A COMPARATIVE STUDY OF HIV RISK FACTORS AND HEALTH CARE UTILISATION   BETWEEN THE BATWA PYGMIES AND SURROUNDING COMMUNITIES OF KANUNGU DISTRICT, SOUTH WEST UGANDA.

Dr. Birungi Mutahunga R. Edwin
MBChB, MPH
Medical Superintendent Bwindi community Hospital- Kanungu

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Abstract

Background: It has not been known whether the formerly secluded Batwa pygmies of Kanungu district, S. western Uganda have equal utilization of the available HIV care services and if their integration into the surrounding Bantu population increased their vulnerability to HIV infection.

Goal: To determine the level of HIV care service utilization and the vulnerabilities among the Batwa people to HIV infection in order to inform specific health and health education interventions.

Methods: 24,195 Cross-sectional survey responses to questions about knowledge of where to test for HIV, ever tested, and where to get ART, including 7,053 HIV test results for 12 months ending June 2009 from sub counties of Kayonza and Mpungu where Batwa settlements are located in Kanungu district were analyzed.

Knowledge and utilization of HIV care services were compared between Batwa and non-Batwa using logistic regression analyses to test for differences between the two groups for HIV diagnoses, knowledge and utilization of HIV care services.

Results: 61% of the Batwa and 59% non Batwa knew where to test from. More Batwa (47.5%) had tested for HIV in the past 1 year than non Batwa (36%), p-value; <0.001. 55.8% Batwa and 52% non-Batwa knew where to get ART. HIV diagnoses were generally found to be 3.8% (270/7,088), although it was lower among the Batwa, 2.2% (5/223) than non batwa, 3.9% (265/6865), OR, 0.60, 95%CI (0.24-1.47), P-value 0.263.

*Conclusions/Recommendations***:** Batwa pygmies were more aware of HIV care services in the area and had utilized the services more than the non-Batwa (Bakiga), had less HIV diagnoses and were 40% less likely to be HIV infected than the non Batwa. HIV awareness and VCT services need more emphasis among men and teenagers.

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DEFINITIONS

'ABC':	Abstinence, Be faithful to one partner, Condom use (as an HIV transmission prevention strategy)
AIDS:	Acquired Immunodeficiency Syndrome
ART:	Anti-retroviral therapy
Batwa:	Pygmies living around Bwindi National Park in South western Uganda
HIV:	Human Immunodeficiency Virus, the virus that causes AIDS
PMTCT:	Prevention of Mother to Child Transmission (of HIV)
UBOS:	Uganda Bureau of Statistics
UNAIDS:	The Joint United Nations Programme on HIV/AIDS
UNGASS:	United Nations General Assembly Special Session
WHO:	World Health Organization

CHAPTER ONE: INTRODUCTION AND BACKGROUND

1.0 Introduction

HIV (Acquired Immunodeficiency syndrome) is a pandemic with the highest burden in Sub-Saharan Africa that accounted for 71% of all the new HIV infections during 2008 (UNAIDS, 2009). Despite measures to combat the pandemic the number of people living with HIV has continued to rise, reaching an estimated 33.4 million in 2008 of which 2.7 million were new infections (UNAIDS/WHO 2009). The number of people living with HIV worldwide had reached 20% higher than in 2000 and the prevalence was three times more than it was in 1990 (UNAIDS/WHO 2009)

In Uganda HIV was first recognized in the early 1980's. With few intervention measures in place, the prevalence among pregnant women attending antenatal clinics reached 29% in the 1980s before dropping to the current 6.4% (Uganda Demographic and Health Survey 2006). There is significant variation in prevalence of HIV in the general population across the country ranging from as high as 8.5 % in the central region to 5.9% in the western region and then as low as 2.3% in West Nile. Although HIV prevalence is still high in urban than rural areas of Uganda, this gap been reducing since 2000.(Uganda MoH 2009)

In recent years the Batwa pygmies, one of the ethnic groups in South West Uganda, have lost access to their traditional homelands and resource base in the Bwindi Impenetrable Forest which was gazetted as a National Park in 1992 by the Government of Uganda.   Batwa people were displaced into settlements along the edges of the forest without provision for adequate shelter, food sources or effective access to education and health care. Moreover, being relatively much poorer, integration with surrounding non-Batwa communities may have placed them at increased risk of STI's and HIV.

It is not established whether the available measures to combat HIV/AIDS care, the 'ABC' (Abstinence, Be faithful to one partner, Condom use) strategy including PMTCT are benefiting this minority group of people. Batwa in the Bwindi region have levels of education and literacy which are much lower than the majority population, and thus are likely to possess low awareness of ways to protect themselves against the risk of infection of communicable and sexually transmitted diseases. This study compares knowledge about HIV and ART, self-reported access to HIV testing and the results of HIV testing between Batwa and non-Batwa communities.

It will also compare VCT results of the two groups from data base of the major health care facility in the area, Bwindi Community Hospital.

1.1 Background

Batwa pygmies are considered an endangered people and culture in Africa, and they are faced with numerous challenges to both physical and cultural survival, including poor access to healthcare, poverty and mal- and under nutrition, and low levels of literacy and education. Their plight is exacerbated by geographic remoteness (Jerom Lewes, 2000).

The HIV sero-prevalence in Uganda in the adult population aged 15 to 49 years is currently estimated at 5.4%(UNAIDS 2008). Prior research has suggested that HIV prevalence within pygmy populations is lower compared with the surrounding communities (Yumo HA, Ndembi N,Yamdeu R et al 2003) at 1.5% and 5.4% respectively. Awareness of HIV/AIDS was also much lower among the pygmy population; just over half (53.9%) of Pygmy community had awareness of the disease compared to over four fifths (80.7%) of the surrounding Bantu community (Minority Rights Group International 2008).

