



NT 325 NUTRITION AND HIV
IES Abroad Cape Town
Cape Town Summer Health Studies Program

DESCRIPTION:

The purpose of this course is to explore HIV and nutrition within a South African context. South Africa is the country with the highest burden of human immunodeficiency virus (HIV) infection in the world, as estimated by the Joint United Nations Program on HIV/AIDS (UNAIDS) in 2012, approximately 6.1 million South African people were infected with the virus. Due to HIV being highly prevalent in South Africa, the course aims to establish the role nutrition plays in the treatment thereof. Firstly, it will look at the prevalence and progression of the virus as well as its complications specifically those impacting nutrition. The course will further focus on nutritional guidelines, supplementation and interventions for HIV-infected individuals during different life stages and conditions in the South African context. These interventions will be explored within the course through the pre-readings, class discussions and course related trips.

CREDITS: 3 credits

CONTACT HOURS: 45 hours

LANGUAGE OF INSTRUCTION: English

PREREQUISITES: None

ADDITIONAL COST: None

METHOD OF PRESENTATION:

The method of presentation for this course will be conducted via lectures using PowerPoint presentations and class and group discussions. Supplementary course information will also be provided through Moodle. In addition, guest lectures, all student site visits and observational rotations (during morning sessions to various public and private hospitals and clinics to observe healthcare on the ground in Cape Town), are incorporated to help to bring knowledge to demonstrate how some of the theory focused on in class is deployed in practical settings. Observational rotations are integral to the academic program and are intended to provide students with additional exposure to the broader public health and health care environment in Cape Town and South Africa.

REQUIRED WORK AND FORM OF ASSESSMENT:

- Class Participation - 10%
- Midterm Exam - 25%
- Course-Related Trip Reports - 25%
- Final Exam - 40%

Course Participation

Participation in all class discussions/debates and attendance for all guest lectures, observational rotations, course related trips and site visits is mandatory. Students are expected to prepare for each class by doing the required reading and reflection, in addition to regularly checking notices on Moodle. Students will, however, be required to do more than simply complete the readings and attend the contact sessions. They will be asked to engage thoughtfully and openly with the material and come to class prepared to respectfully question, engage and explore concepts raised.

Midterm Exam

In session 9, students will be examined on material covered in class, including nutritional status of South Africans, the progression of HIV, infections and complications associated with HIV as well as malnutrition in HIV. This exam will be a sit down, closed book exam which will be completed within the class time, and will be comprised of a combination of multiple choice, short and long answer questions on the material covered in class.

Course-Related Trip Report

Global brilliance begins here.*

Institute for the International Education of Students
Africa | Asia Pacific | Europe | Latin America



After each of the two Course Related Trips, students will submit 1,500-2,000 words (6-8 pages) reflecting on and analyzing their experience, on Moodle. Students are expected to write what they learned during the trip, and need to incorporate readings to connect lessons and theories from class, with their experiences outside of the classroom. Students should also draw from their experiences during observational rotations to enhance their reflections about the broader field of public health and health care providers in Cape Town and South Africa. A total of two Course Related Trip Reports will be submitted. Students will be marked according to a rubric, on the development of their reflection and analysis, and integration of course readings. Additional information will be provided by your lecturer.

Final Exam

The final exam will be a closed book examination and students will be examined on selected content covered during the course. Structured short and long answer questions will be set to demonstrate understanding and application of theories, concepts and approaches to nutrition and HIV in South Africa. The exam questions will require students to apply theories, concepts and approaches learnt to practical situations and/or case studies, by drawing from their experiential learning. The exam will be 1.5 hours.

LEARNING OUTCOMES:

By the end of the course, students will be able to:

- Identify and explain HIV and HIV-associated complications
- Elaborate on how malnutrition and HIV forms a vicious cycle
- Discuss how HIV, its complications and treatments impact on nutrition during different life stages and conditions;
- Design nutritional guidelines for HIV infected individuals during different life stages and conditions
- Comment on current nutrition interventions available in South Africa

ATTENDANCE POLICY:

Attendance is mandatory for all IES Abroad classes, and programming elements including course-related trips, guest lectures, observational rotations, etc. Excused absences are permitted in the cases of documented illness, a family emergency or when class is held on a recognized religious holiday traditionally observed by a student. In this case, an IES Abroad Excused Absence Form and supporting documents must be submitted to the Academic Manager at least 24 hours before the class. For illness, the Excused Absence Form must be submitted to the Academic Manager within 24 hours after class with the doctor's note. In the event of late arrival to class, the instructor will mark the student absent if they are more than ten minutes late.

