

# Tobacco and HIV

- Prevalence of tobacco use among people living with HIV is more than double that of the general population.
- Access to antiretroviral therapy has contributed to increase in life expectancy rates for people living with HIV; high rates of tobacco use are undermining those gains in life expectancy.
- The excess mortality rate among smokers living with HIV is on average three times higher than that of the general population.
- Premature death among smokers living with HIV is due to higher rates of both communicable and noncommunicable diseases – including tuberculosis, pneumonia, cancer, cardiovascular disease and chronic obstructive lung disease – as compared to their non-smoking counterparts.
- HIV programmes have an important role to play in preventing and assessing tobacco use status, and initiating tobacco cessation interventions.
- Evidence-based policies can support the integration and scaling up of tobacco cessation services through training and system changes that leverage the existing HIV care infrastructure.

## What is HIV?

HIV (human immunodeficiency virus) is a virus that attacks the body's immune system which, untreated, increases the risk of infections like tuberculosis (TB) and pneumonia and some cancers (1,2,3). Acquired immunodeficiency syndrome (AIDS) is the most advanced stage of the disease (2). HIV is transmitted from the body fluids of a person living with HIV, including blood, breast milk, semen and vaginal fluids. Antiretroviral therapy (ART) is effective in treating HIV through viral suppression. Taking ART as prescribed reduces both the risk of transmission and of disease progression (3). If the person living with HIV takes ART as prescribed, the viral load can decrease to a level that is undetectable, meaning zero risk of transmission to sexual partners and minimal risk of mother-to-child transmission (3).

This document summarizes the excess burden of disease associated with tobacco use among people living with HIV, reviews the current literature on effective tobacco cessation interventions, and describes approaches for integrating tobacco control in the context of HIV care. This brief specifically focuses on effective tobacco cessation interventions for people living with HIV.

## Tobacco definitions

**Smoked tobacco products:** any product made or derived from tobacco that generates smoke. Examples include manufactured cigarettes, roll-your-own tobacco, cigars, shisha (also known as waterpipe), kreteks and bidis.

**Second-hand smoke (SHS):** the smoke emitted from the burning end of a cigarette or other tobacco products, usually in combination with the smoke exhaled by the smoker.

**Smokeless tobacco:** any product that consists of cut, ground, powdered or otherwise altered tobacco that is intended to be placed in the oral or nasal cavity. Examples include snuff, chewing tobacco, gutka, mishri and snus.

**Heated tobacco products (HTPs):** products that emit aerosols containing nicotine and toxic chemicals when tobacco is heated or when a device containing tobacco is activated. These aerosols are inhaled by sucking or smoking and involve a device. They contain the highly addictive substance nicotine, as well as non-tobacco additives, and are often flavoured.

## The health impact of tobacco on people living with HIV

Worldwide, there are around 1.25 billion people who use tobacco with over 1 billion tobacco users residing in low- and middle-income countries (LMICs) (5). Smoking prevalence among people living with HIV is two to three times higher than that of the general population, across regions and country income level (6–13). Sub-Saharan Africa is the region most affected by HIV, accounting for around 70% of HIV infections (4). In South Africa alone, there were 160 000 new HIV infections in 2022, contributing to an overall prevalence of 17.8% (6). Simultaneously, the country is facing a double burden, since 20.3% of people aged 15 years and older are estimated to be current tobacco smokers (5). Notably, Lesotho has the second highest global HIV prevalence, estimated at 19.3% (7), and a 41.1% prevalence of tobacco use among men living with HIV (8). Recent research in LMICs revealed that among women living with HIV, 1.3% engage in tobacco smoking, 2.1% use smokeless tobacco, and 3.6% partake in some form of tobacco use (8). What is particularly alarming is that these rates are significantly higher compared to their HIV-negative counterparts. The risk of tobacco smoking, for instance, is 1.90 times greater among women living with HIV than among those without HIV (8). Similarly, among men living with HIV, the prevalence of tobacco-related use is notably high. With 24.4% engaging in tobacco smoking, 3.4% using smokeless tobacco, and an overall tobacco use prevalence of 27.1%, it is evident that tobacco-related challenges persist within this demographic (8). Comparatively, the prevalence rates for any tobacco use (RR 1.41) and tobacco smoking (RR 1.46) are significantly elevated in men living with HIV when compared to their HIV-negative counterparts (8). Additionally, studies among people living with HIV in the United States have reported rates of tobacco use as high as 46–76% (9,10,13). Widespread access to ART has transformed HIV into a manageable long-term condition. However, high rates of tobacco use threaten those gains in long-term survival, particularly in LMICs where the burden of HIV and tobacco are increasingly concentrated (13–17,18).

## Pathophysiology of tobacco use and the development of HIV

There is evidence that tobacco smoking affects the likelihood of acquiring HIV when exposed to the virus, due to the negative impact of tobacco smoking on the innate and adaptive immune system, which may increase susceptibility to HIV and other infections (19,20). Compared to non-smokers, tobacco smokers have a poorer immune response when on ART, resulting in more rapid progress to advanced HIV disease and AIDS (21). Due to the above-mentioned effect on the immune system, smoking also increases the risk of sexually transmitted infections, which in turn increases the risk of HIV transmission (19). Additionally, drug use, which is strongly associated with the likelihood of acquiring HIV, is more common among people who smoke tobacco than people who do not (29).

