Sociodemographics and Clinical Presentation of HIV in Jamaica Over 20 years

A Comparative Analysis of Surveillance Data

J Duncan[1], Y Grant[2], TR Clarke[3,4], KM Harvey[1], RC Gibson[5], G Barrow[4], WD Abel[5], EN Barton[3,4], JP Figueroa[5]

ABSTRACT

Objective: *To delineate changes in the epidemiology of HIV including morbidity and mortality patterns based on three key time points in Jamaica's HIV response.*

Method: *Surveillance data from Jamaica's HIV/AIDS Tracking system (HATS) were analysed and distribution of cases by age, gender, sexual practice, risk factors and clinical features were determined for three time periods (1988 – 1994: formal establishment of HIV surveillance at the national level; 1995− 2003: introduction of HAART globally; 2004 – June2008: introduction of HAART and HIV rapid testing in Jamaica). Factors that predicted late stage diagnosis (AIDS or AIDS death) were also determined.*

Results: *22 603 persons with HIV were reported to the Ministry of Health, Jamaica, between 1988 and June 2008. Between the first and last time blocks, the modal age category remained constant (25−49 years) and the proportion of women reported with HIV non-AIDS increased from 32.5% to 61.4% (*$p < 0.001$*). However, the male: female ratio for persons reported with AIDS remained at 1.3:1 between 1995 and 2008. Although heterosexual transmission was the most frequent mode of transmission in each time period, sexual behaviour was consistently under-reported (4769 persons or 21% of all cases ever reported). Late stage diagnosis (AIDS or AIDS death) decreased significantly between the first and last time blocks (16% decline,* $p < 0.0001$*) with men, older persons and persons with unknown risk history being more likely to be diagnosed at AIDS or AIDS death.*

Conclusion: *HIV testing and treatment programmes have improved timely diagnosis and reduced morbidity associated with HIV infection in Jamaica. However, new strategies must be developed to target men and older persons who are often diagnosed at a late stage of disease. Surveillance systems must be strengthened to improve understanding of persons reported with unknown risk behaviours and unknown sexual practices.*

Key words: AIDS, Epidemiology, HIV, Public Health, Jamaica

Sociodemografía y Presentación Clínica del VIH en Jamaica por más de 20 Años

Análisis Comparativo de Datos de Vigilancia

J Duncan[1], Y Grant[2], TR Clarke[3,4], KM Harvey[1], RC Gibson[5], G Barrow[4], WD Abel[5], EN Barton[3,4], JP Figueroa[5]

RESUMEN

Objetivo: *Delinear los cambios en la epidemiología del VIH incluyendo patrones de morbilidad y mortalidad sobre la base de tres momentos claves de la respuesta de Jamaica frente al VIH.*

Método: *Se analizaron datos de vigilancia del sistema de rastreo epidemiológico del VIH/SIDA (HATS) en Jamaica, y se determinó la distribución de casos por edad, género, práctica sexual, factores de riesgo, y características clínicas en los tres periodos de tiempo siguientes. (1988–1994): Establecimiento formal de vigilancia del VIH a nivel nacional. (1995 – 2003): Introducción de la terapia TARGA a nivel global. (2004 – junio 2008): Introducción de la terapia TARGA y pruebas*

From: [1]Ministry of Health, Jamaica, [2]Department of Epidemiology, Miller School of Medicine, University of Miami, Florida, USA, [3]Department of Medicine, [4]Centre for HIV AIDS Research Education and Services (CHARES) and [5]Department of Community Health and Psychiatry, The University of the West Indies, Kingston 7, Jamaica, West Indies.

Correspondence: Dr J Duncan, Ministry of Health, Jamaica, E-mail: jjjduncan@yahoo.com

rápidas de VIH en Jamaica. Asimismo se determinaron los factores que predijeron el diagnóstico en fase tardía (SIDA o muerte por SIDA).