Political strife in the region (1990 to 2003) that affected mainly Uganda, Rwanda and DR Congo in the Great Lakes Region, and home to the Batwa pygmies, may have increased the risk factors for HIV transmission to this group of people. Batwa who frequently move across borders of countries in the region have been vulnerable to acts of sexual violence by soldiers (Unrepresented Nations and Peoples Organization, [Accessed October 2009]. Also false beliefs among other tribes that sex with Batwa women can cure AIDS may have further placed Batwa women at heightened risk and vulnerability (Daily Monitor News. Accessed October 2009).

In recent years, the Batwa in southwest Uganda have lost access to their traditional homelands and resource base in Bwindi Impenetrable Forest which was gazetted as a National Park in 1992 by the Government of Uganda. Batwa people were displaced into settlements along the edges of the forest without provision for adequate shelter, food sources or effective access to education and health care. Moreover, integration with surrounding non-Batwa communities may have placed them at increased risk of STIs and HIV. Batwa in the Bwindi region have levels of education and literacy which are much lower than the majority population (Minority Rights Group International, 2008), and thus are likely to possess low awareness of ways to protect themselves against the risk of infection of communicable and sexually transmitted diseases.

The site of the proposed research is Kanungu District which is one of three Government administrative districts bordering Bwindi Impenetrable National Forest. Kanungu District has a total population of 217,903 people (Uganda Bureau of Statistics 2005) of whom 640 are Batwa living in ten settlements primarily in Kayonza and Mpungu sub-counties. From the 2009 Household Survey performed by Bwindi Community Hospital, the total population of Kayonza and Mpungu sub-counties is 41,629 of which Batwa comprise about 1%.

This study will compare the levels of knowledge that Batwa communities have about access to HIV testing and care with non-Batwa communities. It will also compare HIV diagnoses. The results of the study will inform the public health interventions specific to the endangered Batwa population.

1.2 Problem statement

HIV is a global issue still affecting some estimated 40.3 million people by 2005 and has been steadily increasing (WHO/UNAIDS 2005). Despite intervention measures put in place, the spread of HIV is still not yet controlled in various parts of the world with 2.7 million new infections and 2 million deaths worldwide in 2008 (UNAIDS/WHO 2009). The impact this has had on minority vulnerable groups of people on verge of extinction, such as the Batwa pygmies of South Western Uganda has not been assessed

This study will seek to compare the level of HIV knowledge, number HIV diagnoses and access to HIVcare among the Batwa and non-Batwa in order to inform specific health and health education interventions.

It is hypothesized that Batwa may have lower levels of knowledge about HIV and less access to HIV testing, although their HIV sero-prevalence may be the same as the surrounding community.

1.3 Justification of the Research

The Batwa people of Southwestern Uganda are one of the minority ethnic groups in Uganda. There are international conventions such as the International Labor Office convention Concerning Indigenous and Tribal Peoples in Independent Countries, No.169 (1989), as well as the 1995 constitution of the Republic of Uganda chapter four, "Protection and promotion of fundamental and other human rights and freedom", that provide for protection of such groups. Like every Ugandan, the Batwa are entitled to access to social services including healthcare and education of which HIV care is just a subset.

Batwa in the Bwindi area have levels of education and literacy which are much lower than the majority population (Minority Rights Group International, 2008), and thus are likely to possess low awareness of ways to protect themselves against the risk of infection of communicable and sexually transmitted diseases. It is therefore of paramount importance that this study is undertaken to establish whether formerly secluded Batwa communities have equal utilisation of HIV care service compared with non-Batwa communities and also whether Batwa are characteristized by similar or different risk factors for HIV transmission. The results of this research will provide valuable information to Batwa communities and to Bwindi Community Hospital about their HIV knowledge, access to HIV testing and numbers of HIV diagnoses.

CHAPTER TWO: LITERATURE REVIEW

2.0 Literature review

The national level of HIV sero-prevalence among age group 15-49 years in Uganda is currently at 5.4% (UNAIDS 2008). Prior research has suggested that HIV prevalence within pygmy populations is lower compared with the surrounding communities.

There is a big variation in HIV prevalence in Uganda by ethnicity and region ranging from 1.7% among the Karimojong to 14.8% among the Batoro, and 2.3% in west Nile to 8.3% in Centeral (Uganda HIV/AIDS Sero-behavioural survey 2006). The same survey found that HIV prevalence was 5.9% in the South Western region but slightly higher (6.5%) among the Bakiga who are the largest ethnic group in Kanungu district among which the Batwa live now. This survey report did not report specifically about the Batwa Pygmies living in South Western Uganda.

Despite a 35% increase in the number of people in low and middle income countries utilizing HIV counseling and testing services between 2007 and 2008,and with free tests in most countries, there remains many more HIV infected people un aware of their HIV status (WHO, 2009) . It has been reported that many patients still are diagnosed late translating into delayed initiation of ART and consequently high deaths during the first year of treatment (WHO, 2009)

Quoting WHO Director General Margret Chan, "At least 5 million people living with HIV still do not have access to life-prolonging treatment and care. Prevention services fail to reach many in need", WHO Director General Margret Chan was quoted as saying, (WHO, 2009).

Despite the above scenario, access to ART has reached 42% in the Sub Saharan Africa where 2/3 of all new HIV infection occur, ART coverage in Eastern Africa was reported at 48% in 2008

In Uganda, the number of people aged 15 years and above who had test for HIV in the past 12 months was reported at 146 per 1000 population (WHO 2009). This leaves a big number of people with un diagnosed HIV who would benefit from prompt ART initiation

Acceptability of routine HIV counseling and testing in two urban large Ugandan hospitals was found to be 98% (Wanyenze, Rhoda K. Nawavvu, Cecillia et al, 2006). This could be different in rural areas such as Kanungu district, where the population may be less educated and with limited access to mass media.

Again, the unmet need for offering an HIV test in Uganda in patients was high as only 46% of the admitted patients had the offer (Wanyenze, R.; Moses, Kamya et al, 2006)). This study was in some urban hospital in Uganda's capital-Kampala. The result may not easily apply to rural hospitals compounded by limited human resource for health.

