

The Increasing Impact of Human Immunodeficiency Virus Infections, Sexually Transmitted Diseases, and Viral Hepatitis in Durham County, North Carolina: A Call for Coordinated and Integrated Services

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BACKGROUND Durham County, North Carolina, faces high rates of human immunodeficiency virus (HIV) infection (with or without progression to AIDS) and sexually transmitted diseases (STDs). We explored the use of health care services and the prevalence of coinfections, among HIV-infected residents, and we recorded community perspectives on HIV-related issues.

METHODS We evaluated data on diagnostic codes, outpatient visits, and hospitalizations for individuals with HIV infection, STDs, and/or hepatitis B or C who visited Duke University Hospital System (DUHS). Viral loads for HIV-infected patients receiving care were estimated for 2009. We conducted geospatial mapping to determine disease trends and used focus groups and key informant interviews to identify barriers and solutions to improving testing and care.

RESULTS We identified substantial increases in HIV/STDs in the southern regions of the county. During the 5-year period, 1,291 adults with HIV infection, 4,245 with STDs, and 2,182 with hepatitis B or C were evaluated at DUHS. Among HIV-infected persons, 13.9% and 21.8% were coinfecting with an STD or hepatitis B or C, respectively. In 2009, 65.7% of HIV-infected persons receiving care had undetectable viral loads. Barriers to testing included stigma, fear, and denial of risk, while treatment barriers included costs, transportation, and low medical literacy.

LIMITATIONS Data for health care utilization and HIV load were available from different periods. Focus groups were conducted among a convenience sample, but they represented a diverse population.

CONCLUSIONS Durham County has experienced an increase in the number of HIV-infected persons in the county, and coinfections with STDs and hepatitis B or C are common. Multiple barriers to testing/treatment exist in the community. Coordinated care models are needed to improve access to HIV care and to reduce testing and treatment barriers.

The southern United States has been disproportionately affected by the epidemic of human immunodeficiency virus (HIV) infection and AIDS [1, 2]. Although the southern states compose only 37% of the US population [3], in 2007 46% of AIDS diagnoses and 50% of AIDS deaths in the United States occurred in the South [4, 5]. In North Carolina, 1,710 individuals were newly diagnosed with HIV infection in 2009, and approximately 35,000 people are living with HIV infection [6].

HIV/AIDS programs address 3 primary goals: (1) reducing the number of new HIV infections, (2) improving access to HIV care, and (3) reducing HIV-related health disparities [7]. Comprehensive, communitywide efforts to increase HIV testing, to provide links to care, and to improve adherence with antiretroviral therapy may be effective at reducing morbidity, suppressing population-level virologic load (community viral load), and preventing new infections [8].

HIV/AIDS, sexually transmitted diseases (STDs), and viral hepatitis share common risk factors and modes of transmission [9]. As a result, the Centers for Disease Control and Prevention (CDC) have promoted collaboration and service integration as a priority for programs addressing HIV, STDs,

and viral hepatitis [10]. Successful models of care are those that integrate funding with testing, prevention, treatment, and supportive service agencies [11, 12].

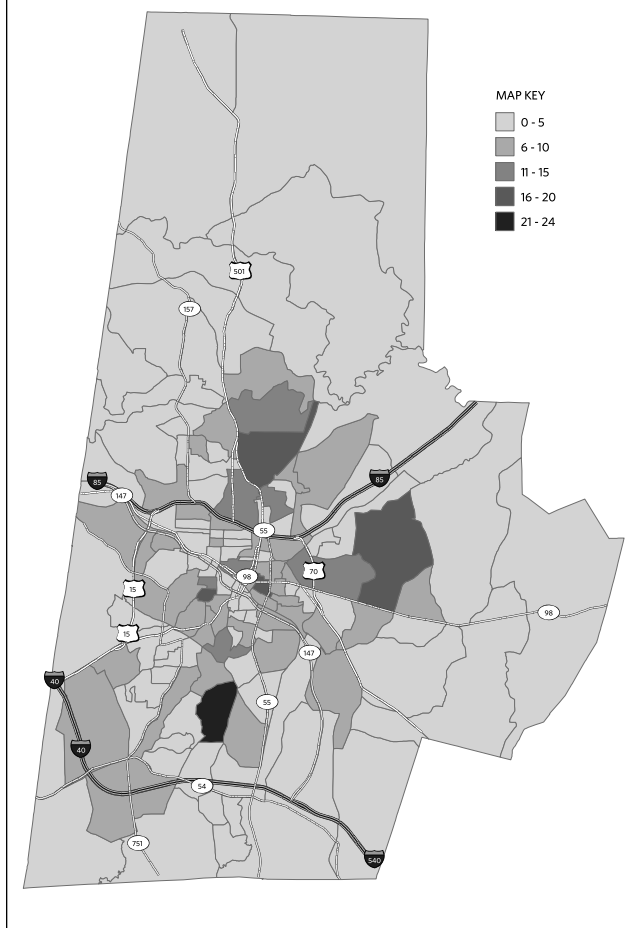
Durham County, North Carolina, has faced challenges from high rates of HIV/AIDS and STDs. Trends in hepatitis B or C are less clear, because of limited reporting and surveillance data. In 2009, Durham County ranked fourth in North Carolina for HIV disease rates (32.7 infections per 100,000 persons) and sixth for the number of early syphilis cases [13]. With approximately 270,000 residents, Durham County is home to Duke University Health Services (DUHS) and numerous health and social service providers. Despite that the county has a higher provider-to-population ratio than the state overall does [14], many county health indicators demonstrate poor health status, limited access to care, and health disparities [15].

