Epidemiology of Sexually Transmitted Infections in Rural Southwestern Haiti: The Grand'Anse Women's Health Study

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Abstract. The study attempts to define socioeconomic, clinical, and laboratory correlates in vaginitis and other sexually transmitted infections in rural southwestern Haiti. A convenience sample of subjects recruited from a rural women's health clinic and attending an established clinic at the Haitian Health Foundation (HHF) clinic was studied. A standardized history and physical examination, including speculum examination, and collection of blood, urine, and vaginal swabs were obtained from the women at the rural clinic. Additional vaginal swab samples only for Nucleic Acid Amplification Test (NAAT) testing were obtained from women at the HHF clinic in Jérémie. Laboratory results from Leon subjects were positive for *Gardnerella vaginalis* in 41% (41 of 100), *Trichomonas vaginalis* in 13.5% (14 of 104), *Candida* sp. in 9% (9 of 100), *Mycoplasma genitalium* in 6.7% (7 of 104), *Chlamydia trachomatis* in 1.9% (2 of 104), and *Neisseria gonorrhea* in 1% (1 of 104) of patients. Human immunodeficiency virus (HIV) antibody tests were negative in 100% (103 of 103) of patients, and syphilis antibody testing was positive for treponemal antibodies in 7.7% (8 of 104) patients. For subjects from the HHF, 19.9% were positive for *T. vaginalis*, 11.9% were positive for *C. trachomatis*, 10.1% were positive for *M. genitalium*, and 4.1% were positive for *N. gonorrhea*. Infections with *G. vaginalis*, *T. vaginalis*, and *Candida* were the most common. *N. gonorrhea*, *C. trachomatis*, *Candida* sp., *T. vaginalis*, and *M. genitalium* infections were associated with younger age (less than 31 years old).

INTRODUCTION

Vaginitis is a common problem encountered in clinical medicine.¹ Evaluation of vaginitis requires a focused history and physical examination as well as laboratory testing. Evaluation of vaginitis and vaginal discharge is a challenge in rural health clinics in developing countries, such as Haiti, because of the lack of laboratory capacity and lack of local information about the prevalence of sexually transmitted infections (STIs).

The Grand'Anse department is located in southwestern Haiti and has a population of approximately 433,000 people.² The capital city of the Grand'Anse department is Jérémie, with a population of approximately 124,000 people.² Residents of this region are largely subsistence farmers who have limited access to healthcare.

The Seattle–King County Disaster Team (SKCDT) has supported a rural primary care health clinic in the town of Leon in the mountains of the Grand'Anse department of Haiti since 1998. This clinic is in partnership with the local Catholic parish. Although the partnership exists with the Catholic parish, all patients are seen, regardless of their faith affiliation or beliefs.

Vaginitis and vaginal discharge are frequent complaints of women presenting at the Leon clinic, with approximately 25% complaining of these issues. Additionally, women often return to the clinic with complaints of vaginitis or vaginal discharge that remain unresolved after treatment. The clinic is not set up routinely to perform vaginal examinations or extensive laboratory testing for vaginal infections and other STIs. Existing clinic treatment protocols are based on patient symptoms at presentation and World Health Organization (WHO) syndromic treatment guidelines.³ The syndromic treatment approach for vaginal discharge is very poor for diagnosing

STIs.⁴ Untreated STIs may result in severe long-term complications, including pelvic inflammatory disease (PID), ectopic pregnancy, and infertility.

Limited data exist regarding prevalence of STIs in other parts of Haiti.^{5–8} A 1996 study of the prevalence of STIs conducted at Hospital Albert Schweitzer, which included 476 women, found that 25.4% of women had trichomonas, 2.3% of women had gonorrhea, 10.7% of women had chlamydia, 6.8% of women were seropositive for syphilis, and 4.3% of women were seropositive for human immunodeficiency virus (HIV).⁶ At a prenatal clinic in Cité Soleil, a 1993 study of 1,001 women found that 11% of women were seropositive for syphilis, 35% of women were positive for trichomonas, and 12% of women were positive for gonorrhea and/or chlamydia infections.⁷ There are no data regarding prevalence of STIs in the Grand'Anse department. There are also no data regarding the prevalence of *Mycoplasma genitalium* in Haitian women or *T. vaginalis* based on molecular diagnostic test methods.

