

An Examination of the Social and Community Context of Substance Use  
Disorder Recovery Support Services in Rutherford County, Tennessee

by

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree  
of Doctor of Philosophy in Human Performance with a Specialization in Health

Middle Tennessee State University

May 2021

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## ACKNOWLEDGEMENTS

I would like to thank my dissertation committee, Dr. Bethany Wrye, Dr. Angie Bowman, and Dr. Dee Priddis for their guidance during this project. Their feedback and input were critical to development of this final product.

This project would not be possible without the knowledge gained from all professors I worked with throughout my graduate programs at MTSU. The knowledge of substance misuse prevention, treatment, and recovery from Dr. Doug Winborn was an inspiration for this project. The knowledge I gained about the importance of program evaluation from Dr. Norman Weatherby provided the foundation for this project.

The most important acknowledgement goes to those struggling with substance use disorder and their families. My hope is that this project contributes to reducing the stigma surrounding substance use disorder and increasing the services needed to sustain recovery.

## ABSTRACT

Substance use disorder causes significant morbidity and mortality in the United States. An estimated 20.1 million persons age 12 or older had a diagnosis of substance use disorder in 2016. Approximately 95,000 lives are lost due to alcohol-related causes yearly. A public health emergency was declared in 2017 due to increasing opioid overdoses. In 2018 in Rutherford County, Tennessee, overdoses resulted in 89 deaths or 27.6 per 100,000 persons.

Many barriers prevent access to treatment services resulting in less than 20% of adults with substance use disorder receiving treatment. Recovery support services are needed to build recovery capital to promote and sustain recovery. Mutual aid and 12-step programs are peer recovery support services available at no cost to participants. Faith-based organizations often provide meeting space for these groups. The purpose of this project is to examine these services including the capacity of a recovery congregation program and program accessibility by population demographics.

Enhancing interorganizational network capacity to increase the transfer of resources is a strategy to improve social programs. For a certified recovery congregation program, community capacity is necessary to achieve the certification best practices including providing visible outreach, disseminating recovery information, and hosting or referring individuals to recovery support groups. A social network analysis including 12 community partners examined the capacity of a recovery congregation program. Sociograms provided visual

diagrams of the network's collaboration frequency and collaboration level. Areas for capacity building were identified including unreciprocated relationships. Increasing capacity by leveraging collaborating cliques and dyads was one of the strategies identified to increase the density of the network. A one-year follow-up is needed to examine change in capacity over time.

A spatial study utilizing geographic information system (GIS) mapping and logistic regression examined accessibility of mutual aid groups by census tract population demographics. In Rutherford County, an uneven distribution was identified with services located in census tracts of smaller square mileage with higher population density. GIS maps provided a visual of location of the services with overlays of poverty level and population density. More research is needed to better understand the accessibility of these important peer recovery support services.

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## CHAPTER I: A Social Network Analysis of a Recovery Congregation Program

### Background

Substance Use Disorder. The American Psychiatric Association's Diagnostic and Statistical Manual of Mental Disorder (DSM-5) defines substance use disorder on a spectrum of mild, moderate, and severe determined by the number of positive responses to a list of 11 criteria in four domains of impaired control, social impairment, risky use, and pharmacological side effects such as tolerance and withdraw. Criteria resulting in severe substance use disorder include experiencing withdraw upon stopping use of the problematic substance, inability to stop use, substance use that results in forfeiture of recreational activities, inability to fulfill home, work, or school obligations, and craving the problematic substance (Kopak et al., 2014; National Institute on Drug Abuse Media, 2018). Approximately 20.1 million persons age 12 or older had a diagnosis of substance use disorder in 2016. There were 15.1 million diagnoses of alcohol use disorder and 7.4 million diagnosis of an illicit drug use disorder. As a result, approximately 1 out of 13 persons in the US were in need of substance use disorder treatment (SAMHSA NSDU, 2017; National Institute on Alcohol Abuse and Alcoholism, 2018).

The term addiction is not a substance use disorder-related diagnosis in the DSM-5. The National Institute of Drug Abuse (NIDA) describes addiction as a severe form of substance use disorder resulting from repeated use of a

substance. According to NIDA, addiction is characterized by an inability to stop use of a substance despite negative consequences. Prolonged use of substances results in changes to the brain especially in the reward and inhibition pathways. Addiction and associated symptoms manifest due to these changes in the brain (National Institute on Drug Abuse Media, 2018).

Substance abuse and substance use disorders result in substantial morbidity and mortality. Alcohol is the third leading cause of preventable death in the United States with an estimated 95,000 persons (68,000 men and 27,000 women) dying of alcohol-related causes annually. Alcohol related mortality includes deaths due to liver disease or other alcohol-induced chronic disease, accidental poisoning, and unintentional injuries. The National Survey on Drug Use and Health estimates 14.4 million adults in the United States have alcohol use disorder which is 5.6% of the adult population (age 18 and older). Only an estimated 7.9% of adults with alcohol use disorder received treatment in the past year (National Institute on Alcohol Abuse and Alcoholism, 2020).

Age-adjusted mortality due to drug overdose increased in 35 states in the US between 2013 to 2017. Drug overdoses caused 70,237 deaths in the United States in 2017. Of the total number overdose deaths, 67.8% involved an opioid and 59.6% involved a synthetic opioid including fentanyl. Demographic categories with the highest rates of opioid overdose deaths include males (20.4 deaths/100,000 persons) and white, non-Hispanic origin race/ethnicity (19.4 deaths/100,000 persons). Age ranges with the highest mortality rates are age 25 to 34 (29.1 deaths/100,000 persons) closely followed by age 36 to 44 (27.3

deaths/100,000 persons) (Scholl et al., 2019). The demographic statistics related to mortality due to opioid overdose in Tennessee are similar to the national data with the highest rate in males (25 deaths/100,000 persons) and non-Hispanic whites. Age ranges with the highest mortality rates are age range 35 to 44 (39 deaths/100,000 persons) and age range 25 to 34 (38 deaths/100,000 persons) (Tennessee Department of Health, 2020). In 2017, the Department of Health and Human Services (HHS) declared a public health emergency due to the rapid rise of misuse of opioids and overdoses caused by opioids (HHS, 2019). A meta-analysis by Brady et al. (2017), found that strong risk factors for prescription drug overdose death include a diagnosis of substance use disorder as well as increased risk with a psychiatric disorder diagnosis. Demographic risk factors for prescription drug overdose include white race, age group of 35 to 44 years, and male sex (Brady et al., 2017).

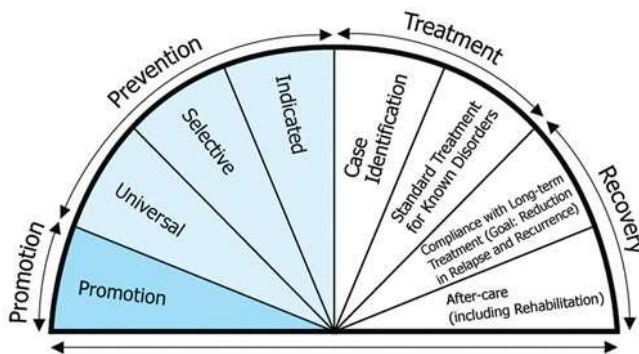
The causes of substance misuse are varied and complex. In addition to genetic predisposing factors, research is increasingly focused on the role of adverse childhood experiences (ACEs), trauma, mental health diagnoses, and other environmental factors in substance use disorder. A seminal study known as The ACEs Study conducted by the CDC and Kaiser Permanente, found that persons reporting four or more adverse childhood experiences were 7.4 times more likely to be an alcoholic, 4.7 times more likely to use illicit drugs, and 10.3 more likely to use injected drugs when compared to persons reporting no adverse childhood experiences (Felitti et al., 1998). A follow-up study concluded

that adverse childhood experiences account for one half to up to two thirds of problematic drug use (Dube et al., 2003).

Treatment and Recovery. Although the terms treatment and recovery are often used simultaneously or even interchangeably, treatment and recovery are not the same. Treatment involves an intervention that may include medication and behavioral therapy which can be delivered in various settings over time (NIDA, 2018). Treatment is one path to recovery. Recovery can occur naturally as well without any clinic intervention (Granfield and Cloud, 2001). The Institute of Medicine developed the first version of the behavioral health continuum of care. The model was updated by the Substance Abuse and Mental Health Services Administration to reflect the spectrum of prevention, treatment, and recovery (Figure 1). This is an important model distinguishing prevention, treatment, and recovery. Treatment and recovery are two separate sections of the continuum with a goal in recovery as a “reduction in relapse and recurrence.”

Figure 1

*The Continuum of Care Model developed by the Substance Abuse and Mental Health Services Administration (SAMHSA)*



The majority of persons with a substance use disorder never receive treatment. The Substance Abuse and Mental Health Services Administration (SAMHSA) estimates in 2016 that 3.8 million individuals age 12 and older received treatment for substance abuse whereas approximately 21 million individuals were in need of treatment. Young adults age 18 to 25 are an age group with the highest rates of substance abuse but also have low treatment rates. Approximately 5.3 million young adults needed treatment for substance use but only an estimated 624,000 received treatment (SAMHSA NSDUH, 2017).