A study in rural South West Uganda found that repeat VCT acceptors previously tested HIV negative were less likely to consistently use a condom than first time acceptors (Joseph K. et al. 2006), thus need to intensify risk reduction counseling among this group

2.1 Research goal and specific aim of the study:

The research goal of the study is to determine the level of HIV care service utilization and the vulnerabilities among the Batwa people to HIV infection in order to inform specific health and health education interventions.

2.2 Specific objectives:

- To compare proportions of Batwa and non-Batwa who have knowledge of and use of HIV counseling and testing services and where to get ART
- To compare HIV diagnoses between the Batwa and non-Batwa.

CHAPTER THREE: METHODOLOGY

3.0 Study design

This was a quantitative retrospective cross-sectional study analysing a hospital database of HIV voluntary Counseling and Testing services (Bwindi Community Hospital) and some aspects of the Community Household Survey undertaken in 2009 on knowledge about HIV testing and care services in the area (available at; http://www.bwindihospital.com/pdf/about-annual-report-section/BCH-SURVEY-REPORT-2009.pdf).

3.1 Study area

The data from Bwindi Community Hospital covered the sub-counties of Mpungu and Kayonza of Kanungu district with nine Parishes including 10 Batwa settlements in the parishes of Ntungamo, Mukono, Bujengwe and Buremba
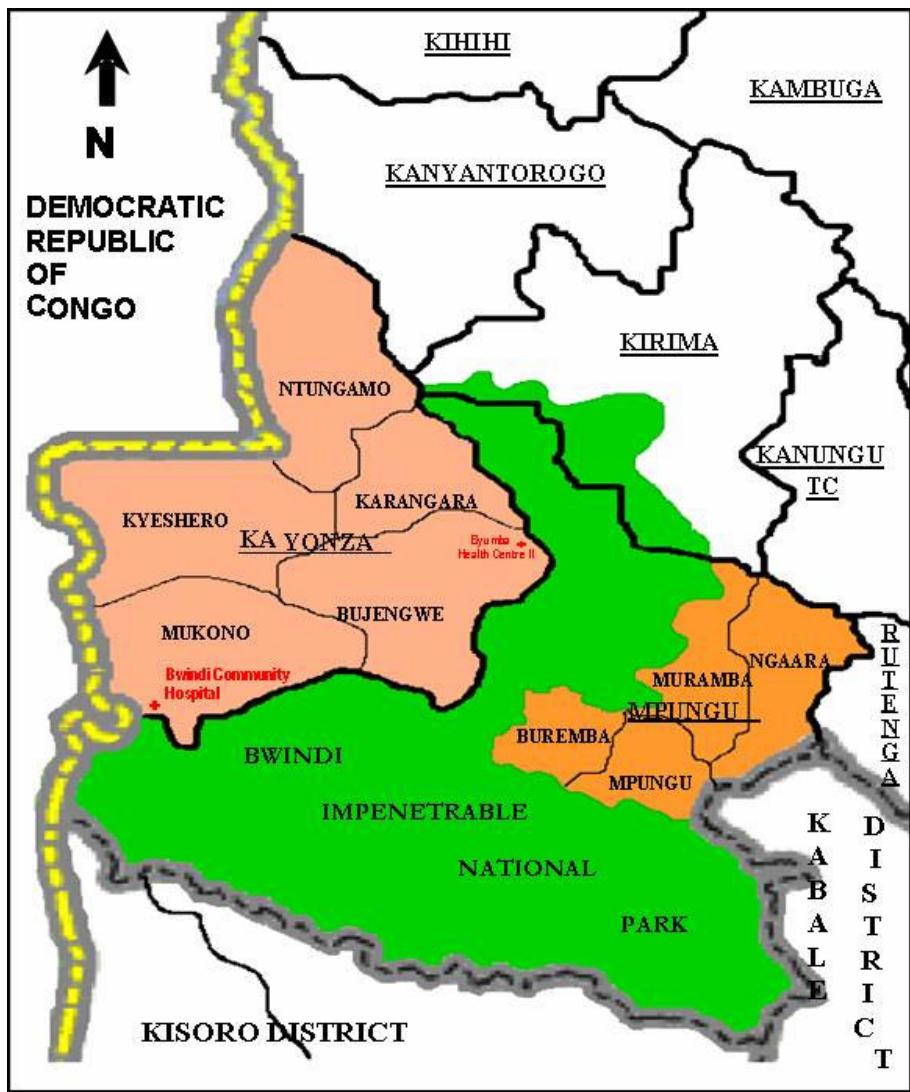
Figure 1.Map of Kayonza and Mpungu sub counties
Reproduced from Bwindi Community hospital, Kayonza and Mpungu sub-counties Household survey (2009) Figure 1,p4

3.2 Study population

The Household Survey covered the whole population of 41,629 people living in Kayonza and Mpungu Sub Counties of whom 538 were Batwa and included all age groups. The response rate was likely to be close to 100% as the 2002 Uganda population and housing census had put the total population in this area at 35,625

The main aim of the survey was to collect household and demographic data from the two sub-counties served by Bwindi Community Hospital as a baseline to monitor targets in the hospital's health strategy. This annual survey was conducted using questionnaires administered face to face by Village health Promoters and gathered information about malaria prevention, immunization, malnutrition, family planning, child birth, HIV and TB as well as water and sanitation The sought information about HIV was limited only to knowledge of place where to test or get ART from.

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The full survey report was published at: http://www.bwindihospital.com/pdf/about-annual-report-section/BCH-SURVEY-REPORT-2009.pdf [Last accessed June 2010]

Although from the survey the percentages of people who knew where to get tested for HIV and/or had tested for HIV and those who knew where to get anti retroviral therapy were obtained, comparison between ethnic groups was never made and that was the area this study addressed. The study population was an extract of all Batwa and non Batwa aged 12 years and above. The data was used to obtain the proportions of Batwa and non-Batwa people who knew where to get an HIV test from and the proportions who reported that they had tested for HIV in the past year.

