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# The etiology of vaginal symptoms in rural Haiti

Claire C Bristow<sup>1</sup>, Tania Desgrottes<sup>2</sup>, Lauren Cutler<sup>2</sup>,  
David Cutler<sup>1</sup>, Karthika Devarajan<sup>2</sup>, Oksana Ocheretina<sup>3,4</sup>,  
Jean William Pape<sup>3,4</sup> and Jeffrey D Klausner<sup>1</sup>

## Abstract

**Background:** Vaginal symptoms are a common chief complaint amongst women visiting outpatient clinics in rural Haiti.

**Methods:** A systematic sample of 206 consecutive women over age 18 with gynecological symptoms underwent gynecologic examination and laboratory testing for chlamydia, gonorrhoea, syphilis, HIV infection, trichomoniasis, candidiasis, and bacterial vaginosis.

**Results:** Among 206 women, 174 (84%) presented with vaginal discharge, 165 (80%) with vaginal itching, 123 (60%) with vaginal pain or dysuria, and 18 (9%) with non-traumatic vaginal sores or boils. Laboratory results were positive for *Chlamydia trachomatis* in 5.4% (11/203), syphilis in 3.5% (7/202), HIV in 1.0% (2/200), and *Neisseria gonorrhoeae* in 1.0% (2/203). Among those that had microscopy, hyphae suggestive of candidiasis were visualized in 2.2% (1/45) and no cases of trichomoniasis were diagnosed 0% (0/45). Bacterial vaginosis was diagnosed in 28.3% (13/46). The prevalence of chlamydia was 4.9 (95% CI: 1.3–17.7) times greater among those 25 years of age and under (10.8%) than those older (2.3%).

**Conclusions:** Chlamydia and bacterial vaginosis were the most common sexually transmitted infection and vaginal condition, respectively, in this study of rural Haitian adult women. The higher risk of chlamydia in younger women suggests education and screening programs in young women should be considered.

## Keywords

Vaginitis, Haiti, sexually transmitted infections, vaginal symptoms, international sexually transmitted infections

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## Background

Manifestations of vaginal and sexually transmitted infections (STIs) are common in both rural and urban Haiti. Estimates of the prevalence of at least one STI among women attending antenatal services was shown to be 40% in data collected from 1996 in a rural region of Haiti and 47% in urban areas.<sup>1,2</sup> A more recent analysis of programmatic data found that 11.3% (118 of 1042) of all female patients presenting for health care had vaginal symptoms, reportedly related to candidiasis, bacterial vaginosis, or STIs.<sup>3</sup>

Presentation of vaginal symptoms can have various etiologies that may include candidiasis, bacterial vaginosis, and STIs. The accurate diagnosis of vaginal infections and conditions can be complex, requiring multiple, sophisticated laboratory tests, without which the prevalence of these infections is unknown. Diagnostic tests may be constrained by limitations in

laboratory and logistic support, particularly in resource-limited settings with a high STI burden. Failure to diagnose and cure persons with STIs is associated with patient morbidity and mortality and facilitates the continued transmission of infections to partners and from mother to fetus during pregnancy or at birth.<sup>4,5</sup>

<sup>1</sup>University of California Los Angeles, Los Angeles, USA

<sup>2</sup>Dr. Henri Gerard Desgranges Foundation, Petit Goave, Haiti

<sup>3</sup>Weill Cornell Medical College, New York, USA

<sup>4</sup>Les Centres GHESKIO, Port-au-Prince, Haiti

## Corresponding author:

Claire C Bristow, UCLA Program in Global Health, David Geffen School of Medicine, 10833 Le Conte Ave., CHS 13-154, Los Angeles, CA 90095, USA.