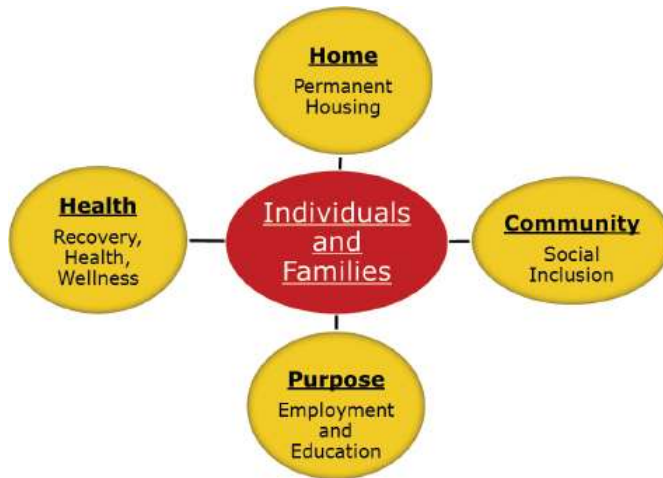
Barriers in the healthcare system such as limitations on insurance coverage, treatment accessibility, and societal factors including stigmatizing attitudes and beliefs about persons with substance use disorder reduce access to treatment services (Hazelton Betty Ford, 2019; McLellen, 2017). Kelly et al. (2016) estimate stigma is the main barrier resulting in only 10% of persons receiving substance use disorder treatment services. Stigma is related to the perception of the level of cause and controllability of a health conditions. Conditions seen as highly controllable and caused by a personal choice are more highly stigmatized. Persons with substance use disorder are often perceived as making poor personal choices resulting in addiction (Kelly et al., 2016). The National Academies of Science states that mental health and substance use disorder are among the most highly stigmatized disorders in the United States (National Academies of Science, 2016).

Recovery Support Services. Recovery support services include any system that helps an individual successfully manage their substance use

disorder including supportive relationships and social networks or programs that reduce barriers to employment, education, or housing.

Figure 2

*Four Dimensions of Recovery*



SAMSHA describes recovery holistically as a “process of change through which people improve their health and wellness, live self-directed lives, and strive to reach their full potential.” Health, home, purpose, and community are four dimensions involved in recovery (Figure 2). The health dimension includes making choices supporting physical and emotional wellbeing to overcome or manage a disease or symptoms. Participation in society including the needed independence, income, resources, and meaningful daily activities is the basis of the purpose dimension. A safe and stable place to live is needed to achieve the home dimension. SAMHSA defines the community dimension as “relationships and social networks that provide support, friendship, love, and hope” (SAMHSA, 2019). An estimated 23.5 million adults in the United States describe themselves as in recovery from substance use (Laudet, 2013).

The National Institute on Drug Abuse estimates that 40-60% of individuals will relapse following treatment for an addiction to drugs or alcohol. A relapse does not indicate treatment has failed. As with other chronic diseases such as hypertension or diabetes, avoiding relapse requires ongoing effort on the part of the individual with the addiction. Mutual-aid groups and 12-step programs following treatment are important for reducing relapse rates (NIDA Principles, 2018). Twelve-step programs are spirituality-based, mutual-aid groups and include Alcoholics Anonymous, Narcotics Anonymous, Cocaine Anonymous, and many others. These group meetings take place at no cost to participants. Alcoholics Anonymous was founded in 1939 upon publication of the “Big Book” text describing the 12 steps followed by participants. Other 12-step programs followed using the framework created by Alcoholics Anonymous (Kelly, 2016). The Alcoholics Anonymous’ website describes the 12 steps as “a group of principles, spiritual in their nature, which, if practiced as a way of life, can expel the obsession to drink and enable the sufferer to become happily and usefully whole” (Alcoholics Anonymous, 2020).

Increasingly often, recovery includes support from peers identifying as being in recovery from substance use disorder. Involvement of peers in recovery programs ranges from the more informal sponsor in 12-step programs such as Alcoholics Anonymous and Narcotics Anonymous to a certified peer recovery specialist in formal recovery coaching programs (Eddie et al., 2019). Peer recovery specialists are individuals with lived experience. These individuals are in recovery from a substance use disorder or a co-occurring mental health



diagnosis. Certification is available at the national level by the National Association for Alcoholism and Drug Abuse or at the state level (National Association for Alcoholism and Drug Abuse, 2020).

Access to 12-step programs and peer support and meeting needs in the four dimensions, health, home, purpose, and community (Figure 2) increase one's recovery capital. According to Granfield and Cloud (2001) recovery capital is a total of an individual's resources that contribute to initiation and maintenance of cessation of substance misuse. Examples of resources important in recovery capital are social resources, human capital, cultural capital, and physical capital (Granfield and Cloud, 2001; Cloud and Granfield, 2008).

Faith-Based Organizations. Despite fewer adults reporting affiliation with a specific religion, the United States continues to be a highly religious country. The Pew Research Center's Religious Landscape Study (2015) found 70.6% of US adults identified as Christian, and 1.7%, 0.7%, 0.4%, and 0.4% identified as Jewish, Buddhist, Muslim, and Hindu respectively. Tennessee is more religious compared to the US average with 81% of Tennesseans identifying as Christian, and 1%, 1%, 1%, and <1% identifying as Jewish, Buddhist, Muslim, and Hindu respectively (Pew, 2014). There are approximately 11,500 institutions of faith in Tennessee (TDMHSAS, n.d.). The strength and numbers of faith institutions is an opportunity to increase access to recovery support services for individuals with a history of addiction.

The George W. Bush administration expanded the Charitable Choice legislation. Charitable Choice clarified faith-based organization's ability to accept

grant funding from federal agencies. Programs related to substance use and mental health from the Department of Health and Human Services are included in the funding sources for faith-based organizations allowed by Charitable Choice (White House, Charitable Choice: The Facts, n.d.). Grim and Grim (2016) estimate 344,894 congregations spanning all faiths in the United States spent over \$9.2 billion on social programs in 2012. Social programs were defined as “activities of congregations across multiple faith traditions that provide for civic life and social cohesion above and beyond providing for the spiritual lives of congregants” (Grim and Grim, 2016, pg. 9). The primary funding sources for social programs are individual donations, dues, and contributions estimated at over \$74.5 billion. In comparison, government grants, contracts, and fees for social services is estimated at only \$252 million. Data used in this estimate are from the National Congregations study and Religious Congregants and Membership study (Grim and Grim, 2016). As of 2012 despite expansion of access to government grant funds from the Charitable Choice legislation, the vast majority of social programs were privately funded by congregations.

In 2018, The White House issued an executive order to further leverage the capacity of the faith communities in the US to address social problems. This executive order further extended federal funding opportunities to faith-based communities which were previously available only to community organizations (White House, Law and Justice, 2018). Funding allows and arguably incentives faith-based organizations to serve as recovery capital to support individuals in recovery from substance use disorder.

An extensive study of the role of religion in addiction prevention and recovery by the Partnership to End Addiction (formerly The National Center on Addiction and Substance Abuse (CASA) at Columbia University), found religion and faith-based organizations play important roles. The study found that 94.4% of clergy surveyed indicated that substance use disorder is an important issue they confront. Despite the high level of awareness, only 36.5% of clergy discuss substance use disorder in a sermon more than once per year and 22.4% never discuss substance use disorder in sermons. One conclusion from the study was faith-based organizations should host support group meetings and help connect members of their congregations connect to treatment services (Columbia University, 2001). Likewise, Former Surgeon General Murthy described the important role of faith leaders in ending stigma towards mental illness. As leaders and community messengers, faith leaders can support their congregations with messages of acceptance and reassurance (Murthy, 2015).

Recovery support in faith communities exists in many forms. Faith-based organizations can support recovery by providing meeting space for 12-step programs such as Alcoholics Anonymous, Narcotics Anonymous, and Celebrate Recovery. Narcotics Anonymous and Alcoholics Anonymous have an element of spirituality but are not connected to a specific religion. Faith-based organizations may host other support groups which are affiliated with specific religions such as the Christian program Celebrate Recovery, Recovery Through Christ, Buddhist Recovery Network, Jewish Alcoholics, and Millati Islami. Recovery churches aim to provide a religious environment to support individuals in recovery (White,

2019). Grim and Grim (2019) estimate there are 130,000 recovery support groups based in congregations throughout the United States. Faith-based communities with recovery support services are an opportunity to increase recovery capital. Gilbert and Kurz (2018) found that an increased level of recovery capital defined as social support, participation in 12-step groups, spirituality, and financial stability increased self-efficacy in sustaining from alcohol and drug use.

The literature indicates that individuals with higher levels of religiosity are more likely to be successful in addiction recovery. In a systematic review, Walton-Moss et al. (2013) found that religiosity or spirituality significantly increased likelihood of sobriety for individuals with alcoholism. Likewise, strong evidence indicates that religious or spiritual individuals with substance use disorder using more than one substance had lower likelihood of relapse (Walton-Moss et al., 2013). An analysis of participation in 12-step programs following substance use disorder treatment found that increased levels of spirituality/religiosity increased likelihood of program participation up to one year post treatment (Carrico et al., 2007). In a study of individuals with opioid use disorder, utilization of religious coping skills was related to participation in 12-step programs (Puffer et al., 2010). Kelly and Moos (2003) examined rates of dropping out of 12-step programs one year following substance use disorder treatment in 2,518 male patients. The overall dropout rate at the one year follow up was 40%. The study found that formal religious background and attendance at

religious services was a statistically significant predictor reducing the likelihood of dropping out of the program (Kelly and Moos, 2003).

Recovery conceptualized as a concept of holistic wellness includes a component of spirituality. Faith-based organizations and mental health services both claim to have a goal to enhance emotional wellbeing. There are many examples of faith-based communities taking concrete steps towards helping their congregation members find help from mental health and substance use disorders. As a result, the number of therapist services offering Christian counseling is increasing (Sullivan et al., 2014). In a study of African American churches in the Los Angeles, California area, 62% of the churches surveyed reported directly linking at least one member of their congregation with care for substance use disorder. Mid-size churches were more likely than small churches to make these direct linkages to care. Churches with clergy with formal seminary training were more likely to make these connections (Wong et al., 2018).