Comparisons between the age, sex and marital status of the two groups were made to look for confounding variables.

Outcome measurements were also evaluated according to geographical distribution of the two populations

In addition to the above analysis, HIV diagnoses amongst the Batwa settlements in two sub-counties were mapped out using Hospital HIV Counseling and Testing HCT) registers.

This served as a guide whether some of the Batwa settlements were more exposed to risk of HIV infection and if both Batwa and non-Batwa had equal utilization of HIV care.

3.3 Inclusion/exclusion criteria
Inclusion
- HIV care access responses from the 2009 Household Survey for those aged 12 years and over from Kayonza and Mpungu sub-counties
- Residents of Kayonza and Mpungu subcounties aged 12 years and above who's Counseling and testing results are in the hospital VCT register.

Exclusion
- Individuals whose responses on the outcomes of interest were not recorded/missing were not included in the final analysis

For each of these sources of data and methods of data collection, protocols for the protection of human subjects, privacy and confidentiality were implemented and followed.

3.4 Sample size estimation:
The sample size formula for complex cross-sectional studies for two groups of unequal size was adapted from Will G. Hopkins (2009) and employed as follows

The population ratio of non Batwa to Batwa is 80:1.

The number of non-Batwa, n_1 tested is over 6,000 (infinitely large compared to Batwa whose total population is only 540)

For unequal samples;

$N = 4n_1n_2 / (n_1+n_2)$

Where, n_1 = Non-Batwa tested for HIV

n_2 = Batwa tested for HIV

N = The total number one would normally require if both sample sizes were equal.

For equal sample sizes, $N = 32/(ES)^2$, where ES is the smallest effect size (0.2), assuming a 10% worthwhile difference to be detected, with 95% CI

Thus $N = 32 / (0.2)^2 = 800$ (i.e 400 in each sample). Since the n_1 for non Batwa is infinitely large, the fomular $N = 4n_1n_2 / (n_1+n_2)^2$ becomes, $N = 4n_2$ and thus $n_2 = N/4$ OR $800/4 = 200$ Batwa tested for HIV.

3.5 Sampling criteria

All responses and HCT results from the survey and HCT register respectively meeting the above criteria were analyzed.

3.6 Instruments

Information already collected by the Hospital for clinical usage was used, i.e. the HCT registers and raw data from the 2009 Household Survey that was conducted by Bwindi Community Hospital. The HCT register is routinely used for HIV counseling and testing as designed by Uganda's Ministry of Health for Health management Information System. It includes demographics as sex, age, tribe (ethnicity), marital status and then HIV test result. The annual survey was conducted with the help of trained Village Health Promoters using questionnaire to record responses from participants during a face to face interview. The questionnaire used had only questions specific to HIV; whether one knew where to test from, where to get ART and tested in the past one year. All responses were initially manually recorded on paper.

3.7 Plan of analysis

The data was analyzed basing on outcomes of interest below:

1. Proportion of Batwa and non-Batwa who know where to get an HIV test from
2. Proportion of Batwa/non-Batwa who have tested for HIV in the past year
3. Proportion of Batwa/non-Batwa who know where to get ART from
4. Diagnosed HIV prevalence amongst Batwa/non-Batwa populations

The explanatory variables were: age, sex, marital status (single, married, separated,widow, widower), geographical location
The outcomes of interest for the two groups were compared using chi-square tests.

Logistic regression analyses were performed to test for significant differences between the two groups of interest. The data was analyzed using STATA RELEASE10, under the guidance of a statistician and results presented in graphs and descriptive language based on the above outcomes of interest and research objective.

3.8 Quality control

Originally from the household survey, data was read from the questionnaires into a designed Excel file using lists to ease data entry and validations to ensure that only the correct data was entered.

For this study in particular, an electronic file of the survey data that had been compiled by data clerks was used unlike the VCT data from the registers

The data was then exported into MS SQL (Structured Query Language) data base server 2005 to ease querying

- SQL commands were used to extract relevant data/parameters for this study, e.g
  Select*from survey where Are you Mutwa = 'Yes' and age > 11, retrieved all Batwa aged 12 years and above.

- At the end of each day of data entry from the HCT registers, the entered data was cross checked to ensure that was correctly entered
- Use of valid data entry software including pull down menus minimized errors while entering the explanatory variables

  Both data sets were then coded and cleaned.
  STATA software for data analysis was used by a statistician with experience in the field.
  The principal investigator developed the whole research protocol and did the final interpretation and discussion of the results.

3.9 Ethical considerations

Permission to use the hospital data base for research was sought from Bwindi Community Hospital Management Executive.

Ethical approval was obtained from Makerere University Faculty of Medicine Research (protocol # REC REF 2010-072) and Ethics Committee as well as London School of Hygiene and Tropical Medicine (Ethics No. 009/45).

There was no contact with human subjects during the study as the data had already been collected for clinical purposes. The informed consent obtained by the hospital prior to data collection was applied.

The data accessed could not reveal identities of the subjects and no attempts were made whatsoever to link it to individual participants.

The data remained the property of the hospital at the end of the study.

Some aspects of the research findings were added to the BCH data base for future health interventions.

3.10 Limitations

The available data base lacked socioeconomic data for further comparison of HIV risk factors between the batwa and non Batwa

Batwa may have been unwilling to disclose HIV related information

Results:
Of the 41,1630 respondents in the household survey done in 2009, 24,194 aged 12 years and above were analyzed to compare proportions of Batwa and non-batwa who have knowledge of and use of HIV VCT services and where to get ART. Sub county, gender, age, and ethnicity each had one entry missing and were not considered in the analysis. Other missing values were, 14 for those tested in the past 1 year, 14 for those who knew where to test from and 17 for those knowing where to get ART from.

Overall there were 23,872 non-Batwa (mainly Bakiga) and 322 Batwa meeting the selection criteria.

The analysis of results was done at three levels;

First univariate analysis was done to describe demographics of the participants and frequency distribution of the main outcomes of interest.

