

**Triangulation of Data on the  
Malawi National Response to HIV/AIDS:**

**Impact on Prevention, Morbidity, and Mortality**

**6-8 June, 2007**

**Lilongwe, Malawi**

**Proceedings of the Meeting and Preliminary Findings**

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## ACRONYMS

ANC	Antenatal clinic
ART	Antiretroviral therapy
BED	lab assay used with testing history to estimate HIV incidence; part of STARHS (serological testing algorithm for recent HIV seroconversion)
BLM	Banja La Mtsogolo
BSS	Behavioural Surveillance Survey
CDC-GAP	United States Centers for Disease Control and Prevention Global AIDS Programme
DHS	Demographic and Health Survey, conducted every four years in Malawi by ORC- Macro
DIPS	District Implementation Plans
HCW	Healthcare Worker
HIV/AIDS	Human Immunodeficiency Virus / Acquired Immunodeficiency Syndrome
HMIS	Health Management Information System
HTC	HIV Testing and Counselling
LSE	Life Skills Education
MACRO	Malawi AIDS Counselling and Resource Organisation
MKAPH	Malawi Knowledge, Attitudes and Practices in Health survey
MDF	Malawi Defence Force
MDICP	Malawi Diffusion and Ideational Change Project
MICS	Multiple Indicator Cluster Survey
MSF	Médecins Sans Frontières (Doctors Without Borders)
NAC	Malawi National AIDS Coordinating Agency
NSO	National Statistics Office, Malawi

NVP	Nevirapine
PLWHA	People Living with HIV/AIDS
PMTCT	Prevention of mother-to-child transmission of HIV
PNG	Protecting the Next Generation: Understanding HIV Risk among Youth
PSI	Population Services International
QA	Quality Assurance
RCT	Randomized controlled trial
REACH	Research on Equity and Community Health
SES	Socioeconomic status
STI	Sexually Transmitted Infection
TB	Tuberculosis ( <i>Tubercle Bacillus</i> )
UCSF-IGH	University of California, San Francisco's Institute for Global Health
UNAIDS	The Joint United Nations Programme on HIV/AIDS
UNDP	United Nations Development Programme
UPenn	University of Pennsylvania
VCT	Voluntary counselling and testing
WHO	World Health Organization

## **EXECUTIVE SUMMARY**

From 6 to 8 June 2007, a workshop was held in Lilongwe to synthesize data on Malawi's national response to HIV/AIDS. The effort represents the culmination of the second cycle of the Malawi Triangulation Project, the first cycle completed in September 2006 which examined current trends in the HIV epidemic and the reach of HIV prevention programs. The over-arching goals of the current 2007 Malawi Triangulation Project cycle were: 1) to provide information to support Malawi's Global Fund 7 application for enhanced HIV prevention efforts and 2) to provide evidence of the impact of ART roll-out on morbidity and mortality in Malawi.

**Objectives:** The workshop reviewed multiple sources of existing data to answer the three specific questions:

- 1) What is the coverage and trend in prevention programs and behavior change, possible links in general and targeted populations?
- 2) What is the impact of HIV/AIDS facility based response on morbidity and mortality?
- 3) What are the trends in incidence of HIV?

Broadly speaking, these questions simplify to: What are Malawi's HIV prevention needs? Has ART rollout benefited Malawi? And, How should Malawi measure HIV incidence?

**Methods:** In keeping with the methods used for the 2006 Malawi Triangulation cycle, the overall approach to answering these questions is through Triangulation. "Triangulation" is the synthesis of data from multiple sources to strengthen our understanding of complex health issues and make evidence-based public health decisions. The workshop brought together stakeholders in Malawi's national response to HIV/AIDS to review existing data. Data were compiled from surveillance, research studies (quantitative and qualitative), and programmatic monitoring and evaluation, including re-examination of data used for the 2006 triangulation as well as new data identified since last year. Hypotheses were generated by examining the results of individual studies and corroborated by comparing findings across studies.

### **Results:**

**HIV Prevention.** In addition to the outcomes of the 2006 Malawi Triangulation cycle, seven new recommendations were made by the participants:

- 1) An emerging disparity in HCT delivery and uptake was identified in nine districts in the South and Center that is correlated to the number of HCT sites per population. Reallocation of effort to increase HCT sites in these districts is recommended.
- 2) An emerging disparity in male HIV testing was identified nationally, potentially affecting ART treatment outcomes. Examination of the barriers to HIV testing among men and promotion of testing among men are recommended.
- 3) An emerging disparity in PMTCT delivery and uptake was identified in six districts in the South and Center. This disparity is not correlated to the number of sites per pregnancy in these districts and national ANC testing (<25% of pregnancies) and use of NVP remains

- low. Evaluation of the barriers to ANC testing and NVP use (including supplies) is recommended, with a particular focus in the six districts of lowest uptake.
- 4) Several Malawian cultural practices negatively impact HIV prevention efforts; however, the interactions are complex and diverse according to location, tradition, and ethnicity. There is a notable detrimental association of circumcision with sexual debut and encouragement for young men and women. At the same time, there is a notable lack of circumcision in Malawi overall. Recommendations include safe provision of circumcision, decoupling circumcision for sexual debut and encouragement, examination of demand in traditionally non-circumcising cultures, and careful studies on the effectiveness of circumcision promotion as HIV prevention in Malawi. Other cultural practices with detrimental affects on HIV prevention (e.g., puberty and sexual initiation rites, wife inheritance, and surrogate fertility) need to be carefully examined in their context to effectively address their impact on HIV transmission.
  - 5) Evaluation data on the Life Skills Education programs in Malawi point to inadequate quality, priority, and coverage in schools, and absence outside of schools. Recommendations are to make LSE examinable; increased quality, coverage, and national coordination of training of public and private teachers; enhanced quantitative monitoring and evaluation; ensured supplies; and creation and coordination of a curriculum for out of school youth with other partners (e.g., FPAM, UNICEF).
  - 6) Condom information, distribution, and quality assurance are inadequate in Malawi. Recommendations are to increase rural access to youth through youth-friendly peripheral outlets; increase access to upper socio-economic status men at acceptable sites (e.g., hotel rooms, restaurants, bars); collection and monitoring of condom distribution data at the district level; national education campaigns to address misconceptions about condoms; and establishment of an in-country condom quality assessment program.
  - 7) Intergeneration sex, concurrent multiple partnerships, successive regular partnerships, and within marriage risk were recognized as potential major drivers of the HIV epidemic in the current stage for Malawi. A recommendation was made for local faith-based organizations to address these issue with national coordination, guidance, and standard materials.
  - 8) Youth-friendly reproductive services are needed in Malawi.

**HIV/AIDS Morbidity and Mortality.** Overall, early evidence supports the benefit of ART roll-out on morbidity and mortality in Malawi; however, disparities are emerging:

- 1) In defined populations with good access to ART, evidence supports substantial decreases in HIV/AIDS morbidity and mortality. These populations include: health care workers, teachers, private sector employees, soldiers, and persons <1 km from major roads. The recommendation is to continue to expand ART roll-out to other populations.
- 2) Findings also point to disparities in ART roll-out, including persons of lower socio-economic status (e.g., those not employed in the sectors mentioned above) and persons in rural areas >1 km from main roads. These groups represent the majority of Malawians. The recommendation is to have careful vigilance – with population level data – to detect and address these disparities.
- 3) There is also a rising disparity in the delivery of ART to persons in the South of Malawi, driven by the higher population, the higher HIV prevalence, the higher HIV incidence,

and the lower relative rate of ART roll-out compared to the North and Center regions. The recommendation is to consider re-direction or allocation of ART roll-out resources to the South.

- 4) There is a potential disparity in survival among male patients on ART compared to female patients. A possible explanation is that men may initiate ART at a later stage of disease compared to women. This hypothesis is supported by testing data, but needs confirmation by comparing stage of initiation. Recommendations are to verify the gender gap in survival, identify potential causes, and examine and address barriers to HIV testing among men.
- 5) Linkage of TB patients to HIV care is lagging; increased coordination between TB and HIV care programs is recommended.

**HIV incidence.** The workshop reviewed the importance of HIV incidence data in tracking the epidemic and the strengths and weaknesses of different methods to measure incidence. The recommendation is to adopt a triangulation of incidence methods including: Spectrum, trends in HIV prevalence among young persons (e.g., in ANC, DHS), repeat HIV testers (with the addition of needed data on month and year of last HIV test), and laboratory methods (e.g., BED and avidity). Training in the latter methods was requested as technical assistance from the CDC.

## **PROCEEDINGS OF THE MEETING AND PRESENTATION OF KEY FINDINGS**

The following provides a brief summary of the data presented at the 2007 Malawi Triangulation Meeting along with key findings and discussion points raised following each presentation. The full data presentations can be found, in order, in Appendix D. Additional data considered are included in Appendix C.