In 2014, the Tennessee Department of Mental Health and Substance Abuse Services (TDMHSAS) began a faith-based initiative with the vision statement:

The vision of the Faith-Based Initiative is to partner with and leverage Tennessee's faith-based communities to increase outreach, build recovery pathways, and provide an educated, welcoming, and supportive place for individuals struggling with substance abuse issues so that they may find help and hope on their pathway to recovery. (TDMHSAS, 2019, pg. 8)

The Certified Recovery Congregation program was developed under this initiative. The TDMHSAS Faith-Based Community Coordinators provide education for congregations including information about the continuum of care of substance use disorder, treatment, and recovery (Figure 2) and resources including access to the TDMHSAS Project Lifeline program to connect persons with addiction to treatment services. The Faith-Based Community Coordinators assist the congregation in the implementation of their best practice model. Currently, TDMHSAS has three Faith-Based Community Coordinators in the three grand regions of east, middle, and west Tennessee (TDMHSAS, n.d.).

The congregation is awarded the Recovery Congregation Certification upon implementation of the following best practices model established by TDMHSAS: provide spiritual/pastoral support, view addition as a treatable disease, embrace and support people in recovery and walk with them on their journey, provide a visible outreach in the community, disseminate recovery information, host or refer individuals to recovery support programs. (TDMHSAS, 2019, pg. 24)

Community Capacity. For all public health programs including programs in faith-based organizations, a network of community partners is essential for success (HHS, 2019). Community capacity is a multi-dimensional concept including resources, readiness, and social and interorganizational networks. These dimensions are measures of a community's capacity to address a social problem (Goodman et al., 1998). The best practices model for the TDMHSAS Recovery Congregation Certificate requires faith-based organizations to build

their capacity including community outreach and developing a referral network (TDMHSAS, 2019, pg. 24).

Faith-based organizations have a history building capacity and involvement in community health promotion activities including emergency response, diabetes prevention, and influenza prevention. A survey of faith-based organizations including congregations found that 55% of the congregations indicated that they provide some type of human service program (Clerkin and Gronbjerg, 2007). Because of the diversity across of faith-based organizations, including levels of capacity, successful implementation of health and social programs varies (Tagai et al., 2018). Faith-based organizations need appropriate levels of capacity to improve implementation of programs and to adequately support program participants. Specifically, for recovery support services, community partners provide resources, expertise, and a source of referrals for faith-based organizations serving individuals with substance-use disorder (HHS, 2019).

#### Theoretical Framework

Carolan (2014) describes social network analysis as both a method and a theory. The concepts of social networks originated in sociology. The term sociometry was first used in the 1930s by sociologist Jacob Moreno. Moreno identified features of social network analysis that remain useful: a focus on patterns between and within groups; systematic collection and analysis of data; use of graphical imagery; and use of mathematical models (Carolan, 2014). Initial

work focused on the relationships to individuals. This was expanded to organizational relationships for capacity building and sharing of resources.

Social network theory relies on four assumptions about the resulting structure formed by actors and relationships: actors and actions are interdependent, relational ties create channels for the transfer or flow of resources, networks related to individual persons view the social network as an opportunity or as a constraint on individual action, structural network characteristics reflect enduring patterns of relationships between the actors (Wasserman and Galaskiewicz, 1994). Building community capacity by enhancing networks to enhance the transfer of resources is a strategy to improve social programs. This is associated with community organizing techniques to strengthen social networks to involve community members and organizations to solve social problems (Heaney and Israel, 2008, pp. 200-203).

Social network analysis is a tool to explore levels and types of relationships that contribute to community capacity (Proven et al., 2005). Social networks analysis increases the understanding of the type and strength of connections between individuals or organizations. Analysis systems, such as UCInet, allows for a visualization of the network connections. The results of a social network analysis include a sociometric diagrams, called sociograms, for a visual presentation of the relationships in the network.

Social network analysis has been used to study a variety of organizations and their relationship to other community partners. A social network analysis conducted at two time points of community cancer network found that the



network strengthened in trust over time (Luque et al., 2010). A social network analysis of the strength of partnership in a coalition of academic institutions and the community working on social determinants of health research found an increase in the density of the connections in the network over time (Bright et al., 2017). A study of a university extension program used social network analysis to analyze the strength of the connections between different extension departments (Bartholomay et al., 2011).

## Methods

Capacity was examined using a social network analysis of for a newly formed Recovery Congregation program. This cross-sectional study used a survey tool to collect network information from the faith-based organization and partnering organizations.

**Purpose.** The purpose of this study was to examine the frequency and collaboration level of network connections of an active recovery congregation program. The recovery congregation program is an initiative from the TDMHSAS to educate congregations, reduce stigma, and to empower congregations to build recovery support services by connecting congregations to the behavioral healthcare system.

**Research Question.** What is the frequency and collaboration level of the ties between organizations in the network of a recovery congregation program?

Data was collected via a semi-structured interview with the model program and surveys of the partnering organizations. The interview included collection of details about the program (Appendix A) and identification of approximately 10 to

15 of the program's most important community partners. The semi-structured interview template was informed by the semi-structured interview template created for the National Academies' Health and Medicine Division's 2020 report "Opportunities to Improve Opioid Use Disorder and Infectious Disease Services: Integrating Responses to a Dual Epidemic." The partnering organizations identified in the interview form the boundary of the network of the recovery congregation.

A survey of the identified community partners was used to collect the data to build the social network surrounding the recovery congregation program (Appendix B). The UCInet software version 6 was utilized for the network analysis and NetDraw was utilized to create the network sociographs (Borgatti et al., 2002; Borgatti, 2002).

The UCInet social network analysis organizes networks around nodes and edges (or ties). The organizations (nodes) in the network are connected based on variables reflecting aspects such as strength and direction of the relationships between the nodes (Garson, 2012). In this study, the nodes are the organizations in the network. The edges are the frequency and level of collaboration existing between the nodes. This is an ego-centric network analysis. Each organization in the network is an 'ego' and the organizations to which they are connected are their alters.

Often the relationships between organizations are complex. In this recovery congregation's network, data collected will focus on the organizations interactions specifically related to the goals of the recovery congregation.

Multiple-category measures of frequency and collaboration level will be collected to examine the recovery congregation network and ties between the organizations that are directly related to the recovery congregation.

The questionnaire to collect network frequency and strength was created based on an instrument developed by Proven et al. (2005) and an instrument developed by Wendel et al. (2010). To measure the frequency of the relationships, data was collected related to the frequency of interactions (daily, weekly, monthly, etc.), Specifically for the collection of data related to collaboration level of the interorganizational ties, the levels developed by Frey et al. (2006) for measuring collaboration between grant partners were utilized. The Prevention Solutions program from SAMHSA recommends use of this measurement to categorize collaboration strength as networking, cooperation, coordination, and full coordination (Prevention Solutions, 2019).

Questionnaire data collected from the nodes was placed in a matrix to be analyzed by UCInet and to develop a socio-gram. Data was entered in Microsoft Excel and imported using UCInet's DL Editor tool to create a matrix. A matrix will be created for frequency and for collaboration level. The sociogram is the graphical representation of the network.

The data collected in this study was directed and valued for both the collaboration frequency and collaboration level. Density of the network was examined. Density is a measure of the number of ties between the nodes. Dyads and reciprocal relationships were examined by comparing each organizations' response to the survey question related to frequency and collaboration level.

Organizations that give the same response (i.e., both organizations indicate a collaboration) have a reciprocal relationship.

Follow-up attempts via phone and email took place to obtain responses from as many organizations as possible. For organizations that did not respond to the survey, data related to these organizations was not utilized. For this analysis, only multiplex data was utilized meaning the collaboration is confirmed by the organization. These multiplex ties are the most reliable network indicators (Proven et al., 2005). This was a baseline data collection for this newly formed recovery congregation program.

## Results

Interview data. A semi-structured interview was conducted with the director of the Recovery Congregation located in Murfreesboro, TN. The interview took place on January 7, 2021 at 1:10 p.m. to 2:20 p.m.

Interview Summary. History and Description: The program director described the church and the Recovery Congregation program. The church has 900 to 1000 members and was founded over 50 years ago although the denomination has changed since the initial founding. The church is currently Christian, non-denominational. The current pastor has led the church for approximately eleven years. The pastor is leaving for a new position with an assistant pastor planned to become the head pastor. The church core values were discussed including a description of the congregation as multigenerational and multicultural.

The program director described the church as offering many programs including youth programs and community outreach. Specific community outreach efforts include offering free health screenings required for youth to participate in sports, free car oil changes for single mothers, and providing lunch to teachers and staff each month at a local school.

Program History: The program director described the Recovery Congregation program and her role in the program. The program director describes herself as a person in recovery from substance use disorder and is a Certified Peer Recovery Specialist. The congregation became certified through the TDMHSAS Recovery Congregation program in approximately March 2019. In January 2019, a workshop that included a presentation about the TDMHSAS Recovery Congregation program and other resources related to mental and behavioral health in Rutherford County took place at the church facility in January 2019. This workshop was a co-hosted event with a non-profit counseling center. The church obtained the certification following the January 2019 workshop. The current program director has been leading the program since obtaining the certification.

The program director described high levels of support for the Recovery Congregation program within the church and from the church leadership. The program director stated that the head pastor selected her to lead the program following the January 2019 workshop. The pastor described the need for the program including the many requests from congregation and community

members related to mental health and substance abuse. The head pastor felt that he could not adequately address the needs and a structured program to connect with resources outside the church was needed. The head pastor has spoken openly about personal mental health struggles with the congregation members.

Program Description: The Recovery Congregation material developed by the program director describes the program as follows:

“We strive to end the stigma associated with addiction and mental health disorders and share healing and hope through Jesus Christ. We believe that recovery is the first step toward an abundant life that is found in Jesus.”