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FIGURE 1A.
Human Immunodeficiency Virus Infections, 2004, Census Block Groups, Durham County



In 2008, Durham Health Innovations (DHI) was developed as a partnership between DUHS and the community, to address the health of its residents. DHI planning grants were awarded to teams from academic centers, local nonprofit agencies, and public health, to assess key health measures and to propose alternative care models. We describe the work of DHI's HIV/STD/hepatitis planning team to explore the health care utilization of HIV-infected residents, the proportion of coinfections, and the community's perspectives on HIV-related issues in Durham County.

Methods

The DHI HIV/STD/hepatitis planning team was convened with representatives from health care, public health, patient advocacy, and community and faith-based organizations. The team's key objectives were to explore the health care utilization by HIV-infected residents, to determine the proportion of coinfections with STDs and hepatitis B or C, and to assess the community's perspectives on HIV-related issues. Quantitative information included health care utilization data from DUHS (includes Duke University Medical Center [DUMC] and Durham Regional Hospital), clinical

data from HIV-infected persons receiving care, and geospatial information. Qualitative information was obtained from focus groups and key informant interviews, with regard to barriers to HIV and STD testing and care. The study was approved by the Duke University institutional review board.

Quantitative analysis. The team analyzed aggregate clinical and business data from Duke's Decision Support Repository (DSR), for patients who received care through DUHS, which were available for 2004-2008. DSR data were obtained for patients with a diagnosis of HIV/AIDS, STDs, and/or hepatitis B or C. STDs included gonococcal or chlamydial infections, trichomoniasis, syphilis, genital herpes, human papilloma virus infections, chancroid, granuloma inguinale, and lymphogranuloma venereum. Each subgroup denominator included patients with associated *International Classification of Diseases, 9th Revision* codes, starting with the year of the first encounter. If a patient died, he or she was removed from the denominator in subsequent years. Service utilization was evaluated for HIV-infected persons by use of outpatient visits, inpatient hospitalizations ≥ 1 day, and emergency department (ED) visits without subsequent admission, and it was tabulated as the number of encoun-

FIGURE 1B.
Human Immunodeficiency Virus Infections, 2008, Census Block Groups, Durham County

