ESSAY

WAR AND HIV PREVALENCE

Evidence from Tigray, Ethiopia

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In this article we examine the hypothesis that armed conflict increases HIV prevalence, using the case study of the Ethiopian Defence Forces and the civilian population of Tigray region of Ethiopia during the Ethio-Eritrean war of 1998–2000.

The study utilises data sets for HIV prevalence in the region, before, during and after the conflict. These include HIV screening conducted among the military during mobilisation and demobilisation, ANC surveillance data, blood donor screening data, and voluntary counselling and testing (VCT) data.

The datasets are severely limited in both quality and quantity. They do not show clear evidence of an increase in HIV prevalence associated with the war. Data from the screening of conscripts and demobilising soldiers indicate a 76% increase in HIV prevalence during the war period, but this increase does not appear to be larger than would have occurred among a similar cohort of young men in civilian life. The ante-natal clinic (ANC) and blood donor data show a decline in HIV prevalence since the end of the war. The robustness of this finding is uncertain.

It can be concluded that there is no evidence of a general increase in HIV prevalence associated with the war in either civilian or military populations. There are indications of a post-conflict decline in prevalence. Better quality HIV surveillance is needed in Tigray to ascertain the trajectory of the HIV/AIDS epidemic in the region.

Introduction[1]

The inter-relation between HIV/AIDS and conflict has been a concern for policymakers over recent years. The debate has been marked by interesting and useful hypotheses and conjectures, but a paucity of data. The field of HIV/AIDS epidemiology in developing countries, limited by poor data sets at the best of times, is further hindered by the difficulties in

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obtaining reliable data in situations of conflict and the habitual secretiveness of armed forces concerning sensitive information such as the prevalence of HIV among their soldiers.

This article represents the results from a systematic study of all sources of HIV prevalence data from Tigray region, Ethiopia, before, during and after the war of 1998–2000 with neighbouring Eritrea. While these data sets are scanty, they provide interesting clues to the pattern and trajectory of the epidemic in the region. Our main conclusion is that a substantial increase in the quality and quantity of data will be required to adequately test hypotheses concerning the relationship between conflict and HIV/AIDS.

The study set out to investigate whether the eruption of the Ethio-Eritrean war in 1998 had an impact on the prevalence of HIV among the affected populations in Ethiopia. The authors had access to data from civilian populations in Tigray, the northernmost region of Ethiopia, which was the principal theatre of operations for the war, and to data from the Ethiopian defence forces. These data were analysed to see if it is possible to identify clear trends in HIV prevalence over time, and according to geographical location (for example proximity to the front line and military garrisons).

The working hypothesis that motivated the study was that the advent of the war in 1998 would witness a marked increase in HIV prevalence and that this would be sustained after the war ended in 2000. Furthermore, it was assumed that the main vector for increased transmission would be unprotected sexual encounters between soldiers stationed in Tigray and commercial sex workers (CSWs) who congregated in large numbers in major garrison towns and peri-urban drinking and recreational spots near the front line, and that such increases in HIV prevalence would rapidly affect the general civilian population. In the event, the data do not clearly show such effects.

The Ethio-Eritrean war and its impact on Tigray

Shortly before the war, the Ethiopian defence force instituted an HIV/AIDS policy that has been widely admired.[2] This was one of the institutional priorities of the army, until overtaken by the immediate demands of the war. HIV/AIDS programmes were continued during the conflict, but could not remain such a high priority for the army command.

After the outbreak of war in May 1998, the Ethiopian army increased its size sixfold to approximately 350,000 men, who were stationed along the border between the two countries, but chiefly in Tigray. The army was disciplined and ordered, and although individual incidents of rape doubtless occurred, sexual violence was not a major characteristic of the conflict. The large inflow of soldiers occasioned an influx of commercial sex workers, who followed the troops. More than 316,000 people were displaced by the conflict, many of them losing their livelihoods in the process. Both countries expelled nationals of the other side during the war. Casualty figures have not been released, but tens of thousands of soldiers are estimated to have died during combat operations. In contrast to most contemporary African wars, mortality among the civilian population was very low.

Prior to the outbreak of war, Tigray had a largely rural population, with only one significant urban centre, the regional capital of Mekelle. Other towns were small. The total population of the region is approximately 3.8 million people.

