

Georgia State University
ScholarWorks @ Georgia State University

Public Health Theses

School of Public Health

Spring 4-20-2015

Urban-rural disparities in HIV related knowledge, behavior and attitude in Burkina Faso: Evidence from Burkina Faso Demographic and Health Survey 2010

Degninou Yehadji

Follow this and additional works at: https://scholarworks.gsu.edu/iph_theses

Recommended Citation

Yehadji, Degninou, "Urban-rural disparities in HIV related knowledge, behavior and attitude in Burkina Faso: Evidence from Burkina Faso Demographic and Health Survey 2010." Thesis, Georgia State University, 2015.
https://scholarworks.gsu.edu/iph_theses/390

This Thesis is brought to you for free and open access by the School of Public Health at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Public Health Theses by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact scholarworks@gsu.edu.

Urban-rural disparities in HIV related knowledge, behavior and attitude in Burkina

Faso: Evidence from Burkina Faso Demographic and Health Survey 2010.

By

Degninou Yehadji

GEORGIA STATE UNIVERSITY

School of Public Health

A Thesis Submitted to the Graduate Faculty

Of Georgia State University in Partial Fulfillment

Of the

Requirements for the Degree

MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA

30303

TABLE OF CONTENTS

	Page
TABLE OF CONTENTS	II
ACKNOWLEDGMENTS	V
LIST OF TABLES	VI
LIST OF MAPS	VI
ABBREVIATIONS AND ACRONYMS	VII
Author’s Statement Page	viii
Notice to Borrowers Page	ix
CURRICULUM VITAE	xi
ABSTRACT	xiii
I. INTRODUCTION	1
1.1. Background	1
1.2. Research question.....	2
II. LITERATURE REVIEW	3
2.1. The HIV epidemic	3
2.1.1. The global epidemic	3
2.1.2. HIV in Sub-Saharan Africa.....	3
2.1.3. Region and country profiles.....	3
2.2. HIV risk factors.....	5

2.2.1.	HIV knowledge	5
2.2.2.	HIV-related attitude.....	6
2.2.3.	Sexual behavior.....	6
2.3.	HIV diagnostics, treatment and prevention	7
III.	METHODS.....	9
3.1.	Study design.....	9
3.2.	Study population and study sample.....	9
3.3.	Variables of interest.....	9
3.3.1.	Socio-demographic characteristics.....	9
3.3.2.	Independent variable	9
3.3.3.	Dependent variables	10
	Variables of HIV-related knowledge, attitudes, and sexual behavior	10
	Knowledge of HIV prevention methods	10
	Comprehensive correct knowledge about HIV	10
	Knowledge of prevention of MTCT of HIV	11
	Stigma and discrimination associated with HIV: accepting attitude toward people leaving with HIV	11
	Adult support of youth education on condom use	11
	Sexual behavior	11
	Condom accessibility	12

HIV status.....	12
3.4. Statistical analysis	12
IV. RESULTS.....	13
4.1. Socio-demographic characteristics.....	13
4.2. Prevalence of HIV-related knowledge, behavior and attitude	14
4.3. Comparison of incomplete or inappropriate HIV-related knowledge, behavior and attitude.....	15
4.4. Prevalence of HIV	17
V. DISCUSSION AND CONCLUSION.....	19
5.1. Discussion	19
5.2. Conclusion	22
REFERENCES.....	23

ACKNOWLEDGMENTS

I would like to thank all institutions and people who contributed to my achievement.

I am indebted to the U.S Department of State, the Fulbright Board, the U.S. Embassy in Lomé, Togo, and the Institute of International Education (IIE) - the funding and managing institutions of the Fulbright Scholarship that allowed my Masters studies in the U.S.

I would like to thank the faculties and staffs of the Georgia State University School of Public Health. I would like to especially thank Dr. Ike S. Okosun, my Thesis Chair and Dr. Kim Ramsey-White, my Committee Member for their guidance.

I am grateful to my family and friends for being confident in me. I am especially grateful to my spouse Ablavi Tondjo Yehadji and our daughter Akpohoun Fulbright Yehadji, for their unfailing support.

LIST OF TABLES

	Page
Table 1	14
Table 2	16
Table 3	17
Table 4	18

LIST OF FIGURES

	Page
Figure 1. HIV prevalence in West Africa. Source: World Health Organization, 2013.	4

ABBREVIATIONS AND ACRONYMS

AIDS: acquired immunodeficiency syndrome (AIDS)

ART: antiretroviral therapy

CDC: Centers for Disease Control and Prevention

CI: Confidence interval

DHS: Demographic and Health Surveys

STD: sexual transmitted disease

HIV: human immunodeficiency virus

UNAIDS: Joint United Nation Program on HIV/AIDS

MSM: men who have sex with men

MTCT: mother to child transmission

OR: odds ratio

PEPFAR: President's Emergency Plan for AIDS Relief

UNGASS: Special Session of the United Nations General Assembly

UNICEF: The United Nations Children's Fund

WHO: World Health Organization

Author's Statement Page

In presenting this thesis as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this thesis may be granted by the author or, in his/her absence, by the professor under whose direction it was written, or in his/her absence, by the Associate Dean, School of Public Health. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this dissertation which involves potential financial gain will not be allowed without written permission of the author.

Signature of Author

Notice to Borrowers Page

All theses deposited in the Georgia State University Library must be used in accordance with the stipulations prescribed by the author in the preceding statement.

Author: Degninou Yehadji

Address: 3546 Clubhouse Circle East, Apt E, Decatur, Georgia 30032

Committee Chair: Dr. Ike S. Okosun, MS, MPH, PhD, FRSPH, FTOS, FACE

Committee Member: Dr. Kim Ramsey-White, PhD

College: Georgia State University

School of Public Health

P.O. Box 3995

Atlanta, Georgia 30302-3995

Users of this thesis who not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulation by signing below. Libraries borrowing this thesis for the use of their patrons are required to see that each user records here the information requested.