Resultados: *Entre 1988 y junio de 2008, se reportaron 22 603 personas con VIH al Ministerio de Salud de Jamaica. Entre el primer y el último bloque de tiempo, la categoría modal* edad *permaneció constante (25–49 años) y el número de mujeres reportadas con VIH sin SIDA aumentó de 32.5% a 61.4% (*$p < 0.001$*). Sin embargo, la proporción varón:hembra entre las personas reportadas con SIDA permaneció en 1.3:1 entre 1995 y 2008. Aunque la transmisión heterosexual fue el modo de transmisión más frecuente en cada periodo del tiempo, los reportes sobre comportamiento sexual fueron persistentemente insuficientes (sólo 4769 personas o 21% de todos los casos reportaron alguna vez). El diagnóstico de fase tardía (SIDA o muerte por SIDA) disminuyó significativamente entre el primer y el último bloque de tiempo (una disminución del 16%,* $p < 0.0001$*), con una mayor probabilidad de diagnóstico de SIDA o muerte por SIDA entre los hombres, las personas de más edad y las personas con una historia de riesgo desconocida.*

Conclusión: *La prueba de VIH y los programas de tratamiento han mejorado el diagnóstico oportuno y reducido la morbilidad asociada con la infección por VIH en Jamaica. Sin embargo, se hace imprescindible desarrollar nuevas estrategias destinadas a hombres y personas de edad que a menudo reciben el diagnóstico en una etapa avanzada de la enfermedad. Deben fortalecerse los sistemas de vigilancia para mejorar la comprensión de las personas reportadas con conductas de riesgo desconocidas y prácticas sexuales desconocidas.*

Palabras claves: SIDA, epidemiología, VIH, salud pública, Jamaica

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INTRODUCTION

The burden of HIV in the Caribbean is second only to Sub-Saharan Africa. Many Caribbean countries including Jamaica are experiencing both generalized and concentrated epidemics (1−3). In Jamaica, the adult population has a HIV prevalence of 1.6% in 2008 but higher HIV prevalence has been reported among vulnerable populations such as MSM (32%) and SW [4.9%] (2, 3). Factors driving the epidemic have been well documented and include high levels of multiple partnerships, early sexual debut, high levels of transactional sex, gender disparities and poverty (2−6).

In response to the HIV epidemic, Jamaica's National HIV/STI programme (NHP) has implemented several strategies to halt and reverse the HIV epidemic. These strategies are outlined in a national strategic plan and include increased HIV prevention programmes targeted at populations most at risk, scale-up of HIV testing programmes and providing access to antiretroviral treatment (ART) [7]. As a result, ART access transitioned from minimal access in the private sector to nearly 5000 persons accessing ART between September 2004 and December 2008. Annual HIV tests increased six-fold between 2003 and 2008 and programmes were launched in various sectors to increase HIV awareness (8). However, there is little documentation of the impact of the HIV response on general epidemiological trends, case identification and morbidity in Jamaica (2, 5, 9, 10).

A previous analysis by Losina *et al* (9) analysed pre-ART surveillance data and confirmed that many persons were diagnosed at a late stage of disease with predictors of mortality including age, number of opportunistic infections and stage of diagnosis. This analysis, however, preceded the strategic scale-up of interventions such as ART and HIV rapid testing. Surveillance data from other countries have also shown changes in transmission and mortality patterns over the last two decades. For example, transmission patterns have shifted from predominantly homosexual to heterosexual transmission in many countries and women have experienced the greatest increase in new HIV infections (1, 11). In some countries, patterns in opportunistic infections and mortality attributable to non-AIDS diseases have changed since introduction of ART (12−14).

This analysis of Jamaica's national surveillance data examines HIV transmission patterns and trends in case identification, morbidity and mortality in relation to key interventions and time points in Jamaica's HIV response.

SUBJECTS AND METHODS

The research team conducted a descriptive analysis of national surveillance data for persons reported to the Ministry of Health (MOH), Jamaica, with HIV/AIDS between 1988 and June 2008. The data were analysed in three time blocks based on significant changes in the national pro-gramme and/or global epidemic (1988 – 1994: formal establishment of HIV surveillance at the national level; 1995–2003: introduction of HAART globally; 2004−June 2008: introduction of HAART and HIV rapid testing in Jamaica along with the scaling-up of HIV programmes). These time points were selected as it was anticipated that the aforementioned changes would significantly impact HIV and AIDS morbidity as well as surveillance reporting.

Both passive and active surveillance are used to capture data on persons living with HIV in Jamaica. Passive

surveillance includes the completion of confidential case reporting forms by healthcare providers at the time of diagnosis with HIV. Additional notifications are submitted to the MOH when persons progress from HIV to AIDS and at the time of death. A national surveillance officer and public health nurses conduct active surveillance by routinely reviewing death registries, hospital admissions and registries of hospices to identify newly diagnosed persons with HIV, AIDS and AIDS deaths.