## Tobacco smoking and HIV-related complications and comorbidities

Tobacco use among people living with HIV substantially increases the risk of morbidity and mortality compared with people who do not use or have never used tobacco (15,17,18,23). A Danish study showed that current tobacco smokers had an excess mortality rate that was more than three times that of people living with HIV who never smoked (15). Similar impacts on life expectancy among people living with HIV have been reported from other European countries and North America (15). The consequences of the cumulative harmful effects of HIV and tobacco smoking on the immune system and the suppression of lung defences include an increased risk of acquiring bacterial pneumonia, acute bronchitis, TB, and higher rates of TB-related mortality (19,24–26). In addition, smoking increases the risk of non-AIDS-related noncommunicable (NCDs) diseases in this population, including cancer, cardiovascular disease, diabetes, and chronic obstructive lung disease, as compared with people living with HIV who do not smoke (16,18,23,26). An analysis of data from the ART Cohort Collaboration found that deaths from non-AIDS related malignancies (for example,

# Tobacco and HIV

lung cancer) and cardiovascular disease account for most of the excess deaths among people living with HIV who smoke (15,28,30). The increased prevalence of NCDs among people living with HIV reflects a combination of factors, including aging, a greater prevalence of traditional NCD risk factors such as alcohol use, and the direct consequences of HIV infection and specific ARTs on cardiovascular risk factors (18,26). However, it is estimated that tobacco smoking among people living with HIV who are taking ART may account for 25% of total mortality (18).

## Second-hand smoke and HIV

Second-hand smoke can have significant implications for people living with HIV, potentially exerting direct effects on blood vessels (32). These effects, in turn, increase the risk of cardiovascular disease (31). Exposure to second-hand smoke can further weaken their immune system, making them more susceptible to infections and illnesses. Second-hand smoke can irritate the respiratory system, leading to wheezing and shortness of breath. These symptoms can be more severe in people with HIV, particularly if they have pre-existing lung issues like TB or pneumonia (31,32).

## Smokeless tobacco and HIV

Despite limited evidence on smokeless tobacco and HIV, a study in South Africa shows that smokeless tobacco, dry nasal snuff in particular, is extremely prevalent among women living with HIV, nearly six times higher than the general population. Furthermore, in this population snuff use is clearly associated with TB diagnosis and has potentially serious health implications (33). Similarly, in India, the prevalence of smokeless tobacco is very high, and people with HIV that are current smokeless tobacco users are at high risk of oral malignant disorders and potentially oral cancer, estimated at 27 times that of the general population (34).

## Tobacco cessation and HIV

Within the literature encompassed by this summary, most studies relate to “**smoking**” and “**smoking cessation**”, which constitutes a subset within the broader category of tobacco use. It is crucial to recognize, however, that the term “**tobacco use**” extends beyond combustible cigarette use, to include various forms such as other smoked tobacco products, smokeless tobacco use, and heated tobacco products. Throughout this summary these terms are used in alignment with the terminology prevalent in the respective studies.

A large international trial found that tobacco cessation has the potential to reduce all-cause mortality for people living with HIV by 15.6%, major cardiovascular disease events by 17%, non-AIDS cancers (for example, lung) by 34%, and pneumonia by 18% (18). After quitting, people that are living with HIV report a decrease in HIV-related symptom burden, depression and anxiety, and report improvements in quality of life (35,36). Tobacco cessation is also associated with better control of HIV (37,38). People living with HIV are less likely to quit than the general population of tobacco users (39,41–43). Obstacles to achieving success in quitting interact with those associated with tobacco use, including higher levels of nicotine addiction, higher rates of depression and polysubstance use, social isolation, and the burden of enduring stigma and discrimination (26). Therefore, addressing mental health issues is an integral part of reducing tobacco use among people living with HIV (85,86). Beliefs held by people living with HIV may lead to continued tobacco use. Tobacco users living with HIV minimize health risks associated with tobacco use and report a sense of fatalism about HIV that may reduce their chances of success in quitting tobacco (39–41). There are also structural barriers that include a lack of access to tobacco cessation services in the context of HIV care.

## Impact of selected tobacco control interventions on HIV

There is strong evidence that brief advice to quit delivered by a physician, health professional or non-health personnel, behavioural interventions (for example, telephone counselling and interventions delivered via short text messaging), and pharmacotherapy, are effective in increasing abstinence compared to placebo/no intervention among general populations of smokers [Box 1] (44–51). Nicotine replacement therapy, bupropion, varenicline and cytisine can all aid quitting tobacco with or without behavioural support. However, the likelihood of a successful quit attempt is increased if counselling is provided in combination with medication (45,47). Although most of this evidence is derived from studies conducted in high income countries, a systematic review and meta-analysis of studies conducted in LMICs similarly concluded that nicotine replacement therapy, behavioural counselling and brief advice are effective in aiding tobacco cessation in LMICs (52). The evidence suggests that tobacco cessation interventions are effective for people living with HIV. A 2016 Cochrane meta-analysis of 12 studies found that counseling combined with pharmacotherapy increased short-term smoking abstinence compared to control groups (55). Behavioral interventions, delivered through various modalities, showed the highest impact when conducted via telephone (56). Tailoring interventions to the unique challenges of people living with HIV yielded inconsistent results (55,56). A meta-analysis indicated that delivering eight counseling sessions was associated with higher smoking abstinence rates than offering fewer sessions (53). Recent trials demonstrated longer-term impact, including an interactive web-based intervention promoting six-month cessation and the safety and efficacy of varenicline combined with behavioural support. One trial reported a significant increase in 48-week continuous smoking abstinence, while another showed varenicline doubling quit rates at three months, though the effect declined over time (58). Overall, these findings underscore the effectiveness of tailored interventions, emphasizing the importance of

counseling and pharmacotherapy in tobacco cessation for people living with HIV. A third randomized controlled trial compared the effectiveness of varenicline and cytisine with nicotine replacement therapy for reducing smoking among individuals with HIV who engage in risky drinking (60).