NAME OF USER	ADDRESS	DATE	TYPE OF USE (EXAMINATION ONLY OR COPYING)

**Urban-rural disparities in HIV related knowledge, behavior and attitude in Burkina Faso:
Evidence from Burkina Faso Demographic and Health Survey 2010.**

By

Degninou Yehadji

Approved:

Committee Chair

Committee Member

Date

CURRICULUM VITAE

Degninou Yehadji

Epidemiologist and Medical Laboratory Technologist

E-mail: hehadji@fulbrightmail.org

Tel: +1 706 254 2017 (USA) | +228 91 61 83 19 (TOGO)

PROFESSIONAL EXPERIENCE

Internship

June 2014 – December 2014

**Centers for Disease Control and Prevention
Center for Global Health, Atlanta GA
Division of Parasitic Diseases and Malaria**

Graduate Scholar

June 2013 – 2015

**Fulbright Junior Staff Development Program
The U.S. Department of State.**

Research assistant

2013 – Present

**Laboratory of Molecular Biology and Immunology
University of Lome (Togo)**

Senior Laboratory Technologist

October 2009- Jun 2013

**Republic of Togo
Ministry of Health, Health District No4**

Laboratory Technologist

April 2009 – September 2009

**Health District No4, Lome (Togo)
Kodjoviakope Health Center**

EDUCATION AND TRAINING

Master Of Public Health 2015

**Georgia State University
School of Public Health
Division of Epidemiology and Biostatistics
*Specialization in Epidemiology***

Intensive English Program

July – August 2013

**University of Arkansas
Spring International Language Center**

Diploma : Epidemiology

Diploma : Health Statistics 2011

**Victor Segalen University (Bordeaux II), France
Bordeaux School of Public Health**

Bachelor : Medical and Biological Analyses

2011

**University of Lome (Togo)
School of Biological and Food Technologies**

National School of Medical Auxiliaries (Togo)

National Diploma : Laboratory Technologist Department Laboratory Technologists
2008

AWARDS AND HONORS

Jun 2014 – 2015 **The Fulbright Scholarship**

COMMUNITY AND VOLUNTEER WORK

2012 – 2013	Association Togolaise de Sensibilisation contre l’Hypertension Artériel <i>Role</i> : Field screening technician (diabetes and hypertension)
2013 – Present	Grain De Sel Togo, Inc.: 501(c) Organization for promotion of higher education in Togo <i>Role:</i> Co-founder and General Secretary.
2013 – Present	TED Talks <i>Role:</i> English-French scripts translator
2014	American Public Health Association <i>Role:</i> Membership Ambassador

SKILLS & EXPERTISE

Laboratory Testing, Public Health, Epidemiology, Research, Infectious Disease, Outbreak Investigation, SAS, EpiInfo, SPSS, Geographic Information Systems (ArcGIS, QGIS).

LANGUAGE SKILLS

French : Native language
English: Full professional skill
African dialects (Ewé, Kabyè, Kotokoli): Speaking.

PUBLICATIONS

Degninou Yehadji. [Infectious markers in blood transfusion in Togo, 2008] French. Thesis, University of Lomé (Togo), January 2011.

Salou, M., **Yehadji, D.**, Ekouevi, K., Dossim, S., Tsogou, C., Nyasenu, Y., Lack, F., Prince-David, M. and Y. Dagnra, A. (2014) Ciprofloxacin Sensitivity of *Staphylococcus* Strains Isolated at the Sylvanus Olympio University Hospital, Togo. *Pharmacology & Pharmacy*, **5**, 1143-1147. doi: [10.4236/pp.2014.513124](https://doi.org/10.4236/pp.2014.513124).

Mounerou, S., Y., D. A., Biova, A.-H. A., Koumavi, E., Sika, D., Kpatcha, K., **Yehadji, D.**,... Mireille, P.-D. (2015). Group B Streptococcal Carriage Rate in Vagina of Pregnant Women in Third Trimester in Lomé, Togo. *Journal of Preventive Medicine*, **3**(1), 7–10. doi:10.12691/jpm-3-1-2

ABSTRACT

Introduction

HIV infection is a global health concern and the epidemic is particularly serious in sub-Saharan Africa. Understanding HIV-related knowledge, attitude and behavior is a key element for prevention programs. Because of rural-urban variations in social and economic factors, this study was conducted to assess urban-rural disparities in HIV-related knowledge, attitude and behavior in Burkina Faso.

Methods

This study is based on a nationally representative data from the 2010 Burkina Faso Demographic and Health Survey. Odds ratios from the logistic regression analyses were used to determine the association between HIV-related knowledge, attitude and behaviors with residence (urban /rural).

Results

More rural residents were uneducated (82.13%), illiterates (80.13%), and poor (94.54%) compared to urban residents with values of 17.87%, 19.87% and 5.45%, respectively. The prevalence of HIV residents was significantly lower among rural residents (0.65%) as compared with urban residents (1.88%). Rural residents compared to urban residents were more likely to have incomplete knowledge or inappropriate HIV-related attitude and behavior: incomplete knowledge about HIV (OR = 3.38, 95% CI 3.15 – 3.63), incomplete knowledge of MTCT prevention methods (OR = 2.01, 95% CI 1.88 – 2.16), non-accepting attitude toward people living with HIV (OR = 3.01, 95% CI 2.78 – 3.26), unfavorable for youth education on condom use (OR = 1.53, 95% CI 1.41 – 1.65), first sex before 15 years old (OR = 1.54, 95% CI 1.96 – 1.21), multiple sex partnership among men (OR = 1.52, 95% CI 1.33 – 1.75), don't know any source of condoms (OR = 3.02, 95% CI 2.67 – 3.42) and don't know any source of female condoms (OR = 3.27 95% CI 3.04 – 3.51).

Conclusion

Compared to urban residents, Burkina Faso rural residents tend to have limited HIV knowledge, limited access to condom. Also, compared to urban residents, more Burkina Faso rural residents had inappropriate HIV attitude and behavior. However, the HIV prevalence was lower among rural residents. The disparities between urban and rural residents of Burkina Faso with respect to HIV knowledge, attitude and behaviors calls for appropriate public health measures to increase HIV awareness in rural areas.

I. INTRODUCTION

1.1. Background

The human immunodeficiency virus (HIV) is a lentiretroviruses responsible for the acquired immunodeficiency syndrome (AIDS) (1). AIDS is a condition in humans resulting from the failure of the immune system. In this condition, the immune system of the infected individual is unable to fight opportunistic infections (2).

The main transmission routes of HIV are: sexual intercourse, direct blood contact (sharing injection drug needles, occupational exposure in healthcare setting, blood transfusion), and mother to child transmission (MTCT) before or during birth or through breast milk (3).