M. genitalium is an emerging sexually transmitted pathogen implicated in several inflammatory reproductive tract syndromes in women, including cervicitis and PID. It is a cause of infertility as well as urethritis in men.⁹ *T. vaginalis* infection and bacterial vaginosis are conditions that have been linked to pre-term delivery and low birth weight, and they are likely to increase acquisition and shedding/transmission of HIV.¹⁰

To improve clinic treatment protocols, we obtained prevalence data on vaginal infections and STIs as well as demographic and clinical information from women who presented to the clinic with complaints of vaginal discharge and vaginitis.

MATERIALS AND METHODS

Subjects. Subjects were adult women in the Grand'Anse department of Haiti. In Leon, a women's health clinic was promoted by local health committee members, health

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workers, and announcements at local church services. A convenience sample of subjects presenting to the clinic during the week of October 15, 2012 was interviewed and examined, and blood, urine, and vaginal swab samples were collected. All women presenting to the clinic were included, regardless of signs or symptoms of vaginitis or STIs. The subjects from the Haitian Health Foundation (HHF) were women who were being seen at the HHF health clinic for any complaint and not specifically vaginitis or STI complaints during the week of October 15, 2012. No subject identifiers were obtained except for age and information about urban or rural residence.

Study design. The University of Washington Institutional Review Board approved the study as a quality improvement study with the understanding that data would be shared with other provincial healthcare organizations, including the HHF. In Leon, the study was explained to the women in Creole, their native language, by one of the study investigators (D.H.) who is fluent in the language and familiar with the local culture. Verbal consent was obtained, because most subjects are non-literate. Subjects were treated according to existing clinic protocols based on examination findings, history given to the provider, and laboratory results obtained during the clinic visit.

At the HHF clinic in Jérémie, vaginal swab samples for Nucleic Acid Amplification Test (NAAT) testing for *Neisseria gonorrhea*, *C. trachomatis*, *M. genitalium*, and *T. vaginalis* were collected along with patient age and information about rural or urban residence. The women were not able to be interviewed, and samples were not collected for urinalysis, HIV, syphilis, or hemoglobin testing. Testing for *Candida* sp. and *Gardnerella vaginalis* was also not performed on the samples collected at the HHF.

In Leon, a clinical social worker (L.V.S.) with a local Haitian interpreter interviewed the women in Creole using a standardized questionnaire to obtain demographic information, sexual history, and current symptoms. Subjects were classified as living in an urban or rural area. Urban was defined as residing within the city of Jérémie.

Questions regarding mobile phone ownership and mode of transport were asked as surrogate markers of wealth. Subjects were asked if they had vaginal discharge. Presence of vaginal discharge on examination was documented, and when present, color, consistency, and odor were recorded. First-void urine samples were provided. Venous blood was collected into ethylenediaminetetraacetic acid (EDTA) anticoagulant for hemoglobin, HIV antibody, and syphilis antibody testing.

Laboratory analysis. At the Leon clinic only, urinalysis, HIV, syphilis, hemoglobin, and DNA probe testing for *Candida* species and *G. vaginalis* were done by a trained laboratory professional using the test methods previously validated for use at the clinic. Tests were performed according to manufacturer's instructions and clinic protocols. Urinalysis was done using Multistix 10SG Reagent Strips read with a Clinitek 50 Urine Chemistry Analyzer (Siemens Healthcare Diagnostics, Tarrytown, NY). Testing for HIV antibodies was done with the Determine HIV-1/2 Assay (Alere Medical, Chiba, Japan). Additional supplementary testing of HIV antibody positive samples was done with the Clearview Complete HIV-1/2 Assay (Alere North America, Inc., Orlando, FL). Testing for hemoglobin was done with the HemoCue Hb201 (HemoCue AB, Ängelholm, Sweden). Testing for syphilis antibodies was done with the Chembio DPP Syphilis Screen and Confirm Assay (Chembio Diagnostic Systems, Medford,

