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978-0-521-14793-4 - HIV/AIDS in South Africa, Second Edition
Edited by S. S. Abdool Karim and Q. Abdool Karim
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HIV / AIDS

in South Africa

Second Edition

THIS DEFINITIVE TEXT covers all aspects of HIV/AIDS in South Africa, from basic science to medicine, sociology, economics and politics. It has been written by a highly respected team of experts on HIV/AIDS in South Africa and provides a thoroughly researched account of the epidemic in the region.

The book comprises seven sections, the first of which describes the evolving epidemic, presents the numbers behind the epidemic, and captures its nature in one of the worst affected parts of the world. This is followed by a section on the science of the virus, covering its structure, and its diagnosis. HIV risk factors and prevention strategies, focal population groups and the impact of HIV/AIDS in all aspects of South African life are discussed in the next four sections. The final sections look at the treatment of HIV/AIDS, the politics of HIV/AIDS treatment, mathematical modelling to extrapolate the potential impact of treatment and finally a discussion of the future of HIV/AIDS in South Africa.

The text has been written at an accessible level for the general reader, undergraduate and postgraduate students, health care providers, researchers and policymakers in this field as well as international scholars studying HIV/AIDS in Africa.

"... taken altogether this wealth of information illuminates the path of this dark disease ... As you, the reader, page through this book, I hope and trust that you will hear the call to action."
Nelson Mandela

"South Africa possesses the capacity to both curb the epidemic and to minimise its impact – dedicated efforts by its government and civil society are already under way. A wealth of essential evidence is available in this book, making it a valuable contribution to the effort against AIDS in South Africa."

Peter Piot

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CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore,
São Paulo, Dubai, Tokyo

Cambridge University Press
The Water Club, Beach Road, Granger Bay, Cape Town 8001, South Africa

www.cambridge.org
Information on this title www.cambridge.org/9780521147934
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First edition published 2005
Second edition 2010

Editor: Dr Bridget Farham
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Proofreader: Pat Hanekom
Illustrators: James Whitelaw, Vanessa Wilson, Adele Wilson, Craig Farham
Designer: The Nimble Mouse
Cover designer: Karen Ahschläger
Typesetter: John Moss and Craig Farham (The Science Press)

Printed in South Africa by Academic Press

ISBN 978-0-521-14793-4

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This book is dedicated to
all those infected and affected by HIV
those who valiantly protect the rights and dignity of those
infected
those in the frontline of service provision for prevention and care,
and
those who persevere in finding new prevention and treatment
options to enhance our response to impact on this pandemic.

Special tribute to Zubaida Bibi Karim – mother, carer and
humanitarian.

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Contributors

Quarraisha Abdool Karim, PhD, is an infectious diseases epidemiologist whose main current research interests are in understanding the evolving HIV epidemic in South Africa, factors influencing acquisition of HIV infection in adolescent girls, and sustainable strategies to introduce antiretroviral therapy in resource-constrained settings. She is also an associate professor in epidemiology at the Mailman School of Public Health at Columbia University, an honorary associate professor in public health at the Nelson R Mandela School of Medicine at the University of KwaZulu-Natal, and associate scientific director at CAPRISA. In addition she directs the Columbia University–Southern African Fogarty AIDS International Training and Research Programme. She is an executive committee member of the HPTN (HIV Prevention Trials Network) Leadership Group and she also, until recently, chaired the HPTN Ethics Working Group. She is a director and board member of the International Partnership for Microbicides. She serves as a consultant to WHO, UNAIDS and UNDP on several HIV/AIDS related expert committees in relation to gender, ethics, vaccines, treatment and research capacity building. As scientific director of the South African Medical Research Council HIVNET site she garnered extensive experience in the conduct of HIV prevention trials. She also has extensive policy and programmatic experience that stems from her term as the first National Director of the South African National HIV/AIDS and STD Programme that was established shortly after the first democratic elections. She is co-PI of the Network leadership application for the HIV Prevention priority area.



Salim S Abdool Karim, MBChB, PhD, is a clinical infectious diseases epidemiologist whose main current research interests are in microbicides and vaccines to prevent HIV infection and implementing antiretroviral therapy in resource constrained settings. He is Pro Vice-Chancellor (Research) at the University of KwaZulu-Natal in Durban, South Africa. He is also Professor of Clinical Epidemiology at the Mailman School of Public Health at Columbia University and Adjunct Professor of Medicine at the Weill Medical College of Cornell University. He is Director of CAPRISA – Centre for the AIDS Programme of Research in South Africa. Dr Abdool Karim is Principal Investigator of clinical trials assessing the effectiveness of microbicides, HIV vaccines and strategies for integrating antiretroviral therapy into TB treatment services. He led the \$90 million NIH-funded HPTN 035 microbicide trial which recently revealed the potential of anionic