No vaccine nor curative drug is yet available for HIV. Hence, the World Health Organization (WHO) suggests, in its first strategic direction (4), to: 1) revolutionize HIV prevention, 2) eliminate new HIV infections in children, 3) catalyze the next phase of HIV diagnosis, treatment, care and support, and 4) provide comprehensive, integrated services for key populations. HIV testing is an important strategic line of defense in fighting the epidemic. Early HIV diagnostic testing has many advantages such as: increase in life expectancy among infected people, reduction of risk for transmitting the infection to others, and prevention of transmission from mother to child (5-7).

Infection from HIV is a global health concern. Indeed, despite efforts deployed to fight the infection, it remains a pandemic (8, 9). Since the beginning of the AIDS epidemic, over 78 million people have become infected with HIV. In 2012, AIDS-related diseases were the 6th leading cause of death worldwide. According to 2013 report, about 35 million people were living with HIV worldwide (10).

1.2. Research question

Although behavioral risk factors are important components of HIV research, only few studies have been conducted to assess HIV-related knowledge, attitudes, and behavior in low income countries. Many of such studies are often related to gender, socioeconomic and intra-urban disparities in HIV/AIDS (11-16). It has been demonstrated that there are disparities between urban and rural areas in several domains such as education, economic development, access to information and access to healthcare. There are several studies showing urban-rural disparities in HIV matters, but only few of these studies focused on West Africa.

The purpose of this study is to assess urban-rural disparities with regard to HIV infection in one West African country by answering the following question:

Is there any urban-rural disparity with regard to HIV-related knowledge, attitudes, and behavior in Burkina Faso?

II. LITERATURE REVIEW

2.1. The HIV epidemic

2.1.1. The global epidemic

Globally, there were 29.8 million people in 2001 and around 35 million people in 2013 living with HIV. The global prevalence was 0.8% in 2013. In 2013, 1.5 million people died of AIDS. This death rate consisted of 35% decrease in the period between 2005 and 2013 (17).

There were about 2.1 million new infections in 2013, roughly 6,000 new infections per day. A decline of 38% in the incidence has been observed since 2001. There is a possibility for more people to be informed about their HIV status because of an increase, as well as an overall improvement of in HIV testing capacity. However, approximately half of all people living with HIV are still unaware of their status (10, 18).

2.1.2. HIV in Sub-Saharan Africa

Sub-Saharan Africa is the region most affected by HIV. While Africa represents only 15.6% of the world's population, it is home to 71% of people living with HIV. Most children with HIV live in this region (91%). National HIV prevalence rate is greater than 1% for almost all countries of the African continent (10).

2.1.3. Region and country profiles

HIV prevalence ranges from 0.1% to 3.7% in West Africa. The most affected countries in the subregion are Nigeria, Cote d'Ivoire and Guinea-Bissau. Benin, Burkina Faso, Cape Verde,

Gambia, Ghana, Guinea, Liberia and Mali, Mauritania, Sierra Leone and Togo are moderately affected, while Niger and Senegal are the least affected countries (Figure 1).

This study is restricted to Burkina Faso noted for a low rate of HIV/AIDS. Burkina Faso is a landlocked sub-Saharan country and a low-income country with limited natural resources. In 2013, the country's per capita income was \$670 and the population was estimated at 17 million with a high percentage (60%) of youth (World Bank, 2015).

According to the World Bank (2015), there have been positive human development trends in Burkina Faso. Infant mortality fell from 81 deaths per 1,000 live births in 2003 to 65 deaths per 1,000 live births in 2010. In 2010, the maternal mortality rate stood at 341 per 100,000 live births, which is down from 484 in 1995. In 2009, the life expectancy at birth was estimated at 57, which is slightly above the regional average of 50 years (19).

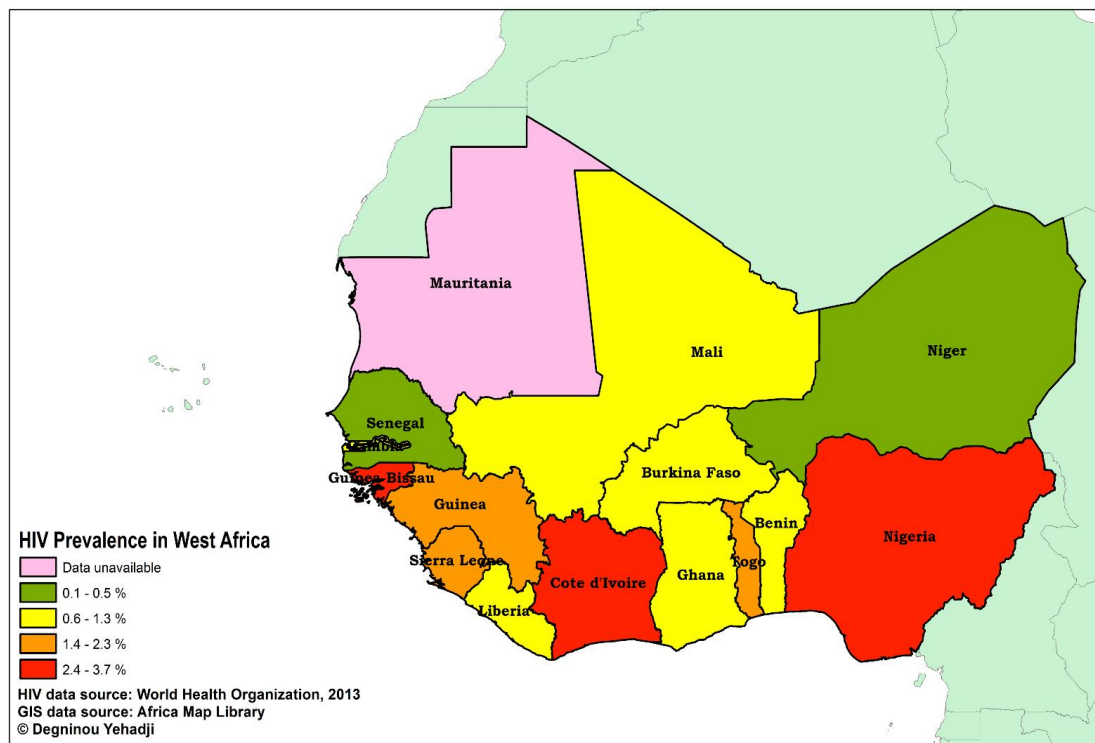


Figure 1. HIV prevalence in West Africa. Source: World Health Organization, 2013.