Bi-variate analysis using chi-square test was then performed to test the relationship between the outcomes of interest and the explanatory variables.

The relationships found significant at this stage were further subjected to multi-variate analysis using logistic regression models to test for significance in presence of confounders.

Characteristics of participants who took part in the survey are summarized in the table below

Table 1: Demographics of the survey respondents

| Characteristic | Ethnicity | | | P-value |
	Non Batwa (%)	Batwa (%)	Totals (%)	
Gender				
Male	11,803 (49.4)	149 (46.3)	11,952 (49.4)	
Female	12,069 (50.6)	173 (53.7)	12,242 (50.6)	0.302
Sub county				
Kayonza	17,734 (74.3)	230 (71.4)	17,964 (74.2)	
Mpungu	6,138 (35.7)	92 (28.6)	6,230 (25.8)	0.468
Age categories				
12-19	7,732 (32.4)	101 (31.4)	7,833 (32.4)	
20-24	3,516 (14.7)	40 (12.4)	3,556 (14.7)	
25-49	9,722 (40.7)	142 (44.1)	9,864 (40.8)	
≥50	2,899 (12.2)	39 (12.1)	2,938 (12.1)	0.538

Most of the respondents were from Kayonza Sub county (74.2%) where as Mpungu had 25.8%
There were almost equal numbers of male and female respondents at 49.5% and 50.6% respectively.
The age group 25-49 years had the highest respondents at 40.8% and those aged 50 years and above were the least at 12.1%.
The Batwa Pygmies as a minority group were only 1.3% compared with the dominant non-Batwa who are largely of Bakiga ethnic group.

Table 2: Frequency distribution of the main outcomes of interest from the survey

Survey question	Response				Total
	Yes (%)		No (%)		
	Batwa	Non Batwa	Batwa	Non Batwa	
Know where to get an HIV test?	196 (60.9)	13,963 (58.5)	126 (39.1)	9,892 (41.5)	24,177
Tested for HIV in the past 1 year	153 (47.5)	8,585 (36.0)	169 (52.5)	15,270 (64)	24,177
Know where to get ART	179 (55.8)	12,810 (53.7)	142 (44.2)	11,185 (46.3)	24,177

More Batwa (60.9%) than non Batwa (58.5%) said they knew where to get an HIV test from, while 47.5% of the Batwa had tested for HIV in the past one year compared with 36% of the non Batwa.
55.8% and 53.7% of the Batwa and non Batwa respectively reported knowing where to get ART from.

Proportion of Batwa and non-Batwa who knew where to get an HIV test from.
Table 3: Association with knowing where to test from

Explanatory variables	Know where to test from outcomes					
	Yes (%)	No (%)	Un adjusted		Adjusted (Logistic regression)	
			OR (95% CI)	P-value	OR (95% CI)	P-Value
Ethnicity						
Batwa	196 (60.9)	126 (39.1)	1		1	
Non-Batwa	13,963 (58.5)	9,892 (41.5)	0.91(0.72-1.14)	0.398	0.94 (0.73-1.19)	0.589
Sub county						
Kayonza	10,254 (57)	7,699 (43)	1		1	
Mpungu	3,906 (63)	2,322 (37)	1.26(1.19-1.34)	<0.001	1.31 (1.23-1.40)	<0.001
Gender						
Female	7,828 (64)	4,408 (36)	1	<0.001	1	
Male	6,332 (53)	5,613 (47)	0.64(0.60-0.67)		0.623 (0.59-0.66)	<0.001

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Table 3. continued						
	Know where to test from outcomes					
Explanatory variables	Yes (%)	No (%)	Un adjusted		Adjusted (Logistic regression)	
			OR (95% CI)	P-value	OR (95% CI)	P-Value
Age group						
12-19	2,662 (34)	5,168 (66)	1		1	
20-24	2,472 (70)	1,082 (30)	4.43(4.07-4.80)	<0.001	4.406 (4.04-4.80)	<0.001
25-49	7,326 (74)	2,532 (26)	5.61(5.26-6.0)	<0.001	5.70 (5.34-6.09)	<0.001
50+	1,699 (58)	1,237 (42)	2.67(2.44-2.91)	<0.001	2.71 (2.49-2.97)	<0.001

People from Mpungu sub county were more likely to know where to test from than those from kayonza at 63% and 57% respectively with adjusted odds ratio of 1.31, 95%CI (1.23-1.40). The association was statistically y significant, P-value, <0.001

Although the Batwa (61%) were more likely to know where to test for HIV than non-Batwa (59%), this association in the difference was not statistically significant, (p-value; 0.589)

Men (53%) were 38% less likely to know where to test from than women (64%), odds ratio 0.623, 95% CI (0.59-0.66), p-value <0.001.

There was a strong association between age and knowing where to test from. Those aged 20 years and above were all more than 2 times likely to know where to test from than the teenager group, 12-19 years. This difference was statistically significant, p-value; <0.001

Proportion of Batwa /non-Batwa who had tested for HIV in the past year.

Table 4: Association with testing for HIV in the past one year

Explanatory variables	Yes (%)	No (%)	Tested for HIV in the past one year outcomes				
			Unadjusted		Adjusted (Logistic regression)		
			OR (95% CI)	P-value	OR (95% CI)	P-Value
Ethnicity						
Batwa	153 (47.5)	169 (52.5)	1		1	
Non-Batwa	8,585 (36.0)	15,270 (64)	0.62 (0.50-0.77)	<0.001	0.585 (0.47-0.75	<0.001
Sub county						
Kayonza	6,534 (36.4)	11,421 (63.6)	1		1	
Mpungu	2,205 (35.4)	4,021 (64.6)	0.96 (0.90-1.10)	0.168	0.957 (0.90- 1.02)	0.192
Gender						
Female	5,589 (45.7)	6,645 (54.3)	1	<0.001	1	
Male	3,150 (26.4)	8,797 (73.6)	0.43(0.40-0.45)		0.391 (0.369-0.415)	<0.001
Age group						
12-19	900 (11.5)	6,930 (88.5)	1		1	
20-24	1,692 (47.6)	1,863 (52.4)	6.99(6.36-7.70)	<0.001	7.208 (6.54-7.945)	<0.001
25-49	5,192 (52.7)	4,665 (47.3)	8.57(7.91-9.30)	<0.001	9.118 (8.40-9.89)	<0.001
50+	955 (32.5)	1,981 (67.5)	3.71(3.35-4.11)	<0.001	3.913 (3.52-4.35)	<0.001