The HIV confidential case reporting form includes demographics, sexual practice, risk history, relevant clinical history, date of HIV test, mode of transmission and stage of disease at time of reporting. All HIV surveillance data is entered into a national database, the HIV/AIDS Tracking system (HATS). Unique identifiers such as address, mother's maiden name and date of birth are used to identify and remove duplicate entries. Persons are classified as asymptomatic HIV (WHO stage1), symptomatic HIV (WHO stage 2 or 3), AIDS (WHO stage 4) and AIDS death.

Prior to 2004, CD4 count was unavailable in the public sector and classification was based solely on clinical history captured on confidential reporting forms. In mid 2007, confidential case reporting forms were modified to include CD4 count, viral load and additional AIDS defining conditions such as recurrent pneumonia and toxoplasmosis. Time block assignment was based on first date of case identification and reporting to the MOH.

Statistical analysis

Statistical analyses were done using SAS version 9.1.3. Adjusted chi-square analyses were used to compare the proportions of cases in the major risk and transmission categories within and between time blocks. Comparisons were made by demographic characteristics where data were sufficient. Risk categories were developed through the application of an algorithm developed from the combination of transmission category, sexual practice and risk behaviour on the HIV confidential reporting form (15). The Cochran Armitage trend test was applied to comparisons over the three time-blocks. For all analyses, statistical significance was taken at the 0.05 level.

Results

General characteristics (including demographics) of sample

Between 1988 and June 30, 2008, a total of 22 603 persons with HIV including 12 919 persons with AIDS (57.2%) were reported to the MOH, Jamaica. A steady increase in women diagnosed with HIV was observed as women accounted for 37.2% of persons with AIDS and 32.5% of persons with HIV non-AIDS from 1988−1994 compared to 44.4% and 61.4% of persons with AIDS and HIV non-AIDS respectively between 2004 and June 2008, $p < 0.0001$ (Table 1).

The overall male: female ratio for persons with HIV non-AIDS declined from 2.1:1 in the first time block to 1:1 in the second time block and further to 0.6:1 in the third time block (Table 1). The decline in male to female ratio for AIDS cases, however, was much less (1.4:1 in the first time block compared to 1.3:1 for the last decade).

The majority of persons reported with HIV or AIDS were 15 to 49 years old and the median age at diagnosis was similar between time blocks for persons diagnosed with HIV non-AIDS. However, median age of persons reported with AIDS increased from 28 to 37 between first and last time blocks (Table 1).

Among all reported HIV cases, the majority were unemployed/unknown occupation (41.1%) or skilled labour (30.9%). Most persons (56.6%) were single but the marital status was unknown for 31.6% of persons. Approximately, eleven per cent (2 409 persons) were married or had a common law partner. The distribution of marital and employment status was similar for all time periods.

Sexual practices and risk history

The most common high risk behaviours and risk histories reported were history of STI (16.2%) and sex with sex-worker (6.9%). Intravenous drug use was rarely reported in this population (0.6% person with AIDS and 0.2% persons with HIV non-AIDS). However, no high risk behaviour was identified for 20.8% of persons reported to the MOH and the risk history was unknown for 21.9% (4915) of persons (Table 2). Application of the risk algorithm attributed 68.3% of HIV transmission to heterosexual sex, 3.9% to homosexual or bisexual activity, 0.4% to IV drug use and 6.1% to perinatal transmission. However, the sexual practices of 4 769 (21%) persons with HIV were not reported, resulting in undetermined mode of transmission based on the risk algorithm. The distribution pattern of HIV transmission was similar for all time blocks with a downward trend in transmission attributed to MSM, perinatal and unknown reasons between first and last time blocks among all HIV cases. HIV transmission due to intravenous drug use was consistently below 1% among persons with HIV for all reporting periods.

Clinical features and symptom complexes

The most common symptoms/diagnoses were weight loss (34.9%), cough > 1 month (25.9%), candidiasis (22.4%), fever (21.6%), shortness of breath (21.0%) and lymphadenopathy (18.4%) (Table 3). This was similar for both men and women and within time blocks. However, the proportion of persons reporting one or more symptoms declined by 13% between the first and last time blocks with significant declines observed for all symptoms/diagnoses except recurrent pneumonia which increased from 0.3% in the first time block to 3.4% in the last time block. Pulmonary TB was rarely reported in this population (1.6% or 362 persons with HIV).

