

Original Article

Religious and Cultural Traits in HIV/AIDS Epidemics in Sub-Saharan Africa

Ali-Akbar Velayati MD*, Valerii Bakayev PhD*, Moslem Bahadori MD*,
Seyed-Javad Tabatabaei MD*, Arash Alaei MD*, Amir Farahbod MD*,
Mohammad-Reza Masjedi MD*

Background: The pandemic of HIV/AIDS in sub-Saharan Africa and the rise of epidemics in Asia to the previously unforeseen level are likely to have global social, economic, and political impacts. In this emergency, it is vital to reappraise the weight of powerful religious and cultural factors in spreading the disease. The role of Islam in shaping values, norms, and public policies in North African states is to be appreciated for the lowest HIV prevalence in their populations. Yet, the place of religion in prevention of the disease diffusion is not fully understood nor worldwide acknowledged by the primary decision makers. Another topic, which has received little attention to date, despite the abundance of literature concerning the unfortunate Africa's anti-AIDS campaign, is an issue of colonial past.

Methods: To better comprehend the share of both traits in diverse spread of HIV in sub-Saharan Africa, we studied the correlation between Muslim and Christian proportions in the state's population and HIV rate.

Results: By this method, Muslim percentage came out as a potential predictor of HIV prevalence in a given state. In another approach, most subcontinental countries were clustered by colocalization and similarity in their leading religion, colonial past, and HIV seroprevalence starting from barely noticeable (0.6 – 1.2%, for Mauritania, Senegal, Somalia, and Niger) and low levels (1.9 – 4.8%, for Mali, Eritrea, Djibouti, Guinea, Guinea-Bissau, Burkina-Faso, and Chad) for Muslim populated past possessions of France and Italy, in the northern part of the subcontinent. Former territories of France, Belgium, Portugal, and the UK formed two other groups of the countries nearing the equator with Catholic prevailing (Democratic Republic of Congo, Republic of Congo, Rwanda, Gabon, and Burundi) or mixed populations comprising Christian, Muslim, and indigenous believers (Benin, Ghana, Uganda, Togo, Angola, Nigeria, Liberia, Kenya, Cameroon, Côte d'Ivoire, and Sierra-Leone), which covered the HIV prevalence range from 1.9% to 7%. Albeit being traced by origin to the central part of the continent, HIV has reached the highest rates in the South, particularly Malawi (14.2%), Zambia (16.5%), South Africa (21.5%), Zimbabwe (24.6%), Lesotho (28.9%), Botswana (37.3%), and Swaziland (38.8%)—all former British colonies with dominating Christian population.

Conclusion: In the group ranking list, a distinct North to South oriented incline in HIV rates related to prevailing religion and previous colonial history of the country was found, endorsing the preventive role of the Islam against rising HIV and the increased vulnerability to menace in states with particular colonial record.

Archives of Iranian Medicine, Volume 10, Number 4, 2007: 486 – 497.

Keywords: Acquired immune deficiency syndrome • colonial past • human immunodeficiency virus • religion

Authors' affiliation: *National Research Institute of Tuberculosis and Lung Disease (NRITLD), Shaheed Beheshti University of Medical Sciences (SBUMS), Tehran, Iran.

Corresponding author and reprints: Valerii Bakayev PhD, National Research Institute of Tuberculosis and Lung Disease, SBUMS, Shaheed Bahonar Ave., Darabad, Tehran 19575-154, Iran.

E-mail: vbakayev@hotmail.com.

Accepted for publication: 24 January 2007

Introduction

Acquired immune deficiency syndrome (AIDS), being first documented in the early 80s, had rapidly become a pandemic with more than 60 million people infected by human immunodeficiency virus

(HIV), 25 million of whom died of AIDS-related illnesses up to date.^{1, 2} In sub-Saharan Africa, for not well-understood reasons, AIDS has reached pandemic proportions in the last decade. The US CIA National Intelligence Council (June 2002) forecasted doubling of the HIV rates in the next five years.²

Africa comprises two main regions dramatically (about two orders of magnitude) different in strength of HIV/AIDS impact: the Muslim-dominated North Africa, with the world's lowest HIV infection rate³ and sub-Saharan Africa, where the generalized epidemics continue to rise, and 3.2 million new cases and 2.3 million deaths have been reported in 2003.⁴ Still within the latter subcontinent, there are important differences in adults' HIV prevalence rates that vary from 0.6% for Mauritania in the North to 38.8% for Swaziland in the South.² Of those Africans, who live with AIDS, 70% reside in 12 contiguous southeastern countries with only 30% of the subcontinent's population.^{2, 4, 5}

Such diverse patterns have raised still unanswered questions such as "if the virus arose in the Central Africa (Congo, Uganda) and first directed its spread to the East and West,^{5, 6} why did the epidemic hit more severely southern Africa, thousands of miles away?"⁷ To answer this question and to explain the HIV crisis in terms of risk factors associated with virus transmission, new determinants influencing the epidemic shall be uncovered, including those factors that have yet not attracted much interests such as country's location, religion, and colonial past.

To better comprehend the role of social and religious traits in HIV epidemics in populations of sub-Saharan Africa, we reviewed and conducted an overall analysis of observational studies, surveillance data, and demographic records available for the countries collected from resources available on 25 January 2005.

Descriptive Overview and Data Analysis

Descriptive overview

Common effects and risk factors of HIV/AIDS epidemics in sub-Saharan Africa

The first cases of AIDS in black Africans were reported in the early 1980s and occurred in heterosexuals with chronic opportunistic infections or Kaposi's sarcoma.⁸ However, it seems probable

that AIDS in Africa has a longer history. The earliest known cases of AIDS were traced by blood samples collected in the 1950s in the former Belgian Congo, Rwanda, and Burundi, near the mouth of the Congo River.⁹ Nowadays, HIV has attained the infection prevalence rate of 9.0% for adult population in sub-Saharan Africa, and AIDS is the most common cause of death in many cities of the subcontinent.^{2, 4, 5}

Common effects of the epidemics

The current stage of the HIV epidemics in sub-Saharan Africa has shown the following effects that are common for many regions and individual countries: 1) unacceptably large numbers of new infections in all countries, which have similar patterns of predominantly heterosexual or a type II distribution of virus; 2) large urban to rural differences in HIV prevalence. A population-based survey in Burundi showed a five-fold increase in HIV prevalence between women living in urban and in rural areas²; 3) growing preponderance of HIV rates in women compared to men. In some countries, girls aged 15 to 19 years are five to six times more likely to be HIV positive than boys of the same age⁴; 4) high mother-to-child transmission rates; 5 – 15% of HIV is perinatally transmitted²; 5) growing morbidity and its burden on health services; 6) rapid rise in the number of AIDS-related deaths²; and 7) a dramatic increase in numbers of AIDS orphans (~11 million).^{1, 2, 10} These effects may be attributed to common events, patterns, and risk factors which shall be considered.