### Box 1. Interventions to assist tobacco cessation

#### Behavioural interventions

- Brief advice from healthcare worker
- In-person multisession counselling
- Telephone counselling
- Mhealth (such as text messaging programmes, mobile phone apps)
- Websites
- Printed self-help material

#### Pharmacotherapy

- Varenicline
- Nicotine replacement therapy
- Cytisine
- Bupropion

The study found that all three medications, varenicline, cytisine and nicotine replacement therapy, achieved six-month cessation rates that were consistent with those of previous trials among people who smoke but are not infected with HIV, ranging from 17 to 19%. This study offered further evidence that these medications may be used safely and effectively for smoking cessation among individuals with HIV who have a history of substance use or active substance use disorders (60).

## Health system interventions to facilitate tobacco cessation

Current guidelines recommend that healthcare workers ask all adults about tobacco use, advise them to quit, assess, assist and arrange (5As) and provide behavioural interventions and pharmacotherapy for cessation, or by referring patient to population-based interventions (such as national quit-lines, mHealth programmes and cessation clinics) [Box 2] (51,61,62).

## Box 2. 5As

**Ask:** Ask every patient about their tobacco use status and note this in their medical records.

**Advise:** Advise patients to quit in a clear, strong, personalized manner: “Quitting smoking strengthens your immune system and allows you to fully benefit from ART.”

**Assess:** Assess tobacco users’ readiness to quit

**Assist:** If ready to quit, support them to make a quit plan or provide information on specialist support

**Arrange:** Arrange for follow up via face-to-face contact or by phone or refer to specialist

## Integrating and scaling tobacco use treatment in HIV care

The World Health Organization Framework Convention on Tobacco Control (WHO FCTC) establishes a minimum standard for action on tobacco control. Article 14 of the WHO FCTC states that Parties to the treaty “shall develop and take effective measures to promote cessation of tobacco use and adequate treatment for tobacco dependence” (63). The WHO FCTC also calls for integrating tobacco control into existing health system infrastructure including HIV services. Important barriers to implementing the WHO FCTC include low political priority, and a lack of funding and infrastructure to support NCD prevention and treatment in these settings (64). However, large investments in HIV service delivery create a platform for extending chronic care models for managing HIV to include tobacco use treatment. HIV treatment requires multiple interactions with the health system, providing healthcare workers with frequent opportunities to screen, diagnose and treat tobacco dependence. In addition, many of the health system interventions that were used to scale up ART resources in poor countries, such as standardized treatment protocols, registries to track adherence to guidelines, task-sharing, and counselling referrals, can facilitate effective management of tobacco dependence (16,65,66–68). Borrowing from

both implementation and systems science, Box 3 outlines a process for optimizing the integration of tobacco use treatment in HIV care systems (69–72). The implementation of effective, evidence-based tobacco cessation interventions for people living with HIV in LMICs has potential to bring substantial benefits to health outcomes among people living with HIV, particularly in areas where the burden of both HIV and tobacco use is high (80).

## Box 3. Recommended System Interventions (49)

- Implement a system to consistently identify tobacco users and document use in all HIV services
- Assign dedicated staff to coordinate tobacco use prevention and treatment
- Train all staff and healthcare workers and define and communicate duties
- Monitor performance and provide feedback
- Develop and promote a programme policy to support screening and treatment
- Include evidence-based tobacco dependence treatments (both counselling and pharmacotherapy) as paid or covered services to remove barriers to treatment

Existing resources, such as national quit-lines in 40 LMICs, mobile health programmes and extensive networks of community health workers supporting HIV programmes, provide the infrastructure for a three-step framework to facilitate treatment integration: 1) Ask all clients using HIV services about tobacco use; 2) Provide clear advice to quit as well as tailored brief counselling and 3) Connect patient to treatment (AAC) (62,73–75). Population-based resources provide a sustainable and scalable option for connecting people living with HIV to treatment. National healthcare policies and infrastructure will inform the larger policy decisions about what types of integration models are selected (for example, integration into HIV care, integration into HIV and coordination with external resources) (76).

## Potential next steps

### Research

- More studies are needed to examine interventions concentrating on the socio-behavioural and environmental factors that may impede tobacco cessation among people living with HIV in LMICs.
- Research is needed to inform the design of interventions that address co-occurring addiction and comorbidities that are common among people living with HIV who smoke, to evaluate if the current evidence for treating cigarette use applies to other tobacco products such as waterpipe/hookah, smokeless tobacco, e-cigarettes and bidis, and to evaluate the effectiveness of digital interventions for people living with HIV.
- Research is needed to determine the best possible strategies and models for integrating tobacco cessation treatment into the context of HIV services.

### Practice

- Involving communities of people living with HIV in the design and delivery of services.
- Immediate action to integrate screening for tobacco use, assessing willingness to quit, and offering brief advice, and supporting the initiation of pharmacotherapy as part of standard HIV care practice.
- Integrating quit-line referral systems in HIV health programmes will increase the reach of smoking cessation services.