Table 1: Demographics of HIV-positive Persons Reported to Ministry of Health, Jamaica, by Reporting Era and Stage of HIV disease 1988–June 30, 2008

	Prior to 1995					1995–2003					2004–June 30, 2008					Total					
	AIDS		HIV (non AIDS)		p-value‡	AIDS		HIV (non AIDS)		p-value‡	AIDS		HIV (non AIDS)		p-value‡	AIDS		HIV (non AIDS)		TOTAL	p-value‡
	N	%	N	%		N	%	N	%		N	%	N	%		N	%	N	%	N	
Total*	1446	11.2	881	9.1		7562	58.5	4171	43.1		3911	30.3	4632	47.8		12919	57.2	9684	42.8	22603	
Gender					0.02					< 0.0001					< 0.0001						< 0.0001
F	538	37.2	286	32.5		3215	42.5	2055	49.3		1738	44.4	2844	61.4		5491	42.5	5185	53.5	10676	
M	908	62.8	595	67.5		4347	57.5	2116	50.7		2173	55.6	1788	38.6		7428	57.5	4499	46.5	11927	
Age at First Diagnosis					0.3665†					< 0.0001					< 0.0001						< 0.0001
Less than 15	20	1.4	7	0.8		424	5.6	183	4.4		234	6.0	239	5.2		678	5.2	429	4.4	1107	
15–24	105	7.3	30	3.4		732	9.7	722	17.3		356	9.1	1151	24.8		1193	9.2	1903	19.7	3096	
25–49	262	18.1	54	6.1		3605	47.7	1517	36.4		2509	64.2	2464	53.2		6376	49.4	4035	41.7	10411	
50 or more	16	1.1	2	0.2		633	8.4	127	3.0		661	16.9	308	6.6		1310	10.1	437	4.5	1747	
Missing	1043	72.1	788	89.4		2168	28.7	1622	38.9		151	3.9	470	10.1		3362	26.0	2880	29.7	6242	
Median Age	28		26			33		28			37		29								
Marital Status					< 0.0001					< 0.0001					0.0004						< 0.0001
Married/Common Law	160	11.1	48	5.4		877	11.6	440	10.5		443	11.3	441	9.5		1480	11.5	929	9.6	2409	
Separated/Divorced	20	1.4	4	0.5		93	1.2	37	0.9		66	1.7	43	0.9		179	1.4	84	0.9	263	
Single	802	55.5	232	26.3		4650	61.5	2397	57.5		2134	54.6	2578	55.7		7586	58.7	5207	53.8	12793	
Unknown	464	32.1	597	67.8		1942	25.7	1297	31.1		1268	32.4	1570	33.9		3674	28.4	3464	35.8	7138	
Occupation Type					< 0.0001					<0.0001					<0.0001						< 0.0001
CSW	58	4.0	14	1.6		122	1.6	52	1.2		17	0.4	39	0.8		197	1.5	105	1.1	302	
Other	40	2.8	7	0.8		204	2.7	111	2.7		80	2.0	89	1.9		324	2.5	207	2.1	531	
Professional	157	10.9	57	6.5		825	10.9	552	13.2		288	7.4	353	7.6		1270	9.8	962	9.9	2232	
Self-Employed	159	11.0	54	6.1		562	7.4	283	6.8		197	5.0	183	4.0		918	7.1	520	5.4	1438	
Student	13	0.9	5	0.6		92	1.2	112	2.7		56	1.4	124	2.7		161	1.2	241	2.5	402	
Trade	501	34.6	201	22.8		2522	33.4	1361	32.6		1162	29.7	1244	26.9		4185	32.4	2806	29.0	6991	
Unemployed	425	29.4	488	55.4		2673	35.3	1434	34.4		1880	48.1	2395	51.7		4978	38.5	4317	44.6	9295	
Missing	93	6.4	55	6.2		562	7.4	266	6.4		231	5.9	205	4.4		886	6.9	526	5.4	1412	

* Row percents
† Fisher's exact test due to sparse cells
*** Zero cells prohibit statistical testing
‡ *p*-value compares differences between AIDS cases and HIV cases by categorical factor
• *p*-value compares categorical variable by era of diagnosis with no regard for HIV/AIDS status

