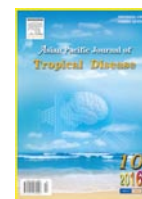




Contents lists available at ScienceDirect

Asian Pacific Journal of Tropical Disease

journal homepage: www.elsevier.com/locate/apjtd



Infectious disease research doi: 10.1016/S2222-1808(16)61126-X ©2016 by the Asian Pacific Journal of Tropical Disease. All rights reserved.

HIV/AIDS infection prevalence in an agriculture-dominated rural community of west region of Cameroon

Silas Lendzele Sevidzem^{1*}, Abdoulmoumini Mamoudou², Nzokem Blaise Kenne³, Demano Michel Lontsi¹, Irene Akoge³¹Department of Animal Biology, Faculty of Science, University of Dschang, P.O. Box 067, Dschang, Cameroon²Department of Parasitology and Parasitological Disease, School of Veterinary Medicine and Sciences, University of Ngaoundéré, P.O. Box 454 Ngaoundéré, Cameroon³Integrated Health Centre of Fondonera, West region of Cameroon BP 12, Dschang, Cameroon

ARTICLE INFO

Article history:

Received 4 Aug 2016

Received in revised form 15 Aug, 2nd

revised form 16 Aug 2016

Accepted 22 Aug 2016

Available online 26 Aug 2016

Keywords:

HIV/AIDS

Retro-prospective

Prevalence

Fondonera

West region

Cameroon

ABSTRACT

Objective: To determine the prevalence of HIV/AIDS, based on associated demographic factors in order to raise awareness on the occurrence/level of infection in this community.**Methods:** 'Determine' and Uni-Gold™ rapid diagnostic kits were used for diagnosis of 221 individuals coming for testing. Questionnaires were administered and group discussions as well as community visits were held.**Results:** Overall prevalence was 5.21%, and prevalence based on demographic factors resulted in the following: based on sex, males were more infected than females, with a significant difference ($\chi^2 = 4.251$, $df = 1$, $P = 0.039$), prevalence did not differ significantly ($\chi^2 = 3.096$, $df = 3$, $P = 0.377$) with age cohorts but individuals ≥ 36 years old recorded the highest prevalence. There was no significant difference ($\chi^2 = 9.531$, $df = 6$, $P = 0.146$) in prevalence with profession. Analysis based on marital status revealed that unmarried were more infected as compared to married with a statistical significant difference ($\chi^2 = 7.421$, $df = 1$, $P = 0.007$). Based on the motif of test, those who made the test because of sickness were significantly ($\chi^2 = 5.44$, $df = 1$, $P = 0.020$) infected than those who did for pregnancy purpose. The year interval (2014–2016) recorded the highest prevalence as compared to other year intervals with a statistical significant difference ($\chi^2 = 27.373$, $df = 8$, $P = 0.002$). Usage of condom in sexual practice for prevention in such individuals showed low prevalence as compared to individuals who did not consider such a prevention option.**Conclusions:** HIV/AIDS prevails in the Fondonera community of west region and serious sensitization on its occurrence/level is of vital importance in order to prevent future infections.

1. Introduction

HIV/AIDS remains a threat to rural development rather than simply a health issue. In the year 2013, an estimated 1.5 million new HIV infections and 1.1 million AIDS related deaths were reported by the Joint United Nations Programme on HIV and AIDS[1] in sub-Saharan African region. The prevalence of this disease in the sub-Saharan African region is country dependent. From the AIDS-related deaths in sub-Saharan African statistics of 2013, Cameroon recorded a global prevalence of 7% which was greater than the previous 5.3% reported by the Joint United Nations Programme on

HIV and AIDS[2]. It is tragic that youths and adults in Cameroon like African countries still have a blurred image and misconception about HIV transmission and prevention. Versteegh *et al.*[3] revealed through questionnaire that rural Cameroonian men with a higher level of education and more HIV/AIDS knowledge seem to take less preventive measures.

