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HIV/AIDS in African militaries: an ecological analysis

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The HIV/AIDS pandemic is considered a security threat. Policy-makers have warned of destabilization of militaries due to massive troop deaths. Estimates of the rate of HIV within African militaries have been as high as 90 per cent. We aimed to determine if HIV prevalence within African militaries is higher than their host nation prevalence rates. Using systematic searching and access to United States Department of Defense data, we abstracted data on prevalence within militaries and their host communities. We conducted a random effects pooled analysis to determine differences in HIV prevalence rates in the military versus the host population. We obtained data on 21 African militaries. In general, HIV prevalence within the military is elevated compared to the general population. The differences were significant (odds ratio 1.97, 95% confidence interval: 1.58–2.45, $P < 0.001$). Further, inflated rates of HIV in militaries compared to non-military males of similar age were also significant (6.09, 4.47–8.30, $P \leq 0.0001$). States with recent conflicts and wars had elevated military rates, but these were also not significant ($P = 0.4$). Population levels predicted military prevalence rates ($P \leq 0.001$). HIV/AIDS prevalence rates in most African militaries are significantly elevated compared to their host communities.

Keywords: AIDS; conflict; ecological analysis; HIV; military; post-conflict; war

Introduction

HIV/AIDS has been referred to as a pre-eminent security threat. The HIV/AIDS pandemic has overwhelmingly affected many countries in Africa, killing more people than any other preventable cause of death[1]. The United Nations Security Council has met twice regarding regional security instability in Africa due to the AIDS crisis. In 1997, UNAIDS estimated

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that sexually transmitted disease 'rates among armed forces are generally 2 to 5 times higher than in civilian populations; the difference can be even greater in times of conflict'[2]. Other media and academic journals have reported specific militaries as having as high as 90 per cent infection rates[3]. This concern about military infection rates has led some to speculate that HIV/AIDS will destroy military stability and allow war to perpetuate in the region[4–6]. But what is the accuracy of these estimates?

In 2002, there were 13 active wars going on within sub-Saharan Africa. By 2005, this number had dropped to five[7]. African Union peacekeepers now monitor peace in more than seven states within Africa[7]. Concern has existed for some time regarding soldiers' and peacekeepers' sexual behaviour as well as active military use of sexual violence and HIV/AIDS as a weapon of war[8].

There has been international concern that not only would heavily infected countries face reduced economic growth rates, but they would suffer weakening military forces[6,9]. The assumed high rate of HIV infection among Africa's militaries is seriously calling into question the capacity of their armed forces to respond to peacekeeping missions and regional crises[10,11]. Clearly, the HIV/AIDS epidemic is severely affecting Africa's military forces, but little is known about the extent of the problem because of a lack of comprehensive data[9]. Some have postulated that states most hard-hit by HIV do not publicly release such data, to prevent tipping off potential hostile forces to weaknesses in national defence[8].

We aimed to determine if the concern about elevated rates of HIV/AIDS in African militaries is supported by available evidence. We conducted a review of the evidence with a meta-analysis to determine the relationship between HIV/AIDS prevalence in the military and prevalence within the state populations.

Methods

Eligibility

Using systematic searching, we aimed to include any study or state report assessing HIV/AIDS prevalence within a stated African military force. We defined African states according to membership of the African Union[12]. We excluded review articles, media articles, and consensus articles.

Search strategy

We conducted extensive searching of the medical literature in English and non-English languages using the following electronic databases: Medline via PubMed, AIDSSearch, Nursing and Allied Health. Subject headings and key terms used for searching included HIV, AIDS, militaries, conflicts, soldiers, and armed forces. In addition to the aforementioned sources, we

conducted searches of the World Wide Web via Google Scholar to identify and review all articles that referenced HIV infection rates within the militaries. Finally, we accessed the US Department of Defense HIV/AIDS Prevention Program (DHAPP 2006) for up-to-date state reports.