HIV origin

According to genetic studies of HIV¹¹ and simian immunodeficiency virus (SIV) isolated from chimps,¹² HIV could have emerged in the West-Central Africa after the cross-species jump of AIDS-like chimpanzee virus which could be dated back to 1930s and first spread along the Congo River. An HIV family tree constructed by comparing the DNA sequences of subtypes from around the world does agree with a time-related position of such a hypothetical virus close to the base of the tree.¹¹

Sexual behavior and HIV transmission

Several modes of transmission account for infection in sub-Saharan Africa, the most considerable one being the heterosexual

intercourse. Extensive spread of the virus has been facilitated by a custom of multiple sexual partners. The increased mobility of the African population has also helped the rapid rising of HIV/AIDS epidemics.^{5, 6} The early geographic lines of transmission were along roads with rest stops where female sex workers (SW) served truck drivers. Both risk populations became infected and began spreading the disease to their communities. As it had progressed, infection rates grew more rapidly among females, especially younger ones who practiced extramarital relations.

The increase of HIV prevalence among women brought about the second major type of transmission—the vertical transmission from mother to her child; when newborns were born, infected or healthy infants were infected through their mothers' milk. Transmission through homosexual sex and injecting drug uses (IDU) was less common in Africa with the exception of a few countries.

HIV genotypes distribution

A virus family known as HIV-1 group M is widely spread in Africa and is the most prevalent worldwide.^{2, 5} HIV M subtype C accounts for over 46% of all infections in sub-Saharan Africa being the most predominant subtype (clade) in southern and eastern African countries where HIV prevalence is the highest in the world. Rest of the subcontinent is plagued mostly by clades O, A, G in northwestern and clades A, D, G in Central Africa.^{2, 13}

HIV patterns in sub-Saharan African sub-regions and countries

Division of Africa into sub-regions, North, East, West, Central, and southern Africa, embracing countries with similar geographic, political, cultural, and religious characteristics,² may give a rational approach in social epidemiologic studies. The basic statistics on the countries proved to be related to HIV prevalence rates are presented in Table 1. Beside, every sub-region is portrayed with a brief look highlighting its unique characteristics, like proportion of urban to rural population, prevailing religions, and former colonial owners.

All East African countries had been under rule of the UK till early 1960s, except independent Ethiopia, Somalia and Eritrea governed by Italy. By 2003, the population of the nine countries in

eastern Africa was more than 190 million, mostly rural residents (78%), including almost 68 million inhabitants of Ethiopia.² Religious communities in the most parts of the northern and eastern Africa believe in Islam. In the remaining sub-regions, Christianity is the main religion. The prevalence rates of HIV infection among the countries vary from 1.0% for Somalia to 8.8% for Tanzania.² This most affected in the recent past sub-region includes those parts of Africa where the AIDS epidemic seems to have originated.^{9, 14, 15} Two countries—Ethiopia and Kenya—reported an HIV prevalence of more than 10% in young pregnant women from urban population. In Ethiopia, rural Muslim recruits were less likely to be HIV-infected than recruits with the Orthodox Christian religion.¹⁶ In Kenya, recent figures based on a sample of 8,561 households across the country (6.7%) are the most comprehensive to date.¹⁷ In several countries, HIV surveillance systems were expanded to cover urban, semi-urban and rural populations. These data being weighted by population distribution according to urban-rural location of the clinics showed substantially higher HIV prevalence in Kenya (6.5 – 10.1%) and lower in other countries including Burundi (5.6 – 3.2%) and Ethiopia (11.2 – 6.6%).²

Overall, the epidemic in East Africa appears to be declining slowly. Comparison of the data collected at the same antenatal care clinic sites in four countries (Burundi, Ethiopia, Kenya, and Uganda) from 1997 through 2002 showed modest to more substantial declines in HIV prevalence.² Uganda has recently built on the success in reversing HIV/AIDS epidemic by showing more than two-fold decrease in HIV rates during the last ten years.^{18, 19} Surveillance data for 2001 indicated a continuation of the decline: the same nine clinics reported HIV prevalence has decreased from 10.6% in 1997 – 1998 to 9.6% in 1999 – 2000 and 7.4% in 2001.¹⁹ A study comparing Ugandan behavioral patterns in 1989 and 1995 showed a marked decrease in those reporting sex with multiple partners and those reporting casual sex partners, increasing condom use, a two-year delay in the age of first sexual contact, and, in the meanwhile, a 40% decline in HIV seroprevalence in women attending antenatal clinics.^{2, 4} Since there are recent surveillance reports, showing that original estimates for epidemic level of the prevalence in 1980s were overestimations due to inaccuracy of extrapolation data from antenatal

care clinics, further analysis is required for receiving a more accurate profile.

France and Belgium were sharing Central Africa till 1960 and 1962, respectively. The sub-region embraces eight continental states including part of the former Belgian Congo where the HIV epidemic had the oldest history in Africa. By 2003, the population of the sub-region was about 93 million, with most inhabited Democratic Republic of Congo (DROC; 58.3 million).² The majority of residents are rural (63%). Catholics in the center and South of the sub-region substitute Muslims of the North, dominating in Chad and substantially represented in northern part of Central African Republic (CAR) and Cameroon. Most regional countries are evidently affected by HIV and vary greatly in HIV prevalence rates from 4.2% for DROC to 13.5% for CAR, where the infected population primarily comprises male IDU and female SW.