Human work force can be hampered by several pathologies such as cancer, lung diseases, malaria, gastritis, tuberculosis, HIV/AIDS and others, but since many rural African communities rely on oxen for traction services in agriculture, a pathology such as African Animal Trypanosomosis has also contributed in hindering agricultural production in most rural communities like in the Benoue (Bini) community of North Cameroon[4]. Agriculture remains the backbone of Cameroon's economy, employing 70% of its work force while providing 42% of its gross domestic product and 30% of its export revenue. Such agro-activities take place in villages where they still exist enough surface area for it like the case of our study area. From the report of Manu *et al.*[5], 53.1%

*Corresponding author: Sevidzem Silas Lendzele, Department of Animal Biology, Faculty of Science, University of Dschang, P.O. Box 067, Dschang, Cameroon.
Tel: 00237673515289

E-mail: lendzele.jimmy@yahoo.com

The study protocol was performed according to the Helsinki declaration and approved by Chief Medical Officer for the Delegation of Health in the West Region of Cameroon. Informed written consent was obtained from patients.

The journal implements double-blind peer review practiced by specially invited international editorial board members.

and 19.5% among other causes of food shortages have been caused by sickness and drought respectively. Fondonera is a poor rural community found in the west region of Cameroon with a greater fraction of its population relying on agriculture as the prime source of livelihood. It was reported in Zimbabwe by Kerina *et al.*[6] that HIV epidemic has been found to decrease gross domestic product, create food security threats, and negatively impact human resources especially the agricultural sector. It was noticed that about 12.2% of patients coming for HIV test were farmers and 79.2% of them were pregnant women who were advised to carry out this test during antenatal clinic checkups. The reasons enumerated in this paragraph indicate the propensity of this disease in reducing agricultural output in this community.

It has been estimated that most vulnerable and affected groups to HIV in Cameroon include: sex workers, truck drivers, mobile populations and military personnel. Young people (15–29 years old) are also highly affected. Urbanization is associated with higher levels of HIV infection than rural residents[6], many who engage in such voyages indulge in risky business (prostitution) to meet up with their needs as well as those of their children[7] living with their parents in the village or with them in town.

Protected sex is a critical element in a comprehensive, effective and sustainable approach to HIV and other sexually transmitted diseases prevention and treatment. It was confirmed in Uganda that the use of condom coupled with increase delay in the age of first sexual intercourse and the reduction of sexual partners, was an important factor in the decline of HIV prevalence in the 1990s[8].

Rural women especially in village-settings still live in a world where they are expected to be subservient to men and where it is unacceptable for a woman to say no to unwanted and unprotected sex[9], this makes it difficult for women to have a say when it comes to negotiating safer sex. Certain religions as well as social norms in the sub-Saharan African contexts permit (and even encourage) men to get several wives, engage in sex with multiple partners, favour sex with younger partners, and dominate sexual decision making. The idea of increase women vulnerability to HIV/AIDS caused by cultural values in sub-Saharan Africa has been well expounded in the report of Ramjee and Daniels[10].

In Africa, marriage is a social obligation and a woman's status in society is judged based on it[11]. Sex is considered as a marital duty to which no woman should withdraw herself from the moment when her husband wishes and even when she has doubts about her husband's sexual life[12]. Against the backdrop of such expectations, women often feel powerless to protect themselves against HIV infection and unintended pregnancies. Economic realities enable men to monopolize the sources of income. Also, incertain village communities in Cameroon, men have the possibility of opening plantations and getting married to several women who are expected to give birth to several children who will add to the labor force. This permits men to use their money to get any kind of young girl they want, exposing themselves and their family to the disease through such promiscuous habits.