Both sub counties of Kayonza (36.4%) and Mpugu (35.4%) had almost equal proportions of people tested in the past 1 year (p-value 0.192)

More Batwa (47.5%) were likely to have tested for HIV in the past one year than the non Batwa (36%). Adjusted odds ratio; 0.585, 95%CI (0.47- 0.75) and the association was statistically significant, p-value; <0.001

More females (45.7%) than males (26.4%) had tested in the previous 12 months. Males were 61% less likely than females to have tested, adjusted odds ratio; 0.391, 95% CI (0.369-0.415). This association was statistically significant, p-value; <0.001

There was a strong association between age and having tested in the past one year.

Compared with the age group 12 to 19 years; those aged 20-24 years were 7.2 times more likely to have tested (p-value <0.001) The age groups 25-49 years and those aged over 50 years, were 9.1 and 3.9 times respectively more likely than those aged 12-19 years to have tested. This association was statistically significant, p-value; <0.001

Proportion of Batwa /non-Batwa who know where to get ART from

Table 5: Association with knowing where to get ART

	Know where to get ART outcomes					
Explanatory variables	Yes (%)	No (%)	Unadjusted		Adjusted (Logistic regression}	
			OR (95% CI)	P-value	OR (95% CI)	P-Value
Ethnicity						
Batwa	179 (55.8)	142 (44.2)	1		1	
Non-Batwa	12,810 (53.7)	11,185 (46.3)	0.92 (0.74-1.15)	0.46	0.94 (0.74-1.19)	0.614
Sub county						
Kayonza	9,480 (52.8)	8,472 (47.2)	1		1	
Mpungu	3,510 (56.4)	2,716 (43.6)	1.15 (1.09-1.22)	<0.001	1.17 (1.10-1.25)	<0.001
Gender						
Female	7,127 (58.2)	5,107 (41.8)	1		1	
Male	5,863 (49.1)	6,081 (50.9)	0.69 (0.66-0.73)	<0.001	0.69 (0.66-0.73)	<0.001
Age group						
12-19	2,514 (32.1)	5,314 (67.9)	1		1	
20-24	2,294 (64.5)	1.260 (35.5)	3.8 (3.54-4.18)	<0.001	3.81 (3.50-4.14)	<0.001
25-49	6,642 (67.4)	3,214 (32.6)	4.37 (4.10-4.65)	<0.001	4.38 (4.11-4.67)	<0.001
50+	1,539 (52.4)	1,398 (47.6)	2.33 (2.13-2.54)	<0.001	2.35 (2.15-2.56)	<0.001

People in Mpungu (56.4%) were more likely than those in Kayonza Sub County (52.8%) to know where to obtain ART from. Adjusted odds ratio; 1.17, 95% CI (1.10-1.25), P-value; <0.001
The Batwa (55.8%) were more likely than non Batwa (53.7%) to know where to get ART from but this difference was not statistically significant, adjusted odds ratio; 0.941, 95% CI (0.657-0.731) p-value; 0.614.
More women than men knew where to obtain ART, 58.2% and 49.1% respectively.

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Men were 31% less likely than women to know where to obtain ART, adjusted odds ratio; 0.693, 95% CI (0.657-0.731), p-value; <0.001

Those aged 20-24 years were 3.8 times more likely than the age group 12-19 years to know where to get ART, p-value; <0.001. The age groups 25-49 years and those aged 50 years and over, were 4.4 and 2.3 times respectively more likely than those aged 12-19 years to know where to get ART from, p-value; <0.001.

Diagnosed HIV prevalence amongst Batwa/non-Batwa population

The analysis of HIV diagnoses among the Batwa and non-Batwa in the VCT register covering a span of one year of 2009 was done. Overall, there were 7,088 HIV tests of which 223 were among the Batwa.

Table 6: Frequency distribution of demographics and HIV test results

Characteristic	Ethnicity			P-value*
	Non Batwa (%)	Batwa (%)	Totals (%)	
Gender				
Female	4,560(66.7%)	199(92.6%)	4759(67.5%)	
Male	2,278(33.3%)	16(7.4%)	2294(32.5%)	<0.001
Age(years)				
Mean age(sd)	31.5(12.4)	36.0(16.2)	N/A	<0.0001**
Sub county				
Kayonza	5686(83.2%)	172(80.0%)	5858(83.1%)	
Mpungu	1152(16.9%)	43(20.0%)	1195(16.9%)	0.225
Age categories(years)				
12-19	822(12.0%)	23(10.7%)	845(12.0%)	
20-24	1562(22.8%)	44(20.5%)	1606(22.8%)	
25-49	3779(55.3%)	98(45.6%)	3877(55.0%)	
≥50	675(9.9%)	50(23.3%)	725(10.3%)	<0.001
Marital status				
Single	951(13.9%)	33(15.4%)	984(14.0%)	
Married	5433(79.5%)	162(75.4%)	5595(79.3%)	
Devorced	227(3.3%)	10(4.7%)	237(3.4%)	
Widowed	227(3.3%)	10(4.7%)	237(3.4%)	0.399

*Pearson's chi-square test

** t-test

Median age = 28 (sd 12.6), interquartile range, 22 to 38 years

There were very few men (7.4%) compared to females (92.6%) who had tested for HIV in 2009 and recorded in the hospital register.

Similarly more women than men among the non Batwa had tested, 66.7% and 33.3% respectively.