According to the National Statistics and Demographics Institute, the poverty rate in Burkina Faso was approximately 46% in 2009, and the country is ranked 181st out of 187 countries by the United Nations Development Program, in the 2014's Human Development Index (19). Burkina Faso has one of the lowest HIV prevalence rates in West Africa, estimated at 0.9% (20)

2.2. HIV risk factors

2.2.1. HIV knowledge

According to the DHS Program (21), having appropriate knowledge about HIV prevention method is defined as knowing that people can protect themselves from contracting HIV by using condoms and by having sex with only one faithful and uninfected partner. Comprehensive knowledge about HIV comprises knowledge about the two major ways of preventing sexual transmission of HIV (using condoms and having sex with only one faithful uninfected partner), correct believe on the two most common local misconceptions about HIV transmission (mosquito bites, sharing food) and awareness that a healthy-looking person can have HIV. Knowledge of prevention of MTCT of HIV requires knowing that HIV can be prevented through anti-retroviral therapy during pregnancy and that breastfeeding can cause MTCT of HIV.

HIV knowledge is an important determinant of non-discrimination and non-stigmatization against HIV-infected people, adoption of safer sexual practices, and willingness to receive HIV testing. A study conducted by Swenson et al. 2010 showed that HIV knowledge is an important contributor to sexual behavior and health (22). It has been demonstrated that an increase in community knowledge on HIV promotes more positive attitudes towards people living with HIV (23).

2.2.2. HIV-related attitude

Accepting attitude toward people living with HIV and adult support of youth education on condom use are some indicators of HIV-related attitude. The DHS Program (21) defines accepting attitude toward people living with HIV as acceptance to buy vegetables from an HIV-positive person, not be secretive about HIV status of a family member, willing to care for relative with AIDS and allowing an HIV-positive female teacher to teach. Adults over the age of 18 years are considered being supportive for youth education on condom use when they are in favor of young people aged 12-14 years being educated about using a condom to prevent HIV.

Stigma and discrimination are important barriers to HIV prevention, testing and treatment(24). Understanding public attitudes about HIV transmission to determine the prevalence and the correlates of stigmatizing attitudes is important for guiding efforts to remove barriers to HIV prevention (25).

2.2.3. Sexual behavior

HIV is a sexually transmitted disease (STD) and sexual behavior is subsequently considered as the most important factor in the spread of the disease. Risk factors for HIV spread include early sexual debut, multiple sex partnerships, unprotected sexual intercourse, commercial sex and anal sex.

Early sexual debut and multiple sex partnership are some of the indicators of sexual behavior. In the HIV/AIDS Survey Indicators Database, early sexual debut refers as having sex before the age of 15 years, and multiple sex partnership refers as having sexual intercourse with more than one partners over the last 12 months.

Sex workers are considered as a vulnerable group. They have a high prevalence of HIV and are more likely to be infected and infect their clients. Risk factors in this group include: large numbers of sex partners, unsafe working conditions, barriers to negotiating condom use, social stigma and criminalized work environments (26, 27).

Another vulnerable group is men who have sex with men (MSM). For example, in the United States, gay, bisexual, and other MSM are more severely affected by HIV than any other group. From 2008 to 2010, HIV infections among young black/African American gay and bisexual men increased 20% (28).

2.3. HIV diagnostics, treatment and prevention

HIV testing is an important method for controlling the epidemic. Knowing HIV status helps in taking the appropriate measures to protect one's health. HIV positive individuals are offered antiretroviral therapy (ART) intended to help them live longer and healthier lives. ART is also known to reduce the risk of sexual transmission of HIV (29). Thus, HIV infected individuals who know their status and receive ART not only protect their health, but also protect their partners.

HIV prevention measures address the main routes of HIV transmission (30): sexual transmission (via unprotected sex without a condom), blood transmission (used needles and blood donations), and mother-to-child transmission (during pregnancy, labor, delivery or breastfeeding).

Prevention of sexual transmission is assured by condom use (including female condoms), safer sex education, treatment of sexually transmitted infections and male circumcision. Screening blood products, reducing needle sharing and preventing needle stick accidents helps preventing HIV transmission through blood. The following steps help prevent mother-to-child transmission of

HIV: testing women during pregnancy, and after delivery and treating pregnant women that have tested positive. Babies should be tested when born and also be offered treatment if positive (31).

III. METHODS

3.1. Study design

This is a cross-sectional study design intended to compare urban versus rural HIV-related knowledge, attitudes, and behavior in Burkina Faso. The study is based on the Standard Demographic and Health Surveys (DHS) Phase VI. Demographic and Health Surveys (DHS) are nationally-representative household surveys. These surveys provide data for monitoring and impact evaluation indicators in the areas of population, health, and nutrition (32).

3.2. Study population and study sample

The Burkina Faso DHS Survey 2010 dataset is a nationally representative sample of 14,424 households, 17,087 women aged 15 to 49 and 7307 men aged 15 to 59 (33). The study is based on data sets which included only men and women who received HIV testing.

3.3. Variables of interest

3.3.1. Socio-demographic characteristics

Socio-demographic characteristics of interest are: age, gender, place of residence, education, literacy, wealth index, and marital status.

3.3.2. Independent variable

Our independent variable is the place of residence. This variable has two observations: urban and rural.

3.3.3. Dependent variables

HIV-related knowledge, attitudes, and sexual behavior

Knowledge of HIV prevention methods, comprehensive correct knowledge about HIV, knowledge of prevention of MTCT of HIV, accepting attitude toward people living with HIV, adult support of youth education on condom use, early sexual debut, multiple sex partnership and condom accessibility are HIV-related knowledge, attitudes, and behavior variables of interest in this study. They were selected from the DHS online tools for HIV/AIDS Survey Indicators Database which is an internationally-accepted, consistent method for measuring HIV indicators across countries. These indicators are used to monitor HIV prevention, treatment, policies, knowledge, availability of methods of prevention, and attitudes towards people with HIV (21).