### Policy

- Global and national policies must define standards of care for treating tobacco use in the context of HIV care (65). This should include increasing access to nicotine replacement therapy, which is a WHO essential medication.
- Brief advice from a healthcare worker, quit-line, automated text messaging, printed self-help materials and nicotine replacement therapy and cytisine are globally affordable healthcare interventions to promote and assist tobacco cessation (50,77).
- International partners should include reporting requirements that clearly define performance measures for screening and treatment and include an evaluation of tobacco use treatment in HIV reported systems.

## Contributors

Shelley D,<sup>1</sup> Aarsand R,<sup>2</sup> Vitoria M,<sup>3</sup> Cantrell J,<sup>1</sup> Namusisi K,<sup>1</sup> Anam F R,<sup>4</sup> Seale A,<sup>3</sup> Dalal S,<sup>3</sup> Stelzle D,<sup>3</sup> Lebedeva E,<sup>5</sup> Ciobanu A,<sup>5</sup> Fu D,<sup>6</sup> Fayokun R,<sup>6</sup> Schotte K,<sup>6</sup> Kaur J.<sup>7</sup>

<sup>1</sup> New York University, School of Global Public Health, Department of Public Health Policy and Management

<sup>2</sup> World Health Organization, Department of Digital Health and Innovation

<sup>3</sup> World Health Organization, Global HIV, Hepatitis and Sexually Transmitted Infections Programmes

<sup>4</sup> The Global Network of People Living with HIV (GNP+)

<sup>5</sup> World Health Organization Regional Office for Europe

<sup>6</sup> World Health Organization, Department of Health Promotion, No Tobacco Unit

