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**ANNOTATED BIBLIOGRAPHY OF RESEARCH AND RESOURCES LINKING WATER, SANITATION AND HYGIENE WITH HIV/AIDS HOME-BASED CARE.** Prepared by USAID Hygiene Improvement Project. October 2007

## Introduction

This bibliography contains citations and abstracts of 90 articles and reports that discuss linkages between water, hygiene and/or sanitation with HIV/AIDS care and treatment, or some aspect of health and well-being of people infected or affected by HIV and AIDS. In addition to the citations and abstracts, links to the full-text documents are included if available.

This bibliography is organized into 3 categories. These are:

**A - [Peer-review Literature](#)** – 32 published journal articles are included in this section.

**B - [Reports](#)** – This category includes 38 fact sheets, project reports and other documents from organizations.

**C - [Guidelines/Manuals](#)** – This section includes 20 guidelines and manuals on issues regarding home-based care (HBC).

### **A. Peer-review Literature**

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Ansari SA, Farrah SR, Chaudhry GR. (1992). **Presence of human immunodeficiency virus nucleic acids in wastewater and their detection by polymerase chain reaction.** *Appl Environ Microbiol. Dec;58(12):3984-90.*

The human immunodeficiency virus type 1 (HIV-1) released by infected individuals or present in human and hospital wastes can potentially cause contamination problems. The presence of HIV-1 was investigated in 16 environmental samples, including raw wastewater, sludge, final effluent, soil, and pond water, collected from different locations. A method was developed to extract total nucleic acids in intact form directly from the raw samples or from the viral concentrates of the raw samples. The isolated nucleic acids were analyzed for the presence of HIV-1 by using in vitro amplification of the target sequences by the polymerase chain reaction (PCR) method. HIV-1-specific proviral DNA and viral RNA were detected in the extracted nucleic acids obtained from three wastewater samples by this method. The specificity of the PCR-amplified products was determined by Southern blot hybridization with an HIV-1-specific oligonucleotide probe, SK19. The isolated nucleic acids from wastewater samples were also screened for the presence of poliovirus type 1, representing a commonly found enteric virus, and simian immunodeficiency virus, representing, presumably, rare viruses. While poliovirus type 1 viral RNA was found in all of the wastewater samples, none of the samples yielded a simian immunodeficiency virus-specific product. No PCR-amplified product was yielded when wastewater samples were directly used for the detection of HIV-1 and poliovirus type 1. The wastewater constituents appeared to be inhibitory to the enzymes reverse transcriptase and DNA polymerase.

Aragon TJ, Novotny S, Enanoria W, Vugia DJ, Khalakdina A, Katz MH. (2003). **Endemic cryptosporidiosis and exposure to municipal tap water in persons with acquired immunodeficiency syndrome (AIDS): a case-control study**. *BMC Public Health* 2003; 6(32):2.

**BACKGROUND:** In persons with acquired immunodeficiency syndrome (AIDS), *Cryptosporidium parvum* causes a prolonged, severe diarrheal illness to which there is no effective treatment, and the risk of developing cryptosporidiosis from drinking tap water in non-outbreak settings remains uncertain. To test the hypothesis that drinking tap water was associated with developing cryptosporidiosis, we conducted a matched case-control study among persons with AIDS in San Francisco.

**METHODS:** Among patients reported to the San Francisco AIDS Registry from May 1996 through September 1998, we compared patients who developed cryptosporidiosis to those who did not. Cases were individually matched to controls based on age, sex, race/ethnicity, CD4+ T lymphocyte count, date of CD4+ count, and date of case diagnosis. Population attributable fractions (PAFs) were calculated.

**RESULTS:** The study consisted of 49 cases and 99 matched controls. In the multivariable analysis with adjustments for confounders, tap water consumption inside and outside the home at the highest exposure categories was associated with the occurrence of cryptosporidiosis (inside the home: odds ratio (OR), 6.76; 95% CI 1.37-33.5, and outside the home: OR 3.16; 95% CI 1.23-8.13). The PAF was 85%; that is, the proportion of cases of cryptosporidiosis in San Francisco AIDS patients attributable to tap water consumption could have been as high as 85%.

**CONCLUSIONS:** Although the results from this observational study cannot be considered definitive, until there is more data, we recommend persons with AIDS, especially those with compromised immune systems, consider avoiding tap water.

Aronson T, Holtzman A, Glover N, Boian M, Froman S, Berlin OG, Hill H, Stelma G Jr. (1999). **Comparison of large restriction fragments of *Mycobacterium avium* isolates recovered from AIDS and non-AIDS patients with those of isolates from potable water**. *J Clin Microbiol* 1999; 37(4): 1008-12.

This study examined potable water in Los Angeles, California, as a possible source of infection in AIDS and non-AIDS patients. Nontuberculous mycobacteria were recovered from 12 (92%) of 13 reservoirs, 45 (82%) of 55 homes, 31 (100%) of 31 commercial buildings, and 15 (100%) of 15 hospitals. Large-restriction-fragment (LRF) pattern analyses were done with *Asel*. The LRF patterns of *Mycobacterium avium* isolates recovered from potable water in three homes, two commercial buildings, one reservoir, and eight hospitals had varying degrees of relatedness to 19 clinical isolates recovered from 17 patients. The high number of *M. avium* isolates recovered from hospital water and their close relationship with clinical isolates suggests the potential threat of nosocomial spread. This study supports the possibility that potable water is a source for the acquisition of *M. avium* infections.

Badri M, Cleary S, Maartens G, Pitt J, Bekker LG, Orrell C, Wood R. (2006). **When to initiate highly active antiretroviral therapy in sub-Saharan Africa? A South African cost-effectiveness study**. *Antivir Ther.* 11(1):63-72.

**BACKGROUND:** Large-scale programmes increasing access to highly active antiretroviral therapy (HAART) are being implemented in sub-Saharan Africa. However, cost-

effectiveness of initiating treatment at different CD4 count thresholds has not been explored in resource-poor settings.

**METHODS:** A cost-effectiveness analysis was conducted from a public health perspective using primary treatment outcomes, healthcare utilisation and cost data (Jan 2004 local prices; US dollars 1=7.6 Rands) derived from the Cape Town AIDS Cohort. A Markov state-transition model was developed to estimate life-expectancy, lifetime costs, quality-adjusted life-years (QALYs), cost per life-year and QALY gained for initiating HAART at three CD4 cell count thresholds (<200/microl, 200-350/microl and >350/microl), including the no antiretroviral therapy (No-ART) alternative. Each treatment option was compared with the next most effective undominated option.

**RESULTS:** Mean life-expectancy was 6.2, 18.8, 21.0 and 23.3 years; discounted (8%) QALYs were 3.1, 6.2, 6.7 and 7.4; and discounted lifetime costs were US dollars 5,250, US dollars 5,434, US dollars 5,740, US dollars 6,588 for No-ART, and therapy initiation at <200/microl, 200-350/microl and >350/microl scenarios respectively. Clinical benefits increased significantly with early therapy initiation. Initiating therapy at <200/microl had an incremental cost-effectiveness ratio (ICER) of US dollars 54 per QALY versus No-ART, 200-350/microl had an ICER of US dollars 616 versus therapy initiation at <200/microl, and >350/microl had an ICER of US dollars 1,137 versus therapy initiation at 200-350/microl. ICERs were sensitive to HAART cost.

**CONCLUSIONS:** HAART is reasonably cost-effective for HIV-infected patients in South Africa, and most effective if initiated when CD4 count >200/microl. Deferring treatment to <200/microl would reduce the aggregate cost of treatment, but this should be balanced against the significant clinical benefits associated with early therapy.

Bland RM, Rollins NC, Coovadia HM, Coutsooudis A, Newell ML. **Infant feeding counselling for HIV-infected and uninfected women: appropriateness of choice and practice.** *Bull World Health Organ.* 2007 Apr; 85(4):289-96.

**OBJECTIVE:** To examine infant feeding intentions of HIV-infected and uninfected women and the appropriateness of their choices according to their home resources; and to determine their adherence to their intentions in the first postnatal week.

**METHODS:** Feeding intentions of pregnant women were compared against four resources that facilitate replacement feeding: clean water, adequate fuel, access to a refrigerator and regular maternal income. First-week feeding practices were documented.

**FINDINGS:** The antenatal feeding intentions of 1253 HIV-infected women were: exclusive breastfeeding 73%; replacement feeding 9%; undecided 18%. Three percent had access to all four resources, of whom 23% chose replacement feeding. Of those choosing replacement feeding, 8% had access to all four resources. A clean water supply and regular maternal income were independently associated with intention to replacement feed (adjusted odds ratio (AOR) 1.94, 95% confidence interval (CI) 1.2-3.2; AOR 2.1, 95% CI: 1.2-3.5, respectively). Significantly more HIV-infected women intending to exclusively breastfeed, rather than replacement feed, adhered to their intention in week one (exclusive breastfeeding 78%; replacement feeding 42%; P<0.001). Of 1238 HIV-uninfected women, 82% intended to exclusively breastfeed; 2% to replacement feed; and 16% were undecided. Seventy-five percent who intended to exclusively breastfeed adhered to this intention postnatally, and only 11 infants (<1%) received no breast milk. The number of antenatal home visits significantly influenced adherence to feeding intention.

CONCLUSION: Most HIV-infected women did not have the resources for safe replacement feeding, instead choosing appropriately to exclusively breastfeed. Adherence to feeding intention among HIV-infected women was higher in those who chose to exclusively breastfeed than to replacement feed. With appropriate counselling and support, spillover of suboptimal feeding practices to HIV-negative women is minimal.