More than two unexcused absences will result in two percentage points (2%) being deducted from the final grade for every additional unexcused absence thereafter. Any exams, tests, presentations, or other work missed due to student absences can only be rescheduled in cases of documented medical emergencies or family emergencies. If a test is missed during an unexcused absence, it cannot be made up. It is the student's responsibility to contact the lecturer and request information on the missed class as well as any relevant reading or homework information.

CONTENT:

Week	Content	Assignments
Week 1	Session 1: Introduction and key terms	World Health Organization, 2016. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. World Health Organization, pp.iii-xv.
Week 1	Session 2: Nutritional status of adults and children in SA	- Mchiza, Z., Steyn, N., Hill, J., Kruger, A., Schönfeldt, H., Nel, J. and Wentzel-Viljoen, E., 2015. A review of dietary surveys in the adult South African population from 2000 to 2015. <i>Nutrients</i>, 7(9), pp.8227-8250. - Symington, E.A., Gericke, G.J., Nel, J.H. and Labadarios, D., 2016. The relationship between stunting and overweight among children from South Africa: Secondary analysis of the National Food Consumption Survey–Fortification Baseline I. <i>South African Medical Journal</i>, 106(1), pp.65-69. - Monyeki, M., Awotidebe, A., Strydom, G., de Ridder, J., Mamabolo, R. and Kemper, H., 2015. The challenges of underweight and overweight in South African children: are we winning or losing the battle? A systematic review. <i>International journal of environmental research and public health</i>, 12(2), pp.1156-1173. - Faber, M. and Wenhold, F., 2007. Nutrition in contemporary South Africa. <i>Water Sa</i>, 33(3), pp.1- 8.
Week 1	Session 3: HIV/AIDS denialism and prevalence	- Kalichman, S.C., Eaton, L. and Cherry, C., 2010. “There is no proof that HIV causes AIDS”: AIDS denialism beliefs among people living with HIV/AIDS. <i>Journal of behavioral medicine</i>, 33(6), pp.432- 440 - Shisana, O., Rehle, T., Simbayi, L.C., Zuma, K., Jooste, S., Zungu, N., Labadarios, D. and Onoya, D., 2014. South African national HIV prevalence, incidence and behaviour survey, 2012, pp.xxii-xlii, 107-120, 124-132. - Maartens, G., Celum, C. and Lewin, S.R., 2014. HIV infection: epidemiology, pathogenesis, treatment, and prevention. <i>The Lancet</i>, 384(9939), pp.258-271.

Week	Content	Assignments
Week 1	Session 4: HIV pathophysiology and progression	Vidya Vijayan, K.K., Karthigeyan, K.P., Tripathi, S.P. and Hanna, L.E., 2017. Pathophysiology of CD4+ T-cell depletion in HIV-1 and HIV-2 infections. <i>Frontiers in immunology</i>, 8, pp 1-8.
Week 2	Session 5: HIV associated opportunistic infections and complications part I	- Chu, C. and Selwyn, P.A., 2011. Complications of HIV infection: a systems-based approach. <i>Am Fam Physician</i>, 83(4), pp.395-406. - Huang, L. and Crothers, K., 2009. HIV-associated opportunistic pneumonias. <i>Respirology</i>, 14(4), pp.474-485. - Gona, P., Van Dyke, R.B., Williams, P.L., Dankner, W.M., Chernoff, M.C., Nachman, S.A. and Seage, G.R., 2006. Incidence of opportunistic and other infections in HIV-infected children in the HAART era. <i>Jama</i>, 296(3), pp.292-300.
Week 2	Session 6: Course Related Trip 1	
Week 2	Session 7: HIV associated opportunistic infections and complications part II	- Gonçalves, P.H., Uldrick, T.S. and Yarchoan, R., 2017. HIV-associated Kaposi sarcoma and related diseases. <i>AIDS (London, England)</i>, 31(14), pp.1-29 - Gougeon, M.L., Pénicaud, L., Fromenty, B., Leclercq, P., Viard, J.P. and Capeau, J., 2004. HIV-associated lipodystrophy syndrome. <i>Antiviral therapy</i>, 9, pp.161-177.

