2019

Social and Structural Barriers to Safer Sex Among Heterosexual Female Sex Workers

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Walden University
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Abstract

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MPH, DePaul University, 2010

BS, Chicago State University, 2008

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

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Abstract

Individuals infected with HIV through heterosexual contact made up 24% (9,578) of all new infections in the United States. Female sex workers are at increased risk of getting HIV and other sexually transmitted infections (STI) because they may be more likely to participate in risky sexual behaviors including sex with multiple partners and condom-less anal/vaginal sex. Guided by the syndemic theory, the purpose of this study was to explore the relationships between social and structural factors (homelessness, substance use, immigration status, and use of healthcare) and risky sexual behaviors (condom-less vaginal sex and multiple sex partners) among female sex workers while controlling for age and sexual violence. This study was conducted using a quantitative research approach with a correlational method. Multiple linear regression statistical testing was performed using data from 534 participants from the National HIV Behavioral Surveillance study. Immigration status was not significantly associated with condom-less vaginal sex or multiple sex partners. However, homelessness and substance use were positively associated with condom-less vaginal sex and multiple sex partners. In addition, utilization of healthcare was negatively associated with condom-less vaginal sex. The results from this study can increase awareness and knowledge of challenges and barriers among female sex workers living in Illinois. In addition, the results of this study may contribute to establishing baseline epidemiology of this population and guidelines on addressing the factors associated with unsafe sexual behaviors that can potentially lead to HIV and other STIs.

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Dedication

This research study is dedicated to every individual who is or was a victim of abuse and those dealing with stigma related to HIV and other STIs. To all public health practitioners who have committed time to addressing the root causes of health issues. Finally, I would like to dedicate this study to those individuals who implemented surveys, analyzed data, partnered with community members, and worked late nights for the National HIV Behavioral Surveillance study.

Acknowledgments

I would like to thank my committee chair Dr. Peter Anderson for agreeing to work with me on my research study, reviewing my papers in such a timely fashion and providing me with feedback to make me a fully functional researcher. In addition, I would like to thank my committee member Dr. Leslie Elliot for providing me with feedback and recommendations related to my research methods and analysis.

I would like to thank my late mother Beverly Ann James who has always been my inspiration and motivation in my life. I will forever miss you. To my husband Issac Davis who has encouraged me along the way to never give up even when I wanted to give up. You always push me to be my best. You are my biggest supporter. To my children (Yazmin, Issys, Ariel and Isaiah) always follow your dreams and know that you can be anything your heart desires. Be fearless in the face of adversity, never stop learning, remember where you came from, but never lose sight of where you are going. Finally, I would like to thank my aunt Dr. Linda Moore. The first African American woman in my life to obtain a doctoral degree. As an underprivileged young black girl faced with many challenges you showed me with persistence and determination anything is possible.

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Chapter 1: Introduction to the Study

Introduction

The prevalence of HIV continues to be problematic for the United States, specifically in Illinois. The Illinois Department of Public Health (IDPH) reported there were 12,213 people living with HIV and 12,216 people living with AIDS in Chicago as of June 30, 2017. Worldwide, there were approximately 37 million individuals living with HIV in 2016 (World Health Organization [WHO], 2018). Furthermore, the WHO (2018) reported that there were 1.8 million newly diagnosed individuals in 2016. Risky sexual behaviors including condom-less anal/vaginal sex and multiple sex partners can contribute to the prevalence of HIV disease worldwide (Center for Disease Control and Prevention [CDC], 2016a).

Commercial sex workers are individuals who exchange sex for money or nonmonetary items (CDC, 2016a). Commercial sex workers are a unique population that has specific needs (CDC, 2016a). In this study, I investigated the relationships between social and structural factors and risky sexual behaviors among female sex workers. Factors such as substance use, homelessness, immigration status, and utilization of health care services was investigated to learn the potential relationship between condom-less anal/vaginal sex and the number of sexual partners among female sex workers. Secondary data from the National HIV Behavioral Surveillance (NHBS) study was used to conduct these investigations.

Social change results in behavior and cultural change. It involves changing the way a person thinks or responds (American Sociological Association, 2018). This can be

political, environmental, cultural, or economical (American Sociological Association, 2018). The study results may be used to contribute to positive social change through altering structural and social factors that contribute to unsafe sexual practices among female sex workers. This can occur through increasing the level of information and knowledge researchers, medical providers and public health professionals currently have as it relates to female sex workers. Changing the way public health professionals and other clinicians implement services can also lead to changes within community-based practices. These practices may often have to address many competing social and clinical needs. Governmental agencies can develop funding that will specifically be allocated to agencies that are able to address the factors that can lead to unsafe sexual practices. The state of Illinois has adopted a framework called, "Getting to Zero" (AIDS Foundation of Chicago [AFC], n.d.). This means zero new HIV infections and zero people living with HIV who are not on treatment (AFC, n.d.). These are some of the overarching goals of this state and were encouraged by other states adopting this framework including New York, San Francisco, and Washington State (AFC, n.d.). This study's research results may contribute to this local and statewide initiative ultimately influencing social change. Social change can occur at many levels beginning with the individual, progressing through the community, and ending with federal agencies. Change can occur with community-based organizations and how they implement services, with clinicians who may have gaps in knowledge related to female sex workers and with governments who wish to identify the primary needs of hard-to-reach populations.

In this chapter I provide an overview of the background of this study, the theoretical framework, the assumptions, definitions of the study and limitations. I also introduce the research questions and the problem statement for the study.

Background

Social determinants of health can play a major role in a person's HIV status (Canadian AIDS Treatment Information Exchange (CATIE), 2018). Specifically, homelessness, addiction, lack of employment opportunities, lack of legal residence, and lack of social support are all things that can potentially play a role in HIV transmission and/or the ability to seek treatment and prevention services (CATIE, 2018). Social and structural factors related to HIV transmission have been studied in many countries including South Africa, Tanzania, Nepal, and Canada (CATIE, 2018.; Deuba et al., 2016; Kohli et al., 2017; Whittaker, 2016). Researchers Deuba et al., (2016) highlighted the syndemic effects of microlevel social and structural factors involved with unprotected sex and HIV among female sex workers in Nepal. Commercial sex workers in Nepal were 14 times more likely to become infected with HIV and were more likely to experience discrimination, violence, and stigma than other women in low- and middle-income countries (Deuba et al., 2016). Researchers recruited 610 female sex workers to participate in HIV testing and interviews related to social, physical, and economic factors (Deuba et al., 2016). The prevalence of unprotected sex among the study participants was 24% and increased based on the number of factors that each person experienced (Deuba et al., 2016).

Challenges among migrant sex workers living in Guatemala related to HIV were investigated by researchers Brouwer, Goldenberg, Jimenez, Miranda, and (2016). The researchers concluded that criminalization of sex work as well as lack of citizenship was factors associated with reluctance to take part in HIV research (Goldenberg et al., 2016). These factors could lead to limitations in the availability of studies specifically related to commercial sex workers. Similarly, Duff et al. (2015) investigated commercial sex work and social and structural barriers among parenting women in Canada. The researchers' findings included factors such as the criminalization of commercial sex work, injection drug use, poverty, homelessness, and fear of having their children taken away; moreover, these factors contributed to risky behaviors and/or prevented women from seeking needed services (Duff et al., 2015). Factors associated with interference of HIV education in Cape Town, South Africa was investigated by Whittaker (2016), who concluded that prevention programs should tailor their programs to the target population. Similarly, Deuba et al. (2016) reported that for prevention efforts to be sustained the factors that lead to sex work need to be understood. Overall, all researchers reported similar findings in their studies (Deuba et al., 2016; Duff et al., 2015; Goldenberg et al., 2016; Whittaker, 2016). Understanding the needs of the target populations may lead to development of improved program planning and outcomes.

Researchers Caney, Williams, Plüddemann and Parrey (2015) conducted a study in Durbin, South Africa and aimed to gather information related to substance use and HIV transmission risk among commercial sex workers. The authors used logistic regression statistics to investigate the relationship among condom use, substance use, and

HIV-related risk behaviors (Caney et al., 2015). The researchers reported that there was an association among over the counter drug use and involvement in risky sexual behaviors (Caney et al., 2015). The researchers included information in their discussion related to the need to have targeted intervention strategies for commercial sex workers (Caney et al., 2015).

Commercial sex work (CSW) is a topic that has not been studied considerably in the United States. In fact, the CDC (2016a) reported that there is a need for population-based studies among commercial sex workers. In Chicago, there is currently limited surveillance related to the prevalence of HIV among those who report the exchange of sexual favors for money or nonmonetary items. After conducting this study, I hope to increase knowledge and education related to factors that can potentially be associated with unsafe sexual behaviors among female sex workers. The study results may be used as baseline knowledge about female sex workers in Chicago and the study findings can potentially be generalizable to a larger population of female sex workers. Currently, there is a gap in knowledge regarding social structural barriers of female sex workers and surveillance of sex workers in Chicago. The 2010 NHBS project showed a prevalence of 16.6% sex exchange among men and women combined (Decker, Beyrer and Sherman, 2014). The 2010 NHBS project lacked some specific details about sex workers including the nature of sex work, consent or exploitation, and degree of formality (Decker et al., 2014). Currently, the NHBS captures data related to several indicators including substance use/abuse, access/use of healthcare services sexual risk factors, violence, criminalization activities and social networks among many other indicators (CDC,

2015c). Surveillance related to these activities can justify the need for programs aimed at preventing HIV/STIs among female sex workers (CDC, 2015c). Without surveillance, describing the behaviors of this often-overlooked population there can be a risk of poor and incomplete understanding of factors associated with HIV/STI transmission (Decker et al., 2014). The CDC added questions to the NHBS study in 2015 to begin to gather data specific to female sex workers excluding males and transgender male-to-females (CDC, 2016b). The NHBS projects can aid in assessing the many factors associated with female sex workers (FSWs) and the programs and/or resources that are needed to address those factors. The CDC (2016a) reports on several different transmission categories as it relates to HIV such as males-who-have-sex-with-other males (MSM), injection drug use (IDU), heterosexuals and, MSM who are also injection drug users. However, it is not well known if HIV transmission was related to commercial sex work (CDC, 2016aa) among these categories. Structural factors affect individual behaviors and should be a part of prevention programming (CATIE, 2018.).

Problem Statement

Sex workers face unique challenges that can enhance their risks of HIV and other STIs (Decker et al., 2014). Many individuals who participate in risky sexual behaviors may not know their HIV status (CDC, 2015a). Drugs and alcohol are strongly associated with exchanging sex (CDC, 2016a). When people exchange sex under the influence of drugs and alcohol, they engage in risky forms of sexual behavior including unprotected anal and vaginal sex (CDC, 2016a). In addition, individuals who engage in drugs and alcohol use have poor condom negotiation skills (CDC, 2015a). CSWs take part in risky

sexual behaviors and can potentially be exposed to HIV and other STIs (Shannon et al., 2014). Some examples of risky sexual behaviors described by the CDC (2016a) include condom-less sex and sex with multiple partners. CSW is described as the exchange of sexual favors for money or nonmonetary items (CDC, 2016a). There are many factors that can contribute to unsafe behaviors among sex workers including income, the type of partners they exchange sex with (main versus casual), and the power dynamics within these relationships (CDC, 2015a). In addition, these individuals experience many challenges such as homelessness, unemployment, incarceration, lack of access to healthcare, and mental/physical/emotional abuse (CDC, 2015a). The prevalence of female sex work in the United States is not exactly known; however, it is estimated that among 42 million sex workers across the world, about 1 million live in the United States (Hance, 2015). A systematic review of published articles related to sex workers and the prevalence of HIV among sex workers in the United States was completed using 14 studies published between 1987–2013 and included 4,049 female sex workers (Paz-Bailey, Noble, Salo, & Tregear, 2016). The reviewers illustrated that there was a high prevalence of HIV among sex workers; mostly among those who injected drugs (Paz-Bailey et al., 2016). Less than half of the women had a health screening in the last year and had an average of 17 sex partners per week (Paz-Bailey et al., 2016). Similarly, researchers investigated risky sexual behaviors among 646 female sex workers in Durbin, South Africa and determined that 29% (189) of those involved in sex work had previously been diagnosed with HIV, all participants reported being involved in condom-

less vaginal and oral sex and lastly participants reported using cannabis (63.5%), alcohol (97%), and ecstasy (24.3%) during their sexual encounters (Carney et al., 2015).

Structural factors are described as things that are independent of individuals but may affect behaviors (Christopherharpertill, 2015). Some examples of structural factors include access to healthcare, work conditions, housing, community support, and economics (Christopherharpertill, 2015). As it relates to social factors, researchers investigated the associations among several social context factors including alcohol use by family members, alcohol use by peers and client-perpetrated pressure or violence (Su, et al., 2015). Results showed that alcohol use by peers predicted the alcohol use among female sex workers (Su et al., 2015). As a result, China adopted a multilevel approach to reduce negative social influence (Su et al., 2015). Similarly, a qualitative systematic review of articles showed that injection drug use resulted from sociostructural factors including social networks and individual interactions (Strathee et al., 2015). Overall, the researchers discussed the varying meanings for individual involvement in injection drug use and how that is shaped by social factors including family history of alcohol and drug use, client perpetrated pressure, client violence, and alcohol use by peers (Su, et al., 2015). These social factors ultimately resulted in involvement in substance use.

In a recent article published by United Nations programme on HIV/AIDS (UNAIDS) (2014), the authors recommended that prevention programs remove structural and social barriers, offer protection against violence and abuse, and protect the human rights of CSWs. Extended research related to CSWs has been completed outside the United States; however, there are limited studies testing the relationships between socio-

structural barriers and risk of HIV/STIs among FSWs in the United States, leaving a gap in the literature (CDC, 2016a). Behavioral interventions implemented in combination with structural interventions may prevent factors leading to risky behaviors among CSWs (CDC, 2016a).

Purpose of Study

The purpose of this study was to investigate the relationships between the sociostructural factors of substance use, homelessness, immigration status and use of health care services and risky sexual behaviors (condom-less anal/vaginal sex and number of sex partners) among FSWs in Chicago ages 18-60 years. To address the research questions a quantitative methods approach was completed using numeric data. Archived data previously collected was analyzed to test what sociostructural factors could potentially be correlated with risky behaviors among FSWs.

Research Questions

1. RQ1: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers?

   $H_0$1: There are no relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

   $H_1$1: There are relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

2. RQ2: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and number of sex partners among female sex workers?

   $H_0$2: There are no relationships between substance use and homelessness and number of sex partners among female sex workers.

   $H_1$2*:* There are relationships between substance use and homelessness and number of sex partners among female sex workers.

3. RQ3: After controlling for age and sexual violence what are the relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_0$3: There are no relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_1$3: There are relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

4. RQ4: After controlling for age and sexual violence, what are the relationships between immigration status and utilization of health care services and number of sex partners among female sex workers?

   $H_0$4: There are no relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

   $H_1$4: There are relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

Theoretical Framework

The theoretical framework that was used to guide the research questions includes the syndemic theory. Syndemics was first reported by Singer in 1994 (Wilson et al., 2014). Singer conducted investigation on the role of substance abuse, violence, and AIDS (collectively known as SAVA) and how these led to poor health outcomes in Northeastern United States (Wilson et al., 2014). He highlighted that the components of SAVA reinforced one another and while one syndemic component decreased the other would decrease (Wilson et al., 2014).

More recently, Brennan et al. (2012) applied the syndemic theory in their research that involved investigating the psychosocial and social marginalization factors associated with sexual risk behavior and self-reported HIV tests. The syndemic theory can be described as several factors that interact with one another leading to an increase in vulnerability to a specific health condition (Brennan et al., 2012). Brennan et al. investigated HIV risk among young transgender individuals using the syndemic theory framework and described the framework as health problems that work together in a context of social and physical conditions making individuals increasingly vulnerable to health conditions affecting the overall health status of a population. Similarly, Wilson et al. (2014) investigated the vulnerability of HIV among Black and Latino men using the syndemic theory. The researchers investigated the syndemics of HIV/AIDS, trauma, substance use, poverty and incarceration that resulted in the development of a conceptual model describing how the interconnection of these elements contribute to the prevalence of HIV/AIDS (Wilson et al., 2014). This theory can be set apart from other theories

because it does not merely address comorbidities and/or coexisting conditions but more importantly focuses on the physiological and psycho-sociological conditions that interact with one another contributing to the development of disease (Wilson et al., 2014).

I investigated factors that could potentially lead to participation in risky behaviors among commercial sex workers in Chicago. For this study, social and structural factors including immigration status, use of healthcare services, substance use, and homelessness were tested as independent variables (IVs) and condom-less anal/vaginal sex and number of sex partners as dependent variables (DVs).

Nature of the Study

The nature of this study was a quantitative approach using a correlational method that used data from the NHBS project (CDC, 2015c) to investigate social and structural barriers and risk behaviors among those involved with commercial sex work. This study was conducted using correlational research with an explanatory approach. This approach allowed me to use numeric information to describe social and structural barriers and behaviors of a population (see Creswell, 2014). This method also allowed me to address the problem by conducting tests to determine if there is a correlation among predictor and outcome variables. In this case, I investigated the factors that could lead to risky behaviors in CSWs.

For this study, I used secondary data previously collected. Primary data was collected using a Computer Assisted Person Interview (CAPI) (CDC, 2015c). The researchers identified seeds, who were individuals who were a part of the target population to conduct the interviews. Each potential seed was required to be screened

and interviewed to assess eligibility (CDC, 2015c). Once eligibility was confirmed, the seeds were responsible for recruiting others to participate in the interview (CDC, 2015c). Eligible participants include heterosexual female born individuals ages 18-60 who lived in Chicago (CDC, 2015c). This method was repeated until the sample size goal was met (CDC, 2015c). Individuals that were seeds were given unique survey ID numbers different from the participants and were not be included in the overall study population (CDC, 2015c). The data set included a collection of responses related to but not limited to social factors, economics, education, behaviors, incarceration, and health history. The data can potentially be used to describe behaviors and barriers specific to persons involved in CSW. The study variables included the independent variables of substance use, homelessness, immigration status, and use of healthcare services and the dependent variables of condom-less anal/vaginal sex and multiple sex partners. Substance use involves individuals who have a history of using alcohol, injection drugs and/or Non-injection drugs. Homelessness involves those individuals who may be living from house to house, a shelter, a car or anywhere that is not known for human habitation. Immigration status is defined as those individuals whose nativity is different than the United States. For this variable, I focused on those born outside the United States and determined if there are any relationships among the variables. Use of health services was described as a person having used primary care services. This did not include other social support services such as substance abuse counseling, mental health counseling and dental care. Condom-less anal/vaginal sex involved individuals who had sex without using any protective barrier. Some individuals had anal and vaginal sex. Both behaviors

were assessed to determine any relationships among the variables. Lastly, multiple sex partners DV was described as a person who has had sex with one or more individuals over a period of 12 months. This includes partners of the opposite sex. I used a quantitative research approach with a correlational method for this study. Secondary data from the NHBS study was analyzed using SPSS to determine the relationship among the variables selected for this study. This includes social and structural barriers and their relationship with unsafe sexual practices among female sex workers.

