

Behets, F., J. Andriamiadana, et al. (2001). "Sexually transmitted infections and associated socio-demographic and behavioural factors in women seeking primary care suggest Madagascar's vulnerability to rapid HIV spread." *Trop Med Int Health* **6**(3): 202-11.

OBJECTIVES: To examine sexually transmitted infections (STIs) and associated socio-demographic and behavioural factors in women seeking care for genital discharge syndrome in Antananarivo, Madagascar. **METHODS:** One thousand and sixty-six consecutive symptomatic women were interviewed and examined; bacterial vaginosis (BV), vulvovaginal candidiasis, trichomoniasis (TV), cervical infection (CI) due to chlamydial or gonococcal infections, and syphilis seroreactivity were determined by laboratory diagnosis. Associations between STIs and individual characteristics were evaluated using bivariate and logistic regression analyses. **RESULTS:** The prevalence of BV, TV, CI, and syphilis seroreactivity was, respectively, 85%, 16%, 49%, 16% in 94 prostitutes; 70%, 18%, 30%, 13% in 96 occasional sex traders; and 53%, 24%, 17%, and 4% in 876 general women. CI was independently and positively associated with a symptomatic partner, new sex partner in last 3 months, unfaithful partner, prostitution, joblessness and being < 25 years old. Syphilis was associated with low schooling, young age at coital debut, sex trading, and > 1 sex partner in the previous 3 months. **CONCLUSIONS:** These high STI rates and associated characteristics suggest the local vulnerability to rapid HIV spread and show the need for prevention efforts that involve youth, prostitutes, occasional sex traders, sex clients, and men who have concurrent sexual partnerships.

Bersoff-Matcha, S. J., M. M. Horgan, et al. (1998). "Sexually transmitted disease acquisition among women infected with human immunodeficiency virus type 1." *J Infect Dis* **178**(4): 1174-7.

Recent evidence suggests that sexually transmitted diseases (STDs) enhance the transmission of human immunodeficiency virus (HIV) type 1. In 143 HIV-infected women enrolled in a university-based longitudinal HIV clinic over 16 months (mean), the STD point prevalence was examined at enrollment and the cumulative prevalence was calculated at follow-up. At enrollment, 35 women (25%) had > or = 1 STD. These included trichomoniasis in 16 women (11%); syphilis, 9 (6%); genital herpes, 8 (6%); gonorrhoea, 5 (4%); chlamydia, 5 (4%); genital warts, 2 (1%); and pelvic inflammatory disease (PID), 1 (1%). STDs were found in 55 (42%) of the 125 patients who returned for at least one follow-up visit: trichomoniasis in 23 (18%); genital herpes, 20 (12%); gonorrhoea, 9 (7%); syphilis, 7 (6%); genital warts, 7 (6%); chlamydia, 5 (4%); and PID, 4 (3%). Despite counseling at both enrollment and follow-up, these women had a very high cumulative prevalence of STDs, indicating persistent high-risk sexual behavior.

Buve, A., H. A. Weiss, et al. (2001). "The epidemiology of trichomoniasis in women in four African cities." *Aids* **15 Suppl 4**: S89-96.

OBJECTIVES: To describe the epidemiology of *Trichomonas vaginalis* infection and its association with HIV infection, in women in four African cities with different levels of HIV infection. **DESIGN:** Cross-sectional study, using standardized methods, including a standardized questionnaire and standardized laboratory tests, in four cities in sub-Saharan Africa: two with a high prevalence of HIV infection (Kisumu, Kenya and Ndola, Zambia), and two with a relatively