Fifteen continental states of West Africa are populated with more than 260 million urban (42%) and rural (58%) residents. In this part of Africa, formerly owned by France and the UK, superficial Islam and superficial Christianity are fairly proper to a modern society. There is increasing evidence that HIV outbreaks first hit Central and East sub-regions and spread to the West in the early 1980s (Figure 1). Fortunately, the number of cases grew less aggressively there: in year 2002, about 18% of all infected individuals were in the sub-region resided by 40% Africans. Sexually-active women were covering about half (2.7 million) of adult population living with HIV (5.4 million). In Abidjan, Côte d'Ivoire, the prevalence of HIV-1 among adults increased from 1% in 1986 to more

than 15% in 1992.⁵

The countries of this Africa's most populous sub-region might be combined into three groups based on local religion and HIV infection level: firstly—Mauritania, Senegal, Niger, and Gambia—with dominating Muslim population (>90%) and barely noticeable HIV rates (0.6 – 1.2%); secondly—Mali, Guinea, Guinea-Bissau, Burkina-Faso, and Sierra-Leone—with leading Muslim residents (51 – 90%) and a low level of HIV, which is significantly decreased in northern Muslim populations; thirdly—Ghana, Benin, Nigeria, Liberia, Côte d'Ivoire, Togo—characterized by mixed populations comprising Muslim, Christian, and indigenous believers and covering the infection rates' diapason 1.9 – 7%.^{1, 2} Côte d'Ivoire, Mali, Gambia, Guinea-Bissau, Nigeria, and Sierra-Leone reported an HIV-2 prevalence rate of over 1% in the general population while others—Benin, Burkina-Faso, Ghana, Guinea, Liberia, Niger, Senegal, and Togo—established a lower level.^{2, 20}

A large screening study within communities of the first group, e.g., former French Senegal, has revealed the low levels of seropositivity developed in all communities. The country's Muslim traditional norms regarding sexuality are based on gender, such as the incentive for girls to remain virgins until they are married and the tendency for marriage at a young age. Girls are faced with strong moral and religious condemnation regarding sexual relations outside of marriage.²¹

In 2003, Africa's biggest population of Nigeria estimated of 137 million was composed of ~25 million (18%) infants under one year of age, 17 million (12%) under five, and 25 million women of

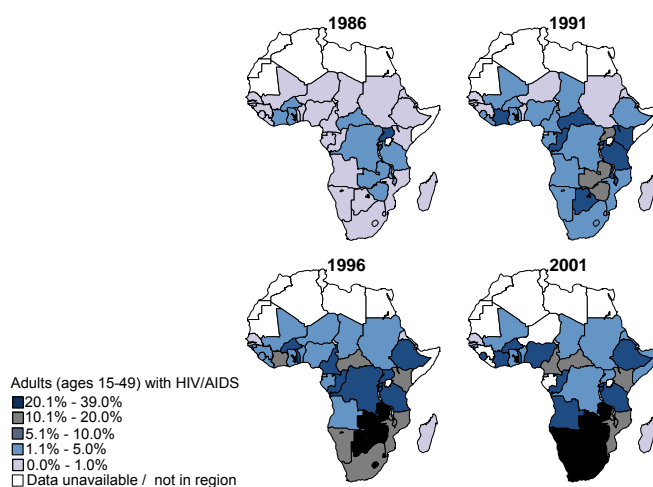


Figure 1. Distribution of HIV prevalence in sub-Saharan Africa.

Source: UNAIDS. "A Global View of HIV Infection" (www.unaids.org, accessed Jan 25, 2002).

child bearing age (15 – 49 years). The fertility rate, although high, has decreased from 8.2 in 1982 to the present rate of 6.5 births per 1000 people. The continuing burden of high fertility and population growth on the nation's agriculture and food availability, and the social and health services are unfortunate for attaining sustainable development. AIDS is an essential problem in the country. It was estimated as of June 1999 that over five million Nigerians were living with HIV. Results of the 2003 HIV sentinel survey in the country saying the prevalence rate had dropped from 5.8% in 2001 to 5% in 2003.^{2,22}

In 1993, the World Health Organization stated that the global HIV epicenter had moved from eastern to southern Africa.^{1,2} The turning point was a 1993 survey showing that 37% of pregnant women in Francistown, Botswana, were infected with HIV.^{5,23} This sub-region now has about 50% of all sub-Saharan Africa's HIV infections. The highest rates of HIV infection worldwide are attained, particularly in Swaziland, Zimbabwe, Botswana, Zambia, Malawi, South Africa, and Namibia.^{1,2,4} Due to the isolating effects of more than 25-year civil war, Angola's HIV prevalence has remained lower (3.9%) than in neighboring Namibia, Zambia, and Zimbabwe. However, significant rates of HIV-2 infection were reported both in Angola and Mozambique, both former Portuguese colonies that maintained ongoing relationships with the master possessions in western Africa (Guinea-Bissau, Cape Verde) where HIV-2 is quite prevalent.²⁰

By 2002, the population of southern Africa was about 120 million, including nearly 45 million people living in South Africa.² Ten countries of this sub-region are former UK colonies populated mostly with Protestant and indigenous followers. A fairly large proportion of the population (42%) live in urban areas. The surveillance systems of several countries have now achieved good coverage of both urban and rural populations. Three countries in southern Africa, South Africa, Zambia, and Zimbabwe, have recently completed national population-based surveys that included HIV testing. The dynamics of the HIV epidemic seemed to be very rapid and most countries estimated high levels of HIV seroprevalence. In 2002, more than one in five pregnant women tested were infected with HIV, and several countries reported the rates in antenatal care clinics to be >25%.² In Zambia, seroprevalence among women was 1.3 times

higher than among men in the age group 15 – 49 years. Among young people, the differences between the sexes were even larger: in both Zimbabwe and Zambia, the prevalence of HIV among women aged 15 – 24 years was about 3.5 times higher than that in men of the same age group. In other words, nearly 80% of all people of 15 – 24 years of age who are infected with HIV in these countries are women.² One of the main reasons of this bad fortune is very high levels of premarital fertility. Overall, the epidemic in southern Africa appears to be stabilizing at very high levels of HIV prevalence. Comparison of data for 1997 – 1998, 1999 – 2000, and 2001 – 2002 from the same antenatal care clinic sites in eight countries provided little evidence of a decline or no change in the prevalence of HIV.^{2,24,25} The HIV epidemic has grown to devastating proportions in countries with smaller populations. In Botswana and Swaziland the prevalence of HIV in both urban and rural sites was found to be well over 30% in 2002 showing no signs of a possible incidence decline.²