Bushen OY, Davenport JA, Lima AB, Piscitelli SC, Uzgiris AJ, Terezinha M, Silva J, Leite R, Kosek M, et al. **Diarrhea and Reduced Levels of Antiretroviral Drugs: Improvement with Glutamine or Alanyl-Glutamine in a Randomized Controlled Trial in Northeast Brazil.** *Clin Infect Dis.* 2004 Jun 15;38(12):1764-70.

The effects of therapy with glutamine and alanyl-glutamine on diarrhea and antiretroviral drug levels in patients with acquired immune deficiency syndrome (AIDS) were examined in a study in northeast Brazil. Patients with AIDS and with diarrhea and/or wasting were randomized into 4 groups to determine the efficacy of glutamine or high- or low-dose alanyl-glutamine given for 7 days, compared with isonitrogenous glycine given to control subjects. The dose-related efficacy of alanyl-glutamine and glutamine in treating diarrhea and in increasing antiretroviral drug levels shows that these supplements may help to improve therapy for patients with AIDS who have diarrhea and/or wasting in developing, tropical areas.

Clasen T, Schmidt WP, Rabie T, Roberts I, Cairncross S. (2007). **Interventions to improve water quality for preventing diarrhoea: systematic review and meta-analysis.** *BMJ.* 2007 Apr 14;334(7597):782.

Interventions to improve water quality are generally effective for preventing diarrhea in all ages and in under 5s. Significant heterogeneity among the trials suggests that the level of effectiveness may depend on a variety of conditions that research to date cannot fully explain.

Colebunders R, Francis H, Mann JM, Bila KM, Izaley L, Kimputu L, Behets F, van der Groen G, Quinn TC, Curran JW. (1987). **Persistent diarrhea, strongly associated with HIV infection in Kinshasa, Zaire.** *Am J Gastroenterol* 82: 859–864.

To determine the predictive value of persistent diarrhea for human immune deficiency virus (HIV) infection, 128 consecutive patients presenting at Mama Yemo Hospital with persistent diarrhea were tested for the presence of HIV antibodies. One hundred seven (84%) of the 128 patients with diarrhea lasting at least 1 month were found to be HIV seropositive. HIV seropositive patients with persistent diarrhea more often had a generalized papular pruritic eruption, a genital herpes simplex infection, a history of herpes zoster, and infection with cryptosporidia ( $p = 0.006$ ) than HIV seronegative patients with persistent diarrhea. Presently, persistent diarrhea in adults in central Africa is strongly associated with HIV infection, but the pathophysiological mechanisms causing this diarrhea remain unclear.

Curtis V, Cairncross S. (2003). **Effect of washing hands with soap on diarrhoea risk in the community: a systematic review.** *Lancet Infect Dis.* 2003 May;3(5):275-81.

This study investigated the impact of washing hands with soap on the risk of diarrheal diseases in the community. The relative risk of diarrheal disease associated with not washing hands from the intervention trials was 1.88 (95% CI 1.31-2.68), implying that handwashing could reduce diarrhoea risk by 47%. When all studies, when only those

of high quality, and when only those studies specifically mentioning soap were pooled, risk reduction ranged from 42-44%. The risks of severe intestinal infections and of shigellosis were associated with reductions of 48% and 59%, respectively. In the absence of adequate mortality studies, the study extrapolates the potential number of diarrhea deaths that could be averted by handwashing at about a million (1.1 million, lower estimate 0.5 million, upper estimate 1.4 million). Results may be affected by the poor quality of many of the studies and may be inflated by publication bias. On current evidence, washing hands with soap can reduce the risk of diarrhoeal diseases by 42-47% and interventions to promote handwashing might save a million lives. More and better-designed trials are needed to measure the impact of washing hands on diarrhoea and acute respiratory infections in developing countries.

Doherty T, Chopra M, Jackson D, Goga A, Colvin M, Persson LA. (2007). **Effectiveness of the WHO/UNICEF guidelines on infant feeding for HIV-positive women: results from a prospective cohort study in South Africa.** *AIDS.* 2007 Aug 20;21(13):1791-1797.

This study of 635 HIV-positive mother-infant pairs across three sites in South Africa assessed mother to child transmission of HIV. Three criteria were found to be associated with improved infant HIV-free survival amongst women choosing to formula feed: piped water; electricity, gas or paraffin for fuel; and disclosing HIV status. The study concludes that counseling of mothers should include an assessment of individual and environmental criteria to support appropriate infant-feeding choices.

Fewtrell L, Kaufmann RB, Kay D, Enanoria W, Haller L, Colford JM Jr. (2005). **Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and meta-analysis.** *Lancet Infect Dis.* 2005 Jan;5(1):42-52.

46 studies were reviewed in detail. Data were extracted from these studies and pooled by meta-analysis to provide summary estimates of the effectiveness of each type of intervention. Water quality interventions (point-of-use water treatment) were found to be more effective than previously thought, and multiple interventions (consisting of combined water, sanitation, and hygiene measures) were not more effective than interventions with a single focus.

Goldie SJ, Yazdanpanah Y, Losina E, Weinstein MC, Anglaret X, Walensky RP, Hsu HE, Kimmel A, Holmes C, Kaplan JE, Freedberg KA. (2006). **Cost-effectiveness of HIV treatment in resource-poor settings--the case of Cote d'Ivoire.** *N Engl J Med.* Sep 14;355(11):1141-53.

As antiretroviral therapy is increasingly used in settings with limited resources, key questions about the timing of treatment and use of diagnostic tests to guide clinical decisions must be addressed. This study assessed the cost-effectiveness of treatment strategies for a cohort of adults in Côte d'Ivoire who were infected with HIV. Undiscounted gains in life expectancy ranged from 10.7 months with antiretroviral therapy and prophylaxis initiated on the basis of clinical criteria to 45.9 months with antiretroviral therapy and prophylaxis initiated on the basis of CD4 testing and clinical criteria, as compared with trimethoprim-sulfamethoxazole prophylaxis alone. A strategy of trimethoprim-sulfamethoxazole prophylaxis and antiretroviral therapy, with the use of clinical criteria alone or in combination with CD4 testing to guide the timing of treatment, is an economically attractive health investment in settings with limited resources.

Grant AD, Djomand G, De Cock KM. (1997). **Natural history and spectrum of disease in adults with HIV/AIDS in Africa.** *AIDS 11(Suppl B): S43–S54.*

Survival after an AIDS diagnosis appears to be substantially shorter in African countries and this may be partly because of later diagnosis of AIDS in Africa, but may also be because of environmental factors such as increased exposure to pathogens of high virulence and lack of access to care. Tuberculosis and bacterial infections are the most important causes of morbidity and mortality among hospitalized patients. Bacteraemia is frequent, particularly due to non-typhoid salmonellae and *S. pneumoniae*. Cryptosporidia and *I. belli* are the most frequently isolated pathogens in patients with diarrhoea; non-typhoid salmonellae and *Shigella* species are also commonly isolated when stool cultures are performed. Cerebral toxoplasmosis, and meningitis due to *Cryptococcus*, tuberculosis and bacterial pathogens are the most frequent neurological infections and cognitive changes are frequently identified when specifically looked for. Individuals infected with HIV-2 progress to AIDS and to death more slowly than those infected with HIV-1, but seem to experience the same spectrum of opportunistic disease when they reach the stage of advanced disease. Tuberculosis is the single most important HIV-related opportunistic infection in African countries, but diagnosis remains difficult. More information is needed about gynaecological disease in HIV-infected women. The most important research questions concern the development and evaluation of cost-effective regimes for prophylaxis and treatment of opportunistic disease in order to prolong healthy life in HIV-infected individuals.

Hillebrand-Haverkort ME, Kolk AH, Kox LF, Ten Velden JJ, Ten Veen JH. (1999).

**Generalized mycobacterium genavense infection in HIV-infected patients: detection of the mycobacterium in hospital tap water.** *Scand J Infect Dis 31(1):63-8.*

Three HIV-infected patients were examined with *M. genavense* infection. The use of corticosteroids possibly favored colonization and dissemination of atypical mycobacteria in these patients with low CD4 cell counts and may have masked symptoms of infection. The fact that these patients were treated with highly active antiretroviral therapy (HAART) together with antimycobacterial therapy may explain that 1 patient was free from mycobacteria 16 months after the end of specific treatment. Hospital tap water contained *M. genavense* at a concentration of >10 bacteria/l as examined by PCR. This species caused 12% of cases of non-tuberculous disseminated mycobacteriosis in HIV-infected patients at the hospital.

van der Hoek L, Boom R, Goudsmit J, Snijders F, Sol CJ. (1995). **Isolation of human immunodeficiency virus type 1 (HIV-1) RNA from feces by a simple method and difference between HIV-1 subpopulations in feces and serum.** *Clin Microbiol. 1995 Mar; 33(3):581-8.*

This article describes a simple method to isolate and subsequently detect human immunodeficiency virus type 1 (HIV-1) RNA from feces. The method was applied on fecal specimens from 18 HIV-1-infected individuals, among which were samples that had been stored for 9 years. It appeared that HIV-1 RNA was detectable in the feces of 12 persons (67%). Viral RNA was present in the feces of persons who fulfilled the criteria for CDC class II and CDC class III HIV infection as well as in patients who were diagnosed with AIDS (CDC class IV). HIV-1 RNA is frequently present in the feces of HIV-1-infected individuals, and in some cases the HIV-1 subpopulation in feces differs from the HIV-1 subpopulation in serum.

