of 2003 (5) further guides the SAMI regarding individual health rights and duties of those using healthcare facilities. The Act includes key rights, such as the right to treatment with informed consent, the right to confidentiality, and the right to access health records.

Based on this policy framework, the SAMI, through the Department of Minerals and Petroleum Resources (DMPR) and other strategic partners, such as the Minerals Council South Africa (MSCA) and the Mine health and Safety Council (MHSC), has implemented several interventions to improve the HIV landscape in the industry.

9.1.4.1 *Policy on HIV, AIDS, TB, and occupational lung disease in the South African mining industry*

According to MHSA section 9, the employer must implement a Code of Practice (CoP) on any matter affecting the health and safety of employees, and all mines in the SAMI must adhere to any CoP or guideline of the Chief Inspector of Mines. Currently, the guideline on the mandatory CoP to perform work on a mine does not include a section on HIV, AIDS or opportunistic infections. In the absence of such guidance, the MHSC developed the HIV, AIDS, TB and occupational lung diseases (HATOLD) policy in 2016 (6).

The HATOLD policy framework underscores the shared responsibility of employers, employees, and organised labour to address the health, human rights, and labour implications of these conditions. The policy promotes a supportive, non-discriminatory work environment, where affected employees can remain productive for as long as reasonably possible. Core principles include zero tolerance for discrimination or stigma based on actual or perceived health status; gender-responsive approaches to health services; and the protection of employee confidentiality. While employers may not compel disclosure of health status, they are encouraged to foster environments that enable voluntary disclosure in the interest of worker wellbeing, fitness to work, and continued access to care and support. Employees are responsible for providing the healthcare providers with relevant and accurate information about their symptoms for diagnostic, treatment, rehabilitation, or counselling purposes.

9.1.4.2 *Guidance note on management and control of HIV in the South African mining industry*

A guidance note on the management and control of HIV in the SAMI (7) was issued under DMR16/3/2/3-B3, effective 1 May 2021 (8). The objective of this note was to assist employers to establish sustainable HIV and AIDS management and control programmes at mines.

The aspects addressed in the guidance note include HIV policies and programmes, and how to develop and implement them in the SAMI. The integration of TB and HIV management is also addressed, as well as monitoring, reporting, training, support, and performance evaluation of the HIV management and control programmes.

9.1.4.3 *Guidance note on strengthening the HIV counselling and testing uptake in the South African mining industry*

This guideline, issued under DMR16/3/2/3-B2 and effective 1 July 2020, relates to the strengthening of the HCT uptake in the SAMI (7).

The guidance covers policy issues related to HIV, resource allocation for HIV, governance and ownership of the HIV programmes, leadership around HIV, and shared accountability, as well as the importance of stakeholder buy-in for the HCT uptake. Furthermore, the note addressed the monitoring, evaluation, and reporting of the HCT uptake.

The objectives of the note include:

- a) Assisting the SAMI to achieve the goals of the UNAIDS 95/95/95 strategy (1) for the AIDS epidemic, by strengthening the HCT uptake to ensure that 95% of PLHIV know their status, 95% of those diagnosed receive treatment, and 95% of those on treatment achieve viral suppression by year 2025:
 - Goal 1 – break down barriers to achieving solutions for HIV, TB, and STIs
 - Goal 2 – maximise equitable and equal access to services and solutions for HIV, TB, and STIs
 - Goal 3 – build resilient systems for HIV, TB, and STIs that are integrated into systems for health, social protection, and pandemic response
 - Goal 4 – resource and sustain an efficient NSP, led by revitalised inclusive and accountable institutions
- b) Achieving the UNAIDS 95/95/95 strategy through targeted testing and linkage to care, in line with the WHO test and treat policy
- c) Assisting the SAMI to have a holistic approach on strengthening the HCT uptake through multiple interventions
- d) Providing an enabling environment to increase health-seeking behaviour, by strengthening and implementing linkages to care, treatment, and support
- e) Strengthening HIV prevention interventions aligned to the NSP 2023–2028 goals
- f) Promoting the reduction of medical incapacity cases and deaths linked to complications of HIV
- g) Promoting leadership and shared accountability for a sustainable response to HIV

9.1.4.4 *Guidance note for the implementation of HIV self-testing in the South African mining industry*

The guidelines issued under DMR16/3/2/3-B1, effective 1 July 2020, relate to the implementation of HIV self-testing in the SAMI (9). HIV self-testing involves a person collecting their own sample (oral fluid or blood), performing an HIV test using a rapid diagnostic test kit, and interpreting the result themselves, often in a private setting.