<sup>7</sup> World Health Organization Regional Office for South-East Asia

## References

1. HIV and AIDS. Key facts. In: World Health Organization [website]. Geneva: World Health Organization; 2023 (<https://www.who.int/news-room/fact-sheets/detail/hiv-aids>, accessed 21 November 2023).
2. Consolidated guidelines on HIV prevention, testing, treatment, service delivery and monitoring: recommendations for a public health approach. Geneva: World Health Organization; 2021 (<https://www.who.int/publications/i/item/9789240031593>, accessed 23 July 2024).
3. The role of HIV viral suppression in improving individual health and reducing transmission: policy brief. Geneva: World Health Organization; 2023 (<https://www.who.int/publications/i/item/9789240055179>, accessed 23 July 2024).
4. The path that ends AIDS: UNAIDS Global AIDS Update 2023. Geneva: Joint United Nations Programme on HIV/AIDS; 2023 ([https://thepath.unaids.org/wp-content/themes/unaids2023/assets/files/2023\\_report.pdf](https://thepath.unaids.org/wp-content/themes/unaids2023/assets/files/2023_report.pdf), accessed 23 July 2024).
5. WHO global report on trends in prevalence of tobacco use 2000–2030. Geneva: World Health Organization; 2024 (<https://iris.who.int/bitstream/handle/10665/375711/9789240088283-eng.pdf?sequence=1>, accessed 28 May 2024).
6. UNAIDS country profile South Africa (<https://www.unaids.org/en/regionscountries/countries/southafrica>, accessed 21 November 2023).
7. UNAIDS country profile Lesotho (<https://www.unaids.org/en/regionscountries/countries/lesotho>, accessed 21 November 2023).
8. Mdege ND, Shah S, Ayo-Yusuf OA, Hakim J, Siddiqi K. Tobacco use among people living with HIV: analysis of data from Demographic and Health Surveys from 28 low-income and middle-income countries. *Lancet Glob Health* 2017; 5:e578–92 ([https://doi.org/10.1016/S2214-109X\(17\)30170-5](https://doi.org/10.1016/S2214-109X(17)30170-5), accessed 5 October 2023).
9. Mdodo R, Frazier EL, Dube SR, Mattson CL, Sutton MY, Brooks JT, Skarbinski J. Cigarette smoking prevalence among adults with HIV compared with the general adult population in the United States: cross-sectional surveys. *Ann Intern Med*. 2015 Mar 3;162(5):335–44 (<https://doi.org/10.7326/M14-0954>, accessed 5 October 2023).
10. Lindayani L, Yeh C-Y, Ko W-C, Ko N-Y. High smoking prevalence among HIV-positive individuals: A systematic review and meta-analysis. *J. Subst. Use* 2020, 25, 1–10. DOI: 10.1080/14659891.2019.1652364.
11. Ale et al. Global burden of active smoking among people living with HIV on antiretroviral therapy: a systematic review and meta-analysis. *Infect Dis Poverty* (2021) 10:12 (<https://doi.org/10.1186/s40249-021-00799-3>, accessed 5 October 2023).
12. Johnston PI, Wright SW, Orr M, Pearce FA, Stevens JW, Hubbard RB, Collini PJ. Worldwide relative smoking prevalence among people living with and without HIV. *AIDS* 2021, 35:957–970 (<https://doi.org/10.1097/QAD.0000000000002815>, accessed 20 September 2023).
13. Murphy J D et al. 2019. Smoking and HIV in Sub-Saharan Africa: a 25-country analysis of the demographic health surveys. *Nic Tob Res*. 2019;21(8):1093–1102. DOI: 10.1093/ntr/nty176.
14. Joint United Nations Programme on HIV/AIDS (UNAIDS). Responding to the challenge of non-communicable diseases, United Nations Programme on HIV/AIDS, Geneva, 2019 (<https://www.unaids.org/en/resources/documents/2019/responding-to-the-challenge-of-non-communicablediseases/>, accessed 4 October 2023).
15. Helleberg M, Afzal S, Kronborg G. Mortality attributable to smoking among HIV-1-infected individuals: a nationwide, population-based cohort study. *Clin Infect Dis*. 2013;56:727–73 (<https://doi.org/10.1093/cid/cis933>, accessed 21 November 2023).
16. Parascandola M, et al. Colliding Epidemics: Research Gaps and Implementation Science Opportunities for Tobacco Use and HIV/AIDS in Low- and Middle-Income Countries. *J Smok Cessat*. 2022;6835146. PMID: 35821759; 24. DOI: 10.1155/2022/6835146.
17. Reddy KP, Parker RA, Losina E, et al. Impact of cigarette smoking and smoking cessation on life expectancy among people with HIV: a US-based modeling study. *J Infect Dis* 2016; 214:1672–81 (<https://doi.org/10.1093/infdis/jiw430>, accessed 15 August 2023).
18. Lifson A. R., Neuhaus J., Arribas J. R., Van Berg-Wolf M. D., Labriola A. M., Read T. R. H. Smoking-related health risks among persons with HIV in the strategies for management of antiretroviral therapy clinical trial. *Am J Pub Health*. 2010;100(10):1896–1903. DOI: 10.2105/AJPH.2009.188664.
19. Jian C, Chen Q, Xie M. Smoking increases the risk of infectious diseases: A narrative review *Chen Tob Induc Dis*. 2020;18(July):60 (<https://doi.org/10.18332/tid/123845>, accessed 15 August 2023).
20. Halsey NA et al. Sexual behavior, smoking, and HIV-1 infection in Haitian Women *JAMA* 1992 Dec 23-30;268(24):3434 DOI:10.1001/jama.1992.03480150068039.
21. Feldman JG, et al. Association of cigarette smoking with HIV prognosis among women in the HAART era: a report from the women's interagency HIV study. *Am J Pub Health*. 2006;96:1060-1065 (<https://doi.org/10.2105/AJPH.2005.062745>, accessed 15 August 2023).
22. Penkower L. et al. Behavioral, Health and Psychosocial Factors and Risk for HIV Infection among Sexually Active Homosexual Men: The Multicenter AIDS Cohort Study, *Am J Pub Health*. 1991;81:194-196 (<https://doi.org/10.2105/ajph.81.2.194>, accessed 20 August 2023).
23. US Surgeon General Report the Health Consequences of Smoking: 50 Years of Progress. A Report of the Surgeon General. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014 ([https://www.ncbi.nlm.nih.gov/books/NBK179276/pdf/Bookshelf\\_NBK179276.pdf](https://www.ncbi.nlm.nih.gov/books/NBK179276/pdf/Bookshelf_NBK179276.pdf), accessed 21 November 2023).
24. Bates B M. Khalakdina A, Pai M, Chang L, Lessa F, Smith KR. Risk of tuberculosis from exposure to tobacco smoke: a systematic review and meta-analysis. *Arch Internal Medicine*. 2007;167 (4): 335–342. PMID: 1725294 (<https://doi.org/10.1001/archinte.167.4.335>, accessed 5 August 2023).
25. Basu S, Stuckler D, Bitton A, Glantz SA. Projected effects of tobacco smoking on worldwide tuberculosis control: mathematical modelling analysis. *BMJ*. 2011; 343:d5506. DOI:10.1136/bmj.d5506.
26. Reynolds NR. Cigarette smoking and HIV: More evidence for action. *AIDS Edu Prev*. 2009;21: (Suppl 3):106-121 ([https://doi.org/10.1521/aeap.2009.21.3\\_suppl.106](https://doi.org/10.1521/aeap.2009.21.3_suppl.106), accessed 5 August 2023).
27. de Socio GLV, Martinelli L, Morosi S, et al. Is estimated cardiovascular risk higher in HIV-infected patients than in the general population? *Scand J Infectious Diseases*. 2007; 39 (9):805–812 (<https://doi.org/10.1080/00365540701230884>, accessed 15 September 2023).
28. Altekruse SF et al. Cancer burden attributable to cigarette smoking among HIV-infected people in North America. *AIDS*. 2018;32:513–521 (<https://doi.org/10.1097/QAD.0000000000001721>, accessed 21 November 2023).
29. Consolidated guidelines on HIV, viral hepatitis and STI prevention, diagnosis, treatment and care for key populations. Geneva: World Health Organization; 2022 (<https://www.who.int/publications/i/item/9789240052390>, accessed 23 July 2024).
30. Helleberg M, May MT, Ingle SM, Dabis F, Reiss P, Fätkenheuer G,

