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## Analysis of Predictors of Unmet HIV-related Support Services and Barriers to Needs among HIV-infected Individuals in Georgia

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## Abstract

Taylor Guffey

(Under the direction of Dr. Richard Rothenberg, MD, MPH, FACP, Dr. Natalie Crawford Ph.D., MPH, and Dr. Jane Kelly, MD.)

### **Analysis of Predictors of Unmet HIV-related Support Services among HIV-infected Individuals in Georgia**

**Introduction:** Behavioral and medical interventions such as syringe exchange and anti-retroviral therapy have been successful in reducing the incidence and transmission of HIV and improving the longevity and quality of life of people with HIV/AIDS. However, there are an estimated 1.1 million people living with HIV in the United States and only about 37% are retained in some form of HIV care. People living with HIV often have multiple comorbidities and other challenges that often require specialty care.

**Methods:** We used data from the Medical Monitoring Project to assess HIV-related supportive service needs among people living with HIV in Georgia to understand whether there is an unmet need in this sample (n = 417). Descriptive tables and Chi-square tests were used to assess differences in types of HIV-related services needed and actually utilized by Blacks and Non-blacks. Bivariate and Multivariable logistic regression was performed to assess correlates of having at least one unmet need.

**Results:** The cross-section was a probability-based sample of people living with HIV/AIDS in Georgia. Blacks were more likely to need Preventative Education and Mental Health counseling than Non-blacks. Despite no significant difference in the need of ART Adherence Support between Blacks and Non-blacks, Blacks significantly had more unmet ART Adherence Support needs when compared to Non-blacks (p = 0.0097). Bivariate analysis showed those with a high school education and those who have experience homelessness were more likely to have unmet service needs (OR = 1.75 95% CI = 1.06 – 1.89) and (OR = 2.97 95% CI = 1.22 – 7.23) respectively. A multivariable logistic model correcting for potential confounding showed those who have experienced homelessness were more likely to have unmet service needs (OR = 2.49 95% CI = 1.02 – 6.11). The most cited reasons for not receiving a service need were Financial Barriers and Lack of Information.

**Discussion:** Marginalized groups exhibit greater need for supportive services and within these groups, a disparate proportion exhibit unmet needs compared to others. This analysis provides a programmatic framework to initiate better-focused efforts for sub-groups who exhibit more unmet needs.

Analysis of Predictors of Unmet HIV-related Support Services and Barriers to Needs among  
HIV-infected Individuals in Georgia

Authored by:

Taylor Guffey

BS, Georgia Institute of Technology, 2013

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Analysis of Predictors of Unmet HIV-related Support Services and Barriers to Needs among  
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Authored By:  
Taylor Guffey

Approved:



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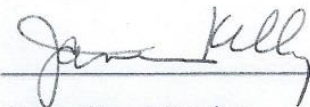
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Natalie Crawford

Digitally signed by Natalie Crawford  
DN: cn=Natalie Crawford, o, ou, email=ndcrawford@gmail.com, c=US  
Date: 2014.12.16 12:26:07 -0500

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Committee Member



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Committee Member

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Taylor Guffey  
65 Payne Ridge  
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The chair of the committee for this thesis is:

Dr. Richard B. Rothenberg, MD, MPH, FACP  
School of Public Health  
Georgia State University  
P.O. Box 4018  
Atlanta, GA 30302-4018

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## Curriculum Vitae

**Taylor Guffey**

65 Payne Ridge

Ellijay, GA 30540

tguffey3@gmail.com

### Education

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*Georgia State University* 2013 – December 2014  
Atlanta, GA  
Master of Public Health – Epidemiology and Biostatistics

*Georgia Institute of Technology* 2009 - 2013  
Atlanta, GA  
Bachelor of Science – Biomedical Engineering

### Research Experience

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*Graduate Research Assistant* May 2014 – Present  
Department of Epidemiology and Biostatistics, Georgia State  
University: Atlanta, GA  
Principal Investigator: Natalie Crawford, Ph.D.

- Statistical data analyst using SAS on various studies assessing the relationship between HIV testing uptake and HIV testing stigma
- Research associate on study finding link between neighborhood foreclosure risk and mental health outcomes
- Prepared manuscripts for submission to peer-reviewed publications

*Division of Health Protection, Department of HIV/AIDS Surveillance* April 2014 - Present  
Georgia Department of Public Health: Atlanta, GA  
HIV Epidemiology Section Director: Jane Kelly, M.D.

- Created HIV-Care Continuum Presentations and documents for each of Georgia's 18 Health Districts
- Analyzed social disparities and fallout in Georgia's HIV-Care Continua among its Health Districts
- Created presentations and abstracts displaying these findings as well as co-authored surveillance reports for district
- Performed queries and data management tasks within Georgia's Enhanced HIV/AIDS Reporting System (eHARS) to create data files used for research

*Quantitative Physiological Engineering Laboratory Student* May 2013 – August 2013  
*Researcher*

School of Engineering, Georgia Institute of Technology: Atlanta, GA  
Instructor: Esfandiar Behraves, Ph.D.

- Created independent research project testing Nickel substrate biocompatibility with MC3T3 cells
- Performed fluorescent, biochemical, and physiological assays such as MTT assays, absorption readings, and hemocytometry.

### Professional Experience

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*Health Information Exchange Data Assistant* October 2014 - Present

Georgia Department of Public Health: Atlanta, GA

Coordinator: A. Eugene Pennisi

- Under minimal supervision, provided assistance with conducting research and analysis with out-of-care lists for Georgia's HIV Health Information Exchange Program (HIE).
- Helped draft continuing correspondence to grantees highlighting progress of HIE activities
- Performed other tasks as needed using SAS software and SQL databases.

Care and Prevention in the United States Demonstration Project

April 2014 – October 2014

Intern

Georgia Department of Public Health: Atlanta, GA

Coordinator: Kate Musgrove, Ph.D., NCC

- Contacted agencies within the state asking for partnership with CAPUS and sharing of information for the online resource hub aimed at increased testing and prevention of HIV/AIDS
- Evaluated efforts of Metro Atlanta Testing and Linkage Consortium and prepared reports sent directly to CDC's NCHHSTP
- Served on the Mapping & Testing panel which created GIS maps representing the current burden of HIV/AIDS so that agencies can better target testing efforts and the general public can find testing and other resources.
- Created a Medical Information website which is aimed at providing HIV/AIDS facts and information to the general population and also aimed at pointing care providers to proper resources within the state for increasing patient linkage to care

## Publications

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1. Crawford, D, Dean, T, Rivera, A, **Guffey, T**, Rudolph, A, Fuller, C. (2014, submitted for review). Pharmacy intervention to improve HIV testing uptake using a comprehensive health screening approach. *American Journal of Preventive Medicine*.
2. Georgia Department of Public Health, HIV/AIDS Epidemiology Program *HIV Care Continuum Report by Health District, Georgia, 2012*. [in press]

## Poster and Oral Presentations

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Pennisi, A, Thompson-Paul, A, Wei, S, Wortley, P, Kelly, J, **Guffey, T**. (2014, December). *Assessing the Feasibility of Using Health Information Exchange to Identify HIV-Diagnosed Persons Who Are Out of Care*. Poster Presentation to National HIV/AIDS Surveillance System Conference, Atlanta, GA.