Email: ccbristow@gmail.com

STIs and vaginal infections are related to many adverse health outcomes. Infections of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* are related to infertility, pelvic inflammatory disease, chronic pelvic pain, and ectopic pregnancy.<sup>6,7</sup> Syphilis infection and herpes simplex virus type 2 may facilitate human immunodeficiency virus (HIV) acquisition and transmission; genital ulcers interfere with the natural mucosal and epithelial barriers and cause inflammation providing a portal of entry for HIV.<sup>8</sup> In HIV co-infected patients, syphilis can increase transmission of HIV by increasing viral shedding and seminal viral load.<sup>9</sup> Furthermore, syphilis infection during pregnancy can lead to adverse birth outcomes, congenital syphilis, and greatly increases the risk of mother-to-child HIV transmission.<sup>10,11</sup> Bacterial vaginosis increases the risk for the acquisition of infections including herpes simplex virus type 2, *Trichomonas vaginalis*, *Neisseria gonorrhoeae*, and *Chlamydia trachomatis*.<sup>12–14</sup> In addition, bacterial vaginosis has also been associated with an increased risk of human immunodeficiency virus (HIV) acquisition and transmission.<sup>15,16</sup>

Many STIs can be asymptomatic and can have long-term adverse effects if left untreated but are not diagnosable without screening tests.<sup>17</sup> The current World Health Organization guidelines recommend syndromic management;<sup>18</sup> yet, syndromic management is unlikely to enhance STI control.<sup>19</sup> Early identification and subsequent treatment of STIs is paramount to achieving an effective reduction in the disease burden.<sup>20</sup> In order to inform clinical management protocols and to identify pathogens for infection control interventions, the current study aimed to describe the distribution of etiologies of vaginal symptoms in Haitian women at a primary care center in rural Haiti.

## Materials and methods

### Study design

This was a cross-sectional study designed to determine the etiology of vaginal symptoms among rural women in Haiti.

### Setting

This study was completed at the Dr. Henri Gerard Desgranges Foundation clinic in Petit Goâve, a rural, under-served coastal town located 70 kilometers west of Haiti's capital, Port-au-Prince ([www.hgdffoundation.org](http://www.hgdffoundation.org)). The Dr. Henri Gerald Desgranges Foundation has been working in the Petit Goâve Community since 1994. It provides care through its outpatient clinic and immunization and prevention campaigns via its mobile health program.

### Sample selection and study design

The systematic sample consisted of 206 consecutive women over age 18 complaining of vaginal itching, discharge, pain, or lesions or associated urinary symptoms presenting to the Henri Gerald Desgranges foundation clinic in March 2013. This was a period of increased clinical services and efforts were made in the community to encourage women with symptoms to seek care. All participants provided verbal informed consent.

All women underwent gynecologic examination including speculum and pelvic examination as well as specimen collection for laboratory analyses, by trained study clinicians. Data were collected on the women's pregnancy history, methods of contraception they had ever used including condoms, and current vaginal symptoms.

### Laboratory methods

Point-of-care testing was conducted in this study to decrease the time to treatment for some infections. Testing included Determine TP assay for syphilis (Abbott Laboratories, Tokyo, Japan) and the OraQuick ADVANCE<sup>®</sup> Rapid HIV-1/2 Antibody Test for HIV (OraSure Technologies, Bethlehem, Pennsylvania). Microscopic analyses for trichomonas, hyphae, and clue cells using saline and KOH mounts were used to diagnose trichomoniasis, candidiasis, and bacterial vaginosis, respectively. Bacterial vaginosis was defined using the Amsel criteria: at least three of elevated vaginal pH, increased vaginal discharge volume, positive wet mount for clue cells, or positive whiff test.<sup>21</sup> The vaginal pH was determined using Hydrion pH test paper (Micro Essential Laboratory Inc, Brooklyn, New York, USA). Microscopy was only available for the first 1.5 days of the study period before the microscope malfunctioned and became unusable. Laboratory testing for *Chlamydia trachomatis* and *Neisseria gonorrhoeae* was performed with the GeneXpert<sup>®</sup> CT/NG assay (Cepheid Inc., Sunnyvale, CA). Testing was encouraged for all women; however, some participants refused HIV and syphilis testing.