Data abstraction

We abstracted data from the original studies on HIV/AIDS prevalence and details on the given military, location (state), and time period for data acquisition. We also abstracted data from the 2006 UNAIDS database on general HIV/AIDS prevalence in the specific countries as well as HIV/AIDS prevalence rates among males aged 15–24 in each country[1]. Using the Uppsala Conflict Database (www.pcr.uu.se/database), we obtained data on states with 'conflict' and 'wars' since 1989.

Statistical analysis

We conducted a linear regression analysis to examine if military prevalence rates were predicted by the state population level infection rates. This is displayed with standard errors and 95 per cent confidence intervals and can be interpreted according to the R^2 value, which estimates the amount of the variance explained by the association. Where available, we calculated proportions by first stabilizing the variances of the raw proportions (r/n) using a Freeman-Tukey type arcsine square root transformation: $y = arcsine(\sqrt{r(n+1)}) + arcsine(\sqrt{(r+1)/(n+1)})$, with a variance of $1/(n+1)$, where n is the denominator total sample size[13,14]. We calculated odds ratios and appropriate 95 per cent confidence intervals for the magnitude of difference between military and population estimates. We further conducted a random-effects meta-analysis to determine if prevalence rates were significantly different in the military compared with the general state population prevalence[15]. We calculated the I^2 statistic for the meta-analysis as a measure of the proportion of the overall variation that is attributable to between-study heterogeneity[16], and calculated the appropriate I^2 95 per cent confidence intervals[17]. The I^2 can be interpreted as $<25\%$ as low non-combinability, 25–50% as moderate, and $>50\%$ as large non-combinability. We conducted a sensitivity analysis to determine if military rates were significantly different from rates reported among males in the general population aged 15–24, as well as to determine if countries with an active 'conflict' (25–1000 deaths per year) between the years 1989–2005 and countries with active 'war' (more than 1000 deaths per year) between 1989–2005 were different from states that did not report such conflicts. All P-values are two-sided and we considered $P < 0.05$ as significant. We used StatsDirect (Manchester, Version 8.1, 2006) for all analyses.

Results

We identified data on 21 African militaries. Table 1 lists the military prevalence rates and the host-state prevalence rate with odds ratios. With the exception of the Republic of Congo, military prevalence rates were either similar to or in most cases higher than their country-specific population estimates. Additionally, findings from the random-effects pooled analysis indicates inflated rates of HIV in militaries compared to the general population (OR 1.97, 95% CI 1.58–2.45, $P \leq 0.0001$, $I^2 = 0\%$, 95% CI 0% to 41.5%, see Figure 1). This was also the case when we conducted a sensitivity analysis to examine whether prevalence rates in non-military males were different from military rates (OR 6.09, 95% CI 4.47–8.30, $P \leq 0.0001$, $I^2 = 0\%$, 95% CI, 0%–41.5%). When we evaluated countries with active 'conflicts' since 1989 compared to militaries without, we found no significant difference ($P = 0.35$). When we examined militaries with active 'wars' since 1989, we also found no significant difference ($P = 0.40$). Figure 2 demonstrates that there is a strong correlation between the prevalence rates within the military and the prevalence rates within the general population ($r = 0.84$, $P \leq 0.0001$, see Figure 2).

Discussion

In our analysis we found an elevated HIV prevalence among military recruits in 21 sub-Saharan African countries. Military prevalence should be of paramount concern to both the military and the local communities where militaries are stationed. While the specific-country rates were, in a few countries such as Benin and Kenya, comparable between the military and general population, in most cases they were importantly higher in the military. In Botswana, for example, military prevalence was almost double that of the general population. When we compared military prevalence to that of males aged 15–24 in the general population, military rates were significantly higher in each of the 21 countries examined. Further, findings from the pooled analysis indicate that, in general, military populations demonstrate inflated rates of HIV compared with young males in the general population. From this study it is clear that HIV/AIDS remains a major problem throughout militaries in sub-Saharan Africa, and this underlines the need for more targeted awareness campaigns to improve HIV prevention in the military. Additionally, improved financial support and universal access to antiretroviral therapy (ART) for infected recruits and in many cases, their families, are also needed. Notably, some African militaries have begun to respond to these pressing concerns and are making major steps to decrease the impact of HIV/AIDS on military stability[18], as we highlight below.