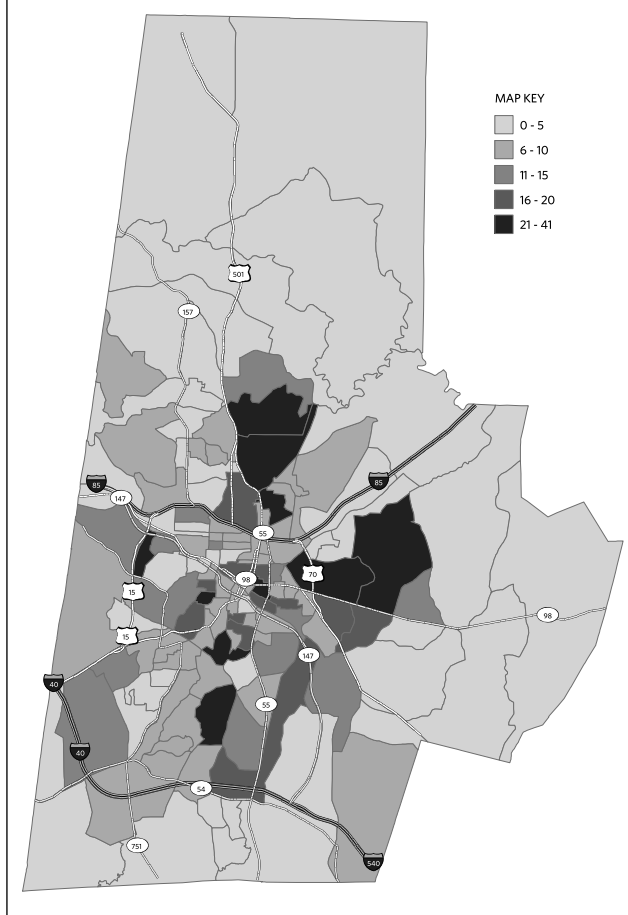
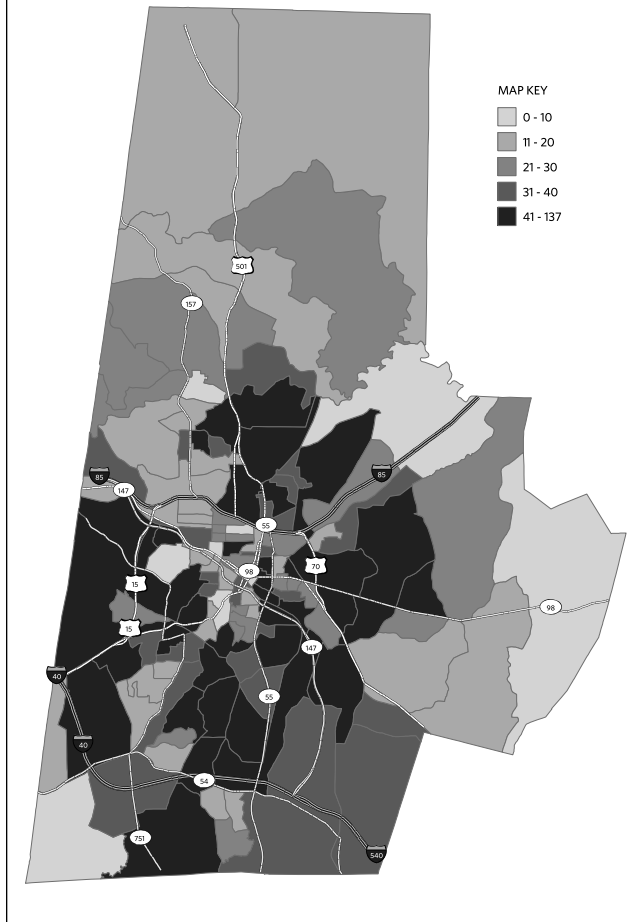


FIGURE 1C.
Sexually Transmitted Disease Infections, 2008, Census
Block Groups, Durham County



ters for each year. Descriptive statistics were generated using SAS version 9.2 (SAS Institute Inc., Cary, NC), and trends were analyzed using regression analysis with Excel 2007 (Microsoft, Redmond, WA).

To obtain a measure of community-level virologic suppression, we assessed the most recent viral load for each patient receiving HIV care and the proportion of patients with undetectable viral loads (<50 copies/ml). Since HIV loads were not available from the DSR, these data were obtained from patients treated at the DUMC Infectious Disease Clinic and the Lincoln Community Health Center Early Intervention Clinic in 2009, which is another major provider of HIV treatment in Durham.

High-resolution geospatial mapping of disease morbidity was conducted to assess annual trends during the 5-year study period. Geocoded addresses of patients diagnosed with HIV infection, STDs, or hepatitis B or C at DUHS were mapped using ArcGIS. Mapped addresses were aggregated by census block group, to protect patient confidentiality, using ArcMap. Higher densities of addresses were indicated by darker shading of the census block group. Interstate highways and roads were added for reference.

Qualitative analysis. The planning team met with key stakeholders and identified the need for focus groups comprising youth, African American students and churchgoers, Latinos, and HIV-infected persons receiving care. We also planned to interview HIV-infected persons with lapses in medical care, recognizing the difficulty of getting them together for a focus group. For recruitment, we contacted community organizations, which invited members by use of word of mouth and an institutional-review-board-approved script. Focus groups were cofacilitated by community organization members, to allow for optimal turnout and to increase comfort discussing the material. The other cofacilitator was a team member trained in conducting focus groups and interviews. We used an introductory script and a semistructured questionnaire for data collection about barriers to testing and treatment for HIV/STDs, viral hepatitis, and potential solutions.