### **PREVENTION COVERAGE AND NEEDS - June 6, 2007**

The first day of the workshop addressed the following question:

- 1) What is the coverage and trend in prevention programs and behavior change, possible links in general and targeted populations?

**1. Dr. Mwale, Executive Director of NAC, provided the welcome and opening of the meeting.** Dr. Mwale thanked the attendees for participation and for sharing data. He stressed the importance of equitable, reasonable, and efficient use of scarce resources, particularly in the service of high risk populations and in the face of the HIV/AIDS crisis and related pressing national health needs. He applauded public health research which translates to swift implementation of programs, and he implored delegates to link evidence-based data to the planning of the national HIV response. He concluded his remarks by saying that the workshop should:

- 1) Inform HIV prevention strategies for Malawi,
- 2) Contribute to an integrated national work-plan, to a district level of implementation,
- 3) Fill data gaps and help guide Malawi's round 7 application to the Global Fund.

**2. Dr. Willi McFarland, facilitator from the San Francisco Department of Public Health and the University of California at San Francisco, gave an overview of triangulation methods and the charge to participants.** Dr. McFarland discussed the approach of triangulation, including the repetitive nature of the process, how it differs from conventional data analysis, and potential biases and limitations. He also presented the charge to the participants: to synthesize the existing data to answer the following working questions:

- 1) What are the coverage and trends in prevention programs and behavior change, with possible links to the general and target populations?
- 2) What is the impact of HIV/AIDS facility-based response on morbidity and mortality?
- 3) How should we estimate HIV incidence in Malawi?

In synthesizing data from multiple sources to answer the above questions, he offered a few rules of thumb in drawing conclusions or selecting between multiple possible explanations or hypotheses:



- 1) Select the hypothesis that is supported by the most data (i.e., diverse sources),
- 2) Select the hypothesis that is supported by the best data (i.e., the highest quality data),
- 3) Select the hypothesis that comes closest to the consensus of the group (i.e., accepted by the diverse stakeholders),
- 4) Select the hypothesis that is most actionable (i.e., that interventions are able to address),

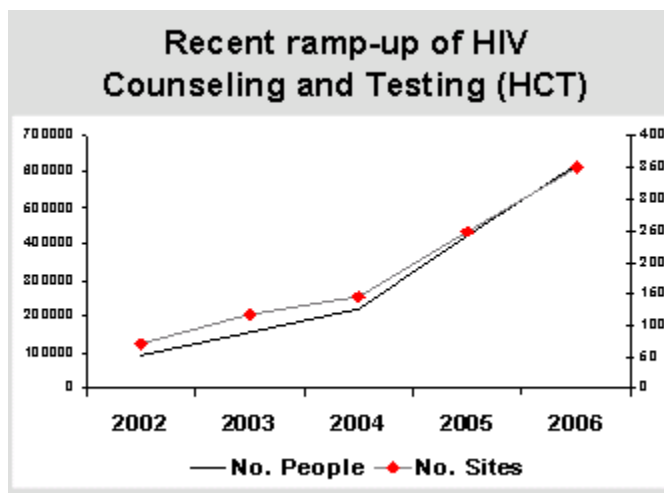
As a review, he summarized the process and main conclusions drawn from the previous 2006 Malawi Triangulation cycle on trends in HIV prevalence. The previous report was provided to participants as the data were relevant to the current question on HIV prevention. He then reviewed the steps taken so far for the current cycle and the agenda and tasks of the current meeting.

He concluded by expressing his appreciation for the excellent data that are emerging from many partners across Malawi and the extraordinary culture of sharing which make the triangulation exercise possible and successful.

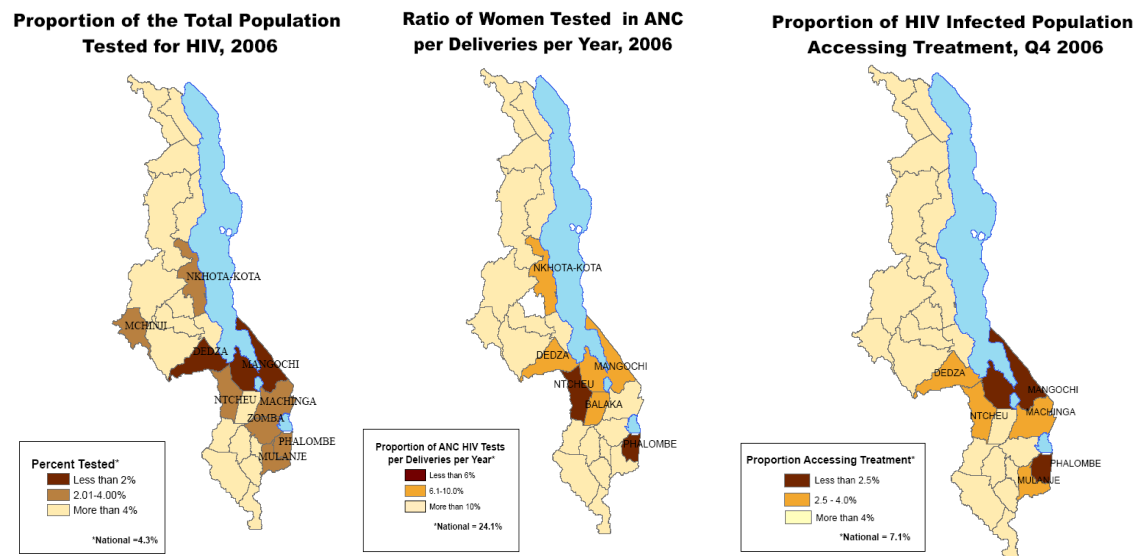
**3. Dr. Kelita Kamoto, Ministry of Health, presented current trends in the delivery and uptake of HCT, PMTCT, and ART.** New data presented were primarily drawn from quarterly monitoring reports and the most recent Situational Analysis. Key findings were the exponential increases in the number of testing sites and people tested from 2002 to 2006. There has also been a dramatic increase in PMTCT sites and pregnant women tested in the last year alone. However, only a modest number of pregnant women are tested nationally (<25%) and further shortfalls in the uptake of NVP among HIV+ pregnant women.

Disparities in uptake of HCT and ANC testing were noted. Nine districts were identified that had a relatively low uptake of HIV testing (HCT) in 2006, including Dedza, Mangochi, Phalombe, Ntcheu, Mulanje, Machinga, Mchinji, Zomba, and Nkhota-Kota. With some overlap, 6 districts had a relative low uptake of HIV testing of pregnant women at ANC sites in 2006 (Dedza, Mangochi, Phalombe, Ntcheu, Nkhota-Kota, and Balaka).

Moreover, 6 districts also had a relative low uptake of ART services, including Dedza



Mangochi, Phalombe, Ntcheu, Mulanje, Machinga. In brief, the following maps illustrate areas of the South and Center regions with consistent low uptake of HCT, ANC testing, and ART services.



**4. Dr. Sophie Kang’oma, National Statistics Office, provided a preliminary comparison of 2004 vs. 2006 Behavioral Surveillance Survey data.** The 2006 round of BSS data are recently becoming available. A preliminary examination of indicators of risk behavior in 3 targeted groups were presented for police, primary school teachers, and secondary school teachers.

Overall, the direction of HIV prevention indicators over the two waves of BSS was mixed. Several tended towards a positive prevention direction from 2004 to 2006 in all 3 groups and both genders, including: a) awareness of testing places, b) ever been tested, c) belief that condom use can prevent HIV, and d) used condom at last sex, trended upward in a positive prevention direction from 2004 to 2006. However, two indicators appeared to have tended towards a negative direction during the period, including: a) comprehensive knowledge of HIV/AIDS transmission and prevention and b) always using a condom. The overall sense from the group discussion was that these data needed further analysis, including clarification of the denominators in each year, sample size consideration, and wording of the questions. Moreover, results of other targeted populations are still pending (e.g., fisherman, vendors, estate workers, sex workers, etc).

**5. Dr. Fred Mwachengere, of UNDP, summarized the assessment of the impact of HIV/AIDS on human resources in the Malawi civil service.** The study conducted by his group examined morbidity and mortality in segments of the public service corps from 1990 to 2000, attrition and vacancies, specific skills affected, and overall impact. Of note, this presentation is relevant to the second day of the meeting addressing the impact of ART on morbidity and mortality, but is included here to preserve the order of the meeting presentations.

The data provide a baseline (i.e., pre-ART roll-out) for the impact of the HIV/AIDS epidemic in key sectors of Malawian society. During the assessment period, there was ample evidence that HIV/AIDS was eroding capacity of the civil service to function optimally in key sectors. The study recommended policies to strengthen the affected institutions, including fast-tracking of recruitment; automation of services; building of capacity in several areas including workers' incentives, private sector partnerships, and training support; and mainstreaming of HIV/AIDS to reduce stigma and enhance provision of ART. The participants recommended the repeating of the assessment in the early post-ART period to compare any recent changes. A hypothesis discussed was that public sector employees may represent a group with high access to ART and therefore early impact might be observed in these sectors.