Our finding that HIV prevalence amongst military populations is, overall, significantly higher than the general population suggests that

Table 1. Comparison of HIV prevalence rates among the military, males aged 15–24, and the general population for 21 African countries.

Country	Population (in thousands)	Military HIV Prevalence	Male 15–24 HIV prevalence (low, high)	OR (95% CI)	Population HIV prevalence	OR (95% CI)
Angola	14,078	11	0.9 (0.4, 1.9)	13.61 (1.76, 1.20)	3.7	3.22 (0.88, 5.02)
Benin	7,659	2.2	0.4 (0.2, 0.6)	1.58 (0.08, 19.87)	1.8	1.23 (0.07, 4.05)
Botswana	1,765	40	5.7 (5.6, 7.5)	11.03 (4.18, 4.37)	24.1	2.10 (1.10, 4.05)
Cameroon	16,322	11.3	4.1 (n/a)	2.98 (0.78, 11.33)	5.4	2.23 (0.65, 7.20)
Chad	8,854	5.3	0.9 (0.4, 1.6)	6.16 (0.52, 07.18)	3.5	1.54 (0.27, 7.14)
Rep. Congo	3,818	4.3	1.2 (0.6, 1.9)	3.70 (0.33, 36.42)	5.3	0.80 (0.14, 3.18)
Cote d-Ivoire	18,154	9	1.7 (0.9, 2.7)	5.72 (1.04, 60.03)	7.1	1.29 (0.41, 4.24)
Ethiopia	77,431	7	n/a (0.2, 0.8)	9.33 (0.99, 24.28)	4.4	1.64 (0.41, 7.47)
Gabon	1,351	4.1	1.8 (0.9, 3.0)	2.33 (0.29, 24.77)	7.9	0.50 (0.10, 1.87)
Gambia	1,517	2.1	0.6 (0.2, 1.0)	3.55 (0.12, 72.24)	2.4	0.87 (0.06, 0.37)
Ghana	20,176	6.7	0.2 (0.2, 0.3)	35.83 (1.56, ∞)	2.3	3.05 (0.68, 7.06)
Guinea	7,613	6.6	0.5 (0.4, 0.5)	14.06 (1.41, ∞)	1.5	4.64 (0.89, 8.17)
Kenya	34,256	7	1.0 (0.9, 1.2)	7.45 (0.92, 39.15)	6.7	1.05 (0.30, 3.72)
Mozambique	16,840	39	3.6 (2.0, 5.3)	17.19 (5.36, 9.98)	15.3	3.55 (1.71, 7.41)
Namibia	2,011	33	4.4 (1.7, 8.1)	10.70 (3.66, 0.87)	21.3	1.82 (0.92, 3.63)
Niger	13,957	3.8	0.2 (0.1, 0.4)	19.71 (0.67, ∞)	1.2	3.25 (0.40, 5.16)
Nigeria	131,530	8	0.9 (0.4, 1.5)	9.57 (1.15, 28.80)	3.9	2.14 (0.54, 10.18)
Senegal	11,658	1.24	0.2 (0.1, 0.4)	6.27 (0.02, ∞)	0.9	1.38 (0.01, 69.47)
South Africa	47,432	25	4.5 (4.0, 4.9)	7.07 (2.39, 26.30)	18.9	1.43 (0.69, 2.99)
Uganda	28,816	20	2.3 (1.9, 2.6)	10.62 (2.62, 0.80)	6.7	3.48 (1.30, 10.43)
Zambia	10,924	35	3.8 (3.6, 4.0)	13.63 (4.42, 6.51)	16.5	2.72 (1.33, 5.69)
Overall				8.12 (5.75, 11.47)		1.97 (1.58, 2.45)