As part of routine clinical gynecological examinations, vaginal swab specimens of the posterior and lateral vaginal walls were collected by the examining study clinician. Vaginal swabs were placed into specimen transport tubes, labeled with the unique study identifier of the participants, and stored for five days at ambient temperature. The specimens were then transported to l'Institut des Maladies Infectieuses et de Santé de la Reproduction clinical laboratory in Port-au-Prince, Haiti, where testing was performed using the GeneXpert<sup>®</sup> CT/NG assay. Test results were reported within 2 weeks to the clinic manager who contacted study participants with positive results

who had not been treated empirically. Contacted study participants were treated and partners managed according to US CDC guidelines.<sup>22</sup>

### Ethics

This study was reviewed and approved by the Institutional Review Board of the University of California Los Angeles.

### Statistical analysis

Descriptive statistics were used to summarize the prevalence of infections and risk factors among the study population. Basic comparative analyses using Cochran-Mantel-Haenszel tests between groups were used to identify statistically different levels of effect. Significance was defined at a  $p$  value of less than or equal to 0.05. Data were entered from a paper form into a database using Epi Info 3.5.4 (CDC, Atlanta, GA, USA) and analyses were conducted using SAS software v9.3 (SAS Institute Inc., Cary, NC, USA).

## Results

### Characteristics of participants

Between 18 March and 22 March 2013, 206 women were enrolled in the study. The mean age in years of the women was 31.9 (SD 10.6) and 123 (61%) reported one or more pregnancies. Most participants ( $n = 189$ , 92%) reported no condom use for contraception.

### Patient symptoms and exam findings

The 206 women had at least one current vaginal symptom, including vaginal discharge ( $n = 174$ , 84.5%), vaginal itching ( $n = 165$ , 80.1%), vaginal pain or dysuria ( $n = 123$ , 59.7%), and non-traumatic vaginal sores or boils ( $n = 18$ , 8.7%). Clinical gynecological examinations revealed vaginal discharge in 64 women (32.0%) and cervical exudate in five women (2.0%).

### Laboratory results

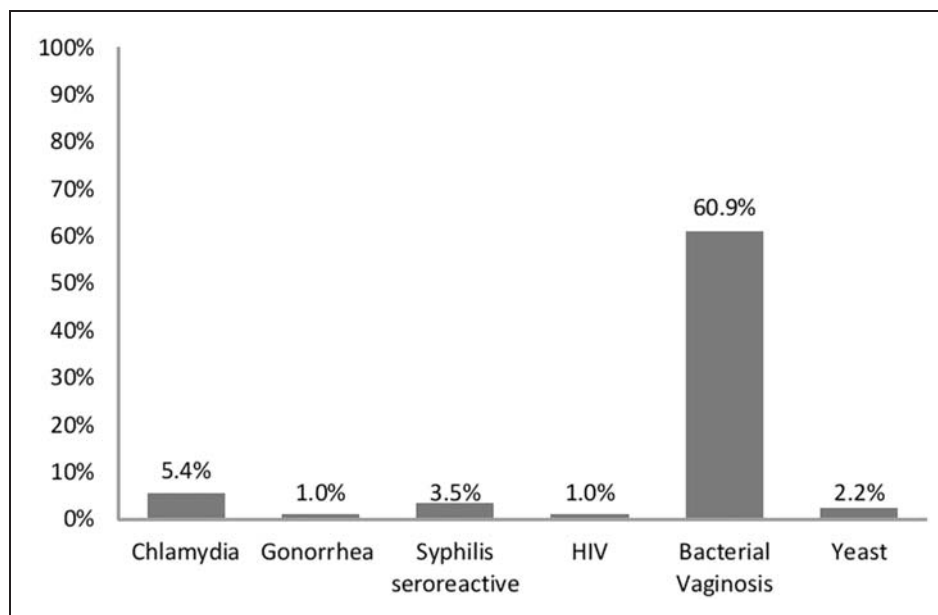
Among the 203 women with test results, 11 (5.4%) were positive for *Chlamydia trachomatis* and 2 (1.0%) were positive for *Neisseria gonorrhoeae*; both cases of gonorrhea infection occurred in women 25 years of age and under (see Figure 1).