**6. Alister Munthali of the Centre for Social Research presented findings of evaluations in three areas: the relationship between Malawian cultural practices and HIV/AIDS, the Life Skills Education programs, and couples knowledge of MTCT programs.**

To assess potential negative effects of Malawian cultural practices on the HIV/AIDS epidemic and prevention efforts, four studies were summarized, including the PNG national survey of adolescents, the MHRC cultural practices survey, CoM study by Chimbiri et al., and the DfID study by Matinga and McConville. As suggested by the 2006 Malawi Triangulation, the presentation affirmed that certain cultural practices can be potential drivers of the epidemic in localized sites or communities. The current evaluation included qualitative research on circumcision, sexual initiation, traditional and religious puberty rites, and wife inheritance (i.e., includes various practices such as gule wankulu, jando, and nsondo; fisi, kulowa kufa). Overall, the issues are diverse and complex, defying a simply summary here (see also previous 2006 Malawi Triangulation Report). In brief, an in-depth understanding of each issue is needed in its context to fully gauge the impact on HIV prevention efforts.

The second presentation examined of Life Skills Education for Malawi from 1999 through 2007, in both public and religious schools. The evaluations, largely qualitative, highlighted several challenges of delivering appropriate LSE to Malawian pupils from both the teachers' and students' perspectives, including the lack of teacher training, shortage of materials, continued discomfort with open discussions, and lack of appropriate monitoring and evaluation. In addition, too low priority is given to LSE because it is not examinable as a subject. Lastly, the program misses out of school youth.

The third presentation examined knowledge and awareness of MTCT by gender in data from the DHS, NSA, and MICS studies. While knowledge has increased between 2000 and 2004 (the official launch of PMTCT was 2003), and uptake of PMTCT services has risen, misconceptions and fear of stigma still cloud many people's understanding of MTCT.

**7. Dr. Willi McFarland reviewed additional data relevant to Malawi prevention efforts from diverse data sources.**

Prior to the Group Work exercise, Dr. McFarland provided a summary of the data and conclusions on HIV prevention reach and intensity from the previous 2006 Malawi Triangulation project, which was provided to the workshop participants. In particular, he highlighted the regional difference in HIV prevalence trends and the local drivers of continued transmission in specific locations (see previous Triangulation report).

Second, data from the DHS on the relationship between circumcision and HIV prevalence were shown. Malawi's apparently paradoxical finding of higher HIV prevalence among men who are circumcised appears to be explained by confounding. That is, the ethnic groups where circumcision is most common are also those with higher overall HIV prevalence. When stratifying by ethnicity, lack of circumcision is associated with lower prevalence.

Third, data from the MDICP study that were not available at the time of the 2006 Malawi Triangulation cycle had encouraging findings of decreases in HIV prevalence and HIV incidence in three rural areas of Malawi, one in each region. HIV prevalence decreased among men and women from 2004 to 2006. Directly measured HIV incidence was encouragingly low, 0.6% per year overall. Of note, HIV incidence was higher in the South, among persons formerly married (i.e., divorced, separated, or widowed), and among persons with a history of STD. No significant difference was noted by gender or education, although women and lower education had slightly higher incidence of HIV.

**8. Group Work Session.** Upon completion of the data presentations, participants were divided into four groups. The charge to the groups was to identify at least one positive and one negative trend in HIV prevention efforts through synthesis of the data presented at the meeting and in the reports and data tables provided. The group was also tasked with documenting the supporting and/or refuting evidence for each conclusion. The findings of each group were presented back to the whole group for discussion. Of note, a second work group was convened on the second day to continue to examine the data on HIV prevention; findings are included here.

### **Findings**

The full results of the four groups individually are presented in Appendix D. Here are seven common conclusions reached and recommendations made by the four groups following report-back and discussion in the larger group:

- 1) There has been a rapid increase in HCT delivery and uptake since 2005; however, a disparity in nine districts in the South and Center has emerged and is correlated to the number of HCT sites per population. Emphasis of efforts to increase sites in these districts is supported. Also, assurance of supplies for scale up of programs is critical.
- 2) There has been a rapid increase in PMTCT delivery and uptake since 2005; however, a disparity in six districts in the South and Center has emerged. This disparity is not correlated to the number of sites per pregnancy in these districts and overall ANC testing (<25% of pregnancies) and use of NVP remains low. More evaluation of the barriers to ANC testing and NVP use is needed, particularly in the districts of lowest uptake. Also, assurance of supplies for scale up of programs is critical.

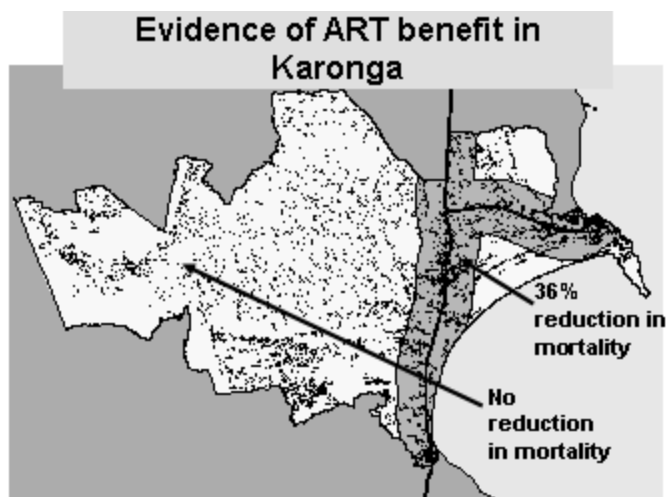
- 3) The evidence supports that several Malawian cultural practices negatively impact HIV prevention efforts; however, the interactions are complex and diverse according to location, tradition, and ethnicity. There is a notable detrimental association of circumcision with sexual debut and encouragement for young men and women. At the same time, there is a notable lack of circumcision in Malawi overall. Recommendations include safe provision of circumcision, decoupling circumcision for sexual debut and encouragement, examination of demand in traditionally non-circumcising cultures, and careful studies on the effectiveness of circumcision promotion as HIV prevention in Malawi. Other cultural practices with detrimental affects on HIV prevention (e.g., puberty and sexual initiation rites, wife inheritance, and surrogate fertility) need to be carefully examined in their context to effectively address their impact on HIV transmission.
- 4) Evaluation data on the Life Skills Education programs in Malawi point to inadequate quality, priority, and coverage in schools, and absence outside of schools. Recommendations are to make LSE examinable; increased quality, coverage, and national coordination of training of public and private teachers; enhanced quantitative monitoring and evaluation; ensured supplies; and creation and coordination of a curriculum for out of school youth with other partners (e.g., FPAM, UNICEF).
- 5) Condom information, distribution, and quality assurance are inadequate in Malawi. Recommendations are to increase rural access to youth through youth-friendly peripheral outlets; increase access to upper socio-economic status men at acceptable sites (e.g., hotel rooms, restaurants, bars); collection and monitoring of condom distribution data at the district level; national education campaigns to address misconceptions about condoms; and establishment of an in-country condom quality assessment program.
- 6) Intergeneration sex, concurrent multiple partnerships, successive regular partnerships, and within marriage risk were recognized as potential major drivers of the HIV epidemic in the current stage for Malawi. A recommendations was made for local faith-based organizations to addressed these issue with national coordination, guidance, and standard materials.
- 7) Youth-friendly reproductive health services need development and expansion in Malawi.

## ART IMPACT on MORBIDITY and MORTALITY - June 7, 2007

The second morning of the workshop was devoted to the impact of the ART rollout on morbidity and mortality in Malawi.

**1. Dr. Andreas Jahn of Lighthouse Trust made the first presentation of the day about the population-level impact of the national ART program in the rural Karonga DSS.** An area in the southern part of Karonga district (population 32,000) has been continuously and comprehensively from August 2002.