Table 2: Risk Profile and transmission patterns of HIV-positive Persons Reported to Ministry of Health, Jamaica, by Reporting Era and Stage of HIV disease 1988–June 30, 2008

	Prior to 1995					1995–2003					2004–June 30, 2008					Total					
	AIDS		HIV (non AIDS)		p-value‡	AIDS		HIV (non AIDS)		p-value‡	AIDS		HIV (non AIDS)		p-value‡	AIDS		HIV (non AIDS)		TOTAL	p-value*
	N	%	N	%		N	%	N	%		N	%	N	%		N	%	N	%	N	
Sex Practice					< 0.0001					< 0.0001					< 0.0001						< 0.0001
Heterosexual	959	66.3	421	47.8		5087	67.3	2912	69.8		2570	65.7	3582	77.3		8616	64.8	6915	74.2	15531	
Homosexual	67	4.6	20	2.3		126	1.7	78	1.9		39	1.0	55	1.2		232	1.7	153	1.6	385	
Bisexual	76	5.3	20	2.3		192	2.5	108	2.6		51	1.3	51	1.1		319	2.4	179	1.9	498	
None - Child	93	6.4	55	6.3		562	7.4	266	6.4		231	5.9	204	4.4		886	6.7	525	5.6	1411	
Not Stated	251	17.3	364	41.4		1595	21.1	804	19.3		1020	26.1	735	15.9		2866	21.6	1903	20.4	4769	
Missing	1	0.1	0	0.0		2	0.0	1	0.0		3	0.1	2	0.0		6	0.0	3	0.0	9	
Risk History Details					< 0.0001					< 0.0001					< 0.0001						< 0.0001
Blood Transfusion	42	2.9	6	0.7		176	2.3	61	1.5		82	2.1	74	1.6		300	2.3	141	1.5	441	
Crack/Cocaine Use	25	1.7	5	0.6		212	2.8	53	1.3		64	1.6	44	0.9		301	2.3	102	1.1	403	
Intravenous Drug Use	5	0.3	3	0.3		21	0.3	5	0.1		7	0.2	3	0.1		33	0.2	11	0.1	44	
Sex with Sex Worker	125	8.6	37	4.2		658	8.7	232	5.5		247	6.3	164	3.5		1030	7.7	433	4.6	1463	
Genital Ulcers/Sores	125	8.6	36	4.1		692	9.2	294	7.0		234	6.0	175	3.8		1051	7.9	505	5.4	1556	
History of STD	174	12.0	74	8.4		1399	18.5	747	17.9		614	15.7	666	14.4		2187	16.4	1487	15.9	3674	
Current STD	119	8.2	42	4.8		590	7.8	438	10.5		275	7.0	397	8.6		984	7.4	877	9.4	1861	
Pregnant	1	0.1	2	0.2		53	0.7	116	2.8		94	2.4	508	11.0		148	1.1	626	6.7	774	
History of Incarceration	1	0.1	1	0.1		55	0.7	23	0.6		63	1.6	58	1.3		119	0.9	82	0.9	201	
Other	62	4.3	29	3.3		170	2.2	70	1.7		5	0.1	16	0.3		237	1.8	115	1.2	352	
Unknown	219	15.1	21	2.4		2035	26.9	1073	25.7		877	22.4	690	14.9		3131	23.5	1784	19.1	4915	
No Risk History	286	19.8	103	11.7		1437	19.0	1044	25.0		772	19.7	1060	22.9		2495	18.8	2207	23.7	4702	
Missing	467	32.3	317	36.0		41	0.5	38	0.9		755	19.3	599	12.9		1263	9.5	954	10.2	2217	
Transmission Risk Group					< 0.0001					0.0015					< 0.0001					22603	< 0.0001
Heterosexual	943	65.2	418	47.4		5047	66.7	2901	69.6		2556	65.4	3569	77.1		8546	66.2	6888	71.1	15434	
IDU	14	1.0	3	0.3		42	0.6	10	0.2		20	0.5	11	0.2		76	0.6	24	0.2	100	
MSM	143	9.9	40	4.5		317	4.2	186	4.5		90	2.3	106	2.3		550	4.3	332	3.4	882	
Other	0	0.0	0	0.0		0	0.0	0	0.0		0	0.0	2	0.0		0	0.0	2	0.0	2	
Perinatal	92	6.4	55	6.2		561	7.4	266	6.4		233	6.0	204	4.4		886	6.9	525	5.4	1411	
Unknown/Not Stated	253	17.5	365	41.4		1594	21.1	808	19.4		1012	25.9	740	16.0		2859	22.1	1913	19.8	4772	
Missing	1	0.1	0	0.0		1	0.0	0	0.0		0	0.0	0	0.0		2	0.0	0	0.0	2	
Crack/Cocaine Use					0.0006†					< 0.0001					< 0.0001†						< 0.0001
No	1389	96.1	868	98.5		7117	94.1	4050	97.1		3765	96.3	4541	98.0		12271	95.0	9459	97.7	21730	
Yes	57	3.9	13	1.5		445	5.9	121	2.9		146	3.7	91	2.0		648	5.0	225	2.3	873	