Data analysis

History and geography of HIV expansion across the subcontinent

Being first emerged in East-Central Africa, HIV/AIDS moved up the Congo River to the interior, spreading among the thousands of people. In 1982, only three countries in the East-Central Africa, Congo (including present Rwanda and Burundi), Uganda, and Tanzania had an estimated rate of HIV seropositivity over 1% of the total population. Then, the infection distributed throughout the subcontinent with expected decline in HIV prevalence from central to peripheral areas (Figure 1; 1986). The major transportation roads, which cut across sub-Saharan Africa through Tanzania, Uganda, and Congo to Ghana, Côte d'Ivoire, and Burkina-Faso, served as primary routes for HIV transmission.⁵ In rural Tanzanian survey, the level of HIV seroprevalence was directly correlated with the distance between the subject's home village and the nearest main road.²⁶ As can be seen on the maps (Figure 1), in the early stages of the epidemic (1982 – 1986), the highest rates were in the countries that had formed East to West direction of HIV spread.²⁷ Over the next five years, by 1991, HIV incidence had dramatically increased in many other countries shaping alternate HIV dominating foci, which

appeared in South-located Zambia and Zimbabwe. The rates of infection were rising throughout the southern countries that formed persistent pesthole embracing most part of the sub-region (1996 – 2001) and some eastern states, all being former UK possessions. By 1997, Namibia, Botswana, Zambia, and Zimbabwe were devastated with a shocking HIV rates from 16% to 32% of the adult population. Other African sub-regions had experienced a slow increase (northwestern) or stabilization (central) in the attained HIV level.

Therefore, the area- and time-related outlook of HIV/AIDS prevalence in sub-Saharan African countries and sub-regions showed that the corresponding variation in rates was not random but geographically structured. This differential spread of the disease pointed to unprecedented HIV rates' bias from the northwestern Africa through the central part towards the southeastern countries. This incline in infection's prevalence was well noticed but as yet poorly-supported by consistent explanation.^{2,5-7} Spread events stratified by countries, risk-groups, and social factors could help in explaining the HIV dispose and related determinants.

New independent variables and their roles: location, religion, and colonial past

Religion and culture are influential forces in sub-Saharan Africa, where over 80% of the residents identify themselves with some established belief playing important role in setting moral and behavioral standards. Muslim believers are prevailing in the northern, northwestern, and northeastern areas. Catholics dominate in the continent-centered states, while Muslim communities are normally settled in the northern provinces. Protestant religion and various Christian sects are characteristic of southern countries. Indigenous traditions remain to be important in all areas.

Religious beliefs and practices, and religious organizations have clear significance to sexual manners related to HIV risk as well as to the ways in which HIV-positive individuals are viewed and cared for. We expected by this variable to ascertain a) the correlation between dominating confession with corresponding practice and the HIV prevalence; b) association between confession and the immediate risk factors (extramarital affairs, drug abuse, alcohol consumption), by which seroprevalence might be influenced among populations. This may include religious restrictions that

help to escape or to minimize transmission. As an example, the Islamic Sharia law bans amongst other things alcohol, adultery, prostitution, homosexual activity, and drug abuse. Proportion of various followers within countries was dug out from databases.²⁸

Colonial heritage may be another important factor responsible for changes in social experience and culture in African societies, which characterizes much of their recent history. Africa stands to be a proper setting to analyze the impact of colonial rulings on various sides of community life because in the past, colonization was far-reaching in the African experience. The development paradigms, imposed by and for colonial powers together with trans-national corporations and international agencies, had been focused on exporting minerals and raw materials and required massive amounts of labor from rural areas. In other places, postcolonial wars and infrastructure projects, such as roads and dams, have displaced farmers and thus forced intact rural communities to migrate elsewhere in search of livelihoods, changing their patriarchal life.

Colonial indicators usually correlate with economic and socio-political variables, like percentage of urban population and purchasing power per capita that are commonly employed to explain HIV prevalence. Meanwhile, these indicators were to blame for the observed heterogeneities within the scale of culture infiltration and deformation of traditions and customs. "Colonial past" was defined by the identity of the metropolitan ruler.

Geographic location, predominant religion, and colonial past are all associated with HIV infection rate in sub-Saharan African countries. The HIV/AIDS status of the countries and common demographic variables were not strongly inter-related (Table 1). For better understanding, two new epidemiologic models were applied. In both, the estimated HIV prevalence was selected as the dependent variable. The inclusion of the new independent variables, location, religion, and colonial past, in the explanatory models was justified on empirical reasons and previous data.^{29,30} The first model examined the continent-wide effects of Muslim and Christian proportion in the population upon the HIV prevalence, without any controls. By this approach, Muslim religion emerged as the potentially strongest predictor of the HIV prevalence rate (Figure 2). Few countries,

Table 1. HIV prevalence rates and related variables in sub-Saharan African countries by 2003.

Present name	Population total urban ²		Former owner	Most prevalent religions*	1 st case report year**	HIV (15 – 49) prevalence ²		Sub-region
	million	%				Number	rate thousands %	
1. Mauritania	3.0	59	France	M100	1988	5.9	0.6	West
2. Senegal	10.9	48	France	M94/C5/In1	1986	38	0.8	West
3. Somalia	11.3	32	Italy	M100	1987	43	1.0	East
4. Niger	12.1	21	France	M89/C6/In5	1987	51	1.2	West
5. Gambia	1.6	31	UK	M90/C6/In1	1989	6.3	1.2	West
6. Benin	7.3	43	France	In51/C26/M20	1985	59	1.9	West
7. Mali	12.7	31	France	M90/In9/C1	1985	120	1.9	West
8. Eritrea	4.5	19	Italy	M50/C50	1988	55	2.7	East
9. Djibouti	0.7	83	France	M94/C6	1988	7.5	2.9	East
10. Ghana	20.8	36	UK	C57/M30/In13	1986	310	3.1	West
11. Guinea	8.5	28	France	M85/C8/In7	1987	100	3.2	West
12. Guinea-Bissau	1.5	32	France	M53/In42/C5	1987	140	3.2	West
13. Angola	11.4	42	Portugal	C53/In44/M3	1985	200	3.9	South
14. Uganda	26.4	15	UK	C60/M26/In14	1982	520	4.1	East
15. Togo	5.0	34	France	In48/C29/M23	1987	94	4.1	West
16. Congo, Democratic Republic	58.3	31	Belgium	C70/M10/In10	1983	950	4.2	Central
17. Burkina-Faso	13.6	17	France	M50/In40/C10	1986	250	4.2	West
18. Ethiopia	69.9	16	—	M50/C40/A10	1986	1200	4.4	East
19. Chad	9.5	24	France	M68/C27/In5	1986	170	4.8	Central
20. Congo, Republic	3.0	66	France	C50/A48/M2	1983	80	4.9	Central
21. Rwanda	8.5	6	Belgium	C82/M7/In6	1983	220	5.1	East
22. Nigeria	137	45	UK	M60/C35/In5	1987	3100	5.4	West
23. Liberia	3.4	45	US	C38/M33/In29	1991	80	5.9	West
24. Burundi	6.3	9	Belgium	C67/In23/M10	1984	220	6.0	East
25. Kenya	32.0	34	UK	C72/M23/In5	1983	1200	6.7	East
26. Cameroon	16.1	50	France	C40/In39/M21	1986	500	6.9	Central
27. Côte d'Ivoire	16.4	44	France	M48/C30/In22	1987	480	7.0	West
28. Sierra-Leone	5.9	37	UK	M60/In30/C10	1987	170	7.0	West
29. Gabon	1.4	82	France	C65/A32/M3	1987	37	8.1	Central
30. Tanzania	36.6	33	UK	M43/C30/In27	1984	1400	8.8	East
31. Mozambique	18.8	33	Portugal	In45/C30/M25	1986	1100	12.2	South
32. Central African Republic	3.8	42	France	C50/In35/M15	1984	230	13.5	Central
33. Malawi	11.9	15	UK	C69/M28/In3	1986	770	14.2	South
34. Zambia	10.4	40	UK	C45/M18/H20	1986	800	16.5	South
35. Namibia	2.0	31	UK***	C85/In14/M2	1992	190	21.3	South
36. South Africa	42.7	58	UK	C68/In28/M2	1982	4800	21.5	South
37. Zimbabwe	12.5	36	UK	S50/C25/In24/M1	1983	1600	24.6	South
38. Lesotho	1.9	29	UK	C80/In17/M3	1986	300	28.9	South
39. Botswana	1.5	49	UK	C50/In48/M2	1986	330	37.3	South
40. Swaziland	1.2	27	UK	C60/In30/M10	1987	190	38.8	South
						662	22123	