Six focus groups were conducted among a convenience sample of residents from the community, composed of youth (peer educator ages, 15-20 years), students from a historically black university, church congregants, Latinos, and HIV-infected persons receiving care; each group consisted of 7-12 participants. We also interviewed 3 HIV-infected persons with lapses in medical care. Focus groups and interviews lasted 60-90 minutes. Participants were asked to complete a survey on demographic characteristics. Participants received lunch and a \$5 gift card.

Because religious beliefs and social norms emerged as strong themes, we added 4 focus groups comprising pastors of different ethnicities and religious denominations. Focus group questions asked about HIV-related church programming, youth programs involving information on HIV/STDs, the role of churches in HIV issues, and collaboration with health care agencies.

Qualitative data were reviewed by 2 team members, who identified themes separately and then discussed those themes to resolve any discrepancies. The team members prioritized themes that recurred frequently or were reported with emotion or in detail by participants.

Results

Quantitative findings. Geospatial mapping identified Durham County neighborhoods with the highest number of individuals treated at DUHS and diagnosed with HIV infection, STDs, or viral hepatitis. Temporal maps from 2004 to 2008 show a dramatic increase in the number of reported HIV infections in south-central and southwestern Durham County (Figure 1A and 1B). This observation may reflect the dynamic spread of HIV infection in this region, which is supported by the observed increase in STDs in the same areas (Figure 1B and 1C).

During the cumulative period from 2004 to 2008, 1,291 adults who received services at DUHS were diagnosed with HIV infection, 4,245 were diagnosed with STDs, and 2,182 were diagnosed with hepatitis B or C. Of those patients with

HIV infection who received treatment, 90% were Durham County residents. The number of patients with an HIV diagnosis treated at DUHS (which included patients who had been treated previously and those who had their first encounter) increased from 626 to 869 per year, while the number of patients with an STD doubled, from 705 to 1,652 per year. The number of hepatitis B or C diagnoses also increased, from 250 in 2004 to 994 in 2008. Of the 1,291 HIV-infected persons, 180 (13.9%) were coinfecting with an STD, and 281 (21.8%) were coinfecting with hepatitis B or C.

HIV-infected persons made 17,300 outpatient visits, with an average of 16.3 visits per person, as well as 1,431 ED visits (from 471 persons), with an average of 2.7 visits per person. The percentage of HIV-infected persons using the ED increased slightly during the study period, from 20.3%

in 2004 to 22.0% in 2008. However, the average number of ED visits per patient did not change noticeably over time (Figure 2). Almost half (47.8%) of the patients were hospitalized during the study period. For the 617 hospitalized HIV-infected persons, the average number of hospitalizations during the 5-year period was 3.1, with an average length of stay of 18.3 days. The percentage of patients hospitalized each year decreased, from 29.6% in 2004 to 26.8% in 2008, although the change was not statistically significant (Figure 2).

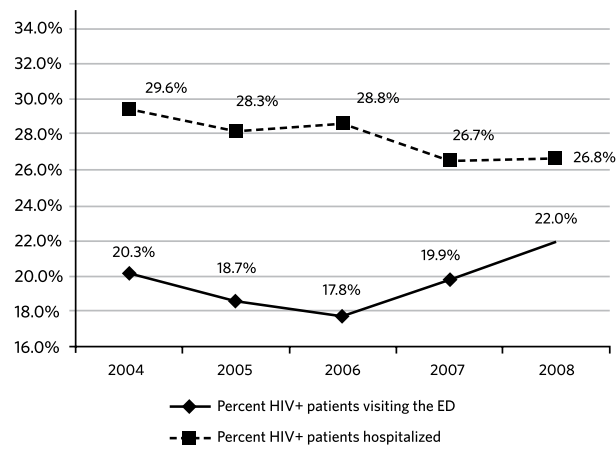
In 2009, there were 2,081 HIV-infected persons who received care at either the DUMC Infectious Disease Clinic or the Lincoln Early Intervention Clinic. Of these patients, 1,367 (65.7%) had undetectable viral loads, and an additional 257 (12.3%) had viral loads <500 copies/ml.