The Recovery Congregation program hosts 12-step meetings following the Recovery Through Christ program. This 12-step program is targeted at individuals struggling with addiction, depression, anger, pride, low self-esteem, and/or childhood trauma. An average of 10 individuals attend the weekly meetings.

The program director described additional programs related to mental health and substance use disorder. The church hosts the program “Parents of Prodigals” for parents of teens or young adults struggling with mental health or substance use disorder. The program director is currently scheduling a Youth Mental Health First Aid class for a church youth group. The program director described the need for evidence-based programs for youth including a pastor with a master level counseling degree leading family and youth programs.

Challenges related to the COVID-19 epidemic were discussed. At the start of 2020, the program director planned to implement a ministry program with Rutherford County Corrections program. A program to provide meals to a local non-profit organization providing reentry services for previously incarcerated women, was planned but not implemented due to COVID-19 restrictions. Likewise, offering services to schools and youth has been limited in 2020 due to COVID-19. The program director expressed frustration in limitations caused by COVID-19 when the need for support services of all types has increased.

Survey data. Sixteen organizations, including the Recovery Congregation program, were identified to receive the social network survey. Organizations include four primarily serving persons experiencing homelessness, two counseling services including a non-profit counseling service offering pastoral and general counseling and a counseling service focused specifically on post-abortion mental health, a substance abuse prevention coalition, two thrift clothing stores including one with a focus on persons in recovery and one Christian-based store providing professional apparel to women, a publisher of a Christian-focused, mental health magazine, an organization serving developmentally delayed youth, two Christian-focused substance use disorder residential recovery services, an organization for recently incarcerated women, and a service for under-resourced pregnant women and new mothers.

Survey data related to the frequency of working with the recovery congregation and the level of collaboration with the recovery congregation was

collected. This method was informed by a study conducted by Bright et al. (2017) to examine the organizational relationships of a coalition formed to increase research of social determinants of health (Bright et al., 2017).

Of the 15 organizations identified by the recovery congregation program, 12 responded to the survey in addition to the recovery congregation resulting in an 81.25% response rate. The three organizations that did not respond were the two thrift stores and one of the treatment facilities. These organizations were removed from the analysis. Based on the data collected from the 13 organizations that completed the survey, connection to these three organizations was minimal. Follow up took place for one organization to clarify one missing response in their survey results. Fully completed surveys were received from the 13 organizations resulting in an analysis including only confirmed, multiplex ties. Frequency was measured as 0 for never, 1 for once a year or less, 2 for about once a quarter, 3 for about once a month, 4 every or almost every week, and 5 for every or almost every day. For purposes of inputting the data into UCINet, the zero to five scale was used.

Collaboration level of the ties of the interorganizational connections was measured as no relationship, networking described as exchanging information and/or attending meetings together, cooperation described as jointly planning, coordinating, or implementing an activity, training, or event or other program and/or intentional efforts to enhance each other's capacity for the benefit of the recovery congregation, coordination described as implementing services together



such as sending referrals to or receiving referrals from the recovery congregation program, and full coordination described as having a written agreement in place to define the relationship between the organizations. For purposes of entering this data in UCINet, a zero to four scale was used.

Summary results of the frequency and collaboration level questions are displayed in Table 1. The total number of possible organization relationships for a directed network is calculated using  $(n*(n-1))$  and was determined to be 156 for this recovery congregation network.

Table 1

*Recovery Congregation collaboration frequency and level network data*

	n	%
Collaboration Frequency		
Never (0)	128	82.05
Once a year or less (1)	13	8.33
About once a quarter (2)	5	3.21
About once a month (3)	7	4.49
Every or almost every week (4)	3	1.92
Every or almost every day (5)	0	0.0
Collaboration Level		
None (0)	128	82.05
Networking (1)	7	4.49
Cooperation (2)	5	3.21
Coordination (3)	16	10.26
Full Coordination (4)	0	0.00

*Note.* F = Frequency measured as 0 to 5; S = Strength measured as 0 to 4.

Data analysis for social networks recommended by Proven et al. (2005) include measures of density and centrality. Examination of weak versus multiplex ties, cliques, dyads, reciprocity, and creation of sociograms are recommended to

better understand the network. Dyads and reciprocity are related. Dyads are connections between two nodes and reciprocity are ties confirmed by both nodes. Dyads are important because a reciprocal relationship between two organization are building blocks for the network to create more ties (Proven et al., 2005). There are 18 dyads in this recovery congregation network. In the 18 dyads, eight of the ties are not reciprocal indicating both organizations in the dyad did not confirm a tie existed regardless of the frequency or collaboration level of the tie. In the sociograms (Figures 3 and 4), these non-reciprocal relationships are the unidirectional edges. In ten of the dyads, the tie was reciprocal meaning both organizations reported a tie. In the sociograms (Figures 3 and 4), these are the bidirectional edges. In a multiplex network of organizations, non-reciprocal relationships exist for many reasons. It is possible that the individual completing the survey was simply not aware of the relationship between the two organizations. Another possibility is when the two organizations interact, the recovery congregation program director is not making it clear that the interaction is related to the recovery congregation program. Identifying non-reciprocal relationships is an opportunity for the program director to strengthen the partnership by clarifying the purpose of the interaction.

Network density describes the overall connectedness of the network. The network density provides an opportunity to increase the connectivity in terms of the frequency of interaction or in the level of the interactions between the organizations (Proven et al., 2005). Network density is calculated as the proportion of the node's ties divided by the total number of ties in the network.

The total network density is the average of the density of each node (Borgotti et al., 2013). The total value of the frequency data in the network is 56 and the total network density is 0.359. None of the organizations communicated every or almost every day; therefore, the highest value for a relationship was 4 or every or almost every week.

The total value of the collaboration level data in the network is 65 and the total network density is 0.417. None of the organizations achieved the highest collaboration level of full coordination. The highest value for a relationship was 3 or the coordination level. For both collaboration frequency and level, the average value is much less than the possible maximum value. This indicates there are partnerships that could be strengthened by increasing the collaboration frequency or level of collaboration.

Cliques are fully connected subgroups of three or more nodes. Frequency, collaboration level, and reciprocity is not considered in the identification of cliques. Nodes connected by edges of any level can form a clique. When considering only reciprocal ties, UCINET identified one cliques of three nodes of the recovery congregation, the substance abuse prevention organization, and the publisher. When including ties that are not reciprocal, four cliques were identified including one clique with four connected organizations including the recovery congregation, mental health counseling facility, substance abuse prevention organization, and treatment facility. The other three node cliques are the recovery congregation, substance abuse prevention organization, and publisher;

the recovery congregation, substance abuse prevention organization, and homelessness service; and the recovery congregation, mental health counseling facility, and homelessness service.

Centrality measures of in-centrality and out-centrality were examined for this directed, valued network. For the centrality measure, degree refers to the number and value of edges (or ties) connected to each node. For directed data, out degree centrality refers to edges initiated by the node. In degree centrality refers to the edges received by the node. For valued data such as this recovery congregation network data, the degrees consist of the sums of the edges. The normalized data is a proportion. To normalize the data, the maximum value must be calculated. For the frequency data, the highest value reported was 4 indicating a collaboration frequency of every or almost every week. This value was used as the maximum collaboration level. Assuming the higher numbers represent stronger ties with 4 being the maximum value, normalization is calculated as  $((n-1)*max)$  (Borgotti et al., 2013). For this network, the normalization value is  $((13-1)*4)$  or 48. Likewise for the collaboration level, the highest reported value was 3 indicating a collaboration level of coordination. For collaboration level for this network, the normalization value is  $((13-1)*3)$  or 36. The normalized out degrees and normalized in degrees in Table 2 are proportions of the maximum value.

Table 2

*Recovery Congregation frequency of collaboration, density, and degree centrality*

	Out Degree	Normalized Out Degree	In Degree	Normalized In Degree
<b>Collaboration Frequency</b>				
RC	27.00	0.563	19.00	0.396
MHC1	2.00	0.042	7.00	0.146
HS1	2.00	0.042	2.00	0.042
SAP	7.00	0.146	8.00	0.167
RE	3.00	0.083	4.00	0.083
PS	1.00	0.021	1.00	0.021
Pub	4.00	0.083	4.00	0.083
TF1	5.00	0.104	3.00	0.063
HS2	0.00	0.000	1.00	0.021
HS3	4.00	0.083	3.00	0.063
MHC2	1.00	0.021	1.00	0.021
DDY	0.00	0.000	2.00	0.042
HS4	0.00	0.000	1.00	0.021
<b>Collaboration Level</b>				
RC	34.00	0.944	21.00	0.583
MHC1	3.00	0.083	7.00	0.194
HS1	2.00	0.056	3.00	0.083
SAP	6.00	0.167	7.00	0.194
RE	3.00	0.083	3.00	0.083
PS	3.00	0.083	1.00	0.028
Pub	2.00	0.056	5.00	0.139
TF1	7.00	0.194	3.00	0.083
HS2	0.00	0.000	3.00	0.083
HS3	3.00	0.083	3.00	0.083
MHC2	2.00	0.056	3.00	0.083
DDY	0.00	0.000	3.00	0.083
HS4	0.00	0.000	3.00	0.083

*Note.* RC = Recovery Congregation, MHC = Mental Health Counseling Services, HS = Homelessness Services, SAP = Substance Abuse Prevention, RE = Reentry Services, PS = Pregnancy Services, TF = Treatment Facility, DDY = Developmentally Delayed Youth Services

The network sociograms are displayed in Figure 3 and Figure 4. Figure 3 is a diagram of the data collected related to frequency of the collaborations. The recovery congregation, the yellow node, is centrally located surrounded by the network of community partners. The recovery congregation program director