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**Guffey, T**, Kelly, J. (2014, September). *A Regional Approach to Addressing Fallouts in Georgia's HIV Care-Continuum among MSM*. Oral Presentation to GDPH's MSM Symposium, Atlanta, GA.

**Guffey, T**, Kelly, J. (2014, September). *A Regional Approach to Addressing Fallouts in Georgia's HIV Care-Continuum*. Oral Presentation to University of Georgia's College of Public Health State of Public Health Conference, Athens, GA.

**Guffey T**, Reed S, Thackston D. (2013, May). *Team Respiro: Oxygen Nasal Cannula Redesign*. Poster presented at Design Expo 2013, Georgia Institute of Technology, Atlanta, GA.

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## **Chapter I - Introduction**

Due to increased use of Anti-retroviral therapy (ART), people living with HIV/AIDS (PLWHA) are living longer and healthier lives (1). Prevention efforts have helped reduce the number of annual infections from almost 130,000 to approximately 50,000 per year in the United States since the beginning of the epidemic (1). Despite lower incidence of the disease, there are an estimated 1.1 million people living with HIV in the United States (2). It is estimated that 37% of the prevalent HIV population (approximately 400,000 individuals) are retained in some form of HIV care, where the individuals receive primary care, medication, and HIV-related supportive services (3). People living with HIV often are burdened with multiple comorbidities as well as other challenges that may require service and care above the standard primary care appointment. Recent studies have shown a significant excess of mental illness such as depression and anxiety among PLWHA (4–6). Often in conjunction with mental illness, HIV-infected individuals frequently report substance abuse as well as alcohol abuse (7–9). In addition to physical and mental comorbidities, PLWHA often exhibit diminished socioeconomic status and consequential need for public assistance, transportation assistance, housing assistance, and medication assistance (7,10–13). Previous research shows that an HIV-positive individual who has to manage at least one or all of these multiple physical, mental, or social challenges is less to be retained in primary HIV-care which ultimately leads to diminished ART adherence and a reduced quality of life (10,12,14). To help facilitate an HIV-infected individual's utilization of supportive services and their retention in HIV primary care, HIV care facilities have incorporated

HIV-related supportive services into a physician's treatment plan so that optimal well-being of the individual is realized.

### **I.I – Purpose of the Study**

In order to more effectively utilize shrinking resources and to ensure the holistic well-being of the patient, this study is designed to describe and understand the unmet service needs of individuals in HIV care and the barriers that lead them to be unmet. This study will focus on the HIV population in Georgia so that better directed care and optimal appropriation of resources within the state can be implemented. This study will identify correlates among different socio-demographic characteristics that may make a particular sub-population more predisposed for unmet service when compared to those within the sub-population who had all of their service needs met. Statistical and epidemiologic methods will be employed to address biases and random error within the study sample and to construct correlates between particular characteristics and their degree of unmet service needs. Upon completion, this thesis will provide a new a starting point for public health programmers, clinicians, and HIV-related supportive service professionals to use in making decisions in HIV care facilities.

### **I.II - Specific Aims**

This study will aim at addressing the following questions in particular:

*Q1:* Do Black Georgians experience the same percentage of their service needs going unmet than non-Black Georgians?

*Q2:* What socio-demographic characteristics predispose individuals in Georgia to experience a higher degree of unmet HIV-related supportive service needs?

*Q3: What specific barriers exist that may inhibit individuals in Georgia for having their service need met?*

Null hypotheses ( $H_0$ ) and Alternate Hypotheses ( $H_a$ ) are created so that statistical tests their corresponding test statistic can be used to determine the validity of the research questions in this study.

*I.III.I - Hypotheses to address research question 1 (Q1):*

$H_0$ : Blacks do not have a significantly different percentage of unmet needs for a particular supportive service when compared to non-blacks in Georgia.

$H_a$ : Blacks do have a significantly different percentage of unmet needs for a particular supportive service when compared to non-blacks in Georgia.

*I.III.II - Hypotheses to address research question 2 (Q2):*

$H_0$ : A particular sociodemographic characteristic does not have a statistically significant association of having at least one unmet need compared to those of the same characteristic with no unmet needs.

$H_a$ : A particular sociodemographic characteristic does have a statistically significant association of having at least one unmet need compared to those of the same characteristic with no unmet needs.

## **Chapter II - Literature Review**

### **II.I - Challenges among Those Living with HIV/AIDS in the United States**

A wide body of literature has discovered people living with HIV/AIDS encounter a myriad of challenges and comorbidities than an un-infected person may not face otherwise. These unique life challenges present themselves as barriers to accessing HIV care in many individual's lives. Some of these additional challenges include excess major depressive symptoms, substance abuse (8) and intimate partner violence (15). It is estimated that the prevalence of major depressive symptoms in the United States among those in HIV care is three times the prevalence of the general population (4). Additionally, up to 40% of HIV-infected individuals report using intravenous drugs (8). A systematic review by Meyer et al, HIV status is positively associated with intimate partner violence and mental abuse among women infected with HIV (15).

Not only do those living with HIV/AIDS face clinical or behavioral challenge, they also encounter many social and structural challenges. In a report by the Institute of Medicine, of those in HIV-care, 42% receive Medicaid benefits and almost 1 in 4 are uninsured (16). Mailman School of Public Health of Columbia University reported that 80% of individuals living with HIV in New York City in 2010 participated in the Supplemental Nutritional Assistance Program and over 40% currently experienced food insecurity (17). According a report published by the Department of Housing and Urban Development, among individuals in HIV-care in 2011, 8% had experienced homelessness within the past 12 months and another 15% percent had experience housing issues (18). It is important that these unique challenges people living with HIV/AIDS face are addressed through supportive services so that any possible barriers to entry of care are

minimized. Not only do HIV-related supportive services ameliorate any barriers to care that may exist, but also act as a mechanism for increased retention in HIV care.

## **II.II - HIV-related Supportive Services as a Facilitator of Entry to and Retention in Care**

In an article by Conviser and Pounds, the authors developed a systematic study which recruited HIV primary care centers in order to determine whether receipt of certain enabling supportive services correlate with early entry into care and ultimate retention in care. They found that case management, mental health services, substance abuse treatment services, transportation assistance and housing assistance all had positive associations with retaining HIV infected individuals in primary care. People living with HIV/AIDS have many conflicting priorities and often have trouble keeping multiple appointments across several locations. These challenges may be so insurmountable that patients would rather delay or forego treatment. This review highlighted that across several sites in the United States, receipt of HIV-related supportive services leads to better retention in care (14,19).

Retention in HIV-care is positively associated with good health outcomes and viral suppression among HIV infected individuals. In an article by Mugavero et al., researchers found that patients with repeat “no-show” visits in their treatment plan experience delayed viral load suppression compared to those who didn’t have any lapses in retention in care (HR = .83). This is due to not only less consultation with the physician once at clinic, but reduced adherence to Anti-retroviral Therapy prescribed by

the physician (20). Chander et al found that among those who both reported substance abuse and psychiatric disorders, decreased ART utilization and adherence were reported. However, interventions that aimed at ameliorating the effects of substance abuse and psychiatric disorders, like HIV-supportive services, showed a positive association with maintenance in an ART regimen and eventual viral suppression (8).