The guidance note has been compiled with the primary objective of promoting self-testing in the SAMI, thereby helping to close the HIV-testing gap and achieve the UNAIDS 95/95/95 strategy goals. This would accelerate diagnosis of people with HIV.

The other objective of this guideline was to assist the SAMI by offering additional approaches to conventional HIV-testing services. Self-testing was covered, as well as the guiding principles

encompassing HIV test services and self-testing, which should adhere to the WHO guidelines of consent, confidentiality, counselling, correct test results, and connection. Additionally, the note highlights the benefits of HIV self-testing, the implementation methods and options of HIV self-testing, the process to be followed in the implementation of HIV self-testing, and the monitoring, evaluation, and reporting of HIV self-testing.

9.1.4.5 Masoyise Health Programme

The MCSA instituted the Masoyise Health Programme (10) in 2018, focused on TB and HIV, which applies a wellness approach for non-communicable diseases and occupational lung diseases (OLDs). The primary aim of the Masoyise Health Programme is to reduce the impact of TB, HIV, OLDs, and non-communicable diseases. Reporting of progress on the HIV/AIDS-related milestones is also conducted by the Masoyise Health Programme.

9.1.4.6 Mine Health and Safety Council milestones for HIV

The MHSC has set the HIV/AIDS milestone for the 2025–2034 period as: *“95% of employees should be offered HIV counselling and testing (HCT) annually with all eligible employees linked and retained to an antiretroviral therapy treatment (ART) programme as per the national strategic plan”* (11). This covers both in-house and outsourced testing.

9.2 HIV Prevention Programmes in South Africa

South Africa aims to reduce the number of new HIV infections from 270 000 to under 100 000 by 2022. It has also committed to achieving zero new HIV infections due to mother-to-child transmission.

In the context of the SAMI, the prevention of mother-to-child transmission (PMTCT) of HIV involves a multi-pronged approach, including early HIV testing for pregnant women, providing ART to HIV-positive mothers, and ensuring access to safe infant feeding practices.

9.2.1.1 Early HIV testing and counselling

In PMTCT, identifying the HIV status of pregnant women early is crucial for initiating timely interventions. Mining companies should ensure that all pregnant women, particularly those in remote or marginalised areas, have access to routine HIV testing and counselling during their antenatal care visits. Additionally, collaboration with local health facilities and non-governmental organisations is essential, to ensure that testing services are accessible and culturally sensitive to all pregnant women.

9.2.1.2 Antiretroviral therapy

In 2013, the WHO issued consolidated guidelines on antiretroviral (ARV) drugs for HIV treatment and prevention, named ‘Option B+’, which were adopted by South Africa in 2015 (12). The ‘Option B+’ approach to HIV/AIDS advocates for lifelong ART for all HIV-positive pregnant and breastfeeding women, regardless of their CD4 count or clinical stage. This approach aims to reduce significantly the risk of mother-to-child transmission of HIV and improve maternal and infant health outcomes.

Mining companies should ensure that HIV-positive pregnant women have access to ART medications

and ongoing support services, including adherence counselling and monitoring.

9.2.1.3 Safe infant feeding

While breastfeeding is recommended for the first six months of life, HIV-positive mothers should be counselled on safe breastfeeding practices, including the use of ART to suppress viral load and reduce the risk of transmission.

If mothers choose not to breastfeed, then they should be provided with adequate support and resources to ensure access to safe and affordable formula. Infants born to HIV-positive mothers should receive antiretroviral prophylaxis to prevent HIV infection.

9.2.1.4 Addressing co-infections

TB is a major cause of morbidity and mortality in the SAMI, and HIV-positive individuals are at higher risk of developing TB. Mining companies should ensure that pregnant women and their partners are screened for TB and receive appropriate treatment, including TB preventative therapy (TPT).