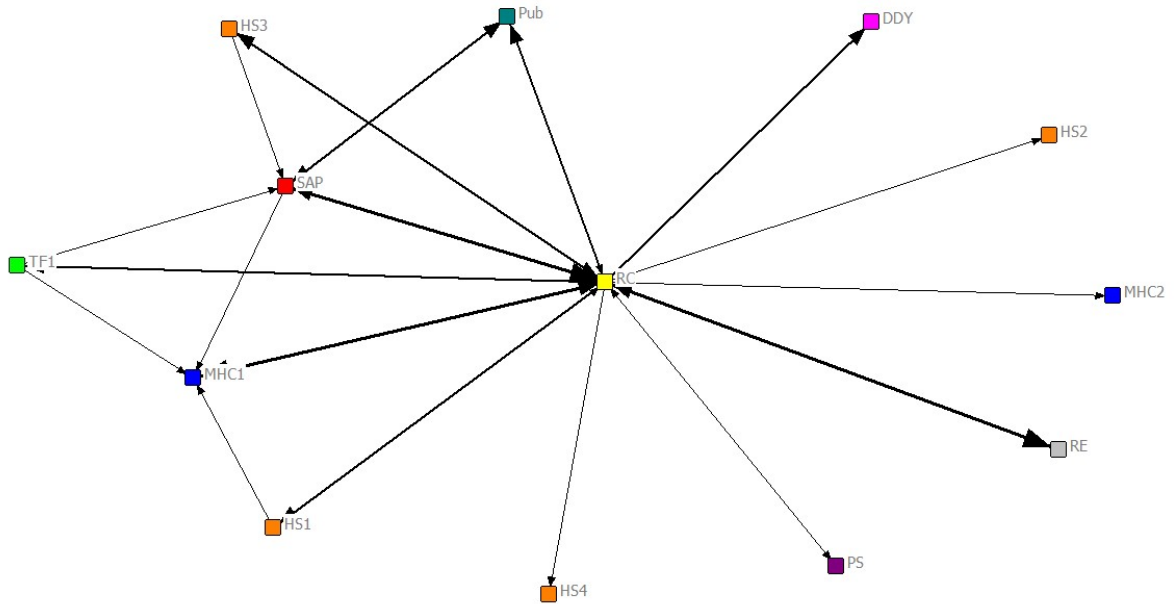
indicated a frequency of working with each community partner at least once per year. The nodes represented by the community partners are color-coded by organization type with the three orange nodes representing homelessness services and the two blue nodes representing the mental health counseling services. The other community partners were unique organization types and are represented by the seven other nodes of various colors.

This directed network is visually represented by the unidirectional or bidirectional arrows on the edges connecting the nodes. The survey completed by three organizations, HS2, DDY, and HS4, indicated they did not work with the recovery congregation. These non-reciprocal relationships are visible in the sociogram as edges with unidirectional arrows pointing from the recovery congregation to HS2, DDY, and HS4.

The thicker lines and larger arrows on the edges indicate more frequent collaboration. Since this is a valued and directed network with every organizations providing data about all other organizations in the network, the thickness of the edge is the highest value reported by either of the two nodes connected by that edge.

Figure 3

*Recovery Congregation Network Frequency Sociogram*



*Note.* Frequency measured as 0 to 5; RC = Recovery Congregation, MHC = Mental Health Counseling Services, HS = Homelessness Services, SAP = Substance Abuse Prevention, RE = Reentry Services, PS = Pregnancy Services, TF = Treatment Facility, DDY = Developmentally Delayed Youth Services

Figure 4 is a diagram of the data collected related to collaboration level of the organizations in the network. The recovery congregation, the yellow node, is centrally located surrounded by the network of community partners. As with the sociogram representing the frequency of collaboration (Figure 3), the nodes are color coded based on organization type. The three organizations that did not report a relationship with the recovery congregation, HS2, DDY, and HS4, are identifiable in the collaboration level sociogram due to the edges with unidirectional arrows pointing from the recovery congregation to HS2, DDY, and HS4.

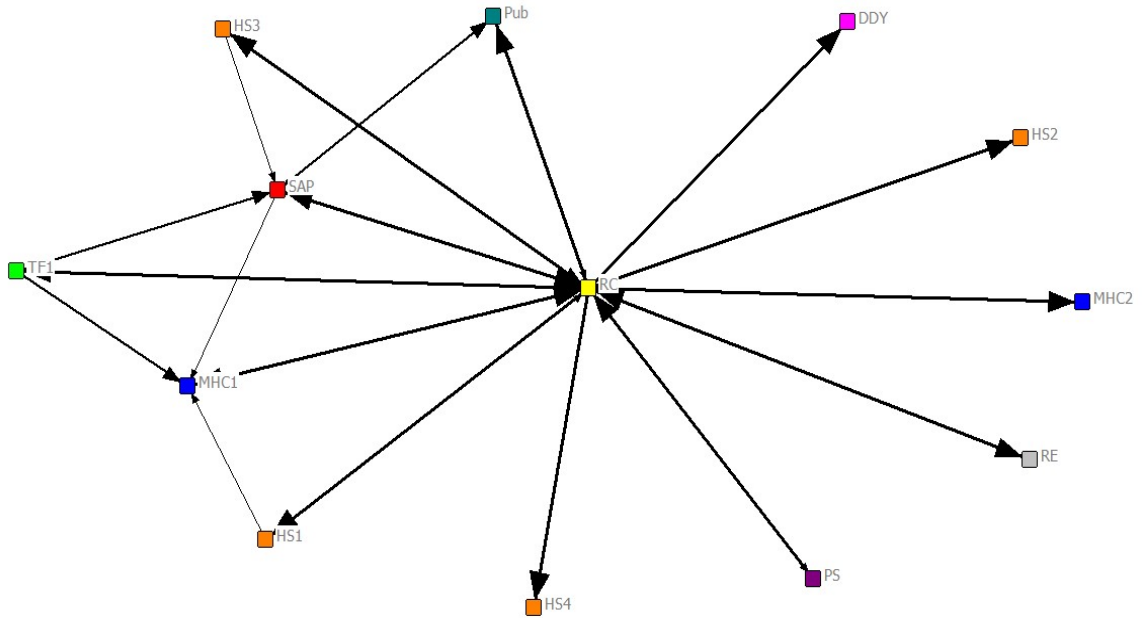
The thicker lines and larger arrows on the edges indicate higher levels of collaboration. Since this is a valued and directed network, the thickness of the edge is the highest collaboration level reported by either of the two nodes connected by that edge.

The network density for the collaboration frequency data was 0.359 and the network density of the collaboration level was 0.417. This is visually represented in the sociograms by the thickness of the edges. The collaboration level sociogram (Figure 4) has thicker edges than the collaboration frequency sociogram (Figure 3). In the collaboration level data, 10.26% of the relationships were the highest reported level of coordinating. In contrast, only 1.92% of the relationships were the highest reported frequency level of every or almost every week (Table 1).



Figure 4

*Recovery Congregation Network Collaboration Level Sociogram*



*Note.* Collaboration level measured as 0 to 4; RC = Recovery Congregation, MHC = Mental Health Counseling Services, HS = Homelessness Services, SAP = Substance Abuse Prevention, RE = Reentry Services, PS = Pregnancy Services, TF = Treatment Facility, DDY = Developmentally Delayed Youth Services

The survey included qualitative questions and open-ended questions to collect feedback about the organizations' contributions to the recovery congregation program, important program outcomes, and partnerships. These questions were included at the start of the survey and at the conclusion. Results of information collected is summarized in Tables 3, 4, 5, 6, and 7. Table 3 summarizes questions about the contributions in the network to the recovery congregation program. The most frequently selected response was community connections. Two organizations selected 'other contribution' and utilized the open text field to enter a response.

Table 3

*Results of question "What is your organization's most important contribution to the recovery congregation program?"*

Possible responses	n	%
Funding/ donations or paid staff	0	0.00
In-kind resources (e.g. – meeting space)	0	0.00
Volunteers or volunteer staff	0	0.00
Specific health expertise	0	0.00
Expertise in an area other than health	1	7.69
Community connections	6	46.15
Send/ receive referrals	3	23.08
Facilitation/ leadership	0	0.00
Advocacy (including raising awareness)	0	0.00
I'm not familiar with the recovery congregation program	1	7.69
Other contribution	2	15.38
Education and connection to serving those with special needs	1	7.69
Offering supportive housing to families and individuals dealing with food insecurity or experiencing homelessness	1	7.69

*Note.* In the survey, the response "other contribution" included an open text field.

Table 4 summarizes the responses about positive outcomes and possible outcomes of the recovery congregation program. Organizations were able to select as multiple responses indicating positive outcomes. Changes to laws, policies, and/or regulations was the response with the lowest number of selections. All other responses except indicating unfamiliarity with the program, were selected at least 8 times.

Table 4

*Results of the question “Outcomes of the recovery congregation include or could potentially include (choose all that apply).”*

Possible responses	n	%
Improved services for individuals with SUD	8	11.94
Reduction of SUD rates	9	13.43
Improved services for individuals with MHD	9	13.43
Increase in shared knowledge	9	13.43
Increase in community support	10	14.93
Increased public awareness	10	14.93
Changes to policy, laws and/or regulations	1	1.49
Improved health outcomes	8	11.94
I'm not familiar with the recovery congregation program	3	4.48
Other outcome	0	0.00

*Note.* SUD = Substance use disorder; MHD = Mental health disorder. Percentages are calculated as a proportion of 67, the total number of responses.

Questions related to partnerships and collaborations to benefit the recovery congregation program are summarized in Tables 5, 6, and 7. Table 7 summarizes the information collected about drawbacks of the collaborations. The results in Table 5 indicate the creation of informal relationships is the most important aspect of collaboration. This seems contradictory to the strongest collaboration level of ‘full coordination’ including having a written agreement in place to define the interorganizational relationship (Frey et al., 2006).