### **II.III - Degree of HIV-related Supportive Services Utilization in the United States**

Based on the evidence given so far, utilization of HIV-related supportive services is undeniably important at increasing entry to and retention in HIV-care. To bolster this evidence and implement a sweeping change of HIV/AIDS treatment protocol in the United States, The National HIV/AIDS strategy was released in 2010 and called for a more concerted effort of HIV programs at the state and federal level (21). This overarching vision is reflected in the United States Federal Expenditure in Fiscal Year 2014, with almost \$30 billion being spent alone for HIV/AIDS prevention, treatment, assistance, and research (22,23). Out of this \$30 billion spent in 2014, 10%, or approximately \$3 billion, was spent for domestic cash and housing assistance. Remaining federal dollars are spent within the national Ryan White Program, the AIDS Drug Assistance Program (ADAP), and the Substance Abuse and Mental Health Administration (23). Despite a generally increasing federal HIV Budget and the knowledge that HIV-related supportive services facilitate entry to and retention in HIV-care, HIV-related supportive services are not being used to their advantage and

individuals in care report having unmet service needs and possibly face detrimental health outcomes in the long term.

Marx et al. showed that in a California Ryan White CARE-funded facility, over 50% of clients reported unmet service needs within the previous four months. Among these individuals, those who had reported unstable living situations like homelessness and those with lower perceived health status were more likely to have unmet service needs. In an article by Krause et al. researchers set out to determine the types of HIV-related clinical and supportive services unmet, adequately met, and overly met among individuals living with HIV/AIDS in Mississippi. It was discovered that clinical services such as HIV viral load testing and CD4/T-cell count testing were reasonably well-met and certain services such as access to free prophylaxis and medical care at a physician's office were in fact "overly met". The most significantly unmet service needs were dental care, eye exams, housing assistance, mental health counseling, and access to peer support groups, and job placement assistance (24).

In research performed out of Los Angeles County, CA, Wohl et al. described particular sociodemographic characteristics of people in HIV care which were associated with having at least one unmet service need. In this study, researchers determined that African-Americans were more likely to have at least one unmet need when compared to whites (OR = 3.1) and earning less than \$10,000/ year was positively associated with having at least one unmet service need when compared to those who earned more (OR = 3.5). Among Latinos, earning less than \$10,000/year was also positively associated with having at least one unmet service need (OR = 4.0) and among whites, not having health insurance was positively associated (OR = 8.1).

Many articles have been published that provide correlates relating how underutilization of HIV-related supportive services stem from a complex system of structural, social and environmental barriers to care and treatment. These barriers include limited English proficiency, perceived stigma, personal income, and the built environment (11,20-22). Marx et al's study of a California Ryan White clinic also identified barriers to unmet service needs and found that 54% of those with unmet service needs reported an agency barrier prevented them from receiving the service, followed by 44.8% reporting emotional issues, 44% reporting lack of information about the service, and 19.4% reporting a financial barrier (25). Kempf et al. sought out to find what particular barriers women in southern rural regions of the United States experienced in their HIV care regimen. The factors that had an impact on participants' ability to maintain their appointments included patient/provider relationships, transportation barriers, familial support, stigma and agency structural barriers (26) This study highlights the differences that a southern rural population faces compared to different HIV-infected populations in the United States; however, its focus on only women sheds light on a smaller percentage of those burdened by HIV/AIDS in the United States and the American south.

In Wohl et al., authors also examined barriers to services in Los Angeles County and found that sexual orientation, race, income, and housing status are all predictors of barriers to HIV services (10). Among those with unmet needs in this study, the barriers to these particular needs were listed and included: "Lack of Information", "Agency Barriers", "Financial/Practical Barriers", or "Other". A large percentage (47%) of participants noted "Lack of Information" as the most deterministic barrier in having an unmet service need.

There is convincing evidence that certain sub-populations of individuals in HIV-care underutilize HIV-related supportive services in several settings across the United States. Additionally, evidence suggests many of these service needs go unmet because of individual, societal, and structural-level barriers which impede individuals in care from fulfilling their particular needs. The focus of this study is on those living with HIV/AIDS in Georgia and who are currently in care. Because many of these studies take place in various metropolitan areas, are limited by their data source, and are limited to a specific sociodemographic characteristic, there is limited generalizability to other populations of people living with HIV/AIDS in the United States and Georgia in particular.

The study by Marx et al is limited by its older data since new AIDS care protocol has been implemented since its publication date as well as reporting only those in Ryan-White funded care. Also, the comparability between California and Georgia is not an accurate juxtaposition due to demographic, structural, and policy-level differences. Krause et al is important to informing research decisions for Georgia's population because of similar socio-demographic and policy-level attributes; however, Krause et al. did not describe perceived barriers to these unmet service needs which is a limitation when trying to formulate behavioral and programmatic changes aimed at addressing unmet service needs. In Wohl et al, this study uses a nationally representative data set from the Medical Monitoring Project (MMP) and encompasses a probabilistic sample of all individuals in HIV care in the Los Angeles County area. Despite its rich data source, the findings in this paper are at least 10 years old and socio-demographic characteristics of this population are not transmutable across populations throughout the country.

## **II.IV - HIV/AIDS in Georgia**

HIV infection remains a public health threat in the state of Georgia. According to data published by the Georgia Department of Public Health, Georgia's prevalence of HIV/AIDS was 508 per 100,000. When compared Georgia's prevalence to the country's of 208 per 100,000, Georgia has almost double the prevalence which leads it to being ranked 6<sup>th</sup> highest prevalence of HIV/AIDS in the nation as of 2009 (27). The incidence of new HIV infection in Georgia made the state rank fifth-highest in the nation for number of new cases in 2011 (28,29). Table I shows demographic characteristics of new HIV/AIDS diagnoses and prevalent HIV/AIDS cases in Georgia. As of December 31<sup>st</sup>, 2012, there were 50,436 people living with HIV/AIDS in the state of Georgia. Of this prevalent population, a majority of the cases (64%) were among Black/non-Hispanic individuals, 19% of the cases were among White/non-Hispanic, and the remainder being among those of Hispanic, American Indian, Asian, or unknown origin and race (28). According to 2010 Census data, Black or African Americans made up 30.5% of Georgia's population (9,697,653), White or Caucasians made up 59.7%, and the remainder was made up of American Indians, Asian/Pacific Islanders, and other races (30). When comparing Georgia's demographics to the distributions of HIV/AIDS cases within the state, there is overrepresentation of Black or African Americans with HIV/AIDS compared to other races in Georgia.

Comparing Georgia's epidemic to the nation's as a whole: (Table I vs. Table II) among new infections, Georgia has a higher percentage of females (22% vs. 19%), a relatively younger population (23% vs. 19% for age < 25), and a relatively higher

proportion of blacks (55% vs. 46%). Also noted by comparing Tables I and II, among the prevalent HIV/AIDS population, Georgia has a younger (5% vs. 4% age < 25) population, relatively middle-aged (20% vs. 16%) population, and a relatively higher percentage of the population whom are black (64% vs. 43%). Because Georgia experiences disparities among demographic characteristics such as age and race when compared to the country as a whole, it is important that contemporary research is performed at the state level to identify unique challenges the state of Georgia faces.