NY). The Chembio DPP Syphilis Assay provides treponemal and non-treponemal antibody results to aid in differentiating untreated syphilis from treated syphilis.¹¹

Vaginal swabs were obtained both in Leon and at the HHF and then shipped to the United States for NAAT. Samples were stored according to collection kit instructions and shipped to the United States for testing at a later date. NAAT samples were packed and shipped according to International Air Transport Association regulations.

NAAT testing for *N. gonorrhea*, *C. trachomatis*, *M. genitalium*, and *T. vaginalis* was done with the Gen-Probe APTIMA Assays (Hologic Gen-Probe, Inc., San Diego, CA) at the Hologic Gen-Probe facility in San Diego, CA. DNA Probe testing for *Candida* species and *G. vaginalis* was done in Leon with the Affirm VPIII Microbial Identification Test Kit (Becton-Dickinson, Franklin Lakes, NJ).¹² Although the Affirm VPIII Assay provides a *T. vaginalis* result, the *T. vaginalis* result from the Gen-Probe APTIMA Assay was used in this evaluation because of the increased sensitivity of the APTIMA amplification assay over the non-amplified Affirm VPIII Assay.¹³

Data analysis. Calculation of Z scores comparing proportions, confidence intervals (CIs), and odds ratios (ORs) was done with Microsoft Excel 2010 (Microsoft, Redmond, WA).

RESULTS

Overall, 303 samples were collected: 104 samples from the Leon clinic and 199 samples from the HHF. Because of technical issues encountered during the testing process, results could not be obtained for all tests on some samples. The total number tested for each assay represents the total number of valid positive and negative results reported by the testing facility.

The mean age of all subjects was 36.0 years (range = 16–78 years), and 68.3% of subjects lived in a rural area. The mean age of the subjects from Leon was 45.7 years (range = 19–78 years), and 87.5% of these women lived in a rural area (Table 1). For samples collected at the HHF, the mean age was 30.9 years (range = 16–75 years), and 41.7% ($N = 83$) of subjects lived in urban Jérémie.

From all of the samples collected, 27.7% ($N = 84$) samples had at least one positive result, and 8.9% ($N = 27$) of samples were positive for two or more organisms: 17.7% (53 of 300) of samples were positive for *T. vaginalis*, 8.9% (27 of 303) of samples were positive for *M. genitalium*, 8.4% (25 of 297) of samples were positive for *C. trachomatis*, and 3.0% (9 of 297) of samples were positive for *N. gonorrhea*. Women under the age of 31 years old had higher rates of infection with *N. gonorrhea*, *C. trachomatis*, *T. vaginalis*, and *M. genitalium* (Figure 1).

From women in Leon, 52.9% ($N = 55$) of women had at least one positive swab test result, and 14.4% ($N = 15$) of women had swab tests positive for two or more organisms: 41% (41 of 100) of women were positive for *G. vaginalis*, 13.5% ($N = 14$) of women were positive for *T. vaginalis*, 9% ($N = 9$) of women were positive for *Candida* sp., 6.7% ($N = 7$) of women were positive for *M. genitalium*, 1.9% ($N = 2$) of women were positive for *C. trachomatis*, and 1% ($N = 1$) of women were positive for *N. gonorrhea*. HIV antibody tests were negative in 103 of the women tested. One woman declined to be tested for HIV. Syphilis antibody testing was positive for treponemal

TABLE 1
Demographic and sexual history information: Leon subjects ($N = 104$)

Characteristic	Number	Range
Mean age (years)	45.7	19–78
Rural residence	87.5%	n/a
Own a mobile phone	65.4%	n/a
Median travel time to clinic (minutes)	30	2–480*
Mean number of children	4.2	0–13
Mean number of people in the home	5.8	1–18
Mean age of onset of sexual activity (years)	20.3	14–33
Mean number of lifetime sexual partners	1.7	1–5
Reported use of contraception	47.1%	n/a
Sexual partner has other partners or partner's monogamy status is unknown	50%	n/a
Subject or partner has lived or worked in Port au Prince	41.3%	n/a

n/a = not applicable.