Week	Content	Assignments
Week 2	Session 8: HIV and malnutrition	- Muenchhoff, M., Healy, M., Singh, R., Roider, J., Groll, A., Kindra, C., Sibaya, T., Moonsamy, A., McGregor, C., Phan, M.Q. and Palma, A., 2018. Malnutrition in HIV-infected children is an indicator of severe disease with an impaired response to antiretroviral therapy. <i>AIDS research and human retroviruses</i>, 34(1), pp.46-55. - Duggal, S., Chugh, T.D. and Duggal, A.K., 2012. HIV and malnutrition: effects on immune system. <i>Clinical and developmental immunology</i>, 2012, pp.1-6. - Koethe, J.R., Heimburger, D.C., PrayGod, G. and Filteau, S., 2016. From wasting to obesity: the contribution of nutritional status to immune activation in HIV infection. <i>The Journal of infectious diseases</i>, 214 (suppl_2), pp.S75-S82. - Adler, H., Archary, M., Mahabeer, P., LaRussa, P. and Bobat, R.A., 2017. Tuberculosis in HIV-infected South African children with complicated severe acute malnutrition. <i>The International Journal of Tuberculosis and Lung Disease</i>, 21(4), pp.438-445.
Week 3	Session 9: Mid-term Test and preparation for Observational Rotations Course-related Trip: Diva Nutritional Products	
Week 3	Session 10: Observational Rotations Guest Lecturer	
Week 3	Session 11: Observational Rotations Guest Lecturer	
Week 3	Session 12: Observational Rotations	

Week	Content	Assignments
Week 3	Session 13: Medical treatment: HIV treatments available and negative effects of treatment with nutritional implications	- Castleman, T., Seumo-Fosso, E., Cogill, B., 2004. Food and Nutrition Implications of Antiretroviral Therapy in Resource Limited Settings, pp.1-21. - World Health Organization, 2016. Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach. World Health Organization, pp.51-149. Deliverables Course Related Trip Report 1 due on Moodle the day before Session 14.
Week 4	Session 14: Nutritional assessment	- Road to Health Booklet. 2017, pp.1-48. - Du Plessis, L.M., Koornhof, H.E., Marais, M.L. and Blaauw, R., 2017. Implementation of the Road-to-Health-Booklet health promotion messages at primary health care facilities, Western Cape Province, South Africa. <i>South African Journal of Child Health</i>, 11(4), pp.164-169.
Week 4	Session 15: Course Related Trip 2	
Week 4	Session 16: Nutritional treatment: Medical Nutrition Therapy – macro- and micro-nutrient requirements of HIV infected individuals	- Dong, K.R. and Imai, C.M., 2012. Medical nutrition therapy for HIV and AIDS. <i>Krause's food, nutrition & diet therapy. 13th ed. Philadelphia, PA: WB Saunders Company</i>, pp.864-883. - World Health Organization, 2003. Nutrient requirements for people living with HIV/AIDS, pp.iii-13.
Week 4	Session 17: HIV and nutrition in pregnancy and lactation and infancy	World Health Organization, 2016. Guideline: updates on HIV and infant feeding: the duration of breastfeeding, and support from health services to improve feeding practices among mothers living with HIV, pp.4-66.
Week 5	Session 18: HIV and nutrition in adolescence and the elderly AND preparation for Observational Rotations	Wing, E.J., 2016. HIV and aging. <i>International journal of infectious diseases</i>, 53, pp.61-68.
Week 5	Session 19: Observational Rotations <u>Site Visit</u> : Groote Schuur Heart Museum	

Week	Content	Assignments
Week 5	Session 20: Observational Rotations Guest Lecture	
Week 5	Session 21: Observational Rotations	
Week 5	Session 22: The issue of food insecurity in South Africa and debrief observational rotations	- Ncube, K., Shackleton, C.M., Swallow, B.M. and Dassanayake, W., 2016. Impacts of HIV/AIDS on food consumption and wild food use in rural South Africa. <i>Food Security</i>, 8(6), pp.1135-1151. - Fielding-Miller, R., Dunkle, K.L. and Murdock, D., 2015. Not everyone can afford an apple a day: stigma and food insecurity in rural South African young adults. <i>African Journal of AIDS Research</i>, 14(4), pp.361-369. - Shiau, S., Webber, A., Strehlau, R., Patel, F., Coovadia, A., Kozakowski, S., Brodli, S., Yin, M.T., Kuhn, L. and Arpadi, S.M., 2017. Dietary Inadequacies in HIV-infected and Uninfected School-aged Children in Johannesburg, South Africa. <i>Journal of pediatric gastroenterology and nutrition</i>, 65(3), pp.1-14. Deliverables Course Related Trip Report 2 due on Moodle the day before Session 23.
Week 6	Session 23: Healthy eating guidelines and food safety for HIV infected individuals – South African Food Based Dietary Guidelines (SAFBDGs)	- Department of Health., 2007. National Guidelines on Nutrition for people living with HIV, AIDS, TB and other Chronic Debilitating Conditions, pp.4-71. - Vorster, H.H., Badham, J.B. and Venter, C.S., 2013. An introduction to the revised food-based dietary guidelines for South Africa. <i>South African Journal of Clinical Nutrition</i>, 26(3), pp.S5-S12. - Hendricks, M.K., Eley, B. and Bourne, L.T., 2007. Nutrition and HIV/AIDS in infants and children in South Africa: implications for food-based dietary guidelines. <i>Maternal & child nutrition</i>, 3(4), pp.322-333.