## **II.V - Degree of HIV-related Supportive Services Utilization in Georgia**

There is limited research about the types of HIV-related supportive services utilized by Georgians. As suggested by papers by Kempf and Wohl et al., residents of Georgia may face unique barriers that prevent them from seeking out their supportive service needs. Kalichman et al. provide a comprehensive look at the unmet HIV-related support services that individuals living with HIV encounter in Atlanta, GA. In this study, however, authors did not describe the type of services needed by those in the study and did not identify the types of barriers that existed for these individuals. Perhaps the most notable limitation to this study is its narrow focus on the metropolitan Atlanta area. Since 40% of those living with HIV/AIDS in Georgia live outside the metropolitan Atlanta area, this study is inconclusive in showing the types of needs, the degree of utilization, and barriers to supportive service needs in the state of Georgia (28,31).

The Georgia Department of Public Health (GDPH) released in their 2012 annual HIV/AIDS Surveillance Report a measure of unmet clinical needs for those living with

HIV/AIDS in Atlanta, GA. GDPH focused on clinical visits and used their enhanced HIV/AIDS Reporting System (eHARS) to measure the number of individuals who went without CD4 or Viral Load testing in 2012. Despite relaying valuable information about missed clinical visits among those in Atlanta, GA infected with HIV/AIDS, this surveillance report uses laboratory testing as a proxy for clinical visits and doesn't utilize observational data in determining the actual measure of clinical visits. Because of limitations with gathering data related to HIV-related supportive services, the GDPH report in 2012 also could not provide information on the degree of utilization of services like oral health, transportation assistance, and housing assistance. Similarly to the Kalichman study, this surveillance report only provided estimates for those living in Atlanta, GA. despite GDPH having information for approximately 50,000 individuals throughout the state. Despite the limitations of these two studies, they do provide reasonable estimates of individuals who are not retained in any type of HIV/AIDS care and provide a launching point for subsequent studies about unmet clinical and supportive service needs (28). Georgia possesses a unique population of individuals living with HIV/AIDS and because of the dearth of tailored research about utilization of HIV-related supportive services and barriers to these service needs, it is important that new research identifies the types of resources those in HIV-care need, analyzes any barriers that may exist to having service needs met, and pin-pointing certain sociodemographic characteristics of the population that may be associated with having unmet service needs.

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## **Chapter III - Manuscript**

### **III.I - Introduction**

People burdened with HIV/AIDS often report multiple comorbidities and challenges that go above and beyond the type HIV-clinical care visit. Often, these challenges are related to the individual's mental health, transportation access, housing status, and drug treatment and counseling. Recent articles have pressed the significant excesses of mental illness and anxiety among those living with HIV/AIDS (4–6). Often coincident with anxiety and mental illness, HIV-infected individuals report substance and alcohol abuse frequently (7,8). PLWHA often exhibit diminished socioeconomic status and consequential need for public assistance, transportation assistance, housing assistance, and medication assistance (7,10–13).

Previous literature shows that HIV-positive individuals who have to manage at least one of these physical, mental, and social challenges are less likely to be retained in HIV care (14). When a lapse in HIV care visits occur, diminished adherence to Anti-retroviral Therapy (ART) may occur which can ultimately lead to a reduced quality of life (10,12) To help facilitate an HIV-infected individual's utilization of supportive services and their retention in HIV primary care, HIV care facilities have incorporated HIV-related supportive services into a physician's treatment plan so that optimal well-being of the individual is realized.

In order to more effectively utilize shrinking resources and to ensure the holistic well-being of the patient, this study is designed to describe and understand the unmet service needs of individuals in HIV care and the barriers that lead them to be unmet. This study will focus on the HIV population in Georgia so that better and directed care and

services can be realized due to limited research of this kind within the state (27,31). This study will identify correlates among different socio-demographic characteristics that may make a particular sub-population more predisposed for unmet service needs than a different body within this sub-population. Statistical and epidemiologic methods will be employed to address biases and random error within the study sample and to construct correlates between particular characteristics and their degree of unmet service needs.

### **III.II - Methods**

This analysis used data collected through the Medical Monitoring Project (MMP) which is a multistate surveillance initiative funded and managed by the Centers for Disease Control and Prevention (CDC). It is designed to better understand the experiences of HIV-infected persons during their HIV-related care. The MMP also assesses the HIV-related supportive services and needs that HIV positive individuals may require. The MMP is conducted through state and local health departments in 23 states and jurisdictions (Atlanta, Los Angeles, San Francisco, Delaware, Florida, Georgia, Illinois, Chicago, Indiana, Michigan, Mississippi, New Jersey, New York City, North Carolina, Oregon, Philadelphia, Puerto Rico, Houston, Virginia, and Washington) (32). The analysis presented here will be limited to the data collected by the Georgia MMP Project site carried out in partnership with the Georgia Department of Public Health in Atlanta, GA.

The MMP uses a three-stage probability sampling technique to achieve nationally representative samples of individuals receiving HIV/AIDS related care in the year the survey is given. In the first stage, samples from all 23 project areas are selected proportional to the burden of HIV/AIDS within that particular area. These project areas

are designed to capture over 80% of the estimated total HIV/AIDS cases in the United States. The second stage of sampling takes place at the healthcare facility level and consists of annual sampling of 25 to 50 facilities within the project area each year. These facilities are selected to represent small, medium, and large HIV care facilities which prescribe antiretroviral (ART) medication or order CD4/Viral Load tests in order to manage an individual's HIV care. The third stage is a sample of 400 individuals taken from the 25 to 50 health care facilities. These individuals must be at least 18 years old at the time of interview, diagnosed with HIV, and currently receiving HIV-related care.

The MMP questionnaire is given in either Spanish or English at the clinic where the participant receives care or at a mutually agreed-upon location. Data are collected using a handheld assisted personal interview device (HAPI) that is programmed with questionnaire design studio (QDS) software. Survey instruments ascertain participants' demographics, sexual behaviors, drug and alcohol use, met and unmet service needs, adherence to medication, and physical and mental health conditions.

A cross sectional analysis of three years of panel data from 2009, 2010, and 2011 will be performed. The sample consists of 400 patients randomly taken from visits at the selected facilities in 2009, 2010, and 2011 for a total analytic sample of 1,200 patients. Of the 400 initial sampled patients for each year, 165 were interviewed in 2009, 144 were interviewed in 2010, and 120 were interviewed in 2011 for a total response rate of 35.7% (N = 429).