HIV test is one of the important tests carried out in pregnant women during antenatal clinic checkups. This is to prevent mother to child transmission which is another means of transmission of the disease apart from sexual intercourse. However, many villages in sub-Saharan African lack health units and many pregnant women end up giving birth at home through local means, making it dangerous for both the woman and the child who has not received the necessary follow up before delivery and obviously does not know her HIV

status. Knowledge of HIV status is crucial in order that pregnant women access the appropriate treatment and care for themselves and their unborn infants. Without treatment, the likelihood of HIV passing from mother-to-child is 15% to 45%. However, antiretroviral treatment and other effective prevent mother to child transmission interventions can reduce this risk to below 5%[13]. The study area of this present study has one health unit offering health services to about 24 villages and this community relies on agriculture as their main economic activity. This study sought to determine the demographic factors and vulnerable groups associated to HIV infection in order to raise awareness about the existence/level of the disease so as to meet with the millennium development goal of Cameroon. This millennium development goal is to halve, between 1990 and 2015, the population of people who suffer from hunger through combatting HIV/AIDS, malaria and other diseases.

2. Materials and methods

2.1. Study area

Fondonera was our study area. It is situated 30 km from the town of Dschang, to the extreme south east of Menoua Division, west region of Cameroon. This area is bordered to the North by Fongodeng, southwards by Foguetafou Village in the Sanzo community, eastwards by Fossong Wentcheng community and westwards by Fontem in the Lebialem Division. The name of this area is colloquially known as Ndoung'lah following the Bamileke tradition (meaning summit of villages). This area suspends on a mountain at altitude between 800 and 1700 m above sea level with surface area of 120 km² with an estimated population of about 21 000 inhabitants. The climate here is equatorial type, characterized by a long rainy season and short dry season and vegetation here is forest. Agriculture is the main activity of the natives of this community, with cash crops such as coffee, cocoa, cassava, cocoyam, plantain, banana, pepper and others. This community is made up of 24 villages and they all seek for health services in the lone Nguiangou health center.

2.2. Study design

A retrospective study was carried out by studying hospital consultation and laboratory registers from 27th November 2008 to 20th November 2015, a prospective study commenced in December 1st 2015 to 27th of February 2016. A prospective study was carried out in collaboration with consulting/counseling senior nurse and laboratory technician. In addition, questionnaires were administered and group discussions organised. Home visits were also made to know the conditions of individuals living with the disease while collecting vital information. All patients coming to carry out the test were considered, but note was taken when studying past data to ensure that the same kit previously used for diagnosis was the same with that presently used for diagnosis. Diagnosis was supervised by a senior researcher to ensure that protocol for testing using the test kit was in accordance with manufacturer's instructions. Confidentiality of test results following the test was ensured and only a code was designated for each test and not the patient's identity.

2.3. HIV testing

The rapid diagnostic tests used in this investigation consisted of standard commercially sourced 'determine' kit was used as pre-

test and the Uni-Gold test kits for confirmation. Uni-Gold test kits (the trinity Biotech Uni-Gold™ HIV test) are kits that pick or react only with HIV in blood sample and was used for confirmation. The protocol for the usage of the above kits was as outlined by Olusi and Abe[14]. Storage conditions and protocols according to manufacturers of kits were strictly followed.

2.4. Ethical consideration

An authorization was given by the chief medical officer at the Dschang health district. Based on the fact that we were working on hospital registers in collaboration with laboratory technicians and nurses following instructions of the head of health unit on patients showing up for the test, ethical clearance was not required since we were not recruiting individuals for HIV screening. All clinical investigations were conducted according to the Declaration of Helsinki principles.

2.5. Data analysis

Data were analysed using the SPSS statistical software of version 22.0 and tables were constructed using MS excel software of version 2010. Chi-square test was used to compare HIV prevalence with sex, age cohort, years of screening, marital status, motif of test and profession.

3. Results

From 27th November to 22nd February 2016, 221 individuals showed up for HIV screening to know their status, 91.4% of them were farmers and this revealed how agriculturally dependent this population is.