A=Animists; C=Christians; H=Hindu; In=Indigenous; M=Muslims; S=Syncretic.

*=available from: URL: <http://www.infoplease.com>; www.adherents.com; www.islamicpopulation.com; minor affiliations are not regarded.

=available from: URL: <http://www.unaids.org>; www.childinfo.org; *=formally, under South Africa protectorate.

like Angola, Republic of Congo, and Rwanda did not fit well into this epidemiologic model because of peculiarities of HIV history in corresponding areas or probable underestimates of the Muslim fraction in these countries.²⁸

In the second model, to probe for relation between the religion and colonial factors to differential spread of HIV, sub-Saharan African countries were ranked by HIV infection rate,

dominating confessions, and former possessor and clustered into several geographic groups.

Primary groups, #1 and #2, laid down from HIV barely noticeable (0.6 – 1.2%, for group #1: Mauritania, Senegal, Somalia, and Niger) to low levels (1.9 – 4.8%, for group #2: Mali, Eritrea, Djibouti, Guinea, Guinea-Bissau, Burkina-Faso, and Chad) for Muslim populated former possessions of France or Italy in the northern part

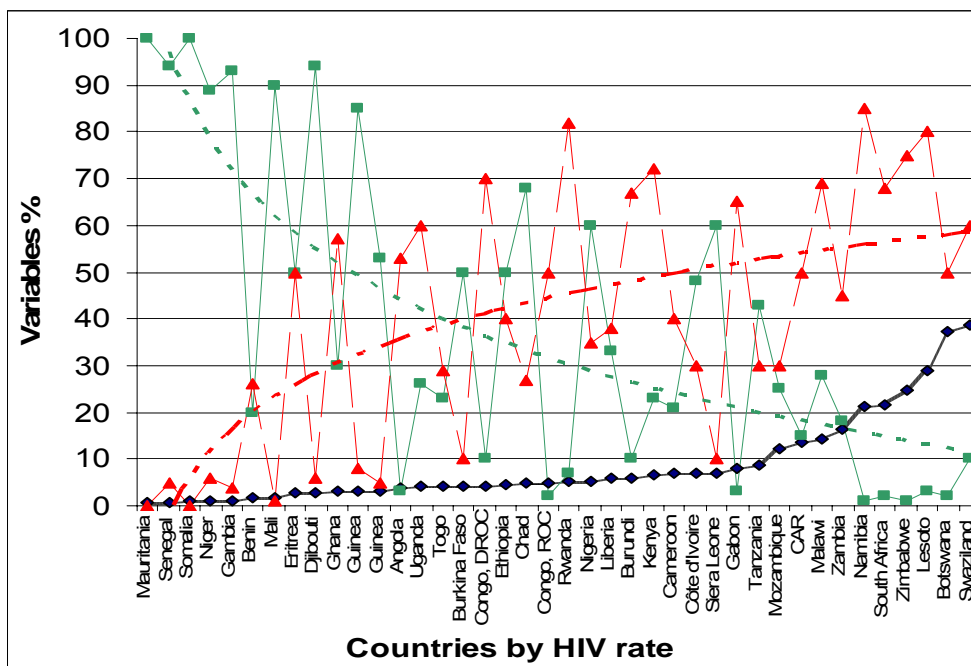


Figure 2. Correlation between HIV prevalence and Muslim and Christian religion proportions among sub-Saharan African states.

■ - proportion, -- trend for Muslims; ▲ -proportion, --- trend for Christians; ◆ - HIV prevalence rate.

of the subcontinent. Former colonies of France, Belgium, the UK, and Portugal drop into two other groups, #3 and #4, located near equator, with Catholic prevailing (#3: DROC, ROC, Rwanda, Gabon, and Burundi) or mixed populations comprising Christian, Muslim, and indigenous believers (#4: Benin, Ghana, Uganda, Togo, Angola, Nigeria, Liberia, Kenya, Cameroon, Côte d'Ivoire, and Sierra-Leone) and covering the HIV seroprevalence diapason from 1.9% to 7%. Though being traced to East-Central Africa, HIV currently reached the highest rates of 10 – 40% in the South (group #5), particularly Malawi (14.2%), Zambia (16.5%), South Africa (21.5%), Zimbabwe (24.6%), Lesotho (28.9%), Botswana (37.3%), and Swaziland (38.8%)—all former UK possessions with dominating Christian population in the sub-region.