Knowledge of HIV prevention methods

Knowledge of HIV prevention methods was determined using a score from the DHS questions related to condom use and one faithful sex partnership. Respondents were prompted the questions as whether people can protect themselves from contracting HIV by using condoms and whether people can protect themselves from contracting HIV by having sex with only one faithful and uninfected partner. Subjects answering “Yes” for both prompts were scored 2, representing accurate knowledge of HIV prevention methods.

Comprehensive correct knowledge about HIV

Comprehensive correct knowledge about HIV was measured using a score from the DHS questions that are related to the two major ways of preventing sexual transmission of HIV (using condoms and having sex with only one faithful uninfected partner), believe on the two most common local

misconceptions about HIV transmission (mosquito bites, sharing food) and awareness that a healthy-looking person can have HIV). Correct answers to all five prompts were scored 3, representing comprehensive correct knowledge.

Knowledge of prevention of MTCT of HIV

This indicator assessed whether respondents were aware that MTCT of HIV can be prevented through anti-retroviral therapy during pregnancy and that breastfeeding can cause MTCT of HIV. Correct answers to both prompts were scored 2, representing correct knowledge of prevention of MTCT of HIV.

Accepting attitude toward people living with HIV

Stigma and discrimination was assessed using accepting attitude toward people living with HIV, which is composite score that is comprised of DHS questions on the acceptance to buy vegetables from an HIV-positive person, not be secretive about HIV status of a family member, willingness to care for relative with AIDS and allowing an HIV-positive female teacher to teach. Correct answers to all four prompts where score 4, representing full accepting attitude.

Adult support of youth education on condom use

This indicator measures whether adults over the age of 18 years are in favor of young people aged 12-14 years being educated about using a condom to prevent HIV.

Sexual behavior

Early sexual debut and multiple sex partnership are the indicators selected to measure sexual behavior in this study. Early sexual debut was defined as having sex before the age of 15 years.

Multiple sex partnership was defined by the number of women the respondent had sex with including his wife in last 12 months.

Condom accessibility

Knowledge of a source of condoms and knowledge of a source of female condoms were used as proxy measures of condom accessibility. Respondents were asked about sources of condom including sources of female condom.

HIV status

Respondents' HIV status was identified by the result of HIV test. The HIV status was classified into two categories: HIV negative and HIV positive.

3.4. Statistical analysis

In the descriptive analysis, frequency procedure was used to provide the descriptive characteristics of independent and dependent variables. Chi-square tests was used to compare the variables of interest across the two types of place of residence. Binary logistic regression was used to determine the associations between the place of residence and selected variables of HIV-related knowledge, attitudes, and behavior. Odds ratios and 95% of confidence interval were computed to determine whether the association between the place of residence and HIV-related knowledge, attitudes, and behavior where significant. SAS[®] version 9.4 (SAS Institute Inc., Cary, NC, USA) was used to manage and analyze the datasets. For all analyses p-value of less than or equal to 0.05 was used to determine statistical significance.

IV. RESULTS

4.1. Socio-demographic characteristics

The total study population is 15,389 with 7,039 (45.74%) men and 8350 (54.26%) women. The socio-demographic characteristics including gender, age, marital status, education and wealth index, between urban and rural residents are presented in Table 1. As shown, there were greater proportions of rural men (67.14%) and rural women (69.15%) than urban residents for both genders. Similarly, rural resident represent more than half of the population across all age groups and marital status. However urban residents were more represented for higher education levels (71.87% for secondary education and 96% of higher education), ability to read (60.16%) and higher wealth index (60.42% of rich people).

4.2. Prevalence of HIV-related knowledge, behavior and attitude

Table 2 compared the rates of HIV-related knowledge, behavior and attitude between urban and rural residents in Burkina Faso. The table shows a statistically significant difference between the two places of residence. A greater proportion of urban residents reported knowledge of HIV prevention methods (85.99%), comprehensive correct knowledge about HIV (55.59%), knowledge of MTCT prevention (64.68%), full accepting attitude toward people leaving with HIV (34.16%), support of youth education on condom (74.94%), knowledge of a source of condoms (93.33%) and knowledge of a source of female condoms (46.98) as compared to 78.97%, 27.00%, 47.56%, 14.69%, 66.86%, 82.41% and 21.40%, respectively for rural residents. However, rural residents reported a greater proportion of early sexual debut (98.48%), and multiple sex partnership among men (19.13%) compared to urban residents

Table 1. Socio-demographic characteristics of urban and rural residents. Source: Burkina Faso Demographic and Health Survey 2010.

	Place of residence				Total
	Urban		Rural		
	N	(%)	N	(%)	
Gender					
Male	2,313	(32.86)	4,726	(67.14)	7,039
Female	2,576	(30.85)	5,774	(69.15)	8,350
Total	4,889	(31.77)	10,500	(68.23)	15,389
Age					
15 – 24	2,015	(35.59)	3,646	(64.41)	5,661
25 – 29	796	(34.05)	1,542	(65.95)	2,338
30 – 39	1,223	(30.97)	2,726	(96.03)	3,949
40 +	855	(24.85)	2,586	(75.15)	3,441
Total	4,889	(31.77)	10,500	(68.23)	15,389
Marital status					
Married/ With partner	2,890	(26.41)	8,051	(73.59)	10,941
Never in union	1,803	(44.75)	2,226	(55.25)	4,029
Widowed/ Divorced	196	(46.89)	222	(53.11)	418
Total	4,889	(31.77)	10,499	(68.23)	15,388
Education					
No educ. /Preschool	1,846	(17.87)	8,485	(82.13)	10,331
Primary	1,223	(47.18)	1,369	(52.82)	2,592
Secondary	1,622	(71.87)	635	(28.13)	2,257
Higher	196	(96.08)	8	(3.92)	204
Total	4,887	(31.77)	10,497	(68.23)	15,384
Literacy					
Cannot read	1,207	19.87	8,498	80.13	10,605
Can read	2,757	60.16	1,826	39.84	4,583
Total	4,864	32.03	10,324	67.97	15,188
Wealth Index					
Poor	300	5.46	5,199	94.54	5,499
Middle	352	12.23	2,526	87.77	2,878
Rich	4,237	60.42	2,775	39.58	7,012
Total	4,889	31.77	10,500	68.23	15,389