Other STIs and infections, like hepatitis B, should also be addressed through screening and treatment.

9.2.1.5 Strengthening health systems

Mining companies should invest in training and capacity building for healthcare workers, to ensure that they have the skills and knowledge to provide effective PMTCT services. Ensuring that health facilities in mining areas have adequate infrastructure, including clean water, sanitation, and transportation, is essential. Regular monitoring of PMTCT programmes is crucial, to identify challenges and track progress towards eliminating mother-to-child transmission.

9.2.2 Condom use and distribution

Condom use and distribution, a key HIV prevention strategy, is implemented by both the Government and mining companies, with a focus on reaching mineworkers and communities. The National Department of Health (NDoH) and provincial departments of health play a crucial role in distributing condoms through various channels, including health facilities, clinics, community venues, and workplaces. Many mining companies, recognising the high-risk environment, incorporate condom distribution as part of their HIV prevention programmes, often targeting migrant workers who are housed in single-sex hostels.

Community-based peer education and condom distribution projects are also implemented in mining communities to address HIV vulnerability. Efforts are made to reach vulnerable populations, including commercial sex workers and their clients, who are often found in mining areas.

However, A significant decline in condom distribution has been observed in South Africa, with the total number of male condoms distributed dropping by over 300 million, from 728 million in the financial year 2018/2019 to 403 million in 2022/2023 (13). The contributing factors include delays in South African Bureau of Standards (SABS) certification of condoms, which has been ongoing before and after the coronavirus disease-2019 (COVID-19) disruptions.

While South Africa has one of the most robust female condom programmes, globally, uptake has been relatively slow due to the challenge of reaching and educating affected communities, especially in remote

mining areas, despite health management plans often including HIV education programmes.

9.2.3 Voluntary medical male circumcision

Voluntary medical male circumcision is a crucial HIV prevention strategy in the SAMI, particularly for mineworkers, as they have a higher HIV prevalence than the national average. The South African government implemented the VMMC programme in 2010, aiming to reduce HIV transmission. The WHO has recommended it as a combination prevention intervention since 2007.

Voluntary medical male circumcision reduces a man's risk of acquiring HIV through sex with women by approximately 60%, and it is considered a cost-effective approach to HIV prevention. Medical male circumcision is facilitated free of charge through health facilities, as a key HIV prevention strategy in the SAMI.

The NDoH is working on establishing continuous quality improvement (CQI) teams to ensure the sustainability of the VMMC programme. These teams are instrumental in training, mentoring, and evaluating the quality of VMMC service provision.

It is important to note that the VMMC programme relies on training and mentorship, to ensure that healthcare providers are equipped to perform circumcisions safely and effectively. In male-dominated industries such as the mines, the implementation of VMMC is integrated into the workplace, increasing workers' awareness and access to the service.

9.2.4 Pre-exposure prophylaxis

South Africa became the first country in sub-Saharan Africa to fully approve PrEP, in December 2015, integrating it as part of a broader HIV prevention strategy. In the mining sector, PrEP access and education have been incorporated into comprehensive HIV management programmes, which include testing, adherence support, psychological counselling, and TB prevention.

By 2017, 30 000–35 000 individuals were targeted for PrEP through various projects. The 2023–2028 NSP has expanded access, aiming to offer PrEP to all individuals at substantial risk of HIV, including adolescents, sex workers, men who have sex with men, and people who inject drugs.

9

South Africa's PrEP guidelines promote integration with the national 'test and treat' (T&T) strategy, enabling rapid ART initiation for individuals testing positive. Mining companies continue to play a critical role by addressing the needs of high-risk populations, including mobile workers and young women, through workplace prevention programme. Pre-exposure prophylaxis eligibility now includes self-reported risk factors, and its wider availability in general health facilities is encouraged to reduce stigma and improve uptake.

At the time of writing, a novel long-acting injectable form of HIV PrEP, lenacapavir (Sunlenca), administered twice yearly, has been approved by the Food and Drug Administration (FDA) in the USA. This innovation holds promise as a potential game changer for HIV prevention, and its progress should be monitored closely for possible implementation in South Africa.