The dependent variables derived from the questionnaire are a series of 15, 3-part, questions aimed at determining which HIV-related supportive services were needed by the individual, whether or not this individual had this service need met, and if not, why

this particular service need went unmet. An HIV-related supportive service is defined as being unmet if the participant actively sought out this service but did not receive the actual service in the 12 months prior to the participant's interview. To create the dependent variable, need with respect to the following services was assessed: child care services, oral health assistance, home health services, case management, prevention education, mental health counseling, insurance assistance, medication assistance, adherence support services, shelter or housing assistance, food or clothing assistance, transportation assistance, and other supportive services not listed. For each of these services, if the individual stated that the service was needed and went unmet, a further question assessed the individual's perceived barrier for this particular unmet need. These additional questions had a series of pre-populated questions that the individual could choose from. These choices included: "Didn't know where to go or whom to call", "In process of getting the service", "Waiting list is too long", "Service isn't available", "Not eligible or denied services", "Transportation problems", "Service hours are inconvenient", "Service costs too much/lack of insurance", "Language barrier", "Too sick to get service", "Psychological barrier", or "other".

The number of the HIV-related supportive services that were unmet were summed and the cumulative number of unmet needs was stored in the dataset for each participant. In order to assess the aims of this research, the outcome of interest is having "at least one unmet HIV-related supportive service need" versus having "no unmet needs."

For parsimony, the types of barrier encountered were grouped in the following categories: "Agency/Structural barriers", "Practical/Financial barriers", "Lack of

information”, “Psychological barriers”, and an “Other” category. The variable “Agency/Structural barriers” included participant answers: “Waiting list is too long”, “Service isn’t available”, “Not eligible or denied services”, and “Service hours are inconvenient.” The variable “Practical/Financial barriers” included participant answers like “Language barrier”, “Too sick to get service”, “Transportation problems” and “Service costs too much/lack of insurance”.

The independent variables are demographic, social, and behavioral characteristics of the participants. Demographic variables include: age (13 – 24, 25 – 34, 35 – 44, 45 – 54, 55+), race (Black, White, other), gender (male, female, transgender/transsexual), and the year the survey was taken. Social characteristics include education level (less than high school level, high school diploma, greater than high school level), income (categorical ranging from \$0 a month to > \$6,251 a month), homelessness status, whether the participant receives public assistance, and travel time to clinic (continuous variable stating travel time in minutes to their clinic). Behavioral characteristics consisted of sexual orientation only (heterosexual, homosexual, bisexual). For analysis purposes, gender was collapsed into “Male” and “Female”, race into “Black” or “Non-Black”, and sexual orientation into “Heterosexual” and “Homosexual/Bisexual”. This analysis is aimed at determining which particular socio-demographic profiles exhibit a higher likelihood of having at least one-unmet service need when one compares a certain profile to a referent group.

Those who reported no HIV-related supportive service needs in the 12 months prior to their interview (n = 12) were excluded from the study which resulted in 417 participants for analysis. This was done as a result of the way the data was coded at

GDPH. Because someone can only list a need as being unmet if and only if that individual need that service in the first place, those who had no service needs were excluded to make a fair comparison. Descriptive statistics of the population were performed including frequencies for all categorical variables. We compared the distributions of those who reported at least one unmet service need to those who had all service needs met for each characteristic of the sample using a Rao-Scott adjusted  $\chi^2$  test of significance, which was also used throughout the study (33). Differences at the  $p < 0.05$  level in unmet service needs across the sample characteristics were considered significant. This descriptive analysis was repeated again, except stratified by race, to find significantly different distributions of unmet service needs across the three racial/ethnic groups.

To determine whether a particular racial group exhibited a significantly increased need for a particular service, we stratified individuals who reported at least one service need ( $n = 417$ ) by their particular service need and race (e.g. Black, Non-Black) and p-values were calculated. These needs were compiled across the individual so it is possible the total number of needs within a race/ethnicity exceeds the sample-size of that race/ethnicity. To determine the types of service needs that went unmet, We stratified individuals with unmet service needs ( $n = 242$ ) by their particular unmet service need and race and reported percentages of service needs that ultimately went unmet. P-values were recorded for each service to determine significant differences in distributions among the three races/ethnicities.

A bivariate analysis was performed to produce odds ratios and 95% confidence intervals comparing levels of a particular sociodemographic characteristic to the referent

level of that same characteristic. This was done for all independent variables. The odds ratios estimate the association between having at least one unmet service need compared to those whom all service needs had been met. Multivariable logistic regression was performed to adjust for confounding covariates. Statistical interaction between race and all other covariates was assessed and no statistically significant results were found (not shown), thus, adjusted odds ratios from the final multivariate model were reported for all races instead of stratified as in the bivariate analysis. Covariates were considered confounding if they were statistically associated with the exposure variable and the independent variable of interest. These covariate decisions were further corroborated using Directed-Acyclic Graph theory (not shown) and prior literature (34). Adjusted odds ratios and 95% confidence intervals were reported.

To determine what barriers exist among those who had at least one unmet service need, a descriptive table showing perceived barrier stratified by race was produced. Percentages of each race reporting a particular barrier were calculated. Significance testing was not performed due to small cell frequencies.

All analyses used standard weights determined by the CDC to accurately adjust the sample to the distribution of the HIV burden in Georgia. Weighted percentages were computed and presented in all characteristic tables. All analyses were performed using SAS 9.3 software (SAS Institute, Cary, NC). In SAS, “proc surveyfreq” and “proc surveylogistic” were used to analyze the weighted data. All data were de-identified before analyses took place. A material transfer agreement was approved by the Georgia Department of Public Health and the Georgia State University Institutional Review Board

approved an exempt status for this study. Confidentiality of the data was kept at all times of the study.

### **III.III - Results**

Table III shows participants' socio-demographic characteristics stratified by whether they exhibited at least one unmet service need or had all of their needs met in the 12 months prior to the interview (n = 417). Looking at the sample as a whole, the majority were aged 45 -55 (36%), had more than a high school diploma level of education (54%), were male (68%), and were Black (66%). Of the 417 individuals who had at least one HIV-related supportive service need in the calendar year before their interview, 242 said that they had at least one unmet need and 174 said they had all of their needs met. Among those with at least one unmet service need, the majority fell into the 45 – 55 age group category (36%), had more than a high school diploma level of education (50%), were male (68%) and were Black (69%). The majority of those with at least one unmet need self-identified as heterosexual (54%), earned more than \$10,000/year (55%), and were not on any type of public assistance (56%). Those with at least one unmet need had a travel time to their HIV-care facility less than 30 minutes (52%) and did not experience any homelessness in the last 12 months (86%). The distribution of Education level, Income, and Homelessness within the past 12 months were significantly heterogeneous when comparing those reporting at least one unmet need and reporting all needs met. An analysis comparing participant demographics was performed, but not shown, to assess homogeneity across survey years. No significant difference among the 3 years was found.

No significant difference was found between Blacks and non-Blacks for having at least one unmet service need among age, education, income, public assistance, and travel time categories (Table IV). The distribution of education levels by race among those with at least one unmet service need was significant ( $p = .0226$ ) as well as the distributions of gender, sexual orientation, and homelessness within the last 12 months ( $p = .0302, .0075, <.001$ ; respectively) among those with at least one unmet service need. No significant difference was found between Blacks and non-Blacks for having all needs met by age, travel time, and homelessness within the last 12 months. The distribution of education levels by race among those with all needs met was significant as well as the distribution of education, gender, sexual orientation, income, and public assistance.