4.3. Comparison of HIV-related knowledge, behavior and attitude

The association between the place of residence and HIV-related knowledge, behavior and attitude variables is presented in Table 3. As shown, subjects from rural areas had significantly greater incomplete knowledge about HIV prevention methods (OR = 1.63; 95% CI: 1.49 – 1.79), incomplete knowledge of MTCT prevention methods (OR = 2.01; 95% CI: 1.88 – 2.16), lack of comprehensive correct knowledge about HIV (OR = 3.38; 95% CI: 3.15 – 3.63), lack of accepting attitude (OR = 1.50; 95% CI: 1.40 – 1.61), adult unfavorable for youth education on condom use (OR = 1.53; 95% CI: 1.41 – 1.65), not knowing any source of condoms (OR = 3.02; 95% CI: 2.67 – 3.42), not knowing any source of female condoms (OR = 3.27; 95% CI: 3.04 – 3.51), early sexual debut (OR = 1.54; 95% CI: 1.96 – 1.21), multiple sex partnership (OR = 1.52; 95% CI: 1.33 – 1.75).

Table 2. HIV-related knowledge, behavior and attitude among urban and rural residents. Source: Burkina Faso Demographic and Health Survey 2010.

Place of residence	Response		p-value
	Yes (%)	No (%)	
Knowledge of HIV prevention methods			
Urban	4,204 (85.99)	685 (14.01)	< 0.001
Rural	8,292 (78.97)	2,208 (21.03)	
Comprehensive correct knowledge about HIV			
Urban	2,718 (55.59)	2,171 (44.41)	< 0.001
Rural	2,835 (27.00)	7,665 (73.00)	
Full accepting attitude			
Urban	1,911 (39.09)	2,978 (60.91)	< 0.001
Rural	7,354 (70.04)	3,146 (29.96)	
Knowledge of MTCT prevention			
Urban	3,162 (64.68)	1,727 (35.32)	< 0.001
Rural	4,994 (47.56)	5,506 (52.44)	
Adult support of youth education on condom			
Urban	3,655 (74.94)	1,093 (22.41)	< 0.001
Rural	6,875 (66.86)	3,148 (30.61)	
Multiple sex partnership (Men, n= 7039)			
Urban	312 (13.50)	1,999 (86.50)	< 0.001
Rural	907 (19.21)	3,814 (80.79)	
Early sexual debut			
Urban	4,774 (97.69)	113 (2.31)	< 0.001
Rural	10,333 (98.48)	159 (1.52)	
Knowledge of a source of condoms			
Urban	4,563 (93.33)	321 (6.57)	< 0.001
Rural	8,653 (82.41)	1,839 (17.51)	
Knowledge of a source of female condoms			
Urban	2,297 (46.98)	2,576 (52.69)	< 0.001
Rural	2,247 (21.40)	8,232 (78.40)	

Table 3. Association between the place of residence and incomplete or inappropriate HIV-related knowledge, behavior and attitude. Source: Burkina Faso Demographic and Health Survey 2010.

Place of residence	Response	OR	(95% CI)	p-value
Urban	Reference	1		
Rural	Incomplete knowledge of HIV prevention methods	1.63	(1.49 – 1.79)	< 0.001
	Incomplete knowledge of MTCT prevention methods	2.01	(1.88 – 2.16)	< 0.001
	Lack of comprehensive correct knowledge about HIV	3.38	(3.15 – 3.63)	< 0.001
	Lack of accepting attitude	1.50	(1.40 – 1.61)	< 0.001
	Adult unfavorable for youth education on condom use	1.53	(1.41 – 1.65)	< 0.001
	Don't know any source of condoms	3.02	(2.67 – 3.42)	< 0.001
	Don't know any source of female condoms	3.27	(3.04 – 3.51)	< 0.001
	First sex before 15 years old	1.54	(1.96 – 1.21)	< 0.001
	Multiple sex partnership (Men)	1.52	(1.33 – 1.75)	< 0.001

4.4. Prevalence of HIV

The odd of HIV prevalence among urban residents as compared to rural residents is presented in Table 4. As shown, rural residence was associated with decreased odds of HIV prevalence (OR = 0.34; 95% CI: 0.25–0.46).

Table 4. Urban and rural prevalence of HIV. Source: Burkina Faso Demographic and Health Survey 2010.

Place of residence	HIV-negative N (%)	HIV-positive N (%)	OR	95%CI	p-value
Urban	4,790 (98.12)	92 (1.88)	1		
Rural	10,430 (99.35)	68 (0.65)	0.34	(0.25–0.46)	< 0.001

V. DISCUSSION AND CONCLUSION

5.1. Discussion

HIV infection is a major public health issue, especially in Sub-Saharan Africa. Since no cure is yet available for AIDS, prevention measures rely on populations having appropriate knowledge, attitude and behavior with regard to the virus and the infection. Health education and access to healthcare are critical for improving populations' knowledge about HIV prevention measures. However, rural areas are known for having limited access to health education and healthcare facilities (34-36). Several studies have shown urban rural disparities for HIV in many countries, however, such studies are not available for West Africa countries (36-40). Hence, this study was conducted in Burkina Faso, a West African country, to examine if there is any urban-rural disparity regarding HIV-related knowledge, attitudes, and behavior.

The results of this study confirms urban rural disparities regarding education, literacy, wealth index, and HIV-related knowledge, attitude and behavior. In Burkina Faso, rural residents were found to have lower education level, literacy and wealth index as compared to urban residents. Rural residents were found to have greater odds of having incomplete knowledge or inappropriate HIV-related attitude and behavior: incomplete knowledge of HIV prevention methods (OR = 1.63; 95% CI: 1.49 – 1.79), incomplete knowledge of MTCT prevention methods (OR = 2.01; 95% CI: 1.88 – 2.16), lack of comprehensive correct knowledge about HIV (OR = 3.38; 95% CI: 3.15 – 3.63), lack of accepting attitude (OR = 1.50; 95% CI: 1.40 – 1.61); adult unfavorable for youth education on condom use (OR = 1.53; 95% CI: 1.41 – 1.65), not knowing any source of condoms (OR = 3.02; 95% CI: 2.67 – 3.42), not knowing any source of female condoms (OR = 3.27; 95%

CI: 3.04 – 3.51), early sexual debut (OR = 1.54; 95% CI: 1.96 – 1.21), multiple sex partnership (OR = 1.52; 95% CI: 1.33 – 1.75).