Syphilis tests were positive in 3.5% (7/202) of the women. Of the 206 women, 19 (9.2%) were found to have at least one curable STI, chlamydia, gonorrhea, or syphilis. Among the 200 tested two (1%) were found to be HIV positive.

Of those that had microscopy, hyphae suggestive of candidiasis were visualized in 2.2% (1/45) and bacterial vaginosis was diagnosed in 28.3% (13/46). Trichomoniasis was not diagnosed in any of the women tested (0/45).

### Bivariate analysis

Age category had an observed effect on chlamydial and syphilis infections (see Table 1). While chlamydia occurred primarily in those under 25 years of age,



**Figure 1.** Distribution of vaginal infections and conditions in the study population. Petit Goâve, Haiti, 2013 (N = 206).

**Table 1.** Select characteristics of study population and frequencies of cervical and vaginal infections and conditions, Petit Goâve, Haiti, 2013.

| Characteristics <sup>a,b</sup>     | (n = 206),<br>n (%) | Chlamydia<br>(n = 203),<br>n (%) | Gonorrhoea<br>(n = 203),<br>n (%) | Syphilis<br>(n = 202),<br>n (%) | At least<br>1 bacterial STI <sup>c</sup><br>(n = 199),<br>n (%) | HIV<br>(n = 200),<br>n (%) | Bacterial Vaginosis<br>(n = 46),<br>n (%) | Candidiasis<br>(n = 45),<br>n (%) |
|------------------------------------|---------------------|----------------------------------|-----------------------------------|---------------------------------|---|----------------------------|---|-----------------------------------|
|                                    |                     |                                  |                                   |                                 |   |                            |   |                                   |
| Age 25 years and under             | 74 (35.9)           | 8 (10.8)                         | 2 (2.7)                           | 1 (1.4)                         | 10 (13.5)   | 1 (1.4)                    | 5 (6.8)                                   | 0 (0)                             |
| Age over 25 years                  | 132 (64.1)          | 3 (2.3)                          | 0 (0)                             | 6 (4.5)                         | 9 (6.8)   | 1 (0.8)                    | 8 (6.1)                                   | 1 (0.8)                           |
| Never been pregnant                | 80 (39.2)           | 4 (5.0)                          | 2 (2.5)                           | 0 (0)                           | 5 (6.3)   | 0 (0)                      | 5 (6.3)                                   | 0 (0)                             |
| At least 1 pregnancy               | 124 (60.8)          | 7 (5.6)                          | 0 (0)                             | 7 (5.6)                         | 14 (11.3)   | 2 (1.6)                    | 8 (6.5)                                   | 1 (0.8)                           |
| No reported condom use             | 189 (91.8)          | 11 (5.8)                         | 2 (1.1)                           | 7 (3.7)                         | 19 (10.1)   | 2 (1.1)                    | 11 (5.8)                                  | 1 (0.5)                           |
| Reported ever using condoms        | 17 (8.3)            | 0 (0)                            | 0 (0)                             | 0 (0)                           | 0 (0)   | 0 (0)                      | 2 (11.8)                                  | 0 (0)                             |
| Normal vaginal discharge volume    | 142 (68.9)          | 7 (4.9)                          | 1 (0.7)                           | 4 (2.8)                         | 12(8.5)   | 1 (0.7)                    | 5 (3.5)                                   | 1 (0.7)                           |
| Increased vaginal discharge volume | 64 (31.1)           | 4 (6.3)                          | 1 (1.6)                           | 3 (4.7)                         | 7 (10.9)  | 1 (1.6)                    | 8 (12.5)                                  | 0 (0)                             |
| No cervical exudate                | 201 (97.6)          | 10 (5.0)                         | 2 (1.0)                           | 6 (3.0)                         | 17 (8.5)  | 2 (1.0)                    | 12 (6.0)                                  | 1 (0.5)                           |
| Cervical exudates                  | 5 (2.4)             | 1 (20.0)                         | 0 (0)                             | 1 (20.0)                        | 2 (40.0)  | 0 (0)                      | 1 (20.0)                                  | 0 (0)                             |
| Reported sores or boils            | 18 (8.7)            | 1 (5.6)                          | 0 (0)                             | 1(5.6)                          | 2 (11.1)  | 1 (5.6)                    | 2 (11.1)                                  | 0 (0)                             |
| No reported sores or boils         | 188 (91.3)          | 10 (5.3)                         | 2 (1.1)                           | 6 (3.2)                         | 17 (9.1)  | 1 (0.5)                    | 11 (5.9)                                  | 1 (0.5)                           |
| Total, n                           |                     | 11 (5.4)                         | 2 (1.0)                           | 7 (3.5)                         | 19 (9.6)  | 2 (1.0)                    | 13 (28.2)                                 | 1 (2.2)                           |