All households in the area have been and repeated censuses conducted. Approximately half (49%) of the population lives > 1 km from the main roads crossing the area. Mortality rates were examined for the period from August 2002 to June 2005 (i.e., pre-ART roll-out) compared to the 8 eight months following the opening of an ART clinic in the district (i.e., in Mzuzu). The adult population (age 15-59) which lived < 1 km of a main road saw a 36% reduction in mortality

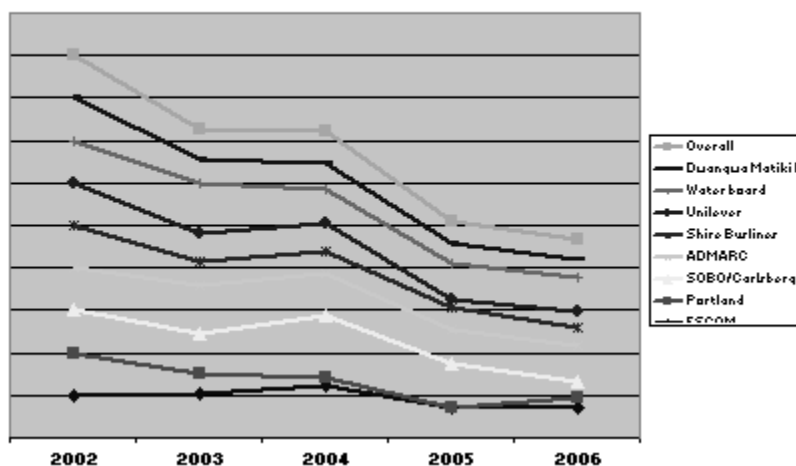


while the adult population which lived in more remote areas saw no reduction in mortality. The linkage of the decline in mortality due to ART use is supported examination of residents enrolled in the Mzuzu clinic, the age of those affected, and the preliminary analysis of causes of death. The study provides strong evidence of a community-level reduction in mortality resulting from ART roll-out. The finding of no reduction among the population living > 1 km from main roads suggests that proximity to a thoroughfare is a proxy for access to ART and has a significant impact on mortality. The latter finding has great implications for Malawi given that the great majority of persons and persons living with HIV/AIDS reside in rural areas.

**2. Dr. Erik Schouten of the Ministry of Health presented on mortality in the private sector.** Examination of nine private companies points to substantial and significant declines in employee mortality and mortality among their spouses and dependents.

Data shown are standardized to the number of deaths for each company in 2002. Of note, no major changes in employee payroll sizes during the period were noted. The exact dates and coverage of ART are unclear, but expected to occur around 2002 or earlier given the

Relative mortality in 8 private sector companies

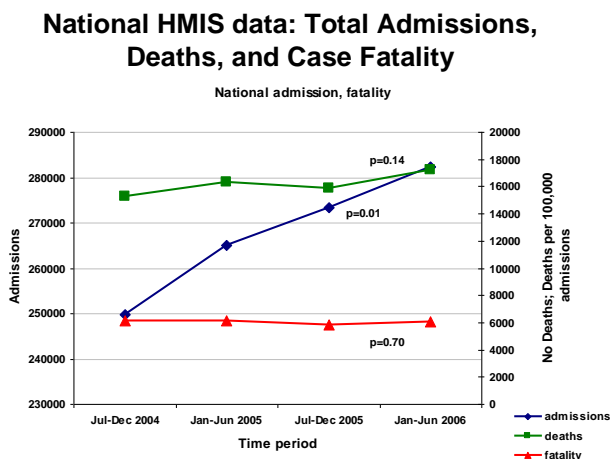


privately employed may have increased access to ART compared to the national as a whole.

Similar declines were reported to have occurred in the Malawi Defense Forces (data not shown).

**3. Dr. Ken Maleta of the College of Medicine presented data from the HMIS, individual hospital record abstraction, and other electronic data sources to evaluate morbidity and mortality in hospitals across Malawi.** The national HMIS data show a rise in hospital admissions, a slight rise in hospital deaths, and a steady case fatality rate. Data from individual hospitals tend to confirm this pattern; however, there was great hospital to hospital, ward to ward, gender, and age variability.

Overall, the data suggest countervailing trends that influence hospital morbidity and mortality. On the one hand, ART increases survival of HIV/AIDS patients. On the other hand, the increasing availability of treatment creates changing patterns in treatment-seeking behavior, with many persons presenting with very severe immunosuppression. Unlike data from well-defined populations such as the Karonga DSS area and employees, hospital morbidity and mortality data do not appear to directly reflect underlying trends in communities – at least not in these early years of ART roll-out.



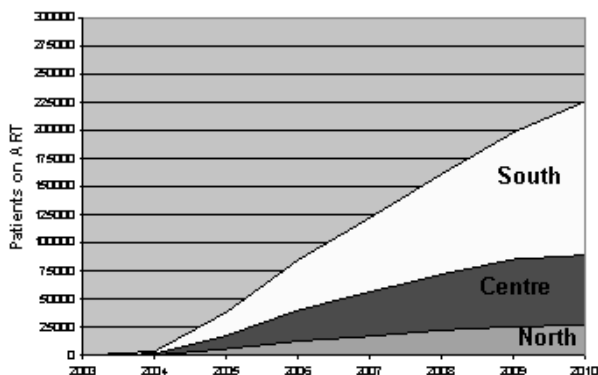
Data on survival of patients on ART were also shown and discussed. Overall survival to 24 months appears high (at least 70% presumed alive). However, limitations in interpretation were discussed, including the effect of patients transferring to other clinics being misplaced in terms of their time from ART initiation.

**4. Ms. Sadhna Patel of the CDC gave an overview of how the Estimation and Projections Package (EPP) and Spectrum model HIV incidence, HIV/AIDS prevalence, morbidity, mortality, and ART need.** Together with the input of ANC surveillance prevalence from Malawi, four adjustable parameters are essential to fitting EPP models to the data: the presumed epidemic start date, the initial rate of growth, the proportion of new risk entrants in the population, and a behavior change parameter. Spectrum subsequently uses EPP’s prevalence

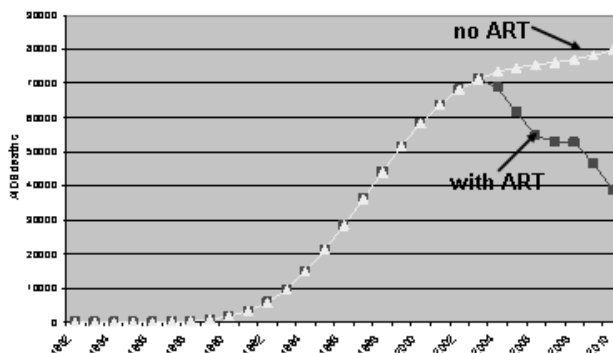
estimate, adds demographic and epidemiological assumptions (age distribution, gender ratios, population growth and fertility rates, and mortality rates) to project HIV incidence, AIDS incidence, AIDS deaths, treatment needs, and new orphans.

**5. George Bello of CHSU presented the latest Spectrum models for Malawi, including HIV incidence, HIV/AIDS prevalence, morbidity, mortality, and ART need nationally and by region.** Models of the current rate of roll-out point to substantial numbers of lives saved in Malawi. However, modeling of regional roll-out efforts point to an emerging unmet need in the South compared to the North and Center of the country due to several factors. The higher number of people in the South, the higher prevalence of HIV in the South, the higher incidence of HIV in the South and the relatively slower coverage of ART are combining to produce a large disparity of unmet need in the South. At current roll-out rates, the North and Center are likely to meet their coverage needs, but not so in the South.

**Rising disparity in ART roll-out in the South**



**Estimated total AIDS mortality**



Spectrum models also point to additional potentially negative consequences of ART roll-out. First, increasing survival of persons living with HIV/AIDS due to ART will raise the overall prevalence of HIV in the country. Second, unless HIV prevention efforts have more effect (including HIV prevention for positives), HIV incidence may also rise. Both factors point to continued burden of care for Malawi and to the great need to increase HIV prevention efforts (the objective of the Global Fund 7 application).

**6. Dr. Talumba Banda of the REACH Trust presented a treatment equity assessment using samples derived from the national ART registers.** Data shown were preliminary; analyses are underway. Early results show that in the 5 districts sampled, 60% of patients accessing treatment in 2006 were women. A notable finding was the patient death rate among men was about 25% higher than that in women. This gender disparity in survival was seen in other studies of patients on ART in Malawi and merits close attention in future studies.



**7. Dr. Erik Schouten provided data on 3 separate areas: 1) the impact of ART on healthcare workers (HCW); 2) access, retention in therapy, and survival of teachers on ART; and 3) impact of HIV interventions on TB patients.** The rationale for the examination of the impact of ART on HCW is that this relatively small proportion of the workforce manages a large number of patients on ART and many HCW have accessed ART at an early stage of disease. HCW also form a key sector in Malawian society, and HIV/AIDS has exacerbated a HCW shortage in many ways (e.g., via mortality, via internal and external brain drains). Results indicate outcomes of HCW on ART are superior to the general population. During early scale-up of ART, the survival of HCW provides a net benefit in terms of the demands made on the health system by HIV/AIDS (i.e., ART saves more person-hours of HCW productivity that it draws off). However, as ART programs rapidly grown, this ratio may be exceeded, potentially compounding a HCW shortage in Malawi.

The second study examined ART impact on teachers, a second group having early access to ART and one that forms a key segment of Malawian society. Treatment outcomes for teachers also appear superior to other patients on ART, likely due to earlier stage of initiation. As found in the REACH study, there also appears to be a gender disparity in survival with female teacher having better survival compared to male teachers (with an adjusted HR of 2.05). Younger age and later stage of initiation were also associated with higher mortality among patients on ART.