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polymer, PRO2000, in preventing HIV infection in women. He was involved in the development, as patent co-inventor, of clade C HIV vaccines and subsequently led the first HIV vaccine trial in South Africa. His clinical research on TB-HIV treatment has impacted on and continues to shape the clinical management of co-infected patients. He has published widely on infectious diseases, including AIDS, measles and hepatitis B and co-edited the textbook that is widely used to teach epidemiology in South Africa as well as a book on HIV/AIDS in South Africa. He is Chair of the Scientific and Technical Advisory Group for Reproductive Health at the World Health Organisation and a Member of the who Expert Advisory Panel on Sexually Transmitted Infections and HIV. He is a Steering Committee member of the Gate's Foundation's Global HIV Prevention Working Group and an Executive Committee Member of the NIH funded Microbicide Trials Network. He is a member of the Academy of Science in South Africa and a Fellow of the Royal Society of South Africa.



Cheryl Baxter, MSc, is a Research Associate for the Centre for the AIDS Programme of Research in South Africa (CAPRISA). She obtained her MSc in entomology in 2000 from the University of KwaZulu-Natal and moved into the HIV/AIDS research field in 2003. She contributes to the scientific output of CAPRISA through writing research grants, protocols, publications, research reports, and prepares scientific presentations for conferences and workshops. She is also responsible for the production of the monthly newsletter for the organisation, which is distributed to several hundred people. Her current research interests include prevention of HIV infection, particularly women-controlled methods. She is part of a team of researchers at CAPRISA conducting a sub-study on patients enrolled in the CAPRISA AIDS Treatment Programme to establish HIV positive women's understanding, knowledge, and practices regarding method choice for fertility control and/or disease prevention. Her PhD focuses on the impact of 1% tenofovir gel, a candidate microbicide for the prevention of HIV infection, on hepatitis B virus (HBV) infection replication and development of drug resistance.



Debbie Bradshaw, MSc, DPhil (Oxon), is an established researcher in the area of South African mortality and epidemiology and heads the Medical Research Council Burden of Disease Research Unit. She trained as a biostatistician and developed expertise in epidemiology and demography during her career. Her main research interests are mortality profiles and health transition. She was part of the team that developed methods to assess the impact of AIDS on adult mortality. She has authored/co-authored peer-reviewed articles and presented papers nationally and internationally. She serves on several advisory committees in the health and health research arena.

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Gavin J Churchyard, MBBCh (WITS), M MED (Internal Medicine), FCP (SA), PhD (WITS), is a specialist physician internationally renowned for his contributions in tuberculosis (TB). He is director of Aurum Institute for Health Research, an independent industry based health research unit, research associate at the University of Cape Town, honorary lecturer at the London School of Hygiene and Tropical medicine and Honorary Associate Professor, Department of Medicine, School of Clinical Sciences in the Faculty of Health Sciences, University of KwaZulu-Natal, Durban. Professor Churchyard is the principal investigator on a number of industry-based studies focusing on TB, HIV and occupational lung disease, the largest of which involves a cohort of 24 000 participants. He is a member of the executive committee of the Gates Foundation-funded Collaborative Programme of Research into New Paradigms for Reducing HIV-Related Tuberculosis in High-Burden Countries and principal investigator of one of the studies: *A comparison between mass and targeted treatment of latent infection as a strategy to improve control of tuberculosis among South African gold miners*. Professor Churchyard serves on the executive committee of the NIH-funded Centre for the AIDS Programme of Research In South Africa (CAPRISA) and the South African AIDS Vaccine Initiative steering committee. He is a founding member of the South African Tuberculosis Trials Consortium whose objective is to establish an extensive infrastructure to support TB clinical trials of relevance to South Africa. Dr Churchyard has consulted for the World Health Organisation and UNAIDS with respect to TB and cotrimoxazole preventive therapy for HIV infected individuals. He has contributed to industry, national and international guidelines for TB preventive therapy. He has served as a reviewer for the *International Journal of Tuberculosis and Lung Disease* and the *International Journal of Infectious Diseases*. He has published widely in the fields of TB, HIV and occupational lung disease.



Tonie Cilliers, PhD, is a Virologist and graduated from the University of the Witwatersrand. He has worked on HIV-1 coreceptors and has isolated and characterised over 200 HIV-1 subtype C viruses. His main project was to determine the sensitivity of HIV-1 subtype C isolates to entry inhibitors that target different stages of the viral entry process. In November 2000, he received a Fogarty International AIDS Fellowship to visit Dr John Moore's laboratory where he acquired the skills to perform entry inhibitor studies. As follow-up he received training in Dr Alexandra Trkola's laboratory sponsored by a WHO African AIDS Vaccine Program training fellowship. He has numerous publications in peer-reviewed journals. A large portion of his work has been presented at international conferences. He received a grant from Bristol Meyers Squibb 'Secure the Future' to perform pre-clinical



studies on the effectiveness of a new class of antiretroviral drugs targeting the coreceptors or binding regions of HIV-1 subtype C viruses. He is currently the managing member of Troy Molecular Technologies a start-up company in the biotechnology sector.