With a few exceptions (Ethiopia, Gambia, Central African Republic, Tanzania, Mozambique, and Namibia), all countries were gathered into these groups (#1 – #5) steadily from North to South with distinct incline of HIV rates, probably related to dominate religion and colonial status (Table 1). The majority of Muslims in the populations of northwestern groups #1 and #2 suggested for the significant role of Islam in controlling HIV. Protestant domination in the countries of southern Africa (#5) and their

common colonial legacy (except for Angola and Mozambique) might be considered as powerful risk factors for susceptibility of communities to HIV-1. The rates of HIV-2 infection reported in Mozambique and Angola, the two Portuguese ex-colonies which preserved relationships with their HIV-2-prevalent colonial counterparts in West Africa,²⁰ supported the idea of association between the particular colonial status and pattern of HIV transmission.

By the end of 2003, seven out of 14 former British territories and dependencies had had the highest HIV rates, compared with all other African states. When HIV prevalences were compared, 11 of 14 (79%) former British colonies rated high (>5%) against four of 16 (25%) French possessions ($P<0.01$). Therefore, the difference between the French and British traditions in Africa might appear to be related to HIV speeding up particularly in former UK colonies in southern Africa.

Discussion

Religious communities and prevalence rates of HIV/AIDS

Two epidemiologic models presented in our study have contributed to the discourse on social behavior and health in sub-Saharan Africa by analyzing the relationship between country's

religions and HIV/AIDS deeds. Both models have revealed significant relationships between these variables and specified the previous suggestions on negative association between Islam and HIV prevalence rate for the region studied. Such a relationship was recently verified using a regression analysis with added controls for other related variables counting population density, urbanization, annual per capita purchasing power, and year of first recorded HIV/AIDS case.³⁰ However, the explanation of this effect was limited to those issues concerning male circumcision with no respect to other Islamic codes of behavior.

Since the early 1980s, when the first cases of AIDS were identified, religious involvements were considered to be germane to discussion on HIV protection and risk behaviors. However, only recent studies considered the preventive role of Islam in HIV transmission for both individuals and communities.^{29,30} The study with opposing conclusion utilized an incorrect method of comparing HIV prevalence and percentage of religious affiliations among political units rather than individuals' religious affiliations with HIV status.^{30,31} Of the two surveys on East African truck drivers, who comprised a high-risk population, one did not observe any significant reduction in HIV status of Muslims compared with Christians, but it did when referred to other religious groups. The second investigation reported that Muslims and Protestants truck drivers both had lower HIV rates than those of other confessions. In other studies, which ascertained negative relationships between HIV and Islam, factors (e.g., circumcision³² and lifetime number of sex partners³³) that themselves can be taken as correlates of Islamic practice, were controlled.

The religion-related disproportion in HIV waves is likely to be due to dissimilarity in individual's behavior and communities' traditions influencing the probability of HIV transmission upon sexual exposure and drug use. A number of patterns related to HIV spread emerged from the proposed models. Firstly, the effect of high social control observed in Muslim communities, where age at marriage is low and premarital fertility is low.^{2,34} This conservative social norm seems to have so far an effect on the dynamics of the epidemics, reducing them to low levels (as in Senegal, Niger, Somalia, Mauritania), unless other factors increase the national value, such as large migration of workers to countries with higher

infection rates (as in Mali with many migrants to Côte d'Ivoire).

It was found in many studies that continent-wide spread of HIV in African communities had been largely promoted by cultural patterns of out-marriage sex, multiple sexual partners, and a propensity for unprotected sex.^{2, 35} The pattern of relationships between premarital fertility and HIV prevalence, as well as the differences from this pattern could be related to a number of factors. In many southeastern African countries, female sexuality outside marriage was neither regarded as the ultimate sin nor identified in traditional religion as a fault—in contrast to Muslim religion. This type of behavior prevented African women from accepting the kind of family subordination regular in northern Africa, and eventually incurred a higher risk of sexually transmitted infection (STI) and HIV infection.

Some local men involve themselves as clients in the sex trade, where a high percentage of SW are infected, making a possible path of infection. In most affected areas, especially in southern Africa, prostitution and alcohol use are more tolerable practices, compared with other parts of the continent. Alcohol consumption that is strongly prohibited by Islam had become increasingly commercialized in southern Africa over the course of the 20th century. Four decades long anthropological study in Zambia hinted that use of alcohol had been raised during the past thirty years due to the proliferation of commercial breweries and distilleries.³⁶ In colonial South Africa and southern Rhodesia (now Zimbabwe), the British replaced small breweries with large, state-operated ones accompanied by outlets called beer halls.

A handful of epidemiologic studies conducted in Africa since 1989 confirmed the important role of alcohol use and bar attendance in the spread of HIV and STIs. A study on 2,691 male factory workers in Harare, Zimbabwe, interviewed and tested for HIV showed that visiting a beer hall was significantly associated with the infection;³⁷ this was also proved in a multivariate analysis that controlled for other risk factors (e.g., having more than two sexual partners or paying for sex in the last year).

An increased consideration of Islam has been obvious in sub-Saharan Africa in recent years. Religious teachings by the divine religion advocate following proper and honest behavior through its cultural values and provide a measure of protection

against AIDS and STI. Muslims in traditional societies are certainly less likely to contract the virus. Moral behavior determined by Islam is keeping in the social framework by avoiding the risk factors of HIV infections and by endowing with prevention of spread of the disease.

It might be important to study the effect of adherence to the behavioral standards instituted by religion and the recommended moral values on individual's attitude to sensual pleasures and on efficiency of controlling HIV transmission in communities. Such a study can be of immense value for the programs devoted to the control of the AIDS epidemic and STI provided religious communities would effectively guide away from behavior patterns through which this epidemic can spread. Countries with a varied history of religious and spiritual orientation and divergent cultural heritage should not limit their prevention strategies to the ABC (abstinence, behaviour change, condom use) model presenting castrated version of behaviour based on religious beliefs.⁴

Both Islam and the Catholic Church do not recognize premarital sexual activity, homosexual relationships, and do not encourage the use of contraception. Today, the reality is admitted that some young people are having sex before they married so they compose risk-group in the areas with epidemic.

Since AIDS also spreads among IDU by contaminated needles, this uncontrolled actions are key targets for prevention strategy both in Christian and Muslim communities. Simple advice to perform drug use by individual syringes cannot secure all members of the risk-group from the action errors leading to sporadic infections.

In some African communities, the occurrence of ulcerative venereal diseases, such as chancroid, genital herpes, and syphilis, and infrequent male circumcision, particularly in southern and East Africa, could add to sexual HIV transmission.⁴³ Recent studies confirmed the higher risk of infection in individuals and communities not practicing male circumcision.^{32, 38} In Muslims, circumcision and traditional hygiene are important cofactors decreasing the risk of HIV contraction.