“People ask me ‘How can you afford to implement new interventions?’ and I always reply, ‘How can we afford not to?’ Once you answer this question, you will find the way to work it out.”

– Aaron Motsoaledi, South Africa’s Minister of Health, 4 November 2016, Pretoria.

9.3 HIV Vaccination in South Africa

Vaccines are critical in preventing vaccine preventable diseases (VPDs), particularly among immunocompromised individuals such as those with HIV infection. HIV-infected individuals have impaired host defense (cellular and humoral immunity) and, hence, have a greater risk and severity of vaccine-related complications than non-immunocompromised populations.

The benefits of vaccination in HIV-infected individuals must be weighed against its risks, as seen in **Table 9.2**.

Due to the complexity of immune responses in PLHIV, decisions regarding immunisation – particularly with live or adjuvanted vaccines – should always be guided by the individual’s primary care physician or treating HIV specialist. Factors such as CD4+ count, viral load, ART adherence, and overall clinical status must be taken into account to ensure safety and efficacy.

As such, occupational health practitioners should refer PLHIV to their attending clinician for vaccine-related decisions and administration.

Table 9.2: Commonly used vaccines in people living with HIV, and important notes

Vaccine	Why recommended	Considerations
Influenza (annual)	Prevents severe flu-related illness	Recommended for all PLHIV, regardless of CD4 count
PCV13 + PPSV23	Prevents pneumonia, sepsis, meningitis	PCV13 first, followed by PPSV23 at least eight weeks later
HBV	Higher risk of chronic infection and liver disease	Check serostatus first; higher dose or additional doses may be required
HAV	For those with chronic liver disease or risk factors (e.g. MSM, drug users)	Two doses; response may be reduced if CD4 < 200
Tetanus, diphtheria, pertussis	Routine adult immunisation, and for wound prophylaxis	Td or Tdap booster every 10 years
HPV	Prevents cervical, anal, and other cancers	Strongly recommended for individuals < 26 years; consider up to age 45
COVID-19	Prevents severe COVID-19 illness	mRNA or other non-live vaccines recommended
Varicella (chickenpox)	Only if seronegative and CD4 > 200	Live vaccine – contraindicated if CD4 < 200
MMR	If non-immune and CD4 > 200	Live vaccine – defer if CD4 < 200
Meningococcal (ACWY and B)	Recommended in outbreaks or high-risk groups	Consider for adolescents, students, mineworkers living in group settings
BCG	Contraindicated in PLHIV, due to risk of disseminated BCG infection	Not recommended post-infancy in HIV-positive adults

BCG: Bacillus Calmette-Guérin, COVID-19: coronavirus disease-2019, HAV: hepatitis A virus, HBV: hepatitis B virus, HPV: human papillomavirus, MMR: measles, mumps, and rubella, PCV13: pneumococcal conjugate vaccine, PLHIV: people living with HIV, PPSV23: pneumococcal polysaccharide vaccine

Vaccines that are generally contraindicated in PLHIV (CD4 < 200 cells/ μ L) are:

- Bacillus Calmette-Guérin (BCG)
- Oral polio (OPV)
- Oral typhoid (Ty21a)
- Live zoster (ZVL)
- Measles, mumps, and rubella (MMR) and varicella (only once CD4 > 200)

9.4 Appropriate Treatment of Opportunistic Infections

Prior to the widespread use of potent ART, opportunistic infections (OIs) – defined as infections that occur more frequently or are more severe due to HIV-related immunosuppression – were the leading cause of illness and death among PLHIV. Common OIs, and implications relevant for the occupational health professional, are:

- Pulmonary tuberculosis (PTB) – the most prevalent OI in the SAMI, driven by high rates of silica dust exposure, high community prevalence, tobacco smoking
- Bacterial pneumonia – common, due to respiratory exposure to dust and fumes, smoking, and HIV-related immune suppression
- Candidiasis (oral/esophageal thrush) – a frequent fungal infection and early indicator of HIV-related immunosuppression
- Cryptococcal meningitis – a life-threatening fungal infection seen in workers with advanced HIV, requiring urgent intervention
- Pneumocystis pneumonia (PCP) – a serious fungal lung infection occurring in workers with severely compromised immune systems
- Diarrhoeal diseases (e.g. cryptosporidiosis) – can lead to dehydration, and is especially dangerous for workers in hot, underground environments where fluid loss is already high
- Herpes simplex virus (HSV) – recurrent infections may become severe and prolonged in immunocompromised individuals
- Toxoplasmosis – a parasitic infection that can affect the brain in miners with advanced HIV