Operational Definitions

CIS Gender Female – Denoting or relating to a person whose self-identity conforms with the gender that corresponds to their biological sex; not transgender (Brydum, 2015).

Commercial Sex Worker – People who exchange money for sex or nonmonetary items (CDC, 2016b) (NHBS Question # HRW1.).

Condom-less Sex – Vaginal and/or Anal sex without using a condom (CDC, 2015d). (NHBS Question # HRW18, P.5; HRW22, P.6; HRW27, P.7)

Healthcare Use – Use of health care is defined as a person that has seen a doctor, nurse or other health care provider in the last 12 months from the date of the interview (CDC, 2015b) (NHBS Question #DM8b., DM8d., P.49).

Homelessness – Homelessness is defined as a person who is living on the street, in a shelter, in a single room occupancy hotel (SRO), or in a car in the past 12 months from the date of the interview (CDC, 2015d) (NHBS Question #DM1, DM1a P. 43).

Human Immunodeficiency Virus (HIV) – HIV is a virus that attacks the body's immune system (Avert, 2017).

Immigration Status – This is a structural factor which refers to a person who is a native of a country outside of the United States and has migrated to the United States (Finno-Velasquez, Cardoso, Dettlaff and Hurlburt, 2015; Ybana, Ha, and Chang, 2014) (NHBS Question # DM3, DM3spec., DM3a, P. 44)

Multiple Sex Partners – Number of men in the last 12 months who the respondent had vaginal, oral, or anal sex with. (CDC, 2015d) (NHBS Question # SX19., P72; HRW15, P.5; HRW19, P.5; HRW21, P.6).

Social Factors – Factors that affect our thoughts and behaviors in social situations (Nugent, 2013).

Structural Factors – Things outside of an individual's control and can be social, economic, legal-political, and cultural (USAID, 2015).

Substance Use – This is a social factor described as alcohol use within the last 30 days, injection drug use within the last 12 months and Non-injection/injection (street or illicit drugs and prescription drugs) use within the last 12 months (CDC, 2015d) (NHBS Question #AL1, P. 109; ID1, P. 111; ID1b.num., P. 112; ND1, P.127; ND2A, P128; ND2B, P.128; ND2C, P.128; ND2D, P.128; ND2E, P.128; ND2F, P.129; ND2G, P.129; ND2H, P.129, ND2J, P.129).

Assumptions

Assumptions for this study were related to the activities conducted during primary data collection. I assumed that the study tool was reliable, and the participants responded

to each question. Validity of the study was also assumed due to the nature in which the interviews were conducted. All interviewers were gatekeepers among the target population and were instructed to read each question as listed using CAPI software (CDC, 2015d). I assumed that the study participants gave honest answers to the best of their recollection because all the interviewers were a part of the target population and recruited members from their networks. I assumed that the research instrument used reliably measured the constructs in this study as a result of the many layers of review and input conducted by primary researchers with developing the interview questions. I assumed that all the participants were properly screened for eligibility and fit the criteria due to the intense training and screening that occurred for each recruiter.

Delimitations and Scope

I focused on social and structural factors that contribute to unsafe sexual practices among female sex workers. These social and structural factors included homelessness, substance use, immigration status, use of healthcare, condom-less anal/vaginal sex, and number of sexual partners. Populations involved in the study include female born persons' ages 18-60 of all races and ethnicity living in Chicago, Illinois (CDC, 2015c). The availability of research on female sex workers and surveillance of female sex workers in the United States is limited (CDC, 2015c; Decker et al., 2014). Highlighting the factors associated with unsafe sexual practices can provide baseline knowledge and data about this population. Public health professionals can have some knowledge and education about the needs of sex workers and determine whether these needs are multilayered. The delimitations of the study interviewers included being a part of the

target population, completing training before conducting interviews and entering data in using a CAPI software. The scope of this study was limited to cisgender females that were 18-60 years of age, have not participated in previous study cycles, are alert and oriented, can speak English or Spanish and consented to participate in the study. The scope was also limited to individuals who identified as female, who live in Chicago and answered yes to questions related to exchanging sexual favors with males for monetary or nonmonetary items. The study results can potentially be generalized to a larger population of female born persons involved in commercial sex work and are living in Chicago. The social determinants of health conceptual framework are involved with social-political context, structural determinants and socioeconomics, and intermediary determinants (WHO, 2010). The framework was not chosen because the level of detail involved with the framework (WHO, 2010). The social determinants of health conceptual framework focused more on structural factors versus the social factors involved with risky sexual behaviors. In addition, this framework focuses on the inequities and lack of policies involved with these determinants versus the relationships among these determinants and behaviors (WHO, 2010).

Limitations

Some level of limitation and bias is bound to occur during research. During this study, I faced some potential internal and external validity issues. The following are limitations of this study:

- The study results only included cis gender females which limits information about other genders who also participate in sex work and the data that could be received from other populations.
- Individuals did not answer all the questions or did not answer the questions completely and led to data limitations in the study. Some individuals may have had difficulty recalling certain events leading to recall bias.
- Reliability and validity testing of the entire question package was not completed by the primary researchers and has impacted the ability to demonstrate construct validity.
- The pilot study conducted used a combined method of respondent driven sampling and venue-based sampling method and analyzed data using both methods together.

Limitations related to recall bias and reliability/validity instrument testing was not addressed due to the study involving secondary data. All participant interviews were de-identified preventing any contact information from being collected resulting in inability to conduct participant follow-up. As it is related to confounder variables, I introduced control variables age and sexual violence to the study statistical testing.

One bias that may have influenced this study is selection bias. Primary researchers identified this bias when using response driven sampling (RDS). The study may have involved some participants being overrepresented due to their networks potentially being larger than the other participant networks (CDC, 2015c). When one study participant has a large network, the individuals involved in the study may have

similar characteristics which can influence the ability to generalize the study results to a larger population of female sex workers. It is also possible that recall bias or responder bias was present in this study. This type of bias can be intentional or unintentional due to the nature of the questions being embarrassing or socially unacceptable such as, answering questions about anal sex activities (Sedgwick, 2014). Activities that primary researchers conducted to minimize this bias included extensive training for all interviewers, recruiting individuals from the interviewer's network, computerized questionnaires and review and revision of questions to be specific and detailed about the participant's social and sexual history (CDC, 2015d). Lastly, there were several values missing for dependent variables condom-less anal sex and condom-less vaginal sex. Overestimation of the standard of error or underestimated standard of error may have occurred due to the use of pairwise deletion technique to replace missing values for these variables.

Significance

The study is significant for public health programs that interact with individuals displaying behaviors of female sex workers. Population-based studies of sex workers are not widely available and should focus efforts on addressing the incidence and prevalence of STIs among sex workers (UNAIDS, 2014). I sought to discover the relationship among social and structural factors and female sex worker's decision to participate in sex work. In addition, statistical testing was done to test any correlation among the study variables and the strength of the correlation. The study results can potentially describe if there were multiple syndemics that contributed to unsafe sexual practices. The study

results might be used to design programs specifically to concentrate on the barriers that female sex workers experience. Moreover, this could lead to increased availability of funding aimed to address sociostructural factors associated with risky behaviors among female sex workers. Results could add to current research and provide data to agencies at the local, state and federal level seeking to engage with CSWs. Public health officials could promote positive social change by developing strategies specific to risky sexual behaviors among female sex workers and hopefully reduce the risks associated with condom-less sex and sex with multiple partners. In addition, specific strategies can be developed within public health programs to be used as evidence-based models that address the sociostructural factors associated with risky sexual behaviors among female CSWs.

Summary

This chapter provided information related to the prevalence and incidence of HIV across the world and within Illinois. Information related to social determinants of health and structural factors related to HIV infection was outlined documenting previous science related to the factors that have been concluded to be associated with HIV and STI disease. The study framework related to the syndemic theory was reviewed in detail as a guide for this study. The syndemic theory was used to outline the interactions of social and structural factors that can lead to disease. The limitations of the study were identified and can potentially be primarily related to completeness of the data which involves the willingness of participants responding to questions and the ability of the individual to

recall events. Social implications of this study involve the development of prevention funding and programming that is specific to the needs of those involved in sex work.

Chapter 2 includes literature related to key variables and concepts that was used in this study. In addition, a detailed overview of literature describing the data source, sex workers and HIV transmission are included in the study. Lastly, Chapter 2 highlight gaps in the literature reviewed.

Chapter 2: Literature Review

Introduction

HIV and AIDS has consistently been a problem in the United States and surrounding countries (CDC, 2017a). There were 37,600 new HIV cases reported in 2014 and an estimated 1.1 million people were living with HIV at the end of 2015 (CDC, 2017a). The CDC estimates about 15%, or 1 in 7, of those individuals did not know that they were HIV positive. In 2015, Illinois had 35,441 individuals living with HIV whereas; Chicago had 20,082 individuals living with HIV (AIDSVu, 2015; CDC, 2017a). In 2004, there were 7,476 prostitution arrests in Chicago (Chicago Data Portal, 2018). In 2009, Cook County implemented social services programs for sex workers and began closely monitoring sex work in Chicago ultimately leading to a decrease of 734 reported prostitution arrest in 2017 (Chicago Data Portal, 2018).

Commercial sex workers are more commonly women and even though there are men and transgenders involved in sex work; this study focuses on female sex workers. Sex workers are described as individuals who exchange sex for money and are at increased risk of exposure to HIV and other STIs (CDC, 2017a). Commercial sex workers are more likely to engage in risky sexual behaviors such as sex with multiple partners and condom less sex (CDC, 2017a).

There can be several factors that contribute to the decision to participate in sex work. Factors that contribute to inconsistent condom use among sex workers include economics, the type of partner (long-term customers versus short-term customers) and power dynamics (CDC, 2016a). People who exchange sex for drugs and have sex while

under the influence of drugs and alcohol can have impaired judgment and engage in risky forms of sex (CDC, 2016a). They also have difficulty negotiating safer sex and have an increased number of instances where they are participating in condom-less sex. Some individuals who do not know their status or do know their status may not know where to access services, are not comfortable with sharing confidential information, mistrust the healthcare system and have financial circumstances such as health insurance coverage that affect health care access (CDC, 2016a). People who exchange sex for money or nonmonetary items may experience substance use issues and poor healthcare use that can contribute to HIV transmission (CDC, 2016a).

The purpose of this research study was to investigate the social and structural factors of substance use, homelessness, immigration status and utilization of healthcare and their relationship with risky sexual behaviors including condom-less anal/vaginal sex and sex with multiple partners. There has been much research internationally specific to the sex work population however there is a lack of research and surveillance of sex work behaviors within the United States (Paz-Bailey et al., 2016).

In this chapter, I reviewed literature related to commercial sex work, risky sexual behaviors of female sex workers, social determinants of health, the syndemic theory and sociostructural factors associated with sex work among women. This chapter is a detailed overview of the sociostructural factors that contribute to sex work, the syndemic theory and behaviors that place sex workers at risk for HIV.

Literature Search Strategy

Research was reviewed from multiple subject areas including health sciences, human services, psychology, and social work. The types of literature reviewed include meta-analysis, qualitative research, and secondary data sources. The literature review began with a search of research databases including CINHAL, MEDLINE, PUBMED, PsyhcINFO, SOCindex with full text and articles from the CDC and the World Health Organization (WHO). Peer reviewed articles were searched from years 2014 through the present using the following key words: *commercial sex work, social factors, structural factors, syndemic theory,* and *risky behaviors.*

Theoretical Framework

Syndemic theory describes two or more conditions that interact and can lead to increased disease burden (Batchelder, Gonzalez, Palma, Schoenbaum & Lounsbury, 2015). Singer (Wilson et al., 2014) was the first to propose the SAGA syndemic which referred to concurrent and reinforcing substance abuse, violence, and HIV infection among low-income and racial/ethnic minorities (Robinson, Knowlton, Gielen & Gallo, 2015). Brennan et al. (2012) used the syndemic theory to assess the interaction of disease and social conditions in transgender women. The researchers hypothesized that co-occurring psychosocial and health conditions are additive factors associated with HIV risk (Robinson et al., 2015). Psychosocial factors such as low self-esteem, polysubstance use, and victimization were assessed along with homelessness and incarceration (Brennan et al., 2012). A total of 151 young transgender women participated in the study, with 75 being from Chicago (Brennan et al., 2012). The study results showed that 52% had a

history of incarceration and 67% had participated in sex work (Brennan et al., 2012). Polysubstance use and intimate partner violence were significantly related to self-report of HIV infection and sexual risk behavior (Brennan et al., 2012). The researchers proposed that the prevalence of HIV infection among transgender sex workers is high and this may differ depending on the type of sex work (Brennan et al., 2012). Furthermore, the authors reported that future studies are needed to investigate whether health issues should be addressed in sequence or if multiple issues should be addressed at one time (Brenna et al., 2012). However, Robinson et al. (2016) proposed that these things should be addressed collectively. These researchers investigated syndemic factors including substance use, mental illness and familial conflict among African American women living with HIV (Robinson et al., 2016). There were only three studies during this time that applied the syndemic theory to assess factors on HIV medical outcomes (Robinson et al, 2016). Robinson et al.'s study is unique when compared to others due to the focus on disadvantaged HIV positive African American women. The researchers reported that these individuals were more likely to be active substance users, suffer from mental illness and have familial conflict (Robinson et al., 2016). Like previous studies (Batchelder et al., 2015; Brennan et al., 2012), researchers reported that those who experience more syndemics are more likely to have poor HIV medical outcomes (Robinson et al., 2016).

The syndemic theory has consistently been used to understand how psychosocial factors are related to HIV medical outcomes. In New York, Black and Latino men were identified as a target population to include in the study of structural, social, behavioral, and biological factors that are associated with vulnerability to HIV (Wilson et al., 2014).

The investigators explained that current research has yet to fully identify the things that may reduce syndemics which can potentially have a negative impact on sex workers (Wilson et al., 2014). They explored the use of complex systems, multidisciplinary and interinstitutional collaboration, and involvement in public health as potential solutions to vulnerability to HIV (Wilson et al., 2014). To my knowledge, use of the syndemic theory to understand factors associated with unsafe sexual behaviors among female sex has not been used in the United States. Furthermore, the researchers mentioned in this section failed to demonstrate the association among risky sexual behaviors and HIV outcomes related to female sex workers (Batchelder et al., 2015; Brennan et al., 2012; Robinson et al., 2016 & Wilson et al., 2014).

Literature Review of Key Variables and Concepts

National HIV Behavioral Surveillance (NHBS)

The NHBS was developed to assist the state and local health departments in maintaining a surveillance system to monitor specific behaviors and prevention services among high risk groups for HIV infection (CDC, 2015c). The CDC's advisory committee for HIV and STI prevention proposed the need for a national plan for HIV/AIDS prevention (CDC, 2015c). The CDC (2015c) developed the NHBS in 2002 as a start toward addressing HIV and AIDS. In addition, several state and local health departments were funded to develop and implement the national HIV behavioral surveillance project activities (CDC, 2015c). Funding was given to state and local health departments that have the highest prevalence of HIV (CDC, 2015c). The CDC implanted the following activities in rounds:

- MSM
- IDU
- High Risk Heterosexual Women

NHBS is the only population-based system that provides data on HIV positive and negative individuals that know and do not know their HIV status (CDC, 2015c). The project objectives are to monitor behaviors that place people at risk for HIV infection (CDC, 2015c).

NHBS data has been used to explore many factors associated with HIV risk and prevention among several different populations. NHBS surveillance data was collected from the 2010 heterosexual cycle and included men and women ages 18-60, living in a Metropolitan Statistical Area (MSA) who had participated in vaginal and anal sex with one or more opposite-sex partners in the last 12 months before the interview (Sionean et al., 2014). MSAs are cities funded through their state health department and funded directly by CDC to provide NHBS project activities (CDC, 2015c). These MSAs include Chicago, Houston, Los Angeles, New York, Philadelphia, San Francisco, San Diego, Denver, Washington, Miami, Atlanta, New Orleans, Boston, Detroit, Nassau, Newark, San Juan, Dallas, Memphis, Portland, Virginia Beach, and Seattle (CDC, 2015c).

The NHBS report summarized HIV-associated risk, prevention, and testing behaviors among 9,278 heterosexual men and women interviewed in 2010 (Sionean et al., 2014). The researchers compared HIV risk of those with high socioeconomic status with those of low socioeconomic status (Sionean et al., 2014). While my study potentially shows the relationship among substance use and risky sexual behaviors in the

Chicago area, other researchers have used NHBS to explore similar variables. According to Sionean et al. (2014), the study results showed that 90% of women in the study reported having vaginal sex without a condom with one or more partners in the past 12 months. A large percentage (59%) of participants reported using Non-injection drugs in the last 12 months (Sionean et al., 2014). NHBS data has been used across the United States, primarily focusing on men who have sex with men. Many of the variables that have been used in these studies with MSM and IDU were also be used in my study with females who exchange sex for monetary or nonmonetary items.

Similarly, Balaji et al. (2017) explored the relationship between sexual minority stigma and psychological distress as it relates to HIV-related risk behaviors among MSM. Researchers conducted a cross-sectional study in 20 U.S. cities to examine the association between sexual minority stigma and psychosocial distress (Balaji et al., 2017). Verbal harassment, discrimination, and physical assault were all data variables investigated to understand the relation to stigma (Balaji et al., 2017). Cross sectional studies are common among researchers using NHBS data because they can investigate the factors at a given point in time (Balaji et al., 2017; Sionean et al., 2014). Healthcare access and use is another variable used by researchers to assess factors associated with HIV risk. Coffin et al. (2014) used NHBS data to investigate the use of health care and HIV prevention services for injection drug users living in San Francisco. According to Coffin et al. (2014), there were 82.5% of individuals who had accessed health care coverage and 58.6% who were HIV positive in 2012.