<sup>a</sup>Includes only those that gave a response, so there may be some missing values

<sup>b</sup>Percentages may not sum to 100 because of rounding. Denominators may not sum to 206 because of inadequate sample or test refusal.

<sup>c</sup>At least one of chlamydia, gonorrhoea, and/or syphilis of those that were tested for all three.

syphilis infection tended to occur in those over 25 years of age. Of the 11 chlamydia cases, 72.7% (n = 8) were in women 25 years of age and younger, resulting in a risk of *Chlamydia trachomatis* in the younger women 4.9 (95% confidence interval: 1.3–17.7) times that of women over 25 years of age. Of the seven cases of syphilis, 85.7% (n = 6) occurred in women over 25 years of age. No (0%) STIs were diagnosed in the 17 women that reported ever using condoms for contraception.

## Discussion

In this cross-sectional study of women in rural Haiti with vaginal symptoms, approximately 1 in 11 women had a curable STI and more than three times that had bacterial vaginosis or candidiasis. Chlamydial infection was the most common STI and bacterial vaginosis was the most common vaginal condition.

The higher risk of *Chlamydia trachomatis* in younger women is consistent with the epidemiology of the infection demonstrated in other studies.<sup>23</sup> Conversely, those who tested positive for syphilis tended to be those over 25 years of age, in part, perhaps, because treponemal tests, such as the one used in this study, do not differentiate between past and current infections.

Syphilis infections are concerning in this setting because of the propensity of syphilis to adversely affect pregnancy. In syphilis-infected pregnant women, adverse birth outcomes are common and have been shown to be 4.5 times higher in those with untreated syphilis than those without syphilis.<sup>24</sup> If syphilis remains untreated during pregnancy, it can lead to fetal loss or stillbirth or, in a live-born infant, neonatal death, prematurity, low birth weight, and congenital syphilis.<sup>24,25</sup> It has been demonstrated that congenital syphilis rates in rural Haiti were among the highest in the world at 550 per 100,000 live births in 1998, highlighting the need for syphilis control strategies targeted at pregnant women and their partners.<sup>1</sup> Congenital syphilis can be prevented by screening early in pregnancy, treating seropositive pregnant women, and preventing re-infection.<sup>24,25</sup>

The high numbers of previously undiagnosed STIs observed in this study can continue to be transmitted in the community to sex partners unless treated. Failure to identify and cure persons with STIs impacts patient health, fertility, vulnerability to other infections such as HIV, and facilitates continued transmission.<sup>5</sup> In this study, we found 2% of participants tested positive for HIV, which is consistent with Haitian national findings from a demographic health survey conducted in 2005–2006 where 2.3% of women aged 15 to 49 were HIV-positive (2.0% among men).<sup>26</sup>

The age-associated infections suggest education and age-targeted screening programs should be considered. While screening programs are warranted in the

developed world to prevent adverse health outcomes, in developing countries there may be competing priorities, so further research is needed to determine the utility and cost effectiveness of such interventions for the most severely resource-limited settings.