*Many women could not indicate how long it took them to get to the clinic or simply stated "a long time."

antibodies in 7.7% ($N = 8$) of the women. Of eight samples positive for treponemal antibodies, 1.9% ($N = 2$) of samples were also positive for non-treponemal antibodies.

From women at the HHF, 33.2% ($N = 66$) of samples had at least one positive result, and 10.6% ($N = 21$) of samples were positive for multiple organisms: 19.9% ($N = 39$) of samples were positive for *T. vaginalis*, 11.9% ($N = 23$) of samples were positive for *C. trachomatis*, 10.1% ($N = 20$) of samples were positive for *M. genitalium*, and 4.1% ($N = 8$) of samples were positive for *N. gonorrhea* (Table 2).

In Leon subjects, the mean hemoglobin was 12.3 g/dL (1 SD = 1.1 g/dL), and urinalysis found that 69.2% (72 of 104) of women had positive urine leukocyte esterase (trace or greater). Of these women, 26% ($N = 27$) had positive urine leukocyte esterase results of 1+ or greater.

Agreement between subject-reported and provider-assessed vaginal discharge was 50%. For women with provider-observed discharge, 48.6% (17 of 35) had at least one positive swab result. Six (35.3%) women were positive for two or more organisms, eight (47.1%) women were positive only for *G. vaginalis*, and three (17.6%) women were positive only for *Candida* species. For the women who reported discharge, 54.1% (33 of 61) had at least one positive swab result. Eight (24.2%) women were positive for two or more organisms. In addition, 18 (54.5%) subjects were positive for only *G. vaginalis*, 5 (15.2%) subjects were positive only

for *Candida* species, and 2 (6.1%) subjects were positive only for *T. vaginalis*. For the women who did not report discharge and did not have provider-observed discharge, 53.3% (16 of 30) had at least one positive swab result. Four (25.0%) women were positive for two or more organisms, nine (56.3%) women were positive for only *G. vaginalis*, one (6.3%) woman was positive only for *Candida* species, one (6.3%) woman was positive only for *T. vaginalis*, and one (6.3%) woman was positive only for *M. genitalium*.

Women less than 31 years of age had increased odds of infection with *N. gonorrhea* (OR = 9.5, CI = 1.2–77.2), *C. trachomatis* (OR = 6.8, CI = 2.3–20.4), *Candida* sp. (OR = 6.3, CI = 1.5–26.4), *T. vaginalis* (OR = 3.3, CI = 1.8–6.3), and *M. genitalium* (OR = 2.5, CI = 1.1–5.7). Women who stated that their partner had other partners or that they did not know the monogamy status of their partner had increased odds of a positive swab test (OR = 3.3).

DISCUSSION

Our study revealed a higher than expected prevalence of *G. vaginalis*, *T. vaginalis*, and *M. genitalium* infection and a lower than expected prevalence of *Candida* infection. Other studies of women in rural Haiti have estimated the prevalence of *N. gonorrhea* to be from 1.3% to 1.7% and *C. trachomatis* to be from 4.8% to 6.2%.^{5,8} We found higher rates of

FIGURE 1. Positive results by subject age.