The use of NHBS data goes beyond just the burden of disease to include behavioral data that contributes to HIV risk (Paz-Bailey et al., 2014). The data also allows for the investigation of structural factors including homelessness, poverty and lack of insurance (Paz-Bailey et al., 2014). This data can possibly be used to explain the prevalence of HIV across different cities over time. Many researchers have used NHBS data to investigate relationships between contributing factors to HIV risk and/or transmission; however, there have not been studies completed that focus on female sex workers in Chicago. Data have been used to explore factors within several cities overtime and within specific cities over time. This data has yet to be used to describe the prevalence of HIV and factors associated with risky behaviors that can lead to HIV transmission in female sex workers. Although the NHBS project has been existing for several years, in 2016 the CDC decided to add questions regarding the exchange of sex for money or nonmonetary items (CDC, 2016b). The data has yet to be used or researched thus far. My study can potentially be instrumental to contributing to research focused on sex workers considering the CDC wishes to establish surveillance for this population and understand risky sexual behaviors. This study can contribute to NHBS science and serve as a catalyst to program development and implementation for female sex workers in the United States.

HIV Transmission

HIV and STIs can be a consequence of condom-less sex and/or sex with multiple partners. In this section, I review advancing knowledge about HIV and how HIV is transmitted from person to person. HIV is most commonly transmitted by sexual

behaviors or needle or syringe use (CDC, 2017a). It can be spread through blood, semen, pre-seminal fluid, rectal fluids, vaginal fluids, and breast milk (CDC, 2017a). It is primarily spread in the United States by having anal or vaginal sex without the use of a condom (CDC, 2017a). In fact, vaginal sex is less risky than anal sex due to the thin lining of the rectum (CDC, 2017a). STIs such as syphilis and genital herpes that cause a break in the skin or sores make it easier for HIV to enter a person's body during sexual activities (CDC, 2017a). This connection between HIV and other sexually transmitted infections including gonorrhea, chlamydia, syphilis, trichomoniasis, human papillomavirus, genital herpes and hepatitis can place a person at increased risk of HIV transmission (CDC, 2017a). That being the case, having an STI and having sex with an HIV positive person can potentially place a person at increased risk of HIV transmission (CDC, 2017a). Condoms are highly effective in the prevention of HIV but they provide less protection against some STIs including syphilis, genital herpes, and human papillomavirus because these STIs can be spread by skin-to-skin contact (CDC, 2016a). When a person has unprotected vaginal and/or anal sex and/or conducts these behaviors with multiple partners it can potentially put them at risk for HIV and STIs.

HIV and Sex Workers

While surveillance data related to sex workers and HIV may be limited in the United States it is important to note the past science and the need for further investigation with the commercial sex work population. Researchers systematically identified and critically assessed published studies reporting HIV prevalence among female sex workers in the United States (Paz-Bailey et al., 2016). The investigators reported that among 14

studies and 4,909 female sex workers there was very limited information available related to sexual practices and factors that contribute to HIV prevalence (Paz-Bailey et al., 2016). Furthermore, researchers emphasized the lack of information related to the female sex work population and the age of the studies which included only two studies conducted in the last 10 years (Paz-Bailey et al., 2016). Obtaining a better understanding of the prevalence of HIV among female sex workers could inform HIV prevention activities (Paz-Bailey et al., 2016). After analyzing several articles, Paz-Bailey et al. (2016) concluded that the level of research completed is limited, lacks important information and has very few studies that have been completed within the last 10 years. I can contribute to research through my investigation of risky sexual behaviors among female sex workers by analyzing behavioral, social, and structural data. This study results can enhance the lack of data and knowledge known about sex workers and begin to fill gaps related to the availability of surveillance data among commercial sex workers

A large portion of this section is contributed to qualitative and quantitative research conducted outside of the United States since most studies focusing on HIV among sex workers has occurred outside the United States. Surveillance data helps public health practitioners gain an understanding of the burden of disease. The lack of surveillance data regarding HIV among sex workers and the behaviors of this population can ultimately contribute to transmission of HIV and other STIs (Beyrer et al., 2014). The United States and Canada are both unique countries that have a lack of surveillance data related to the spread of HIV among sex workers (Beyrer et al., 2014; Paz-Bailey et al., 2016). Neither of these places collected HIV surveillance data specific to females

who participate in sex work (Beyrer et al., 2014). In recent research a total of 111 studies in 50 countries were analyzed to capture the prevalence of HIV among sex workers (Beyrer et al., 2014). Overall, the average percentage of HIV among female sex workers was 11.8% with Sub-Saharan Africa having the highest (36.9%) prevalence among the 50 countries (Kerrigan, 2013; Paz-Bailey et al., 2016). When investigating the global aspect of HIV burden, South Africa was a place that most needed interventions tailored for sex workers with 15% of HIV infections being among female sex workers (Beyrer et al., 2014). Sex workers were highly affected by HIV globally (Kerrigan, 2013; Paz-Bailey et al., 2016). Beyrer et al. (2014) emphasized the importance of HIV prevention programs that specifically focus on macrostructural change including decriminalization of sex and environmental changes including elimination of violence and police harassment is needed to help decrease the transmission of HIV among sex workers. The high prevalence of HIV among sex workers in Africa can largely be due to macrostructural factors (Kerrigan, 2013; Paz-Bailey et al., 2016).

Macrostructural factors, including sexual violence, criminalization of sex, and police harassment, have contributed to the prevalence of HIV among sex workers outside of the United States (Breyer et al., 2014; Kerrigan, 2013; Paz-Bailey et al., 2016). Although researchers have conducted much investigation regarding macrolevel structural factors, there is little literature contributing to how these factors correlate with risky sexual behaviors (Breyer et al., 2014; Kerrigan, 2013; Paz-Bailey et al., 2016). Sex workers have been underexplored in the United States (CDC, 2016a). The prevalence of HIV within the United States is not well understood due to the lack of surveillance data

among this population (CDC, 2015a). In this study, I investigated the relationships of structural and social factors on risky sexual behaviors and contribute to science the challenges, barriers and needs of females who participate in risky behaviors. The study results can possibly be used to promote funding toward HIV prevention focusing on female sex workers in the United States.

Social and Structural Factors

In the previous section I considered the prevalence of HIV among commercial sex workers and the epidemiology of HIV in the United States. In this section I review literature involving social and structural factors and potential associations to risky sexual behaviors that may involve transmission of HIV. The role of structural determinants of HIV and access to care for female sex workers is not well understood (Shannon et al., 2015). Factors influencing women's HIV risk was studied using a socioecological approach that described these factors as interacting (Frew et al, 2016). These factors were described as levels which included the individual, dyadic, network and community level that are all a part of larger systems (Frew et al., 2016). Individual and dyadic levels are all microsystems while network level is described as a mesosystem affecting individual behavior and community level is described as an exosystem which can affect individuals indirectly (Frew et al., 2016). The respondents involved in this study reported factors within the socioecological approach and how these factors influenced vulnerability to HIV. Education, poverty, gender imbalances, community and housing are all things that are a part of the microsystem that may contribute to risky behaviors. Researchers used the CDC National HIV Behavioral Surveillance sampling methodology

to identify communities from which women at risk for HIV could be drawn (Frew et al., 2016). A total of 288 women ages 18-44 years of age had reported at least one episode of unprotected sex with a man in the last 6 months were included in the study (Frew et al., 2016). Using venue-based sampling the study participants were chosen from 6 U.S. communities including Atlanta, Baltimore, New York City, Newark, Raleigh-Durham, and Washington (Frew et al., 2016). The results showed that there were several factors that were related to trading sex for money, food, housing, drugs or other gifts and aligned to the socioecological model including lack of HIV/STI awareness and vulnerability, sexual risk taking and substance use, interpersonal support, sex exchange, intimate partner violence within the microsystem; organization support and community support within the mesosystem; and poverty, discrimination, gender imbalances, community violence and housing challenge at the exosystem level (Frew et al., 2016). Several factors were correlated; for example, poor financial support and environmental living conditions were all related to trading sex for money, food, housing, drugs, or other gifts that contributed to a better living (Frew et al., 2016). Four themes were identified at each level including community (exosystem), network (mesosystem), dyadic (microsystem) and individual (Frew et al., 2016). Over 80% of the study population reported financial insecurity as a theme which was linked to risk taking behaviors (Frew et al., 2016). Thus, one factor can lead to another for example; poor education can lead to inability to find a job.

The influence of structural factors on risky sexual behaviors among commercial sex workers has been studied by several researchers including Shannon et al. (2015) who

conducted a systematic review of available epidemiological data from India, China, Latin America, and the Caribbean to gather structural determinants of HIV risk among female sex workers. These researchers argued that higher education and literacy level would help mitigate HIV risk among female sex workers. Similar to Frew et al. (2016) socioecological framework Shannon et al. (2015) included in their study, information related to macro-level structural factors that played a central role in HIV among female sex workers including criminalization and punitive policies, stigma, low-income and residential instability (housing instability). The researchers systemic review of epidemiological, qualitative, and grey literature showed associations between macro-level factors such as laws or policies and community organization (Shannon et al., 2015). These macro-level factors were also associated with several HIV risks including number of clients, non-condom use, alcohol use, injection drug use and HIV rates (Shannon et al, 2015). With regard to economics, Deuba et al. (2016) and Shannon et al. (2015) both concluded that economics was found to be a factor associated with poor condom use among Commercial Sex Workers (CSWs). In addition, migration and mobility have had a non-linear effect on the risk of HIV among female sex workers. Female sex workers who were mobile and migrated domestically had enhanced vulnerability to HIV while those who migrated internationally had decreased levels of HIV prevalence and higher condom use (Shannon et al., 2015). Mobility and migration was also largely associated with geographical features such as immigration or emigration to high prevalence areas and urban versus rural migration (Shannon et al., 2015). Similarly, research conducted by Urada, Morisky, Pimentel-Simbulan, Silverman and Strathdee (2012) used the same

approach to describe socio-structural factors at the micro-level and the macro-level when they explored environmental and individual factors associated with condom negotiation among female sex workers. Out of 142 female sex workers who traded sex in the last 6 months there was 24% who did not negotiate condom use (Urada et al., 2012). Physical environment, economics, policies, and substance use were all factors associated with the lack of condom negotiation (Urada et al., 2015). The role that the environment has played with HIV risk is prevalent in other countries. In Vancouver, Canada the work environment played a vital role in the prevalence of HIV among female sex-workers (Shannon et al., 2015). The authors discussed those individuals that have moved from street-based sex work to venue-based sex work and how this was largely due to criminalization laws and police officers who would confiscate the sex workers condoms (Shannon et al., 2015). A decision to decriminalize sex work would take effect by 2014 and researchers Shannon et al. (2015) predicted that this would lead to a 39% decrease of infections in Canada. Although in December of 2014 bill c-36 protecting communities and exploited persons Act became law, sex workers in Canada continue to face predatory immigration raids, deportation, and arrest (Prasad, 2017). The need for sex work reform is continuing to be encouraged by citizens of Canada (Prasad, 2017). HIV prevention programs for sex workers should include interventions at the micro and macro-level to address the holistic needs of sex workers (Shannon et al., 2015). Many factors at different levels can contribute to the prevalence and risk of HIV among sex workers. The environment, laws, policies, behavioral and social factors all can contribute to involvement in risky sexual behaviors. Research conducted within and outside of the

U.S. both include details related to the importance of focusing on micro-level and macro-level factors that play a role on the transmission of HIV and STIs among female sex workers (Frew et al., 2015; Shannon et al., 2015;). Although researchers have conducted investigation outside of the U.S. with a focus on diverse factors very little research within the U.S. has investigated the role of social and structural factors on risky sexual behaviors (CDC, 2016a). This study can potentially contribute to research regarding social and structural barriers of female sex workers and potentially enhance knowledge of public health professionals. I wish to contribute new research that can influence policies and practice related to female sex workers and the need for funding specifically for this population. I investigated the relationships among healthcare utilization and immigration status and multiple sex partners and condom-less anal/vaginal sex among female sex workers in the United States.

Substance Use and High-Risk Behaviors

Substance abuse is defined as the harmful or hazardous use of psychoactive substances which includes alcohol and illicit drugs (World Health Organization (WHO) 2018). The use of substances can lead to a dependence syndrome which is described as a cluster of behavioral, cognitive, and physiological phenomena (WHO, 2018). Health problems from the use of alcohol have ranged from mental health disorders to unsafe sexual behaviors (WHO, 2018). A study conducted in Uganda that included a cohort of female sex workers investigated the social context of high-risk sexual relationships among women at high risk of HIV infection (Mbonye, Kumwa, Weiss & Seeley, 2014). The study participants reported consistent alcohol use during sexual encounters. Some

women reported that it made them feel calm and more comfortable when trying to pick-up customers. In addition, participants reported participating in condom-less sex while under the influence of alcohol. Alcohol use contributed to decision making of the women in the study (Mbonye et al., 2014). Complementary to other studies researchers conducted outreach to 646 female sex workers in Durban (Carney et al., 2015). The researchers reported 29% of those females were HIV positive and 56.3% had a history of an STD (Carney et al., 2015). As it relates to drug and alcohol use, 217 of the 646 women reported inconsistent condom use (Carney et al., 2015). Inconsistent condom use was related to alcohol (96.3%), Cannibis (67.3%), Ecstasy (24.0%), prescription drugs (12.9%) and cocaine (12.4%) use for the respondents (Carney et al., 2015). These were reported as being the top five choices of substances for the study participants (Carney et al., 2015). According to Strathdee et al. (2015) drug trafficking is considered a macro-level risk while drug use is considered a micro-level risk. HIV risk behaviors among female sex workers can be influenced by factors at the micro and the macro-level (Strathdee et al., 2015). Micro-level social risk factors involve little social support (Strathdee et al., 2015). These researchers conducted a study with 143 women in the Philippines and reported 58% being under the influence of drugs with inconsistent condom use (Strathdee et al., 2015). The researchers concluded that individuals who have had a better support system are associated with more consistent condom use (Strathdee et al., 2015). Community organization is very important in reducing the risk of HIV among female sex workers (Strathdee et al., 2015). Lack of social support has consistently been

shown in studies as a micro-level factor that contributes to distrust which leads to social isolation (Frew et al., 2016).

Female sex workers that were married were found to experience more sexual violence than those who were not married, likely due to their willingness to submit to their husbands (Alemayehu et al., 2015). Those with higher levels of education may have better negotiation skills and conflict management skills (Alemayehu et al., 2015). Subsequently, researchers concluded that low self-esteem and vulnerability of women led to traumatic experiences including intimate partner violence (Alemayehu et al., 2015). Sex workers face stigma, discrimination, and violence around the world and are more likely to become HIV-infected than other women in low- and middle-income countries because of their line of work (Alemayehu et al., 2015; Deuba et al., 2016). The researchers investigated physical violence, poor social support and condom negotiation skills and economic micro-level factors as associations to unprotected sex (Deuba et al., 2016). Interaction between two or more micro-level factors was found to be associated with increased participation in unprotected sex. Although micro-level factors were investigated for association the researchers failed to include macro-level factors that could also potentially be associated with unprotected sex among female sex workers. Another study completed in Northern Ethiopia had 250 commercial sex worker participants of which 75.6% reported experiencing sexual violence in their lifetime (Alemayehu et al., 2015). In addition, there were 55.6% of women who reported being pressured to have sex without a condom, 45.6% who had physical harm inflicted on them and 60% who reported unwanted genitalia touching. The researchers argued that some of

the major predictors of sexual violence included educational status, marital status, drug use and income (Alemayehu et al., 2015). While both Alemayehu et al. (2015) and Deuba et al. (2015) discussed drug use among female sex workers neither included data or details in their studies regarding the association among drug use and condom use and condom negotiation among sex workers. On the other hand, researchers Carney et al. (2015) investigated substance use and condom use among female sex workers but failed to gather details regarding anal sex among the study participants to determine other levels of risks.

There are many factors that can potentially be associated with participation in risky sexual behaviors. Substance use has many interactions with other syndemics such as education, marital status, and income level (Alemayehu et al., 2015; Deuba et al., 2016). Substance use can lead to sexual violence and sexual violence can lead to risky sexual behaviors (Alemayehu et al., 2015). In several articles women who reported condom-less sex also reported using substances and were victims of physical violence (Mbonye, Kumwa, Weiss & Seeley, 2014; Strathdee et al., 2015). Researchers Mbonye et al. (2014) and Strathdee et al. (2015) conducted research investigating the association of substance use and inconsistent condom use. However, other researchers focused on associations of substance use and sexual violence (Alemayeh et al, 2015; Frew et al., 2016). Strathdee et al. (2015) highlighted many details related to the physical, social, economic and policy influences on HIV risk among female prisoners and female sex workers. However, there was no data related to the prevalence of HIV among female sex workers. In addition, female prisoners were inclusive of transgender females which may

affect generalizability (Strathee et al., 2015). There were no details regarding the location and number of articles reviewed which also may affect the ability to make any inferences. The needs and challenges of those involved with sex work may be different than those who were born female versus transgender females. While substance use was mentioned several times as a risk factor for female prisoners and sex workers there was no literature documenting if female prisoners were incarcerated due to substance use or sex work (Strathee et al., 2015). The link between female prisoners and sex workers could have been enhanced if these details were available. While substance use can potentially be associated with a variety of factors I on the other hand investigated the associations between substance use and participation in sex with multiple partners and condom-less anal/vaginal sex. This study focused on the relationships among substance use and condom-less sex and multiple sex partners among female sex workers.