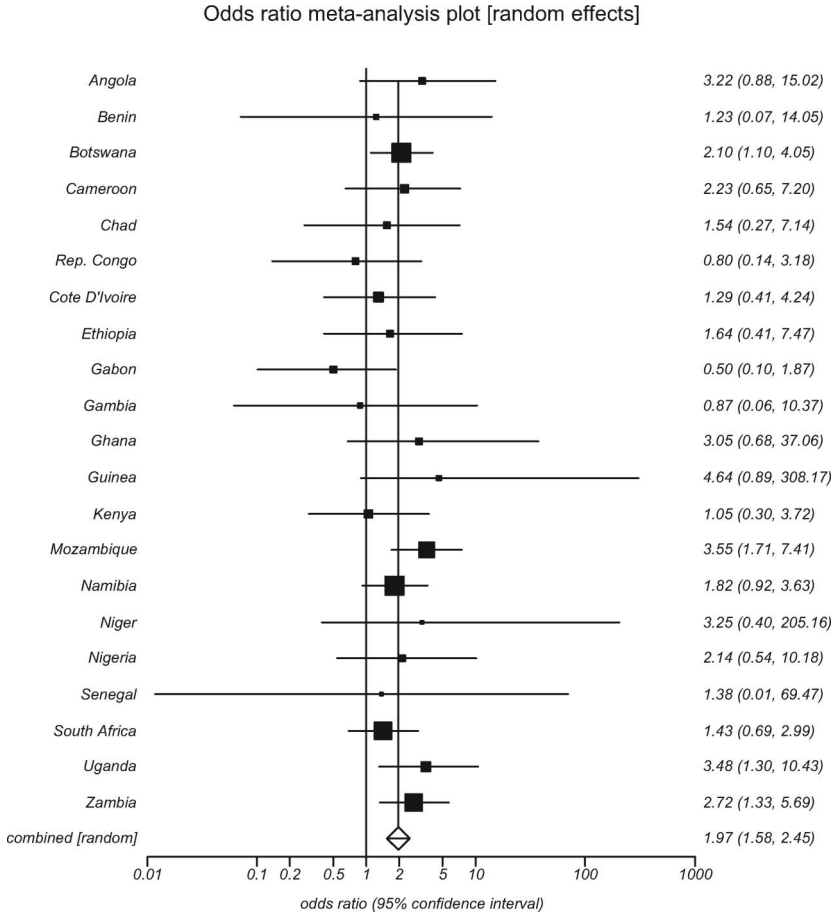

Figure 1. Random effects meta-analysis of military versus population prevalence of HIV/AIDS.

HIV/AIDS has hit the military, at least in sub-Saharan Africa, more severely than the general population. Indeed, a number of factors that place the military at risk for both HIV infection and transmission can largely be attributed to demographics and the circumstances of the deployment[11]. More specifically, military populations are made up of individuals who are predominately young, male and sexually active. Further, lengthy periods spent away from home, deployment to conflict zones or areas of high social disruption where they face increased opportunities for casual and unprotected sex, and a culture of strength combined with peer pressure may make soldiers more likely to engage in high-risk activities[10,19–21]. In Cameroon, for example, a 2004 survey of 2,029 military personnel