*Row percents
†Fisher's exact test due to sparse cells
***Zero cells prohibit statistical testing
‡ *p*-value compares differences between AIDS cases and HIV cases by categorical factor
• *p*-value compares categorical variable by era of diagnosis with no regard for HIV/AIDS status

Table 3: Clinical Features of HIV-positive Persons Reported to the Ministry of Health, Jamaica, by Reporting Era 1988–June 30, 2008

	Reporting Era								
	Prior to 1995		1995–2003		2004–June 30, 2008		Total		*p*-value
	n	%	n	%	n	%	n	%	
Total Cases Reported*	2327	10.3	11733	51.9	8543	37.8	22603	100	
Stage at Diagnosis									< 0.0001**
HIV	1622	69.7	8557	72.9	7355	86.1	17534	77.6	
AIDS or Death	705	30.3	3176	27.1	1188	13.9	5069	22.46	
Presence of Clinical Symptoms									< 0.0001**
Any symptoms	1200	51.6	6430	54.8	3316	38.8	10946	48.4	
No symptoms	1127	48.4	5303	45.2	5227	61.2	11657	51.6	
Case Symptom Burden									< 0.0001**
Less then 3 symptoms	1411	60.6	7540	64.3	6360	74.4	15311	67.7	
Three or more symptoms	916	39.4	4193	35.7	2183	25.6	7292	32.3	
Frequency of reported symptoms									< 0.0001
CNS involvement	135	5.8	627	5.3	279	3.3	1041	4.6	
Candidiasis	682	29.3	2837	24.2	1542	18.0	5061	22.4	
Cough (>1 month)	809	34.8	3263	27.8	1793	21.0	5865	25.9	
Crusted scabies	88	3.8	301	2.6	115	1.3	504	2.2	
Diarrhoea (>1 month)	609	26.2	2021	17.2	902	10.6	3532	15.6	
Fever (> 1 month)	720	30.9	2785	23.7	1383	16.2	4888	21.6	
Gen. dermatitis	481	20.7	2165	18.5	1345	15.7	3991	17.7	
Kaposi's sarcoma	39	1.7	114	1.0	34	0.4	187	0.8	
Lymphadenopathy	618	26.6	2318	19.8	1239	14.5	4175	18.5	
Pulm. tuberculosis	49	2.1	236	2.0	77	0.9	362	1.6	
Recurrent pneumonia	7	0.3	216	1.8	289	3.4	512	2.3	
Shingles	32	1.4	210	1.8	125	1.5	367	1.6	
Shortness of breath	692	29.7	2680	22.8	1391	16.3	4763	21.1	
Weight loss (> 10%)	1021	43.9	4520	38.5	2340	27.4	7881	34.9	

Stage of diagnosis

Seventeen thousand, five hundred and thirty-four persons (77.6%) were first reported as HIV asymptomatic or mildly symptomatic; 22.4% of cases (5 069) were first reported as AIDS or AIDS death. Comparison of time blocks showed a significant decline in late stage diagnosis since 1988 with a 16% decline in persons diagnosed as AIDS or AIDS death between first and last time blocks ($p < 0.00001$). Thirty per cent of the total reported HIV cases were diagnosed at AIDS or AIDS death prior to 1995 compared to 27.0% between 1995 and 2003 and 13.9% between 2004 and 2008 ($p = < 0.0001$).