TABLE 1.
Testing and Treatment Barriers and Solutions

Barrier(s) to testing and/or treatment	Solution(s)
*Stigma and shame of having a disease that was transmitted through sex	Play up desire to know what is wrong with you Free STD hotline that offers anonymity
*Fear and denial: ignoring the possibility of having HIV, in hopes that one never gets sick and doesn't have to face the consequences of having HIV	*Letting people know that, if they are infected, there is treatment, and it is not a death sentence *PSAs/media campaigns *Celebrities talking more about treatment *Role models and doctors talking openly about having an STD *Real people in PSAs talking about continuing relationships, even when they have HIV or an STD
Fear that the health worker giving them their test results won't be sensitive or won't be able to help them cope with the diagnosis	*Training for health care workers *Increased counseling *Assistance from care bridge coordinators
Confidentiality fears	*Assurance of confidentiality from all persons at medical facilities Improved training in privacy and confidentiality for all levels of health care workers
*Belief that if you remain uncertain about your HIV status, you won't pass HIV on to anyone else	*More sex education *Celebrities normalizing having an STD and treatment *More PSAs
*Denial of positive status	Intensive counseling for those newly diagnosed Someone to check on them multiple times after their diagnosis and between appointments *More PSAs
*Mistrust of doctors and health care	Clinic-level interventions that emphasize treating the total person, knowing patients by name, giving reminder phone calls that are personalized, providing accurate information, having a welcoming demeanor, having compassion, and breaking down technical language
*Cost issues: people deprioritize treatment because they are preoccupied with paying bills	Reminder calls that mention the co-pay so patients can plan ahead Paying in installments Discounted medication Education that treatment for HIV is not always expensive *PSAs *Low-cost and free testing and treatment Sliding-scale fees More legal assistance to get disability Being billed later
*Transportation	*Better localized treatment in downtown, with a lab on site Transportation in the form of bus passes, a friend giving a ride, or being able to walk Clinic hours when buses run

Note. Asterisk indicates that the barrier or potential solution was named in >1 focus group or interview. HIV, human immunodeficiency virus; PSA, public service announcement; STD, sexually transmitted disease.

FIGURE 2.
Resource Utilization of Adult Patients Diagnosed With Human Immunodeficiency Virus Infection (2004-2008)



Qualitative findings. A total of 76 people participated in the focus groups and interviews, of which 53 (not including pastors) completed the survey on demographic characteristics. The races/ethnicities of these participants were as follows: 77% were African American, 15% were Latino, and 9% were white. Fifty-five percent of participants were male, and the average time that participants reported living in Durham County was 13.1 years.

Participants described avoiding testing because of fear they would be unable to cope with a positive diagnosis or that they would be stigmatized in ways that would affect their relationships and lives (Table 1). Only 2 Latino participants mentioned clinic hours being a barrier to testing.

Frequently mentioned barriers were cost and transportation. Other barriers stemmed from stigma and fear, such as fear of being ostracized or abandoned and fear of living with a chronic illness and facing possible death. Mistrust of doctors and of health care were also stated.

Youth in the focus groups indicated embarrassment about others finding out they may have an STD and indicated they would confide in a trusted friend or adult and that having this person accompany them for testing or treatment would be helpful. They indicated a preference for private health care locations, to avoid being seen. Youth suggested that having music and sports celebrities talk openly about STDs and testing could shift attitudes for young fans.

From the congregants group, participants emphasized their sense that people avoid testing because they prefer to live in denial, rather than face the consequences of testing positive for HIV, STDs, or viral hepatitis. They indicated a lack of understanding about symptoms and long-term effects and suggested a high-visibility campaign to move their community to take action. They expressed difficulty talking to their children about STDs but wanted to learn how to do so.

Pastors identified the need to discuss moral issues underlying risky behaviors and negative attitudes that

many congregants associate with HIV diagnosis (Table 2). One solution identified from the pastors focus groups was to combine HIV education in the church with other health topics not associated with stigma, such as influenza and diabetes.

The Latino experience in accessing health care appeared to be different from that of other Durham County residents. Participants reported a need for more Spanish-speaking providers and translators. Participants indicated fear of deportation if they were identified with HIV infection. To address this fear, participants suggested having Latino case managers and Spanish-language educational materials. Participants indicated that Latino men may not get tested because having health problems is equated with being weak. Finally, Latino participants related both positive and negative health care experiences in Durham, in terms of cultural sensitivity. They felt they were treated differently because of their ethnicity and desired more respectful treatment, such as the use of formal titles (eg, the formal “you” (“usted” in Spanish) and “señor” and “señora”).