The third study highlighted HCT, cotrimoxazole administration, and ART for TB patients. Annual HIV testing jumped from 8% in 2002 to 44 % in 2005 among TB patients, but uptake of testing is still too low and must be addressed with a variety of interventions. The study concludes that TB and ARV delivery must be synchronized; that cotrimoxazole preventive therapy is likely contributing to a decline in TB mortality, but that ART is probably not. Of note, the study on cotrimoxazole also found higher mortality among men compared to women.

**8. Dr. Willi McFarland reviewed additional data on evidence Malawi's benefit from ART rollout.** First, Malawi's survival curves were comparable to San Francisco's during the early period of ART roll-out in that city. Second, the DHS surveys show that knowing someone who died of AIDS decreased between 2000 and 2004. Third, the MDICP study showed declines in the percent of persons knowing someone currently sick with or recently died of AIDS. Third, the MICS data also showed declining infant, child, and <5 mortality from 1995-2006.

An additional discussion point raised was the emerging disparity in HIV testing among men compared to women – as much as a 20% gap in the delivery of tests in the last year.

**9. Group Work Sessions.** Participants were divided into 2 groups; one group was tasked to develop hypotheses on the impact of ART on morbidity and mortality and to triangulate available data with the goals of identifying successes, failures, and gaps in ART roll-out. The other group was tasked to go deeper into prevention trends and strategies (findings and recommendations of the later are incorporated above).

## **Findings**

The following summarizes findings from the Group Work report back and subsequent discussion in the larger group:

- 1) In defined populations with good access to ART, the evidence supports substantial decreases in HIV/AIDS morbidity and mortality. These populations include: health care workers, teachers, private sector employees, soldiers, and persons <1 km from major roads. The recommendation is to continue to expand ART roll-out, particularly focus on rural access to services.
- 2) Findings also point to disparities in ART roll-out, including persons of lower socio-economic status (e.g., those not employed in the sectors mentioned) and persons in rural areas >1 km from main roads. These groups represent the majority of Malawians. The recommendation is to have careful vigilance – with population level data – to detect and address these disparities.
- 3) There is also a rising disparity in the delivery of ART to persons in the South of Malawi, driven by the high population, high HIV prevalence and incidence, and given that the relative rate of ART roll-out compared to the North and Center regions. The recommendation is to consider re-allocation of ART roll-out resources to the South.
- 4) There is a potential disparity in survival among male patients on ART compared to female patients. A possible explanation is that men may initiate ART at a later stage of disease compared to women. This hypothesis is supported by testing data, but needs confirmation by comparing stage of initiation. Recommendations are to verify the potential gender gap in survival, identifying potential causes, and to examine and address barriers to HIV testing among men.
- 5) Linkage of TB patients to HIV care is lagging; continued focus on increasing coordination between TB and HIV care programs is recommended.
- 6) Explore the development of demographic surveillance sites in the central and south regions; currently the only DSS is the Karonga Prevention Study in the north.

## **HIV INCIDENCE - June 8, 2007**

Day 3 included a brief presentation by Nellie Wadonda-Kabondo of the MOH-CHSU on measuring HIV incidence. She reviewed the advantages and limitations of epidemiological and laboratory-based methods to measure HIV incidence, including prospective cohort studies of the general population, analysis of repeat HIV testers, repeated cross-sectional prevalence studies of young people, mathematical modeling using Spectrum, and several new laboratory methods. Of note, there are a few cohort studies in Malawi measuring HIV incidence (e.g., Karonga DSS, and MDICP).

After group discussion, the recommendations were that direct HIV incidence measures in the ART and post-ART roll-out periods need to be prioritized in order to track the course of the epidemic in an area of increasing HIV prevalence due to improved survival. The group recommended a triangulation approach that will measure and compare HIV incidence measured by Spectrum, trends in HIV prevalence among young persons (e.g., in ANC, DHS), repeat HIV testers (with the addition of needed data on month and year of last HIV test), and laboratory methods (e.g., BED and avidity). Training in the latter methods was requested as technical assistance from the CDC. She recommended that in Malawi's short-term future investigators should use existing lab and cohort data, acquire more advanced lab skills and train more laboratory technicians in these skills, and take advantage of varying research opportunities.

Dr. Willi McFarland concluded the workshop with a summary of the findings, conclusions, and recommendations from the previous days' proceedings.

**Appendix A:** Meeting Agenda, Malawi HIV Impact Triangulation Workshop, Lilongwe, Malawi, 6-8 June 2007



**Malawi HIV Impact Triangulation Workshop**  
June 6-8, 2007

*Lilongwe Hotel*

*DRAFT AGENDA*

Day 1

<b>Time</b>	<b>Agenda Item</b>	<b>Facilitators</b>
8:30-9:10 am	Registration Welcome Remarks and speech	NAC (Executive Director)
9:10-9:30 am	Overview: Review of agenda, triangulation methods, introduction to impact questions, goals for the meeting days. <b>20 min (Willi McFarland, John Aberle-Grasse)</b>	
9:30-10:15am	<p>“What is the coverage and trend in prevention programs and behavior change, possible links in general and targeted populations?”</p> <ul style="list-style-type: none"> <li>• DHS trends- summary of previous triangulation on prevention. <b>15 min (John Chipeta, NAC)</b></li> <li>• Trends in uptake of services- HTC, PMTCT, ART <b>30 min (K. Kamoto, HIV/AIDS Unit-MOH)</b> <ul style="list-style-type: none"> <li>• HIV/AIDS services situation analysis</li> <li>• Mapping of coverage- HBC, HTC, PMTCT</li> </ul> </li> </ul>	Nelson Kalanje/ Blackson Matatiyo (NAC)
10:15-	<i>Tea Break</i>	

10:35am		
10:35-12:40	<ul style="list-style-type: none"> <li>• UNDP report 2002 and current survey update. <b>15 min (Fred Mwachengere, UNDP)</b></li> <li>• BSS update trends from 2004 and preliminary from 2006. <b>15 min (Sophie Kang'oma-NSO)</b></li> <li>• Health care workers and teachers uptake and outcomes of ART. <b>20 min (HIV/AIDS Unit)</b></li> <li>• Support to MOH human resource. <b>15 min (MOH)</b></li> <li>• Life skills teaching and outcomes. <b>15 min (Alister Munthali)</b></li> <li>• Cultural practices- the PNG study. <b>15 min (Alister Munthali)</b></li> <li>• PMTCT and Gender. <b>15 min (Alister Munthali)</b></li> <li>• Group work instructions. <b>15 min</b></li> </ul>	B. Matatiyo (NAC)
12:40 – 1:40pm	<b>Lunch Break</b>	
1:40pm-4:10 pm	<ul style="list-style-type: none"> <li>• <b>Group work:</b></li> <li>• Synthesis and interpretation of multiple sources of data: generation of hypotheses</li> <li>• Refute/confirm hypotheses</li> </ul>	John Aberle-Grasse (CDC)
4:10-4:30 pm	<b>Tea break</b>	
4:30-5:00 pm	<ul style="list-style-type: none"> <li>• <b>Report back from groups</b></li> </ul>	John Aberle-Grasse (CDC)

## Day 2

<b>Time</b>	<b>Agenda Item</b>	<b>Facilitators</b>
8:30-10:00 am	<p><i>“What is the impact of HIV/AIDS facility based response on morbidity and mortality?”</i></p> <p><i>“What is the coverage and quality of community and facility home based care and the linkage between them?”</i></p> <ul style="list-style-type: none"> <li>• Summary of day 1 discussions <b>15 min</b></li> <li>• Spectrum projections: HIV prevalence, AIDS mortality, ART need, ART coverage and deaths averted. <b>45 min (John, Sadhna, George)</b></li> <li>• Employer mortality data</li> </ul>	Eric Schouten (MOH-HIV/AIDS Unit)