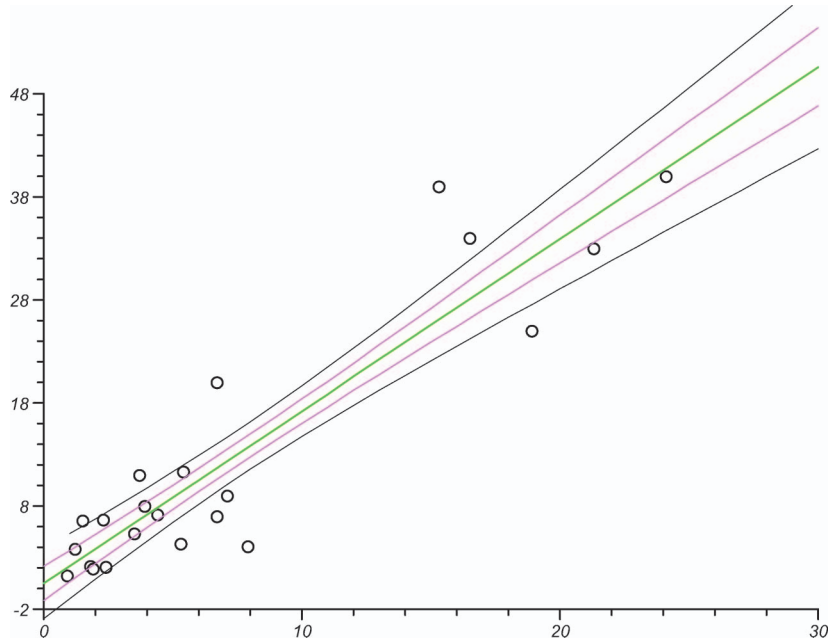

Figure 2. Correlation of military prevalence with population prevalence. Standard error and 95% confidence intervals plotted. *Note*: Y axis is military levels and X axis is population levels.

found that 79 per cent had had sex within the past month, 24 per cent with a non-regular partner and 89 per cent without a condom[22]. Another study among Nigerian naval personnel revealed that approximately 33 per cent reported having sex with a female sex worker in the past, and further, 41 per cent did not use a condom during their most recent sexual encounter[23].

When prevalence was compared among military populations and males aged 15–24 in the general population, we observed an importantly higher rate among military populations. The country-specific military prevalence, ranging from 2.2 per cent in Benin to 40 per cent in Botswana, was higher than the prevalence reported for males aged 15–24 in all countries examined. In many cases, such as Zambia, prevalence was almost ten times higher in the military compared with young males in the general population. Interestingly, UNAIDS has traditionally estimated that almost half of all new HIV infections in sub-Saharan Africa occur among those aged 15–24[15]. However, it is important to mention that HIV prevalence among young women is most often higher than that of young men. In some countries, for example, women 15–24 are 2–12 times more likely to be infected than their male counterparts[24]. It is likely that the large differences observed in the country-specific rates in this case are at least, in part, due to the exclusion of

young women from our analysis. Nevertheless, given that the military is largely comprised of young sexually active males often exposed to high-risk settings, our finding that HIV prevalence is inflated in this population is not surprising.

Our findings have important implications. When the military becomes enfeebled by HIV/AIDS, a nation's ability to protect its citizens is weakened, posing a threat to internal and external stability[25]. In particular, high rates of infection among military populations, as observed in this study, have the potential to result in shortages in the number of qualified and experienced military personnel available for deployment. Within the South African National Defense Force (SANDF) for example, up to 50 per cent of those infected are between the ages of 25 and 29. Importantly, this age group represents the largest number of operationally deployable personnel, often trained to be highly skilled and able to perform numerous management functions. Gaps in the organizational structure of the military as a result of high rates of HIV, as in the SANDF, will undoubtedly impact on the operational capacity of their forces[11]. Further, rising health costs as a result of the growing numbers of HIV-infected military personnel also need to be considered. While more resources are required for recruiting and training, they are also needed to provide health care for soldiers who are ill and in many cases, for their families and/or dependents[26]. As limited resources are channelled towards health care, governments may be less able to fund military and defence operations, again undermining internal and external security[11].

The impact of military infections upon the surrounding civilian communities is important. Military recruits are capable of infecting both local sexual partners and family members upon their return. The findings of this study should highlight the public health importance of appropriate community awareness regarding potential recruit infection rates and of possible training directed at sexual partners who include sex workers, young women and family members. This study underscores the importance of condom campaigns and, where possible, fewer sexual partners. For any intervention to have a measurable impact there must be leadership and political will highlighting that commercial sex is a risky behaviour and transactional sex is an unacceptable behaviour.