Among HIV-infected persons receiving care, participants indicated that reliable transportation, low-cost arrangements, and appointment availability made it possible to get care. They stated that a lack of any of these resources resulted in lapses in medical care. Participants indicated they remained in HIV care because of personalized outreach (eg, reminder phone calls), a welcoming environment (eg, family atmosphere, treating the total person, compassion), support groups, social workers, and clear explanations from providers.

Participants with a previous lapse in HIV care highlighted transportation as a critical barrier to HIV treatment. For example, “Most of my friends don’t have cars. My relatives don’t have time and charge me for a ride.” Stigma and the cost of medications appeared to play a role in preventing people with HIV infection from seeking treatment. In addition, participants with a lapse in HIV care discussed their experience with comorbidities, including substance abuse, tuberculosis, and mental health issues, and how these limit one’s motivation and ability to seek HIV treatment (eg, too sick to ride the bus). They reported postponing treatment until they were faced with possible death: “I didn’t know if I was going to live.”

Discussion

Durham County has experienced high HIV/STD rates, with an increasing number of infected individuals from 2004 to 2008 located in neighborhoods in the south-central and southwestern parts of the county. Among HIV-infected persons treated at DUHS, 14% were coinfecting with an STD, and 22% were coinfecting with hepatitis B or C. Although an increasing proportion of HIV-infected persons visited the ED from 2004 to 2008, there was an average of 16 outpatient visits during the 5-year period, and hospitalizations remained stable. More than one-fourth of patients were

TABLE 2.
Themes From Pastor Focus Groups, Paired With Suggested Actions

Theme	Suggested action(s)
Congregants don't discuss HIV: "My father's youngest brother passed away from HIV/AIDS, but it was kept quiet in our family, and we still do not discuss it."	Pastors can use the pulpit to tell stories of how congregations have reached out to people with HIV.
Congregants assume that there will be great HIV/AIDS stigma, but there are churches that are very supportive.	One church could provide an HIV care team to congregants of other churches so that those congregants do not have to "out" themselves to the church they attend.
Immorality/condemnation: In the church, there is a sense of immorality for some if you have AIDS because of actions including not being faithful, so congregations do not talk about HIV.	Pastors can call attention to negative attitudes toward persons with HIV/AIDS in the context of their Christian faith; acceptance should be preached. The connection between HIV and leprosy is strong, and health and leprosy are taught about by Jesus. "HIV is today's leprosy."
It is a struggle to match HIV prevention messages, other than abstinence, with theology and morality.	Pastors can reassure congregants that every conversation they have with individuals discusses moral actions and complex choices.
The urgency to bring awareness to HIV is gone now that there are medications; congregants have moved on to issues such as cancer.	Public health people could pair together different health issues (eg, H1N1 and HIV) into a single talk to a church to increase acceptability. Churches could have a bulletin insert on HIV statistics, risk factors, and testing locations. Within churches, it may be helpful to have the HIV/AIDS ministry link with other ministries to rally support for their activities.
Parents and pastors in churches are interested in how to talk to youth about sex.	Churches and pastors need to talk about sex; develop ways to have faith-based conversations about sex.
Pastors are afraid of conflict. They don't want the congregants to leave.	Public health people could build interest in HIV with coalitions of churches, thus giving credibility to any individual church wishing to do something HIV related.
Pastors want and need more information on HIV testing and resources.	Public health people can regularly distribute and update a list of HIV resources to pastors.
The Durham community, including churches and pastors, expressed concerns about researchers' sporadic community involvement coinciding with specific grant funded projects.	Duke University must recognize the need for a durable commitment to the community and engage in sustained relationships.

Note. For a theme to be listed, it had to be named in at least 2 of the 4 pastor focus groups. HIV, human immunodeficiency virus.

hospitalized on a yearly basis, with an average stay of more than 2 weeks. This proportion may represent HIV-infected persons who have had lapses in medical care or who are not receiving care. In North Carolina, it is estimated that 38% of residents with HIV infection do not receive care [16]. In comparison, the CDC estimates that 25% of HIV-infected persons nationwide are undiagnosed and that 25% are diagnosed but are not receiving care [17].