Table V shows the different types of HIV-related supportive services needed among individuals in the sample stratified by race. Dental Services Assistance was overwhelmingly identified as the largest need by both racial groups, followed by public assistance support and HIV case management. The least needed supportive services were home health services assistance, child care services assistance, and domestic violence support. Between the two racial categories, Blacks exhibited a statistically larger need for Preventative Education ( $p <.001$ ) when compared to non-Blacks. Non-Blacks exhibited a statistically larger proportion of individuals needing Mental Health counseling ( $p = .0087$ ) when compared to Blacks. Table V also highlights percentages of individuals who had their HIV-related supportive service need go unmet. As expected, the service needs which went unmet most frequently were Dental Services assistance, HIV Case management, and Public Assistance support. Non-Blacks had a statistically significant

higher percentage of individuals have their ART Adherence support service go unmet compared to Blacks.

Table VI provides bivariate and multivariable models showing the association between a particular characteristic or structural barrier and whether or not the individual had any unmet service needs or all needs met. The odds ratio associated with a high school education and having unmet service needs was 1.75 (95% CI [1.06 – 1.89]). Earning less than \$10,000 year was associated with having more unmet service needs compared to those who earned more than \$10,000 (OR = 1.65; 95% CI [1.04 – 2.62]). Finally, experiencing homelessness within the last 12 months had a positive association of having unmet service needs when compared to those who have not experienced homelessness (OR = 2.97; 95% CI = [1.22 – 7.23]). A multivariable model adjusting for all covariates is shown in Table VI as well. After adjusting for covariates, homelessness was the only significant association that persisted (OR = 2.49; 95% CI = [1.02 – 6.11]). Age, education level, gender, race, earning less than \$10,000/year, and travel time also had non-significant associations between having unmet service needs when compared to referent categories among these characteristics. Sexual orientation and having receipt of public assistance had non-significant negative associations between having unmet service needs when compared to reference categories of these two characteristics.

Among those who exhibited at least one unmet service need (n = 242), the perceived barrier to this need was reported. Table VII shows reasons for a particular unmet service need stratified by Black and non-Black racial categories. Answers were summed across an individual, so if a participant had multiple unmet service needs, then they may have cited more than one barrier to their unmet service need. Financial/Practical

Barriers were cited as the largest barrier for both racial categories, followed by lack of information and agency/structural barriers. Blacks reported lack of information and agency/structural barriers as a bigger perceived barrier to service when compared to non-blacks.

### **III.IV - Discussion**

This study assessed which sociodemographic characteristics and individual-level structural barriers are associated with having at least one unmet need among people in HIV care in Georgia. Additionally, the specific types of services needed most by HIV-infected Georgians and whether or not these specific services went unmet were determined across two racial categories. Finally, perceived barriers to service needs were described for both racial categories. Experiencing homelessness within the last 12 months was associated with having at least one unmet service needs compared to those who haven't experienced homelessness in the bivariate and multivariate analysis. Despite no significant difference between Blacks and non-Blacks requesting ART Adherence Support services, a statistically significant difference between Blacks and non-Blacks having this need go unmet was found, with a higher percentage of non-Blacks (17%) reporting this need going unmet when compared to only 4% of Blacks. This analysis also shows that having only a high school education is associated with having more unmet needs compared to those who have post-high school education. Earning less than \$10,000/year is positively associated with having more unmet needs, but in the adjusted models, this association is not found, which means other structural barriers such as homelessness or receipt of public assistance was confounding this association.

These findings represent that individual-level characteristics and structural barriers can influence the degree which patients in HIV-care utilize supportive services. In this study, race was not found as a predictor to having at least one unmet service need. This finding is contradictory to the findings from studies in California which found a significant association between being Black or Hispanic and having at least one unmet service need (10,25). This non-significant association between race and degree of unmet service needs was evident with the lack of statistical interaction between race and the other sociodemographic characteristics and structural barriers. This suggests that HIV-care in Georgia is a generally equitable process across races and disparities may not be as pronounced as they are in other regions of the country.

Other findings from similar studies found that income was a predictor of having at least one unmet service need. In Marx et al, individuals earning less than \$10,000/year were found to forego services more than those who earned greater than \$10,000/year in the adjusted model (25). In Kalichman et al's study, those who experienced individual-level stressors like limited income were more likely to forego service needs compared to those who didn't state they had individual-level stressors (31). The Kalichman study was carried out in Atlanta, GA whereas this study used individuals throughout the entire state of Georgia. This difference, as well as operationalization differences of income between these two studies may be the source of the different associations between income level and unmet service needs.

Oral health care assistance was cited as the service need most as well as the service that individuals said went unmet most frequently. Among all individuals, 83% said that they needed oral health care assistance within the last 12 months and of those 83% who

needed this service (n = 345), 117 of them (34%) said this service need went unmet. These findings were similar to the article written by Kempf et al which found oral health care assistance was overwhelmingly needed and unmet among HIV-positive women in Mississippi (26). Oral health care assistance as a major service need as found in Kempf et al paired with the findings of this study suggests that inadequate oral health care assistance services are a unique challenge among HIV-infected individuals living in the Southern United States face.

Despite several efforts implemented in this study to investigate the association between sociodemographic characteristics and structural barriers to unmet service needs, the findings are subject to several limitations. This research was fortunate enough to use secondary data gathered and maintained by the Georgia Department of Public Health and the CDC. The CDC creates sampling weights for the data to capture the true distribution of those in HIV care in Georgia. However, since only 417 out of 1,200 (37%) possible candidates were sampled across the three years, there is a chance that selection bias was introduced into this study. This data had a limited number of transsexual/transgender individuals (n = 4) and because of this small sub-sample, all results pertaining to this population were omitted. It is known that transsexual/transgendered individuals also face unique challenges in their course of HIV treatment, so subsequent studies should utilize data with more complete data on these individuals (35). Only 31 people who identified as “other” were recruited across the 3 survey years. These individuals were grouped into the non-Black category, which includes several different races, including Whites, Hispanics, and Asian/Pacific Islanders. Despite no statistical difference between the “other” and “White” racial categories, there is documented evidence that Hispanics in Georgia are

less likely to be retained in care and reach viral suppression, so future studies should have data accessible with a larger Hispanic population to address differences among the different racial makeups of Georgia (28). HIV treatment protocols changed in 2012 and suggested that all infected individuals should be on a regimen of ART regardless of the CD4 and Viral Loads (36). Because this research only uses data up to this date, it is safe to assume that this wide-reaching treatment protocol change would not have an effect on the outcomes, but any possible regional or statewide changes that occurred in these years could have had an effect that went unnoticed in this study. Future research including this data set should include sensitivity analyses to determine the degree of selection bias that was introduced in this study stemming from a poor response rate. Finally, this study only focuses on those currently enrolled in some form of HIV care. Since it is estimated that only 37% of those diagnosed with HIV are in some form of care, this study is not generalizable to the entire prevalent population of Georgia and the rest of the United States. Future studies should consider those not enrolled in HIV care as well, so that their service needs are assessed as well.