International organizations have called upon the African Union and Southern African Development Community (SADC) to harmonize HIV prevention and treatment policies among African security forces[27]. Some African militaries have begun to respond to these pressing issues and are taking major steps to decrease the impact of HIV/AIDS on military stability[18,28]. In South Africa, for example, HIV testing is mandatory upon application for military employment, and is recommended on a regular basis thereafter[29]. Sierra Leone's military pioneered the country's first HIV/AIDS policy in the public sector, yielding a reported increase in condom use from

39 to 68 per cent among some military personnel[30]. Meanwhile, international initiatives by UNAIDS and the UN Department of Peacekeeping Operations (DPKO) are working with national authorities to integrate uniformed and civilian HIV/AIDS programmes in 29 sub-Saharan African countries, placing AIDS advisors in key countries with current or recent conflict such as Burundi, Côte d'Ivoire, Democratic Republic of Congo, Ethiopia-Eritrea, Liberia, Sierra Leone and Sudan[22]. In spite of these advances, numerous challenges remain. Resource constraints are preventing some national authorities from following international guidelines. For example, although the International Labor Organization (ILO) recommends the recruitment and employment of HIV-positive individuals[31], many militaries refuse HIV-positive applicants on the basis that their employment is not a practical or financially worthwhile human resource investment. In Zimbabwe and Tanzania, for example, HIV testing has been used to screen and reject HIV-positive individuals, on pragmatic and economic bases respectively[28].

Similar challenges exist with regards to access to HIV treatment. While 'universal access' to ART, as recommended by UNAIDS, has the potential to strengthen African militaries by reducing HIV-related morbidity and mortality, economic constraints prevent national authorities from rolling-out ART access. Access to ART within the military population is patchy, and there is emerging evidence to suggest that more senior officers have been prioritized[29]. Sub-Saharan countries can learn from the progressive national HIV/AIDS programmes, such as in Botswana, where ART coverage has exceeded 85 per cent[32] and a novel 'take away' ART policy ensures military personnel continue to receive treatment during deployment[28].

There are a number of limitations in our analysis that are worth considering when interpreting our findings. It is important that we define 'military'. We considered the military estimates as rates amongst the uniformed forces attached to the governing state, as defined by the US Department of Defense[18]. Publication bias plays a clear and important role in our report. Of 54 African Union countries, we identified data on 21 countries. It is possible that other militias, rebel groups, and fighters would have different prevalence estimates as highlighted below. Estimates of military prevalence were difficult to obtain, and we were unsuccessful at obtaining prevalence data on all African countries. It is possible that the countries that have not addressed and disseminated their HIV prevalence data have reason to cover up estimates. Perhaps, given that HIV will probably impact on a state's internal and external security, keeping the health status of the military secret from potential enemies is not surprising[26]. It is possible that countries such as Rwanda, Burundi, and the DRC, all with active militaries, have differing prevalence rates. These same countries have been implicated in the command-approved use of sexual violence[29,33]. Furthermore, HIV incidence and prevalence is likely to change within

militaries more rapidly than HIV rates in the general populations. As militaries recognize HIV/AIDS as a problem and respond with appropriate prevention strategies, they will rapidly see a decrease in overall HIV rates[29].