Of the 7,053 HIV test results analyzed, 16.9% were from Mpungu while the majority, 83.2% were from Kayonza.

Age category 25-49 years had tested most (55.0%) and those aged 50 years and above least (10.3%)

Married people among both Batwa and non Batwa had tested most (79.3%) while the divorced and widowed each comprised 3.4% of all the test results.

Table 7: Association with HIV status

Characteristic	HIV test result		Unadjusted		Adjusted for ethnicity, sub county, age & marital status	
	Negative (%)	Positive (%)	OR (95% CI)	P-Value	OR (95% CI)	P-Value
Ethnicity						
Non Batwa	6576 (96.2)	262 (3.8)	1		1	
Batwa	210 (97.7)	5 (2.3)	0.60 (0.24-1.46)	0.255	0.57 (0.23-1.40)	0.217
Gender						
Female	4583 (96.3)	176 (3.7)	1			
Male	2203 (96)	91 (4.0)	1.08 (0.83-1.39)	0.580		
Sub county						
Kayonza	5609 (95.7)	249 (4.3)	1		1	
Mpungu	1177 (98.5)	18 (1.5)	0.34 (0.21-0.56)	<0.0001	0.37 (0.23-0.60)	<0.001
Age categories(yrs)						
12-19	824 (97.5)	21 (2.5)	1		1	
20-24	1537 (95.7)	69 (4.3)	1.76 (1.07-2.89)	0.025	1.77 (1.05-2.98)	0.033
25-49	3721 (96.0)	156 (4.0)	1.65 (1.03-2.61)	0.035	1.48 (0.88-2.49)	0.135
50+	704 (96.6)	21 (3.4)	1.17 (0.63-2.16)	0.615	0.88 (0.45-1.75)	0.729
Marital status						
Single	951 (96.8)	31 (3.2)	1		1	
Married	5416 (96.8)	179 (3.2)	1.02 (0.69-1.50)	0.936	1.01 (0.75-1.63)	0.605
Divorced	204 (86.1)	33 (13.9)	4.97 (2.95-8.39)	<0.0001	5.00 (2.99-8.36)	<0.001
Widowed	213 (89.9)	24 (10.1)	3.46 (1.98-6.05)	<0.0001	3.74 (2.14-6.51)	<0.001

A lower proportion of the Batwa of 2.3% tested HIV positive compared with 3.8% of the non-Batwa. Although this suggested that the Batwa were 40% less likely to be HIV infected, the association was not statistically significant, 95%CI (0.24-1.47), p-value; 0.263.

There was no statistically significant difference between females and males diagnosed of HIV, odds ratio; 1.08 CI (0.83-1.39), p-value; 0.580

People in Mpungu sub county were 66% less likely to be infected than in Kayonza and this association was statistically significant, odds ratio; 0.37, 95%CI (0.23-0.60), p-value; <0.001.

Those aged 20-24 years were 1.77 times more likely to be HIV infected than those aged 12-19 years, 95%CI (1.05-2.98), p-value; 0.033.
Age group 25-49 were 1.48 times likely to be HIV infected than 12-19 years category although this association was not statistically significant, 95%CI (0.88-2.49), p-value; 0.135.
Those aged 50 years and above were 12% less likely to be HIV infected although no statistical significance was found, 95%CI (0.45-1.75), p-value; 0.729

There was no difference in the likelihood of HIV infection between the single and the married. Odds ratio; 1.01, 95%CI (0.75-1.63), p-value; 0.605

The divorced were 5 times more likely to be HIV infected compared to those who have never married, 95% CI (2.99-8.36), p-value; 0.001.
The widowed were 3.74 times likely to be diagnosed of HIV than the singles, 95%CI (2.14-6.51), p-value; <0.001.

Discussion

This study was purposed to find out whether integration of the formerly secluded Batwa pygmies into the non-Batwa 19 years ago, could have increased their vulnerability STIs including HIV. As a minority group comprising only slightly over 1% of the population of Kayonza and Mpungu sub counties with relatively low levels of education, high rate of HIV infection rates would further endanger this group of people.
The study analyzed 7,053 HIV diagnoses among the Batwa and non-Batwa of Kayonza and Mpungu sub counties of Kanungu district, S.W Uganda over a period of 12 months ending June 2009. It also compared some aspects of knowledge, of HIV care services available in the area, between the two ethnic groups. Both univariate and multivariable analyses were performed to ascertain statistical significances between associations.
Previous studies in Cameroon ((Yumo HA, Ndembi N et al 2003)) had shown lower HIV prevalence among pygmies compared to the surrounding Bantu tribes, however no publications of similar studies in Uganda could be found.
From the household survey, the Batwa as a minority group were only 1.3% of the study population. Despite 58.7% of all the respondents knowing where to test from, this figure falls

short of the regional average of 77.2% for women and 88.5% for men in S.W Uganda, (UDHS 2006).

The proportion of the Batwa (61%) who knew where to get an HIV test was slightly higher than non Batwa (59%) but this difference was not statistically significant,
p-value; 0.589. However, for both groups, men were 38% less likely to know than women (p-value; <0.001). The young people aged 12-19 were at least twice as less likely to know where to test from compared with the older age groups (p-value; <0.001)

The proportion of Batwa (47.5%) who had tested for HIV in the past 1 year was higher than for non Batwa (36%) and this remained statistically significant after multivariable analysis, adjusted OR 0.585, 95%CI (0.47-0.75), p-value; <0.001. The Batwa, living in settlements, may have been easier to reach than the general population during the ongoing HIV prevention campaigns. Among both groups, men were 61% less likely to test than women (p-value; <0.001). This is a similar finding as the (UDHS 2006) in which despite 88.5% of the men compared with 77.2% of the women knowing where to test from, 8.9% and 11.3% of the men and women respectively, had tested in the past 12 months. Testing for HIV during antenatal and labour may one of the reasons for this difference. Those aged 12-19 years, for both Batwa and non-Batwa, were at least 4 times less likely to have tested than those aged 20 years and above (p-value; <0.001)

A higher proportion of the Batwa (55.8%) compared to (52%) of the non-Batwa, knew where to get ART from although not statistically significant (p-value 0.614). Both percentages are still below regional average where of the 79.4% who know ART, 88.5% know the source (UDHS 2006). Men were 31% less likely to know where to get ART from compared with women (p-value; <0.001), an opposite finding of the UDHS 2006, in which 92.8% of the men who had knowledge about ART also knew the source as compared to 84.2%. This could be a regional variation.