Huang, DB, Zhou J. (2007). **Effect of intensive handwashing in the prevention of diarrhoeal illness among patients with AIDS: a randomized controlled study.** *J Med Microbiol* 56(5)659-63.

In this study, 260 patients were screened for those who had not had diarrhea in the preceding 3 months and who had received a stable highly active antiretroviral therapy regimen for at least 6 weeks prior to the study. Seventy-five patients were randomly assigned to an intensive handwashing intervention (i.e. handwashing after defecation, after cleaning infants who had defecated, before preparing food, before eating, and before and after sex) and 73 patients were randomly assigned to the control group. Patients in both groups were called weekly by telephone to determine compliance with handwashing and to determine the number of diarrheal episodes for the preceding week. Patients were observed for 1 year. Patients assigned to the intensive handwashing intervention group washed their hands more frequently compared with the control group (seven vs four times a day, respectively) and developed fewer episodes of diarrheal illness during the 1 year observation. The most common pathogens identified in both groups in patients who developed diarrhoeal illness were *Giardia lamblia*, *Cryptosporidium*, *Entamoeba histolytica* and *Shigella flexneri*. These data suggest that intensive handwashing reduces diarrheal illness in patients with AIDS.

Joloba M et al. (2000). **Determination of drug susceptibility and DNA fingerprint patterns of clinical isolates of Mycobacterium tuberculosis from Kampala, Uganda.** *East Afr Med J*, 77(2): 111-5.

This study investigated the rate of initial drug resistance and transmission patterns of *Mycobacterium tuberculosis* in Kampala, Uganda. There were no significant differences in resistance rates between patients with and without HIV infection. It shows that in Uganda initial drug resistance rates to anti-tuberculosis agents are low and similar to other sub-Saharan African countries and that multiple strains of *M. tuberculosis* have been transmitted within the community.

Kaplan JE, Hu DJ, Holmes KK, Jaffe HW, Masur H, De Cock KM. (1996). **Preventing opportunistic infections in human immunodeficiency virus-infected persons: implications for the developing world.** *Am J Trop Med Hyg* 55: 1-11.

More than 18 million people worldwide are estimated to have been infected with human immunodeficiency virus (HIV), the cause of the acquired immunodeficiency syndrome (AIDS). As immunodeficiency progresses, these persons become susceptible to a wide variety of opportunistic infections (OIs) Tuberculosis is the most common serious OI in sub-Saharan Africa and is also more common in Latin America and in Asia than in the United States. Bacterial and parasitic infections are prevalent in Africa; protozoal infections such as toxoplasmosis, cryptosporidiosis, and isosporiasis are also common in Latin America. Fungal infections, including cryptococcosis and *Penicillium marneffeii* infection, appear to be prevalent in Southeast Asia. Research is needed to determine the spectrum of OIs and the efficacy of various prevention measures in resource-poor nations, and health officials need to determine a minimum standard of care for HIV-infected persons.

Lule J et al. (2005). **Effect of home-based water chlorination and safe storage on diarrhea among persons with human immunodeficiency virus in Uganda.** *Am J Trop Med Hyg.* Nov; 73(5):926-33.

This trial examined the effect of a home-based, safe water intervention on the incidence and severity of diarrhea among persons with HIV living in rural Uganda. Between April 2001 and November 2002, households of 509 persons with HIV and 1,521 HIV-negative household members received a closed-mouth plastic container, a dilute chlorine solution, and hygiene education (safe water system [SWS]) or simply hygiene education alone. Persons with HIV using SWS had 25% fewer diarrhea episodes, 33% fewer days with diarrhea, and less visible blood or mucus in stools. The SWS was equally effective with or without cotrimoxazole prophylaxis and together they reduced diarrhea episodes by 67%, days with diarrhea by 54% and days of work or school lost due to diarrhea by 47%. A home-based safe water system reduced diarrhea frequency and severity among persons with HIV living in Africa and large scale implementation should be considered.

Mata L. **Diarrhoea and AIDS.** (1988). *Dialogue Diarrhoea* (35):3.

Patients with acquired immunodeficiency syndrome (AIDS) are particularly susceptible to gut colonization or invasion by common enteroviruses, resulting in both acute and chronic diarrhea and in wasting. Bacterial overgrowth may also develop in the small intestine people living with AIDS (PLHA), causing chronic diarrhea and malabsorption. The fecal flora of PLHA and those of immunocompetent children living in deprived rural environments show many similarities in terms of pathogenic and opportunistic agents. Since gut pathogens are significantly more prevalent in developing countries, they are likely to affect AIDS more than in developed countries. Thus, efforts to improve personal hygiene and environmental sanitation should be given a high priority in less developed countries.

Meier A, Bukusi E, Cohen C, Holmes K. (2006). **Independent association of hygiene, socioeconomic status, and circumcision with reduced risk of HIV infection among Kenyan men.** *JAIDS* 43(1)117-118.

Among 150 Kenyan men recruited as sex partners of women with genital symptoms, 22 were HIV seropositive. Because male HIV infection and male hygiene were unexpectedly found to be associated with each other, this study examined the relationship of 5 hygiene variables with HIV infection in the men. By multivariate analyses, HIV infection in men was not only independently associated with previous illness and inversely associated with being circumcised, but also independently associated with a combined measure of hygiene.

Mermin J, Bunnell R, Lule J, Opio A, Gibbons A, Dybul M, Kaplan J. (2005). **Developing an evidence-based, preventive care package for persons with HIV in Africa.** *Trop Med Int Health* 10(10)961-970.

Currently, 95% of the 40 million persons with HIV live in low and middle income countries; 27 million in sub-Saharan Africa. HIV/AIDS is a leading cause of death in Africa, yet access to care and treatment considered standard-of-care in the industrialized world is extremely limited. Standardized, evidence-based recommendations on preventive measures are needed. This article lists potential interventions based, when possible, on documented efficacy in reducing morbidity or mortality among persons with HIV in Africa. Potential components included cotrimoxazole prophylaxis, safe drinking water, isoniazid prophylaxis, insecticide-treated bed nets, micronutrients, and provision of HIV counseling

and testing and condoms to family members of persons with HIV. Several additional interventions (acyclovir prophylaxis, food supplementation, hand washing, and fluconazole prophylaxis) require further evaluation before being included in a standard package of care.

Moore BE. (1993). **Survival of human immunodeficiency virus (HIV), HIV-infected lymphocytes, and poliovirus in water.** *Appl Environ Microbiol.* 1993 May;59(5):1437-43.

The potential for human immunodeficiency virus (HIV) to enter domestic sewers via contaminated body fluids such as blood has spurred interest in the survival of this virus in water and wastewater. This study focused on establishing the inactivation of HIV and productively infected lymphocytes in dechlorinated tap water. In addition, HIV survival was compared with that of poliovirus. Results indicated that either free HIV or cell-associated HIV was rapidly inactivated. In comparison, poliovirus showed no loss of infectivity over 24 h. In addition, blood from stage IV AIDS patients was introduced into tap water, and the recovery of HIV was monitored. Virally infected cells were no longer detectable after 5 min in dechlorinated tap water.

Onadeko MO, Joynson DH, Payne RA. (1992). **The prevalence of Toxoplasma infection among pregnant women in Ibadan, Nigeria.** *J Trop Med Hyg* 95(2):143-5.

The seroprevalence of toxoplasmosis in pregnant women from the inner area of Ibadan was determined by the dye test. Two hundred and seventy-three of the 352 women (78%) had dye test titres of 1/16 or greater with 165 (47%) having titres of 1/128 or greater. Social and environmental conditions indicate that the source of infection is contact with cat faeces.

Potgieter, N., Koekemoer, R. and P. Jagals. (2007). **A pilot assessment of water, sanitation, hygiene and home-based care services for people living with HIV/AIDS in rural and peri-urban communities in South Africa.** *Water Science & Technology Vol 56 No 5 pp 125–131.*

Researchers conducted a short-term assessment of water, sanitation, hygiene and home-based care services in two rural and two peri-urban communities in South Africa using specially designed questionnaires. The results indicated the shortcomings of various services to people affected and living with HIV/AIDS in South Africa. This paper summarized the assessment and outlines the inadequacies of some of these services.

Shrestha RK, et al. (2006). **Cost-effectiveness of home-based chlorination and safe water storage in reducing diarrhea among HIV-affected households in rural Uganda.** *Am J Trop Med Hyg* 2006; 74(5):884-90.

This study examined the cost-effectiveness of the Safe Water System (SWS) for HIV-affected households using health outcomes and costs from a trial in Tororo, Uganda. SWS was part of a home-based health care package that included rapid diarrhea diagnosis and treatment of 196 households with relatively good water and sanitation coverage. SWS use averted 37 diarrhea episodes and 310 diarrhea-days, representing 0.155 disability-adjusted life year (DALY) gained per 100 person-years, but did not alter mortality. Net program costs were 5.21 dollars/episode averted, 0.62 dollars/diarrhea-day averted, and 1,252 dollars/DALY gained. If mortality reduction had equaled another SWS trial in Kenya, the cost would have been 11 dollars/DALY gained. The high SWS cost per DALY

gained was probably caused by a lack of mortality benefit in a trial designed to rapidly treat diarrhea.

Short RV. (2006). **New ways of preventing HIV infection: thinking simply, simply thinking.** *PTRSLBS* 361(1469)811-820.