Table 5

*Results of the question “What aspects of the collaboration contribute to the desired outcomes of the recovery congregation program (chose all that apply)?”*

Possible responses	n	%
Bringing together diverse stakeholders	6	12.00
Meeting regularly	4	8.00
Exchanging information and knowledge	9	18.00
Share resources	9	18.00
Informal relationships created	11	22.00
Collective decision-making	1	2.00
Having a shared mission or goals	6	12.00
I'm not familiar with the recovery congregation program	2	4.00
Other contribution	2	4.00

*Note.* Percentages are calculated as a proportion of 50, the total number of responses.

Benefits and drawbacks of collaboration were collected and summarized in Table 5 and Table 6 respectively. As seen in Table 5, many benefits or possible benefits of interorganizational collaboration were selected with ‘acquisition of new knowledge or skills’ and ‘building new relationships helps my organization’ as the most frequently selected responses. Both of these responses point towards benefits to the contributing organization and not necessarily to benefit the recovery congregation program. However, the next two responses with the highest frequency were ‘ability to serve my clients better’ and ‘greater capacity to serve the community as a whole.’ These responses are directed at the benefits of a strong recovery congregation program.

Table 6

*Results of the question “What benefits have occurred or could occur from cooperating or collaborating with other organizations on initiatives related to substance use disorder recovery support services (Choose all that apply)?”*

Possible responses	n	%
Ability to serve my clients better	11	12.79
Greater capacity to serve the community as a whole	11	12.79
Acquisition of additional funding or other resources	8	9.30
Acquisition of new knowledge or skills	12	13.95
Better use of my organization’s services	7	8.14
Building new relationships helps my organization	12	13.95
Heightened public profile of my organization	8	9.30
Enhanced influence in my community	9	10.47
Increased ability to reallocate resources	8	9.30
Other benefits	0	0.00

*Note.* Percentages are calculated as a proportion of 86, the total number of responses.

Possible drawbacks are described in Table 7. Building partnerships is a time-consuming, challenging process (Frey et al., 2006). An option indicating that there were no drawbacks was not included as an option in the responses. Two organizations selected ‘other drawbacks’ and wrote in none or no drawbacks. A third organization entered a response in the text field in the other category. This organization noted the challenge of time-consuming meetings and overlap of other similar programs.

Table 7

*Results of the question “What drawbacks have occurred or could occur from cooperating or collaborating with other organizations on initiatives related to substance use disorder recovery support services (Choose all that apply)?”*

Possible responses	n	%
Takes too much time and resources	5	35.71
Loss of control/ autonomy of decisions	2	14.29
Strained relations within my organization	1	7.14
Difficulty in dealing with partners	2	14.29
Not enough credit given to my organization	1	7.14
Other drawbacks	3	21.43
None/ no drawbacks	2	14.29
The number of various collaborations that already exist with multiple focuses; the regular meetings can become time consuming	1	7.14

*Note.* Percentages are calculated as a proportion of 14, the total number of responses.

## Discussion

An adequate level of community capacity including a network of community partners and is essential for success of any public health program (Goodman et al., 1998; HHS, 2019). Evaluating community partnerships and relaying the information in a way understandable to the community is challenging (Frey et al., 2006). Social network analysis is a method to better understand interorganizational relationships. The sociogram is a visual tool useful for explaining the relationship to stakeholders (Proven et al., 2005).

This social network analysis is the first known examination of partnerships and capacity of a recovery congregation program. The TDMHSAS Recovery Congregation Certification Program was created with a vision statement in the Office of Faith-Based Initiatives in 2014 followed by development of criteria for

organizations to obtain the certification (TDMHSAS, 2019). The next step involved recruiting of interested faith-based organizations in obtaining the certification. The recovery congregation program examined in this analysis was formed in March 2019. This is a newly formed program based on criteria for certification established less than six years ago. The recovery congregation program in this analysis experienced significant challenges expanding programs in 2020 due to COVID-19 pandemic. This analysis will serve as a baseline for the recovery congregation. A repeat of this analysis with newly collected data in one year will allow for an examination of increasing capacity.

To obtain the TDMHSAS Recovery Congregation Program certification, faith-based organizations must implement the following best practices: provide a visible outreach in the community, disseminate recovery information, and host or refer individuals to recovery support groups. Community partnerships are necessary to achieve these best practices. Likewise, the recovery congregation in this analysis identified their own program goal of ending stigma associated with addiction and mental health disorders. The social network analysis provides a visual and evaluation tool to better understand the community partnership and interorganizational relationships necessary to achieve these goals.

The outcome of this social network analysis identified several areas of focus for the program to expand including increasing reciprocal relationships. Other than directly working with the recovery congregation program, few community partners indicated they were working with other organizations to

benefit the recovery congregation program. This is an area for improvement and capacity building.

The addiction crisis including the opioid epidemic continues to persist in Rutherford County and across the US. New solutions are necessary to address this crisis. The faith-based community is an important stakeholder in this work especially in a highly religious state such as Tennessee (Pew, 2014). As of June 2018, Tennessee had 682 certified recovery congregation programs (TDMHSAS, 2018). Leveraging these programs could increase the availability and accessibility of 12-step programs. There are many opportunities for involvement from the faith community including programs for youth to prevent substance misuse, outreach opportunities to persons with substance use disorder or a mental health disorder, and to reduce the stigma associated with addiction.

Study limitations. This is a study of one of the 682 certified recovery congregations in Tennessee. Conclusions from this social network analysis cannot be generalized to other programs. This study was an examination of program capacity and community partnerships. Other areas for study include program outcomes including referrals to mental health or treatment services, prevention of relapse, and retention or engagement of participants in the programming offered by the recovery congregation. A follow up study in one year is needed for an evaluation of program capacity building and achievement of desired outcomes.



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## CHAPTER II: A Spatial Study of Recovery Support Service Location Accessibility and Socioeconomic Characteristics in Rutherford County, Tennessee

### Background

Substance Use Disorder. Approximately 20.1 million persons age 12 or older in the United States had a diagnosis of substance use disorder in 2016. There were 15.1 million diagnoses of alcohol use disorder and 7.4 million diagnosis of an illicit drug use disorder. (SAMHSA NSDU, 2017; National Institute on Alcohol Abuse and Alcoholism, 2018).

Alcohol use is the third leading cause of preventable death in the United States with an estimated 95,000 persons (68,000 men and 27,000 women) dying of alcohol-related causes annually. Alcohol related mortality includes deaths due to liver disease or other alcohol-induced chronic disease, accidental poisoning, and unintentional injuries. The National Survey on Drug Use and Health estimates 14.4 million adults in the United States have alcohol use disorder which is 5.6% of the adult population (age 18 and older). Only an estimated 7.9% of adults with alcohol use disorder received treatment in the past year (National Institute on Alcohol Abuse and Alcoholism, 2020).

The Department of Health and Human Services (HHS) declared a public health emergency in 2017 due to the rapid rise of misuse of opioids and overdoses caused by opioids (HHS, 2019). Drug overdoses caused 70,237 deaths in the United States in 2017. Of the total number overdose deaths, 47,600

(67.8%) involved an opioid (Scholl et al., 2019). Geographic variation in overdose mortality and behavioral health services exists across the United States. From 1999 to 2009, the age adjusted overdose death rate increased by a greater proportion in rural counties compared to counties in large metropolitan areas. However, the highest age adjusted death rates occurred in large metropolitan counties (Rossen et al., 2013).

Nonfatal overdoses are increasing in the United States. Data related to nonfatal overdoses are obtained from hospital billing reports and emergency departments. Non-fatal overdoses are more challenging to track than fatal overdoses because some individuals are not seen in a hospital setting. Both fatal and nonfatal overdoses have an emotional impact the overdose victim and family, friends, and others witnessing the overdose. Individuals who experience one nonfatal overdose are at higher risk of another overdose (CDC Opioid Overdose, 2018).

Specifically, for overdoses caused by prescription drugs, demographic risk factors include white race, age group of 35 to 44 years, and male sex (Brady et al., 2017). Prescription availability, medical need for opioid prescriptions, and economic stressors are localized factors contributing to overdoses. In a study of California zip codes, opioid prescription overdose was negatively related to median household income. Opioid prescription overdose was higher in areas with higher rates of employment in manual labor industries. This is likely due to the higher opioid prescribing rates due to higher self-reported injury and pain in manual labor industries. (Cerdeira et al., 2016).

There are many barriers such as social determinants and stigma that limit access to substance use disorder treatment resulting in the majority of persons with a substance use disorder never receiving treatment. SAMHSA estimates in 2016 that 3.8 million individuals age 12 and older received treatment for substance use disorder whereas approximately 21 million individuals were in need of treatment. The National Institute on Drug Abuse (NIDA) estimates that 40-60% of individuals will relapse following treatment for an addiction to drugs or alcohol (NIDA Principles, 2018).

According to the Tennessee Department of Health, there were 1,818 deaths were attributed to drug overdose. Opioids were the largest contributor to deaths with 1,304 deaths involving an opioid (prescription and illicit). The number of deaths in 2018 was a moderate increase from previous years with 1,776 and 1,631 deaths in 2017 and 2016 respectively. The 1,818 deaths in 2018 is a mortality rate of 27.4 deaths per 100,000 persons. In 2018, 16,363 nonfatal overdose outpatient visits occurred in Tennessee. A nonfatal overdose outpatient visit is typically an emergency department encounter. The total number of inpatient stays in 2018 was 7,202 (TN Department of Health, 2020). Access to needed services including general healthcare, mental health services, substance use disorder treatment, and recovery support is a crucial component to reducing overdoses.