Advances in chemoprophylaxis, vaccination, and acute OI management improved survival in the early 1990s, but it was the introduction of ART that had the most profound impact in reducing OI-related mortality. In the SAMI, however, OIs remain a significant burden due to high rates of HIV, TB, and co-existing occupational respiratory diseases like silicosis. This intersection of exposures increases vulnerability to OIs and related complications. Occupational health doctors must remain vigilant in assessing PLHIV for OIs, and promptly refer for specialised HIV management.

9.5 Impact of HIV Medication on Persons

HIV medications are essential for prolonging life and improving the health of PLHIV, although they may cause short- or long-term side effects. While most side effects are mild and manageable, some can be serious or life threatening. Newer ART tends to have fewer adverse effects than earlier regimens, and

treatment choices are increasingly individualised. Patients should never stop ART without medical advice, as doing so risks immune deterioration and drug resistance. Ongoing communication with healthcare providers is key to monitoring, managing, and, if necessary, adjusting treatment to ensure both safety and effectiveness.

Occupational medical practitioners should be familiar with the main classes of ARV medications and their associated side effects, as outlined in **Table 9.3**. Clinical management, including adjustments or interventions, should always be referred to the attending physician.

Table 9.3: Side effects of ARV medications

	ARV class	Examples	Occupational health-relevant side effects
1	NRTIs	Tenofovir, lamivudine, abacavir	Renal toxicity, bone demineralisation (TDF); hypersensitivity (abacavir)
2	NNRTIs	Efavirenz, nevirapine	Neuropsychiatric effects (efavirenz), rash, and hepatotoxicity (nevirapine)
3	PIs	Lopinavir/ritonavir, atazanavir	Gastrointestinal upset, hyperlipidemia, insulin resistance
4	INSTIs	Dolutegravir, raltegravir	Insomnia, weight gain, headache
5	Entry inhibitors	Maraviroc	Hepatotoxicity, cough, musculoskeletal pain
6	Fusion inhibitors	Enfuvirtide	Injection site reactions, hypersensitivity
7	Pharmacokinetic enhancers	Ritonavir, cobicistat	Gastrointestinal side effects, drug-drug interactions
8	Post-attachment inhibitors	Ibalizumab	Diarrhea, dizziness, rash

INSTI: integrase strand transfer inhibitor, NNRTI: non-nucleoside reverse transcriptase inhibitor, NRTI: nucleoside reverse transcriptase inhibitor, PI: protease inhibitor, TDF: tenofovir disoproxil

The occupational medical practitioner's (OMP's) role in managing people living with HIV on antiretroviral therapy includes:

- Pre-ART baseline assessment – measure renal/hepatic function, lipid profiles, bone health status
- Ongoing monitoring – routine follow ups for metabolic, renal, and neuropsychiatric parameters
- Fitness-for-duty evaluation – identify side effects that may impair heavy labour or safety-critical tasks
- Adjustment and referral – coordinate with clinicians to consider switching ARVs if side effects interfere with work
- Education and support – inform workers about side effects and encourage early reporting to manage them proactively

9.6 Monitoring and Evaluation of HIV Programmes Infections

Monitoring is an important part of the HIV/AIDS programme in the SAMI, because it enables measurement of its progress against the stated goals, and allows OMPs to make informed decisions about the effectiveness of various interventions.

To be most effective, a monitoring system should involve reporting throughout the chain of command, with accountability to senior management. Effectiveness may be measured in terms of both quantitative and qualitative indicators. This is only possible if compressive baseline data exist or have been collected at the

start of the programme, to enable comparison, and if the clinical data are available.

Quantitative indicators may include productivity, in the form of absenteeism rates, behavioural change indicators such as condom use, number of requests for voluntary counselling and testing (VCT) services pertaining to volunteer peer educators, and STD incidence rates reported by the clinic.