TABLE 2
Comparison of positive results from the HHF and the Leon clinic

	<i>C. trachomatis</i> NAAT-positive (%)		<i>N. gonorrhea</i> NAAT-positive (%)		<i>T. vaginalis</i> NAAT-positive (%)		<i>M. genitalium</i> NAAT-positive (%)	
	HHF	Leon	HHF	Leon	HHF	Leon	HHF	Leon
Percent	11.9	1.9	4.1	1.0	19.9	13.5	10.1	6.7
P value	0.003	0.003	0.136	0.136	0.168	0.168	0.322	0.322

N. gonorrhea and *C. trachomatis* than in these other studies. However, these studies were performed using non-amplified DNA probe assays. The *N. gonorrhea* and *C. trachomatis* assays used in this study have increased sensitivity relative to non-amplified assays. This may account for the higher incidences of *N. gonorrhea* and *C. trachomatis* infections reported in this study. One study using amplified polymerase chain reaction testing of urine collected from rural Haitian women estimated prevalence of *N. gonorrhea* to be 2.3% and *C. trachomatis* to be 10.7%.⁶

Prevalence of *M. genitalium* has not previously been evaluated in Haitian women. There is an association between *M. genitalium* and both lower and upper reproductive tract disease in women, including cervicitis, PID, and infertility. The 8.9% prevalence of *M. genitalium* found in this study was similar to prevalence rates reported elsewhere in the world.⁹

In our sample, there was no association between subject-reported discharge, provider-observed discharge, and positive test results. There is a local cultural belief that infections are associated with sexual contact with a partner who has lived in Port au Prince, Haiti's capital and largest urban center. We did find a positive association, but this result was not significant (Table 3).

None of the subjects from the Leon clinic reported participating in sex out of economic necessity (prostitution). Most people in Leon work as subsistence farmers, reflecting the rural nature of this study population. It is possible that subjects did not understand the question or were reluctant to honestly answer it. This may also represent selection bias in this volunteer population.

HIV and syphilis antibody testing was not done at the HHF. There were no HIV-positive subjects identified in the Leon clinic study population. This is surprising given the historic prevalence of 4.7% from the usual SKCDT Leon primary care clinics. The prevalence of HIV in men and women ages 15–49 years in the Grand'Anse department was estimated to be 1.6% in 2007,¹⁴ and 4.7% of HIV antibody tests performed at the Leon clinic since 2005 have been positive. However, the historic clinic prevalence data are based on patients referred for testing based on a provider's clinical

assessment of the patient or because a sexual partner had tested positive. Similarly, the prevalence of syphilis (treponemal) antibodies was somewhat lower than the 10.5% of treponemal antibody-positive results from historical clinic laboratory data. The historical laboratory data include results from both male and female patients who were tested because of symptoms or other risk factors. Thus, historical clinic data are not representative of HIV and syphilis prevalence in the general population.

We asked about mobile phone ownership and mode of travel (walking versus vehicle). Use of mobile phones in this region is relatively new (installation of a cell tower 3 years ago). Mobile phone ownership is a surrogate marker for relative wealth. Similarly, most people travel by foot, and therefore, other modes of transportation may indicate more wealth; both of these markers may be indicators of greater mobility. There were no significant differences in positive swab test results based on these markers of socioeconomic rank (Table 3).

The HHF is located in Jérémie, a larger and more urban community than rural Leon. Comparing the samples from the two groups, we found no difference in the prevalence of *M. genitalium*, *T. vaginalis*, and *N. gonorrhea*, but significantly more *C. trachomatis* infections were found in the samples collected at the HHF (Table 2). Possible explanations are that the subjects from the HHF study group were younger (mean = 30.9 years old) than the subjects from Leon (mean = 45.7 years old) or that urban residency may be associated with STI risk behaviors.

We considered leukocyte esterase (LE) as a surrogate marker, because other studies have incorporated this simple test into STI screening algorithms for women.¹⁵ We found a high overall rate of positive LE and that negative LE did not rule out the possibility of an STI.