Housing and Health

Housing was considered a Public Health indicator in the Healthy People 2020 report and is a strong social determinant of health (American Public Health Association (APHA), 2016). Healthy housing can be a contributing factor to keeping individuals healthy (APHA, 2016). According to Borrell, Malmusi and Muntaner (2017) unstable housing leads to poor mental health. Researchers Hankel, Heil, Dewey, and Martinez (2016) sought to develop a demographic profile of women seeking transitional housing services who wished to exit the sex trade. The researchers gave a detailed overview of factors associated with housing instability and characteristics of female sex workers involved in sex work (Borrell et al., 2017). There were 87 case files reviewed at this

transitional facility. Subsequently the researchers discovered that many of the women share similar demographics, experiences with employment, the criminal justice system, substance abuse issues and mental health conditions (Borrell et al., 2017). Similar demographics included an average age of 33 years, 52% identified as white and 52.9% reported to be single (Hankel et al., 2016). There were 25% of women who reported that they desired a stable living environment which was their reason for entering the transitional living facility. Similarly, researchers Brennan et al. (2012) and Duff et al. (2015) both reported high percentages, 88% and 43%, of homelessness among individuals involved in sex work. Although Brennan et al. (2012) has research that indicates associations among homelessness and sex work the study participants all identified as transgender females and does not highlight any syndemics among female born sex workers. Hankel et al. (2016) discuss how secure and adequate housing can improve the overall health of individuals while public policies can address housing instability. In Europe housing conditions were related to poverty and associated with poor health outcomes (Hankel et al., 2016). Researchers Bowen, Canfield, Trostle, and Harley (2015) further investigated the impact of transitional housing for sex workers with 263 adult women. The study participants were all enrolled in a transitional housing program that led to 45% of the women involved becoming permanently housed (Bowen et al., 2015). Participants who were older and had stable housing were more likely to obtain permanent housing within this program. Homelessness and sex work are strongly related. In addition, having stable housing is instrumental to women leaving the sex trade (Bowen et al., 2015). Many of the women involved in sex work shared many

characteristics with one being the need to have stable housing which may have had a big impact on being involved in sex work. Those who had unstable housing often were low-income, had been involved in the criminal justice system and had substance use issues. Homelessness is an independent variable that was investigated to understand its relationship with participating in risky sexual behaviors for this study. While researchers Duff et al. (2015) and Hankel et al. (2016) both confirm that homelessness is prevalent among female sex workers, the association of homelessness and unsafe sexual practices was not included in their study's. An article was developed to urge law makers, housing authorities and shelter systems to take a harm reduction approach to developing housing for street-based sex workers (Breakstone, 2015). Breakstone (2015) from University of New York's law school reported responses from 26 street-based sex workers who had unstable housing. Non-profit providers from New York reported that there is a lack of housing options available and there are no options available for street-based sex workers. Much like Hankel et al. (2016) the author reports that a "housing first" model is needed to provide the important link between emergency shelter/transitional housing systems and the community-based and governmental services and resources that may currently exist (Breakstone, 2015). Borrell et al. (2017) agree that adequate housing and access to stable housing contributes to improved overall health. Borrell et al. (2017) go in depth regarding housing and its' impact on overall health however, there are no specific details in the study related to how housing contributes to risky sexual behaviors.

Housing can have a huge impact on the health and wellbeing of sex workers. I reported the science related to the impact of poor housing on female sex workers and the

gap within structural systems that may contribute to participation in risky behaviors. Researchers agree that housing has an impact on overall health outcomes (Borrell et al., 2017; Hankel et al., 2016) yet, the association among housing and risky sexual behaviors among female sex workers still needs to be further explained (Bowen et al., 2015). Although there are housing transition programs for women involved in sex work there is still a deficit in the availability of housing and the long-term effects of stable housing among women who were previously unstably housed. Understanding the impact of poor availability and/or access to housing and participation in risky sexual behaviors among female sex workers can assist in addressing the potential needs of this population. Although many sex workers have reported unstable housing I explored potential relationships among female sex workers who are homeless and participate in risky sexual behaviors.

Immigration and Utilization of Health Care Services among Sex Workers

Immigration policies can affect the health of immigrants and those who do not have the proper documentation including driver's license (Rhodes et al., 2015). An immigrant involves coming to live in a country of which they are not a native (U.S. Legal, 2016). Testing of Sexually Transmitted Infections and HIV are often delayed in this population due to the stigma involved with these diseases (Rhodes et al., 2015). Both Rhodes et al. (2015) and Socías et al. (2016) explored how immigration policies affect immigrant's decision to participate in healthcare services. Researchers Socías et al. (2016) assessed the correlation and prevalence of institutional barriers to healthcare among sex workers in a universal health care environment in Vancouver, Canada. The study results illustrated

that there was a strong association between the lack of health coverage and access to healthcare among sex workers (Socías et al., 2016). Researchers Rhodes et al. (2015) further investigated the association between access and utilization of healthcare among immigrants living in North Carolina. The researchers explored how immigrant policies affected the utilization of health services among Hispanic/Latinos. Rhodes et al. (2015) concluded that mothers sought prenatal care later and had inadequate care compared to non-Hispanics. In addition, immigrants had a mistrust of the health system and often delayed seeking services as a result. Researchers documented several factors associated with poor utilization of health care services including fear of deportation, interaction with law enforcement and lack of required documents (Rhodes et al., 2015). Unmet healthcare needs were examined in Canada among female sex workers (Benoit, Ouellet & Jansson, 2016). Researchers asked women ages 19 and older, "How often in the previous 12 months did you feel you needed healthcare but did not receive it?" Using a bivariate analysis, the researchers reported that adults working in the sexual industry had a higher prevalence of socio-demographic characteristics that were related to structural disadvantage (Benoit et all., 2016). These demographics included; less likely to be married, less likely to report good or excellent mental and general health and less likely to have completed high school (Benoit et al., 2016). Sex workers also reported feelings of not belonging to their community and cost as factors that contributed to unmet healthcare needs. More importantly, sex workers reported in a need's assessment that judgmental health care and social services providers were the most important reason for not accessing healthcare services (Benoit et al., 2016). While there are provider-patient

barriers that prevent sex workers from seeking care there are also immigration policies that can potentially lead to poor utilization of health care services. Section 287(g) of the immigration and nationality act became widely used in the mid-2000s and required state and local law enforcement to enforce federal immigration laws (Rhodes et al., 2015). This law involved removing undocumented immigrants that were convicted of sexual-related offenses among others and was considered a barrier to accessing care among immigrants (Rhodes et al., 2015). These researchers (Benoit et al., 2016; Rhodes et al., 2015) nevertheless failed to make the distinction between access and utilization of healthcare and unsafe sexual practices among sex workers. Further research was conducted to explore patterns and factors associated with utilization of HIV-related and general health services (Pan et al., 2015). There were 429 women in Shanghai that completed questionnaires to assess their utilization of free health care services in the previous 12 months (Pan et al., 2015). The most common health services that was used by the participants includes physical exams (236), HIV testing (179) and face-to-face health promotion (138) (Pan et al., 2015). There was a high demand for free community-based services and integration of free HIV testing for female sex workers in Shanghai (Pan et al., 2015).

Structural barriers are further discussed by researchers Goldenberg, Brouwer, Jimenez, Miranda, and Mindt (2016) who highlighted the intersection between human rights and migrant workers involved in sex work in Guatemala. Some of the factors that may influence the ability to engage migrant sex workers in prevention programs include their immigration status and fear of criminalization (Goldenberg et al., 2016). Similarly,

Duff et al. (2015) concluded in their study with pregnant and parenting mothers the need to move away from the criminalized nature of sex work in efforts to decrease stigmatization of sex work and for the development of prevention programs. Research related to the impact of immigration policies on access to and utilization of healthcare is limited (Rhodes et al., 2015). In addition, interventions that focus on increasing the knowledge of immigration rights and the process to access healthcare services are needed (Rhodes et al., 2015). Much of the research included in this section is not specifically related to sex workers who are migrants and choose not to use healthcare services. In addition, there is not much known about the behaviors of the study participants and the risks involved with not utilizing healthcare services. Researchers Rhodes et al. (2015) and Socías et al. (2016) reported how immigration status led to delayed utilization of healthcare services among immigrants. On the other hand, Pan et al. (2015) emphasized in their research that many participants used community health services. Researchers concluded that although some individuals delayed services others decided to participate in community health services. Although Socías et al. (2016) described the strong association between lack of health coverage and access to healthcare services there is still some question as to whether services consist of primary health care or include mental health services. In addition, the researchers fail to include details regarding the association among immigrants and utilization of healthcare services. While much research has been completed outside of the U.S. including Shanghai, Guatemala, and Canada, little is known about the association of immigration and utilization of healthcare services among female sex workers in the U.S. (CDC, 2016a). Although Rhodes et al.

(2015) conducted some research with Hispanic women living in North Carolina the authors did not include details regarding whether access and utilization of health care is primarily related to immigration or patient-provider relationships (Rhodes et al, 2015; Socías et al, 2016). In addition, the relationship between healthcare utilization and immigration status has yet to be fully understood among this population including factors that may contribute to delayed utilization of healthcare services (Pan et al., 2015; Rhodes et al., 2016; Socías et al., 2016). Benoit et al. (2016) documented that fear was one reason why sex workers delayed going to the doctor however they did not include details in their research regarding reasons why sex workers had fear of going to the doctor.

Immigration policies and the fear of criminalization laws are some of the structural factors that can lead to poor healthcare utilization among sex workers. Many people may migrate to the United States and are experiencing difficulty utilizing healthcare. Immigration could potentially lead to participation in risky behaviors in efforts to have access to income and other non-monetary items that female sex workers may not have had access to otherwise. In my study I investigated the relationship with immigration status and risky sexual behaviors among female sex workers.

Summary

Sex work involves a unique group of individuals that have unique risk factors that require specific interventions (Beyrer, 2014). For this study, I focused on sex work among females living in Chicago. The impact of structural factors including laws and policies related to female sex workers can be harmful and contribute to the vulnerability of sex workers for contracting HIV (Beyrer, 2014). Many scientists have contributed to

literature related to vulnerability to contracting HIV and have concluded that commercial sex workers have common characteristics such as substance use issues, homelessness, fear of criminalization laws, sexual violence, low education and low-income status (Alemayehu et al., 2015; Brown, Catfield, Trostle & Harley, 2015; Deuba et al., 2016; Frew et al., 2016; Goldenburg et al., 2016; Shannon et al., 2015). There is limited research on immigration laws and how these law effect access to and utilization of healthcare services (Rhodes et al., 2015). All of these things together may potentially contribute to unprotected sex and sex with multiple partners among female sex workers (CDC, 2015). There are many prevention programs in several countries specifically in Africa, India, and China however many of these programs lack the capacity to address the primary needs of sex workers (Beyrer et al., 2014; Rhodes et al., 2015; Shannon et al., 2015). Although there are transitional housing programs available many programs do not conduct follow-up after women have transitioned to permanent housing to learn if they are still stably housed (Hankel et al., 2016). It is known that sex workers have unique needs and challenges that contribute to unsafe sexual practices that can potentially put them at risk for HIV and other STIs (Decker et al., 2014). In contrast, there is little known about the specific challenges and barriers of this population including the unsafe sexual practices that occur in Chicago among female sex workers. As a result, a quantitative research approach using a correlational method was conducted to understand factors that may contribute to unsafe sexual practices.

Chapter 3: Research Method

The purpose of this study was to investigate factors associated with risky sexual behaviors among FSWs living in Chicago during the period of January 2016 to December 2016. These factors consist of social and structural factors that can lead to risky sexual behaviors. In this study, I explored the relationships between the independent variables of substance use, homelessness, immigration status, and use of healthcare services and the dependent variables of condom-less anal/vaginal sex and multiple sex partners. The study results can be used to encourage public health professionals to develop funding and prevention guidelines that are aligned with the factors associated with unsafe sexual practices among female sex workers. These unsafe practices may lead to transmission of HIV and STIs.

Chapter 3 of this study includes details related to the research methodology. A quantitative design was used as the approach for this study. In addition, Chapter 3 also includes details related to the study participants, the specific procedures that are involved with data collection and analysis, instrumentation and operationalization of constructs, any threats to validity, characteristics and ethical procedures involved with the study.

Research Design and Rationale

For this study, I explored the relationships between the independent variables of substance use, homelessness, immigration status, and use of healthcare and the dependent variables condom-less anal/vaginal sex and sex with multiple partners. I used nonexperimental research with a correlational method using an explanatory design. Quantitative research relies on data to determine associations among variables (CDC,

2012). This research design is consistent with other research designs as it relates to providing answers of *why* or *how* certain events have occurred (CDC, 2012). This nonexperimental approach means that the independent variables are not manipulated or randomly assigned to a control and noncontrol group (Price, Jhangiani, and Chiang, 2015). Knowledge learned at the population level can be applied in community-based practice (CDC, 2015).

Therefore, a correlational research design was used to describe the relationship among the variables in this study.

The research questions and hypotheses are as follows:

1. RQ1: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers?

   $H_0$1: There are no relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

   $H_1$1: There are relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

2. RQ2: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and number of sex partners among female sex workers?

   $H_0$2: There are no relationships between substance use and homelessness and number of sex partners among female sex workers.

$H_1$2*:* There are relationships between substance use and homelessness and number of sex partners among female sex workers.

3. RQ3: After controlling for age and sexual violence, what are the relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_0$3: There are no relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_1$3: There are relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

4. RQ4: After controlling for age and sexual violence, what are the relationships between immigration status and utilization of health care services and number of sex partners among female sex workers?

   $H_0$4: There are no relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

   $H_1$4: There are relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

During primary research the authors established processes to recruit participants and gather the data. The procedures involved during primary research were as follows:

- Individuals called seeds were screened for eligibility and trained to recruit members of their networks.
- Participants were screened for eligibility
- If eligible, participants completed the interview guided survey.
- Participants were offered HIV testing
- If the participant chose to be tested for HIV, they completed a consent form
- Participants were offered to become seeds to recruit more participants.
- Primary researchers distributed a $10 coupon to the research participant

Secondary data from the NHBS was used to address the research questions. I used a correlational method to explore relationships between the independent and dependent variables. A quantitative approach was chosen because I used previously collected numerical data with respondent-driven interviews. This approach is cost effective and can be implemented over a short period of time (Bickman & Rog, 2008). Quantitative research has the goal of making generalizations from the sample to a larger population (Lund Research Ltd, 2012). It often uses questionnaires and/or surveys to generate data and use tables, data, and graphs to address the research questions (Lund Research Ltd, 2012). This type of research uses relationship-based techniques to investigate correlations, trends, and associations among two or more variables (Lund Research Ltd, 2012). In addition, quantitative research was used to test a theory which is the syndemic theory in this case (Lund Research Ltd, 2012). There was not any time or resource constraints with using this research method. All data is readily available and accessible. Data was collected from the study participants by seeds who used a structured interview.

Seeds were a part of the target population responsible for starting the recruitment chain (CDC, 2015c).

The quantitative methods approach allows for generalizability of the study results to a larger population of female sex workers. Quantitative research methods allow for description of a relationship among the independent and dependent variables (Statistics Solutions, 2018). Primary researchers included specific procedures to support reliability and validity of the study. These procedures included the development of a structured interview using the CAPI (CDC, 2015c). This structured interview technique allowed for consistency when using the interview instrument and to maintain internal validity and reliability. Staff personnel participated in training conducted by each local site principal investigator. Primary researchers also chose a diverse group of seeds by race, ethnicity, gender, and age to ensure that the sample would maintain external validity (CDC, 2015c).

Methodology

An interview guided survey was used to gather the study data. The primary researchers used detailed and precise lists of criteria that would determine whether each participant was eligible to participate in the survey (CDC, 2015b).

Population

The target population for this study included U.S. born and non-U.S. born females of all races and ethnicity who are between the ages 18-60 years of age. Individuals who answered yes to questions related to the exchange of sex for money or nonmonetary items are a part of the target population known as female sex workers. The estimated target population size for a power of .80 and an alpha at .05 for this

study is 85 respondents.

Sampling and Sampling Procedures

There were three cycles included in the NHBS project including (IDU), Heterosexual (HET) and MSM. The CDC required each project site (22 project sites) to identify a sample size of 500 eligible respondents per cycle (IDU, HET and MSM) (CDC, 2015b). Questions that would identify someone as a sex worker were a part of Round 4 of the NHBS heterosexual cycle. The decision to select a sample size of 500 for each cycle was determined based on the HIV prevalence and desired standard error for key indicators of interest (CDC, 2015c). The researchers used a response driven sampling (RDS) approach as the strategy was to recruit at-risk heterosexuals and individuals that were a part of the respondent's social networks (CDC, 2015c). This method has been used widely by public health professionals to investigate IDU's and HIV/AIDS (CDC, 2015c). Respondent driven sampling is a mechanism that can be used to capture hard-to-reach populations. Examples of hard-to-reach populations include drug users, sex workers, and men who have sex with other men (MSM) (Léon, Jarlais, Jautfre-Roustide and LeStrat, 2016). There were four main activities that occurred during RDS including formative assessment, recruiting, screening and interviewing seeds, screening and interviewing persons who present a valid coupon (used for participant recruitment and had to be redeemed during interview) and training eligible participants to recruit others (CDC, 2015b). A valid coupon is one that included the local NHBS name, location(s) of the field sites or vans, phone number(s) where staff can be reached, a survey ID and any unique physical

characteristics (e.g. tattoos, scars, etc.) (CDC, 2015b). The recruiter would use the survey ID and physical characteristics to verify the participant and would give the participant $10 once the interview was completed (CDC, 2015b). The sampling strategy began with seeds that were a part of the target population and were responsible for initiating the screening and survey (CDC, 2015b). The seeds were responsible for all the surveillance activities which included:

1. Completing the eligibility screening
2. Implementing the survey
3. Offering an optional HIV test
4. And then recruiting up to 5 more individuals from their target population

To be eligible to be a seed the following criteria had to be met:

1. Present a valid NHBS-HET cycle coupon
2. Have not previously participated in the current NHBS-HET cycle
3. Live in the metropolitan surveillance area (MSA)
4. Are between the ages of 18 and 60 years of age
5. Have had vaginal or anal sex with an opposite sex partner in the past 12 months
6. Are male or female (not transgender) and
7. Are able to interview in English or Spanish
8. Has not injected drugs in the past 12 months
9. Income does not exceed HHS poverty guidelines or educational attainment is not greater than high school
10. Has never injected drugs

11. Resident of High-Risk Areas (HRA)

This recruitment process continued until the sample size was met. Those who completed the survey received a $10 coupon. NHBS used a set of criteria to identify respondents as heterosexuals at increased risk of HIV. This criterion was a part of the screening eligibility conducted by the seeds. Each participant was screened for eligibility to ensure that they met the inclusion criteria. Each participant was eligible if they met all the criteria for a seed, excluding the following criteria (CDC, 2015b):

- Has never injected drugs
- Resident of a High-Risk Area (HRA)

To determine the sample size, I used the G*Power version 3.1.9.2 software to conduct the sampling test. This test involved the effect size, the standard error, the power and the number of test predictors. The effect size is described as the strength among the independent and dependent variables (Statistics Solutions, 2013). The greater the effect size the greater the statistical power leading to high changes of test validity (Statistics Solutions, 2018). The significance level determines if a conclusion can be drawn from the desired population (Statistics Solutions, 2018). An alpha level of 0.05 is standard for regression testing and determines if a relationship exists when the p-value is at 0.05 (Statistics Solutions, 2018). The statistical power of a test depends on the effect size, the significance, and the sample size. With an effect size of 0.15, a significance level of 0.05 and four predictor variables, a sample size of 85 is needed to obtain a power of 0.80. Although a sample size of 85 is needed to conduct the study I used the entire sample available. A medium level effect size will require a

reasonable sample size that will take less time and energy. The decision to use secondary data and a small sample size is cost efficient and time sensitive. The Alpha and power levels are standard levels for conducting multiple linear regression testing.