Five new methods are discussed to prevent HIV infection. (i) A natural microbicide; intravaginal lime or lemon juice has been used for centuries as a traditional contraceptive. The juice can also kill HIV in the laboratory, but clinical trials are needed to see if vaginal application is acceptable, safe and effective. (ii) Intravaginal oestrogen. Monkeys can be protected from Simian immunodeficiency virus (SIV) infection by keratinizing the vagina with topical oestrogen. If women take the oral contraceptive pill vaginally it retains its contraceptive efficacy, and the oestrogen it contains should thicken the vagina and protect against HIV infection. Clinical trials are needed. (iii) Male circumcision. Removal of the inner foreskin removes the main site of HIV entry into the penis, resulting in a sevenfold reduction in susceptibility to infection. The practice needs to be promoted. (iv) Post-coital penile hygiene. Wiping the penis immediately after intercourse with lime or lemon juice or vinegar should kill the virus before it has had a chance to infect. A clinical trial of efficacy is needed. (v) PhotoVoice. Asking schoolchildren in developing countries to photograph their impressions of HIV/AIDS is a powerful way of getting them to discuss the subject openly, and develop their own preventive strategies.

Sorvillo F, Lieb LE, Nahlen B, Miller J, Mascola L, Ash LR. (1994). **Municipal drinking water and cryptosporidiosis among persons with AIDS in Los Angeles County.** *Epidemiol Infect* 113(2): 313-20.

This study measured the prevalence of cryptosporidiosis among people living with AIDS (PLHA) in Los Angeles County by water service area to assess whether unfiltered drinking water could be a source of cryptosporidium infection in PLHA. One water distributor, serving approximately 60% of the county's residents (area B), has consistently employed filtration. The other company serving the remainder of the county (area A), did not institute filtration until mid-December 1986. This difference provided a 'natural experiment' in which to assess the effect of municipal water filtration on the level of cryptosporidiosis among PLHA. The data suggest that filtration had no effect on levels of cryptosporidiosis among persons with AIDS. Thus municipal drinking water does not seem to be an important risk factor for cryptosporidiosis in PLHA residing in Los Angeles County.

Taylor RH, Falkinham JO 3rd, Norton CD, LeChevallier MW. (2000). **Chlorine, chloramine, chlorine dioxide, and ozone susceptibility of Mycobacterium avium.** *Appl Environ Microbiol.* 2000 Apr; 66(4): 1702-5.

Environmental and patient isolates of *Mycobacterium avium* were resistant to chlorine, monochloramine, chlorine dioxide, and ozone. For chlorine, the product of the disinfectant concentration (in parts per million) and the time (in minutes) to 99.9% inactivation for five *M. avium* strains ranged from 51 to 204. Chlorine susceptibility of cells was the same in washed cultures containing aggregates and in reduced aggregate fractions lacking aggregates. Cells of the more slowly growing strains were more resistant to chlorine than were cells of the more rapidly growing strains. Water-grown cells were 10-fold more resistant than medium-grown cells. Disinfectant resistance may be one factor promoting the persistence of *M. avium* in drinking water.

Voss JG, Sukati NA, Seboni NM. (2007). **Symptom burden of fatigue in men and women living with HIV/AIDS in Southern Africa.** *J Assoc Nurses AIDS Care.* Jul-Aug; 18(4):22-31.

In 743 people living with AIDS (PLHA) from Southern Africa, the authors found ratings of HIV-related fatigue to be highly prevalent. The analysis focused on 538 patients who reported fatigue to investigate correlates and predictors of fatigue severity in relationship to demographic and HIV/AIDS illness indicators, as well as HIV-specific physical and psychological symptoms. Fatigue severity in Southern Africa was moderate, and the factors contributing to the perceived fatigue were most likely related to symptoms of acute HIV disease (such as fever and gastrointestinal problems). In conclusion, fatigue severity is less impacted by demographic or environmental variables but much more by co-occurring symptoms and HIV disease severity. The study results imply the need for more research to understand if improvements in water quality and access to food would prevent infection and diarrhea and whether sufficient access to antiretroviral treatments to manage the HIV infection would improve fatigue and co-occurring symptom profiles.

Walensky RP, Weinstein MC, Yazdanpanah Y, Losina E, Mercincavage LM, Toure S, Divi N, Anglaret X, Goldie SJ, Freedberg KA. (2007). **HIV drug resistance surveillance for prioritizing treatment in resource-limited settings.** *AIDS.* 21(8):973-982.

This study examined the value of resistance surveillance in influencing recommendations toward effective and cost-effective sequencing of antiretroviral (ART) regimens. A state-transition model of HIV infection was adapted to simulate clinical care in Côte d'Ivoire and evaluate the incremental cost-effectiveness of (1) no ART; (2) ART beginning with a non-nucleoside reverse transcriptase inhibitor (NNRTI)-based regimen followed by a boosted protease inhibitor (PI)-based regimen; and (3) ART beginning with a boosted PI-based regimen followed by an NNRTI-based regimen. Drug costs and treatment efficacies, but not NNRTI resistance levels, were most influential in determining optimal HIV drug sequencing in Côte d'Ivoire. Results of surveillance for NNRTI resistance should not be used as a major guide to treatment policy in resource-limited settings.

## **B. Reports** (alphabetical by author)

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Ashton, P. and Ramasar, V. (2001). **Water and HIV/AIDS: some strategic considerations in Southern Africa.** IN: A.R. & Henwood, R. (Eds.) *Hydropolitics in the Developing World: A Southern African Perspective*, African Water Issues Research Unit (AWIRU) (2002).

Link: [http://www.internationalwaterlaw.org/Articles/hydropolitics\\_book.pdf](http://www.internationalwaterlaw.org/Articles/hydropolitics_book.pdf)

This publication discusses the negative effects of the HIV/AIDS pandemic on the provision of water supply and efficient resource management. First a strategic overview of the HIV/AIDS pandemic in Southern Africa is provided and then the extent in which it influences and is influenced by water resource management on the continent is examined.

Centers for Disease Control and Prevention. (1999). **HIV and Its Transmission.** Atlanta, GA: CDC. Link: <http://www.cdc.gov/hiv/resources/factsheets/PDF/transmission.pdf>

This Fact Sheet discusses HIV transmission factors in the environment, households and business settings. For households, HIV has been transmitted between family members but this type of transmission is very rare. These transmissions are believed to have resulted from contact between skin or mucous membranes and infected blood. To prevent even

such rare occurrences, precautions, should be taken in all settings "including the home" to prevent exposures to the blood of persons who are HIV infected, at risk for HIV infection, or whose infection and risk status are unknown. CDC recommends that gloves should be worn during contact with blood or other body fluids that could possibly contain visible blood, such as urine, feces, or vomit.

Centers for Disease Control and Prevention. (2007). **What You Need to Know About HIV and AIDS**. Atlanta, GA: CDC. Link: [www.cdc.gov/hiv/resources/brochures/careathome/care3.htm](http://www.cdc.gov/hiv/resources/brochures/careathome/care3.htm)

This brochure discusses how HIV is spread and how it is not spread. The brochure clearly says that HIV is not spread through feces, but that other germs can be transmitted through feces.

Centers for Disease Control and Prevention. (2007). **What Women Can Do**. Atlanta, GA: CDC. Link: [www.cdc.gov/hiv/topics/women/protection.htm](http://www.cdc.gov/hiv/topics/women/protection.htm)

This resource outlines the things that women can do to protect themselves from getting infected with HIV. The document tells women not to douche as it removes some of the body's natural protection.

Chandler, R., Decker, C. & Nziyige, B. (2004). **Estimating the Cost of Providing Home-based Care for HIV/AIDS in Rwanda**. PHRplus. Link: [http://www.phrplus.org/Pubs/Tech045\\_fin.pdf](http://www.phrplus.org/Pubs/Tech045_fin.pdf)

Partners for Health Reform Plus estimated the cost of Home-based Care for HIV in Rwanda, based on a sample of eight programs offering care in early 2004. The study found that facility-based care has higher estimated costs per client than community-based care, with monthly costs per client ranging from approximately \$ 31.20 to \$36.01 per month, the cost of community-based care ranged from \$ 12.75 to \$ 24.53 per month.

Fox, S. (2002). **Integrated Community-based Home Care (ICHC) in South Africa: a review of the model implemented by the Hospice Association of South Africa**. Cape Town, South Africa: POLICY Project. Link: [http://www.synergyaids.com/documents/Hospice\\_SAfrica.pdf](http://www.synergyaids.com/documents/Hospice_SAfrica.pdf)

In 1999 the POLICY Project supported seven hospices to incorporate the Integrated Community-based Home Care (ICHC) model into their operational activities. In the light of the grant period drawing to an end, this report was commissioned to document the critical elements of the ICHC model and reflect on the experiences of those working in the field. Objectives of the research were to: (1) identify and discuss key similarities and differences between the hospice ICHC model and other home-based care models used in South Africa; (2) identify and critically review the core elements related to the ICHC model as implemented by Hospice Association of South Africa; and highlight key aspects of best practice related to the hospice ICHC model. This report outlines information from a literature review and field research pertaining to these three objectives.

HABITAT. (2007) **HIV/AIDS checklist for water and sanitation projects**. Nairobi: United Nations Human Settlements Programme. Link: <http://www.unhabitat.org/pmss/getPage.asp?page=bookView&book=2068>

The HIV/AIDS checklist for water and Sanitation projects is a reference guide on how to deal with the issues raised by HIV/AIDS in the project cycle and to help practitioners in

the water and sanitation sector design appropriate HIV/AIDS strategies, components and indicators to respond to the pandemic.