The study had several limitations. The women included in the study were those that chose to seek healthcare for their vaginal symptoms, therefore our findings may not be representative of the overall local population. In addition, this study was done during a time of increased service delivery and women with symptoms were encouraged to seek services, therefore the findings may not be representative of the frequency of cases or infections during other clinic operating periods. However, there is strength in the systematic sampling method used to enroll participants. The moderate sample size made it difficult to conduct conclusive between group comparisons. Additionally, the equipment malfunction made microscopy possible for only the first 1.5 days of the study, resulting in smaller sample sizes for those conditions diagnosed microscopically. Fortunately, many of the diagnostic tests did not require microscopy and we were able to test most patients for syphilis, gonorrhea, chlamydia, and HIV infection. The strengths of this study lay in the use of state-of-the-art diagnostic tests for most infections using a combination of point-of-care tests and nucleic acid amplification test methods.

Although the World Health Organization recommends syndromic management for STI control in resource-limited settings, this is not always effective as a public health strategy because of the high rate of asymptomatic STIs and the varying etiology of vaginal symptoms.<sup>18,19</sup> Targeted screening programs, for improved clinical management, can be used to help mitigate STI epidemics and to reduce the burden of other vaginal infections. For optimal, comprehensive sexual and reproductive health diagnostics, a combination of tests is needed. Laboratory-based testing is not feasible in some resource-limited settings. Fortunately, tests that do not require extensive laboratory infrastructure including complex specimen collection and transport already exist for HIV infection, syphilis, bacterial vaginosis, trichomonas, and now most recently for chlamydia and gonorrhea as well. For *Chlamydia trachomatis* and *Neisseria gonorrhoeae*, the advent of on-site diagnostics with nucleic acid amplification tests has brought the technology of the laboratory to the clinic.<sup>27</sup> For HIV and syphilis, rapid screening tests can be used to get a result within 20 minutes with a finger-prick blood test.<sup>28,29</sup> Microscopy can be conducted in a clinical setting to identify infections of bacterial vaginosis, candidiasis, and trichomoniasis.<sup>4,21,29</sup> In addition, test developers have created point-of-care or near-care screening tests that can detect multiple

STIs with the same specimen using a single device, including the test used for detection of *Chlamydia trachomatis* and *Neisseria gonorrhoeae* in this study, the GeneXpert® CT/NG. Combination tests simplify what is otherwise a complicated, costly, and labor intensive diagnostic process. These integrated, combination near-care or point-of-care tests are a major step towards the comprehensive prevention and control of STI transmission.

## Conclusion

Public health strategies to prevent and control STIs should include early identification and treatment of infected individuals and their partners. The rates of infection suggest the need for better diagnostic testing including point-of-care diagnostics and improved understanding of chlamydia transmission and the impact of bacterial vaginosis is needed. Further examination is needed to better understand the efficacy of screening for STIs in limited-resource settings as a means of STI control. Additionally, studies addressing patient preferences for screening and prevention behaviors are needed. Cost effectiveness studies are necessary for the comparison of prevention efforts to estimate and compare the health and economic outcomes of alternative and additional methods. Information on preferences, efficacy, cost, and feasibility of prevention initiatives would help identify best practices for prevention, screening, and treatment to reduce the continued burden of sexual and reproductive health-related diseases in low-resource settings.

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## Conflict of interest

The authors declare no conflict of interest.

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