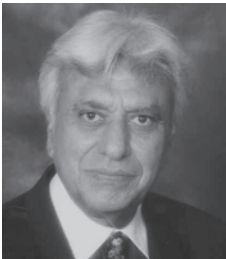
David Coetzee, BA, MB BCH, FFCH, is a clinical infectious diseases epidemiologist whose main research interests are in the prevention and management of HIV infection including the implementation of antiretroviral therapy in resource constrained settings. He is a Senior Specialist and Head of the Infectious Disease and HIV/AIDS Epidemiology Unit at the School of Public Health and Family Medicine at the University of Cape Town. This Unit has worked with Médecins Sans Frontières to develop the HIV services in Khayelitsha where antiretrovirals are provided. Dr Coetzee headed the Sub-Directorate of Sexually Transmitted Infections at the National Department of Health in Pretoria for a number of years and has served as a consultant for the World Health Organisation. He has written articles on the epidemiology of STIs, TB and HIV/AIDS. He is the principal investigator for the Sequella TB vaccine site in Gugulethu, Cape Town and performs clinical work and conducts research in TB, STI and HIV services.



Mark Colvin, BSc, MBChB, DOH, MS, is a senior specialist scientist at CADRE (Centre for AIDS Development, Research and Evaluation) and an honorary lecturer in the School of Public Health, Nelson R Mandela school of Medicine, University of KwaZulu-Natal, Durban. He is a medical doctor and infectious diseases epidemiologist. Dr Colvin's research interests centre around the epidemiology of STIs and HIV in Southern Africa with a focus on surveillance studies, including the design of the South African national antenatal survey protocol. He has conducted HIV surveillance and behavioural studies on the general population, in prisons, health services and in numerous workplaces. Other related research activities include conducting STI intervention trials, research into preventing mother-to-child transmission of HIV and investigating how traditional healers may be incorporated into community-based TB DOTS programmes. Currently Dr Colvin has active collaborations with several other national research organisations including the Health Systems Trust and the Human Sciences Research Council and he has been a principal investigator or collaborator on grants received from the NIH, Wellcome Trust, the World Health Organisation and the World Bank.

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Hoosen Coovadia, MBBS, MD, is a paediatrician and expert in perinatal HIV transmission. Dr Coovadia was the Head of the Department of Pediatrics at the University of Natal until 2000, and is now the Victor Daitz Professor for HIV/AIDS research at the University of KwaZulu-Natal. He has made substantial contributions in pediatric diseases, including the definitive work on nephrosis in black South African children, malnutrition and immunity, measles, particularly the effect of Vitamin A supplementation on children with measles and other infections. He is internationally recognized for his groundbreaking research in HIV/AIDS transmission from mother to child, especially through breastfeeding and is the Protocol Chair for HIVNET 023 and HPTN 046. He is particularly committed to developing research capacity, having supervised over 40 postgraduate students and taught in the medical, nursing and allied health professions for more than 20 years. He is also a Fellow of the University of Natal and was awarded the Star of South Africa by President Nelson Mandela for his contribution to democracy in South Africa. In 1999, he was awarded the Silver Medal by the Medical Research Council for his achievements in medical research.



Elizabeth Corbett, MB BCH, PhD, is a clinical epidemiologist and a Senior Lecturer in the Clinical Research Unit, London School of Hygiene and Tropical Medicine. She has extensive research experience in the field of HIV and TB in Africa, and has been a close collaborator of Dr Churchyard since 1996. She has published widely on micobacterial diseases and is a regular reviewer for journals, including *The Lancet* and *International Journal of Tuberculosis and Lung Disease*. She is a member of the TB Expert Committee that advises the Ministry of Health and Child Welfare, Zimbabwe. She has collaborated with Stop TB Department of the World Health Organisation in estimating the burden of HIV-associated TB and direction of trends. Dr Corbett is engaged in full-time epidemiological research, based in the Biomedical Research and Training Institute, Harare, Zimbabwe. Her ongoing research projects are centred on TB epidemiology and control in high HIV prevalence areas.



Dr. Debra de Assis Rosa, PhD, completed her PhD in human population genetics in 2004. She has applied her interest in human genetic variation to HIV research while working at the NICD AIDS Unit in Johannesburg since 2003. Her particular interest lies in characterising variation in the HLA and KIR genes in the South African population, and understanding how these host genes interact with the immune system to influence HIV disease infection and progression.