	<p><b>15 min (Erik Schouten)</b></p> <ul style="list-style-type: none"> <li>Karonga Cohort Prevention Study</li> </ul> <p><b>15 min (Andreas)</b></p>	
10:00 – 10:20am	<b>Tea Break</b>	
10:20-12:00am	<ul style="list-style-type: none"> <li>District Hospital Record Abstraction/HMIS/other electronic hospital data and MSF Thyolo <b>25 min (Ken Maleta)</b></li> <li>Equity and access of health facility based services <b>15 min (Ireen Makwiza- REACH)</b></li> <li>TB and HIV co-infection <b>15 min (Rehab Chimzizi)</b></li> <li>UPenn-Verbal Autopsy <b>15 min (UPEN)</b></li> <li>Matrix to assess and monitor coordination of HIV interventions in District Implementation Plans (DIPS) <b>15 min (David Chitate-UNAIDS).</b></li> <li>Group work orientation <b>15 min</b></li> </ul>	Eric Schouten (MOH-HIV/AIDS Unit)
12:00 – 01:00pm	<b>Lunch Break</b>	
1:00-3:00 pm	<ul style="list-style-type: none"> <li><b>Group work:</b></li> <li>Synthesis and interpretation of multiple sources of data: generation of hypotheses</li> <li>Refute/confirm hypotheses</li> <li><b>Report back from groups</b></li> <li>Conclusions – what can we say about ART impact in Malawi?</li> </ul>	David Chitate (UNAIDS)
3:00-3:30	<b>Tea Break</b>	
3:30-4:30 pm	<ul style="list-style-type: none"> <li>Report back from groups</li> </ul>	David Chitate (UNAIDS)

## Day 3

Time	Agenda Item	Facilitators
8:30-9:00 am	Conclusions about day one and day two findings	Nelson Kalanje/Blackson Matatiyo

9:00-9:30 am	“What are the trends in incidence of HIV? How many infections have been averted?” <b>30min (Nellie Kabondo-CHSU)</b>	Nelson Kalanje/Blackson Matatiyo
9:30-11:00	<ul style="list-style-type: none"> <li>• Presentation of Findings and Recommendations from Impact Workshop.</li> <li><b>1 hr (Consultants)</b> <ul style="list-style-type: none"> <li>• Summary of findings, conclusions</li> <li>• Recommendations for data collection going forward (GF and other)</li> <li>• Recommendations for NAC Consultant TOR</li> <li>• GF impact assessment vs. Malawi plan - Gaps</li> </ul> </li> </ul>	Nelson Kalanje/Blackson Matatiyo
11:00-11:30	<b>TEA break</b>	
11:30-12:00	<ul style="list-style-type: none"> <li>• Next Steps</li> </ul>	
12:00	End of Workshop and lunch	

**Appendix B:** Participants and organizations, Malawi HIV Impact Triangulation Workshop, Lilongwe, Malawi, 6-8 June 2007

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**Appendix C: Preliminary indicators, Malawi HIV Impact Triangulation Workshop, Lilongwe, Malawi, 6-8 June 2007**

**Malawi national indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out. Trend indicates direction of indicator post- vs. pre- ART roll-out**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend
HIV prevalence (ANC all)	22.8		16.9		17.0		15.0		Down
HIV incidence (ANC <25)	20.7		15.0		17.0		14.1		Down
Spectrum Adult: AIDS deaths no ART	51,662	58,282	63,867	68,182	71,315	73,384	74,670	75,480	Up
Spectrum: AIDS deaths with ART	51,662	58,282	63,867	68,182	71,315	68,770	61,505	54,748	Down
Patients on ART	0	0	0	0	0	10,490	38,868	77,697	Up
Spectrum patients in need of ART	122134	132019	139436	144583	147,857	149860	155473	168,906	Up
Spectrum coverage %	0	0	0	0	0	7	25	46	Up
Spectrum HIV prevalence	13.27	13.16	12.99	12.85	12.75	12.67	12.72	12.93	Down/Crest
Spectrum HIV incidence	1.38	1.36	1.38	1.47	1.54	1.6	1.67	1.71	Up?
Spectrum Child: AIDS deaths no ART	14,749	15,291	15,763	16,225	16,716	17,227	17,760	18,296	Up
Spectrum: AIDS deaths with ART	14,749	15,291	15,763	15,884	14,799	13,715	12,830	9,753	Down
Patients on ART	0	0	0	0	0	0	248	4,570	Up
Spectrum patients in need of ART	31,268	32,268	32,825	31,740	29,407	27,370	24,766	22,848	Up
Spectrum coverage %	0	0	0	0	0	0	1	20	Up
Total patients on ART				0	3000	13183	37840	81821	Up
					<b>6m</b>	<b>12m</b>	<b>18m</b>	<b>24m</b>	
SF roll-out, from initial HAART (94-96)					94	89	86	84	SF
ART patients presumed alive					81	71	73	70	High
Known alive and on ART					74	61	59	55	High
Transferred out					7	10	14	15	Low
Lost to follow-up					8	14	11	14	Low
Dead					11	14	15	15	Low
Stopped treatment					1	1	1	1	Low
Survival of HCW (% presumed alive)					85	81	78		High
Survival of teachers (% presumed alive)					79	74	68		High
				<b>2004b</b>	<b>2005a</b>	<b>2005b</b>	<b>2006a</b>	<b>2006b</b>	
Hospital mortality (HMIS)				15256	16322	15907	17232		Up
Hospital morbidity (admissions)				249742	264961	273304	282311		Up
Hospital fatality (dths / 100,000 adm)				6109	6160	5820	6104		Level
Hosp. abstraction mortality male				1017	1128	1165	1183	1119	Down
Hosp. abstr. morbidity male				9370	10221	10511	10425	9636	Down
Hosp. abstr. fatality male				109	110	110	113	116	Up

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend
Hosp. abstr. mort. NT male young				87	86	94	81	86	Level
Hosp. abstr. mort. NT male middle				419	490	526	519	546	Up
Hosp. abstr. mort. NT male old				298	312	352	396	386	Crest
Hosp. abstraction mortality female				640	648	666	699	717	Up
Hosp. abstr. morb. female				10206	10175	10950	11477	11172	Crest
Hosp. abstr. fatality female				63	64	61	61	64	Level
Hosp. abstr. mort. NT female young				92	141	103	105	93	Down
Hosp. abstr. mort. NT female middle				287	320	296	334	325	Crest
Hosp. abstr. mort. NT female old				158	129	164	169	206	Up
		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	
Private sector mortality all 8				445	318	328	240	222	Down
ESCOM (employees and spouses)		2	56	47	48	57	33	34	Down
Portland (employees and dependents)				10	5	2	0	2	Down
Sobo/Carlsberg (employees, spouses)				15	14	22	16	6	Down
ADMARC (employees and spouses)				56	64	55	44	48	Down
Shire (employees and spouses)				47	27	25	25	20	Down
Unilever (employees and spouses)				11	7	7	2	4	Down
Blantyre Water (employees, spouses)				11	13	9	9	9	Down
Dwanga Matiki				248	140	151	117	99	Down
DHS know with/died AIDS men %		81.5				69.6			Down
DHS know with/died AIDS women %		72.2				64.1			Down
	<b>1998</b>		<b>2001</b>			<b>2004</b>		<b>2006</b>	
MDICP mean # died AIDS men	8.4		8.4			6.9			Down
MDICP mean # died AIDS women	8.0		7.6			5.8			Down
MDICP mean # died AIDS men 12m			4.1			2.8			Down
MDICP mean # died AIDS women 12m			3.6			2.3			Down
MDICP mean # sick AIDS men now			2.5			2.3			Down
MDICP mean # sick AIDS women now			2.1			1.7			Down
MDICP mean # rel sick /d AIDS men			1.1			1.1			Level
MDICP mean # rel sick /d AIDS women			1.2			1.1			Down
		<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>		
VCT MACRO feel ill male %		3.0	3.3	4.6	3.4	4.2	6.8		Up
VCT MACRO feel ill female %		7.0	8.0	9.7	8.0	8.2	9.7		Up
VCT MACRO partner ill male %		15.1	11.0	8.2	7.0	4.1	0.8		Down
VCT MACRO partner ill female %		23.5	19.8	16.2	13.8	7.3	1.6		Down
VCT MACRO partner died male %		0.8	0.3	1.0	0.6	0.5	0.6		Down
VCT MACRO partner died female %		1.9	0.8	1.6	1.2	2.5	3.2		Up

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend
	1995							2006	
MICS, Infant mort. (dths/1000 live births)	133							69	Down
Child mortality (dths/1000 live births)	90							53	Down
<5 mortality (dths/1000 live births)	211							118	Down

**North: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum Adult: AIDS deaths no ART									Not done	
Spectrum: AIDS deaths with ART	3,079	3,833	4,588	5,294	5,919	6,253	4,905	3,721	Down	
Patients on ART	0	0	0	0	0	447	4,915	11,144	Up	
Spectrum patients in need of ART	8,421	9,881	11,212	12,355	13,275	13,965	14,627	16,758	Up	
Spectrum coverage %	0	0	0	0	0	3	34	66	Up	Best
Spectrum HIV prevalence	9.19	10.44	11.38	11.98	12.31	12.44	12.44	12.37	Crest	
Spectrum HIV incidence	1.62	1.44	1.34	1.3	1.31	1.35	1.45	1.54	Resurg	
Spectrum Child: AIDS deaths no ART										
Spectrum: AIDS deaths with ART										
Patients on ART										
Spectrum patients in need of ART										
Spectrum coverage %										
Patients on ART							5860	12344	Up	
					6m	12m	18m	24m		
ART patients presumed alive										
Known alive and on ART					69	62	51	47	High	Worst
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
				2004b	2005a	2005b	2006a	2006b		
Hospital mortality (HMIS)				1682	1755	1858	1963		Up	



Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Hospital morbidity (admissions)				23311	25929	24806	27782		Up	
Hospital fatality (dths / 100,000 adm)				7215	6768	7490	7066		Level	
Hosp. abstraction mortality male (n=4)				231	262	274	266	318	Up	
Hosp. abstr. morbidity male n=4				1909	2233	2202	2157	2264	Up	
Hosp. abstr. fatality male n=4				121	117	124	123	140	Up	
Hosp. abstraction mort. female (n=3)				213	202	225	207	235	Up	
Hosp. abstr. morb. Female n=3				1703	1975	2004	2217	2086	Up	
Hosp. abstr. fatality female n=3				125	102	112	93	113	Level	
	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>		
DHS know w/died AIDS men Chitipa		80.0				78.8			Level	
DHS know w/died AIDS men Mzimba		85.9				88.7			Level	

**Center: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum Adult: AIDS deaths no ART										Not done
Spectrum: AIDS deaths with ART	12,815	14,085	15,039	15,674	16,050	15,920	12,132	8,313	Down	
Patients on ART	0	0	0	0	0	650	9,795	24,667	Up	
Spectrum patients in need of ART	29,121	30,707	31,710	32,232	32,419	32,479	32,870	36,927	Up	
Spectrum coverage %	0	0	0	0	0	2	30	67	Up	Best
Spectrum HIV prevalence	8.95	8.75	8.57	8.43	8.36	8.34	8.38	8.64	Resur	
Spectrum HIV incidence	0.82	0.84	0.9	0.96	1.03	1.07	1.13	1.17	Up	
Spectrum Child: AIDS deaths no ART										
Spectrum: AIDS deaths with ART										
Patients on ART										
Spectrum patients in need of ART										
Spectrum coverage %										
Patients on ART							11645	26552	Up	
					6m	12m	18m	24m		
ART patients presumed alive										

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Known alive and on ART					73	61	55	51	High	Middle
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
				<b>2004b</b>	<b>2005a</b>	<b>2005b</b>	<b>2006a</b>	<b>2006b</b>		
Hospital mortality (HMIS)				4948	5329	5514	5303		Crest	
Hospital morbidity (admissions)				122450	131462	140337	139695		Crest	
Hospital fatality (dths / 100,000 adm)				4041	4054	3929	3796		Down	
Hosp. abstraction mortality male n=6				357	346	341	350	291	Down	
Hosp. abstr. morbidity male n=6				4005	3710	3849	3723	3947	Level	
Hosp. abstr. fatality male n=6				89	93	89	94	74	Level	
Hosp. abstraction mortality female n=5				208	240	251	229	233	Crest	
Hosp. abstr. morb. Female n=5				4294	4572	4541	4551	4508	Crest	
Hosp. abstr. fatality female n=5				48	52	55	50	52	Level	
	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>		
DHS know w/died AIDS men Kasungu		88.4				92.0			Level	
DHS know w/died AIDS men Dowa		88.8				84.7			Level	
DHS know w/died AIDS men Salima		82.2				74.2			Down	
DHS know w/died AIDS men Lilongw		85.3				74.6			Down	
DHS know w/died AIDS men Dedza		81.3				69.3			Down	

**South: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum Adult: AIDS deaths no ART										
Spectrum: AIDS deaths with ART	38,443	43,470	47,735	51,033	53,429	53,935	47,935	44,986	Down	
Patients on ART	0	0	0	0	0	2,473	20,489	43,238	Up	
Spectrum patients in need of ART	91193	98,743	104,413	108,363	110,892	112,425	114,463	122,834	Up	
Spectrum coverage %	0	0	0	0	0	2	18	35	Up	Worst

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Spectrum HIV prevalence	17.33	17.22	17.07	16.93	16.85	16.79	16.82	17.06	Resurg	
Spectrum HIV incidence	1.87	1.86	1.91	2.02	2.15	2.21	2.31	2.35	Up	
Spectrum Child: AIDS deaths no ART										
Spectrum: AIDS deaths with ART										
Patients on ART										
Spectrum patients in need of ART										
Spectrum coverage %										
Patients on ART							20335	42925	Up	
					6m	12m	18m	24m		
ART patients presumed alive										
Survival of patients on ART					76	62	65	60	High	Best
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
				2004b	2005a	2005b	2006a	2006b		
Hospital mortality (HMIS)				8440	9052	8535	9903		Up	
Hospital morbidity (admissions)				103981	107570	108161	114834		Up	
Hospital fatality (dths / 100,000 adm)				8117	8415	7891	8624		Up	
Hosp. abstraction mortality male n=4				429	520	550	567	510	Up	
Hosp. abstr. morbidity male n=4				3456	4278	4460	4545	3425	Up?	
Hosp. abstr. fatality male n=4				124	122	123	125	149	Up?	
Hosp. abstraction mortality female n=2				219	206	190	263	249	Up?	
Hosp. abstr. morb. Female n=2				2929	2332	3073	3311	3144	Level	
Hosp. abstr. fatality female n=2				75	88	62	79	79	Level	
	1999	2000	2001	2002	2003	2004	2005	2006		
DHS know w/died AIDS men Mangochi		69.5				55.3			Down	
DHS know w/died AIDS men Machinga		69.4				21.7			Down	
DHS know w/died AIDS men Zomba		75.1				63.6			Down	
DHS know w/died AIDS men Blantyre		83.3				67.3			Down	
DHS know w/died AIDS men Thyolo		73.2				59.2			Down	
DHS know w/died AIDS men Mulanje		76.0				54.5			Down	

**North Urban: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum estimates?										
Karonga DSS Adult AIDS (<1 km)				8.4			5.5		Down	
Karonga non-AIDS				4.1			2.5		Level	
Karonga all cause, adults				16.9			12.6		Down	
Karonga all cause, 15-59				13.2			8.5		Down	
Karonga all cause, 15-29				4.0			3.3		Level	
Karonga all cause, 30-44				25.5			14.6		Down	
Karonga all cause, 45-59				28.2			17.2		Level	
Karonga all cause, 60+				46.9			46.4		Level	
Patients on ART										
					6m	12m	18m	24m		
ART patients presumed alive										
Known alive and on ART										
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
				2004b	2005a	2005b	2006a	2006b		
Hospital mortality (HMIS)										Not done
Hospital morbidity (admissions)										
Hospital fatality										
Hosp. abstraction mortality male										
Hosp. abstr. morbidity male										
Hosp. abstr. fatality male										
Hosp. abstraction mortality female										
Hosp. abstr. morb. Female										
Hosp. abstr. fatality female										
	2002a	2002b	2003a	2003b	2004a	2004b	2005a	2005b		
Mzuzu mortality adult male inpatient	90	85	84	89	75	82	103	85		
Mzuzu adult male inpatient adm	579	701	664	722	477	449	667	703		
Mzuzu fatality adult male	155	121	127	123	157	183	154	121		
Mzuzu mortality adult female inpatient	75	86	78	96	60	94	93	82		

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Mzuzu adult female inpatient adm	676	754	756	688	353	735	735	613		
Mzuzu fatality adult female	110.9	114.1	103.2	139.5	170	127.9	126.5	133.8		
Mzuzu mortality adult TB male					25	21	16	10		
Mzuzu morbity adult TB male					98	89	85	83		
Mzuzu fatality adult male TB					255	236	188	121		
Mzuzu mortality adult TB female				25	21	19	13	8		
Mzuzu morbity adult TB female				104	104	95	72	67		
Mzuzu fatality adult TB female				240.38	201.92	200.00	180.56	119.40		
DHS know died of AIDS men		86.8				81.7			Down	
DHS know died of AIDS women		85.2				88.5			Level	Worst

**North Rural: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum estimates?										
Patients on ART										
Karonga DSS Adult AIDS (>1 km)				4.2			4.9		Level	
Karonga non-AIDS				2.1			4.0		Up	
Karonga all cause, adults				10.4			12.1		Level	
Karonga all cause, 15-59				6.9			8.9		Level	
Karonga all cause, 15-29				3.1			2.4		Level	
Karonga all cause, 30-44				11.5			16.3		Level	
Karonga all cause, 45-59				12.7			19.8		Level	
Karonga all cause, 60+				31.8			37.6		Level	
					6m	12m	18m	24m		
ART patients presumed alive										