The war was concluded in June 2000 with an Ethiopian military offensive that defeated the main forces of the Eritrean army and resulted in the reoccupation of disputed territories and the occupation of additional areas inside Eritrea, subsequently evacuated to form a demilitarised zone. A United Nations (UN) peacekeeping force was dispatched to patrol the demilitarised zone between the two armies. At the time of writing, the failure of the two governments to agree on a border demarcation has left them in a situation of no-war, no-peace, with both sides maintaining substantial forces on the border.

Starting in late 2000, Ethiopia demobilised most of the men it had mobilised in 1998/99. Of these, approximately 64,000 demobilised veterans returned to live in Tigray in 2002.

The Ethio-Eritrean conflict was unusual in contemporary Africa in that it was a conventional war fought between two disciplined and

mechanised armies. It was not accompanied by significant guerrilla operations, banditry or violence against civilians. Any increases in HIV prevalence associated with the war can be attributed to the very large military mobilisation and the accompanying commercial sex industry, rather than to hordes of armed men rampaging through civilian populations.

Data sources and analysis

HIV prevalence in the Ethiopian Defence Force

The first indications of HIV prevalence at rates of concern in the army came from serological tests of inpatients at the Armed Forces General Hospital (AFGH). Of 2,704 medical cases tested from 1996 to 1998, 1,828 (67.6 per cent) were HIV positive. While this is not indicative of the general level of infection in the army, it illustrates the burden placed on the medical services by the HIV/AIDS caseload. According to unpublished data from the AFGH in 1997/98 (that is, immediately before the war and including its first few months), deaths related to HIV constituted 60 per cent of all medical causes (excluding surgery cases hospitalised because of wounds).

A survey in the army found a prevalence of 6.2 per cent in 1996.[3] The details have not been released, but it has been reported that rates were higher among the officer class than the rank and file. At that time, the army was 60,000 strong.

During mobilisation in 1999–2000, mass mandatory screening of recruits for HIV was undertaken. A total of 71,626 recruits, young men aged about 18-29, were tested. The rate of HIV was 7.2 per cent among the nearly 10,000 urban recruits and 3.8 per cent among the 62,000 rural recruits.[4] Only those who tested negative were admitted to the army. Because of a shortage of testing kits, this screening programme was abandoned, and the additional recruits, numbering about 160,000, were not tested. However, given that their demographic and geographical profile was similar to the previous batch, we can assume that they had an HIV prevalence of about 4.3 per cent, giving an overall prevalence among new recruits of 2.8 per cent.

In addition to this mass recruitment, 15,000 former fighters from the Ethiopian People's Revolutionary Democratic Front (EPRDF) and 30,000 militia were (re-)mobilised. They were not tested for HIV, so their prevalence rates are unknown. The final group that was mobilised consisted of retired soldiers from the army of the former government. All of this group, totalling 12,553, were tested for HIV, and a prevalence of 23 per cent seropositivity was found (a fact of interest in itself). The soldiers who tested positive were not admitted to the army and were sent home, having been told they were not physically fit for service. They were not told of their HIV status.

The overall HIV prevalence in the army in 1998/99 cannot be known accurately. However, given that the remobilised veterans provided only a minority of the total force, let us assume that the prevalence among the 60,000 existing soldiers was 6.2 per cent and the prevalence among the 290,000 recruits, new and remobilised, was 2.8–3.0 per cent, giving an estimated overall prevalence of 3.5per cent.

Between the end of the war (in June 2000) and June 2001, 135,000 soldiers were demobilised. Of these, 26,496 were tested in a VCT programme. These consisted of recent conscripts and pre-1998 serving soldiers, approximately in proportion. The rate of HIV was 6.1 per cent, which implies an increase of 76 per cent compared with 2–3 years earlier. We should compare this with the expected increase in HIV prevalence in a comparable cohort of young men in civilian life. Data for this can be obtained from screening the conscript population.[5] Among those tested, there was a steep increase in prevalence from 18–19 year olds (urban 2.2 per cent, rural 1.5 per cent), to 20–24 year olds (9.4 and 4.4 per cent) and 25–29 year olds (15.3 and 6.0 per cent). These gradients of increase are comparable with those among the demobilising soldiers. There is no evidence for increased HIV susceptibility as a result of military service.

A marker of the depth of stigma is that a programme of cash assistance to demobilised soldiers living with HIV in Tigray found just 17 ready to come forward. Of the demobilised soldiers, 64,144 were Tigrayans. If they had a 6.1 per cent HIV prevalence level, it

would imply that 3,900 were living with HIV. The programme offered 150 Ethiopian birr per month plus counselling for those who wished to participate. Given that most soldiers resumed life as unskilled labourers, earning perhaps 10 birr per day, a supplement of 150 birr per month represents a significant increase in income. This makes the low turnout even more remarkable.