The stage of HIV at time of reporting varied by gender, age group, era of reporting, risk group and job category (Table 4). Women were less likely to be reported at AIDS or AIDS death when compared to men but the significance was lost when adjusted for variables such as age, era of reporting and risk group (crude OR = 0.65, 95% CI 0.61, 0.69). With the exception of children under 12 years of age, increasing age was associated with greater likelihood of late stage. Among persons reported in the 25–49-year age group, 22% were reported at AIDS compared with 11% of those reported at AIDS in the 15–24-year age group ($p < 0.0001$). More than 50% of persons 50 years and older with HIV were reported at AIDS or AIDS death. Unknown risk group was also associated with late stage reporting.

DISCUSSION

This analysis of Jamaica's HIV surveillance data indicates that heterosexual intercourse continues to be the main mode of transmission of HIV in this population and most at risk populations are sex-workers, clients of sex-workers, MSM, and persons with STIs. However, the high proportion of persons with unknown risk history and men with unknown sexual practices is of concern. These finding have been attributed to inadequate case investigation and an unwillingness of men to disclose their sexual practice due to fear of stigmatization (2, 16). These large categories of persons with unknown risk and sexual practices in all time blocks makes it difficult to draw conclusions about changes in risk behaviours or modes of transmission between time periods.

Multiple partnership and concurrency have been identified as major risk factors in countries where heterosexual sex drives the HIV epidemic (1, 17, 18). Limited data on multiple partnerships was available in the present analysis as this risk factor was included in Jamaica's surveillance reporting form in 2007. Prior to 2007, surveillance forms collected information on lifetime partners rather than partners during a 12-month period, whether serially or concurrently. However, several national surveys have confirmed high levels of multiple partnerships in Jamaica with significantly higher levels among Jamaican men compared to women (6, 19–21).

Table 4: Summary of factors associated with late stage diagnosis of HIV infection (AIDS or AIDS death) between 1988−June 30, 2008 in Jamaica

Factor	Crude Odds Ratio (95% CL)	Adjusted Odds Ratio (95% CL)
Sex at Birth		
Male	1.00	1.00
Female	0.65 (0.61, 0.69)	0.95 (0.85, 1.06)
Age at First Diagnosis (yrs)		
0 −12	0.44 (0.37, 0.53)	0.10 (0.04, 0.26)
13 −19	0.09 (0.07, 0.13)	0.09 (0.07, 0.13)
20 − 29	0.26 (0.23, 0.30)	0.26 (0.23,0.30)
30 − 39	0.52 (0.46, 0.58)	0.50 (0.44, 0.56)
40 − 49	0.72 (0.63, 0.82)	0.71 (0.62, 0.82)
50+	1.00	1.00
Era of Diagnosis		
Prior to 1995	1.00	1.00
1996 − 2003	0.85 (0.78, 0.94)	1.05 (0.83, 1.33)
2004 − 2008	0.37 (0.33, 0.41)	0.40 (0.31, 0.51)
Risk Group		
Unknown	1.00	1.00
Heterosexual	0.54 (0.50, 0.58)	0.48 (0.43, 0.54)
IDU	0.85 (0.55,1.32)	0.71 (0.41, 1.24)
MSM	0.50 (0.42, 0.60)	0.34 (0.25, 0.45)
Job		
Unemployed/unknown	1.00	1.00
Commercial sex-worker	1.12 (0.86,1.45)	1.14 (0.77, 1.68)
Professional	0.75 (0.67, 0.84)	0.61 (0.52, 0.71)
Student	0.27 (0.19, 0.39)	0.85 (0.53, 1.38)
Trade	0.84 (0.78, 0.91)	0.68 (0.61, 0.75)
Self-employed	0.91 (0.80, 1.04)	0.71 (0.59, 0.84)
Other	0.79 (0.64, 0.98)	0.77 (0.53, 0.94)
Marital Status		
Unknown	1.00	1.00
Single	0.91 (0.85, 0.98)	1.16 (1.03, 1.29)
Married/common law	0.99 (0.89, 1.11)	0.97 (0.83, 1.13)
Separated/divorced	0.89 (0.66,1.20)	0.76 (0.52, 1.11)
Crack Cocaine Use		
No	0.80 (0.69, 0.93)	1.08 (0.89, 1.31)
Yes	1.00	1.00

This suggests that many men with unknown risk history in the present analysis may be men with multiple partnerships and many HIV-infected women may be women with one male partner who was HIV-infected. This pattern of HIV transmission from HIV-infected men to women with one sexual partner has been described in many African countries and is consistent with data on the global HIV epidemic which shows that many new HIV infections occur among persons in stable relationships (1, 22).