Week	Content	Assignments
Week 6	Session 24: Nutrition and other interventions available to HIV infected individuals	• Labadarios, D., Steyn, N.P., Mgijima, C. and Daldla, N., 2005. Review of the South African nutrition policy 1994–2002 and targets for 2007: achievements and challenges. <i>Nutrition</i>, 21(1), pp.100-108. • van Deventer, C., Robert, G. and Wright, A., 2016. Improving childhood nutrition and wellness in South Africa: involving mothers/caregivers of malnourished or HIV positive children and health care workers as co-designers to enhance a local quality improvement intervention. <i>BMC health services research</i>, 16(1), pp.1-12.
Week 6	Session 25: Supplementation available for HIV infected individuals and final evaluation	• Audain, K.A., Zotor, F.B., Amuna, P. and Ellahi, B., 2015. Food supplementation among HIV-infected adults in Sub-Saharan Africa: impact on treatment adherence and weight gain. <i>Proceedings of the Nutrition Society</i>, 74(4), pp.517-525. • McHenry, M.S., Dixit, A. and Vreeman, R.C., 2015. A systematic review of nutritional supplementation in HIV-infected children in resource-limited settings. <i>Journal of the International Association of Providers of AIDS Care (JIAPAC)</i>, 14(4), pp.313-323. • Hansen, T.T., Herselman, M., Du Plessis, L., Daniels, L., Bezuidenhout, T., Van Niekerk, C., Truter, L. and Iversen, P.O., 2015. Evaluation of selected aspects of the Nutrition Therapeutic Programme offered to HIV-positive women of child-bearing age in Western Cape Province, South Africa. <i>Southern African journal of HIV medicine</i>, 16(1), pp.1-5. • Rehman, A.M., Woodd, S., PrayGod, G., Chisenga, M., Siame, J., Koethe, J.R., Heimbürger, D.C., Kelly, P., Friis, H. and Filteau, S., 2015. Effects on anthropometry and appetite of vitamins and minerals given in lipid nutritional supplements for malnourished HIV-infected adults referred for antiretroviral therapy: results from the NUSTART randomized controlled trial. <i>Journal of acquired immune deficiency syndromes (1999)</i>, 68(4), pp.1-8.

Week	Content	Assignments
Week 6	Session 26: Final exam	

COURSE-RELATED TRIPS:

- Course related trip 1: Etafeni: The Etafeni Day Care Centre Trust in Nyanga, operates a multi-purpose day care centre and range of outreach services, providing education and wellbeing services to support families and children affected by HIV. The objective of this course related trip is to expose students to an organisation working with vulnerable populations, such as children, who are affected by HIV, in Cape Town.
- Course related trip 2: Masiphumele rural area and clinic: Masiphumelele is a township in Cape Town located in Kommetjie Road between Kommetjie and Noordhoek. Masiphumelele has a school and a day clinic to where HIV positive residents go, amongst others, to receive treatment. The objective of this course related trip is to see first hand what several HIV infected individuals in South Africa's daily lives look like, how some of these residents live, what they eat and how they prepare food in order to visualize HIV in the South African context and the challenges that are faced.