An STI program developed in Haiti in 1992 described the importance of local data generation, communication, and collaboration with various institutions for consensus-building, the need for continued training, and the need for field supervision to ensure behavior change among STI providers.¹⁶ The WHO recommends that all women presenting with vaginal discharge be treated for trichomonas and bacterial vaginosis and that knowledge of the local prevalence of chlamydia and gonorrhea is important.¹⁷ Because of the high percentage of women in this study with at least one STI, the high prevalence of multiple STIs, the distance that many women travel to seek care, and the lack of clearly defined demographic (other than age) or symptomatic correlates with infection, we recommend empiric treatment covering a broad spectrum of organisms for any woman with a complaint of vaginal discharge but especially, women under the age of 31 years and women who report partners with multiple partners. *Candida* infection was relatively uncommon, and treatment could be added for women with significant complaint of itching associated with discharge. The modifications to our clinic treatment protocols

TABLE 3
Risk factors for positive swab test results

Factor	OR	95% CI
Walks to clinic	1.0	0.4–2.6
Owens a mobile phone	0.7	0.3–1.6
Partner has other partners or partner's monogamy status unknown	3.3	1.5–7.4
Subject or partner lived or worked in Port au Prince	1.4	0.7–3.2
Subject reported discharge	0.8	0.3–1.7
Provider observed discharge	0.8	0.3–1.7
Positive urine leukocyte esterase result	2.5	1.0–5.8

based on these data increase treatment of *T. vaginalis* as well as recommend 1 g oral azithromycin for suspected *C. trachomatis* rather than doxycycline. Azithromycin is more expensive than doxycycline but far more effective in the treatment of *M. genitalium*. Azithromycin is at least 100-fold more active *in vitro* against *M. genitalium* than any of the fluoroquinolones or tetracyclines.¹⁸ In one study, *M. genitalium* eradication rates in women treated with azithromycin were 88% compared with 37% with doxycycline.¹⁹ Azithromycin is available locally, and the treatment cost for 1 g in Haiti ranges from 40 to 200 Haitian Gourdes (US \$0.93–\$4.65). In addition to providing coverage for both *C. trachomatis* and *M. genitalium*, a single dose of azithromycin also has the advantage of use in directly observed therapy (DOT) protocols for immediate onsite treatment. Our experience at the Leon clinic has shown that patients are often not compliant with medicines and that patients commonly share medicines with others or sell them in the market. When possible, we try to use protocols that allow for DOT at the provider station.

This study was limited by the logistical challenges of working in rural Haiti. We also had a limited supply of testing materials. These issues limited the power of the study. In addition, although we had interpreters and one investigator who is fluent in Creole, there may have been cultural or language barriers in interpreting the questions. For example, time is a very fluid thing in Haiti, and many rural Haitians find it difficult to answer questions such as “How long did it take you to walk to the clinic?” The inclusion of the HHF specimens added additional data to the study; however, the evaluation at the HHF was limited only to NAAT swabs for *N. gonorrhea*, *C. trachomatis*, *M. genitalium*, and *T. vaginalis* without examination, demographic data collection, or other testing, which was done in Leon. Additional studies with a large sample size would be useful in defining the epidemiology of vaginitis and STIs in this population. Additional investigation into surrogate laboratory, demographic, or clinical markers would help clinicians working in this region.

CONCLUSION

The rate of infection of *G. vaginalis*, *T. vaginalis*, and *C. trachomatis* was high, particularly in women less than 31 years old. This finding supports empiric treatment of these organisms for women with a complaint of vaginal discharge. The estimated rate of *Candida* suggested that only women with itching as a symptom may need treatment. There was little correlation between subject-reported symptoms and vaginitis and STIs.

The study has produced epidemiologic data regarding vaginitis and STIs in southwestern Haiti. This information should help to guide clinical evaluation and treatment for clinicians working in this region.