Hillbrunner, Chris. (2007). **Workshop on Integration of Water, Sanitation and Hygiene into HIV/AIDS Home-based Care Strategies: Background Paper**. Baltimore, MD: Catholic Relief Services.

This paper is an introduction for a workshop in Malawi to integrate water, sanitation and hygiene into HIV/AIDS home based care strategies. The background section provides information on the current status of the HIV/AIDS epidemic in Malawi, the country's water, sanitation and hygiene situation and an outline of the key linkages between these two sectors. A second section focuses on common findings and recommendations from the six WHO/USAID country assessments with additional Malawi specific information. A third section then highlights key lessons learned and recommendations. The paper ends with a series of issues requiring further discussion.

Hygiene Improvement Project. (2006) **Integrating Hygiene Improvement into HIV/AIDS Programming to Reduce Diarrhea Morbidity**. Washington DC: U.S. Agency for International Development.

Link:

<http://www.hip.watsan.net/content/download/1528/7298/file/HIP%20HI%20and%20HIV-AIDS%20integration8-06.pdf>

The purpose of this paper is to highlight discrete hygiene improvement activities that can be incorporated into HIV/AIDS programs in different settings to help mitigate the impact of diarrhea on people living with HIV and AIDS (PLWHA) and their families—prolonging and improving the quality of life for PLWHA and protecting family members and caregivers from contracting diarrhea.

IRC Water and Sanitation Centre. (May 2007). **HIV/AIDS : caring for HIV-infected people in South Africa requires love, patience and 200 litres of water per day**. *SOURCE Newsletter*, May 2007.

Link: <http://quisana.antenna.nl/pipermail/source-weekly/2007/000148.html>

This newsletter article discusses a Mvula Trust survey of home-based caregivers in the peri-urban settlement Jeppe's Reef. HBC groups say that they need 200 litres of water a day to care properly for their patients – 75-100 litres for laundry and the rest for cooking, bathing and drinking. Water for bathing and laundry is disposed of in toilet pits rather than being used for other purposes as it is used for washing soiled clothing and bedding and contains disinfectants. Another finding was that it is important for people with HIV to have access to clean toilets. Caregivers found that some models were more suitable than others.

IRC International Water and Sanitation Centre. (2007) **HIV/AIDS: Making the links with WASH**. Delft: IRC.

Link: <http://www.irc.nl/page/32435>

This web page lists a series of questions that need to be answered for discussing the specific water, sanitation and hygiene needs of households affected by HIV/AIDS.

Jones, H. & Reed, B. (2005). **Water and Sanitation for Disabled People and Other Vulnerable Groups: Designing services to improve accessibility**. Loughborough,

UK: WEDC.

Link: <http://wedc.lboro.ac.uk/>

A major contributing factor to the poverty of disabled people is their lack of access to sanitation and safe water. Many vulnerable groups of people experience difficulties using water and sanitation facilities, such as frail, elderly people, pregnant women, parents with small children, and people who are injured or sick – including people with AIDS. Despite the size of the problem, almost nothing has been published on this subject to date, and disabled people continue to be ignored by providers of water and sanitation services. Based on three years of international research and collaboration with water and sanitation and disability sector organizations, this book's main focus is on facilities for families in rural and peri-urban areas of low- and middle-income countries, but many of the approaches and solutions may also be applied in institutional settings, such as schools and hospitals and in emergency situations.

Kamminga, E. & Wegelin-Schuringa, M. (2006). **HIV/AIDS and Water, Sanitation and Hygiene: Thematic Overview Paper**. Delft: IRC International Water and Sanitation Centre.

Link: [http://www.irc.nl/content/download/4199/48511/file/TOP2HIV\\_AIDS05.pdf](http://www.irc.nl/content/download/4199/48511/file/TOP2HIV_AIDS05.pdf)

IRC's Thematic Overview Paper on HIV/AIDS discusses the main principles of HIV/AIDS and water, sanitation and hygiene, based on worldwide experiences and views of leading practitioners. It also provides direct links to more explanations and documented experiences of critical aspects of the topic. Some of the topics in the document include: (1) Some basic facts about the HIV/AIDS epidemic; (2) Linkages between HIV/AIDS and water, sanitation and hygiene from different perspectives: health, gender, community management, poverty alleviation and human rights, (3) The impact of HIV/AIDS on WSH organizations and service providers, etc.

Kangamba, M., Roberts, C. Campbell, J., Service, J. & Adalla, C. (2006). **Catholic Relief Services – Water and Sanitation Assessment of Home-based Care Clients in Zambia**. Baltimore, MD: Catholic Relief Services.

Link: [http://pdf.usaid.gov/pdf\\_docs/PNADJ423.pdf](http://pdf.usaid.gov/pdf_docs/PNADJ423.pdf)

CRS responded to an announcement by the World Health Organization to conduct an assessment on the adequacy of water, sanitation and hygiene in relation to home-based care strategies for people living with HIV&AIDS in Zambia. One goal of the assessment was to provide evidence-based guidance on water and sanitation needs in home-based care strategies, particularly in resource-poor situations. Another goal was to identify the most critical measures to be taken by the health sector and the water and sanitation sector to provide short- and medium-term solutions in the area of water, sanitation and hygiene support to home-based care.

Kgalushi, R., Smits, S. & Eales, K. (2004). **People living with HIV / AIDS in a context of rural poverty: the importance of water and sanitation services and hygiene education, A case study from Bolobedu (Limpopo Province, South Africa)**.

Johannesburg, South Africa: The Mvula Trust and Delft, IRC International Water and Sanitation Centre.

Link:

[http://www.irc.nl/content/download/11414/167794/file/Case\\_study\\_Limpopo\\_South\\_Af.pdf](http://www.irc.nl/content/download/11414/167794/file/Case_study_Limpopo_South_Af.pdf)

This case study was undertaken by the NGO, The Mvula Trust, and recommends that the water sector give more attention to the specific effects of inadequate services on those who are HIV positive. It states that efforts to strengthen targeted multi-sectoral initiatives – notably with health and agricultural sectors and in schools – can have a key role in promoting closer integration of support and training to care givers.

Kiongo, J.M. (2005). **The Millennium Development Goal on Poverty and the Links with Water Supply, Sanitation, Hygiene and HIV/AIDS: A case study from Kenya**. Delft: IRC International Water and Sanitation Centre.  
Link: [http://www.irc.nl/content/download/14995/199310/file/Case\\_study\\_Poverty-Watsan-H.pdf](http://www.irc.nl/content/download/14995/199310/file/Case_study_Poverty-Watsan-H.pdf)

This case study reviews the water supply and sanitation conditions in Kenya in relation to the Millennium Development Goals and with specific reference to the HIV/AIDS epidemic. Major conclusions are that the National HIV/AIDS strategy does not address any of the water and sanitation related needs of HIV/AIDS affected families. The Human Resource Development strategies of the WATSAN sector do not sufficiently take the implications of the HIV/AIDS epidemic into account. One of the recommendations is a partnership initiative for water, sanitation and hygiene promotion for health and livelihoods of the poor.

Laurent, P. (2005). **Household Drinking Water Systems and Their Impact on People with Weakened Immunity**. Geneva: World Health Organization. Link: [http://www.who.int/household\\_water/research/HWTS\\_impacts\\_on\\_weakened\\_immunity.pdf](http://www.who.int/household_water/research/HWTS_impacts_on_weakened_immunity.pdf)

This report evaluates selected household water treatment systems, their respective strengths and weaknesses and their potential impact on people with weakened immune systems. The water treatment options that were evaluated include: boiling, pasteurization (fuel, firewood, solar radiation or cooking), solar disinfection, UV lamps disinfection, chemical disinfection (chlorination, preceded or not by coagulation/floculation and/or filtration), and ceramic filters in particular, other types of filters in general.

Lockwood, K., Msapato, K., Senefeld, S., Nigi, J., Perrin, P., Mitka, M. (2006). **Catholic Relief Services: Water and Sanitation Assessment of Home-Based Care Clients in Malawi**. Baltimore, MD: Catholic Relief Services.  
Link: [http://pdf.usaid.gov/pdf\\_docs/PNADJ422.pdf](http://pdf.usaid.gov/pdf_docs/PNADJ422.pdf)

Catholic Relief Service conducted an assessment on the adequacy of water, sanitation and hygiene in relation to home-based care strategies for people living with HIV&AIDS in Malawi. The assessment was commissioned by the World Health Organization with the goal of producing evidence-based guidance on water and sanitation needs in home-based care strategies, particularly in resource-poor situations. In addition, to the assessment findings, this report makes recommendations to be made at the policy level, while also identifying the most critical measures to be taken by the health sector and the water and sanitation sector to provide short and medium-term solutions in the area of water, sanitation and hygiene support to home-based care.

Millennium Water Alliance. **Quality of life: Exploring the links between living with HIV/AIDS and safe water and sanitation**.  
Link: [www.mwawater.org/pdf/MWA%20H2O%20HIV%20final%20404%20\(2\).pdf](http://www.mwawater.org/pdf/MWA%20H2O%20HIV%20final%20404%20(2).pdf)

This paper provides a concise and useful overview of the many links between HIV/AIDS and clean water, improved sanitation, and adequate hygiene.