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Known alive and on ART										
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
	2003a	2003b	2004a	2004b	2005a	2005b	2006a	2006b		
Hospital mortality (HMIS)										
Hospital morbidity (admissions)										
Hospital fatality										
Ekwendeni abstraction mortality male	37	39	21	33	21	27	20	38		
Ekwendeni abstr. morbidity male	411	456	428	460	457	417	343	420		
Ekwendeni abstr. fatality male	63.636	90	86	49	72	46	65	58		
Ekwendeni abs mort. NT male young	3	1	0	4	0	1	1	4		
Ekwendeni abs mort. NT male mid	9	12	18	9	13	9	12	8		
Ekwendeni abstr. mort. NT male old	12	13	14	4	13	12	12	8		
Ekwendeni abstraction mortality female	33	31	43	35	18	37	33	29		
Ekwendeni abstr. morb. female	584	617	540	395	617	620	591	608		
Ekwendeni abstr. fatality female	56.5	50	80	89	29	60	56	48		
Ekwendeni abstr. mort. NT female yng	4	4	5	3	3	3	5	5		
Ekwendeni abstr. mort. NT female mid	16	13	14	14	7	14	13	10		
Ekwendeni abstr. mort. NT female old	6	13	23	11	7	13	14	14		
DHS know died of AIDS men		81.2				85.2			Level	Worst
DHS know died of AIDS women		85.8				79.3			Down	

**Center Urban: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum estimates?										

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Patients on ART										
					6m	12m	18m	24m		
ART patients presumed alive										
Known alive and on ART										
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
				2004b	2005a	2005b	2006a	2006b		
Hospital mortality (HMIS)										
Hospital morbidity (admissions)										
Hospital fatality										
Hosp. abstraction mortality male										
Hosp. abstr. morbidity male										
Hosp. abstr. fatality male										
Hosp. abstr. mort. NT male young										
Hosp. abstr. mort. NT male middle										
Hosp. abstr. mort. NT male old										
Hosp. abstraction mortality female										
Hosp. abstr. morb. female										
Hosp. abstr. fatality female										
Hosp. abstr. mort. NT female yng										
Hosp. abstr. mort. NT female mid										
Hosp. abstr. mort. NT female old										
				2002	2003	2004	2005	2006		
Kamuzu pediatric HIV mortality				402	318	566	445	204	Down	
Kamuzu pediatric HIV adm				2729	3165	4894	4796	2435	Down	
Kamuzu pediatric HIV fatality /1000				147	101	116	93	84	Down	
Kamuzu mortality male										
Kamuzu morbity male										
Kamuzu. fatality male										
Kamuzu electronic mortality female										
Kamuzu morbity female										
Kamuzu fatality female										

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
DHS know died of AIDS men %		86.1				73.1			Down	
DHS know died of AIDS women %		78.3				63.9			Down	
DHS know w/died AIDS men Lilongw		85.3				74.6			Down	

**Center Rural: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum estimates?										
Patients on ART										
					6m	12m	18m	24m		
ART patients presumed alive										
Known alive and on ART										
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
				2004b	2005a	2005b	2006a	2006b		
Hospital mortality (HMIS)										
Hospital morbidity (admissions)										
Hospital fatality										
Hosp. abstraction mortality male										
Hosp. abstr. morbidity male										
Hosp. abstr. fatality male										
Hosp. abstr. mort. NT male young										
Hosp. abstr. mort. NT male middle										
Hosp. abstr. mort. NT male old										
Hosp. abstraction mortality female										





Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Hospital fatality										
Hosp. abstraction mortality male										
Hosp. abstr. morbidity male										
Hosp. abstr. fatality male										
Hosp. abstr. mort. NT male young										
Hosp. abstr. mort. NT male middle										
Hosp. abstr. mort. NT male old										
Hosp. abstraction mortality female										
Hosp. abstr. morb. female										
Hosp. abstr. fatality female										
Hosp. abstr. mort. NT female yng										
Hosp. abstr. mort. NT female mid										
Hosp. abstr. mort. NT female old										
QECH mortality male										
QECH. morbity male										
QECH. fatality male										
QECH. electronic mortality female										
QECH. morbity female										
QECH. fatality female										
	<b>2002b</b>	<b>2003a</b>	<b>2003b</b>	<b>2004a</b>	<b>2004b</b>	<b>2005a</b>	<b>2005b</b>	<b>2006a</b>	<b>2006b</b>	
Thyolo mortality male	117	120	115	56	106	166	181	211	226	
Thyolo morbidity male (admissions)	847	891	937	520	694	868	1100	1375	1331	
Thyolo. fatality male /1000	138.1	134.7	122.7	107.7	152.7	191.2	164.5	153.5	169.8	
Thyolo mortality female										
Thyolo morbidity female (admissions)										
Thyolo fatality female										
Thyolo mortality pediatric			167	233	134	179	128	189	162	
Thyolo morbidity pediatric adm			1479	2115	1357	1875	2010	2398	1233	
Thyolo. fatality pediatric /1000 adm			112.9	110.2	98.7	95.5	63.7	78.8	131.4	
Chiradzulu mortality male				125	83	152	178	152	160	
Chiradzulu morbidity male adm				573	662	938	1004	918	1028	
Chiradzulu fatality male /1000				218	125	162	177.29	165.6	155.6	
Chiradzulu mortality female	114	112	181	130	146	44	117	157	164	
Chiradzulu morbidity female adm	847	808	929	847	986	332	1130	1371	1323	
Chiradzulu fatality female /1000	143	135	139	195	153	148	133	104	114.5	
DHS know died of AIDS men		73.8				70.2			Level	

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
DHS know died of AIDS women		70.3				61.4			Down	

**South Rural: Malawi regional indicators of HIV/AIDS related mortality and morbidity, pre- and post- ART roll-out.**

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
HIV prevalence (ANC all)										
HIV incidence (ANC <25)										
Spectrum estimates?										
Patients on ART										
					6m	12m	18m	24m		
ART patients presumed alive										
Known alive and on ART										
Transferred out										
Dead										
Lost to follow-up										
Stopped treatment										
	1999	2000	2001	2002	2003	2004	2005	2006		
Hospital mortality (HMIS)										
Hospital morbidity (admissions)										
Hospital fatality										
Hosp. abstraction mortality male										
Hosp. abstr. morbidity male										
Hosp. abstr. fatality male										
Hosp. abstr. mort. NT male young										
Hosp. abstr. mort. NT male middle										
Hosp. abstr. mort. NT male old										
Hosp. abstraction mortality female										
Hosp. abstr. morb. female										
Hosp. abstr. fatality female										

Indicator	1999	2000	2001	2002	2003	2004	2005	2006	Trend	Rank
Hosp. abstr. mort. NT female yng										
Hosp. abstr. mort. NT female mid										
Hosp. abstr. mort. NT female old										
Mulanje elec mort adults (AIDS deaths)				179	n/a	234	232	256	Up	
Mulanje morb adults (AIDS adm)				1255	n/a	1296	1354	1469	Up	
Mulanje fatality adults (AIDS deaths)				143	n/a	181	171	174	Level	
Mulanje mort male AIDS deaths				96	n/a	127	114	126	Level	
Mulanje morb male AIDS adm				498	n/a	577	571	608	Up	
Mulanje fatality male AIDS				193	n/a	220	200	207	Level	
Mulanje mort female AIDS deaths				83	n/a	107	118	130	Up	
Mulanje morb female AIDS adm				766	n/a	725	790	865	Up	
Mulanje fatality female AIDS				108		148	149	150	Level	
Mulanje mort pediatric AIDS				82	n/a	72	81	77	Level	
Mulanje morbidity pediatric AIDS				403	n/a	369	484	556	Up	
Mulanje fatality pediatric AIDS				2045	n/a	195	167	139	Down	
Mulanje children 0-4 (malaria fatality)				82	n/a	97	71	67		
Mulanje children 0-4 (HIV+AIDS deaths/ 1000 HIV+AIDS admissions)				210	n/a	188	172	140		
Mulanje children 0-4 overall fatality (deaths per 1000 admissions)				142	n/a	155	117	99		
Mtengawanthenga Mort adult (AIDS)				101	135	141	101	87	Down	
Mteng. morb adult (AIDS admissions)				1749	2018	1624	1207	923	Down	
Mteng. fatality adult /1000 adm				58	67	87	84	94	Up	
Mteng. Mort male				46	54	59	31	41	Down	
Mteng. Morb male				624	647	557	424	347	Down	
Mteng. Fatality male				74	84	106	73	118	Up	
Mteng. Mort female				16	39	31	33	33	Crest	
Mteng. Morb female				552	695	585	452	346	Down	
Mteng. Fatality female				29	56	53	73	95	Up	
Mteng. Mort. Pediatric				59	58	66	44	23	Down	
Mteng. Morb. Pediatric				548	792	424	384	297	Down	
Mteng. Fatality Pediatric				108	73	156	115	77	Down	
DHS know died of AIDS men		75.8				52.7			Down	Best
DHS know died of AIDS women		63.1				56.2			Down	Best

DRAFT: Do not circulate