Table 1

Statistical Power Analysis

F tests - Linear multiple regression: Fixed model, R^2 increase			
Analysis:	A priori: Compute required sample size		
Input:	Effect size f^2	=	0.15
	α err prob	=	0.05
	Power (1-β err prob)	=	0.80
	Number of tested predictors	=	4
	Total number of predictors	=	4
Output:	Noncentrality parameter λ	=	12.7500000
	Critical *F*	=	2.4858849
	Numerator *df*	=	4
	Denominator *df*	=	80
	Total sample size	=	85
	Actual power	=	0.8030923

In this study, I focused on individuals who participated in the heterosexual cycle and exchanged sex for money or nonmonetary items. Seeds were used as a part of the target population responsible for selecting potential NHBS participants using their networks and coupons. The selection criteria were very specific, and each participant was screened by seeds to determine eligibility. Recruitment and formative assessment activities are discussed in the following section.

Recruitment Participation and Data Collection

The primary researchers conducted a formative assessment to define the

community of interest, investigate attributes of the community and to determine how the researchers would gain access to the community (CDC, 2015b). The goals of the formative assessment were the following (CDC, 2015b):

- Gain support of the community and the stakeholders involved
- Define the social and demographic characteristics of the target population
- Develop questions of interest for HIV prevention
- Monitor on-going implementation of NHBS
- Obtain information relative to logistics
- Identify seeds to implement RDS
- Gather information about the major networks of the target population and,
- Identify strategies for accessing the target population

To meet the goals of the formative assessment, secondary and primary data were collected. Review of secondary data were conducted to establish a foundation of information related to the target population and to identify gaps of knowledge that could potentially affect implementation of the project (CDC, 2015c). The primary researchers used primary research data collected to validate findings from the secondary data review and to explore new and emerging issues related to the implementation of NHBS (CDC, 2015c).

Data for the formative assessment was gathered through several different avenues including key informant interviews, focus groups, street intercept surveys, and direct observations (CDC, 2015c). Key informant interviews allowed for cultural and subject matter experts to provide insights about the target population's HIV-related

behavior, barriers to accessing the target population and information related to recruitment of potential NHBS participants (CDC, 2015c). These individuals included community leaders, researchers, health department staff and individuals who were members of the target population (CDC, 2015c). Focus groups were made up of individuals that were a part of the MSA and were conducted under the direction of a moderator (CDC, 2015c). Discussion topics included, social, sexual, and drug-using networks in the MSA; venues and geographical locations significant to the target population; strategies for gaining community support; marketing and recruiting to the target population; and the identifying key community members (CDC, 2015c). Street intercept surveys were used to gather spontaneous input from community members about NHBS and share information with the community members about NHBS (CDC, 2015c). Lastly, direct observations allowed the researchers to gain an understanding of what was occurring in the field such as neighborhoods, parks, high drug activity areas and community organizations (CDC, 2015c).

Seeds were a very important part of the recruitment process because, they were the initial recruiters, were knowledgeable about the target population and, could potentially encourage others to participate in NHBS (CDC, 2015c). Project staff was responsible for recruiting an initial group of five to10 seeds. Each seed was responsible for completing the eligibility screener, informed consent, NHBS questionnaire, HIV test (if agreed) and training to recruit other seeds (CDC, 2015c). After training on the recruitment process, each seed was given up to five coded coupons that were used to recruit participants (CDC, 2015c). Once the participant was

assessed for eligibility and gave consent to be interviewed, they were asked if they were willing to recruit other participants for an incentive (CDC, 2015c). If the study participants agreed then they would receive an incentive to recruit more participants (CDC, 2015c). However, if they denied the incentive then they would exit the interview process (CDC, 2015c). NHBS primary researchers used a software program called, Questionnaire Development System (QDS™) CAPI 2.6.1 to administer the interviews to the respondents (CDC, 2015c). The survey questions were uploaded to this software and used on a lap top and/or tablet by the seeds.

For me to access the dataset and use it for secondary research purposes I obtained a data use agreement with the Chicago department of public health's director of HIV/STI surveillance operations and institutional review board (IRB) approval. The data use agreement described storage and usage of the data including what is permissible and non-permissible. Data was stored on a jump drive using a private laptop. The laptop has a security and virus protection software installed. Internet was used with a firewall protection in place. All data was deleted at the end of the terms of the data use agreement (August 29, 2019). The data use agreement also included language related to identifiable indicators and how these indicators were not be a part of the data set. All variables in the dataset were used excluding dates of birth and zip codes to ensure that the dataset was indeed a limited dataset and was fully de-identified.

Primary recruitment involved a detailed formative assessment process that was used for providing knowledge, awareness and information about the target population

and the community of interest. Primary and secondary data was collected and contributed to NHBS. Seeds were an instrumental part of the recruitment process and required the same screening eligibility of potential research participants. Ongoing formative assessment occurred throughout the NBHS cycle to monitor enrollment, effectiveness of seeds, data quality, potential concerns, and demographic characteristics of the sample.

Instrumentation and Operationalization of Constructs

The development of the NHBS questionnaire involved the participating project sites (Chicago, Houston, Los Angeles, New York City, Philadelphia, San Francisco, California, Colorado, Washington DC, Florida, Georgia, Louisiana, Massachusetts, Michigan, New York, New Jersey, Puerto Rico, Texas, Tennessee, Oregon, Virginia and Washington) and the CDC (CDC, 2015c). The NHBS questionnaire includes three components, core questions, local questions, and cycle-specific questions (CDC, 2015c). Core questions were used by all project sites and provide data related to risk behaviors and HIV testing behaviors of the target population within the MSA (CDC, 2015c). The local questions are additional questions of interest that may be included by the project site (CDC, 2015). Lastly, the cycle-specific questions in the NHBS questionnaire include cycle appropriate questions based on the MSM, IDU or HET cycle (CDC, 2015b). The NHBS heterosexual (HET) cycle 4 used version 2 of the NHBS questionnaire and was published in 2015 (CDC, 2015b). Prior to developing the questionnaire, the questions were reviewed by each project site and the CDC Behavioral Surveillance Team (CDC, 2015c). Project sites were asked to provide feedback for content modification (CDC,

2015c). Any feedback received resulted in revising the questionnaire (CDC, 2015c). All items were reviewed by subject matter experts (CDC, 2015c). The questionnaire was previously used with MSM, IDU and Heterosexual populations during cycle 3 of NHBS (CDC, 2015c). The instrument was provided to study participants in both English and Spanish and the formatting of the questionnaire was the same for both languages (CDC, 2015c). For the purposes of this study only data from the NHBS High Risk Women and Heterosexual cycle 4 was used.

Network questions were used during previous cycles as well as the current cycle 4 that are used for this study. The primary researchers conducted consultation with Douglas Heckathorn whom is a developer of the RDS method (CDC, 2015c). The network questions were used in the heterosexual cycle pilot studies prior to this cycle (CDC, 2015c). These questions are also based on consultation with the NHBS principal investigators and cognitive testing conducted by the National Center for Health Statistics (CDC, 2015c). Using 25 MSA areas (Atlanta, GA; Baltimore, MD; Boston, MA; Chicago, IL; Dallas, TX; Denver, CO; Detroit, MI; Fort Lauderdale, FL; Houston, TX; Las Vegas, NV; Los Angeles, CA; Miami, FL; New Haven, CT; New Orleans, LA; New York, NY; Nassau-Suffolk, NY; Newark, NJ; Norfolk, VA ;Philadelphia, PA; San Diego, CA; San Francisco, CA; San Juan, Puerto Rico; Seattle, WA; St. Louis, MO; and Washington, DC) in 2006-2007 15 sites were required to recruit using RDS method and 10 using VBS method (DiNenno, Oster, Sionean, Denning and Lanskey, 2012). Each predictor variable was evaluated as ways of defining the target population using 4 criteria (DiNenno et al., 2012):

1. HIV prevalence must be > 1.4%
2. Specificity must be low < 40%
3. Sensitivity must be high ≥ 70%
4. Variable must be practical to use in a national surveillance system

Researchers wanted to ensure that they would capture individuals at high risk of HIV therefore; variables that had good sensitivity and specificity were assessed for practicality and usefulness as it relates to screening eligibility (DiNenno et al., 2012). Social and structural factors including living in high risk areas, income and education had a sensitivity of 96% and specificity of 12% (DiNenno et al., 2012). Four predictor variables were assessed for specificity and sensitivity. Three predictor variables are listed below and the last one is explained further in the text (DiNenno et al., 2012).

Table 2

Sensitivity and Specificity Performance of Potential Eligibility Criteria by HIV Prevalence, Pilot Study of National HIV Behavioral Surveillance System Among Heterosexuals at Increased Risk, 2006-2007

Predictor Variables	Participants		HIV Prevalence	Sensitivity	Specificity
	No.	%			
Individual Risk Behavior					
Crack Use	1560	11	3.1	23	90
Exchange Sex	1686	11	2.9	24	89
≥ 5 Sex Partners	3111	21	2.1	32	79
Incarcerated >1 Week	1184	8	2.2	13	92
STD Diagnosis	1978	13	2.6	25	87
Any of above	6066	41	2.0	59	59
Sexual Networks					
Partner had HIV-positive or unknown status	8257	58	1.8	75	42
Partner was IDU, MSM, had been incarcerated, used crack, or participant didn't know partner's HIV status	5975	41	1.8	77	37
Partner was HIV +, IDU, MSM or participant did not know partner's HIV status	8797	55	2.3	46	79
Sexual Concurrency	8566	58	1.5	73	39
Socio-Structural Context					
Living in high risk area	12074	82	1.5	87	18
Limited education (≤ high school graduate)	10827	73	1.6	84	27
Low income (≤ HHS poverty guidelines)	11025	75	1.6	86	25
Low socio-economic status (income ≤ HHS poverty guidelines or education ≤ high school)	13015	88	1.5	96	12
Total	14750	100	1.4		

Note. From" Piloting a system for behavioral surveillance among heterosexuals at increased risk of HIV in the United States," by DiNenno, E. Oster A., Sionean, C., Denning, P., & Lanskey, A., 2012, *The Open AIDS Journal, 6*, p.173

Due to the small number of participants who were residents in High Risk Areas (HRA) this predictor variable (HRA) performed poorly in the Midwest and the West regions (DiNenno et al., 2012). Therefore, this was problematic for a national

surveillance system (DiNenno et al., 2012). On the other hand, the use of low SES posed fewer concerns (DiNenno et al., 2012). In 2009 NHBS principal investigators were asked to provide input regarding the final definition of the target population and the best sampling method to utilize (DiNenno et al., 2012). The NHBS pilot study's focus was shifted from risky behaviors to communities at risk with an emphasizes on low SES, which was measured by education and income (DiNenno et al., 2012).

Operationalization

This study's title is, "Social and structural barriers to safer sex practices among heterosexual female sex workers". This study was conducted to understand the relationship among social and structural variables and sex practices among female sex workers in Chicago. The NHBS questionnaire included several questions that were asked of each participant. The question responses that were included in this study used a dichotomous scale and some open-ended questions involving persons having to report the number of times they participated in an activity, the number of days or the number of sexual partners. Specific interview results were reviewed to align with the research title and questions. Researchers used categorical and discrete data responses for each variable. The operational definitions for each variable included in the research questions are as follows (CDC, 2015d):

1. Substance use is defined as
    a. A drink of alcohol is defined as a 12oz beer, a 5oz glass of wine or a 1.5oz shot of liquor over the last 30 days from the date of the study interview. This is a categorical response with answer selections ranging from *0 = No,*

1 = Yes, 9 = Don't Know and 7 = Refused to Answer.

b. Injecting drugs is defined as drugs that were injected by the participant or drugs that were injected by someone who is not a health care provider. A person who has ever injected any drug. This is categorical data with responses ranging from *0 = No, 1= Yes, 9 = Don't Know or 7 = Refuse to Answer.*

c. Non-injection drug use was defined as drugs that have not been injected but may have been snorted, smoked, inhaled, or ingested such as marijuana, methamphetamine, cocaine, or crack. A person who used Non-injection drugs anytime in the las 12 months from the date of the interview. Responses can range from *0 = No, 1 = Yes, 9 = Don't Know or 7 = Refuse to Answer.*

2. Homelessness is defined as a person who is living on the street, in a shelter, in a single room occupancy hotel (SRO), or in a car in the past 12 months from the date of the interview. Homelessness is a categorical variable and responses can range from *0 = No, 1= Yes, 9 = Don't Know (DK) and 7 = Refuse to Answer.*
3. Immigration Status is defined as the participant's native status. Those who were born in the U.S. versus those who were not born in the U.S. Immigration status is a categorical variable and responses can range from *0 = No, 1 = Yes, 9 = Don't Know and 7 = Refuse to Answer.*
4. Utilization of Health Care is defined as a person that has seen a doctor, nurse, or other health care provider in the last 12 months from the date of the interview.

Utilization of Health Care is a categorical variable and responses can range from *0 = No, 1 = Yes, 9 = Don't Know and 7 = Refuse to Answer.*

5. Number of Sexual Partners is defined as the number of men in the past 12 months from the interview date that a female had oral, vaginal, or anal sex with. Number of sexual partners involves discrete data and responses can range from *0 – 7000, 9999 = Don't Know or 7777 = Refused to Answer.*
6. Unprotected vaginal/anal sex is defined as the number of condom-less anal exchange partners in the last 12 months from the date of the interview and the number of condom-less vaginal exchange partners in the last 12 months from the date of the interview. Unprotected vaginal/anal sex is a categorical variable that has responses ranging from *0 – 7000, 9999 = Don't Know or 7777 = Refused to Answer.*

Data Analysis Plan

A non-experimental approach with correlational research and an explanatory design was used for this study. Statistical Package for the Social Sciences (SPSS) was used to analyze and report the study findings. I explored the following research questions after controlling for age and sexual violence:

1. RQ1, What are the relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers?

   $H_0$1: There are no relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

$H_1$1: There are relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

2. RQ2, What are the relationships between substance use and homelessness and number of sex partners among female sex workers?

   $H_0$2: There are no relationships between substance use and homelessness and number of sex partners among female sex workers.

   $H_1$2*:* There are relationships between substance use and homeless ness and number of sex partners among female sex workers.

3. RQ3, What are the relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_0$3: There are no relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_1$3: There are relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

4. RQ4, What are the relationships between immigration status and utilization of health care services and number of sex partners among female sex workers?

   $H_0$4: There are no relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

   $H_1$4: There are relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

I tested the relationships between the independent variables of substance use, homelessness, immigration status and utilization of healthcare and the dependent

variables multiple sex partners and condom-less anal/vaginal sex among female sex workers. This correlational research may increase understanding of the baseline factors associated with unsafe sexual behaviors among female sex workers. Once all the research data was initially collected it was sent to the CDC where a first level of cleaning was complete. After the CDC cleaned the data, it was then sent to CDPH for analysis and reporting. For my study I reviewed all the data and reviewed missing data patterns. Missing data can lead to decreased power and validity of the study (Trochim, W.M.K., 2006). In efforts to ensure that all assumptions are met, variables that need to be changed were revised as appropriate.

The statistics and statistical tests that were used in this study include:

- *Descriptive Statistical Analysis* was conducted to determine the characteristics of the target population.
- *Multiple Linear Regression* analysis was conducted for all research questions. This statistical analysis test involves measuring the relationship between one or more continuous dependent variables and one or more independent variables (Statistical Solutions, 2018).

Key statistics included in the study include statistics for multiple linear regressions testing including the model summary, ANOVA table and the coefficients table. The significance levels, F-test values, and R-squared are key statistics displayed. The descriptive statistics of the sample displays highlighting measures of central tendency, frequencies and giving an overall summary of the sample. In addition, I conducted a crude statistical analysis to illustrate a comparison of differences among the

cisgender female respondents.

Threats to Validity

I would prefer to be able to generalize the study findings to a larger population of individuals across different settings who participate in sex work. Large differences in the study sample limits the ability to generalize the findings to a larger population. One example of how this study includes threats to internal validity includes selection bias and volunteer bias. General compensation may have led to selection bias and may involve several similarities between individuals (Laerd, 2012). This could occur because the seeds are selecting participants from their own networks. Primary researchers reported several limitations and/or biases through the use of RDS. One bias includes groups that are more likely to recruit individuals within their own network leading to over-representation of one group. Second, the groups who have a larger network may also be over represented because they may have more recruitment leads to their own network members and lastly some groups may be less likely or unwilling to participate in the study (CDC, 2015). During piloting of the screening and eligibility questions researchers DiNenno et al. (2012) reported that due to the combined use of VBS and HRA methods the study posed bias. In addition, data for both methods were not weighed and therefore limits the generalizability to all heterosexuals (DiNenno et al., 2012). There are several other biases related to calculating the population estimates and sample variances. The participants network size and information on who recruited who, has to be understood and controlled for in order to gather a true estimate of the target population. The researchers implemented formative assessment and monitored the sample closely

throughout data collection process to minimize the occurrence of these biases (CDC, 2015c). As it relates to HIV testing there may be some biases with enrollment and agreement to get an HIV test which can result in under or over estimation of HIV prevalence rates (CDC, 2015c). A pairwise deletion method may contribute to the validity of the study. Due to many missing values with the dependent variables condom-less anal sex and condom-less vaginal sex a pairwise deletion technique was used during statistical testing.