Mohammed, N., Gikonyo, J. (2005). **Operational Challenges: Community Home Based Care (CHBC) for PLWHA in Multi-Country HIV/AIDS Programs (MAP) for Sub-Saharan Africa**. Washington DC: World Bank.

Link: <http://www.worldbank.org/afr/wps/wp88.pdf>

This paper documents Community Home-based Care for Africa, focusing on the operational challenges and limitations. It does not deal specifically with water and sanitation issues but provides a thorough discuss of current CHBC practices in Africa. Research shows that an effective and affordable CHBC for PLWHA, has the potential to positively impact the health and social status of patients, families and the community as a whole. However, research has also shown that CHBC area facing a multitude of challenges and limitations which not only adversely affect their ability to carry out their activities, but also have the potential to exacerbate poverty and existing gender inequalities among affected families and communities

Obi, C.L., et al. (2006). **The interesting cross-paths of HIV/AIDS and water in Southern Africa with special reference to South Africa**. *Water SA* 32(3) July 2006 pp 323-344.

Link: <http://www.wrc.org.za/downloads/watersa/2006/Jul%2006/1955.pdf>

This article gives estimates of the HIV/AIDS epidemic in South Africa. In rural areas that lack electricity and potable water, the impact HIV/AIDS is more profound because of the role of water in cooking, drinking, consumption of anti-retrovirals and in the preparation of milk supplements for infants. People with compromised immune systems are more prone to several diseases than individuals whose immune systems are not compromised by HIV/AIDS. HIV/AIDS patients therefore have greater requirements for potable water than uninfected individuals. Improving water quality will lead to a decline in child and adult mortality as well as diarrheal diseases in people living with HIV/AIDS. The cross-paths between HIV/AIDS and water have long-term implications for effective water resource management and the provision of wholesome water to communities.

Potter, A. and Clacherty, A. (2007). **Water services and HIV/AIDS. Water, sanitation and health and hygiene education in the context of HIV/AIDS : a guide for local government councillors and officials responsible for water, sanitation and municipal health services**. Pretoria, South Africa, Water Research Commission.

This report is intended to assist local government water services and environmental health officials with planning and implementing water and sanitation services, together with health and hygiene education, in order to reduce the impact of HIV/AIDS. It sets out a framework for municipal responses to HIV/AIDS and highlights ways in which HIV/AIDS can be mainstreamed into water and sanitation planning, regulation, implementation and provision. In order to clarify the institutional complexities in water and environmental health services, it provides a model, strategies and indicators for implementing project-related health and hygiene education in the context of HIV/AIDS.

Schuler, N. (2005) **Lessons and Experiences from Mainstreaming HIV/AIDS into Urban/Water (AFTU1 & 2) Projects**. Washington DC: World Bank.

Link:

[http://iris37.worldbank.org/domdoc/PRD/Other/PRDDContainer.nsf/WB\\_ViewAttachments?ReadForm&ID=85256D2400766CC785257097005B8959&](http://iris37.worldbank.org/domdoc/PRD/Other/PRDDContainer.nsf/WB_ViewAttachments?ReadForm&ID=85256D2400766CC785257097005B8959&)

This study gives an overview of HIV/AIDS interventions in the World Bank's African urban portfolio and reviews the challenges and lessons learned from 13 urban /water projects in Benin, Burundi, Lesotho, Mozambique and several other African countries.

UNICEF. (2002). **HIV and Infant Feeding: a UNICEF Fact Sheet**. New York: UNICEF.  
Link: [http://www.unicef.org/publications/files/pub\\_hiv\\_infantfeeding\\_en.pdf](http://www.unicef.org/publications/files/pub_hiv_infantfeeding_en.pdf)

The Fact Sheet provides facts on breastfeeding and replacement feeding to protect infants and a brief overview of UNICEF infant feeding activities and projects.

UNICEF. (2002). **Mother-to-Child Transmission of HIV: a UNICEF Fact Sheet**. New York: UNICEF.  
Link: [www.unicef.org/adolescence/files/pub\\_factsheet\\_mtct\\_en.pdf](http://www.unicef.org/adolescence/files/pub_factsheet_mtct_en.pdf)

The Fact Sheet provides facts on mother-to-child transmission of HIV, core principles and strategies to prevent transmission from a mother to her child and a brief overview of UNICEF MTCT activities and projects.

UNICEF. (2001). **Teacher's Guide for the Integrated Water, Sanitation and Hygiene Education, and HIV/AIDS for Grades 1 to 7**. Lusaka, Zambia: UNICEF. Link: [www.schoolsanitation.org/Resources/Readings/Zambia\\_teachersguide%5B1%5D.pdf](http://www.schoolsanitation.org/Resources/Readings/Zambia_teachersguide%5B1%5D.pdf)

The guide covers the following themes: personal, water, food and community hygiene as well as HIV/AIDS facts, prevention, support, and care for those with HIV/AIDS. It includes participatory activities such as role-play, guessing games, case studies, surveys, mime, etc.

Water and Sanitation Program. (2007). **Water, Sanitation, and Hygiene for People Living with HIV and AIDS**. Washington DC: Water and Sanitation Program.  
Link: [http://www.wsp.org/filez/pubs/72200723130\\_SAHIVAIDSFN.pdf](http://www.wsp.org/filez/pubs/72200723130_SAHIVAIDSFN.pdf)

This WSP study was conducted among people living with HIV and AIDS and a section of the population in selected areas of the Indian states of Tamil Nadu and Andhra Pradesh. It was followed by a national consultation for disseminating the findings of the study, building consensus on the need for mainstreaming water, sanitation, and hygiene safety messages in care and support programs for people living with HIV and AIDS, and identifying further strategies. This was followed by two state-level consultations in the two states. The Field Note summarizes the learnings from the study commissioned by the Program, the proceedings of the national and state-level consultations, and from desk research on other studies and experiences, mainly in South Asia.

WaterAid – **Making the links: Mapping the relationship between water, hygiene and sanitation, and HIV/AIDS: a joint think-piece by WaterAid Ethiopia and Prognist**. London: WaterAid.  
Link: <http://www.wateraid.org/documents/makinglinks.pdf>

This paper highlights key connections in the relationship between water, hygiene and sanitation provision, and HIV/AIDS. It also makes recommendations for additional research that needs to be conducted such as how many HIV/AIDS sufferers are contracting (and eventually dying from) hygiene and sanitation related illnesses. More in-depth analysis of the different needs and concerns of different categories of people living with HIV/AIDS is important. The situation in rural areas is likely to be significantly

different to that in congested urban slum areas. And any future study should differentiate along gender and age lines, as well as considering the different situations of those who may only recently have become infected with the virus compared to those who are in an advanced stage of full-blown AIDS. Many questions need asking. These include: What is the nature of the link between levels of infection of HIV/AIDS and the provision of hygiene and sanitation facilities? What is the relative importance of hygiene and sanitation compared to nutrition, medical care, etc? Do we need a better understanding, briefly alluded to, of the three-way causal relationship between hygiene and sanitation, poverty and HIV/AIDS? Should agencies working to improve the well being of people living with HIV/AIDS be concentrating their efforts on hygiene and sanitation activities? And how might the WATSAN sector reduce the risk that people living with HIV/AIDS experience hygiene and sanitation related discrimination?

WaterAid. (2006). **Assessment of the Adequacy of Water, Sanitation and Hygiene Facilities in Resource-poor Areas of Nigeria in Relation to the Needs of Vulnerable People**. Abuja, Nigeria: WaterAid Nigeria.

This study was conducted in 36 communities in six of Nigeria's 36 states. Respondents indicated their HIV status had financial, health, social, physio-social and educational impacts on their lives. However, generally, there was considerable social support from relations and family members even though their major caregivers were adult females (90%). The study revealed that PLWHAs did not have adequate access to water and sanitation. Although a variety of improved and unimproved water sources were available in the communities studied, the improved sources (e.g. boreholes) which provided potable water were less than a quarter of what is required to serve the entire population. Availability of water varied with the season: more water was available to respondents in the rainy season because respondents predominantly relied on rain water during this period. During the dry season when water is scarce or in during times of illness, some PLWHAs (18.6%) resort to unimproved water sources of very poor quality. Stigma and discrimination against PLWHAs is a significant factor affecting access to water supply. 29% of respondents attested that they have felt unwelcome, uncomfortable, and discriminated against at a water point. They resorted to commercial water vendors to avoid such confrontations. Access to sanitation among PLWHAs was low. 47% of the PLWHAs did not have their own household latrines. Although the use of personal latrines was believed to promote privacy for respondents, many could not access these due to lack of funds.

Water Environment Federation. (1997). **WEF/U.S. EPA Biosolids Fact Sheet: Can AIDS Be Transmitted By Biosolids?** Alexandria, VA: Water Environment Federation.

Link: <http://www.biosolids.org/docs/intro.pdf>

The possibility of HIV entering municipal sewer systems has prompted inquiries as to whether HIV may be transmitted through contact with wastewater or with biosolids, the solid product created during wastewater treatment. Research has refuted links between contact with wastewater or biosolids and HIV transmission.

Water Supply and Sanitation Collaborative Council; Water, Engineering and Development Centre. (2004). **For Her It's the Big Issue: Putting Women at the Centre of Water Supply, Sanitation and Hygiene**. Water, Sanitation and Hygiene Evidence Report. Geneva: Water Supply and Sanitation Collaborative Council.