Contaminated blood products and medical injections with unclean needles are also significant and probably underestimated routes of transmission.³⁹ It is approximated that in sub-Saharan Africa only 50 – 60% of the blood transfused annually is tested for HIV before use that

contributed to an estimated 10 – 15% of HIV infection in Africa, particularly affecting children with malaria, women with pregnancy-related anemia, and patients with sickle cell disease.² The risk of getting HIV contamination from a transfusion depends on the virus prevalence in a particular area. Besides, there are indigenous rituals and practices, like scarification and tattooing, which given through an unclean reed or horn, may lead to infection due to the habit of sharing only one instrument by a group.

Colonial past and HIV burden

Being well explanatory for differences in the HIV level between Muslims and Christians, the “Muslim proportion” model does not explicate variations in the disease rates among countries with prevailing non-Muslim population. The cited multivariate analysis did not explain this disparity: when subjected to sets of socioeconomic factors usually employed, no independent variables, beside religion affiliation and annual per capita purchasing power, were significantly related to HIV rank.³⁰

The colonial background of African countries has often been disputed to be an essential factor in various happenings. This argument is usually based on the different political systems that are inherited by the African countries from France, Britain, Italy, Portugal, or Belgium⁴⁰ and takes into account traditions and rules, including Christian missionaries activity, the level of social control, and external influences on them. Examination of the related evidences provided good support for the hypothesis about dependence of HIV level on former possessor's status as a risk factor, which indicated culture and economy infiltrations supposed for the particular country.

It is widely believed that colonial urbanization fundamentally changed the terms of family life and gender relations in sub-Saharan Africa. The levers of this change were colonial administration and proselytizing, male migration to the cities, the creation of jobs dominated by men, and the consequent marginalization of women.⁵ As taxation monetized the economy, women were forced to earn money where they could. In colonial towns appeared in East and southern Africa, single women were often automatically associated with the exchange of sex for money or other support.⁴¹ Cities in East and southern Africa attracted a much higher proportion of male than female migrants, so

that sex ratios in the cities were quite unbalanced. This pattern was partly a legacy from the colonial period, when men were recruited for work in the mines but were often prohibited from bringing their families to town with them.⁴²

Someone might consider that the most plausible link between the higher HIV prevalence found in former UK possessions could be a biomedical product of social conditions that had been created in them. If focused on individual behaviors, the root causes of the epidemic in southern Africa lie in the legacy of colonial projects. The "social engineers" altered the community life, religion, and morality of patriarchal peoples and enforced male workers to reside in hostels.⁴³ Contained to hostel conditions, workers took temporary "wives" and formed "bedholds" in place of households.⁴⁴ When women were unavailable to service the army of displaced workers recruited from all over southern Africa, migrant workers engaged in same-sex relations, violating strong cultural taboos. Out of forced migration, family disruption, improper living conditions, general human misery, and absence of strong religion and moral values, an environment ripe for a sexually transmitted epidemic was born. Evidently, in the poor regions of Arab North Africa, there are much less infection-prone conditions, presumably because Islam provides more social stability and safety.

The dominant religion and colonial past are suggested as powerful determinants accountable for the differential spread of the menace across sub-Saharan Africa countries. The effect of religion and colonial infiltration on social conditions, culture, and behavior has to get the closer consideration of both the public and AIDS professionals.

Acknowledgment

This study was supported by a grant from the Technology Cooperation Office, Presidency of Iran.

References

- 1 UNAIDS. World Health Organization. Epidemiological fact sheets by country 2002. Available from: URL: www.who.int/emc-hiv/fact_sheets.
- 2 UNAIDS and WHO. HIV/AIDS Epidemiological Surveillance Update for WHO African Region, 2002. September 2003. WHO Regional Office for Africa, Harare, Zimbabwe. Available from: URL: www.afro.who.int/aids/surveillance/resources/hiv_surveillance_report_2002.pdf.
- 3 Sadrizadeh B. HIV/AIDS in the world, in the Eastern Mediterranean region and in Iran. *Arch Iranian Med.* 1999; **2**: 154 – 157.
- 4 UNAIDS/WHO. AIDS Epidemic Update, Dec 2004. Geneva, Switzerland: UNAIDS/WHO; 2003. Available from: URL: www.unaids.org/wad/2003/press/Epiupdate2003_en/Epi03_00_en.htm.
- 5 Cohen B, Trussell J. *Preventing and Mitigating AIDS in sub-Saharan Africa: Research and Data Priorities for the Social and Behavioral Sciences*. NY: Natl Acad Press; 1996.
- 6 Schoepf BG. International AIDS research in anthropology: taking a critical perspective on the crisis. *Annu Rev Anthropol.* 2001; **30**: 335 – 361.
- 7 Buve A, Bishikwabo-Nsarhaza K, Mutangadura G. The spread and effect of HIV-1 infection in sub-Saharan Africa. *Lancet.* 2002; **359**: 2011 – 2017.
- 8 Clumeck N, Mascart-Lemone F, De Maubeuge J, Brenez D, Marcelis L. Acquired immune deficiency syndrome in black Africans. *Lancet.* 1983; **1**: 642.
- 9 Zhu T, Korber BT, Nahmias AJ, Hooper E, Sharp P, Ho DD. An African HIV-1 sequence from 1959 and implications for the origin of the epidemic. *Nature.* 1998; **391**: 594 – 597.
- 10 Monasch R, Boerma JT. Orphanhood and childcare patterns in sub-Saharan Africa: an analysis of national surveys from 40 countries. *AIDS.* 2004; **18** (suppl 2): S55 – S65.
- 11 Korber B, Muldoon M, Theiler J, Gao F, Gupta R, Lapedes A, et al. Timing the ancestor of the HIV-1 pandemic strains. *Science.* 2000; **288**: 1789 – 1796.
- 12 Hahn BH, Shaw GM, De Cock KM, Sharp PM. AIDS as a zoonosis: scientific and public health implications. *Science.* 2000; **287**: 607 – 614.
- 13 Bures R, Morris L, Williamson C, Ramjee G, Deers M, Fiscus SA, et al. Regional clustering of shared neutralization determinants on primary isolates of clade C human immunodeficiency virus type 1 from South Africa. *J Virol.* 2002; **76**: 2233 – 2244.
- 14 Vidal N, Peeters M, Mulanga-Kabeya C, Nzilambi N, Robertson D, Ilunga W, et al. Unprecedented degree of human immunodeficiency virus type 1 (HIV-1) group M genetic diversity in the Democratic Republic of Congo suggests that the HIV-1 pandemic originated in Central Africa. *J Virol.* 2000; **74**: 10498 – 10507.
- 15 Serwadda D, Mugerwa RD, Sewankambo NK, Lwegaba A, Carswell JW, Kirya GB, et al. Slim disease: a new disease in Uganda and its association with HTLV-III infection. *Lancet.* 1985; **2**: 849 – 852.
- 16 Abebe Y, Schaap A, Mamo G, Negussie A, Darimo B, Woldaya D, et al. HIV prevalence in 72,000 urban and rural male army recruits. *Ethiopia AIDS.* 2003; **17**: 1835 – 1840.
- 17 Kenya Demographic and Health Survey 2003. Preliminary Report. Ministry of Health, Nairobi, Kenya. 2004. Available from: URL: www.afronets.org/files/KenyaDHS2003.pdf.
- 18 Asiiimwe-Okiror G, Opio AA, Musinguzi J, Madraa E, Tembo G, Caraël M. Change in sexual behavior and decline in HIV infection among young pregnant women in urban Uganda. *AIDS.* 1997; **11**: 1157 – 1163.
- 19 Mbulaiteye SM, Mahe C, Whitworth JA, Ruberantwari