Young people aged 12-19 years were at least twice as less likely to know where to obtain ART compared with the older age groups, again this was in contrast to UDHS 2006 in which there was no substantial difference between the age categories.

The national HIV sero prevalence for both sexes aged 15- 49 years is estimated at 5.4% (UNAIDS 2009) or 6.4% (UDHS 2006). This according to ethnicity and region across the country ranging from 1.6% to 14.6%, and 6.5% among the people of S.W Uganda (Uganda HIV/AIDS sero-behavioural Survey 2006).

This study analyzed 7,088 HIV tests done in 12 months ending June 2009 of which 223 were among the Batwa pygmies whose total population is estimated at 640. Both univariate and multivariable analyses were performed to test for significance of associations.

HIV diagnoses were generally found to be 3.8% (270/7,088), although it was lower among the Batwa, 2.2% (5/223) and higher among non batwa, 3.9% (265/6865), OR, 0.60, 95%CI (0.24-1.47), p-value 0.263. Although not statistically significant owing to small numbers of this minority group, it implied that the Batwa were 40% less likely to be infected with HIV.

The people from Mpungu were 1.3 times more likely to know where to test from than those from Kayonza (p-value; <0.001), and were also 66% less likely to be infected with HIV (p-value; <0.001). This finding will need further investigation as Mpungu is more remote than Kayonza from the Hospital that provides HIV care services in the area.

The age group 20-24 years (young adults) for both Batwa and non Batwa, was 1.8 times more likely to be infected with HIV than those aged 12-19 years. This is suggestive of recent infection and could be related to the earlier to earlier findings in this study where those aged 12-19 years consistently had less knowledge compared with the rest, on where to test for HIV or find ART or had tested in the past 12 months. This association was statistically significant (p-value; <0.001) in all instances. There was no substantial difference between the married and single (never married), odds ratio; 1.01.

The divorced and widowed were 5, [95%CI (2.99-8.36), p-value; <0.001] and 3.7 times [95% CI (2.14-6.51), p-value; <0.001] respectively, more likely to be infected with HIV than those who are single. These could be high risk groups as infidelity may be cause of divorce.

Limitations
- Owing to the small number of the Batwa compared with non Batwa, further comparisons, according to age groups, geographic location, and marital status between the two ethnic groups was not possible.
- There was no previous data on HIV diagnoses among the Batwa before integration into Bakiga for comparison with the current diagnoses.
- This study was limited to the Batwa living on the Kanungu side of the forest and hence findings may not be generalisable to those living in Kabale and Kisoro districts on the other side of the Bwindi impenetrable forest.
- Although the survey had over 90% response rate and VCT data covered the same period, these participants could have been different in a way.
- The survey questionnaire was administered by the Village Health Promoters and wrote down responses and therefore may not have been free from biases such as information bias.
- The questionnaire used in the survey only addressed limited aspect of knowledge about HIV such as transmission and prevention and therefore this study could not compare these between the two ethnic groups
- The education back ground of the participants in both the survey and VCT registers was not included consequently limiting the extent of analysis of this data.

Recommendations
- More sensitization about HIV should be targeted to both Batwa and non Batwa aged 12-19 years as there was a strong association with almost doubling the likelihood of HIV infection later between 20 and 24 years.
- Men involvement in HIV programs should be intensified as very few (7.4%) and 33.3% among the non Batwa and Batwa respectively had tested during the period of the study.
- More focus on kayonza Sub County which had more HIV diagnoses and significantly less knowledgeable about HIV care services in the area than Mpungu Sub County.
- Risk reduction counseling targeting the divorced and widowed for both Batwa and non Batwa as these categories had the highest HIV diagnoses.
- Although in this study the difference in HIV diagnoses between Batwa and non-Batwa was not statistically significant, [OR, 0.60, 95%CI (0.24-1.47), p-value 0.263], with such a wide CI, this difference could still be of practical importance and therefore another

study with a larger population of the Batwa in all the three districts of Kanungu, Kabale and Kisoro could provide enough sample to further evaluate this.

Conclusion

It had been hypothesized that Batwa may have lower levels of knowledge about HIV and less access to HIV testing, although their HIV sero-prevalence may be the same as the surrounding community.

This study established that Batwa pygmies had higher levels of knowledge about HIV care services in the area and had utilized the services more than the non-Batwa (Bakiga) living in Kayonza and Mpungu sub counties.

The HIV diagnoses were less among the Batwa, 2.2% than non-Batwa, 3.9% and the Batwa pygmies were 40% less likely to be HIV infected although this was not statistically significant at 95%CI (0.24-1.47), p-value; 0.263.

Contributions:

Bwindi Community Hospital provided all the data used in this study

Prof. Ellen Kraly, professor of Geography at Colgate University and Dr. Paul Williams, former Bwindi Community Hospital Medical Superintendent helped in reviewing the proposal.

Mr. Ssempiira Julius, M&E Officer at MJAP Kampala head office contributed to statistical analysis (Survey data).

Dr. Kakuru Abel, Medical Officer at Infectious Diseases Research Collaboration, Tororo-Uganda also contributed to statistical analysis (VCT data)

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*Figure 1.*Reproduced from Bwindi Community hospital (2009)*, Kayonza and Mpungu sub-counties Household survey (2009) Figure 1,p4*. Available at; http://www.bwindihospital.com/pdf/about-annual-report-section/BCH-SURVEY-REPORT-2009.pdf [Last accessed May 2010]