HIV treatment is a multi-faceted process that provides clinical and ancillary care to those who seek it. This study revealed certain sociodemographic characteristics of those in HIV care that health care providers and case managers should pay particular attention to in order to ensure they are not forgoing service needs. The homeless population in Georgia, despite receiving treatment for their HIV are more likely to experience having an unmet need compared to those who haven't experience homelessness recently. This effect is exacerbated when you compare Black homeless in Georgia and non-Black homeless individuals. Those who earn limited income are more

likely to forgo their service needs, so it is important that case managers seek out and exhaust all resources available to ensure this population's needs don't become unmet. Because Financial/Structural barriers and Lack of Information were cited as the biggest barriers among those in care to having their needs met, it is important that agencies who provide HIV-related supportive services understand how cost of services can act as a barrier as well as poor communication between the agency and the individual. Georgia's HIV population is unique and faces several unique challenges that other locations many not experience. This research provides insight into how we can shape Georgia's treatment protocol into a better-directed and more equitable system.

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## Tables

**Table I. Demographic Characteristics of New HIV/AIDS Diagnoses and Prevalent HIV/AIDS Cases in Georgia<sup>a</sup>, 2012**

<i>Characteristic</i>	New Infections (n = 2,911)		PLWHA (n = 50,436)	
	n	%	n	%
<b>Sex</b>				
Male	2263	78%	37516	74%
Female	645	22%	12640	25%
Unknown	3	<1%	380	1%
<b>Age</b>				
<25	661	23%	2736	5%
25 - 29	462	16%	4017	8%
30 - 39	632	22%	10081	20%
40 - 49	656	23%	16241	32%
50 - 59	390	13%	12601	25%
60+	110	4%	4736	9%
<b>Race</b>				
White	307	11%	9793	19%
Black	1590	55%	32320	64%
Other	167	6%	3942	8%
Unknown	847	29%	4381	9%

<sup>a</sup> Uses estimated numbers resulting from statistical adjustment accounting for reporting delays and missing transmission categories

Adapted from: <https://dph.georgia.gov/data-fact-sheet-summaries>

**Table II. Demographic Characteristics of New HIV/AIDS Diagnoses and Prevalent HIV/AIDS Cases in the United States<sup>a</sup>, 2012**

<i>Characteristic</i>	New Infections <sup>b</sup> (n = 55,404)		PLWHA <sup>b,c</sup> (n = 950,854)	
	Count	%	Count	%
<b>Sex</b>				
Male	38,822	81%	661,072	75%
Female	9,289	19%	216,756	25%
Unknown <sup>d</sup>	-	-	-	-
<b>Age</b>				
<25	10,686	19%	41,475	4%
25 - 29	14,224	26%	122,471	13%
30 - 39	11,532	21%	156,511	16%
40 - 49	10,559	19%	299,554	32%
50 - 59	6,187	11%	239,338	25%
60+	2,216	4%	91,505	10%
<b>Race</b>				
White	13,296	27%	288,760	33%
Black	22,589	46%	379,985	43%
Other	13,008	27%	211,695	24%
Unknown <sup>d</sup>	-	-	-	-

<sup>a</sup> Uses estimated numbers resulting from statistical adjustment accounting for reporting delays and missing transmission categories

<sup>b</sup> Because column totals for estimated numbers are calculated independently of subpopulations, values in each column may not sum to total

<sup>c</sup> Using estimates from 2011

<sup>d</sup> CDC does not report unknown statistics separately and are incorporated into the sum total

Adapted from <http://www.cdc.gov/hiv/topics/surveillance/resources/reports/>

**Table III. Characteristics of Individuals Reporting At Least One Need, Medical Monitoring Project, Georgia, 2009 - 2011**

<i>Characteristic</i>	Total		Any Unmet Need		No Unmet Needs		p-value
	N = 417 <sup>a</sup>	wt. %	n = 242	wt. %	n = 174	wt. %	
<b>Age</b>							0.513
18-24	16	5%	10	4%	6	5%	
25-34	57	14%	36	15%	21	13%	
35-44	111	26%	69	28%	42	24%	
45-55	148	36%	86	36%	62	35%	
55+	84	20%	41	17%	43	24%	
<b>Education Level</b>							0.0361
< High School Diploma	73	16%	46	18%	27	13%	
High School Diploma	119	29%	76	32%	43	24%	
> High School Diploma	225	54%	120	50%	105	62%	
<b>Gender</b>							0.4611
Male	286	68%	166	68%	120	70%	
Female	127	30%	75	32%	52	28%	
<b>Race<sup>c</sup></b>							0.192
Black	240	60%	163	69%	107	63%	
Non-Black	175	40%	77	31%	68	37%	
<b>Sexual Orientation</b>							0.1935
Homosexual/Bisexual	200	49%	112	47%	88	54%	
Heterosexual	210	51%	126	54%	84	46%	
<b>Income</b>							0.0327
≤ 10,000/yr	128	33%	82	37%	46	26%	
>10,000/yr	268	67%	143	63%	125	74%	
<b>Public Assistance</b>							0.9704
Yes	192	44%	107	44%	85	44%	
No	219	56%	130	56%	89	56%	
<b>Travel Time</b>							0.1988
> 30 mins	197	46%	122	48%	75	42%	
≤ 30 mins	220	54%	120	52%	100	58%	
<b>Homelessness, past 12 months</b>							0.0027
Yes	41	10%	33	14%	8	5%	
No	376	90%	209	86%	167	95%	

wt. % = weighted percentage

**Table IV. Characteristics of Individuals by Unmet Needs between 2 Racial/Ethnicity Categories, Medical Monitoring Project, Georgia, 2009 - 2011**

<i>Characteristic</i>	<b>Total</b>		<b>Any Unmet Need</b>				<b>No Unmet Needs</b>					
	N = 417 <sup>a</sup>	wt. %	Black n = 163	wt. %	Non-Black n = 77	wt. %	p-value	Black n = 106	wt. %	Non-Black n = 68	wt. %	p-value
<b>Age<sup>b</sup></b>							0.3092					0.7395
18-24	16	5%	9	6%	1	1%		4	7%	2	2%	
25-34	57	14%	24	14%	12	16%		12	12%	9	14%	
35-44	111	26%	48	31%	21	24%		26	23%	16	24%	
45-55	148	36%	54	33%	32	44%		37	33%	25	39%	
55+	84	20%	28	16%	11	15%		27	25%	16	22%	
<b>Education Level<sup>g</sup></b>							0.0226					<.001
< High School Diploma	73	16%	34	21%	12	14%		21	17%	6	7%	
High School Diploma	119	29%	58	36%	17	23%		33	31%	10	13%	
> High School Diploma	225	54%	71	43%	48	63%		53	52%	52	80%	
<b>Gender</b>							0.0302					<.0001
Male	286	68%	102	63%	62	79%		59	59%	63	93%	
Female	127	30%	61	37%	14	21%		47	41%	5	7%	
<b>Sexual Orientation<sup>d</sup></b>							0.0075					<.0001
Homosexual/Bisexual	210	51%	66	41%	46	61%		33	35%	55	85%	
Heterosexual	200	49%	95	59%	29	39%		72	65%	12	15%	
<b>Income<sup>e, g</sup></b>							0.5319					<.0001
≤ 10,000/yr	128	33%	58	39%	24	34%		40	38%	6	5%	
>10,000/yr	268	67%	93	61%	48	66%		64	62%	61	95%	