low prevalence of HIV (Cotonou, Benin and Yaounde, Cameroon). METHODS: In each city, a random sample of about 2000 adults aged 15-49 years was taken. Consenting men and women were interviewed about their socio-demographic characteristics and their sexual behaviour, and were tested for HIV, syphilis, herpes simplex virus type 2 (HSV-2), gonorrhoea, chlamydial infection, and (women only) *T. vaginalis* infection. Risk factor analyses were carried out for trichomoniasis for each city separately. Multivariate analysis, however, was only possible for Yaounde, Kisumu and Ndola. RESULTS: The prevalence of trichomoniasis was significantly higher in the high HIV prevalence cities (29.3% in Kisumu and 34.3% in Ndola) than in Cotonou (3.2%) and Yaounde (17.6%). Risk of trichomoniasis was increased in women who reported more lifetime sex partners. HIV infection was an independent risk factor for trichomonas infection in Yaounde [adjusted odds ratio (OR) = 1.8, 95% confidence interval (CI) = 0.9-3.7] and Kisumu (adjusted OR = 1.7, 95% CI = 1.1-2.7), but not in Ndola. A striking finding was the high prevalence (40%) of trichomonas infection in women in Ndola who denied that they had ever had sex. CONCLUSION: Trichomoniasis may have played a role in the spread of HIV in sub-Saharan Africa and may be one of the factors explaining the differences in levels of HIV infection between different regions in Africa. The differences in prevalence of trichomoniasis between the four cities remain unexplained, but we lack data on the epidemiology of trichomoniasis in men. More research is required on the interaction between trichomoniasis and HIV infection, the epidemiology of trichomoniasis in men, and trichomonas infections in women who deny sexual activity.

Kengne, P., F. Veas, et al. (1994). "Trichomonas vaginalis: repeated DNA target for highly sensitive and specific polymerase chain reaction diagnosis." Cell Mol Biol (Noisy-le-grand) **40**(6): 819-31.

Trichomoniasis is recognised as a major sexually transmitted disease (STD) in the world and may act as an acquired immunodeficiency syndromes (AIDS) co-factor by enhancing the transmission of human immunodeficiency virus (HIV). Diagnosis of *Trichomonas vaginalis* can be achieved by several methods, but sensitive detection means are still lacking. In this study a 2000-bp repeated DNA fragment of *T. vaginalis* was cloned. Part of a conserved region of this insert was sequenced, two primers (TVK3 and TVK4) were chosen and a highly sensitive detection by polymerase chain reaction (PCR) was then developed for *T. vaginalis*. All strains of *T. vaginalis* analysed with these primers gave the expected 350-bp fragment and a 450-bp additional fragment. Sequence analysis of these PCR amplification products revealed that the 450-bp fragment contained the 350-bp with a 100-bp insertion characterised by a TGG microsatellite. A second primer set, namely TVK3 and TVK7 (determined at the border of the insertion), yielded PCR products of expected sizes. After amplification we were able to detect a single parasite. We also detected *T. vaginalis* in vaginal fluids of patients with STD. There was no reaction with human DNA or other infectious agents. It appears that the two set primers are highly specific of *T. vaginalis* and provide a useful tool for PCR diagnosis in asymptomatic and symptomatic patients especially among the HIV at risk individuals.

Laga, M., A. Manoka, et al. (1993). "Non-ulcerative sexually transmitted diseases as risk factors for HIV-1 transmission in women: results from a cohort study." Aids **7**(1): 95-102.

OBJECTIVES: The heterosexual spread of HIV-1 is occurring at different rates in different parts of the world. The transmission probability of HIV-1 per sexual contact is low, but may be greatly enhanced by several cofactors. Sexually transmitted diseases (STD), especially genital ulcers, may

be such factors. So far, epidemiological evidence that other STD facilitate HIV-1 transmission is weak. The objective of this study was to determine whether treatable STD enhanced sexual transmission of HIV-1 in a cohort of female prostitutes in Kinshasa, Zaire. METHODS: We conducted a nested case-control study of 431 initially HIV-1-negative women followed prospectively for a mean duration of 2 years (with monthly STD check-ups and 3-monthly HIV-1 serology). Cases (seroconverters, n = 68) were compared with controls (women who remained HIV-1-negative, n = 126) for incidence of STD and sexual exposure during the presumed period of HIV-1 acquisition. RESULTS: The annual incidence of HIV-1 in this cohort was 9.8%. Seroconverters were younger than HIV-1-negative women (mean age, 24.6 versus 26.8 years; P = 0.04). During the period of HIV-1 acquisition, cases had a much higher incidence of gonorrhoea, chlamydial infection and trichomoniasis, and engaged in unprotected sex with clients and partners more frequently than controls. After controlling for sexual exposure by multivariate analysis, adjusted odds ratios for seroconversion were 4.8 [95% confidence interval (CI), 2.4-9.8] for gonorrhoea, 3.6 (95% CI, 1.4-9.1) for chlamydial infection and 1.9 (95% CI, 0.9-4.1) for trichomoniasis. Genital ulcers were more frequent in cases than controls, but much less common than other STD. CONCLUSION: Non-ulcerative STD were risk factors for sexual transmission of HIV-1 in women, after controlling for sexual exposure. Because of their high prevalence in some populations, non-ulcerative STD may represent a considerable population-attributable risk in the transmission of HIV-1 worldwide. The identification of treatable STD as risk factors for HIV-1 transmission offers an important additional strategy for the prevention of HIV/AIDS.