Violations of the assumptions of a statistical test can potentially lead to threats to conclusion validity. Some guidelines for improving conclusion validity include having good statistical power (Trochim, 2006). This can be done by increasing the sample size if possible (Trochim, 2006).

The main threats to validity for this study include violation bias, selection bias, missing data, and conclusion validity. Researchers implemented several activities prior to and during primary data collection such as close monitoring of data collection, trainings on the instrumentation for all participants, and an interview guided survey (CDC, 2015c) An interview guided survey is described as the Computer Assisted Program Interview (CAPI) which is an electronic tool used to conduct the interviews (CDC, 2015c). In research threats to validity will occur and it is important to ensure that they are addressed appropriately to limit the effects on the research findings.

Ethical Procedures

A data use agreement was obtained from the Chicago Department of Public Health's Director of Surveillance Operations to gain access to the research data for

secondary use. In addition, IRB approval was obtained by the CDPH IRB chairman and the Chicago Department of Public Health. The CDC reported on January 1, 2016 that NHBS is classified as surveillance and not research (CDC, 2015c). Therefore, the CDC did not require the project sites to submit NHBS to the local IRB for review and approval (CDC, 2015c). Although individual sites did not have to be IRB approved the CDC strongly recommended that it be obtained. Therefore, the Chicago Department of Public Health obtained IRB approval on March 25, 2016.

Participation in formative activities led to increased confidentiality and security of the study participants. These activities included:

1. Completion of an anonymous interviewer-administered interview or facilitator-led focus group.
2. Consent for informant interviews
3. Completion of an anonymous interviewer-administered risk behavior survey and voluntary HIV counseling and testing.

All data were de-identified during the interview process and the only record linking the participant to NHBS was the HIV consent document (CDC, 2015c). Each study participant completed a consent form at the beginning of the study and was entered in the interview program after the eligibility screening was administered (CDC, 2015c). The consent form was read to each participant to account for those who may have difficulty reading and comprehending information (CDC, 2015c). Participation in NHBS was voluntary and participants could refuse to participate in the survey and the HIV testing component or just the HIV testing component (CDC, 2015c). Any person under the age

of 18 was not included in the study. The primary risk involved with this study included potential risk of breach of confidentiality of the study participants (CDC, 2015c). Some of the main activities that were done to ensure the security and confidentiality of study participants were protected included anonymity of the participants, protecting electronic security of surveillance databases, protecting transmission of electronic data, protecting the physical security of paper copies and ensuring that project staff take responsibility for protecting participant data (CDC, 2015c). Anonymity of the participants was maintained by doing the following (CDC, 2015c):

1. Names of the participants were not included in the study or on any collection instrument.
2. Survey IDs were assigned to the written consents and these forms were kept separate from other NHBS files.
3. The Survey ID was used to keep track of who received a coupon.
4. Specimens, laboratory slips, and questionnaires were linked using a survey ID.
5. Information related to Unique IDs or about physical marks (tattoos, etc.) was destroyed within 8 months of data finalization.

Electronic security of the surveillance databases was maintained by doing the following (CDC, 2015c):

1. Computers were physically secured and protected by password.
2. Only authorized persons had access to NHBS data.
3. Data accessed by personnel outside of the surveillance unit was limited and justifiable.

4. Portable computers used for CAPI were kept with the researchers, data was encrypted using encryption software, were locked in a drawer or office when not used and at the end of every interview data was uploaded to the main database.
5. Computers taken out of service had the hard drive reformatted.
6. The Overall Responsible Party (ORP) and the CDC project officer were notified if a computer was lost or stolen.

Primary researchers implemented several measures to ensure that the privacy of the participants was protected. Paper copies of consent forms were kept in a locked cabinet and in a secure environment with limited access (CDC, 2015c). Computers used for access to data were all password protected and only authorized staff had access to the completed survey data and study files (CDC, 2015c). The NHBS project sites used the Data Coordinating Center (DCC) to send data to the CDC (CDC, 2015c). The DCC used a secure transfer algorithm called the Federal Information Processing Standard (FIPS) 140-2 and ensured that this algorithm was in compliance with the Office of Management and Budget (OMB), the Health and Human Services (HHS) and the CDC certification and accreditation guidelines (CDC, 2015c). FIPS 140-2 ensures that hardware or software using sensitive or classified information goes through a series of security measures to ensure end users have a high degree of security (Corsec, 2018). Federal agencies sharing sensitive data must meet this method (Corsec, 2018). The CDC also ensured that all the data management processes were in compliance with the HIV/AIDS surveillance security and confidentiality guidelines (CDC, 2015c).

Currently, at the local level only individuals who are funded to work with the

NHBS Chicago project are able to access the dataset. The dataset was located in a secure computer drive and requires approval from the director, the deputy commissioner of HIV/STI bureau and information management to access the dataset. The drive can only be accessed while using the CDPH intranet and is not accessible outside of the department on non-CDPH computers. I ensured the data is protected by also obtaining Walden's IRB approval. Data was used on secure networks and using a secure password protected flash drive. The primary researchers implemented several measures to guarantee that the security and confidentiality of all participants was protected at the federal level and ensured that local governments implemented the same measures.

Summary

In this study, I tested the relationships among variables possibly associated with unsafe sex practices of female sex workers. The independent variables include substance use, homelessness, immigration status and utilization of health care. The dependent variables are condom-less anal/vaginal sex and sex with multiple partners. Secondary data was used to analyze the variables and report results that were collected previously. Non-experimental research using correlational methods and an explanatory design was the approach for this study. There were many steps performed by the primary researchers to ensure validity and reliability. Primary researchers conducted pilot testing with the study questionnaire in previous cycles of NHBS (CDC, 2015c). Program staff were trained and educated about the security and confidentiality of the research participants (CDC, 2015c). In addition, the computerized software used to conduct the interview is secured through several layers of protection (CDC, 2015c). Although the CDC did not

require IRB approval they highly recommended getting approval which led to the Chicago Department of Public Health being IRB approved in March of 2016 (CDC, 2015c). This study includes descriptive statistics, multiple linear regression testing and Pearson R Correlation testing. A sampling justification was completed using G*Power and determined a sample size of 85 is appropriate for this study with a power of 0.80. Chapter 4 describes the research findings related to the study results. In this chapter I analyzed the statistical results of the test that was conducted. Study results include tables and figures. Key statistics were reported for all statistical test conducted

Chapter 4: Results

Introduction

The purpose of this study was to explore the factors associated with unsafe sex practices among heterosexual female sex workers living in Chicago Illinois between the ages of 18 and 60 years. The following research questions were used to investigate the purpose of the study:

1. RQ1: What are the relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers?

   $H_0$1: There are no relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

   $H_1$1: There are relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers.

2. RQ2: What are the relationships between substance use and homelessness and number of sex partners among female sex workers?

   $H_0$2: There are no relationships between substance use and homelessness and number of sex partners among female sex workers.

   $H_1$2*:* There are relationships between substance use and homelessness and number of sex partners among female sex workers.

3. RQ3: What are the relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

   $H_0$3: There are no relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

$H_1$3: There are relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.

4. RQ4: What are the relationships between immigration status and utilization of health care services and number of sex partners among female sex workers?

   $H_0$4: There are no relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

   $H_1$4: There are relationships between immigration status and utilization of health care services and number of sex partners among female sex workers.

This chapter presents the study findings and includes details on how the data was collected, descriptive statistics of the target population, assumption testing outcomes and the results of the study. I conducted multiple linear regression testing for all research questions.

Data Collection

Interviews began in August of 2016 and ended in December of 2016. A total of 633 participants responded to the survey however there were 534 valid cases after removing the seeds (6) and those who were not eligible (93). Primary researchers used nonprobability sampling methods to identify their target population. All individuals in the sample represent CIS gender heterosexuals who exchanged sex for money or nonmonetary items within the last 12 months. The Tables 3-6 display frequencies and percentages for categorical variables age, education, race, and marital status. Majority of the respondents were between the ages 46 and 54 (45%), had achieved some level of high

school education for Grades 9-11 (39%), were primarily Black (74%), mostly born in the United States (98%) and were never married (62%). Additional characteristics of the target population are listed below in Tables 3-6.

Table 3

Education Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Never attended school	1	.2	.2	.2
	1 through 8	26	4.9	4.9	5.1
	9 through 11	207	38.8	38.8	43.9
	12 or GED	195	36.5	36.6	80.5
	Some college, Associate's Degree or Technical Degree	101	18.9	18.9	99.4
	Bachelor's Degree	3	.6	.6	100.0
	Total	533	99.8	100.0	
Missing	System	1	.2		
Total		534	100.0		

Table 4

Race Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Hispanic/Latino	72	13.5	13.5	13.5
	American Indian/Alaska Native	3	.6	.6	14.0
	Black	394	73.8	73.8	87.8
	White	38	7.1	7.1	94.9
	Some other race or multiple races	27	5.1	5.1	100.0
	Total	534	100.0	100.0	

Table 5

Marital Status Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	MARRIED	27	5.1	5.1	5.1
	LIVING TOGETHER AS MARRIED	55	10.3	10.3	15.4
	SEPARATED	55	10.3	10.3	25.7
	DIVORCED	46	8.6	8.6	34.3
	WIDOWED	19	3.6	3.6	37.9
	NEVER MARRIED	331	62.0	62.1	100.0
	Total	533	99.8	100.0	
Missing	System	1	.2		
Total		534	100.0		

Table 6

Age Statistics

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-25	21	3.9	3.9	3.9
	26-35	96	18.0	18.0	21.9
	36-45	113	21.2	21.2	43.1
	46-55	242	45.3	45.3	88.4
	56-65	62	11.6	11.6	100.0
	Total	534	100.0	100.0	

I determined frequency statistics for variables substance use, homelessness, and utilization of health care. Non-injection drug use over the past 12 months, ever injected drugs, homeless during the past 12 months and healthcare visits over the past 12 months ranged from 0 to 1. A 0 means the individual responded “no” while 1 means the individual responded “yes.’ There were more individuals who participated in Non-injection drug use in the past 12 months (85%) versus those that reported ever injecting

drugs (35%). Most participants reported completing a healthcare visit in the past 12 months (83%). There was 48% of individuals who reported being homeless in the past 12 months. Table 7 shows statistics for the dependent variable total number of exchange partners. A total of 425 individuals responded about the total number of oral, vaginal, and anal sexual partners of the opposite sex in the last 12 months. The mean statistic was 76.05 while the standard deviation was 266.

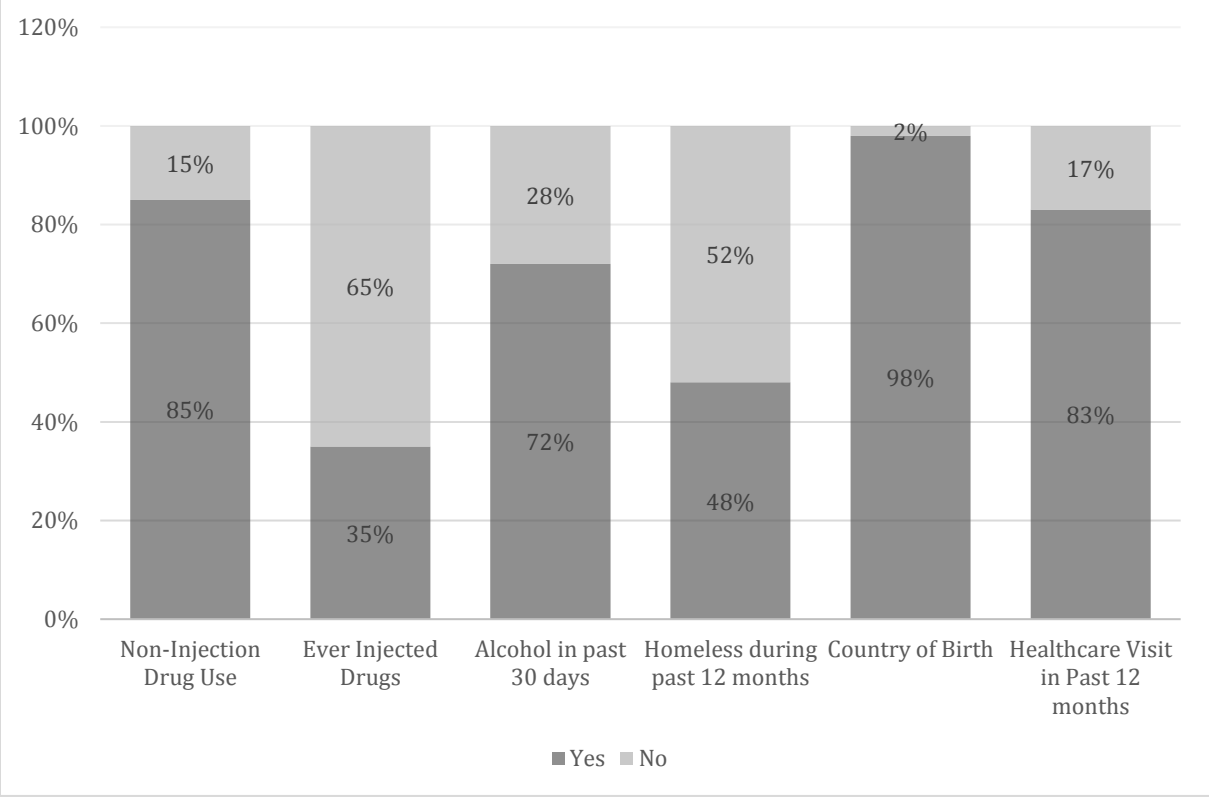

Figure 1. Participant Response Outcomes for Predictor Variable n=534

Table 6

Descriptive Statistics for Outcome Variable Total Number of Exchange Partners Over the Past 12 Months (N=532)

	N	Minimum	Maximum	Sum	Mean	Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
F_M Number of male sex partners - 12 mon	532	1	4000	34202	64.29	278.160	77372.944	10.531	.106	130.200	.211
Valid N (listwise)	532										

Assumption Testing

A multiple linear regression assumption analysis was conducted to determine whether the test variables met the assumptions for multiple linear regression testing. When conducting multiple linear regression analysis, the following assumptions must be met (Statistics Solutions, 2018):

- Multivariate normality
- Homoscedasticity
- No or little Multicollinearity of the independent variables
- Linear Relationship

While conducting assumption testing with original data the dependent variables violated assumptions of linearity. In efforts to address this violation I conducted a log

transformation of the dependent variables. Log transformations are used routinely to turn data that is skewed into normal distributed data (Institute for Digital Research and Education, n.d.). Log transformation allows for easier interpretation of the statistical results. When one unit of change occurs in the independent variable results one occurs in the expected value of the dependent variable (Institute for Digital Research and Education, n.d.). The dependent variable number of sex partners in the past 12 months (F_MSX12) name and values was therefore transformed to the log of number of sex partners, exchange in unprotected anal sex with male partner (EXUAS_M) was renamed and log transformed to condom-less anal sex and exchange in unprotected vaginal sex with male partner (EXUVS_M) was renamed and log transformed to condom-less vaginal sex.

Missing Data

Research questions using the dependent variables unprotected anal sex and unprotected vaginal sex were reviewed and analyzed for data completeness. I analyzed data patterns in SPSS for the log transformed dependent variable condom-less anal sex and the log transformed dependent variable condom-less vaginal sex. The results showed that the dependent variable *condom-less anal sex* had 76% of values missing while the dependent variable *condom-less vaginal sex* had 30% of values missing. As a result of the large number of missing values for the outcome variable condom-less anal sex and the reduction in power for this variable, I have removed this variable from the analysis. Therefore, the outcome variables for this study include condom-less vaginal sex and number of sex partners. For my study, I reviewed all the data and reviewed missing data

patterns. The results show that there are currently no specific patterns of the missing data and are therefore missing completely at random (MCAR). In addition, I determined that the missing data was not related to either the specific value being obtained or the observed responses (see Kang, 2013). Data that are MCAR are known to be less biased and therefore the pairwise deletion method was chosen as the technique to address missing data (see Kang, 2013). Pairwise deletion uses all observations in a dataset and preserves information (Kang, 2013). For the dependent variable *number of sex partners* a listwise deletion method was used while obtaining statistics for linear regression testing. There were two values missing for dependent variable number of sex partners.

Multicollinearity and Homoscedasticity

Assumptions for regression testing were met using the transformed dependent variables. The variance inflation factor (VIF) was used to detect multicollinearity between the predictor variables in Tables 8-10. Table 9 displays multicollinearity using dependent variable unprotected anal sex partners. Multicollinearity determines whether the predictor variables are highly correlated (Statistics Solution, n.d.). The VIFs were mostly right at 10 and therefore, I determined that there is not an extreme amount of multicollinearity among the predictor variables (Institution for Digital Research and Education, n.d.; Statistics Solutions, n.d.). Homoscedasticity was confirmed using a scatterplot that displays the predicted values and residuals as randomly distributed.

Table 7

Coefficients Table Displaying Collinearity Statistics Among the Predictor Variables and Outcome Variable Number of Sex Partners, n=438

Model	Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.	Collinearity Statistics Tolerance	VIF
1(Constant)	.670	.137		4.900	.000		
Health care visit, 12 months	-.122	.084	-.064	-1.441	.150	.994	1.006
Country of birth	-.147	.077	-.086	-1.915	.056	.956	1.046
Had one or more drinks past 30 days	.138	.072	.087	1.916	.056	.945	1.058
Homeless during past 12 months	.391	.065	.276	5.990	.000	.915	1.093
Ever Injected drugs	.216	.070	.144	3.100	.002	.906	1.104
Non-injection drug use - 12 months	.254	.091	.129	2.803	.005	.913	1.096

Table 8

Collinearity Statistics for Predictor Variables and Outcome Variable Condom-less Vaginal Sex n=280

Model		Unstandardized Coefficients B	Std. Error	Standardized Coefficients Beta	T	Sig.	Collinearity Statistics Tolerance	VIF
1	(Constant)	.504	.129		3.919	.000		
	Health care visit, 12 months	-.204	.081	-.133	-2.529	.012	.991	1.009
	Country of birth	-.125	.069	-.096	-1.805	.072	.965	1.036
	Had one or more drinks past 30 days	.123	.068	.097	1.798	.073	.947	1.056
	Homeless during past 12 months	.358	.062	.314	5.781	.000	.928	1.078
	Ever Injected drugs	.246	.065	.206	3.762	.000	.916	1.092
	Non-injection drug use - 12 months	.262	.087	.164	3.022	.003	.930	1.075

Normality and Linearity

Figures 1-6 depict normality and linearity among the dependent variables' residuals. Outliers were identified during assumption testing. I assumed normality for the dependent variables due to little or no deviation of data in the P-P plots of regression. In addition, all residual means are centered around zero. Extreme outliers with residuals outside of +/-3 standard deviations were omitted (*N*=96) from the study sample. As a result, a total of 438 respondents were included in the study for dependent variable number of sex partners. As a part of regression testing the standardized residuals must meet the assumption of linearity (Taylor, 2017).