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Lara Fairall, MBChB, PhD, is head of the Knowledge Translation Unit of the University of Cape Town Lung Institute. She developed an interest in implementation research during her community service in Cape Town's busy primary care clinics in 1999, and left clinical medicine in 2002 to pursue a doctorate in health systems research. Entitled *The costs and effects of the Practical Approach to Lung Health in South Africa (PALSA)*, it evaluates the effectiveness, and cost-effectiveness of a guideline-based training programme for primary care nurses on the costs and outcomes of respiratory care. PALSA has since been expanded to cover the management of HIV/AIDS in response to the national roll-out of antiretroviral treatment services, and has been widely implemented in the Free State and Western Cape provinces. Dr Fairall's research interests are the implementation of clinical practice guidelines in primary care and prospective multi-method evaluation of complex health interventions using pragmatic randomised controlled trials.



Janet Fröhlich, DCur, is the Project Director for the Vulindlela site and Head of the Community Research Core at CAPRISA. She is an honorary lecturer in the Department of Community Health, Nelson R Mandela School of Medicine, University of KwaZulu-Natal, Durban. Dr Fröhlich has extensive local and international experience in community engagement for HIV/AIDS research and is recognised both internationally and nationally for her expertise in community participation strategies and has been an invited speaker at a number

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of national and international meetings on community participation, mobilisation and education in HIV and AIDS research. As part of her doctoral thesis she developed ‘A model for the management of community participation in clinical health research’. She has served as a member of the Independent Study Group, Honorary Consultant to the National Department of Health in palliative care and community-based care, Technical Advisor to UNAIDS on community mobilisation in South Africa, Executive Member of the National AIDS Convention of South Africa (NACOSA) and Gauteng Provincial Coordinator. In 1997 she coordinated the first South African National STD/ HIV/AIDS Review. During the period 1998 to 2002 she served as Project Director of the MRC HIV Vaccine Preparedness Study and Site Manager of the MRC community-based research site in Hlabisa, KwaZulu-Natal, South Africa. She was awarded a Fogarty post-doctoral fellowship in 2002. She is the Project Director for the Vulindlela HIV Sero-incidence and Prevention Preparedness Study, a co-investigator of a community based intervention ‘Community Based Voluntary Counselling and Testing (RCT)’ funded by the National Institutes of Health, the International Co-Chair for the HPTN Community Working Group, consultant to Family Health International for community preparation and education for HIV prevention trials, and a member of the Daidis Cross CAB Working Group.

Eleanor Gouws, MSc, MPH, PhD, has, since 2004, been employed as adviser in statistics, modelling and estimations in the Epidemiology and Analysis Division of the Joint United Nations Programme on HIV/ AIDS in Geneva, where she is part of the team that produces estimates of HIV infection and impact globally, as well as in different countries and regions across the world. Between 1990 and 2001 she worked as biostatistical consultant and scientist at the Medical Research Council in Durban, South Africa, and between 2001 and 2004 she worked on the Multi-Country Evaluation of the Integrated Management of Childhood Illness strategy for the World Health Organisation. She has several years of experience in biostatistical analysis and researching HIV epidemiology. Areas of particular interest include the dynamics of HIV infection and estimating the impact of the HIV epidemic. She has published widely in the medical research field in a range of diseases, including malaria, child health and HIV.



Andrew Gray, MSc (Pharm), is a pharmacist whose research interests include the development of quality management tools for pharmaceutical services at district level, the implementation of District Health Systems, policy analysis (particularly the processes of development and implementation of Drug Policies), rational medicines use (particularly in the elderly and in relation to antimicrobial use) and the application of antiretroviral therapy in



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resource-constrained settings. He is a Senior Lecturer in the Department of Experimental and Clinical Pharmacology, Nelson R Mandela School of Medicine, University of KwaZulu-Natal, Durban, South Africa. He is a consultant pharmacist for the Centre for the AIDS Programme of Research in South Africa (CAPRISA). Mr Gray is a Fellow of the Pharmaceutical Society of South Africa, a past president of the South African Association of Hospital and Institutional Pharmacists and is currently Vice-President (Africa) of the International Pharmacy Federation (FIP). He has been appointed to the Scheduling Committee of the South African Medicines Control Council.



Clive Gray, PhD (Immunologist: Head, CTL laboratory, National Institute for Virology), is co-chair of HIVNET 028 – a five country study on immune responses in acute HIV infection. Dr Gray received training as a biologist and later specialised in immunology. His initial research was in transplantation immunology and understanding allo-recognition and innate immunity. He moved into HIV/AIDS research, seeing this as a priority in the South African context. He was awarded the James Gear Fellowship in 1995, which allowed him to work at the Center for AIDS Research at Stanford University as a post-doctoral fellow. From 1996 to 1998 he was involved in investigating specific cellular immunity to HIV in individuals receiving antiretroviral drug therapy. He was responsible for co-ordinating an HIV vaccine workshop in Cape Town in early 1997 with the aim of initiating HIV vaccine research in South Africa. Since this time, he has been actively involved in the scientific agenda of vaccine development in South Africa and directs much of his energies to accomplishing this task. At present, he directs a laboratory within the AIDS Unit at the National Institute for Virology specifically addressing cellular immunity in southern African HIV-1 infected individuals.