Qualitative indicators such as staff morale, general awareness and attitudes towards HIV/AIDS, and satisfaction with company programmes and services can be evaluated through questionnaires, focus groups and key informant interviews.

These results can then be reviewed in light of expenditures to determine the overall cost effectiveness of a company's activities. To assist in this analysis, many companies find it useful to track their annual expenditures by establishing a dedicated cost centre for all HIV/AIDS activities, including budgetary allocations, staff time, and in-kind contributions or subsidies of supplies and infrastructure.

9.6.1 Medical monitoring of HIV/AIDS

The following factors are required to be monitored, and are the minimum essential standardised data elements, by category:

- Demographic information:
 - Name, sex, date of birth, age at registration, marital status
 - Patient identification
 - Address, telephone, contact details
- HIV care and family status:
 - Date and location confirmed HIV-positive, HIV subtype
 - Entry point into HIV care
 - Current health facility, district, district clinician/team
 - Treatment supporter(s) name/address/contact information
 - If family members/partners: name, HIV status, HIV care status, unique identification document (ID) number, date of birth/age at registration
 - Drug allergies
- Antiretroviral therapy summary
 - ART history prior to entry
 - ART START date/treatment cohort:
 - Date medically eligible to start ART
 - Why medically eligible; baseline CD4, clinical stage
 - Date medically eligible AND ready to start ART
 - Date medically eligible, ready, AND selected to start ART
 - Functional status, clinical stage, and weight at ART start
- First-line regimen:
 - Original first-line regimen (list drugs)
 - If SUBSTITUTE within first-line regimen: dates, reasons, new regimens
- If SWITCH to or SUBSTITUTE within second-line regimen or higher: dates, reasons, new regimens:
 - ART interruptions: dates, reasons
 - STOP ART: dates, reasons
 - LOST (temporarily): dates

- RESTART: dates
- Transfer in, transfer out: date, facility transferred from or to:
 - DROP: dates
 - DEAD: date
- Patient encounter information:
 - Encounter date, whether scheduled or not, next scheduled follow-up visit date
 - Months on current regimen
 - Current functional status, clinical stage, weight, height (for children)
 - TB status, TB treatment start/stop dates
 - Pregnancy status estimated date of delivery (EDD), family planning method(s), PMTCT referral/provision
 - Possible side-effects (including drug allergies), severity
 - New symptoms/diagnoses/OIs
 - Laboratory test dates and results
 - Prophylaxis: medication, dose dispensed, start/stop dates, reason for discontinuation
 - ART dispensed: regimen code, dose dispensed, (start/stop dates)
 - Adherence assessment (pill count, self-report, other) and reasons for both ART and prophylaxis non-adherence
 - Referral or link to other clinical or supportive care
 - Hospital days since last outpatient visit

9.6.2 Calculating indicators from the patient monitoring data

Keeping careful track of patient data is not only critical for monitoring individual patients, but is also essential in forming indicators for monitoring the progress of the HIV care/ART programme at the facility, district, and national levels. An indicator is a measurable number, proportion, percentage, ratio, or rate that suggests the extent of achievement in delivering HIV care and ART of a programme, or summarises the level of some condition in a district or facility's patient population. Six types of indicators can be calculated from the recommended patient monitoring data in these guidelines:

- Indicators related to patients accessing HIV care and ART
- Indicators related to success of ART
- HIV drug resistance early warning indicators
- Other indicators for programme monitoring at the facility level
- Prevention indicators
- TB/HIV indicators

It is important to monitor and evaluate a project or programme, to:

- See what has been achieved
- Collect evidence of activities and results
- Measure progress and programme effectiveness in reaching predefined objectives and targets
- Improve monitoring and management
- Identify strengths and weaknesses
- Judge whether the cost was reasonable for what was achieved
- Collect information to help run activities better
- Avoid repeating mistakes by sharing experiences. It is important to record and report on a project or programme in order to document successes and failures, develop a body of knowledge and good practices, and meet internal and external reporting requirements

The following are important components of any monitoring and evaluation (M&E) strategy:

Defining responsibilities – include planning and developing systems for M&E, collecting, and generating data from different sources, verifying data, analysing and interpreting data, and reporting and dissemination of results

SAMI monitoring and evaluation framework – align the M&E framework with the NSP 2023–2028 guidelines, the Masoyise Health Programme indicators for HIV, and the MHSC HIV/AIDS milestones indicated above in section 9.1

Using and disseminating data – once data have been collected, analysed, and interpreted, they should be properly disseminated and used. The results of M&E activities should be communicated to all relevant stakeholders. Results should also be shared with those who collect the data, so that they may provide feedback. Dissemination can be done in many ways, such as through annual reports, at annual planning and evaluation meetings, and in scientific publications

9.7 References

1. Department of Health . National Strategic Plan for HIV, TB and STIs 2023-2028. [Online] 2023. [Cited: 12 March 2025.] https://knowledgehub.health.gov.za/system/files/elibdownloads/2023-04/NSP-HIV-TB-STIs-2023-2028-MARCH20_23-PRINT2.pdf.
2. Dietler D, Farnham A, Lyatuu I, Fink G, Winkler MS. Industrial mining and HIV risk: evidence from 39 mine openings across 16 countries in sub-Saharan Africa. *Aids*, 2022. 2022 Sep 1;36(11):1573-81.
3. South Africa. Mine Health and Safety Act No. 29 of 1996 as amended. Government Printers, Pretoria.
4. South Africa. Employment Equity Act No. 55 of 1998. Government Printers, Pretoria.
5. South Africa. National Health Act No. 61 of 2003. Government Printers, Pretoria.
6. Mine Health and Safety Council . Policy on the Integrated Management and Reporting for HIV, AIDS, TB and Occupational Lung Disease in the South African Mining Industry. [Online] July 2016. [Cited: 10 March 2025.] <https://mhsc.org.za/wp-content/uploads/2024/06/5.-Policy-on-the-Integrated-Man>.
7. Department of Minerals and Petroleum Resources . Guidance Note on Strengthening the HTC Uptake in the SAMI (DMR16/3/2/3-B2). [Online] 1 January 2020. [Cited: 15 March 2025.] <https://mhsc.org.za/wp-content/uploads/2023/11/Guidance-Note-On-Strengthening-HCT-uptake.pdf>.
8. Department of Minerals and Petroleum Resources . Guidance Note on the Management and Control of HIV in the South African Mining Industry (DMR16/3/2/3-B3). [Online] 1 May 2021. [Cited: 18 March 2025.] https://mhsc.org.za/wp-content/uploads/2021/12/Book-2_Management-and-control-of-HIV-in-the-SA-min.
9. Department of Minerals and Petroleum Resources. The Guidance Note for the Implementation of HIV Self-Testing in the South African Mining Industry (DMR16/3/2/3-B1). [Online] 1 July 2020. [Cited: 18 March 2025.] https://www.gov.za/sites/default/files/gcis_document/202001/42956gon30.pdf.
10. Minerals Council South Africa. Masoyise Health Programme . [Online] 2018. [Cited: March 14, 2025.] <https://www.mineralscouncil.org.za/work/masoyise>.
11. Mine Health and Safety Council. New Mine Health and Safety Milestones for adoption beyond 2024. [Online] 16 October 2024. [Cited: 18 March 2025.] <https://mhsc.org.za/wp-content/uploads/2024/10/15.-New-Mine-Health-and-Safety-Milestones-for-adoption.-Dr-Balfour.16.10.2024.pdf>.
12. Besada D, Van Cutsem G, Goemaere E, Ford N, Bygrave H, Lynch S. The case for Option B and Optional B+: Ensuring that South Africa's commitment to eliminating mother-to-child transmission of HIV becomes a reality. *Vols. Southern African Journal of HIV Medicine.* , 2012. 2012 Nov 1;13(4):178-81.
13. Tomlinson C. Dramatic decline in condom distribution in SA, new figures show . [Online] 2 April 2024. [Cited: 22 March 2025.] <https://section27.org.za/2024/04/dramatic-decline-in-condom-distribution-in-sa-new-figures-show/#:~:text=The%20total%20number%20>.