Since incorrect or inappropriate knowledge, attitude and behavior in HIV matter are risk factors for HIV infection, the expectation is that rural residents would be at a much greater prevalence of HIV, because these factors are more common in rural areas. Paradoxically, the study showed a lower prevalence of HIV among rural residents as compared to urban residents. Unlike this study, several other studies also found higher prevalence of HIV among urban residents. For example, in a study conducted in Tanzania by Msisha, Kapiga, Earls, & Subramanian (2008), higher odds of positive HIV serostatus among urban residents. Men residing in small cities had the highest odds were found to have greater odds of being HIV-positive compared with those living in rural areas (OR, 2.72, 95% CI 1.60–4.60,) and capital city residing women showed the highest risk (OR 3.34, 95% CI 2.27–4.93) (41). A similar study conducted in the U.S. revealed HIV prevalence of 274.6 per 100,000 in urban counties versus 91.0 across rural counties (42).

The result of this study is consistent with several other studies which showed urban-rural disparities related to health, health behaviors and preventive services. An article published by David E. et al. (2004) showed an urban-rural inequality in living standards, with indicators pertaining to wealth index, health and education, in Africa (39). A similar urban-rural disparity in health and health behaviors have been reported in the U.S. A report by Bennett, Olatosi, & Probst in 2008 showed an urban – rural divide regarding health matters in the U.S (43). Among many other indicators, rural residents were more likely to report fair to poor health status than were urban residents of urban (19.5% versus 15.6%); rural adults were more likely to report having diabetes than were urban adults (9.6% versus 8.4%); rural residents were more likely to be obese than were

urban residents (27.4% versus 23.9%); and rural residents were less likely than urban residents to meet CDC recommendations for physical activity (44.0% versus 45.4%) (43).

In a 2010 study conducted by Williams et al. among African American men, they assessed the differences and similarities regarding knowledge, attitude, beliefs, myths, and misconceptions and high-risk behavioral factors that influence the rate of infectivity of HIV among African American men in urban and rural communities of Mississippi. They observed statistically significant differences between urban and rural populations on HIV knowledge, HIV/sexually transmitted infection testing history, sexual partners, unprotected sexual intercourse with drug users, unprotected casual sex, intercourse in an open relationship or marriage, and communication with potential sex partners regarding sexual limits prior to intercourse (44).

Yebei, Violet N. et al (2008) conducted a study in Kenya that showed urban and rural differences in stigmatization among people living with HIV. Urban women reported a significant lower level of stigmatization. This finding is consistent with the higher level of non-accepting attitude toward people living with HIV observed in rural residents in our study (45).

This study has several strengths and limitations. The strength is that the study is based on a nationally representative data with a large sample size. Hence, the findings are generalizable to Burkina Faso. However, due to the cross sectional study type, we could not demonstrate causation.

Findings from this study are have a public health implication of pointing out areas where HIV awareness needs to be improved. We recommend that special attention be given to rural areas regarding the HIV issue. HIV awareness programs specially tailored to rural areas should be implemented to increase residents' knowledge in HIV matters. Appropriate measures are also need to increase condom accessibility in these areas.

5.2. Conclusion

Although significant efforts have been made to increase HIV awareness in West African countries like Burkina Faso, this study reveals urban-rural disparities in HIV-related knowledge, attitude and behavior. Rural residents in Burkina Faso were more likely to have limited HIV knowledge and inappropriate HIV-related behaviors and attitude, as compared to urban residents. Rural residents also tend to have limited access to condom. However, the HIV prevalence was higher among urban residents. Urban rural disparities observed in Burkina Faso with respect to HIV knowledge, attitude and behaviors calls for appropriate public health measures to increase HIV awareness in rural areas.

REFERENCES

1. Gallo RC, Montagnier L. The Discovery of HIV as the Cause of AIDS. *New England Journal of Medicine*. 2003;349(24):2283-5. doi: 10.1056/NEJMp038194.
2. Weiss RA. How does HIV cause AIDS? *Science*. 1993;260(5112):1273-9. doi: 10.1126/science.8493571.
3. Centers for Disease Control. HIV and Its Transmission. 2005.
4. World Health Organization. Global health sector strategy on HIV/AIDS 2011-2015. Geneva, Switzerland: World Health Organization; 2011.
5. Dilernia DA, Mónaco DC, Krolewiecki A, César C, Cahn P, Salomón H. The importance of early diagnosis for the survival of HIV positive patients. *Medicina (B Aires)*. 2010;70(5):453-6.
6. Smit C, Geskus R, Walker S, Sabin C, Coutinho R, Porter K, et al. Effective therapy has altered the spectrum of cause-specific mortality following HIV seroconversion. *AIDS*. 2006;20(5):741-9. doi: 10.1097/01.aids.0000216375.99560.a2.
7. Hollingsworth TD, Anderson RM, Fraser C. HIV-1 transmission, by stage of infection. *J Infect Dis*. 2008;198(5):687-93. doi: 10.1086/590501.
8. Koff WC, Russell ND, Walport M, Feinberg MB, Shiver JW, Karim SA, et al. Accelerating the development of a safe and effective HIV vaccine: HIV vaccine case study for the Decade of Vaccines. *Vaccine*. 2013;31:B204-B8. doi: 10.1016/j.vaccine.2012.10.115.
9. Cohen MS, Hellmann N, Levy JA, DeCock K, Lange J. The spread, treatment, and prevention of HIV-1: evolution of a global pandemic. *The Journal of Clinical Investigation*. 2008;118:1244-54. doi: 10.1172/JCI34706.
10. HIV/AIDS UNAIDS. 2013 Report on the Global AIDS Epidemic 2013 [updated 2013].
11. Hallman K. Gendered socioeconomic conditions and HIV risk behaviours among young people in South Africa. *Afr J AIDS Res*. 2005;4(1):37-50. Epub 2005/05/01. doi: 10.2989/16085900509490340. PubMed PMID: 25865640.
12. Magadi MA. Understanding the gender disparity in HIV infection across countries in sub-Saharan Africa: evidence from the Demographic and Health Surveys. *Sociol Health Illn*. 2011;33(4):522-39. Epub 2011/05/07. doi: 10.1111/j.1467-9566.2010.01304.x. PubMed PMID: 21545443; PubMed Central PMCID: PMC3412216.
13. Magadi MA. The disproportionate high risk of HIV infection among the urban poor in sub-Saharan Africa. *AIDS Behav*. 2013;17(5):1645-54. Epub 2012/06/05. doi: 10.1007/s10461-012-0217-y. PubMed PMID: 22660933; PubMed Central PMCID: PMC3663197.