Abigail Harrison, PhD, is a social scientist who focuses on the interdisciplinary application of medical anthropology, demography and epidemiology in public health. Her current research focuses on adolescents and the transition to adulthood in the context of HIV/AIDS in southern Africa. In collaboration with South African colleagues, she serves as co-investigator on a study of education, schooling patterns and HIV prevention in secondary schools, as well as a research project 'Structurally Linking HIV/AIDS and Family Planning Services', in collaboration with the Reproductive Health Research Unit with funding from the Hewlett Foundation. Dr. Harrison's research also focuses on analysis of ethnographic data from her long-term project on 'Adolescents through the Lifecourse in Rural South Africa', and on the interrelationships between non-marital unions, fertility and HIV risks among young adult women in South Africa. Recently, she has extended this work to Lesotho, in collaboration with

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Professor Susan Short and with support from NICHD. She received her PhD (2004) in Epidemiology and Population Health from the Centre for Population Studies, London School of Hygiene and Tropical Medicine, University of London. Dr Harrison also holds both an MPH (International Health) and an MA (International Development) from Johns Hopkins University. Dr Harrison is also an affiliate of the International Health Institute at Brown.

Anthon du P Heyns, MBChB, DTM&H, FCPATH, MD, DSc, is a haematologist whose main current interests are blood safety and estimating and minimising the risk of the impact of the HIV/AIDS pandemic on the safety of the blood supply. He retired in 2006 as chief executive officer of the South African National Blood Service (SANBS) and is now the Programme Director of the SANBS PEPFAR Safe Blood Programme. He is an Honorary Professor in the Department of Haematology and Molecular Medicine of the University of the Witwatersrand, and Extraordinary Professor in the Department of Haematology and Molecular Biology of the Medical Faculty at University of the Free State. He has published widely in the fields of haematology, blood platelets, blood transfusion and blood safety. He collaborates extensively with the World Health Organisation where he is an adviser on blood transfusion, a member of the Global Collaboration on Blood Safety. He is a member of the Global Development/International Activities Committee of the AABB and a member of the Working Party on Transfusion Transmitted Infectious Disease of the International Society of Blood Transfusion. He is on the Board of the National Bioproducts Institute, the chairman of the South African Bone Marrow Registry, chairman of the Africa Institute for Transfusion Medicine and President of the Africa Society for Blood Transfusion.



Mark Heywood, MA, is a senior researcher and head of the AIDS Law Project (ALP) at the Centre for Applied Legal Studies (CALS), University of the Witwatersrand. He is also National Treasurer of the Treatment Action Campaign (TAC). At the ALP he has been involved in successful public impact litigation around the rights of people living with HIV, including South Africa's first Constitutional Court judgment dealing with HIV (*Hoffmann v SAA*, where the ALP was *amicus curiae*); the *Pharmaceutical Manufacturers' Association v SA Government* case where the TAC was admitted as an *amicus curiae*; and the case brought by the TAC against the South African government on mother to child HIV transmission, which also led to a ground-breaking judgment in South Africa's Constitutional Court. He has undertaken consultancy work on AIDS, the law and human rights for organisations such as UNAIDS, the UNDP, the ILO and the Office of the High Commission on Human Rights (OHCHR). He assisted the drafting of the Southern



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African Development Community (SADC) Code on AIDS and Employment (1996) and WHO/UNAIDS Guidance on Disclosure, Partner Notification and AIDS Reporting (1999). He was involved in consultative processes that drew up the United Nations International Guidelines on HIV and Human Rights (1996) and the UNAIDS manual on HIV/AIDS and Human rights for Members of Parliament (1999). He is one of the editors of the *HIV/AIDS and the Law: Resource Manual* (first edition: 1997; second edition 2001; Third edition, 2003) and has published more than 100 articles on legal, ethical and human rights questions linked to HIV/AIDS.



Leigh Johnson, BBusSc, PGDipActSc, is a researcher at the Centre for Actuarial Research at the University of Cape Town. His research interests are in the modelling of HIV/AIDS and other sexually transmitted infections (STIs), and in the modelling of prevention and treatment strategies for these diseases. This includes the assessment of the demographic impact of HIV/AIDS in South Africa, the effect of antiretroviral treatment on demographic indicators, the potential effect of an HIV/AIDS vaccine, interactions between HIV and other STIs and the role of STI treatment in HIV prevention, as well as the monitoring of access to antiretroviral treatment in South Africa. He is a member of the AIDS Committee of the Actuarial Society of South Africa (ASSA), and he has been closely involved in the development of the ASSA AIDS models.