- A, Nakiyingi JS, Ojwiya A, et al. Declining HIV-1 incidence and associated prevalence over 10 years in a rural population in SW Uganda: a cohort study. *Lancet*. 2002; **360**: 41 – 46.
- 20 Markovitz DM. Infection with the human immunodeficiency virus type 2. *Ann Intern Med*. 1993; **118**: 211 – 218.
- 21 Lagarde E, Enel C, Seck K, Gueye-Ndiaye A, Piau JP, Pison G, et al. Religion and protective behaviors towards AIDS in rural Senegal. *AIDS*. 2000; **8**: 2027 – 2033.
- 22 Nigeria Demographic and Health Survey 2003. Ministry of Health, Lagos, Nigeria. 2004.
- 23 U.S. Bureau of the Census, 1994c.
- 24 World Health Organization, Regional Office for Africa, HIV/AIDS Epidemiological Surveillance Update for the WHO African Region, 2002; Harare, Zimbabwe, September 2003.
- 25 UNAIDS/WHO Working Group on Global HIV/AIDS/STI Surveillance. Guidelines for second-generation HIV surveillance. Geneva: UNAIDS/WHO, 2000.
- 26 Atzori C, Bruno A, Chichino G, Cevini C, Bernuzzi AM, Gatti S, et al. HIV-1 and parasitic infections in rural Tanzania. *Ann Trop Med Parasitol*. 1993; **87**: 585 – 593.
- 27 UNAIDS. “A Global View of HIV Infection”. Available from: URL: www.unaids.org, accessed Jan 25, 2005.
- 28 UN confession proportion. Available from: URL: <http://www.infoplease.com>; www.adherents.com; www.islamicpopulation.com.
- 29 Drain PK, Smith JS, Hughes JP, Halperin DT, Holmes KK. Correlates of National HIV Seroprevalence: an ecologic analysis of 122 developing countries. *J Acquir Immune Defic Syndr*. 2004; **35**: 407 – 420.
- 30 Gray PB. 2004. HIV and Islam: is HIV prevalence lower among Muslims? *Soc Sci Med*. 2003; **58**: 1751 – 1756.
- 31 Killewo J, Dahlgren L, Sandstrom A. Sociogeographical patterns of HIV-1 transmission in Kagera region, Tanzania. *Soc Sci Med*. 1994; **38**: 129 – 134.
- 32 Gray RH, Kiwanuka N, Quinn T, Sewankambo NK, Serwadda D, Wabwire Mangen F, et al. Male circumcision and HIV acquisition and transmission: cohort studies in Rakai, Uganda. *AIDS*. 2000; **14**: 2371 – 2381.
- 33 Malamba SS, Wagner HU, Maude G, Okongo M, Nunn AJ, Kengeya-Kayondo JF, et al. Risk factors for HIV-1 infection in adults in a rural Ugandan community: a case-control study. *AIDS*. 1994; **8**: 253 – 257.
- 34 Garenne M, Zwang J. Premarital fertility and HIV/AIDS in Africa. 2003. Available from: URL: www.nu.ac.za/heard/workshopsreports/democonf/PremaritalFertilityHIV-AIDS%20in%20Africa.pdf.
- 35 Royce RA, Sena A, Cates W Jr, Cohen MS. Sexual transmission of HIV. *N Engl J Med*. 1997; **10**: 1072 – 1078.
- 36 Colson E, Scudder T. *For Prayer and Profit: The Ritual Economic and Social Importance of Beer in Gwembe District, Zambia, 1950 – 1982*. Stanford: Stanford University Press; 1988.
- 37 Bassett MT, McFarland W, Ray S, Mbizvo MT, Machekeano R, van de Wijgert JH, et al. Risk factors for HIV infection at enrollment in an urban male factory cohort in Harare, Zimbabwe. *J Acquir Immune Defic Syndr Hum Retrovirol*. 1996; **13**: 287 – 293.
- 38 Buve A, Carael M, Hayes RJ, Auvert B, Ferry B, Robinson NJ, et al. The multicenter study on factors determining the differential spread of HIV in four African cities: summary and conclusions. *AIDS*. 2001; **15 (suppl 4)**: S127 – S131.
- 39 Gisselquist D, Rothenberg R, Potterat J, Drucker E. HIV infections in sub-Saharan Africa not explained by sexual or vertical transmission. *Int J STD AIDS*. 2002; **13**: 657 – 666.
- 40 Coleman JS, Belmont B Jr. The role of the military in sub-Saharan Africa. In: Johnson J, ed. *The Role of the Military in Underdeveloped Countries*. Princeton, NJ: Princeton University Press; 1962: 364.
- 41 Larson A. Social context of human immunodeficiency virus transmission in Africa: historical and cultural bases of east and central African sexual relations. *Rev Infect Dis*. 1989; **11**: 716 – 731.
- 42 Oucho JO. Towards migration research networking in eastern-southern African subregions. *Int Migr*. 1993; **31**: 625 – 645.
- 43 Epstein H. The Hidden Cause of AIDS. *The New York Review*. May 9, 2002.
- 44 Mamphela-Ramphela M. *A Bed Called Home: Life in the Migrant Labor Hostels of Cape Town*. Ohio: Ohio University Press; 1993.