Le Bacq, F., P. R. Mason, et al. (1993). "HIV and other sexually transmitted diseases at a rural hospital in Zimbabwe." Genitourin Med **69**(5): 352-6.

OBJECTIVE--To define the epidemiological characteristics of STD patients attending an outpatient clinic in rural Zimbabwe, to examine the aetiologic agents causing infection and to determine their relationship with HIV infection. SUBJECTS--319 men and 146 women, making a sample of about 7% all patients attending an STD clinic during the 3 month study period. Microbiological data were collected from 104 men and 72 women selected randomly from these. Pregnant women were excluded and patients who had received antibiotics within the previous 14 days were excluded from the microbiology sub-sample. SETTING--An outpatient STD clinic at a District Hospital on a major truck route about 300 km north of the capital, Harare. METHODS--All new patients attending the clinic during a 3 month period were enrolled for clinical and epidemiological investigations using a standard procedure. Specimens for microbiological investigation were taken from every second patient seen on the first three days of each week. RESULTS--The typical patient was male (m:f ratio 2.2) aged 20-29 years (68% patients), not married (56% men) and in paid employment (66% men vs. 27% for the district). In men the most common presenting feature was genital ulceration, while in women, discharges were more common. Genital warts were noted frequently in both sexes. In the sub-sample examined microbiologically, *H ducreyi* was isolated from 46% ulcers clinically diagnosed as chancroid, and motile spirochaetes were detected in 25% painless ulcers. Neither of these were detected in ulcers in women, but HSV antigen was found as frequently in ulcers from men (19%) as from women (17%). In patients with genital discharges, gonococcal infection occurred in 64% men and 17% women, while *T vaginalis* was isolated from 39% women and only 8% men. Over 60% gonococcal isolates were PPNG, and 18% showed in vitro resistance to tetracycline. Yeasts, mainly *C albicans* were isolated from 42% women with a discharge and 25% women with ulcers. In men the presence of yeasts was associated with superficial ulceration and itchiness of the glans. Positive HIV-1 serology was found in 64% patients. There was no statistical association with current genital ulcers, though there was an association with previous STD episodes and particularly with serological evidence of syphilis. Apart from yeasts, there was no association

between positive HIV-1 serology and the presence of pathogens in the genital tract.
CONCLUSIONS--The high prevalence of HIV-1 antibodies in STD patients in Karoi suggests integration of STD and AIDS control programmes to be a necessity. Since paid employment was a common feature of both STD clinic attendance and HIV-1 seropositivity, these programmes may be effectively directed through the work place.

Moodley, P., C. Connolly, et al. (2002). "Interrelationships among Human Immunodeficiency Virus Type 1 Infection, Bacterial Vaginosis, Trichomoniasis, and the Presence of Yeasts." *J Infect Dis* **185**(1): 69-73.

Vaginal discharge of mixed etiology occurs frequently, with abnormal vaginal flora being the most common condition. The interrelationships among the disturbance of the vaginal ecology, the presence of yeasts, and infection with *Trichomonas vaginalis* and human immunodeficiency virus type 1 (HIV-1) were investigated among women presenting to a sexually transmitted diseases service. Analysis was done for 598 women. Although the prevalence of HIV-1 infection increased linearly with increasing Nugent's score (bacterial vaginosis score of Gram stain), the prevalence of *T. vaginalis* increased suddenly, from 12% in patients with a Nugent's score of ≤ 3 to 33% in patients with a score of 4, and remained at this level at higher scores. Yeast colonization and vulvovaginal candidiasis were inversely related to Nugent's scores. *T. vaginalis* might be responsible for the change in normal vaginal flora and may, therefore, be one of the causes of bacterial vaginosis. This could lead to more effective HIV-1 acquisition.