Given that there is little available data on HIV prevalence in military populations in sub-Saharan Africa, future research should work to identify which sectors are most affected and at what stage of in-service employment individuals are most vulnerable. This is particularly important in that previous research has indicated that the longer units are deployed in a given area the more prone they are to infection[11]. While not addressed in our present analysis, the distinction between state-military and other military forces such as rebel groups may be important and require additional exploration. Currently, there is no existing information on prevalence rates amongst rebel groups although there is reason for concern. Rape has been used as a weapon of war in numerous conflicts, including the Rwandan genocide and more recently in Darfur[33], and there have been findings by the African Commission on Human and People's Rights that HIV-positive troops had been deployed for the purpose of rape during the DRC war[10,33]. However, the likelihood that rebel groups will respond to HIV education will be highly related to context. HIV prevention programmes targeting insurgency groups in active conflicts would require special consideration of the command structure, resource and logistical obstacles, access to health care (such as treatment for sexually transmitted infections, safe tattooing, battlefield transfusions), traditional medical beliefs, illiteracy, an accepted culture of rape, and sexual bartering by combatants[34]. A similar consideration of the unique risks and behaviours encountered in military populations is also merited. Although many African governments and militaries are making important improvements to their HIV/AIDS programmes, current research indicates that, in many contexts, risky practices persist even though knowledge and awareness of HIV is reportedly high[25]. Perhaps a more targeted, clear and consistent strategy is still needed.

Conclusions

The findings of the present study are of particular importance and should be of interest to the international community. In this analysis, we observed an inflated HIV prevalence in the military populations examined. Militaries are comprised of individuals who are predominately young, male and sexually active and in this analysis, military prevalence was also significantly higher than that of young males in the general population. While many countries in sub-Saharan Africa are making important improvements to their respective HIV programmes, further changes are necessary given that in many contexts, high-risk behaviours among military personnel persist. Africa's military and armed forces play a key role in maintaining and promoting peace in the region. The willingness of their leadership to acknowledge that

HIV exists in the military is therefore essential if any improvements are to be effective and sustainable.

Notes on contributors

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References

1. Joint United Nations Programme on HIV/AIDS (UNAIDS), 2006 Report on the Global AIDS Epidemic [cited 2008 Jan 3]. Available from: www.unaids.org/en/HIV_data/2006GlobalReport/default.asp
2. Kavvoura FK, Liberopoulos G, Ioannidis JP. Selection in reported epidemiological risks: an empirical assessment. PLoS Med. 2006;4(3):e79.
3. Beyrer C, Kass NE. Human rights, politics, and reviews of research ethics. Lancet. 2002;360:246–251.
4. Isaakidis P, Ioannidis JP. Evaluation of cluster randomized controlled trials in sub-Saharan Africa. Am J Epidemiol. 2003;158:921–926.
5. Swingler GH, Volmink J, Ioannidis JP. Number of published systematic reviews and global burden of disease: database analysis. BMJ. 2003;327:1083–1084.

