## The neglected triple disease burden and interaction of helminths, HIV and tuberculosis: An opportunity for integrated action in South Africa

**To the Editor:** The convergent distribution of HIV/AIDS and neglected tropical diseases (NTDs), particularly helminthiasis, in sub-Saharan Africa has been described and associated with accelerated HIV/AIDS and tuberculosis (TB) epidemics in the region.[1]

South Africa (SA) suffers from the highest burden of HIV/AIDS and TB, especially in poor communities where helminth infection is endemic. The international NTD community is calling for integration of helminth control programmes into HIV/AIDS, TB and malaria control activities in developing countries.[2] SA has integrated TB and HIV/AIDS services and plans to initiate a national helminth control programme,[3] though how this might be integrated into HIV/AIDS and TB services is not clear.

In SA, the most common NTDs include infection with the soil-transmitted helminths – *Ascaris lumbricoides, Trichuris trichiura*, *Necator americanus*, *Enterobius vermicularis* – and the less prevalent but common *Strongyloides* and *Taenia* spp. and *Schistosoma haematobium* and *S. mansoni*. These pathogens, owing to the undramatic symptoms they typically cause, have largely been neglected globally and in SA, despite their detrimental impact on nutritional status, child development, pregnancy outcome and worker productivity. Under conditions of poverty, overcrowding and limited access to water and sanitation, children and adults are commonly infested by helminths, as shown in Limpopo[4] and KwaZulu-Natal provinces,[5,6] and in Cape Town.[7]

When the association of helminth infections with AIDS and TB became recognised from the 1990s onwards,[1] a greater interest was shown in the triple disease burden borne by the 36.4% of the SA population living below the poverty line.[8]

Epidemiological and immunological studies have provided plausible evidence to suggest that the transmission of HIV and accelerated progression to full-blown AIDS are driven in part by the endemic presence of NTDs, especially in developing countries.[1] Similarly, chronic infection with NTDs results in impaired immune responses to TB, compromised BCG vaccination[1] and a poor clinical response to TB therapy.[9] While studies of helminth co-infection with HIV/TB and their deleterious effects are lacking in SA, elsewhere on the African continent there is accumulating evidence that prevention of helminthiasis might be part of the solution to the pandemics of HIV/AIDS and TB.[1]

Great strides have been taken in SA to control the dual epidemic of HIV/TB by integrating HIV and TB services with the 'one-stop shop under one roof for two diseases, one patient and one folder' approach.[10] A recent evaluation of this service integration reported success in both rural and urban settings.[11] Deworming and preventive chemotherapy can be incorporated into these integrated HIV/TB services to achieve a sustainable reduction of worm burden and control of co-morbidities.

Screening for, and treatment of, helminth infections is relatively simple and inexpensive, and treatment of helminth infections alongside treatment of HIV/AIDS can be implemented at various levels of the SA healthcare system including: HIV counselling and testing programmes, targeting the general population; HIV prevention of mother-to-child transmission, targeting pregnant women; medical male circumcision campaigns at primary healthcare level, targeting youth and young adults; school health programmes, targeting learners; and TB and HIV healthcare facilities, targeting these patient populations. Such an integrated intervention package could also include appropriate education of communities on the modes of transmission of helminths and the importance of effective sanitation, a supply of clean water, and general hygiene as preventive measures.

Alternatively, mass treatment of all high-risk populations in regions of the country with a high prevalence of helminth infection, using the preventive chemotherapy approach recommended by the World Health Organization,[12] could be adopted. All vulnerable individuals in the general adult population, and particularly pregnant women, children, youth and young adults, could be targeted. Depending on the group being targeted, some helminth control programmes might be school-based and others community-based.

The potential benefits of integrating helminth control programmes into existing HIV and TB services warrant consideration. Such efforts should be supported by operational research to evaluate the impact of helminth control on HIV/AIDS and TB disease progression. Epidemiological and immunological research is also essential to understand the complexities of immunity during co-infections with helminths, HIV and TB.

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1. Borkow G, Bentwich Z. Chronic immune activation associated with chronic helminthic and human immunodeficiency virus infections: Role of hyporesponsiveness and anergy. Clin Microbiol Rev 2004;17(4):1012-1030. [http://dx.doi.org/10.1128/CMR.17.4.1012-1030.2004]
2. Hotez PJ, Mistry N, Rubinstein J, Sachs JD. Integrating neglected tropical diseases into AIDS, tuberculosis, and malaria control. N Engl J Med 2011;364:2086-2089. [http://dx.doi.org/10.1056/NEJMp1014637]
3. National Department of Health. Draft Policy Guidelines for Control of Schistosomiasis and Soil Transmitted Helminths. Pretoria: NDoH, 2005. http://www.health.gov.za/policies.php (accessed 22 January 2014).
4. Samie A, Nchachi DJ, Obi CL, Igumbor EO. Prevalence and temporal distribution of *Schistosoma haematobium* infections in the Vhembe district, Limpopo Province, South Africa. Afr J Biotechnol 2010;9:7157-7164.
5. Sumad AF, Anderson CB, Jackson TFHG. Impact of environmental conditions on the prevalence of intestinal parasites in the Durban metropolitan area. J S Afr Vet Assoc 2003;75(1):61-71.
6. Kwitshana ZL, Tsoka JM, Mabaso MLH. Intestinal parasitic infections in adult patients in KwaZulu-Natal. S Afr Med J 2008;98(9):709-711.
7. Mkhize-Kwitshana ZL, Taylor M, Jooste P, Mabaso MHL, Walzl G. The influence of different helminth infection phenotypes on immune responses against HIV in co-infected adults in South Africa. BMC Infect Dis 2011;11:273. [http://dx.doi.org/10.1186/1471-2334-11-273]
8. Statistics South Africa. Living Conditions Survey 2008/09. Poverty Profile of South Africa: Application of the Poverty Lines on the LCS 2008/2009. Pretoria: StatsSA, 2012. http://www.statssa.gov.za/publications/Report-03-10-03/Report-03-10-032009.pdf (accessed 25 August 2013).
9. Resende Co T, Hirsch CS, Toossi Z, Dietze R, Ribeiro-Rodrigues R. Intestinal helminth co-infection has a negative impact on both anti-*Mycobacterium tuberculosis* immunity and clinical response to tuberculosis therapy. Clin Exp Immunol 2007;147(1):45-52. [http://dx.doi.org/10.1111/j.1365-2249.2006.03247.x]
10. National Department of Health. A Practical Guide for TB and HIV Service Integration at Primary Health Care Facilities. Pretoria: NDoH, 2010. http://www.inpracticeafrica.com/~/media/Guidelines/Practical_Guide_TBHIV.pdf (accessed 24 February 2014).
11. Scott VE, Sanders D. Evaluation of how integrated HIV and TB programs are implemented in South Africa and the implications for rural-urban equity. Rural Remote Health 2013;13(2):2165.
12. World Health Organization. Preventive Chemotherapy in Human Helminthiasis. Coordinated use of Anthelminthic Drugs in Control Interventions: A Manual for Health Professionals and Programme Managers. Geneva: WHO, 2006. http://whqlibdoc.who.int/publications/2006/9241547103_eng.pdf (accessed 18 December 2013).

*S Afr Med J* 2014;104(4):258-259. DOI:10.7196/SAMJ.7947