Recovery Support Services. Support services are needed for persons with substance use disorder especially considering the limitations related to treatment access and the high numbers of overdoses. SAMSHA describes recovery

holistically as a “process of change through which people improve their health and wellness, live self-directed lives, and strive to reach their full potential.” Health, home, purpose, and community are four dimensions involved in recovery. Recovery support services are systems that help individuals manage their substance use disorder and prevent relapses. Examples include services removing transportation or employment barriers, and housing (SAMHSA, 2019). Availability and accessibility of recovery support services following treatment are a critical component on the continuum of care to sustain recovery (Rural Health Information Hub, 2020).

Mutual aid groups and peer support programs including 12-step programs such as Alcoholics Anonymous, Narcotics Anonymous, Cocaine Anonymous, and many others are important examples of recovery support services that reduce relapse rates in program participants (NIDA Media, 2018). Recovery support programs often utilize space in faith-based institutions or community organizations for meetings. Grim and Grim (2019) estimate there are 130,000 recovery support groups based in congregations throughout the United States. Tennessee is more religious compared to the US average with 81% of Tennesseans identifying as Christian, and 1%, 1%, 1%, and <1% identifying as Jewish, Buddhist, Muslim, and Hindu respectively (Pew, 2014). There are approximately 11,500 institutions of faith in Tennessee (TDMHSAS, 2019). Celebrate Recovery is a Christian based, spiritual 12-step program with faith-based institutions as the most common meeting location (Celebrate Recovery, 2018). The Tennessee Department of Mental Health and Substance Abuse

Service's (TDMHSAS) Certified Recovery Congregation program supports faith-based organizations and congregations in offering recovery support services to participants (TDMHSAS, 2019).

Importantly, these peer support recovery programs are free to participants. Generally, the programs are open and available to anyone regardless of race, age, or gender. These free services are important resources considering the challenges with accessibility. A better understanding of the accessibility of peer support services including those offered in faith-based organizations in a highly religious state such as Tennessee could identify opportunities to leverage these organizations to support recovery support services.

Place-Based Framework. Environmental factors including socioeconomic status, neighborhood conditions, and access to transportation are social determinants that affect health status including behavioral health. Examination of social and community context is part of the place-based organizing framework to examine social determinants (CDC Social Determinants, 2020). Socioeconomic deprivation is often associated with increased likelihood of drug use. Boardman et al. (2001) examined neighborhood disadvantage and deprivation compared to drug use at the census tract level in Detroit, Michigan. The study found increased drug use in disadvantaged neighborhoods. The increased use was attributed to high levels of social stressors and social strain (Boardman et al., 2001). A study of Baltimore, Maryland found a positive relationship between heroin or cocaine use and neighborhood poverty. Social support and access to social networks of employed individuals were protective factors (Williams & Latkin, 2007).

Published studies using GIS mapping of locations of overdoses are increasingly available. A GIS study in Flint and Genesee Counties in Michigan found that treatment facilities were not geographically related to locations of naloxone administration. The study authors recommended consideration of locations with clusters of overdoses for future treatment locations including those offering medication assisted treatment (Sadler & Furr-Holden, 2019). Similarly, Dworkis et al. (2017) recommend making naloxone publicly available in areas of opioid overdose clustering. This GIS study of Cambridge, MA used data from emergency medical services and identified several overdose clusters (Dworkis et al., 2017).

Transportation barriers are important considerations when examining location of services. Barriers including travel time and distance have been cited as barriers to treatment and recovery. Individuals traveling more than 10 miles to inpatient alcoholism treatment consume significantly more alcohol in the year following treatment than individuals traveling 10 miles or less to inpatient treatment (Klinger et al., 2018). Treatment facilities in high crime neighborhoods reduced treatment retention for patients traveling from a lower crime neighborhood (Mennis et al., 2012). Studies indicate transportation barriers reduce engagement in treatment aftercare programs. For drug dependent individuals with serious mental illness, travel time was a strong predictor of attendance at the first outpatient visit following hospitalization.

Differences in rural and urban areas have been identified in various types of healthcare services including substance use disorder treatment services.

Edmond et al. (2015) found differences including fewer treatment services and few indicators of high-quality treatment from the services available in rural areas (Edmond et al., 2015). A study of the geographic distribution of mental healthcare providers in California found an uneven distribution of providers by population density with a disproportionately higher number in urban areas. Disproportionately higher numbers of mental healthcare providers were found in areas with populations that were more educated, wealthier, older average age, and less racial diversity (Sharma et al., 2017).

Agencies providing social services are important in recovery from substance use disorder. Bauer et al. (2015) examined the geographic distribution in agencies providing income-related social services in the Boston, MA area. Location of agencies providing low-income financial services is an important consideration for accessibility by low socioeconomic status populations. Most areas of high unemployment had access to at least one income-related social service agency. However, 25.6% of the low socioeconomic status population had no geographic access to an agency (Bauer et al., 2015).

Morton (2019) examined mutual aid recovery groups and availability in areas of social deprivation at the census tract level in New Hampshire. Mutual aid recovery groups included locations of Alcoholics Anonymous, Narcotics Anonymous, Heroin Anonymous, and SMART Recovery. This study found a positive relationship between social deprivation, an index compiled from education level, vehicle access, rental housing, non-employment, and poverty, and mutual aid recovery services (Morton, 2019).



The literature is lacking in geographic studies of mutual aid and 12-step programs. The study by Morton (2019) was the only study identified in a literature review utilizing a place-based framework and geographic information systems to examine 12-step program location. Mutual aid and 12-step programs are available at no cost to participants and this is an important socioeconomic consideration.

Morton (2019) proposed that stigma related to substance use disorder is a factor in location of mutual aid recovery services resulting in lower socioeconomic areas having higher proportion of these services. This is an important consideration for the social and community context of the place-based framework. Additional studies are needed to better understand the community context surrounding these services.

A mix of rural and urban areas, rapid population growth, and increasing numbers of overdoses make Rutherford County useful to examine the geographic locations of recovery support services. Rutherford County is in the geographic center of Tennessee. The population estimate on July 1, 2019 was 332,285 persons. The county is rapidly growing with an estimated population increase of 26.5% between April 1, 2010 and July 1, 2019 (Census Quick Facts, 2020). The county's rapid population growth has strained many social services. Rutherford County experienced a substantial increase in fatal overdoses from 2017 to 2018. In 2017, overdose resulted in 65 total deaths or 20.1 per 100,000 persons. In 2018, the total number of deaths increased to 89 or 27.6 per 100,000 persons. The rate of outpatient visits for overdoses in Rutherford County was

274.6 per 100,000 persons. Comparatively in Tennessee in 2018, the rate of outpatient visits was 252.7 per 100,000 persons. The rate of inpatient visits for overdoses in Rutherford County was 77.5 per 100,000 persons. In Tennessee in 2018, the rate of inpatient visits was 103.2 per 100,000 persons. Treatment type is influenced by the availability and accessibility of treatment within the county and state (TN Department of Health, 2020). The increasing number of overdoses support the need for improved services for persons with substance use disorder in this county.

#### Theoretical Framework

Examining characteristics of place is an important epidemiological approach to describe characteristics of a disease. Examinations of place can inform strategic allocation of resources. Localized place examinations identify influences of the built environment or other demographic, social, and economic factors on disease (Friis and Sellers, 2014). The CDC describes geographic information system mapping as a method to examine place and space. The studies provide new insight into why phenomena occur in some locations but not in others (CDC, 2019). Increasingly geographic information system (GIS) mapping is used in public health to understand geographic contribution to risk.

#### Methods

Research Question. What is the accessibility to recovery support services with no financial cost for low socioeconomic status populations in Rutherford County, Tennessee?

A descriptive, spatial study was conducted utilizing a geographic information system (GIS) to map recovery support services and census population demographic information in Rutherford County, Tennessee. A logistic regression analysis examined the relationship between recovery support services and population demographics at the census tract level.

#### Descriptive Spatial Study

Esri ArcMAP version 10.7 was utilized for the GIS mapping. Locations of 12-step recovery meetings including Narcotics Anonymous, Alcohol Anonymous, Celebrate Recovery, and Certified Recovery Congregations were geocoded and uploaded to ArcMAP. Geocoding entail input of location data such as an address and an output of latitude and longitude coordinates. These recovery support services have no financial cost, and the meeting locations are publicly available (Appendix C).

A workflow diagram guided the process for the descriptive study in ArcMap (Appendix D). The ArcMap buffer tool was used to create a 0.5 mile radius (walking / walkability) surrounding each recovery support service (Bauer et al., 2015).

#### Logistic Regression Analysis.

The Census Bureau's American Community Survey was used for the data analysis. The American Community Survey (ACS) collects data related to demographic characteristics, economic data, housing, household characteristics, and other population measures. Data is collected by the Census Bureau from a sample size of approximately 3.5 million households on an ongoing basis. The

ACS provides estimates of population characteristics and not individual level characteristics. Data is collected by paper questionnaire, internet surveys, and personal visits. Over 5 years, the Census Bureau samples approximately 1 out of every 9 households in the United States. Rural and low population density areas are oversampled to reduce sampling error. To increase statistical reliability due to the small population size, the Census Bureau produces five-year estimates from the ACS at the census tract level (Census Bureau American Community Survey, 2019). Census tracts have populations between 1,200 to 8,000 persons (Census Bureau Geography, 2020).

Data Source. Data from the ACS Data Profile Tables for Economic Characteristics (Summary Table ID DP03) and Demographics Characteristics (Summary Table ID DP05) was utilized for this analysis (Census Data Profile, n.d.). The tables contain the 2015-2019 ACS 5-year data profiles. The statistical analysis was restricted to the Rutherford County boundary (FIPS Code 47149) (Census Bureau Quick Facts, 2020). Census tract boundaries do not restrict persons from accessing recovery support services. Therefore, census tracts with a recovery support service located within 0.5 miles will be considered positive for access to a recovery support service.