Link:

[http://www.wsscc.org/fileadmin/files/FOR\\_HER\\_ITs\\_THE\\_BIG\\_ISSUE\\_Evidence\\_Report-en.pdf](http://www.wsscc.org/fileadmin/files/FOR_HER_ITs_THE_BIG_ISSUE_Evidence_Report-en.pdf)

This report provides key messages and recommendations to promote the role of women in water, sanitation and hygiene (WASH) interventions. Even though women's involvement in the planning, design, management and implementation of such projects and programs has proved to be fruitful and cost-effective, the substantial benefits of this approach are not properly recognized. One result is that, all too often, women are not as centrally engaged in water and sanitation efforts as they should be.

Wegelin-Schuringa, M. Kamminga, E. & de Graaf, S. (2003) **Towards the Millenium Development Goals: HIV/AIDS and Its Implications for the Water and Sanitation Sector**. Abuja, Nigeria: WEDC 29th International Conference.  
Link: <http://wedc.lboro.ac.uk/conferences/pdfs/29/Wegelin-Schuringa.pdf>

This conference paper has a section on Home Based Care and concludes that: "caregivers need to be trained in safe water handling and sanitation practices, personal hygiene, domestic hygiene, food hygiene and safe waste water disposal and drainage to effectively reduce the exposure to water and sanitation related diseases of their patients. Therefore, hygiene education must be one of the elements in training for home based care. Most training manuals for home based care do mention the need for hygiene and the use of safe water and latrines, but the manuals are based on an assumption that everyone has access to safe water and sanitation. They moreover assume that caregivers are informed on safe water handling practices. The advice that most care givers give to households with people living with HIV/AIDS (PLWHA) is to boil water for drinking. This is not always realistic."

Wegelin-Schuringa, M. & Kamminga. (2006). **Water and sanitation in the context of HIV/AIDS - The right of access in resource-poor countries**. *Health and Human Rights, 9(1) 2006: 153-172*.  
Link: [Download pdf \(154 Kb\)](#).

This article reviews the linkages between these sectors and HIV/AIDS from a rights perspective and gives suggestions for strategies to be undertaken by state and non-state actors to promote access to water and sanitation as a right in an HIV/AIDS context.

Wegelin-Schuringa, M., and G.Tiendrebeogo (eds) (2004), **Techniques and Practices for Local Responses to HIV/AIDS. Part 1: techniques Part 2: practices**. Amsterdam: KIT Publishers; and Geneva: UNAIDS.

This toolkit documents experiences of communities around the world in dealing with HIV/AIDS. Techniques and practices are presented for others to learn from and adapt to their own context. Whenever possible, a contact address is given to enable users to get more information or to share their experience of using and adapting a given technique or practice. 'Part 1: Techniques' contains 20 techniques for application in different stages of the planning cycle. The purpose and use of each technique is described, and practical guidelines are given on how to proceed. 'Part 2: Practices' contains 50 practices used to address one or more specific problems. The practices are grouped into four categories: prevention, care and treatment, support and mitigation, and partnership and coordination.

WELL Project. (2004). **WELL Briefing Note: The HIV / AIDS Millennium Development Goal - What water, sanitation and hygiene can do.** London: WELL Project.  
<http://www.lboro.ac.uk/well/resources/Publications/Briefing%20Notes/BN%20HIV%20AIDS.htm>

This Briefing Note states that even if there is no direct evidence of the impact of water, sanitation and hygiene on the care of HIV/AIDS patients, it is clear that water, sanitation and hygiene makes care of the sick within the home easier. Due to the establishment of a safe water supply, water used for personal bathing, washing clothing and utensils increased from about 3 0% to more than 50% of total water consumption. Volume of water consumption for potable and non potable purposes increased from 40 to 100 litres per day in India. Bathing using soap increased from less than once a week to as often as every day. The existence of a yard tap nearly doubles the chances of a mother washing her hands after cleaning a child's anus, and doubles the chances of her washing faecally soiled linen immediately. Households with a distant water source cooked little, and only once a day because of a lack of water. A study in Salvador, Brazil, showed that children in households with no toilet, had twice the incidence of diarrhea than those with sanitary toilets.

WELL Project. **The HIV/AIDS Millennium Development Goal HIV/AIDS and water supply, sanitation and hygiene in Southern Africa.** London: WELL Project. Link:  
<http://www.lboro.ac.uk/well/resources/Publications/Briefing%20Notes/WELL%20HIV%20Poster%20Southern%20Africa%20NC.pdf>

This Poster looks at what school water, sanitation and hygiene can do to help fight HIV/AIDS in children in Southern Africa.

Wijk van, C. (2003). **WELL Factsheet: HIV/AIDS and water supply, sanitation and hygiene.** London: WELL Project.  
Link: <http://www.lboro.ac.uk/well/resources/fact-sheets/fact-sheets-htm/hiv-aids.htm>

An overview of the impacts of HIV/AIDS on families and households is discussed and a section on recommendations for the water sector is provided. It recommends that more robust water supplies, water treatment and sanitation systems requiring less (and less complex) maintenance and repairs, and more attention to home systems, including home treatment of drinking water, would make communities and households less dependent on outside support.

World Health Organization. (2000) **Home-based Long-term Care: Report of a WHO Study Group.** Geneva: World Health Organization.  
Link: [http://whqlibdoc.who.int/trs/WHO\\_TRS\\_898.pdf](http://whqlibdoc.who.int/trs/WHO_TRS_898.pdf)

This report of a WHO Study Group provides guidance on the development, implementation, adjustment and monitoring of home-based long-term care. It includes definitions of long-term care and home-based long-term care and covers policy development, organization and management, financing mechanisms, and material and human resources (both formal and informal). The report also looks at the challenges of migration and living conditions; changes in the family and work-place; natural and other disasters and their aftermath; cost and sustainability; and accessibility, acceptability, adequacy, coverage, and quality of services and care.

World Health Organization. (2003). **Emerging Issues in Water and Infectious Disease**. Geneva: World Health Organization.  
Link: [http://www.who.int/water\\_sanitation\\_health/emerging/emerging.pdf](http://www.who.int/water_sanitation_health/emerging/emerging.pdf)

This WHO report provides an overview of HIV/AIDS and other infectious diseases that are spread by contaminated water supplies.

### C. Guidelines/Manuals

Colton, T., Dunnington, L., Hainsworth, G. & Israel, E. (2006). **Community Home-Based Care for People and Communities Affected by HIV/AIDS: A Handbook for Community Health Workers**. Watertown, MA: Pathfinder International.  
Link: [http://www.pathfind.org/site/DocServer/CHBC\\_HB\\_Complete.pdf?docID=7961](http://www.pathfind.org/site/DocServer/CHBC_HB_Complete.pdf?docID=7961)

The Handbook draws on the experience of Pathfinder community home-based care (CHBC) in projects in Kenya, Tanzania, Ethiopia, Nigeria, and Uganda. Pathfinder's CHBC model, emphasizes community mobilization for prevention as well as participation in care and support for those affected by HIV/AIDS. It includes diagrams and instructions for purifying drinking water and sections on personal and food hygiene.

Colton, T., Dunnington, L., Hainsworth, G. & Israel, E. (2006). **Community Home-Based Care for People and Communities Affected by HIV/AIDS A Comprehensive Training Course for Community Health Workers, Trainer's Guide**. Watertown, MA: Pathfinder International.  
Link: [http://www.pathfind.org/site/DocServer/CHBC\\_Trainer\\_s\\_Guide\\_Complete.pdf?docID=8001](http://www.pathfind.org/site/DocServer/CHBC_Trainer_s_Guide_Complete.pdf?docID=8001)

This curriculum is primarily based on Pathfinder's experience in sub-Saharan Africa, But it is intended to provide a global model for community home-based care which can be adapted into local contexts as needed. Other successful approaches from local and international organizations and projects were also added to enrich the content and training methodologies. The curriculum was pre-tested in Tanzania and Mozambique, and underwent an internal and external peer review.

Family Health International. (2004). **Module 4: Monitoring and Evaluating Community Home-Based Care Programs**. Research Triangle Park, NC: Family Health International.

This training module is for workshop participants and teaches: (1) the components of community home-based care (CHBC) that need to be monitored, (2) how to develop home-based care (HBC)-specific process indicators, and (3) to identify appropriate monitoring and evaluation methodologies and tools.

Link: <http://www.fhi.org/NR/rdonlyres/ehz3d4ozmhvbvbjpcehueub57rj222dojjm6nvyodu4ljdambpht2ipj5mxelce7w4ctj3eyyl5dc/Mod04.pdf>

Hsi, N. Musau, S. & Chanfreau, C. (2005). **HIV/AIDS Home- Based Care Costing Guidelines**. Bethesda, MD: PHRplus.  
Link: [http://pdf.usaid.gov/pdf\\_docs/PNADE226.pdf](http://pdf.usaid.gov/pdf_docs/PNADE226.pdf)

The guidelines present costing principles that can be applied to HBC interventions at community level, to allow for determinations of the cost of HBC approaches. They then take users through a 10-step process in which they define the

boundaries of an existing, expanding, or proposed HBC program; identify and quantify the resource requirements of that program; collect needed cost and other data; analyze the data in terms of total and unit costs; and apply the results.

Kenya National AIDS/STD Control Programme. (2002). **National Home-Based Care Programme and Service Guidelines**. Nairobi: Ministry of Health.