Seth Kalichman, PhD, is a Professor of Psychology at the University of Connecticut. His research interests focus on preventing the spread of HIV/AIDS and caring for those affected by the HIV epidemic. His work has been continuously and exclusively funded by the National Institutes of Health since 1992. He was previously on the faculties of Loyola University of Chicago, Georgia State University, and the Medical College of Wisconsin where he worked under the direction of Jeffrey A Kelly to help establish the Center for AIDS Intervention Research (CAIR). He is currently the director of the Southeast HIV and AIDS Research and Evaluation (SHARE) Project, a research programme within the AIDS Survival Project in Atlanta, Georgia. His research in South Africa is in collaboration with the Human Sciences Research Council. Professor Kalichman serves on NIH grant review panels, has over 200 peer-reviewed journal articles, and has authored and edited five books in the area of HIV/AIDS prevention and care services, including *Positive Prevention*, recently published by Springer. He is also the current editor of the bimonthly journal *AIDS and Behavior*. Professor Kalichman was the recipient of the 1997 Early Career Award in Health Psychology from the American Psychological Association and the 2005 Distinguished Scientist Award from the Society for Behavioral Medicine.

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Netty Malatsi qualified as a Medical Technologist but decided to pursue scientific research after completing her Masters degree with the University of Johannesburg. In 2004, she joined the HIV Immunology Group headed by Dr Clive Gray at the National Institute for Communicable Diseases, Johannesburg. She is currently a doctoral fellow with the University of the Witwatersrand and her project focuses on understanding T-cell immunity and cell signalling in HIV infection.



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Adrian Puren, MB BCh, PhD, is a medical specialist with particular interests in immunology and virology. He currently heads the Division of Virology at the National Institute for Communicable Diseases that serves as a national reference laboratory. The range of activities includes the use and evaluation of appropriate technologies in HIV-1 vaccine trials, recent infections and surveillance as well as expanded services for HIV-1 testing.



Gita Ramjee, PhD, is Chief Specialist Scientist whose main current research interests are in HIV prevention, particularly women-controlled methods. Dr Ramjee is Director of the HIV Prevention Research Unit, Durban. As a Chief Specialist Scientist, she is involved in numerous international research programmes and clinical trials in the field of HIV prevention. Dr Ramjee is the Director of the HIV Prevention Trials Unit (HPTU) in South Africa, which forms part of the global HIV Prevention Trials Network (HPTN). Her expertise in the clinical testing of vaginal microbicides has earned her international acclaim and brought the HIV Prevention Research Unit to the forefront in its field. Dr Ramjee has been Principal Investigator on several advanced phase trials of microbicides for HIV prevention. Dr Ramjee pioneered the South African Microbicide Research Initiative, which works in collaboration with microbicide and barrier method advocacy groups to accelerate the testing of microbicides and other HIV prevention technologies.



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Johanna Petronella Swanevelder, MSc (Quantitative Health Sciences), is the National Data Analyst for the South African National Blood Service. Ms Swanevelder has been responsible for the development of a model to manage the transfusion risk in blood services. This model forms the basis for the continuous evaluation of the risk profile of donors/donations enabling the targeting of safe blood procurement to ensure a safe blood supply is available to all South Africa patients. Prior to joining the South African National Blood Service in 1997, she

was employed by the Department of Health in the Epidemiology Directorate where she started and conducted the annual national surveys of antenatal clinic attenders from 1990 to 1996.

Marianne Visser, B Nutr, MPhil (Epidemiology), is a registered dietician who has a research interest in the epidemiology of micronutrient deficiencies in HIV-infection and tuberculosis. She is currently involved in a systematic review examining the role of micronutrient supplementation in HIV-infected children and adults. She is an honorary lecturer at the Nutrition and Dietetics Unit, School of Health and Rehabilitation Sciences at the University of Cape Town.



Alan Whiteside MA, D Econ, is a development economist who has been working on HIV/AIDS and health issues for the past 20 years. His main research interests are around health and development, how they interact, and the impact of HIV/AIDS and its consequences for societies and economies. He is a professor at the University of KwaZulu-Natal and is the Director of the Health Economics and HIV/AIDS Research Division at the University, which he established in 1998. He also holds associate posts with the Liverpool School of Tropical Medicine and the School of Development Studies at the University of East Anglia. He grew up in Swaziland where he was educated at Waterford Kamhlaba United World College and then went to the University of East Anglia. From there he went as an Overseas Development Institute Fellow in the Government of Botswana from 1980-1983. He joined the Economic Research Unit at the University of Natal. He has published widely in the field of development economics. His most recent books are *AIDS in the 21st Century: Disease and Globalisation* co-authored with Professor Tony Barnett (2002) and *AIDS the Challenge for South Africa* co-authored with Clem Sunter (2001). He is a member of the International AIDS Society Governing Council and is also a Commissioner for the Commission on Health and Governance in Africa. He is currently working on the issue of AIDS as a 'Darwinian event'.