ANC surveillance

At the outbreak of the war there were no sentinel sites for HIV surveillance in Tigray, making it impossible to obtain reliable population-based figures for HIV. Our sole data are estimates for HIV prevalence published by Tigray Regional Health Bureau (TRHB) for the eastern zone of Tigray 1997/98. The figures are urban 12.4 per cent and rural 6.4 per cent. No documentation on the sample size or sampling techniques is available within the TRHB so these data need to be treated with caution, and cannot be rigorously compared with other surveillance data.

In 2001 three sentinel surveillance sites were established at antenatal clinics in the regional capital, Mekele, and the towns of Adigrat and Maichew. These three towns all lie on the main north-south highway, which until the war served as the main road connecting Ethiopia and Eritrea. These locational factors are all clear risk factors for HIV prevalence. During the war, one of the major front lines was located north of the town of Adigrat, which served as a major supply centre. Soldiers from the front line visited temporary villages set up by hoteliers and bar-keepers outside the town, and also came to the town for rest and recreation. During the conflict the town swelled from its pre-war population of 44,000 to about 120,000. The city of Mekele was also swollen by an inflow of soldiers and contractors. Maichew is further from the front line, but is located on the main supply route. After the war, a fourth ANC sentinel site was established at Abi Adi, a small town in central Tigray zone, not close to the front line and not on any major road. Table 1 shows data from these four sites.

The figures for 2001 are about 30–40% higher than the TRHB survey findings from before the war, and the 2003 figures are about 30% lower. However, the methodological caveat about the earlier survey means that we must be cautious about this comparison.

These data show unexpected results. In three of four sites, the prevalence of HIV fell after the end of the war.

These data need to be interpreted in the light of the high level of variability in HIV prevalence in Ethiopia's sentinel sites (of which there were just 17 in 2000).[6] The large year-on-year fluctuations in HIV prevalence in specific sites cannot be an accurate representation and must result from sampling bias or rapid shifts in population in the small towns. These findings indicate the need for a more representative and comprehensive surveillance programme in Ethiopia. However, the drop in HIV prevalence between 2001 and 2003 is replicated in blood bank screening data. This gives us confidence in supposing that the ANC figures indicate a real decrease in the group tested.

It is possible that the Abi Adi data show the beginning of the hypothesised demobilisation effect, namely an increase in positive tests among soldiers demobilised after the war and their partners. Almost one third of the demobilising veterans in Tigray in 2001/02 were from the central zone, which includes Abi Adi. Such conclusions must be extremely tentative, however.

Table 1 ANC surveillance data from Tigray

	Mekelle			Maichew			Adigrat			Abi Adi		
	No	HIV	%	No	HIV	%	No	HIV	%	No	HIV	%
01	400	72	**18.0**	349	58	**16.6**	396	65	**16.4**	0		
02	400	67	**16.7**	0			0			299	24	**8.0**
03	429	40	**9.3**	258	17	**6.5**	351	27	**7.6**	208	20	**9.6**

Blood donor screening

An additional source of data on HIV prevalence is the screening of blood donations. Most donations of blood are from close relatives of individuals hospitalised for medical emergencies or surgery, who require transfusions ('replacement' donors). There is a clear gender bias in blood donors (more than 90% are male), but their occupational breakdown is broadly indicative of the general population. While there are problems with taking such blood donors as representative of the general (male) population, the trends in HIV prevalence in donated blood, subject to caveats relating to the changing profile of blood donors, can provide us with evidence for trends in HIV prevalence.

In line with the ANC surveillance data, this shows a counter-intuitive set of results. Our initial hypothesis was that the HIV prevalence would have increased during the war years and remained high afterwards. What these data show is no significant increase during the war, but a significant drop afterwards.

The data need to be interpreted with reference to the ages, genders and occupations of the blood donors, and whether they were voluntary donors (responding to public appeals) or relatives of a person in hospital, providing matched replacement blood. If we split our time series data into three periods, namely pre-war, war, and post-war, we can see some important shifts in these key characteristics.

This additional information might help to explain why the HIV rate failed to rise in 1998/99. In 1999, a major call for blood from civilians led to large numbers of civil servants providing voluntary donations. It is possible that self-selection among volunteer donors led those who had reason to suspect that they were at higher risk to decide not to give blood.