- Costagliola D, d'Arminio A, Cavassini M, Smith C, Justice AC, Gill. Smoking and life expectancy among HIV-infected individuals on antiretroviral therapy in Europe and North America (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4284008/>, accessed 20 October 2023).
31. HIV.gov. (2022) Smoking and HIV (<https://www.hiv.gov/hiv-basics/staying-in-hiv-care/other-related-health-issues/smoking/> accessed 14 October 2023).
  32. Zhang J, Du Ester EJ, Watson RR. (2002). Side-stream cigarette smoke accentuates immunomodulation during murine AIDS. *International immunopharmacology*, 2(6), 759–766 ([https://doi.org/10.1016/s1567-5769\(02\)00012-7](https://doi.org/10.1016/s1567-5769(02)00012-7), accessed 21 November 2023).
  33. Elf JL, Variava E, Chon S, et al. Prevalence and Correlates of Snuff Use, and its Association with Tuberculosis, Among Women Living with HIV in South Africa. *Nicotine Tob Res.* 2019;21(8):1087–1092 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6636253/>, accessed 5 August 2023).
  34. Marbaniang I, Joshi S, Sangle S, Khaire S, Thakur R, Chavan A, Gupte N, Kulkarni V, Deshpande P, Nimkar S, Mave V (2022). Smokeless tobacco use and oral potentially malignant disorders among people living with HIV (PLHIV) in Pune, India: Implications for oral cancer screening in PLHIV. *PloS one*, 17(7), e0270876 (<https://doi.org/10.1371/journal.pone.0270876>, accessed 5 August 2023).
  35. Vidrine DJ, Arduino RC, Gritz ER. The effects of smoking abstinence on symptom burden and quality of life among persons living with HIV/AIDS. *AIDS Patient Care STDS* 2007; 21:659–66 (<https://doi.org/10.1089/apc.2007.0022>, accessed 22 July 2023).
  36. Lubitz SF, Flitter A, Ashare RL, et al. Improved clinical outcomes among persons with HIV who quit smoking. *AIDS Care* 2020; 32:1217–23 (<https://doi.org/10.1080/09540121.2019.1703891>, accessed 22 July 2023).
  37. Moscou-Jackson G, Commodore-Mensah Y, Farley J, DiGiacomo M. Smoking-Cessation Interventions in People Living With HIV Infection: A Systematic Review. *J Assoc Nurses AIDS Care.*2014;25(1):32–45 (<https://doi.org/10.1016/j.jana.2013.04.005>, accessed 8 August 2023).
  38. King D et al. *AIDS Behav.* Treatment outcomes associated with quitting cigarettes among sexual minority men living with HIV: antiretroviral adherence, engagement in care and sustained HIV RNA suppression. 2018;22:2868–76 (<https://doi.org/10.1007/s10461-018-2116-3>, accessed 8 August 2023).
  39. Mdege ND, Makumbi FE, Ssenyonga R, Thirlway F, Matovu JKB, Ratschen E, Kamran Siddiqi K, Namusisi KNN. Tobacco Smoking and Associated Factors Among People Living with HIV in Uganda. *Nicotine Tob Res.* 2021;8;23(7):1208–1216 (<https://doi.org/10.1093/ntr/ntaa262>, accessed 21 November 2023).
  40. Kress AC, Stadnik C, Phiri MM, Goma FM, Twentyman E. Tobacco Use among HIV-Positive and HIV-Negative Women and Men in Zambia-Demographic and Health Survey, 2018. *Int J Environ Res Public Health.* 2022;19(7):3859. *IJERP* (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8997506/>, accessed 21 November 2023).
  41. Lifson AR, Lando HA. Smoking and HIV: prevalence, health risks, and cessation strategies. *Curr HIV/AIDS Rep.* 2012;9(3):223–30.
  42. Shuter J, Bernstein SL, Moadel AB. Cigarette smoking behaviors and beliefs in persons living with HIV/AIDS. *Am J Health Behav.* 2012 Jan;36(1):75–85 (<https://doi.org/10.5993/ajhb.36.1.8>, accessed 5 August 2023).
  43. De Socio et al. Smoking habits in HIV-infected people compared with the general population in Italy: a cross-sectional study. *BMC Pub Health.* 2020;20:734–23 (<https://bmcpubhealth.biomedcentral.com/articles/10.1186/s12889-020-08862-8>, accessed 5 December 2023).