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REFERENCES

1. Kent HL, 1991. Epidemiology of vaginitis. *Am J Obstet Gynecol* 165: 1168–1176.
2. Haiti Ministère de la Santé Publique et de la Population, Port au Prince, 2011. *2010 Estimate, Département Sanitaire de la Grand'Anse, Etat Des Lieux de la Situation du Département: Rapport Final*.
3. World Health Organization (WHO), 2005. *Department of Reproductive Health and Research: Sexually Transmitted and Other Reproductive Tract Infections: A Guide to Essential Practice*. Geneva: World Health Organization.
4. World Health Organization (WHO), 2013. *Sexually Transmitted Infections (STIs): The Importance of a Renewed Commitment to STI Prevention and Control in Achieving Global Sexual and Reproductive Health*. Geneva: World Health Organization.
5. Smith Fawzi MC, Lambert W, Singler JM, 2003. Prevalence and risk factors of STDs in rural Haiti: implications for policy and programming in resource-poor settings. *Int J STD AIDS* 14: 848–853.
6. Fitzgerald DW, Behets F, Caliendo A, 2000. Economic hardship and sexually transmitted diseases in Haiti's rural Artibonite Valley. *Am J Trop Med Hyg* 62: 496–501.
7. Behets FM, Desormeaux J, Joseph D, 1995. Control of sexually transmitted diseases in Haiti: results and implications of a baseline study among pregnant women living in Cité Soleil Shantytowns. *J Infect Dis* 172: 764–771.
8. Smith Fawzi MC, Lambert W, Singler J, 2006. Identification of *Chlamydia* and gonorrhoea among women in rural Haiti: maximising access to treatment in a resource poor setting. *Sex Transm Infect* 82: 175–181.
9. McGowan CL, Anderson-Smiths C, 2011. *Mycoplasma genitalium*: an emerging cause of sexually transmitted disease in women. *PLoS Pathog* 7: e1001324.
10. Romoren M, Velauthapillai M, Rahman M, Sundby J, Klouman E, Hjortdahl P, 2007. Trichomoniasis and bacterial vaginosis in pregnancy: inadequately managed with the syndromic approach. *Bull World Health Organ* 85: 297–304.
11. Castro AR, Esfandiari J, Kumar S, 2010. Novel point-of-care test for simultaneous detection of nontreponemal and treponemal antibodies in patients with syphilis. *J Clin Microbiol* 48: 4615–4619.

12. Brown HL, Fuller DD, Jasper LT, Davis TE, Wright JD, 2004. Clinical evaluation of affirm VPIII in the detection and identification of *Trichomonas vaginalis*, *Gardnerella vaginalis*, and *Candida* species in vaginitis/vaginosis. *Infect Dis Obstet Gynecol* 12: 17–21.
13. Andrea SB, Chapin KC, 2011. Comparison of Aptima *Trichomonas vaginalis* transcription-mediated amplification assay and BD affirm VPIII for detection of *T. vaginalis* in symptomatic women: performance parameters and epidemiological implications. *J Clin Microbiol* 49: 866–869.
14. Haïti Ministère de la Santé Publique et de la Population, Port au Prince, 2007. *Profil Épidémiologique De l'infection par le VIH et du SIDA dans le Grand Sud, Haïti*.
15. Vuylsteke B, Laga M, Alary M, 1993. Clinical algorithms for the screening of women for gonococcal and chlamydial infection: evaluation of pregnant women and prostitutes in Zaire. *Clin Infect Dis* 17: 82–88.
16. Behets FM, Gënëcé E, Narcisse M, Liautaud B, Cohen M, Dallabetta GA, 1998. Approaches to control sexually transmitted diseases in Haiti, 1992–95. *Bull World Health Organ* 76: 189–194.
17. World Health Organization, 2003. *Guidelines for the Management of Sexually Transmitted Infections*. Geneva: World Health Organization.
18. Taylor-Robinson D, 2002. *Mycoplasma genitalium*—an up-date. *Int J STD AIDS* 13: 145–151.
19. Björnelius E, Anagrus C, Bojs G, 2008. Antibiotic treatment of symptomatic *Mycoplasma genitalium* infection in Scandinavia: a controlled clinical trial. *Sex Transm Infect* 84: 72–76.