Prevalence with sex revealed that male (14.3%) were more infected than female (4.0%) with a statistical significant difference ($\chi^2 = 4.251, df = 1, P = 0.039$) (Table 1). Prevalence recorded with respect to age showed that the highest cases were signaled in individuals of ages ≥ 36 , followed by 14–24 and lastly by 25–35 years, even though such discrepancies in prevalence existed with age, there was no significant difference ($\chi^2 = 3.096, df = 3, P = 0.377$) recorded with age cohorts (Table 2).

Table 1 HIV prevalence with sex.

Sex	N	I	Prevalence (I/N × 100)%	χ^2	df	P-value
Male	21	3	14.3	/	/	/
Female	200	8	4.0	4.251	1	0.039
Total	221	11	18.3	/	/	/

N: Number sampled; I: Number infected; /: Empty; P-value is level of significance ($P < 0.05$).

Table 2 Prevalence with age cohorts.

Age	N	I	Prevalence (I/N × 100)%	χ^2	df	P-value
14–24	73	5	6.8	/	/	/
25–35	104	5	4.8	/	/	/
≥ 36	44	1	11.1	3.096	3	0.377
Total	221	11	22.7	/	/	/

N: Number sampled; I: Number infected; /: Empty; P-value is level of significance ($P < 0.05$).

Evolution of the disease in this area since 2008 till date was monitored. Prevalence based on the year of screening showed that

the years between 2014 and 2016 (30.0%), recorded the highest infected and 2012–2013 (4.1%) presented the least number of cases. Statistically, there was a significant difference ($\chi^2 = 27.373, df = 8, P = 0.002$) in HIV prevalence with years of testing (Table 3).

Table 3 Prevalence of HIV with year of testing.

Year	N	I	Prevalence (I/N × 100)%	χ^2	df	P-value
2008–2009	12	1	14.3	/	/	/
2010–2011	44	5	21.2	/	/	/
2012–2013	93	2	4.1	/	/	/
2014–2016	72	3	30.0	27.373	8	0.002
Total	221	11	69.6	/	/	/

N: Number sampled; I: Number infected; /: Empty; P-value is level of significance ($P < 0.05$).

Prevalence based on profession showed that traders (20.0%) presented the highest prevalence, followed by farmers (14.8%) while students and teachers had zero prevalence, despite the difference in HIV prevalence registered in various occupations, there still existed no statistical significant difference ($\chi^2 = 9.531, df = 6, P = 0.146$) (Table 4). The high HIV prevalence recorded by farmers in this community was an indicator of a possible decrease in agricultural work force in this agriculture-dependent community if serious measures were not taken to prevent the spread of this disease among farmers. Traders recorded the highest infection rate among others and this was due to their high mobility rates exposing them to high risks of contracting the disease.

Table 4 Prevalence based on profession.

Profession	N	I	Prevalence (I/N × 100)%	χ^2	df	P-value
Farmer	27	4	14.8	/	/	/
House wife	175	6	3.4	/	/	/
Student	12	0	0.0	/	/	/
Teacher	2	0	0.0	/	/	/
Trader	5	1	20.0	9.531	6	0.146
Total	221	11	38.2	/	/	/

N: Number sampled; I: Number infected; /: Empty; P-value is level of significance ($P < 0.05$).

Apparently, there are two reasons why people in this study area go in for HIV screening, one being pregnancy and the other was sickness for both men and women. From data recorded, pregnant women frequently showed up for this test than those who choose to make HIV-test when they come to consult because they are sick. From the prevalence results, those who diagnosed because they were sick (10.9%) as reason recorded the highest number of cases as compared to women who did for pregnancy reasons (3.0%), with a statistical significant difference ($\chi^2 = 5.44, df = 1, P = 0.020$) (Table 5).

Table 5 Prevalence based on reason of test.

Motif	N	I	Prevalence (I/N × 100)%	χ^2	df	P-value
Pregnancy	166	5	3.0	/	/	/
Sick	55	6	10.9	5.44	1	0.020
Total	221	11	13.9	/	/	/

N: Number sampled; I: Number infected; /: Empty; P-value is level of significance ($P < 0.05$).