  44. Hartmann-Boyce et al. Behavioural interventions for smoking cessation: an overview and network meta-analysis. *Cochrane Database of Systematic Reviews* (<https://doi.org/10.1002/14651858.CD013229.pub2>, accessed 21 November 2023).
  45. Stead LF, Lancaster T. Combined pharmacotherapy and behavioral interventions for smoking cessation. *Cochrane Database Syst Rev.* 2016 Mar 24;3:CD008286 (<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10042551/>, accessed 5 August 2023).
  46. Lancaster T, Stead LF. Individual behavioural counselling for smoking cessation. *Cochrane Database Syst Rev.* 2017;31;3:CD001292 (<https://doi.org/10.1002/14651858.CD001292.pub3>, accessed 5 August 2023).
  47. Fiore M. Tobacco Use and Dependence Guideline Panel. Treating tobacco use and dependence: 2008 update. U.S. Dept. of Health and Human Services, Public Health Service; 2008 (<https://stacks.cdc.gov/view/cdc/6964>, accessed 22 July 2023).
  48. Cahill K, Stead L, Lancaster T. Nicotine receptor partial agonists for smoking cessation. *Cochrane Database of Systematic Reviews* 2012; CD006103 (<https://doi.org/10.1002/14651858.CD006103.pub6>, accessed 22 July 2023).
  49. Matkin W, Ordóñez-Mena JM, Hartmann-Boyce J. Telephone counselling for smoking cessation. *Cochrane Database Syst Rev* 2019; 5:CD002850 (<https://doi.org/10.1002/14651858.CD002850.pub4>, accessed 22 July 2023).
  50. West R, Raw M, McNeill A, Stead L, Aveyard P, Bitton J, Stapleton J, McRobbie H, Pokhrel S, Lester-George A, Borland R. Health-care interventions to promote and assist tobacco cessation: a review of efficacy, effectiveness and affordability for use in national guideline development. *Addiction.* 2015 Sep;110(9):1388–403 (<https://doi.org/10.1111/add.12998>, accessed 22 July 2023).
  51. Krist AH, Davidson KW, Mangione CM, et al. US Preventive Services Task Force. Interventions for tobacco smoking cessation in adults, including pregnant persons: US Preventive Services Task Force Recommendation Statement. *JAMA* 2021; 325:265–79 (<https://doi.org/10.1001/jama.2020.25019>, accessed 22 July 2023).
  52. Akanbi MO, Carroll AJ, Achenbach C et al. The efficacy of smoking cessation interventions in low- and middle-income countries: a systematic review and meta-analysis. *Addiction.* 2019 Apr;114(4):620–635 (<https://doi.org/10.1111/add.14518>, accessed 22 July 2023).
  53. Keith A, Dong Y, Shuter J, Himelhoch S. Behavioral Interventions for Tobacco Use in HIV-Infected Smokers: A Meta-Analysis. *J Acquir Immune Defic Syndr.* 2016 Aug 15;72(5):527–33 (<https://europepmc.org/article/MED/27028502>, accessed 22 July 2023).
  54. Uthman OA, Nduka CU, Abba M, Enriquez R, Nordenstedt H, Nalugoda F, Kengne AP, Ekström AM. Comparison of mHealth and Face-to-Face Interventions for Smoking Cessation Among People Living With HIV: Meta-Analysis. *JMIR Mhealth Uhealth.* 2019 Jan 7;7(1):e203. DOI: 10.2196/mhealth.9329.
  55. Pool ER, Dogar O, Lindsay RP, Weatherburn P, Siddiqi K. Interventions for tobacco use cessation in people living with HIV and AIDS. *Cochrane Database Syst Rev.* 2016 Jun 13;2016(6):CD011120 (<https://doi.org/10.1002/14651858.CD011120.pub2>, accessed 8 August 2023).
  56. Vidrine DJ, Marks RM, Arduino RC, Gritz ER. Efficacy of cell phone-delivered smoking cessation counseling for persons living with HIV/AIDS: 3-month outcomes. *Nic Tob Res.* 2012;14(1):106–10 (<https://doi.org/10.1093/ntr/ntr121>, accessed 8 August 2023).
  57. Shuter J, Chander G, Graham AL, Kim RS, Stanton CA. Randomized Trial of a Web-Based Tobacco Treatment and Online Community Support for People with HIV Attempting to Quit Smoking Cigarettes. *J Acquir Immune Defic Syndr.* 2022 Jun 1;90(2):223–231 (<https://doi.org/10.1097/QAI.0000000000002936>, accessed 21 September 2023).