Brian Williams, BSc (Hons), PhD (Cantab), studied physics at the universities of KwaZulu-Natal, South Africa and Cambridge, England. After working in Cambridge and Helsinki he taught physics at the University of Dar es Salaam in Tanzania. Returning to Cambridge he spent several years studying electron microscopy and from there went to Kenya where he worked on a community based tsetse and trypanosomiasis control programme. From Kenya he went to Oxford University where he helped to develop the use of remote sensing to determine risk maps for the distribution of tsetse and trypanosomiasis. His next appointment was at the London School of



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Hygiene and Tropical Medicine where he worked on mathematical modelling of a range of diseases including malaria, leishmaniasis and measles. In 1994 he returned to South Africa as Director of the Epidemiology Research Unit where he worked on diseases of mine workers focusing on tuberculosis, silicosis and HIV and in 1998 moved to the Council for Scientific and Industrial Research. During this time he set up and ran the Carletonville *Mothusimpilo* ('Working-together-for health') project, a community based intervention for the control of HIV in a mining community. In 2001 he moved to the World Health Organisation in Geneva where he works on tuberculosis and HIV/AIDS. His interests are in public health, especially TB and HIV, and in modelling disease processes and dynamics. He has published widely on a range of diseases including measles, trypanosomiasis, leishmaniasis, silicosis, malaria, tuberculosis and HIV.



Carolyn Williamson, PhD, directs the HIV Viral Diversity and Pathogenesis research programme at the Institute for Infectious Diseases and Molecular Medicine, University of Cape Town. She is an Associate Professor in the Division of Medical Virology, Institute for Infectious Diseases and Molecular Medicine, University of Cape Town Health Sciences Faculty; and an Executive Committee Member of the Centre for the AIDS Programme of Research in South Africa (CAPRISA). Within CAPRISA she is head of the Diversity Laboratory Core and is protocol co-chair of the Acute HIV Infection Study, which aims to understand HIV acute infection and pathogenesis as well as defining surrogate markers as vaccine endpoints in subtype C infection. Her group was central to the initial elucidation of HIV-1 diversity in South Africa and has been one of the lead research groups in the country investigating the role of diversity in vaccine development and HIV pathogenesis. She is the principal investigator for projects funded by the South African AIDS Vaccine Initiative and has designed and developed candidate vaccines for clinical trials. She participates in numerous multi-centre national and international studies, including Centre for HIV AIDS Vaccine Immunology (CHAVI) and Collaborative Programme for Vaccine Discovery (CAVD). She plays an active role in the WHO/UNAIDS, and her laboratory is part of the African AIDS Vaccine Programme (AAVP) Biomedical Research Collaborative Centre.



Douglas Wilson, MBChB, FCP (SA), is a specialist physician whose current research interests are in HIV medicine and infectious diseases. He is presently doing research in the use of antiretrovirals in patients with tuberculosis, and in the diagnosis of smear negative tuberculosis. Dr Wilson is a Lecturer in the Department of Medicine at the University of KwaZulu-Natal and Project Director for the Centre for the AIDS Programme of Research in South Africa (CAPRISA). His work at CAPRISA involves conducting a randomised control trial

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(Starting AntiRetroviral Therapy) to assess the effectiveness of an innovative strategy to provide antiretroviral therapy safely, effectively and with high levels of adherence through the TB directly observed therapy programme.

Robin Wood, FCP (SA), is the Director of The Desmond Tutu HIV Centre, Institute of Infectious Diseases and Molecular Medicine, University of Cape Town. He completed his undergraduate training at Oxford, London University, post-graduate training in internal medicine at the University of Cape Town, and infectious diseases training at Stanford Medical School, California, USA. Professor Wood is a Specialist in Infectious Diseases, Professor of Medicine and has been honoured as a Fellow of the University of Cape Town. He also holds a post as Visiting Scientist at Harvard Medical School, Boston, MA, USA and is the South African elected representative on the governing council of the International Aids Society. Since 1993 he has supervised the first dedicated HIV clinic in the Western Cape at Somerset Hospital (Cape Town, South Africa). Professor Wood’s major research interests are in the fields of infectious diseases and HIV/TB transmission. He has published widely in the areas of HIV management, tuberculosis interaction with HIV and new drug development.



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Foreword: Peter Piot

South Africa is a dynamic country that has faced – and transcended – extraordinary challenges. Now, 15 years into its new democracy, its future wellbeing – in terms of its prospects for prosperity, for human development, for sustaining that hard-won democracy – hinges on rolling back the AIDS epidemic.

HIV prevalence levels continue to climb in virtually every age group. National HIV prevalence among pregnant women was 28 per cent in 2007 – with a high of 37.4 per cent in KwaZulu-Natal.