Comparison of time blocks revealed a significant increase in women diagnosed with HIV in particular HIV non-AIDS but this was not consistent with the sex distribution for AIDS diagnoses. Jamaican men continue to be disproportionately affected by AIDS, despite a narrowing of the male to female ratio between the first and second time blocks. This suggests that the increase HIV non-AIDS cases among women is primarily a reflection of increased access to HIV testing for women through provider initiated testing in family planning clinics, antenatal care and paediatric clinics rather than a feminization of the HIV epidemic in Jamaica. This finding is contrary to the pace of feminization of the HIV epidemic being observed in other countries with predominantly heterosexual transmission of HIV (1).

The present study showed that the proportion of persons with late stage diagnoses (AIDS or AIDS death) significantly declined between time blocks and was significantly lower than late stage diagnoses reported by Losina *et al* (9). This is also reflected in the significant increase in persons with asymptomatic HIV infection at initial diagnosis (Table 3). This is likely due to scale-up of HIV testing since 2004 by opt-out testing for pregnant women and STI clinic attendees coupled with increase awareness about HIV infection among healthcare providers and the general population. However, men and older persons (> 50 years old) were more likely to have a late stage diagnosis compared to women and younger individuals. This may be related to the lack of targeted HIV testing programmes for these groups. Similar patterns of late stage diagnosis have continued to challenge HIV responses in other countries and underscores the need for counselling and testing targeting high risk men who often have poor health-seeking behaviour (12, 23−24). Programmes that include partner testing such as male

partners of pregnant women, door-to door testing for couples, mobile HIV testing units in high prevalence neighbourhoods, optout testing for inmates and testing persons visiting hospital emergency rooms have been shown to increase HIV testing uptake and decrease late diagnosis (22, 25−27). These interventions may also strengthen prevention efforts.

Jamaica's surveillance data also confirmed that the proportion of persons reported with symptoms or diagnoses such as candidiasis, cough, and shortness of breath decreased significantly across time blocks. This may be due to a decline in presentation with opportunistic infections such as *Pneumocystis jirovecii* due to treatment availability and expanded testing programmes. However, the reporting of symptoms rather than specific diagnoses in some instances coupled with the absence of confirmatory testing limits interpretation of this finding.

The most common symptoms reported for all time blocks include fever, diarrhoea, cough and shortness of breath. Vickers *et al* (10) reported a much higher prevalence of generalized lymphadenopathy at presentation of HIV-positive persons in Jamaica but this was at a specialized clinic and based on chart review rather than surveillance data. Oral candidiasis was the most common opportunistic infection reported in the present analysis but specific diagnoses of other opportunistic infections were not available. Data from other Caribbean countries show that pulmonary TB and toxoplasmosis are leading causes of AIDS related morbidity and mortality in the Caribbean (22, 28, 29). However, occurrence of pulmonary TB in our population was much lower than reported in these studies and this may reflect a need for greater emphasis on TB screening and diagnosis (22, 28, 29).

There were several limitations to this study. Misclassification of persons by stage of HIV infection may have occurred due to the limited data available on clinical features and lack of CD4 counts prior to revision of the HIV case report forms in 2007. In addition, progression to AIDS and AIDS deaths may have been under-reported due to inadequate follow-up after initial diagnosis and reporting. Data on variables such as sexual practices, risk history and clinical features were unknown or missing for many persons limiting interpretation of changes between time blocks. This analysis may also be more representative of trends in the public sector due to the use of active surveillance in public health facilities and difficulties in determining the level of reporting from the private sector. Despite these limitations, this time block analysis indicates that the national HIV response in Jamaica has improved timely diagnosis of HIV-positive persons, in particular HIV-positive women and decreased morbidity. While general characteristics of PLHIV in Jamaica have not changed, HIV transmission patterns must be interpreted with caution due to the high level of under-reporting of sexual practices of HIV-infected men. Strategic planning should include prevention programmes that increase access to high risk men and most at risk populations such a MSM, SW and their clients and persons with STIs. Surveillance systems must be strengthened in order to improve data capture and understand the risk profile of persons infected with HIV.

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