Table 2 Mekelle regional blood bank screening data

Year	Number	HIV +	% HIV +
1993	381	26	6.8
1994	425	50	11.8
1995	451	36	8.0
1996	359	28	7.8
1997	342	26	7.6
1998	437	32	7.3
1993-1998			***8.3***
1999	1 261	104	8.2
2000	529	57	10.8
1999-2000			***9.0***
2001	428	9	2.1
2002	605	22	3.6
2003	559	20	3.6
2001-2003			***3.2***

Table 3 Origins of blood donations (%)

	Voluntary	Replacement	M	F
Pre-war	17.7	82.3	95.2	4.7
War	90.6	90.6	96.3	3.7
Post-war	10.9	89.1	99.9	0.1

Table 4 Occupations of blood donors

	Civil Servant	Army	Student	Trader	House-wife	Bar-lady	Farmer	Driver	Day labour-er	Unem-ploy-ment
Pre-war	1.7	11.4	20.9	4.6	0.9	1.2	9.3	4.4	35.3	10.3
War	52.3	6.4	11.7	2.4	0	0	1.2	0.3	20.2	5.3
Post-war	6.6	7.6	17.1	6.1	0.6	0	8.3	1.5	51.4	0.9

Note that the proportion of soldiers donating blood at the civilian hospital fell during the war. Subsequently, the profile of blood donors reverted to approximately the pre-war pattern (with a marked drop in 'unemployed' donors). Another possible explanation for the constant/falling HIV rate is that the blood donors were overwhelmingly male civilians. If we assume that the main new transmission vortex associated with the war was between soldiers and CSWs, and in addition that the majority of the at-risk CSWs were patronised exclusively by soldiers, then the risk factors for civilian males in Tigray would not necessarily have risen during the conflict and its immediate aftermath. Moreover, if increased HIV transmission during the war were largely confined to this soldier-CSW link, and most of the CSWs left the region after the end of the war, the male population would have remained shielded from this risk factor. In this scenario, the major risks to the general population would arise when demobilised soldiers returned home after the end of the war.

VCT data

Prevalence data from VCT screening cannot be taken as a basis for ascertaining prevalence levels in the general population. For our purposes, however, VCT data possess the important advantage that they are available for an array of sites and time periods. On the assumption that the socio-economic profile of individuals coming forward for VCT is not substantially different across place and time, differences in HIV rates may provide clues to variations and changes in HIV prevalence in the general population.

The longest time series data for VCT is from the town of Adigrat. This is of particular interest because Adigrat was close to the front line,

Table 5 VCT data, Adigrat Hospital

Year	Number	HIV +	% HIV +
1992/93	11	6	54.6
1993/94	40	30	75.0
1994/95	83	59	71.1
1995/96	193	146	75.6
1996/97	240	149	62.1
1997/98	199	84	42.2
1993-1998			***61.9***
1998/99	439	242	55.0
1999/2000	255	150	58.8
1999-2000			***56.5***
2000/01	172	105	61.1
2001/02	374	205	54.8
2002/03	191	55	29.0
2001-2003			***49.5***

serving as the rear base for rest and recreation by soldiers, and because its population expanded almost threefold during the war, including an influx of displaced people.

The data from 1998/99 could be read either way. The increase (approximately doubling) of the numbers of people being tested positive might be an indication of an increasing prevalence. Or, the similar proportion of positive tests could be said to indicate an unchanging prevalence. The most recent data point (2002/03) would seem to confirm the declining trend manifest in other datasets. However, as a single data point, it is far too weak a basis for reaching conclusions.

Data from the overall VCT statistics of the TRHB show an encouraging increase in the uptake of VCT services, especially among men, and no clear shifts in the pattern of infection over the time period 2000–2003.

Data sets from VCT are also available from other hospitals in the region. The number of individuals coming forward for VCT varied hugely by site and by year, from 27 to 1,180. The numbers of individuals testing positive are considerably lower than the Adigrat data and do not show clear trends.

It is striking that VCT centres in these other towns had much lower rates of seropositivity than Adigrat. Given that the social and economic profile of individuals coming forward for testing is likely to be similar in the various towns, this is prima facie evidence for considerably higher rates of HIV in Adigrat, before, during and after the war.