Prevalence based on marital status indicated that single (unmarried) (16.0%) recorded high cases of the disease than their married counterparts (3.6%), with a statistical significant difference ($\chi^2 = 7.421, df = 1, P = 0.007$) (Table 6). It was observed that married people showed up for the test than single persons.

Table 6

Prevalence based on marital status.

Marital status	N	I	Prevalence (I/N × 100)%	χ^2	df	P-value
Single	25	4	16.0	/	/	/
Married	196	7	3.6	7.241	1	0.007
Total	221	11	19.6	/	/	/

N: Number sampled; I: Number infected; /: Empty; P-value is level of significance ($P < 0.05$).

The most frequent control measure for sexually transmitted diseases in this community is the use of condoms. During community visits, it was discovered that 100% of shops sold condom and when shop sellers were interviewed on which age group frequently purchased it. The response was students in secondary and high schools and rarely parents. From the results of our group discussions and questionnaires analysis, we realised that 80% of adolescent population used condom for safe sex as a preventive tool for sexually transmitted diseases while 20% preferred abstinence. A further analysis of the effect of condom usage by youths of this village as prevention option for HIV showed that 60% of individuals who showed up for screening and were diagnosed/confirmed positive did not practice safe sex (use condom), meanwhile, the other fraction who practiced safe sex with condom recorded 38% HIV-AIDS prevalence.

4. Discussion

The overall HIV/AIDS prevalence of 5.21% was recorded in the Fondonera community of west region of Cameroon which is greater than 2.8% reported by the demographic /health survey and multiple indicators cluster survey (DHS-MICS) in 2011 for this same region[15]. The number sampled was small as compared to other studies because people in this village rarely go to the hospital even for routine checkups, hence the data collected represent the actual number of individuals who willingly demanded for the test. From our results, 91.4% of the individuals coming for HIV screening are farmers and this proves that a greater fraction of the population of indigenes of this area is made up of farmers. Females (especially pregnant women and those carrying out pre-marital tests) regularly come for consultation as well as HIV testing than men in this area. Prevalence of the disease with sex indicated that males were more infected than females. This projects a poor quality and quantity of work force and food security as men contribute more for the upkeep of their families as well as agricultural work force than women. According to the DHS-MICS[15,16] women were most infected than men, this same report was made in a rural community known as Noni in the north west region of Cameroon by Manu *et al.*[5]. HIV prevalence was the highest in individuals of ages ≥ 36 years, this result is similar to the HIV prevalence curve for age plotted by DHS-MICS[16] which indicated peak prevalence in ages between 35 and 39 years and above. From community visit observation, 90% of individuals from 35 years and above living in this village did not go to school and 95% of youths below 30 years have at least attended primary school. Lack of education amongst parents in this village has led to their unawareness of the transmission and prevention of the disease as well as lack of parental doctrine about the disease to their children. Parents in this community are equally high consumers of alcohol (beer or palm wine) which renders them senseless, exposing them to risky behaviors and consequently, the disease. From 2014 till date, the highest HIV positive cases were

