

## **Overview**

There has been an increase in antiretroviral therapy (ART) since the roll out of ‘treat all’ programmes. However, evidence reflects an increase in HIV drug-resistant mutation (DRM)s.<sup>1</sup> Effective monitoring of those on treatment is essential to stop drug-resistant HIV becoming a major public health threat. There is a high prevalence of DRMs in HIV and HIV-TB coinfecting patients with first-line failure.<sup>2</sup> Although data is limited, transmitted drug resistance (TDR) in Gaborone, Botswana, is estimated to have increased from 2.9% in 2012/14 to 9.7% in 2014/15 – underlining the importance of continued testing for TDR, especially as access to HIV treatment increases.<sup>3</sup> There is a high burden of tuberculosis (TB); with an incidence rate of 326 per 100,000 in 2016.<sup>4</sup> In the same year, there were 7,300 new TB cases, with 4,400 (60%) of them co-infected with HIV. Treatment coverage in 2016 was relatively low at 65%. 60% of people living with HIV were being treated for TB/HIV co-infection and 81% of these patients were on ART.<sup>5</sup>

## **Funding Landscape**

Botswana’s upper-middle income country status has impeded funding. For example, PEPFAR has more than halved its funding from US\$84 million in 2011 to US\$39 million in 2015.<sup>6</sup> In 2013, the Gates Foundation withdrew funding altogether.<sup>7</sup> Similar situations for the Center for Disease Control and the African Comprehensive HIV/AIDS Partnerships have occurred for funding specific to safe male

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<sup>1</sup> Khan et al (2019) HIV Drug Resistance Mutations in Patients with HIV and HIV-TB Coinfection After Failure of First-Line Therapy: A Prevalence Study in a Resource-Limited Setting *Journal Of the International Association Of providers of AIDS care* <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6748516/>

<sup>2</sup> Chimukangara et al (2020) Impact of pretreatment low-abundance HIV-1 drug-resistant variants on virological failure among HIV-1/TB-co-infected individuals *Journal of Antimicrobial Chemotherapy* <https://academic.oup.com/jac/advance-article/doi/10.1093/jac/dkaa343/5890037>

<sup>3</sup> Rowley et al (2016) Sharp increase in rates of HIV transmitted drug resistance at antenatal clinics in Botswana demonstrates the need for routine surveillance *Journal of Antimicrobial Chemotherapy*, <https://doi.org/10.1093/jac/dkv500>

<sup>4</sup> WHO (2018) Global TB Report UNAIDS <http://aidsinfo.unaids.org/>

<sup>5</sup> WHO (2018) Global TB Report UNAIDS <http://aidsinfo.unaids.org/>

<sup>6</sup> World Bank Group (2017) Disease Control Priorities <https://issuu.com/world.bank.publications/docs/9781464805226>

<sup>7</sup> T. Kebinakgomo (2019) Botswana Ranked Fourth On HIV Prevalence In The World *The Gazette* <https://www.thegazette.news/news/botswana-ranked-fourth-on-hiv-prevalence-in-the-world/29035/#.X0cX4cqzblU>

circumcision. This has grave implications for Botswana's national prevention and treatment programmes, further aggravated by a shortage of human resources.<sup>8</sup>

### Other Issues

As ART programs in resource-limited settings mature and people living with HIV (PLHIV) survive longer. The morbidity and mortality associated with co-infections will become increasingly important. Although hepatitis B (HBV) and C (HCV) share risk factors for transmission with HIV, their demographics and impact remain less defined in resource-limited settings. Accordingly, the screening, monitoring, and treatment of HBV and HCV among PLHIV present clinical dilemmas and challenges in such settings.<sup>9</sup> This reflects the importance of prevention and management of co-infections in Botswana. This should be founded by sound participatory and scientific knowledge production.