14. Rogan M, Hynie M, Casale M, Nixon S, Flicker S, Jobson G, et al. The effects of gender and socioeconomic status on youth sexual-risk norms: evidence from a poor urban community in South Africa. *Afr J AIDS Res.* 2010;9(4):355-66. Epub 2010/12/01. doi: 10.2989/16085906.2010.545639. PubMed PMID: 25875884.
15. Hajizadeh M, Sia D, Heymann S, Nandi A. Socioeconomic inequalities in HIV/AIDS prevalence in sub-Saharan African countries: evidence from the Demographic Health Surveys. *International Journal for Equity in Health.* 2014;13(1):18. PubMed PMID: doi:10.1186/1475-9276-13-18.
16. Masanjala W. The poverty-HIV/AIDS nexus in Africa: a livelihood approach. *Soc Sci Med.* 2007;64(5):1032-41. Epub 2006/11/28. doi: 10.1016/j.socscimed.2006.10.009. PubMed PMID: 17126972.
17. UNAIDS. Global Report: UNAIDS report on the global AIDS epidemic 2013. 2013.
18. WHO, UNAIDS. Global update on HIV treatment 2013: Results, impact and opportunities 2013 [updated 2013].
19. World Bank. Burkina Faso Overview 2015 [updated Jan 12, 2015].
20. Organization WH. Global Health Observatory Data Repository 2015 [updated 2015].
21. The DHS Program. HIV/AIDS Survey Indicators Database. 2012.
22. Swenson RR, Rizzo CJ, Brown LK, Venable PA, Carey MP, Valois RF, et al. HIV knowledge and its contribution to sexual health behaviors of low-income African American adolescents. *Journal of the National Medical Association.* 2010;102:1173-82.
23. Aggleton P, Parker R. World AIDS Campaign 2002–2003: A conceptual framework and basis for action. Geneva, Switzerland: UNAIDS; 2000 2000.
24. Nations U. Declaration of Commitment on HIV/AIDS. Assembly TG; 2 August 2001 Contract No.: A /RES/S-26/2.
25. Lentine DA, Hersey JC, Iannacchione VG, Laird GH, McClamroch K, Thalji L. HIV-related knowledge and stigma -- United States, 2000. *Morbidity and Mortality Weekly Report.* 2000;49(47):1062-4.
26. HIV/AIDS UNAIDS. UNAIDS Guidance Note on HIV and Sex Work. UNAIDS; 2012.
27. Organisation WH. Prevention and treatment of HIV and other sexually transmitted infections for sex workers in low- and middle-income countries: Recommendations for a public health approach. 2012.

28. Center for Disease Control. HIV Among Gay and Bisexual Men 2015 [updated January 13, 2015].
29. U.S. Department of Health and Human Services. HIV Overview: HIV Testing 2014 [updated 9/23/2014].
30. U.S. Department of Health and Human Services. The Basics of HIV Prevention. 2014.
31. AVERT. HIV Prevention - Reducing the Risks of HIV Transmission 2014 [updated 12/12/2014].
32. ICF International. Understanding and Using the Demographic and Health Surveys –DHS Curriculum Facilitator’s Guide: Instructor’s Guide. 2014.
33. Institut National de la Statistique et de la Démographie, ICF International. Enquête Démographique et de Santé et à Indicateurs Multiples du Burkina Faso 2010. Calverton, Maryland, USA : INSD et ICF International.; 2012.
34. Carael M. Urban–rural differentials in HIV/STDs and sexual behaviour. Sexual cultures and migration in the era of AIDS: Anthropological and demographic perspectives. 1997:107-26.
35. Liu M, Zhang Q, Lu M, Kwon C-S, Quan H. Rural and Urban Disparity in Health Services Utilization in China. *Medical Care*. 2007;45(8):767-74. doi: 10.1097/MLR.0b013e3180618b9a.
36. Lurie M, Pronyk P, de Moor E, Heyer A, de Bruyn G, Struthers H, et al. Sexual behavior and reproductive health among HIV-infected patients in urban and rural South Africa. *Journal of acquired immune deficiency syndromes (1999)*. 2008;47(4).
37. Liu H, Fang H, Zhao Z. Urban–rural disparities of child health and nutritional status in China from 1989 to 2006. *Economics & Human Biology*. 2013;11(3):294-309.
38. Reif S, Golin CE, Smith SR. Barriers to accessing HIV/AIDS care in North Carolina: Rural and urban differences. *AIDS care*. 2005;17(5):558-65.
39. Sahn DE, Stifel DC. Urban-rural inequality in living standards in Africa. Helsinki: United nations university. World institute for development economics research (UNU-WIDER); 2004 2004.
40. Tran TK, Nguyen CTK, Nguyen HD, Eriksson B, Bondjers G, Gottvall K, et al. Urban-rural disparities in antenatal care utilization: a study of two cohorts of pregnant women in Vietnam. *BMC health services research*. 2011;11(1).
41. Msisha WM, Kapiga SH, Earls F, Subramanian S. Socioeconomic status and HIV seroprevalence in Tanzania: a counterintuitive relationship. *International Journal of Epidemiology*. 2008;37(6):1297-303. doi: 10.1093/ije/dyn186.

42. Saundra G, Janice C P, Medha V. HIV/AIDS in Rural America: Prevalence and Service Availability. 2013.
43. Bennett KJ, Olatosi B, Probst JC. Health disparities: a rural-urban chartbook. 2008 2008.
44. Williams PB, Sallar AM. HIV/AIDS and African American men: Urban-rural differentials in sexual behavior, HIV knowledge, and attitude towards condoms use. *Journal of the National Medical Association*. 2010;102(12):1139-49.
45. Yebei VN, Fortenberry JB, Ayuku DO. Felt stigma among people living with HIV/AIDS in rural and urban Kenya. *African health sciences*. 2008;8(2).