recorded in this community. This can be justified by referring to some socio-economic reasons which involve relocation of youths from cities during festive periods into this community and introduction of risky habits acquired from towns, exposing the community to more danger. Also, the opening up of the Santchou-Fondonera road has increased accessibility by indigenes of this village and visitors that are based in towns to frequently visit this area as compared to past years, exposing this vulnerable community to this disease. From our frequency table analysis, 75.1% of individuals coming for HIV test constitute pregnant women and only 24.9% carry out the test because they are sick. It is clear from these figures that HIV test is not a priority of sick patients in this village and they prefer routine tests like stool, typhoid and malaria. The high screening percentage for pregnant women is because HIV test is obligatory for them taught during antenatal clinic sessions. Even though a greater fraction consulting is made of pregnant women, they rather recorded low (3.0%) prevalence as compared to 10% in cases testing for sick reasons. This low prevalence in pregnant women in this community is still epidemiologically significant because a seropositive pregnant woman being mainly married have a far-reaching implication to the family as well as the socio-economic life of the people[17]. Based on the marital status and the frequency of consultations, free (single, divorced, widows and widowers) recorded an 11.3% testing frequency as compared to 88.7% in married persons. From the prevalence results, free persons were infected than their married counterparts and this finding is contrary to that of Manu *et al.*[5] who reported that married were more infected than unmarried. This finding is still contrary to the finding of Omanje *et al.*[18] in Kenya who reported that couples were at a high risk of acquiring the virus as they are ignorant of their status but still indulge in unprotected sex. Our present finding even though contrary to that of the above two authors was similar to that of Odimayo *et al.*[19] who reported that single individuals were more infected than couples. It is logical that free persons have multiple sex partners to a greater extent than married people in a village setting like our study community. Such risky habits expose those free individual to HIV infection than those legally married therefore, the present result was expectant. Fondonera community is an agriculture-dominated area with a greater population of the indigenes residing in the villages of this community being farmers. This is portrayed from the global hospital statistics of patients consulting yearly according occupation, with 91.4% of them consulting as farmers. It was interesting even though vexing to know that farmers had the second highest infection prevalence after traders than any other occupation with no association. This finding is similar to that of Nyambi *et al.*[7] who reported that there is no association of HIV infection with occupation of participants in rural areas of Cameroon. Traders were highly infected because their mobility is the highest hence confirming the risk of mobile populations in the contraction of the disease[20]. This finding is similar to that of Njukeng *et al.*[21] who reported the highest cases with traders. The consequences of high farmer infection in this rural agriculture-dependent society can be deduced from the report of Nmadu *et al.*[22] in Rwanda who said that 60%–80% reduction rates witnessed in farm labor is due to illness and death of infected households. It was noted from respondents about prevention strategies that 80% of them used condom for safe sex and only 20% preferred abstinence to the use of condoms. This finding on frequency of the use of condom for HIV/AIDS prevention is similar to the findings of Wahdan *et al.*[23], Omanje *et al.*[18] and Menna

et al.[24]. A further analysis was made on HIV prevalence amongst users and non-users of condom as prevention strategy and it revealed that 62% of infected cases did not use condom during sex and only 38% of infected individuals were aware of the necessity of condom in protection against sexually transmitted diseases. It was reported by shop sellers during interviews that most of their customers are students and teachers who rather reported zero HIV prevalence as compared to parents who did not use condom and recorded high number of cases. This finding is in consonance with the report of Dimbuene and Defo[25] who reported that abstinence was the best option by participants to control the spread of the disease followed by use of condoms. From the above findings, it can be deduced that even though condom users recorded low prevalence than non-condom users, condom still failed because it did not give a 100% protection from the virus. Meaning that there were still some positive cases existing amongst condom-users.

Based on the 221 individuals who tested to know their HIV status from the year 2008 till 2016, 11 of them were confirmed positive with an overall prevalence of 5.21%. Demographic information revealed that sex, marital status and years of testing showed association with HIV prevalence, but age, reason and profession showed no association with HIV prevalence in the Fondonera community. This community is dominated by farmers and farmers recorded the highest prevalence which is a threat to agricultural production and food security in this poor rural community. As a prevention strategy, condom will not be 100% protective against the virus and should not be indispensable but abstinence will be the best knockout option which can only be transmitted through stringent sensitization. Positive cases are encouraged to follow-up their antiretroviral treatment and avoid spread of the disease to other vulnerable groups.

Conflict of interest statement

We declare that we have no conflict of interest.

Acknowledgments

Authors are grateful to the support of the Fondonera health unit for providing retrospective information and also for supplying kits that were needed for diagnosis in our prospective study. We also thank Mrs. Melaine Tieubou Lapa for grammatical corrections. This research work was financed by authors with support from the entire Fondonera community.

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