Evidence reflects HBV Genotypes A, D and E were found a cohort of HIV co-infected patients in Botswana, consistent with the findings from the sub-Saharan Africa region.<sup>10</sup> Other evidence reflects non-mutation of some HBV Genotypes that were previously been associated with diagnosis failure.<sup>11</sup> These patients were resistant to vaccine and immunoglobulin therapy.<sup>12</sup> These are critical findings for guiding future policy interventions on vaccine implementation, therapeutic and diagnostic guidelines. They further assist in identifying patients at an increased risk of disease progression so they can be provided improved care and therapy. Future research should focus on determining the clinical significance of different HBV genotypes and mutations found within this sub-group population.<sup>13</sup>

<sup>8</sup> Avert (2020) HIV/AIDS in Botswana [https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/botswana#footnote74\\_bx60b8w](https://www.avert.org/professionals/hiv-around-world/sub-saharan-africa/botswana#footnote74_bx60b8w)

<sup>9</sup> Patel et al (2011) Prevalence of Hepatitis B and Hepatitis C Coinfections in an Adult HIV Centre Population in Gaborone, Botswana American Journal of tropical Medicine and hygiene <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3144842/>

<sup>10</sup> Gu et al (2017) HIV Continuum And Expedited Tb Diagnosis In TB/HIV Coinfected Patients In Botswana Conference on Retroviruses and Opportunistic Infections <https://www.croiconference.org/abstract/hiv-continuum-and-expedited-tb-diagnosis-tbhiv-coinfected-patients-botswana/>

<sup>11</sup> Anderson et al (2015) Molecular characterisation of hepatitis B virus in HIV-1 subtype C infected patients in Botswana BMC <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4535680/>

<sup>12</sup> Anderson et al (2015) Molecular characterisation of hepatitis B virus in HIV-1 subtype C infected patients in Botswana BMC <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4535680/>

<sup>13</sup> Anderson et al (2015) Molecular characterisation of hepatitis B virus in HIV-1 subtype C infected patients in Botswana BMC <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4535680/>

## Best Practices

- Industrialised country contexts recommend adults with HIV type 1 undergo baseline screening for pathogens that might cause latent or active infections such as syphilis, hepatitis B, hepatitis C. There is no Sub-Saharan Africa specific data of a similar nature.<sup>14</sup> This should be explored in Botswana.
- Continuous reviews of strategic response frameworks, vaccine trials, HIV testing expansion, gender inequalities, and access to quality health services should be conducted within the context of increasing demand and overstretched resources.<sup>15</sup>
- Even with high HIV testing coverage, multi-modality HIV testing strategies should be adopted to reach different sub-group populations who are hard to reach. Community testing can serve as a conduit specific to men and youth in places they access routinely.<sup>16</sup>
- Continuous expansion and adoption of national guidelines for voluntary counselling and testing and ART to international standards.<sup>17</sup> A critical aspect should be informed consent and human rights safeguards that include protection from HIV-related discrimination and protection of women against violence.<sup>18</sup>

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<sup>14</sup> Wester et al (2007). Serological Evidence of HIV-Associated Infection among HIV-1—Infected Adults in Botswana. *Clinical infectious diseases Infectious Diseases Society of America*  
[https://www.researchgate.net/publication/6689109\\_Serological\\_Evidence\\_of\\_HIV-Associated\\_Infection\\_among\\_HIV-1-Infected\\_Adults\\_in\\_Botswana](https://www.researchgate.net/publication/6689109_Serological_Evidence_of_HIV-Associated_Infection_among_HIV-1-Infected_Adults_in_Botswana)

<sup>15</sup> Government of Botswana (2011) Botswana HIV and AIDS Policy  
<https://www.undp.org/content/dam/botswana/docs/HIVAIDS/Botswana%20HIV%20and%20AIDS%20Policy%202012.pdf>

<sup>16</sup> Alwano et al (2019) Increasing knowledge of HIV status in a country with high HIV testing coverage: Results from the Botswana Combination Prevention Project *Plos one*  
<https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0225076>

<sup>17</sup> World Health Organisation (2005) Botswana: country profile [https://www.who.int/hiv/HIVCP\\_BWA.pdf](https://www.who.int/hiv/HIVCP_BWA.pdf)

<sup>18</sup> Tlou et al (2006) Routine HIV Testing in Botswana: A Population-Based Study on Attitudes, Practices, and Human Rights Concerns *Plos one* <https://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030261>