58. Mercie P, Arsandaux J, Katlama C, Ferret S, et al. ANRS 144-InterACTIV Study Group, 2018. Efficacy and safety of varenicline for smoking cessation in people living with HIV in France (ANRS 144 InterACTIV): A randomised controlled phase 3 clinical trial. *Lancet HIV* 5, e126–e135 ([https://doi.org/10.1016/S2352-3018\(18\)30002-X](https://doi.org/10.1016/S2352-3018(18)30002-X), accessed 16 August 2023).
59. Ashare RL, Thompson M, Serrano K, et al. Placebo-controlled randomized clinical trial testing the efficacy and safety of varenicline for smokers with HIV. *Drug Alcohol Depend.* 2019;200:26–33 (<https://doi.org/10.1016/j.drugalcdep.2019.03.011>, accessed 21 August 2023).
60. Tindle HA, Freiberg MS, Cheng DM, et al. Effectiveness of varenicline and cytisine for alcohol use reduction among people with HIV and substance use: a randomized clinical trial. *JAMA Network Open* 2022;5(8):e2225129. 23101453 (<https://doi.org/10.1001/jamanetworkopen.2022.25129>, accessed 21 August 2023).
61. World Health Organization. Toolkit for delivering the 5A's and 5R's brief tobacco interventions in Primary Care ([https://apps.who.int/iris/bitstream/handle/10665/112835/9789241506953\\_eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/112835/9789241506953_eng.pdf), accessed 8 August 2023).
62. Reddy KP, Kruse GR, Lee S, Shuter J, Rigotti NA. Tobacco Use and Treatment of Tobacco Dependence Among People With Human Immunodeficiency Virus: A Practical Guide for Clinicians. *Clin Infect Dis.* 2022 Aug 31;75(3):525–533 (<https://doi.org/10.1093/cid/ciab1069>, accessed 8 August 2023).
63. World Health Organization (WHO). WHO Framework Convention on tobacco control. Geneva, World Health Organization, 2003 (<http://apps.who.int/iris/bitstream/10665/42811/1/9241591013.pdf?ua=1>, accessed 10 August 2023).
64. Shelley DR, Kyriakos C, McNeill A, Murray R, Nilan K, Sherman SE, Raw M. Challenges to implementing the WHO Framework Convention on Tobacco Control guidelines on tobacco cessation treatment: a qualitative analysis. *Addiction.* 2020 Mar;115(3):527–533 (<https://doi.org/10.1111/add.14863>, accessed 10 August 2023).
65. Shelley D, Alvarez GG, Nguyen T, Nguyen N, Goldsamt L, Cleland C, Tozan Y, Shuter J, Armstrong-Hough M. Adapting a tobacco cessation treatment intervention and implementation strategies to enhance implementation effectiveness and clinical outcomes in the context of HIV care in Vietnam: a case study. *Implement Sci Commun.* 2022 Oct 17;3(1):112 (<https://doi.org/10.1186/s43058-022-00361-8>, accessed 8 August 2023).
66. Fischer F, Lange K, Klose K, Greiner W, Kraemer A. Barriers and strategies in guideline implementation—a scoping review. *Healthcare (Basel).* 2016 Jun 29;4(3):36. DOI: 10.3390/healthcare4030036 (<https://doi.org/10.3390/healthcare4030036>, accessed 8 August 2023).
67. VanDevanter N, Kumar P, Nguyen N, Nguyen L, Nguyen T, Stillman F, Weiner B, Shelley D. Application of the Consolidated Framework for Implementation Research to assess factors that may influence implementation of tobacco use treatment guidelines in the Viet Nam public health care delivery system. *Implement Sci.* 2017 Feb 28;12(1):27 (<https://doi.org/10.1186/s13012-017-0558-z>, accessed 8 August 2023).
68. Parascandola M, Neta G, Salloum RG, Shelley D, Rositch AF. Role of Local Evidence in Transferring Evidence-Based Interventions to Low- and Middle-Income Country Settings: Application to Global Cancer Prevention and Control. *JCO Glob Oncol.* 2022 Aug;8:e220005 (<https://doi.org/10.1200/GO.22.00054>, accessed 21 September 2023).
69. Peters DH, Tran NT, Taghreed A. Alliance for Health Policy and Systems Research & World Health Organization. (2013). Implementation research in health: a practical guide. World Health Organization (<https://iris.who.int/handle/10665/91758>, accessed 8 August 2023).
70. Shelley D, Wang VHC, Taylor K et al. Accelerating integration of tobacco use treatment in the context of lung cancer screening: Relevance and application of implementation science to achieving policy and practice. *Transl Behav Med.* 2022 Nov; 12(11): 1076–1083 (<https://doi.org/10.1093/tbm/ibac076>, accessed 8 August 2023).
71. Sherr K et al. Scaling-up the Systems Analysis and Improvement Approach for prevention of mother-to-child HIV transmission in Mozambique (SAIA-SCALE): a stepped-wedge cluster randomized trial. *Implement Sci.* 2019 Apr 27;14(1):41 (<https://doi.org/10.1186/s13012-019-0889-z>, accessed 8 August 2023).
72. Gravitt PE, Silver MI, Hussey HM, Arrossi S, Huchko M, Jeronimo J, Kapambwe S, Kumar S, Meza G, Nervi L, Paz-Soldan VA, Woo YL. Achieving equity in cervical cancer screening in low- and middle-income countries (LMICs): Strengthening health systems using a systems thinking approach. *Prev Med.* 2021 Mar;144:106322 (<https://doi.org/10.1016/j.ypmed.2020.106322>, accessed 10 August 2023).
73. Vidrine JI, Shete S, Li Y, Cao Y, Alford MH, Galindo-Talton M, et al. The Ask-Advise-Connect approach for smokers in a safety net healthcare system: a group-randomized trial. *Am J Prev Med.* 2013 Dec;45(6):737–41 (<https://doi.org/10.1016/j.amepre.2013.07.011>, accessed 10 August 2023).
74. Piñeiro B, Vidrine DJ, Wetter DW, Hoover DS, Frank-Pearce SG, Nguyen N, Zbikowski SM, Vidrine JI. Implementation of Ask-Advise-Connect in a safety net healthcare system: quitline treatment engagement and smoking cessation outcomes. *Transl Behav Med.* 2020 Feb 3;10(1):163–167 (<https://doi.org/10.1016/j.amepre.2013.07.011>, accessed 15 August 2023).
75. Mussulman LM, Faseru B, Fitzgerald S, Nazir N, Patel V, Richter KP. A randomized, controlled pilot study of warm handoff versus fax referral for hospital-initiated smoking cessation among people living with HIV/AIDS. *Addict Behav.* 2018;78:205–208 (<https://doi.org/10.1016/j.addbeh.2017.11.035>, accessed 15 August 2023).
76. Duffy M, Ojikutu B, Andrian S et al. Non-communicable diseases and HIV care and treatment: models of integrated service delivery. *Trop Med International Health.* 2017;22 (8):926–937 (<https://doi.org/10.1111/tmi.12901>, accessed 20 August 2023).
77. WHO report on the global tobacco epidemic, 2023: protect people from tobacco smoke. Geneva: World Health Organization; 2023. License: CC BY-NC-SA 3.0 IGO (<https://www.who.int/publications/i/item/9789240077164>, accessed 20 September 2023).
78. National Institute of Mental Health. HIV, AIDS and mental health (<https://www.nimh.nih.gov/health/topics/hiv-aids>, accessed 28 October 2023).
79. Junaid K, Afzal S, Daood M, Siddiqui M (2023). Substance Abuse and Mental Health Issues Among HIV/AIDS Patients. *Journal of the College of Physicians and Surgeons--Pakistan : JCPSP*, 33(3), 325–334 (<https://doi.org/10.29271/jcpsp.2023.03.325>, accessed 18 October 2023).
80. Parascandola M, Neta G, Bloch M, Gopal S. “Colliding Epidemics: Research Gaps and Implementation Science Opportunities for Tobacco Use and HIV/AIDS in Low- and Middle-Income Countries”, *Journal of Smoking Cessation*, vol. 2022, Article ID 6835146, 10 pages, 2022 (<https://doi.org/10.1155/2022/6835146>, accessed 15 November 2023).



Tobacco and HIV: WHO tobacco knowledge summaries

ISBN 978-92-4-009686-8 (electronic version)

ISBN 978-92-4-009687-5 (print version)

© World Health Organization 2024. Some rights reserved. This work is available under the [CC BY-NC-SA 3.0 IGO](https://creativecommons.org/licenses/by-nc-sa/3.0/) licence.