We calculated the proportion of HIV-infected persons with undetectable viral loads treated at the Duke Infectious Disease Clinic or the Lincoln Early Intervention Clinic, to estimate the maximum level of communitywide virologic suppression, with the knowledge that the true community level would be lower once patients not receiving care were accounted for. While our findings suggest that HIV care is suboptimal, possibly because of factors such as medication nonadherence, substance abuse, and mental illness, the converse viewpoint is that two-thirds of patients have undetectable HIV RNA levels. Further investigations are needed to determine trends in community viral load over time, among both patients receiving care and those not receiving care.

The strongest barriers to testing identified from the focus groups were stigma, fear, and denial of risk. Latino participants expressed additional concerns, such as fear of deportation and lack of cultural sensitivity. The most common barriers to treatment were cost of care and transporta-

tion. Religious beliefs and social norms set by churches were strong themes surrounding HIV/STDs in the community, and pastors expressed interest in partnering with public health to educate congregants on health issues, including but not limited to HIV/STDs and viral hepatitis. Both congregants and pastors reported wanting to provide sex education, including STD prevention, to adolescent congregants, an interesting fact given the stigma barriers they articulated. This may signify a readiness to overcome the stigma barriers.

Several limitations were notable in our study. We conducted our assessments using DUHS data, and not countywide surveillance data, for HIV, STDs, and hepatitis B or C. We did not have information from all health care providers in the community, and some residents may receive care outside of the county; however, our findings estimate utilization data from the major health care providers in Durham County. We presented health care utilization data for 2004-2008 for HIV-infected persons, but viral load data was for 2009 only. Despite these heterogeneous periods, we provided the most recent estimation of the viral load among HIV-infected persons receiving care who are either taking or not taking antiretroviral therapy. Although we conducted the focus groups among a convenience sample, we obtained information from a diversity of residents. Another limitation of our qualitative analysis was the use of theme generation, as opposed to dual coding of transcripts. Last, our findings from Durham

County may not be generalizable to other communities in the state or nationwide.

Effective prevention and treatment of HIV infection and its coinfections are dependent on the reduction of high-risk behaviors, which are confounded by sensitive behavioral and moral issues. Continued activities are needed to shift public perception, including fear and stigma, that disappointingly still exist despite local, state, and national educational efforts. The results of our focus groups suggest that the integration of information regarding sexual behaviors and substance abuse may be more effective when combined with information regarding other chronic diseases (eg, hypertension, diabetes). Faith-based organizations can play a role in decreasing stigmas and can provide education through sermons and outreach ministries; the inclusion of these organizations into the HIV prevention strategy requires further exploration [18, 19].

Linking HIV-infected persons to HIV care and treatment is important, and it could improve the community viral load. Care bridge coordination (CBC) was initiated in Durham in 2008, through a grant supported by the University of North Carolina and the North Carolina HIV/STD Control Program, in which the coordinator ensures newly diagnosed HIV-infected persons enter care soon after diagnosis and that persons "lost to care" are linked back to care. The CBC program differs from standard HIV case management, which provides assistance to patients already receiving care. The CBC program can provide transportation and other social support to HIV-infected persons not receiving care, it can strengthen connections between HIV providers, and it can coordinate services for coinfecting individuals with STDs or hepatitis B or C.

A similar program to address HIV-infected persons who are lost to care has been implemented in several large cities; the program assists clients with navigating health and social service systems [20]. The program demonstrated significant improvements in provider engagement, health outcomes, and utilization of HIV care. Furthermore, the proportion of participants with an undetectable viral load was 50% greater at 12 months than at baseline. Maintaining HIV-infected persons in care may yield significant cost savings by improving the health of those retained in care and by potentially reducing infectiousness from HIV and coinfections, including STDs and hepatitis B or C, that facilitate secondary disease transmission.

Conclusions

During a 5-year period, the health care utilization of HIV-infected persons in Durham County has remained stable, despite dramatic increases in HIV infections in some areas. Coinfections with STDs or hepatitis B or C were notable among HIV-infected persons. Multiple barriers to testing and treatment for HIV/STDs and viral hepatitis still exist in the community. Coordinated and integrated services are needed to link and retain HIV-infected persons

receiving care, to screen for coinfections, and to reduce barriers to testing and treatment at the individual and community levels. **NCMJ**

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to others. Your
example can make
a difference.

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