REQUIRED READINGS:

- Adler, H., Archary, M., Mahabeer, P., LaRussa, P. and Bobat, R.A., 2017. Tuberculosis in HIV-infected South African children with complicated severe acute malnutrition. *The International Journal of Tuberculosis and Lung Disease*, 21(4), pp.438-445.
- Audain, K.A., Zotor, F.B., Amuna, P. and Ellahi, B., 2015. Food supplementation among HIV-infected adults in Sub-Saharan Africa: impact on treatment adherence and weight gain. *Proceedings of the Nutrition Society*, 74(4), pp.517-525.
- Castleman, T., Seumo-Fosso, E., Cogill, B., 2004. Food and Nutrition Implications of Antiretroviral Therapy in Resource Limited Settings, pp.1-21.
- Chu, C. and Selwyn, P.A., 2011. Complications of HIV infection: a systems-based approach. *Am Fam Physician*, 83(4), pp.395-406.
- Department of Health., 2007. National Guidelines on Nutrition for people living with HIV, AIDS, TB and other Chronic Debilitating Conditions, pp.4-71.
- Dong, K.R. and Imai, C.M., 2012. Medical nutrition therapy for HIV and AIDS. *Krause's food, nutrition & diet therapy. 13th ed. Philadelphia, PA: WB Saunders Company*, pp.864-883.
- Du Plessis, L.M., Koornhof, H.E., Marais, M.L. and Blaauw, R., 2017. Implementation of the Road-to-Health-Booklet health promotion messages at primary health care facilities, Western Cape Province, South Africa. *South African Journal of Child Health*, 11(4), pp.164-169.
- Duggal, S., Chugh, T.D. and Duggal, A.K., 2012. HIV and malnutrition: effects on immune system. *Clinical and developmental immunology*, 2012, pp.1-6.
- Faber, M. and Wenhold, F., 2007. Nutrition in contemporary South Africa. *Water Sa*, 33(3), pp.1- 8.
- Fielding-Miller, R., Dunkle, K.L. and Murdock, D., 2015. Not everyone can afford an apple a day: stigma and food insecurity in rural South African young adults. *African Journal of AIDS Research*, 14(4), pp.361-369.
- Gona, P., Van Dyke, R.B., Williams, P.L., Dankner, W.M., Chernoff, M.C., Nachman, S.A. and Seage, G.R., 2006. Incidence of opportunistic and other infections in HIV-infected children in the HAART era. *Jama*, 296(3), pp.292-300.
- Gonçalves, P.H., Uldrick, T.S. and Yarchoan, R., 2017. HIV-associated Kaposi sarcoma and related diseases. *AIDS (London, England)*, 31(14), pp.1-29
- Gougeon, M.L., Pénicaut, L., Fromenty, B., Leclercq, P., Viard, J.P. and Capeau, J., 2004. HIV-associated lipodystrophy syndrome. *Antiviral therapy*, 9, pp.161-177.
- Hansen, T.T., Herselman, M., Du Plessis, L., Daniels, L., Bezuidenhout, T., Van Niekerk, C., Truter, L. and Iversen, P.O., 2015. Evaluation of selected aspects of the Nutrition Therapeutic Programme offered to HIV-positive women of child-bearing age in Western Cape Province, South Africa. *Southern African journal of HIV medicine*, 16(1), pp.1-5.
- Hendricks, M.K., Eley, B. and Bourne, L.T., 2007. Nutrition and HIV/AIDS in infants and children in South Africa: implications for food-based dietary guidelines. *Maternal & child nutrition*, 3(4), pp.322-333.
- Huang, L. and Crothers, K., 2009. HIV-associated opportunistic pneumonias. *Respirology*, 14(4), pp.474-485.