These guidelines call for the use of "clean boiled water for cooking and drinking to prevent diarrhea. It states that after cleaning soiled children or sick people more protection is required, especially the use of gloves or other protective material. For cleaning infected wounds, it recommends the use polythene bags (or gloves if available) and washing hands before and after the procedure. For dressings that are re-used, rinse thoroughly in cold water and pour the rinse water into the latrine. Soak dressings in bleach solution or boil. Wash with water and soap, rinse well, and hang in the sun. Dispose of soiled dressings that are not reused by burning or throwing into the pit latrine.

Lamptey, P.R. (n.d.). **HIV/AIDS Prevention Care Resource-Constrained Settings: A Handbook for the Design and Management of Programs**. Research Triangle Park, NC: Family Health International.  
[www.fhi.org/NR/rdonlyres/eh7tyyfcpwmy6w3okmfxspm3cyenzp55jaooz3omemjlggh3w4sn2dnybkbhw3sq4cegcvefivihmm/HIVAIDSPreventionCare1enhv.pdf](http://www.fhi.org/NR/rdonlyres/eh7tyyfcpwmy6w3okmfxspm3cyenzp55jaooz3omemjlggh3w4sn2dnybkbhw3sq4cegcvefivihmm/HIVAIDSPreventionCare1enhv.pdf)

This comprehensive manual provides guidelines on planning, implementing and evaluating HIV/AIDS programs. It mentions boiling and filters to improve household water quality and states that "improvements in water and sanitation reduce labor demands on affected families and community members who want to help, thus giving them more time to do so."

Malawi Ministry of Gender and Community Services. (2003). **National Policy on Orphans and Other Vulnerable Children**. Lilongwe: Ministry of Gender and Community Services.

This policy document does not deal with water, sanitation and hygiene issues. The key areas covered by the National Policy on Orphans and other Vulnerable Children include Provision of Assistance, Coordination, Institutional and Legal Framework, Transparency and Accountability, Monitoring and Evaluation. It emphasizes that care for orphans and other vulnerable children remain the responsibility of families and communities. The Policy emphasizes community-based approaches because they have proved to be highly sustainable. In this regard institutional care for orphans and other vulnerable children should be the last resort.

Malawi Ministry of Health. (2005). **National Community Home Based Care Policy and Guidelines**.

In the section on Nutrition Support, the Guidelines specify that "water shall be obtained from a protected source and safety measures taken to avoid contamination."

Malawi National AIDS Commission. **Community home-based care providers' handbook**. National AIDS Commission. Link:  
<http://www.aidsmalawi.org.mw/contentdocuments/HBC%20Providers'%20Handbook.pdf>

The handbook provides information about the organization of Malawi's national home-based care program and includes chapters on counseling, communication, treatment and other topics.

Malawi National AIDS Commission. (2003). **Malawi national HIV/AIDS policy: a call for renewed action**. Lilongwe: National AIDS Commission.

Link:

<http://www.aidsmalawi.org.mw/contentdocuments/Malawi%20National%20HIVAIDS%20Policy.pdf>

Malawi's policy provides technical and administrative guidelines for the design, implementation and management of HIV/AIDS interventions, programs and activities. It offers guidance on critical intervention areas, among them social and economic support for people living with HIV/AIDS (PLWAs); provision of care and support for treatment to achieve a better quality of life for Malawians living with HIV/AIDS; and protection of their human rights and freedoms.

PACT. **Home-based Care for People living with HIV/AIDS: Course Notebook for Participants**. Washington DC: U.S. Agency for International Development.

Link: [http://www.pactworld.org/reach/documents/HBC\\_training\\_participant\\_guide.pdf](http://www.pactworld.org/reach/documents/HBC_training_participant_guide.pdf)

The Course Notebook for Participants is a learning resource package to equip the caregiver, the supervisor and any home-based care participant with the skills to ensure that the home-based care program works effectively. The components of the package include: medical care (both nursing and clinical), support and counseling, psychosocial support (including spiritual support), AIDS education, health education, nutrition, hygiene and sanitation.

South Africa. **National Guideline on Home-based Care and Community Based Care**.

This 14 page document provides information on general goals and principles of home-based care programs. It does not include any specific mention of water, sanitation or hygiene issues or practices.

Tanzania Ministry of Health. (2005) **Guidelines for Home Based Care Services**. Dar Es Salaam: Ministry of Health.

Link:

<http://www.nacptz.org/publications/Guidelines%20for%20HBC%20Services%20Feb-2005.pdf>

These Guidelines were developed by Tanzania's Ministry of Health to support the effective implementation of the National Care & Treatment Plan for People Living with HIV/AIDS. As basic elements of a home-based care service it highlights: Identification and protection of water source and basic sanitation; Fetching, storage and utilization safe water; Proper utilization of sanitary facilities (latrines etc) and Community education on safe water and proper sanitation.

World Health Organization. (2002) **Community Home-based Care in Resource-limited Settings: A Framework for Action**. Geneva: World Health Organization.

Link: [http://www.who.int/chp/knowledge/publications/comm\\_home\\_based\\_care.pdf](http://www.who.int/chp/knowledge/publications/comm_home_based_care.pdf)

This document provides a framework for establishing and maintaining community home-based care (CHBC) in resource-limited settings for people with HIV/AIDS and those with other chronic or disabling conditions. It is for governments, national and international donor agencies and community-based organizations (including nongovernmental

organizations, faith-based organizations and community groups) in developing or expanding CHBC programs. This document targets three audiences: policy-makers and senior administrators, middle managers and those who develop and run CHBC programs.

World Health Organization. (2002). **Living Well with HIV/AIDS: A Manual on Nutritional Care and Support for People Living with HIV/AIDS**. Rome: Food and Agriculture Organization. Link: [http://portal.unesco.org/education/en/file\\_download.php/69ac3b14bec384ed89414d26e57bde8enuitrition-AIDS-people.pdf](http://portal.unesco.org/education/en/file_download.php/69ac3b14bec384ed89414d26e57bde8enuitrition-AIDS-people.pdf)

This manual provides home care agents and local service providers with practical recommendations for a healthy and well-balanced diet for people living with HIV/AIDS. The manual was developed following an extensive review of existing guides from both developed and developing countries and includes sections on personal and food hygiene.

World Health Organization. (2006) **Guidelines for Drinking Water Quality**. Geneva: World Health Organization. Link: [http://www.who.int/water\\_sanitation\\_health/dwq/gdwq3rev/en/index.html](http://www.who.int/water_sanitation_health/dwq/gdwq3rev/en/index.html)

Developments in the third edition of the Guidelines include significantly expanded guidance on ensuring the microbial safety of drinking-water. For the first time, reviews of many waterborne pathogens are provided. "A typical *Mycobacterium* spp. can cause a range of diseases involving the skeleton, lymph nodes, skin and soft tissues, as well as the respiratory, gastrointestinal and genitourinary tracts. These bacteria are a major cause of disseminated infections in immunocompromised patients and are a common cause of death in HIV-positive persons."

World Health Organization. **IASC Guidelines for HIV/AIDS interventions in emergency settings**. Geneva: World Health Organization. Link: [http://www.who.int/3by5/publications/documents/en/iasc\\_guidelines.pdf](http://www.who.int/3by5/publications/documents/en/iasc_guidelines.pdf)

*Guidelines for HIV/AIDS interventions in Emergency Settings* is to help individuals and organizations in their efforts to address the special needs of HIV-infected and HIV-affected people living in emergency situations. The *Guidelines* are based on the experiences of organizations of the UN system and their NGO partners. It includes a section on HIV considerations when planning water supply and sanitation services.

Zambia National Food and Nutrition Commission. (2004). **Nutrition Guidelines for Care and Support of People Living with HIV/AIDS**. Lusaka: National Food and Nutrition Commission.

Chapter 8 of this Guideline is on Food Safety and Hygiene. It recommends that water for human consumption should come from protected sources such as boreholes or protected wells. If this is not possible, it states that water from rivers and streams should be treated. " PLWHA should always drink boiled or treated water." Regarding sanitation, the Guideline specifies that if flush toilets are not available, the use of clean, ventilated latrines and that handwashing facilities, soap and towels be provided within the latrine.

Zimbabwe Ministry of Health and Child Welfare. (2004). **National Community Home-based Standards**. Harare: Ministry of Health.

These standards are intended to give program managers and home-based care providers a foundation from which to identify gaps in their service and to seek the training and support they need. This guidebook presents the home-based care standards in five sections covering the following areas: Care and Support for Patient and Family; Team Service Provision; Governance and Management; Training, Information and Education; and Monitoring and Evaluation. Sample Data Collection Tools are included in the Annex. One of these, the Client Management Form, has a Safe Drinking Water category for monitoring a patient's environment.

Zimbabwe National Action Committee. (2004). **Zimbabwe water and sanitation sector HIV/AIDS response: programme, strategies and guidelines**. Zimbabwe: National Action Committee, Government of Zimbabwe, UNICEF.

Link:

[http://www.sarpn.org.za/documents/d0001030/Water\\_HIV\\_AIDS\\_Response\\_Guidelines\\_June2003.pdf](http://www.sarpn.org.za/documents/d0001030/Water_HIV_AIDS_Response_Guidelines_June2003.pdf)

Zimbabwe's National Action Committee for the Rural Water Supply and Sanitation Programme, developed these guidelines. This booklet contains guidelines/strategies for the integration of HIV/AIDS awareness into the water and sanitation sector activities and approaches in prevention, care and mitigating measures against the spread of HIV/AIDS. It also provides suggestions for possible water and sanitation related research areas in Zimbabwe.