Generations of young people are being decimated. Young women are in greatest peril: more than three quarters of young South Africans living with HIV are female.

The prolonged sickness and death of productive adults is a major blow to many key drivers of development, ranging from human capital to government finances and public services. Recent studies of South Africa have documented that poverty levels remain high and that economic growth is not reaching its true potential. In the long term, if left unchecked, AIDS can irreversibly damage the country's economy and social fabric.

South Africa possesses the capacity to both curb the epidemic and to minimise its impact – dedicated efforts by its government and civil society are already under way. The most successful efforts to tackle AIDS are based on evidence. A wealth of essential evidence is available in this book, making it a valuable contribution to the effort against AIDS in South Africa.

South Africa has demonstrated its ability to overcome adversity. It can – and must – defeat AIDS.

Peter Piot

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Foreword: Nelson R Mandela

There is no question that the AIDS epidemic has had a devastating impact on Africa, and particularly in South Africa. A tragedy of unprecedented proportions is unfolding. So far, the AIDS epidemic in Africa has created several million orphans. Today, the epidemic in Africa has claimed more lives than the sum total of all wars, famines and floods, and the ravages of such deadly diseases as malaria. It is devastating families and communities, overwhelming and depleting health care services; and robbing schools of both students and teachers. Business has suffered, and will continue to suffer, losses of personnel, productivity and profits; economic growth is being undermined and scarce development resources have to be diverted to deal with the consequences of the pandemic. Decades have been chopped from life expectancy and young child mortality is expected to more than double in the most severely affected countries of Africa. AIDS is clearly a disaster, effectively wiping out the development gains of the past decades and threatens the future.

South Africa has been especially hard hit. Every day in South Africa, its estimated that more than one thousand people are newly infected with HIV. In the face of the grave threat posed by HIV/AIDS, we have to rise above our differences and combine our efforts to save our people. History will judge us harshly if we fail to do so now, and right now.

Experience in a number of countries has taught us that HIV infection can be prevented through investing in information and life skills development for young people. Promoting abstinence, safe sex and the use of condoms and ensuring the early treatment of sexually transmitted diseases are some of the steps needed. Ensuring that people, especially the young, have access to voluntary and confidential HIV counselling and testing services and introducing measures to reduce mother-to-child transmission have been proven to be essential in the fight against AIDS. Just as we will not succeed until we appreciate the gender dimension of vulnerability to HIV, we will also not succeed until we have addressed the stigmatisation and discrimination associated with it and provide safe and supportive environments for people affected by HIV/AIDS. We need to break the silence, banish stigma and discrimination, and ensure inclusiveness within the struggle against AIDS; those who are infected with this terrible disease do not want stigma, they want love.

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We need bold initiatives to prevent new infections among young people, and large-scale actions to prevent mother-to-child transmission, and at the same time we need to continue the international effort of searching for an effective microbicide and vaccine; and we need to aggressively treat opportunistic infections; to work with families and communities to care for children and young people to protect them from violence and abuse, and to ensure that they grow up in a safe and supportive environment. For this there is need for us to be focused, to be strategic, and to mobilise all of our resources and alliances, and to sustain the effort until this war is won.

It is not as if all sectors of South Africa have not moved significantly on many of these areas; the government, private sector, non-governmental organisations, and civil society have made great strides in the struggle against AIDS but much more remains to be done. The challenge is to move from rhetoric to action, and action at an unprecedented intensity and scale. There is a need for us to focus on what we know works based on evidence.

For this we all need to be well informed and I am pleased to see such a large group of South Africa's leading AIDS researchers come together to produce this book on HIV/AIDS in South Africa. The comprehensive picture of the epidemic in our country provided by this book is a carefully woven tapestry of information on AIDS – while each thread of information is important, taken altogether, this wealth of information illuminates the path of this dark disease. Salim and Quarraisha Abdool Karim are congratulated for having created this book which is written predominantly for and by South Africans. The Abdool Karim's have taken their knowledge, commitment and dedication in the face of this epidemic and given it new meaning through this text. It comes at a time when the country's AIDS treatment roll-out is gathering momentum and the thirst for information is rapidly growing. As you, the reader, page through this book, I hope and trust that you will hear the call to action. It is imperative that we respond with all the energy and resources that we can bring to bear in the fight against AIDS.



Nelson Mandela

Acknowledgements

This book would not have been possible without the contributions of a wide number of people. The editors would like to acknowledge the efforts of each of the contributors in preparing this comprehensive account of the HIV/AIDS epidemic in southern Africa. In particular, the editors would like to point out that the book would not have been possible without the the dedication, time and effort put in by Cheryl Baxter, associate researcher for the Centre for the AIDS Programme of Research in South Africa (CAPRISA). David Newmarch provided invaluable assistance with the early drafts of the first edition of the book.

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