6. Ioannidis JP. Why most published research findings are false. PLoS Med. 2005;2(8):e124.
7. Gourevitch P. We wish to inform you that tomorrow we will be killed with our families: stories from Rwanda. New York: Picador; 1999.
8. Gontopoulos-Ioannidis DG, Ntzani E, Ioannidis JP. Translation of highly promising basic science research into clinical applications. Am J Med. 2003;114:477–484.
9. World Medical Association, 2004. Declaration of Helsinki. Available from: http://www. Wma.net/e/policy/b3.htm
10. United Nations General Assembly Special Session Declaration of Commitment (UNGASS), 2006 [cited 2008 Jan 3]. Available from: http://www.phac-aspc.gc.ca/aids-sida/publication/ungass06/cper_more_e.html
11. Heinecken L. Living in terror: the looming security threat to Southern Africa. African Security Rev. 2001;10(4). [cited 2008 Jan 3]. Available from: http://www.iss.co.za/Pubs/ASR/10No4/Heinecken.html
12. Miller RK. Informed consent in the military: fighting a losing battle against the anthrax vaccine. Am J Law Med. 2002;28:325–343.
13. Stuart A, Ord JK. Kendall's Advanced Theory of Statistics. (6th Edition). London: Edward Arnold; 1994.
14. Jaynes ET. Confidence Intervals vs. Baysian Intervals. In: Harper WL, Hooker CA, editors. Foundations of Probability Theory, Statistical Inference, and Statistical Theories of Science. Dordrecht: D. Reidel; 1976. p. 175.
15. Monasch R, Mahy M. Young people: the centre of the HIV epidemic. WHO technical report series: preventing HIV/AIDS in young people. A systematic review of evidence from developing countries. Geneva: WHO; 2006. p. 24–51.
16. Higgins JP, Thompson SG. Quantifying heterogeneity in a meta-analysis. Stat Med. 2002;21:1539–1558.
17. Ioannidis JP, Patsopoulos NA, Evangelou E. Uncertainty in heterogeneity estimates in meta-analyses. BMJ. 2007;335:914–916.
18. Department of Defense HIV/AIDS Prevention Program (DHAPP), 2006 [cited 2008 Jan 3]. Available from: http://www.nhrc.navy.mil/programs/dhapp/country.html
19. Abebe Y, Schapp A, Mamo G, Negussie A, Darimo B, Wolday D, Sanders EJ. HIV prevalence in 72,000 urban and rural male army recruits, Ethiopia, 1999–2000. Ethiop Med J. 2003;41(Suppl 1):25–30.
20. Nwokoji UA, Ajuwon AJ. Knowledge of AIDS and HIV risk-related sexual behavior among Nigerian naval personnel. BMC Public Health. 2004;4:24.
21. Ortiz DJ, Bing EG, Boyer CB, Russak SM, De Deus FJ, Ernesto F. Evidence-based recommendations for prevention of human immunodeficiency virus and sexually transmitted infections in the Angolan Armed Forces: challenges and opportunities at the end of 30 years of war. Mil Med. 2005;170:327–332.
22. Parry J. Global fund withdraws grants to Myanmar. Bull World Health Organ. 2005;83(10):724–725.
23. Nilstun T. [New guidelines on research ethics from CIOMS (Council for International Organizations of Medical Sciences). A good example of balancing autonomy, benefits, and human rights.]. Lakartidningen. 1994;91:157–158 (in Swedish).
24. World Health Organization (WHO) Regional Office for Africa. HIV/AIDS epidemiological surveillance update for the WHO Africa Region: 2002. Harare, WHO Regional Office for Africa, 2003.
25. Heinecken L. Facing a merciless enemy: HIV/AIDS and the South African Armed Forces. Armed Forces and Security. 2004;20:281–300.

26. Tripodi P, Patel P. HIV/AIDS, peacekeeping, and conflict crises in Africa. Med Confl Surviv. 2004;20:195–208.
27. International Covenant on Civil and Political Rights. Adopted and opened for signature, ratification, and accession by General Assembly resolution 2200A (XXI) of 16 December 1966 [cited 2008 Jan 3]. Available from: http://www.unesco.org/most/rr4iccpr.htm
28. Beyrer C, Suwanvanichkij V, Mullany LC, Richards AK, Franck N, Samuels A, Lee TJ. Responding to AIDS, tuberculosis, malaria, and emerging infectious diseases in Burma: dilemmas of policy and practice. PLoS Med. 2006;3(10):e393.
29. Mills EJ, Singh S, Nelson BD, Nachega JB. The impact of conflict on HIV/AIDS in sub-Saharan. Africa. Int. J. STD AIDS. 2006;17:713–717.
30. Lee TJ, Mullany LC, Richards AK, Kuiper HK, Maung C, Beyrer C. Mortality rates in conflict zones in Karen, Karenni, and Mon states in eastern Burma. Trop Med Int Health. 2006;11:1119–1127.
31. The International Conference on Harmonisation of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH), 1996 [cited 2008 Jan 3]. Available from: http://www.ich.org/cache/compo/276–254-1.html
32. United Nations Educational, Scientific, and Cultural Organization (UNESCO), 2005. Universal Declaration on Bioethics and Human Rights [cited 2008 Jan 3]. Available from: http://portal.unesco.org/shs/en/ev.php-URL_ID=1883& URL_DO=DO_TOPIC&URL_SECTION =201.html
33. Mills EJ, Nachega JB. HIV infection as a weapon of war. Lancet Infect Dis. 2006;6:752–753.
34. Directive 2001/20EC. Brussels: European Union. 4 April 2001.