Niccolai, L. M., J. J. Kopicko, et al. (2000). "Incidence and predictors of reinfection with *Trichomonas vaginalis* in HIV-infected women." *Sex Transm Dis* **27**(5): 284-8.

BACKGROUND AND OBJECTIVES: The presence of sexually transmitted infections (STIs) may facilitate transmission of HIV to uninfected partners. GOAL: To describe the incidence of reinfection with *Trichomonas vaginalis* in HIV-infected women and to assess predictors of reinfection. STUDY DESIGN: A retrospective cohort study using data abstracted from medical records of HIV-infected women with at least one diagnosis of trichomoniasis. RESULTS: Approximately one third (36%) of the study population was reinfected with *T vaginalis* during the follow-up period, with an incidence of 16.4 reinfections per 100 person years. Significant predictors of reinfection included history of another STI (hazard ratio, 1.52; 95% CI, 1.08-2.14) and becoming pregnant during the follow-up period (hazard ratio, 0.59; 95% CI, 0.39-0.87). CONCLUSIONS: There is a high rate of reinfection with *T vaginalis* in HIV-infected women. Further research that includes information on sexual partners should be conducted to better describe the reinfection patterns of trichomoniasis.

Paterson, B. A., S. N. Tabrizi, et al. (1998). "The tampon test for trichomoniasis: a comparison between conventional methods and a polymerase chain reaction for *Trichomonas vaginalis* in women." *Sex Transm Infect* **74**(2): 136-9.

OBJECTIVES: *Trichomonas vaginalis* is the most common STD worldwide and the infection has been linked with an increased risk of HIV transmission. We present a detailed comparison between conventional collection and testing methods and the polymerase chain reaction (PCR) tampon test for *T vaginalis*. METHODS: Women were tested for the presence of *T vaginalis* by PCR analysis of a tampon specimen and by conventional methods which included one or more of

the following: culture and microscopy from a high vaginal swab (HVS) or endocervical swab (ECS), and microscopy of a Papanicolaou (Pap) smear. RESULTS: T vaginalis was detected in 51/590 (8.6%) conventional tests and 93/590 (15.8%) tampon specimens. Retesting of all tampon PCR positive specimens confirmed 89/93 (95.7%) tests. Using the tampon PCR as the reference, the sensitivities of the different conventional sampling and testing methods for the detection of T vaginalis were 8.3% (5/60) for ECS microscopy or culture, 31% (13/42) for HVS microscopy or culture, 52.8% (19/36) for HVS directly inoculated into Trichomonas medium and 59.4% (38/64) for Pap smear. CONCLUSIONS: No conventional test in the remote setting has comparable sensitivity to PCR. The Pap smear is the next most sensitive, but requires a speculum examination. The use of PCR will allow inclusion of T vaginalis into STD screening programmes in both developed (lower prevalence) and developing (higher prevalence) countries.

Sorvillo, F., Smith, L., Kerndt, P., Ash, L. (2001). "Trichomonas vaginalis, HIV, and African-Americans." Emerging Infectious Diseases 7(6): 927-32.

Trichomonas vaginalis may be emerging as one of the most important cofactors in amplifying HIV transmission, particularly in African-American communities of the United States. In a person co-infected with HIV, the pathology induced by T. vaginalis infection can increase HIV shedding. Trichomonas infection may also act to expand the portal of entry for HIV in an HIV-negative person. Studies from Africa have suggested that T. vaginalis infection may increase the rate of HIV transmission by approximately twofold. Available data indicate that T. vaginalis is highly prevalent among African-Americans in major urban centers of the United States and is often the most common sexually transmitted infection in black women. Even if T. vaginalis increases the risk of HIV transmission by a small amount, this could translate into an important amplifying effect since Trichomonas is so common. Substantial HIV transmission may be attributable to T. vaginalis in African-American communities of the United States.