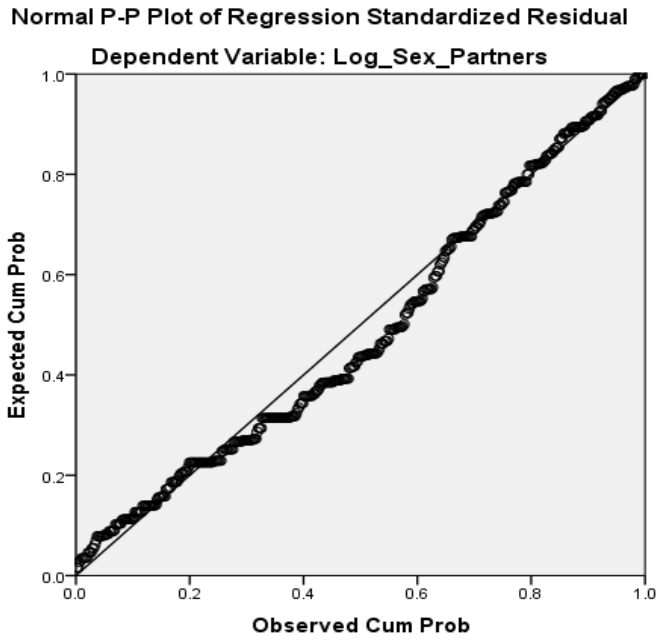

Figure 2. Standardized residuals for DV number of sex partners *n*=438

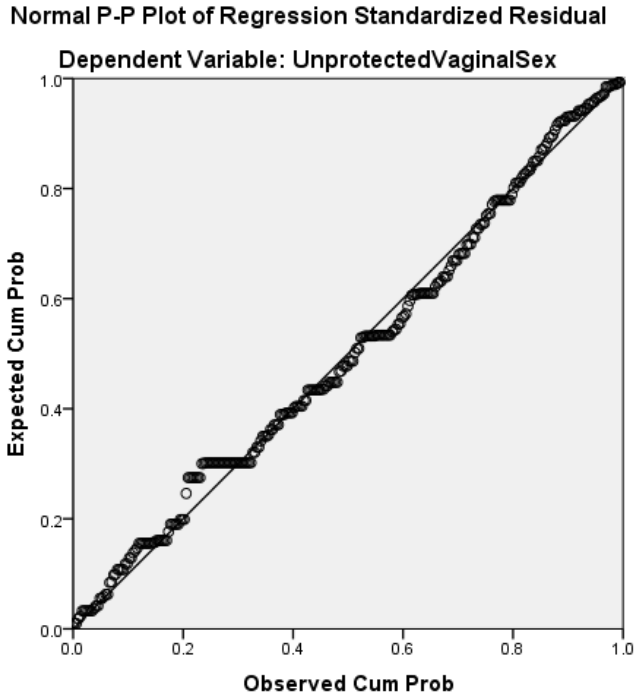

Figure 3. Standardized residuals for DV unprotected vaginal sex n=280

Output of Statistical Results

Research Question 1: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and condom-less vaginal sex among female sex workers? To approach Research Question 1, a hierarchical linear regression analysis was conducted to evaluate the prediction of condom-less vaginal sex partners from substance use and homelessness. For the first block analysis, the predictor variables, substance use (alcohol in the past 30 days, ever injected drugs and Non-injection drug use) and homelessness (homeless anytime in the last 12 months) were analyzed. The results of the first block hierarchical linear regression analysis revealed a model to be statistically significant (p <.05). The null hypothesis was rejected.

Additionally, the R^2 value of .223 associated with this regression suggest that condom-less vaginal sex accounts for 22% of the variance in the data.

For the second block control variables age and sexual violence were added to the model. In the second model the R^2 increased to .268 or 27% of the variance in condom-less vaginal sex. Overall, the predictor variables account for 27% of the variation in condom-less vaginal sex. The results of the hierarchical linear regression analysis revealed a model to be statistically significant ($p \leq 05$). Additionally, the R^2 change value of .045 associated with this model suggested that the addition of age and sexual violence to the first block model accounts for a 5% change in the variation of the dependent variable condom-less vaginal sex. The adjusted R^2 allowed me to assess how well the model is generalizable to the target population. If this model was derived from the entire population versus just a sample, it would account for approximately 1.7% less variance in the outcome.

Table 9

Research Question 1 Model Summary Statistics for Predictor Variables Substance Use and Homelessness, n=280

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.472[a]	.223	.211	.506	.223	19.293	4	269	.000
2	.517[b]	.268	.251	.493	.045	8.140	2	267	.000

a. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months

b. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months, QDS calculated age today, Any sexual violence, p 12m

Table 10

Research Question 1 ANOVA table Displaying Predictability Statistics for Outcome Variable Condom-less Vaginal Sex, n=280

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	19.763	4	4.941	19.293	.000[b]
	Residual	68.886	269	.256		
	Total	88.649	273			
2	Regression	23.722	6	3.954	16.258	.000[c]
	Residual	64.927	267	.243		
	Total	88.649	273			

b. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months

c. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months, QDS calculated age today, Any sexual violence, p 12m

The *F*-value represents the ratio of improvement in predicting the model (Field, 2009). An *F*-value greater than 1 means that the regression likely did not happen by chance (Field, 2009). The ANOVA model 1 results show that there is an *F*-value of 19.293 (p <.001). The model results are significant and likely did not happen by chance. Model 2 shows an *F*-value of 16.258 and is significant (p <.001). This means that model 2 (controlling for age and sexual violence) significantly improves the ability to predict outcomes for the dependent variable condom-less vaginal sex.

Table 11 displays all predictor variables and their individual contribution to condom-less vaginal sex. Controlling for age and sexual violence, the regression coefficient [B= .086 95% C.I. (-.050, .222) p >.05] associated with alcohol consumed in the past 30 days suggest that alcohol consumption is not associated with condom-less vaginal sex and is

not statistically significant. Controlling for age and sexual violence, the regression coefficient [B=.234 95% C.I. (.063, .404) p <.05] associated with Non-injection drug use in the past 12 months suggest that Non-injection drug use is associated with condom-less vaginal sex and is statistically significant. There is a positive correlation among Non-injection drug use and condom-less vaginal sex. For every increase in Non-injection drug use there was an increase in condom-less vaginal sex between 0.063 – 0.404 units. Controlling for age and sexual violence, the regression coefficient [B=.228 95% C.I. (.101, .356) p <.05] associated with ever injecting drugs suggests that injection drug use is associated with condom-less vaginal sex and is statistically significant. There was a positive correlation among injection drug use and condom-less vaginal sex. For every increase in injection drug use there was an increase in condom-less vaginal sex between 0.101 – 0.356 units. Controlling for age and sexual violence, the regression coefficient [B= .299 95% C.I. (.173, .425) p <.05] associated with homeless during the past 12 months suggest that homelessness was associated with condom-less vaginal sex and was statistically significant. Homelessness was positively correlated with condom-less vaginal sex. For every unit of increase in homelessness there was an increase in condom-less vaginal sex between 0.173 and 0.425 units. Among all variables in model 2 homelessness had a larger impact on condom-less vaginal sex.

Table 11

Research question 1 table determining the predictor variables measure of association and statistical significance with the outcome variable condom-less vaginal sex, n=280

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	.207	.091		2.266	.024	.027	.386		
	Had one or more drinks past 30 days	.127	.070	.100	1.811	.071	-.011	.265	.947	1.056
	Non-injection drug use - 12 months	.253	.089	.159	2.854	.005	.078	.427	.935	1.070
	Ever Injected drugs	.234	.066	.196	3.532	.000	.104	.364	.942	1.062
	Homeless during past 12 months	.365	.064	.321	5.751	.000	.240	.490	.929	1.076
2	(Constant)	.417	.169		2.466	.014	.084	.750		
	Had one or more drinks past 30 days	.086	.069	.068	1.242	.216	-.050	.222	.926	1.080
	Non-injection drug use - 12 months	.234	.086	.147	2.700	.007	.063	.404	.931	1.074
	Ever Injected drugs	.228	.065	.191	3.536	.000	.101	.356	.940	1.064
	Homeless during past 12 months	.299	.064	.263	4.670	.000	.173	.425	.868	1.152
	QDS calculated age today	-.005	.003	-.079	-1.489	.138	-.011	.001	.980	1.020
	Any sexual violence, p 12m	.262	.070	.206	3.750	.000	.124	.399	.909	1.101

Research Questions 2: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and number of sex partners among female sex workers?

To approach research question 2, a hierarchical linear regression analysis was conducted to evaluate the prediction of multiple sex partners from substance use, homelessness, immigration status and utilization of healthcare services. For the first block analysis in table 12, the predictor variables substance use (alcohol in the past 30 days, ever injected drugs and Non-injection drug use) and homelessness (homeless during the last 12 months) was analyzed. The results of the first block hierarchical linear regression analysis revealed a model to be statistically significant ($p < .05$) therefore, the null hypothesis is rejected. The model summary shows a R^2 value of .151 and explains 15% of the variance in the data.

For the second block control variables age and sexual violence were added to the model. For the second model the R^2 increases to .172 or 17.2% of the variance in number of sex partners. Therefore, when sexual violence and age were added to the model they accounted for a 17% increase in the variance of sex partners. The results of the hierarchical linear regression analysis revealed a model to be statistically significant (p <.05). An r-value of .414 suggests a positive correlation. Overall, an increase among the predictor variables suggests an increase in the total number of sex partners. Additionally, the R^2 change value of .021 associated with this model suggests that the addition of age and sexual violence to the first block model accounts for 2% of the change in variation of the dependent variable log_sex_partners. If this model was derived from the entire population versus just a sample the variance would be approximately 1.2% less variance in the outcome.

Table 12

Research Question 2 Model Summary Displaying Variance Statistics for Outcome Variable Number of Sex Partners, n =438

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.388[a]	.151	.143	.656	.151	19.228	4	433	.000
2	.414[b]	.172	.160	.650	.021	5.414	2	431	.005

a. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months

b. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months, QDS calculated age today, Any sexual violence, p 12m

The ANOVA model 1 results in table 13 show that there is an F-value of 19.228 (p <.001). The results show that the model is highly significant and unlikely to have happened by chance. Model 2 results show that there is an F-value of 14.885 and the

model is highly significant (p <.001). This means that model 2 significantly improves the ability to predict outcomes for the dependent variable number of sex partners.

Table 13

Research Question 2 Model Summary Displaying Predictability Statistics of Outcome Variable Number of Sex Partners n=438

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	33.113	4	8.278	19.228	.000[b]
	Residual	186.416	433	.431		
	Total	219.529	437			
2	Regression	37.681	6	6.280	14.885	.000[c]
	Residual	181.848	431	.422		
	Total	219.529	437			

a. Dependent Variable: Number of Sex Partners

b. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months

c. Predictors: (Constant), Non-injection drug use - 12 months, Ever Injected drugs, Had one or more drinks past 30 days, Homeless during past 12 months, QDS calculated age today, Any sexual violence, p 12m

Controlling for sexual violence and age, the regression coefficient [B= .212 95% C.I. (.046, .377) p <.05] associated with Non-injection drug use suggests that Non-injection drug use is associated with the number of sex partners and is statistically significant. Non-injection drug use is positively correlated with the number of sex partners. For every unit increase in Non-injection drug use there is an increase in number of sex partners between 0.046 – 0.377 units. Controlling for sexual violence and age, the regression coefficient [B= .253 95% C.I. (.129, .376) p < .05] associated with ever injected drugs suggests that injection drug use is associated with the number of sex partners and is statistically significant. Injection drug use is positively associated with

the number of sex partners. For every unit increase in injection drug use there is an increase in number of sex partners between 0.129 and 0.376 units. Controlling for sexual violence and age, the regression coefficient [B= .084 95% C.I. (-.047, .216) p >.05] associated with alcohol consumed in the past 30 days suggests that alcohol consumption in the past 30 days is not associated with the number of sex partners and is not statistically significant. Controlling for sexual violence and age, the regression coefficient [B= .382 95% C.I. (.215, .478) p<.05] associated with homelessness suggests that homelessness is associated with number of sex partners and is statistically significant. Homelessness is positively associated with the number of sex partners. For every unit increase in sexual violence there is an increase in the number of partners between 0.215 and 0.478 units. Among all predictors in model 2 homelessness contributes mostly to predicting number of sex partners.

Table 14

Research question 2 coefficients table displaying measures of association among the dependent variable number of sex partners and predictor variables substance use and homelessness, n=438

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Correlations		
	B	Std. Error	Beta	T	Sig.	Lower Bound	Upper Bound	Zero-order	Partial	Part
1(Constant)	.427	.088		4.861	.000	.254	.599			
Non-injection drug use - 12 months	.233	.085	.113	2.729	.007	.065	.401	.160	.119	.109
Ever Injected drugs	.259	.064	.167	4.059	.000	.134	.385	.223	.175	.162
Had one or more drinks past 30 days	.123	.068	.075	1.824	.069	-.009	.256	.112	.080	.073
Homeless during past 12 months	.449	.061	.303	7.332	.000	.329	.570	.359	.306	.293
2(Constant)	.595	.129		4.631	.000	.343	.848			
Non-injection drug use - 12 months	.212	.084	.102	2.510	.012	.046	.377	.160	.110	.099
Ever Injected drugs	.253	.063	.163	4.016	.000	.129	.376	.223	.174	.158
Had one or more drinks past 30 days	.084	.067	.051	1.258	.209	-.047	.216	.112	.055	.049
Homeless during past 12 months	.382	.062	.258	6.138	.000	.260	.505	.359	.261	.241
QDS calculated age today	-.076	.042	-.072	-1.817	.070	-.158	.006	-.115	-.080	-.071
Any sexual violence, p 12m	.269	.068	.163	3.956	.000	.135	.403	.260	.171	.155

Research Question 3: After controlling for age and sexual violence what the relationships between immigration status and utilization of health care services and condom-less vaginal sex among female sex workers are.

To approach research question 3, a hierarchical linear regression analysis was conducted to evaluate the prediction of condom-less vaginal sex from healthcare visits in

the past 12 months and country of birth (immigration status). For the first block analysis, the predictor variables healthcare utilization and immigration status were analyzed. The null hypothesis is rejected, hence the results of the first block hierarchical linear regression analysis revealed a model to be statistically significant (p <.05). The model summary shows a R^2 value of .030 and explains 3% of the variance in the data.

For the second block control variables age and sexual violence were added to the model. For the second model the R^2 increases to .132 or 13% of the variance in condom-less vaginal sex. Therefore, when age and sexual violence were added to the model they accounted for 13% of the variance. The results of the hierarchical linear regression analysis revealed a model to be statistically significant (p <.05). Additionally, the R^2 change value of .114 associated with this model suggests that the addition of age and sexual violence to the first block model accounts for 11% of the change in variation of the dependent variable condom-less vaginal sex. If this model was applied to the entire population it would account for approximately 1.2% less variance in the outcome.

Table 15

Research question 3 model summary displaying variation statistics for outcome variable condom-less vaginal sex, n=280

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.174[a]	.030	.023	.563	.030	4.214	2	271	.016
2	.380[b]	.144	.132	.531	.114	17.956	2	269	.000

a. Predictors: (Constant), Health care visit, 12 months, Country of birth

b. Predictors: (Constant), Health care visit, 12 months, Country of birth, Any sexual violence, p 12m, QDS calculated age today

The ANOVA model 1 results show that there is an *F*-value of 4.214 (p <.05). Model 1 results are significant and likely did not happen by chance. Model 2 shows an *F*-value of 11.349 and a significance of p <.001. This means that model 2 significantly improves the ability to predict outcomes for the dependent variable condom-less vaginal sex.

Table 16

Research question 3 ANOVA table displaying predictability statistics for outcome variable condom-less vaginal sex, n=280

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	2.674	2	1.337	4.214	.016[b]
	Residual	85.975	271	.317		
	Total	88.649	273			
2	Regression	12.800	4	3.200	11.349	.000[c]
	Residual	75.849	269	.282		
	Total	88.649	273			

b. Predictors: (Constant), Health care visit, 12 months, Country of birth
c. Predictors: (Constant), Health care visit, 12 months, Country of birth, Any sexual violence, p 12m, QDS calculated age today

Controlling for age and sexual violence, the regression coefficient [B= -.065 95% C.I. (-.209, .079) $p > .05$] associated with country of birth suggest that country of birth is not associated with condom-less vaginal sex and is not statistically significant. Controlling for age and sexual violence, the regression coefficient [B= -.246 95% C.I. (-.417, -.076) p <. 05] associated with healthcare visits in the past 12 months suggests that health care visits are associated with condom-less vaginal sex and is statistically significant. Healthcare visits are negatively associated with condom-less vaginal sex. For every unit increase in healthcare visits there is a decrease in condom-less vaginal sex

Table 17

Research question 3 Table Displaying Measures of Association and Significance Among the Predictor Variables Immigration Status and Utilization of Healthcare, n=280

Model		Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B		Collinearity Statistics	
		B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound	Tolerance	VIF
1	(Constant)	1.043	.114		9.130	.000	.818	1.268		
	Country of birth	-.058	.078	-.045	-.743	.458	-.211	.095	.996	1.004
	Health care visit, 12 months	-.253	.092	-.165	-2.754	.006	-.434	-.072	.996	1.004
2	(Constant)	1.269	.185		6.863	.000	.905	1.633		
	Country of birth	-.065	.073	-.050	-.891	.374	-.209	.079	.995	1.005
	Health care visit, 12 months	-.246	.087	-.161	-2.843	.005	-.417	-.076	.996	1.004
	QDS calculated age today	-.007	.003	-.129	-2.276	.024	-.014	-.001	.998	1.002
	Any sexual violence, p 12m	.391	.072	.308	5.449	.000	.249	.532	.998	1.002

Research Question 4: After controlling for age and sexual violence, what are the relationships between immigration status and utilization of health care services and number of sex partners among female sex workers?