- Kalichman, S.C., Eaton, L. and Cherry, C., 2010. "There is no proof that HIV causes AIDS": AIDS denialism beliefs among people living with HIV/AIDS. *Journal of behavioral medicine*, 33(6), pp.432-440.
- Koethe, J.R., Heimbürger, D.C., PrayGod, G. and Filteau, S., 2016. From wasting to obesity: the contribution of nutritional status to immune activation in HIV infection. *The Journal of infectious diseases*, 214(suppl_2), pp.S75-S82.
- Labadarios, D., Steyn, N.P., Mgiijima, C. and Daldla, N., 2005. Review of the South African nutrition policy 1994–2002 and targets for 2007: achievements and challenges. *Nutrition*, 21(1), pp.100-108.
- Maartens, G., Celum, C. and Lewin, S.R., 2014. HIV infection: epidemiology, pathogenesis, treatment, and prevention. *The Lancet*, 384(9939), pp.258-271.
- McHenry, M.S., Dixit, A. and Vreeman, R.C., 2015. A systematic review of nutritional supplementation in HIV-infected children in resource-limited settings. *Journal of the International Association of Providers of AIDS Care (JIAPAC)*, 14(4), pp.313-323.
- Mchiza, Z., Steyn, N., Hill, J., Kruger, A., Schönfeldt, H., Nel, J. and Wentzel-Viljoen, E., 2015. A review of dietary surveys in the adult South African population from 2000 to 2015. *Nutrients*, 7(9), pp.8227-8250.
- Monyeki, M., Awotidebe, A., Strydom, G., de Ridder, J., Mamabolo, R. and Kemper, H., 2015. The challenges of underweight and overweight in South African children: are we winning or losing the battle? A systematic review. *International journal of environmental research and public health*, 12(2), pp.1156-1173.
- Muenchhoff, M., Healy, M., Singh, R., Roider, J., Groll, A., Kindra, C., Sibaya, T., Moonsamy, A., McGregor, C., Phan, M.Q. and Palma, A., 2018. Malnutrition in HIV-infected children is an indicator of severe disease with an impaired response to antiretroviral therapy. *AIDS research and human retroviruses*, 34(1), pp.46-55.
- Ncube, K., Shackleton, C.M., Swallow, B.M. and Dassanayake, W., 2016. Impacts of HIV/AIDS on food consumption and wild food use in rural South Africa. *Food Security*, 8(6), pp.1135-1151.
- Rehman, A.M., Woodd, S., PrayGod, G., Chisenga, M., Siame, J., Koethe, J.R., Heimbürger, D.C., Kelly, P., Friis, H. and Filteau, S., 2015. Effects on anthropometry and appetite of vitamins and minerals given in lipid nutritional supplements for malnourished HIV-infected adults referred for antiretroviral therapy: results from the NUSTART randomized controlled trial. *Journal of acquired immune deficiency syndromes (1999)*, 68(4), pp.1-8.
- Road to Health Booklet. 2017, pp.1-48.
- Shiao, S., Webber, A., Strehlau, R., Patel, F., Coovadia, A., Kozakowski, S., Brodlie, S., Yin, M.T., Kuhn, L. and Arpadi, S.M., 2017. Dietary inadequacies in HIV-infected and Uninfected School-aged Children in Johannesburg, South Africa. *Journal of pediatric gastroenterology and nutrition*, 65(3), pp.1-14.
- Shisana, O., Rehle, T., Simbayi, L.C., Zuma, K., Jooste, S., Zungu, N., Labadarios, D. and Onoya, D., 2014. South African national HIV prevalence, incidence and behaviour survey, 2012, pp.xxii-xlii, 107-120, 124-132.
- Symington, E.A., Gericke, G.J., Nel, J.H. and Labadarios, D., 2016. The relationship between stunting and overweight among children from South Africa: Secondary analysis of the National Food Consumption Survey–Fortification Baseline I. *South African Medical Journal*, 106(1), pp.65-69.
- van Deventer, C., Robert, G. and Wright, A., 2016. Improving childhood nutrition and wellness in South Africa: involving mothers/caregivers of malnourished or HIV positive children and health care workers as co-designers to enhance a local quality improvement intervention. *BMC health services research*, 16(1), pp.1-12.
- Vidya Vijayan, K.K., Karthigeyan, K.P., Tripathi, S.P. and Hanna, L.E., 2017. Pathophysiology of CD4+ T-cell depletion in HIV-1 and HIV-2 infections. *Frontiers in immunology*, 8, pp 1-8.
- Vorster, H.H., Badham, J.B. and Venter, C.S., 2013. An introduction to the revised food-based dietary guidelines for South Africa. *South African Journal of Clinical Nutrition*, 26(3), pp.S5-S12.
- Wing, E.J., 2016. HIV and aging. *International journal of infectious diseases*, 53, pp.61-68.
- World Health Organization, 2003. Nutrient requirements for people living with HIV/AIDS, pp.iii-13.
- World Health Organization, 2016. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach*. World Health Organization, pp.iii-xv.
- World Health Organization, 2016. *Consolidated guidelines on the use of antiretroviral drugs for treating and preventing HIV infection: recommendations for a public health approach*. World Health Organization, pp.51-149.
- World Health Organization, 2016. Guideline: updates on HIV and infant feeding: the duration of breastfeeding, and support from health services to improve feeding practices among mothers living with HIV, pp.4-66.

RECOMMENDED READINGS:

- Bhardwaj, V. Frequently asked questions about HIV/AIDS in South Africa. *Africa Check*, 2016
- Child, K. Here's why SA is struggling to beat HIV. *Times Live*, 2017
- Mkize, V. Living with HIV in South Africa. *IOL*, 2017