Conclusions

This investigation has demonstrated the difficulty of reaching clear conclusions about HIV prevalence in a region that has poor data sources. The ANC sentinel surveillance data show an encouraging trend of declining prevalence, but this must be interpreted with extreme caution in the light of the small sample sizes and the high year-on-year variability of Ethiopian surveillance statistics. The blood bank screening data have lower variance than the ANC data for the period up to 2000, and also show a comparable level of prevalence among the (almost entirely male) sample. The VCT data are highly variable and, more than any other, are prone to shifts associated with the changing composition of the population coming forward for testing. The most comprehensive and reliable data are from the military screening programmes, which indicate that the war period witnessed a significant increase in HIV prevalence among conscripts. However, this increase is comparable to that expected among a cohort of young men in civilian life.

The main conclusion from these data sets is that more data are needed. The number of surveillance sites in Tigray needs to be increased and the consistency of testing methods needs to be established. Only with substantially better data will it be possible to come to clear conclusions about the trajectory of the HIV/AIDS epidemic in Tigray, in war and in peacetime.

An important finding of the data sets is the modest evidence that HIV prevalence among

Table 6 TRHB VCT data

Age Group	2000							Age Group	2003						
	VCT screened			Tested HIV +					VCT screened			Tested HIV % +			
	M	F	Total	M	F	Total	% +		M	F	Total	M	F	Total	% +
>14	141	214	355	4	25	29	8.2	>14	19	56	75	4	3	7	9.3
15-19	254	315	569	25	31	56	9.8	15-19	492	822	1 314	9	35	44	3.4
20-39	570	332	902	82	59	141	15.6	20-39	2 882	1 206	4 088	376	245	621	15.0
40+	103	66	169	15	9	24	14.2	40+	331	66	397	81	21	102	26.0
Total	1 068	927	1 995	126	124	250	12.5	Total	3 724	2 150	5 874	470	304	774	13.0
%	53.5	46.5	100	50.4	49.6	100		%	63.4	36.6	100	60.7	39.3	100	

Table 7 VCT data from other hospitals: % HIV positive

Year	Shire	Axum	Maichew	Adigrat
2000/01	16.0			61.1
2001/02	16.2	8.8		54.8
2002/03	12.3	14.4	10.7	29.0
2003/04	8.0	15.3		

soldiers and civilians in Tigray appears to have risen during the war. This is a case of 'the dog that did not bark'. Everything that is known about the epidemiology of HIV/AIDS would point to a much heightened risk of HIV transmission during the Ethio-Eritrean war, associated particularly with the convergence of a very large army and an influx of CSWs. Whether this is a genuine finding, or whether the sampling methodologies failed to capture the at-risk groups, cannot be clearly identified.

An intriguing finding is that HIV prevalence appears to have fallen after the war. As stated, this finding needs to be treated with caution. However, because the ANC surveillance data and the blood bank screening data show the same trend, this may be a real phenomenon and not a methodological artefact.

The most plausible interpretation of this trend – if indeed it is real – is that after the end of the war, the highest-risk population dispersed from the towns in Tigray. Two high-risk groups, namely CSWs and displaced people, would have had reason to leave the towns. Following the demobilisation of much of the army, CSWs may have moved elsewhere. After the army's reoccupation of areas that had formerly been the locus of fighting or had been occupied by the Eritrean army, displaced people would have been able to return home.

The most significant impact of the Ethio-Eritrean war on HIV/AIDS in Tigray is probably the indirect and long-term effect of changing the social and economic situation of the region. The social and economic disruptions visited on Tigray during the war, including an increase in the number of CSWs and a change in the patterns of commercial sex work, a growing problem of orphans and street children, and the near-complete closure of trade routes with Eritrea, will have an impact on the future of the region. In this context it is important to underline that the Ethio-Eritrean war was not typical of recent conflicts in Africa, in that it was a conventional war fought between disciplined armies, and did not witness social disintegration and widespread sexual violence. Generalising from this experience to other conflicts in Africa should be undertaken with caution.

Notes

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2 Tsadkan Gebre Tensae, HIV/AIDS in the Ethiopian Military: Perceptions, strategies and impacts, unpublished paper, 2002.

3 Tsadkan Gebre-Tensae, op cit.

4 Yigeremu Abebe, Ab Schaap, Girmatchew Mamo, Asheber Negussie, Birke Darimo, Dawit Wolday and Eduard J Sanders, HIV prevalence in 72,000 urban and rural army recruits, Ethiopia, AIDS 17(12), 2003, pp 1835-1840.

5 Abebe et al, op cit, p 1838.

6 UNAIDS, Epidemiological fact sheets on HIV/AIDS and sexually-transmitted infections: Ethiopia, 2002 update, pp 2,5.