**Table IV (cont'd). Characteristics of Individuals by Unmet Needs between 2 Racial/Ethnicity Categories, Medical Monitoring Project, Georgia, 2009 - 2011**

<i>Characteristic</i>	<b>Total</b>		<b>Any unmet need</b>				<b>No unmet needs</b>					
	N = 417	wt. %	Black n = 163	wt. %	Non-Black n = 77	wt. %	p-value	Black n = 106	wt. %	Non-Black n = 68	wt.%	p-value
<b>Public Assistance<sup>f</sup></b>							0.1516					0.0015
Yes	192	44%	79	48%	28	37%		64	54%	21	28%	
No	219	56%	82	52%	46	63%		42	46%	47	72%	
<b>Travel Time</b>							0.2979					0.9682
> 30 mins	220	54%	87	50%	43	57%		45	41%	38	58%	
≤ 30 mins	197	46%	76	50%	34	43%		62	59%	30	42%	
<b>Homelessness, past 12 months</b>							<.001					0.9438
Yes	41	10%	28	19%	5	5%		5	5%	3	5%	
No	376	90%	135	81%	72	95%		102	95%	65	95%	

**Table V. Types of HIV-Related Supportive Services Needed and Unmet between 2 Racial Categories, Medical Monitoring Project, Georgia, 2009 - 2011**

<i>Service Needed</i>	Number of Types of Service Needs Reported by Race							Number of Types of Unmet Needs by Race						
	Black		Non-Black		Total		p-value	Black		Non-Black		Total		p-value
	n = 270	%	n = 147	%	N = 417	%		n	%	n	%	n	%	
Dental Services Assistance	219	81%	126	86%	345	83%	0.0978	83	38%	34	27%	117	34%	0.2943
HIV Case Management	169	63%	79	54%	248	59%	0.0656	28	17%	10	13%	38	15%	0.5616
Public Assistance Support	189	70%	85	58%	274	66%	0.1098	43	23%	28	33%	71	26%	0.2568
ADAP Assistance	144	53%	79	54%	223	53%	0.9343	14	10%	5	6%	19	9%	0.9652
Preventative Education	147	54%	48	33%	195	47%	<.001	1	1%	2	4%	3	2%	0.3234
Mental Health Counseling	73	27%	57	39%	130	31%	0.0087	15	21%	10	18%	25	19%	0.176
ART Adherence Support	77	29%	39	27%	116	28%	0.6546	3	4%	7	18%	10	9%	0.0097
Food and Meal Assistance	95	35%	41	28%	136	33%	0.3221	25	26%	13	32%	38	28%	0.7925
Peer Support Assistance	86	32%	31	21%	117	28%	0.0857	21	24%	14	45%	35	30%	0.57
Transportation Assistance	87	32%	32	22%	119	29%	0.0753	30	34%	16	50%	46	39%	0.89
Housing/Shelter Assistance	67	25%	26	18%	93	22%	0.0617	31	46%	17	65%	48	52%	0.8663
Alcohol and Substance Abuse Counseling	20	7%	12	8%	32	8%	0.7824	2	10%	1	8%	3	9%	0.7721
Home Health Services Assistance	15	6%	2	1%	17	4%	0.0745	4	27%	0	-	4	24%	-
Child Care Services Assistance	7	3%	3	2%	10	2%	0.8202	3	43%	0	-	3	30%	-
Domestic Violence Support	7	3%	2	1%	9	2%	0.2645	1	14%	0	-	1	11%	-

Each cell percentage under Number of Types of Unmet Needs by Race is the percentage of individuals in the corresponding cell under Number of Types of Service Needs Reported by Race who had a particular service need go unmet.

**Table VI. Bivariate and Multivariable Analyses between Selected Participant Characteristics and Degree of Unmet Service Needs, Georgia, 2009 - 2011**

<i>Characteristic</i>	Any Unmet Need		No Unmet Needs		Odds Ratio (95% CI)	Adjusted Odds Ratio (95% CI)
	n = 242	%	n = 174	%		
<b>Age<sup>b</sup></b>						
18-24	10	63%	6	38%	1.78 (.45 – 7.09)	1.55 (0.31 – 7.69)
25-34	36	63%	21	37%	1.49 (.70 – 3.17)	1.54 (0.68 – 3.47)
35-44	69	62%	42	38%	1.76 (.94 – 3.31)	1.72 (0.87 – 3.38)
45-55	86	58%	62	42%	1.48 (.82 – 2.67)	1.48 (0.79 – 2.74)
55+	41	49%	43	51%	Referent	Referent
<b>Education Level<sup>g</sup></b>						
< High School Diploma	46	63%	27	37%	1.49 (0.82 – 2.74)	1.46 (0.85 – 2.54)
High School Diploma	76	64%	43	36%	<b>1.75 (1.06 – 1.89)</b>	1.33 (0.67 – 2.65)
> High School Diploma	120	53%	105	47%	Referent	Referent
<b>Gender</b>						
Male	166	58%	120	42%	1.31 (.82 – 2.08)	1.13 (0.60 – 2.12)
Female	75	59%	52	41%	Referent	Referent
<b>Race<sup>c</sup></b>						
Black	163	60%	107	40%	1.33 (0.87 – 2.04)	1.16 (0.70 – 1.91)
Non-Black	31	65%	17	35%	Referent	Referent
<b>Sexual Orientation<sup>d</sup></b>						
Homosexual/Bisexual	112	56%	88	43%	.76 (.49 – 1.16)	.99 (0.53 – 1.83)
Heterosexual	126	63%	84	37%	Referent	Referent
<b>Income<sup>e, g</sup></b>						
≤ 10,000/yr	82	64%	46	36%	<b>1.65 (1.04 – 2.62)</b>	1.46 (0.89 – 2.48)
>10,000/yr	143	53%	125	47%	Referent	Referent
<b>Public Assistance<sup>f</sup></b>						
Yes	107	56%	85	44%	1.02 (.67 – 1.56)	0.89 (0.54 – 1.46)
No	130	59%	89	41%	Referent	Referent
<b>Travel Time</b>						
> 30 mins	122	63%	75	36%	1.21 (.79 – 1.86)	1.29 (0.82 – 2.03)
≤ 30 mins	120	57%	100	43%	Referent	Referent
<b>Homelessness, past 12 months<sup>g</sup></b>						
Yes	33	80%	8	20%	<b>2.97 (1.22 – 7.23)</b>	<b>2.49 (1.02 – 6.11)</b>
No	209	56%	167	44%	Referent	Referent

**Table VII. Reasons for Unmet Services among Those Reporting At Least One Unmet HIV-Related Supportive Service Need by Race (n = 242), Medical Monitoring Project, Georgia, 2009 - 2011**

<i>Reason for Unmet Need</i>	Black (n = 163)		Non-Black (n = 77)	
	n	%	n	%
Financial/Practical Barriers	73	27%	37	48%
Lack of Information	67	25%	27	35%
Agency/Structural Barriers	36	13%	14	18%
Other Barriers	12	4%	12	15%
Psychological Barriers	15	6%	7	9%