To approach research question 4, a hierarchical linear regression analysis was conducted to evaluate the dependent variable number of sex partners from healthcare utilization and immigration status in table 18. For the 1st block analysis, the predictor variables healthcare visit in the last 12 months and country of birth was analyzed. The results of the 1st block hierarchical linear regression analysis revealed a model not to be statistically significant ($p > .05$). Additionally, the R^2 value of .009 associated with this regression model suggests that healthcare visits in the past 12 months and country of birth does not account for any variations in number of sex partners. This means that healthcare visits in the last 12 months and country of birth alone cannot determine variations in the number of sex partners.

The second block analysis, the predictor variables sexual violence and age was added to the analysis. The results of the second block hierarchical linear regression analysis revealed a model to be statistically significant ($p < .05$). Additionally, the R^2 change value of .062 associated with this regression model suggests that the addition of sexual violence and age to the first block model accounts for 6% of the variation in the number of sex partners, which means that majority of the variation in number of sex partners cannot be explained by health care visits in the last 12 months and country of birth alone. The R^2 and the Adjusted R^2 gives an idea of out well the model would be generalizable to

an entire population. If this model was applied to the entire population it would account for approximately 1% less variance in the outcome.

Table 18

Research Question 4 Displaying Variance Statistics Among the Outcome Variable Number of Sex Partners, n=438

					Change Statistics				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.094[a]	.009	.004	.707	.009	1.928	2	435	.147
2	.265[b]	.070	.062	.687	.062	14.325	2	433	.000

a. Predictors: (Constant), Health care visit, 12 months, Country of birth

b. Predictors: (Constant), Health care visit, 12 months, Country of birth, Any sexual violence, p 12m, QDS calculated age today

Table 19 displays the analysis of variance results. Model 1 results show that there is an *F*-value of 1.928 and were not statistically significant ($p > .05$). Model 2 results show that there is an *F*-value of 8.185 and were statistically significant ($p < .05$). These results show that model 2 (controlling for age and sexual violence) significantly improves the ability to predict outcomes for number of sexual partners.

Table 19

Research question 4 ANOVA table describing the predictability statistics for the outcome variable number of sex partners, n=438

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1.929	2	.964	1.928	.147[b]
	Residual	217.600	435	.500		
	Total	219.529	437			
2	Regression	15.433	4	3.858	8.185	.000[c]
	Residual	204.096	433	.471		
	Total	219.529	437			

b. Predictors: (Constant), Health care visit, 12 months, Country of birth

c. Predictors: (Constant), Health care visit, 12 months, Country of birth, Any sexual violence, p 12m, QDS calculated age today

Table 20 displays the measures of association among the dependent variable number of sex partners and the predictor variables immigration status and utilization of healthcare. Controlling for age and sexual violence, the regression coefficient [B= -.088 95% C.I. (-.243, .068) p >.05] associated with country of birth suggests that country of birth (immigration status) is not statistically significant and is not associated with number of sex partners. Controlling for age and sexual violence, the regression coefficient [B= -.147 95% C.I. (-.321, .027) p >.05] associated with healthcare visits in the last 12 months suggests that healthcare visits in the last 12 months is not statistically significant and is not associated with number of sex partners. However, control variable sexual violence and age is significant ($p \leq .05$) and suggests that sexual violence has an impact on predicting the number of sexual partners.

Table 20

Research question 4 table displays the measures of association among the dependent variable number of sex partners and predictor variables immigration status and utilization of healthcare, n=438

Model	Unstandardized Coefficients		Standardized Coefficients			95.0% Confidence Interval for B	
	B	Std. Error	Beta	t	Sig.	Lower Bound	Upper Bound
1(Constant)	1.199	.116		10.295	.000	.970	1.428
Country of birth	-.086	.081	-.051	-1.061	.290	-.246	.074
Health care visit, 12 months	-.145	.091	-.076	-1.591	.112	-.325	.034
2(Constant)	1.343	.154		8.739	.000	1.041	1.646
Country of birth	-.088	.079	-.051	-1.110	.268	-.243	.068
Health care visit, 12 months	-.147	.089	-.077	-1.657	.098	-.321	.027
QDS calculated age today	-.110	.047	-.108	-2.339	.020	-.202	-.018
Any sexual violence, p 12m	.354	.074	.222	4.787	.000	.209	.499

Summary

This chapter contains the results of the analysis using a hierarchical multiple linear regression testing method. There was a total of 534 respondents involved in this study during primary research. The respondents were cis gender females ages 18 and over living in high risk areas and participating in high risk behaviors. The total number of respondents for each dependent variable deviated from the original sample due to several values missing completely at random and/or values outside residuals of +/-3 standard deviations.

The descriptive statistics overall show that the study sample was primarily born in the United States, were African American (74%), most respondents were never married

(62%) and majority had at least a 9-11th grade education (39%) or 12th/GED level education (37%). Initial multiple regression analysis showed the dependent variables condom-less-anal sex, condom-less-vaginal sex, and number of sex partners to be linear after performing a log-transformation of the dependent variables. There was a significant positive association between condom-less vaginal sex and utilization of healthcare, Non-injection drug use, injection drug use and homelessness. There was also a significant positive association among number of sex partners and Non-injection drug use, injection drug use and homelessness. Lastly each model controlled for age and sexual violence. Sexual violence showed to increase the predictability of the number of sex partners and condom-less vaginal sex.

The factors that are more strongly contributing to condom-less vaginal sex and number of sex partners include homelessness and substance use. These predictor variables showed increased predictability and were statistically significant. Consistent with previous science this research study results show that social and structural factors such as homelessness and substance use are associated with risky sexual behaviors. Chapter 5 provides an interpretation of the findings, limitations in the study, recommendations, and implications for this study.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

The purpose of this study was to investigate the relationship between sociostructural factors of substance use, homelessness, immigration status and use of health care services and risky sexual behaviors (condom-less anal/vaginal sex and number of sex partners) among cis gender female sex workers who reside in the city of Chicago and are between 18-60 years of age. This quantitative study used correlational methods with an exploratory approach. Secondary data from the NHBS project was used to investigate relationships among the dependent variables of condom-less vaginal sex and number of sex partners and independent variables of substance use, homelessness, utilization of healthcare and immigration status. Condom-less anal sex was removed from the analysis due to missing values leading to a decrease in the power of this study. This chapter provides a detailed overview and discussion regarding the following research questions:

1. RQ1: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and condom-less anal/vaginal sex among female sex workers?
2. RQ2: After controlling for age and sexual violence, what are the relationships between substance use and homelessness and number of sex partners among female sex workers?

3. RQ3: After controlling for age and sexual violence what are the relationships between immigration status and utilization of health care services and condom-less anal/vaginal sex among female sex workers.
4. RQ4: After controlling for age and sexual violence, what are the relationships between immigration status and utilization of health care services and number of sex partners among female sex workers?

The key findings in this study include significant associations among variables condom-less vaginal sex and substance use, homelessness, and use of healthcare. In addition, the number of sex partners was significantly associated with substance use and homelessness. Overall, the study statistics show that women involved in sex work who also participate in substance use are more likely to participate in risky sexual behaviors such as vaginal sex without a condom and having sex with multiple partners. Use of healthcare among female sex workers was negatively associated with condom-less vaginal sex. In addition, being homeless was also positively associated with condom-less vaginal sex among female sex workers. In this chapter, I provided a detailed overview of the findings, the limitations of the study, recommendations, and implications for future studies.

Interpretation of the Findings

Participation in social factors such as substance use was associated with risky sexual behaviors that include condom-less vaginal sex and multiple sex partners. Homelessness as a structural factor was also correlated with participation in risky sexual behaviors among FSWs. Utilization of healthcare services was a statistically significant

structural factor that may contribute to long-term health issues including HIV and STIs among FSWs.

Substance Use and Risky Sexual Behaviors

Researchers reported inconsistent condom use to be associated with Non-injection drugs such as cannabis, ecstasy, prescription drugs and cocaine (Carney et al., 2015). Similarly, my study's findings produced statistically significant results regarding the association among Non-injection drug use and its impact on a person's poor judgement to participate in risky sexual behaviors. While 72% of the study participants reported alcohol use, this was not statistically associated with risky sexual behaviors. This is consistent with other researchers that reported 97% of the study's population alcohol use was found to be not significantly associated with inconsistent condom use (Carney et al., 2015). In contrast a study completed with female sex workers in Uganda reported a correlation among alcohol consumption and unsafe sexual behaviors (Seeley et al., 2014).

In my study, 85% of study participants reported using Non-injection drugs over the past 12 months versus 35% who reported ever using injection drugs. Consistent with this study. Carney et al. (2015) reported that participants who used over the counter drugs or prescribed drugs were four times as likely to participate in high risk sexual behaviors. Non-injection and injection drug use were significant predictors of number of sex partners and condom-less vaginal sex. In this study, I found that as substance use increased so did condom-less vaginal sex and the number of sex partners. Participation in these risky sexual behaviors is common among the sample population who were primarily African American single women living in Illinois. According to Alemayehu et

al. (2015), women who were involved in substance use were considered more vulnerable and desperate for money to support their substance use addiction. This vulnerability led to an increase in the number of sex partners among the study's sample population. This is consistent with my study that provides statistically significant ($P < .001$) results among condom-less vaginal sex and multiple sex partners. These results differ with a study completed with women in Durbin, South Africa. Substance use was not associated with condom-less vaginal sex among the study sample; however, the researchers noted that condom-less sex has been linked to an increase in HIV among female sex workers in other South African Studies (Carney et al., 2015). In addition, their test of condom-less sex was associated with specific substances.

Homelessness and Risky Sexual Behaviors

Women involved in sex work often face multiple challenges and barriers with unstable housing and homelessness being a primary factor. Homelessness was significantly associated with multiple sex partners and condom-less vaginal sex in my study. According to Hankel et al. (2016), housing was a primary barrier to physical and mental health wellness for sex workers. Other factors mentioned previously in this study such as substance use was reported by Hankel et al. as a contributing factor associated with participation in risky sexual behaviors. Likewise, my study results show the association among substance use, homelessness, and risky sexual behaviors. While researchers Hankel et al. (2016) and Duff et al. (2015) reported a high percentage of sex workers who were homeless there has been little research on how this is related to risky sexual behaviors.

Utilization of Healthcare, Immigration Status, and Risky Sexual Behaviors

Utilization of healthcare was negatively associated with number of sex partners. Therefore, as utilization of healthcare increased the number of condom-less vaginal sex units decreased. According to Benoit et al. (2016) there are several factors that contribute to poor utilization of health care among female sex workers including not feeling like they belonged to the community and feelings of being judged. Likewise, my research findings are similar with this study and may provide explanation for poor utilization of healthcare among female sex workers. While this research study did not find immigration status to be significantly associated with risky sexual behaviors researchers Benoit et al. discovered that immigration status was associated with poor utilization of healthcare. My study's population primarily involved U.S. born individuals. This may provide some explanation for the insignificant results.

Confounding Variables Age and Sexual Violence

Sexual violence and age were added to the study as control variables which led to an increase in the percentage of variance for predictor variables condom-less vaginal sex and number of sex partners. When age and sexual violence were added to the model with predictor variables immigration status and utilization of healthcare, the model displayed increased significance and prediction of risky sexual behaviors. The findings showed that immigration status and utilization of healthcare alone could not predict risky sexual behaviors. When sexual violence and age were added as potential factors associated with the number of sex partners and condom-less vaginal sex the statistics showed that this was associated with risky sexual behaviors including multiple sex partners and condom-

less vaginal sex. The literature review documents researchers who have found that sexual violence has been associated with increased sex partners and condom-less sex among female sex workers (Alemayehu et al., 2015; Deuba et al., 2016;). The ability to predict risky sexual behaviors increased when age and sexual violence was added to my study analysis. In fact, age and sexual violence were statistically significant ($p < .001$) when added to the regression model that predicted a positive association with number of sex partners. These outside variables have the potential to influence risky sexual behaviors among female sex workers.

The Syndemic Theory

The syndemic theory is one that allows researchers to consider several factors that can ultimately lead to increased disease burden (Batchelder et al., 2015). Researchers Brennan et al. (2012) hypothesized that co-occurring psychosocial and health conditions are factors that can add to HIV risk. Likewise, I found that factors such as being homeless and using substances was associated with condom-less vaginal sex and multiple sex partners. Participation in risky sexual behaviors combined with psychosocial and structural factors can lead to an increase in HIV infection among CSWs (Brennan et al., 2012). Adding sexual violence and age as predictors of risky sexual behaviors increased the ability to predict these behaviors. Other researchers reported in their study that individuals such as disadvantaged HIV positive African American women were more likely to be active substance users (Wilson et al., 2014). Similarly, my study included 74% African American female sex workers and 85% of women who participated in Non-injection substance use. These syndemics of physiological and psychosocial factors that

interact with one another can contribute to unsafe sexual behaviors leading to risk of infectious diseases (Wilson et al., 2014).

Limitations of the Study

Sample size was a limitation for the predictor variable condom-less anal sex. There was 76% of the data missing which led to a decrease in the sample size and the scope of my analysis for determining association of factors leading to high risk sexual behaviors. However, this was not the case for condom-less vaginal sex that had less (38%) missing values. This could be due to the thought of how a person thinks that they will be perceived. In addition, there could be some stigma related to types of sexual behaviors.

Self-reported data almost always contains some sort of bias. Data collected during the interviews with the respondents may have involved selected memory bias. Respondents may not remember all experiences or events. In addition, these respondents may intentionally not associate negative experiences with themselves because they are being influenced by social desirability (Salters-Pedneault, 2018). Lastly, a large percentage of the sample population had used substances and if they were under the influence of substances during the interview process this could lead to unreliable responses.

The data collection method for this study was key-informant interviews. This type of data collection method led to generalizability concerns. The informants recruited respondents that were 74% African American which limits the ability to generalize these findings to a diverse group of sex workers that are from different racial and ethnic

backgrounds. In addition, majority of the respondents were involved in street-based sex work versus venue-based sex work. The study interviewers selected respondents in their networks that had similar characteristics and were over-represented which limits the ability to generalize the findings to a larger population.

Recommendations

Future research involving commercial sex workers and risky sexual behaviors should extend beyond cisgender women to transgender male-to-female persons. Comparing cisgender females to transgender male-to-females is needed to understand needs specific to both populations. Diverse populations of different racial and ethnic backgrounds are imperative for generalizability purposes. There continues to be limited research conducted in the United States with FSWs. Individuals who may not be United States citizens could have very different needs than those who are United States citizens. Obtaining a diverse study sample from different countries is needed for future research. Immigrants versus U.S. citizens can be analyzed for differences in characteristics and to assess their needs.

Another recommendation for future research involves investigating target venues and the ways in which sex workers find partners. Such as venue-based sex work versus street-based sex work in the United States. The outcomes from the different types of ways in which sex workers seek partners may lead to different findings. In addition, researchers could investigate the use of social media as an approach to finding sex partners and should be considered in future research similar to this study.

Finally, linking sex work to disease conditions should also be considered in future research. In this study, I did not include statistics regarding the prevalence of Sexually Transmitted Diseases among the sample population. The Syndemic theory links psychosocial factors to disease conditions and the link between the two should be considered in future research. Sexually transmitted diseases can be analyzed when comparing diverse groups of individuals to determine the risk involved with sex work. Considering diverse groups and the risks among those groups can provide information on the populations most at risk and determine where prevention efforts should be targeted. While this may be difficult to establish and ethically challenging, collaborating with medical professionals to obtain laboratory records can lead to reliable data when determining the prevalence of infectious diseases among this sample population.

Implications

There are many ways that this study results can be used to create social change. There continues to be a limited amount of research conducted in the U.S. with female sex workers. It is clear from this study and other studies conducted outside of the U.S. that FSWs participate in risky sexual behaviors that place them at high risk for infectious diseases. The study results can be used to make an impact at the individual, local and federal level contributing to social change. At the federal level funding toward addressing the needs of female sex workers can be established and policies can be created for immigrants who are arrested for involvement with female sex work as well as for US citizens. At the local level leaders can coordinate surveillance across cities for FSWs and monitor funding for local health departments. At the individual level practitioners can

change the way they interact with this population and improve provider-patient relationships.

Healthcare and public health professionals can utilize this type of research to gain an understanding of the needs of commercial sex workers. These are professionals that are treating individuals involved in risky behaviors that have the knowledge and skills to implement activities that may lead to prevention of these risky behaviors. Executive leaders that manage operations for community-based clinical practices and social service agencies can drive a new model of how services are implemented at their organizations. They can implement training programs for providers and build access to resources that will address the underlying issues that lead individuals to being involved with FSW. These programs could involve educating providers on the needs of FSWs and how to link them to these services. These resources could include rehabilitation services for substance users, resources for emergency housing locations, workforce programs, and counseling for those who have experienced abuse.

Conclusion

This research study involved quantitative research methods with an explanatory and correlational approach. Secondary data from the National HIV Behavioral Surveillance study was used to conduct this research study. The independent variables substance use and homelessness were found to be positively associated with number of sex partners and condom-less vaginal sex. In addition, utilization of healthcare was negatively associated with number of sex partners. The theoretical framework syndemic theory, describes how multiple factors such as substance use, homelessness and

utilization of healthcare together can lead to risk of sexually transmitted diseases. This study results supported this theory by providing statistically significant results between several structural and social factors and risky sexual behaviors. Further research in the U.S. is needed to determine differences among diverse groups and prevalence of sexually transmitted diseases. Similar to research conducted outside of the U.S. substance use and homelessness are correlated with risky sexual behaviors. However, there continues to be a gap in literature regarding effective interventions that address the needs of CSWs within the U.S. Conducting more research in the U.S. among CSWs, understanding the epidemiology of infectious diseases among this population and building surveillance systems specific to CSWs can lead to changes in the way clinical and public health practitioners respond to the needs of this population.

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