IBM Statistical Package for Social Sciences (SPSS) version 21 will be used for the statistical analysis. The ACS data sets Summary Table ID DP03 and Summary Table ID DP05 were merged in SPSS using the GEO\_ID as the match variable. The GEO\_ID is the FIPS code and unique census tract number.

Selected Measures. Rutherford County, Tennessee is divided into 49 census tracts. The census tracts are the unit of analysis for this study. The binary dichotomous dependent variable was created by categorizing each census tract into either containing one or more recovery support services or containing no recovery support services. A Logistic regression analyses with continuous independent variables was conducted. To examine the odds ratios, a second logistic regression with independent variables transformed to into categorical variables based on county averages was also conducted. Independent variables indicating higher levels of social determinants of health compared to the county level were coded as '1'. Likewise, independent variables indicating lower levels of social determinants of health compared to or equal to the county level were coded as '0'. A value of  $p \leq 0.5$  is considered statistically significant. Independent variables reflect social determinant of health factors and socio-economic indicators of poverty, participation in public assistance programs, unemployment, and race/ethnicity in the census tract (Bauer et al., 2015; CDC Social Determinants of Health, 2020). Test for collinearity were conducted to identify highly correlated variables.

Independent variables from the ACS included the total population in census tract and the total square mileage of the census tract. Population demographic race variables included in the analysis were percent of Black or African American, Hispanic or Latino, and Non-Hispanic White in the census tract. The social determinant variables in the analysis were the percent of unemployment, and percent of adults over age 18 with income below the federal

poverty level, and percent of households receiving food stamps/SNAP benefits in the census tract.

Hypothesis. When controlling for census tract total population and size, census tracts with populations with high proportions of social determinants of health risk factors are more likely to have a recovery support service in the census tract.

## Results

Geographic Information Systems (GIS) Maps. ArcGIS was utilized to create a map to visualize the locations of peer support recovery services available at no cost to participants in Rutherford County, Tennessee. Locations of 34 recovery support services were mapped (Appendix C). Three locations host two meetings; therefore, these locations are one point on the map. These 31 locations and the census tract boundaries can be seen in Figure 5. In Figure 6, each recovery support service has a buffer of 0.5 miles. The buffers were dissolved at points of overlap.

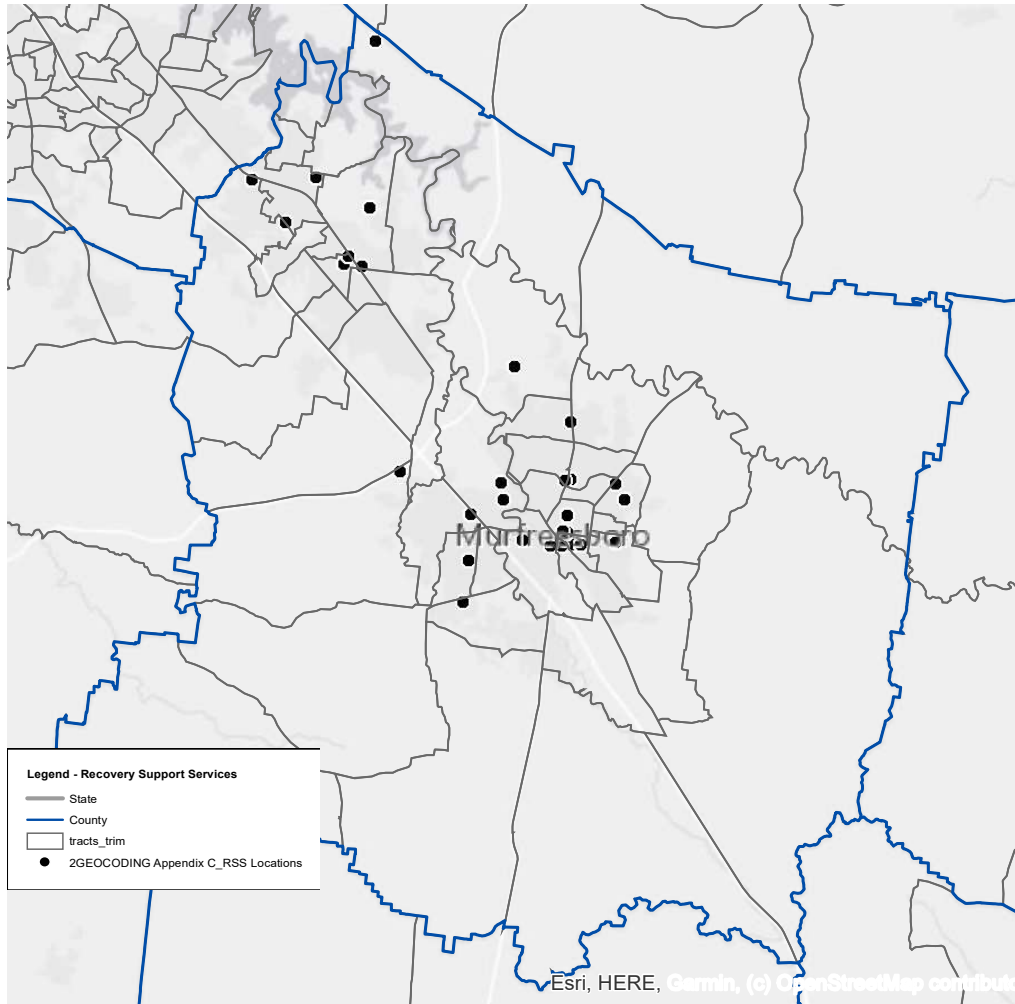
Of the 49 total census tracts in Rutherford County, 31 have one or more recovery support service within the boundary or within 0.5 miles of the boundary. Census tract FIPS code 47149041900 contains six recovery support services which is the most services in of any of the census tracts. Census tract FIPS code 47149041800 contains four recovery support services. These two census tracts are adjacent and centrally located in Murfreesboro, TN near the downtown area. Of the census tracts with one or more recovery support service located in the tract or within 0.5 miles, 16 census tracts have one recovery support service.

There are seven census tracts with two recovery support services and six census tracts with three recovery support services.

Figure 7 shows the location of recovery support services and the percent of persons age 18 and over living at or below the federal poverty level by census tract. Figure 8 shows population density by square mile. Census tracts are created based on population size and not by square mileage. As a result, the square mileage can differ widely from tract to tract. Comparing the more urban areas with denser populations to the rural tracts with less dense populations is helpful to visualize differences in accessibility in urban versus rural areas.

Figure 5

*ArcGIS Map of Recovery Support Services*

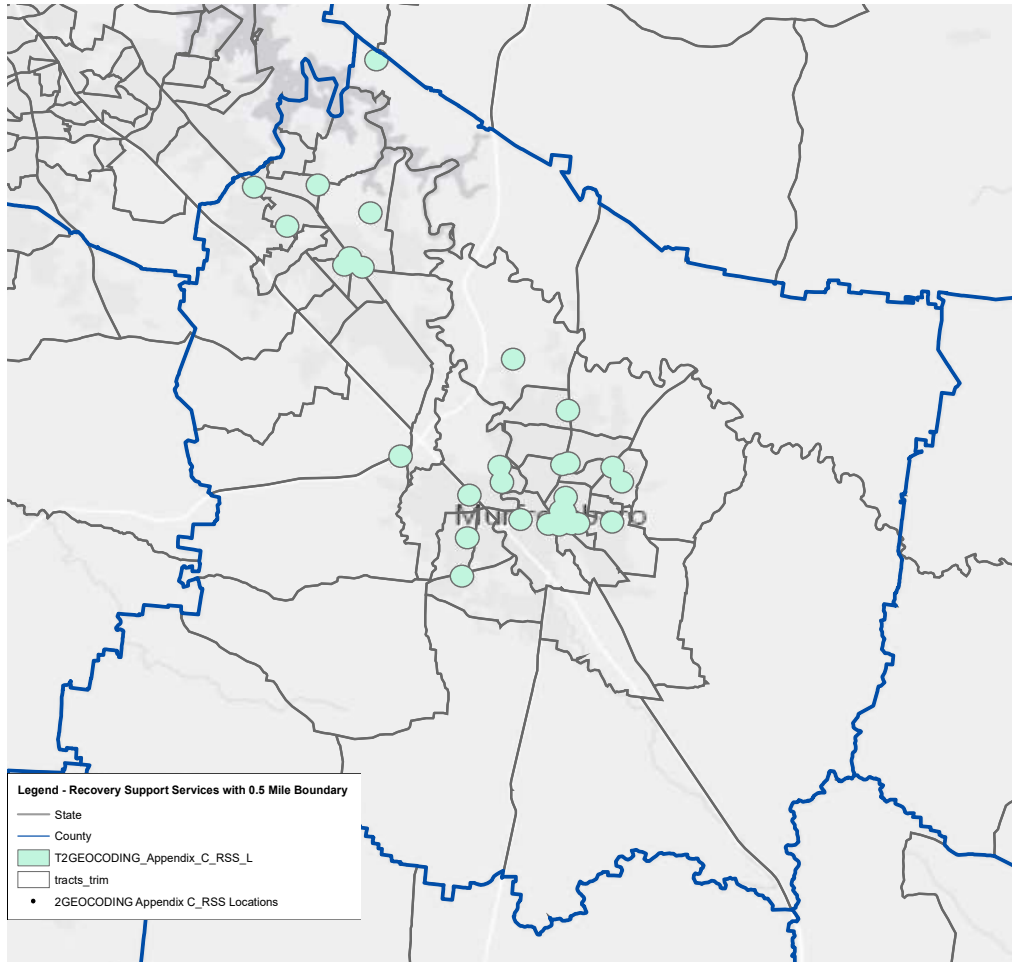


*Note.* Meeting Locations of Alcoholics Anonymous, Narcotics Anonymous, Celebrate Recovery, and Tennessee Certified Recovery Congregations and census tracts in Rutherford County, TN



Figure 6

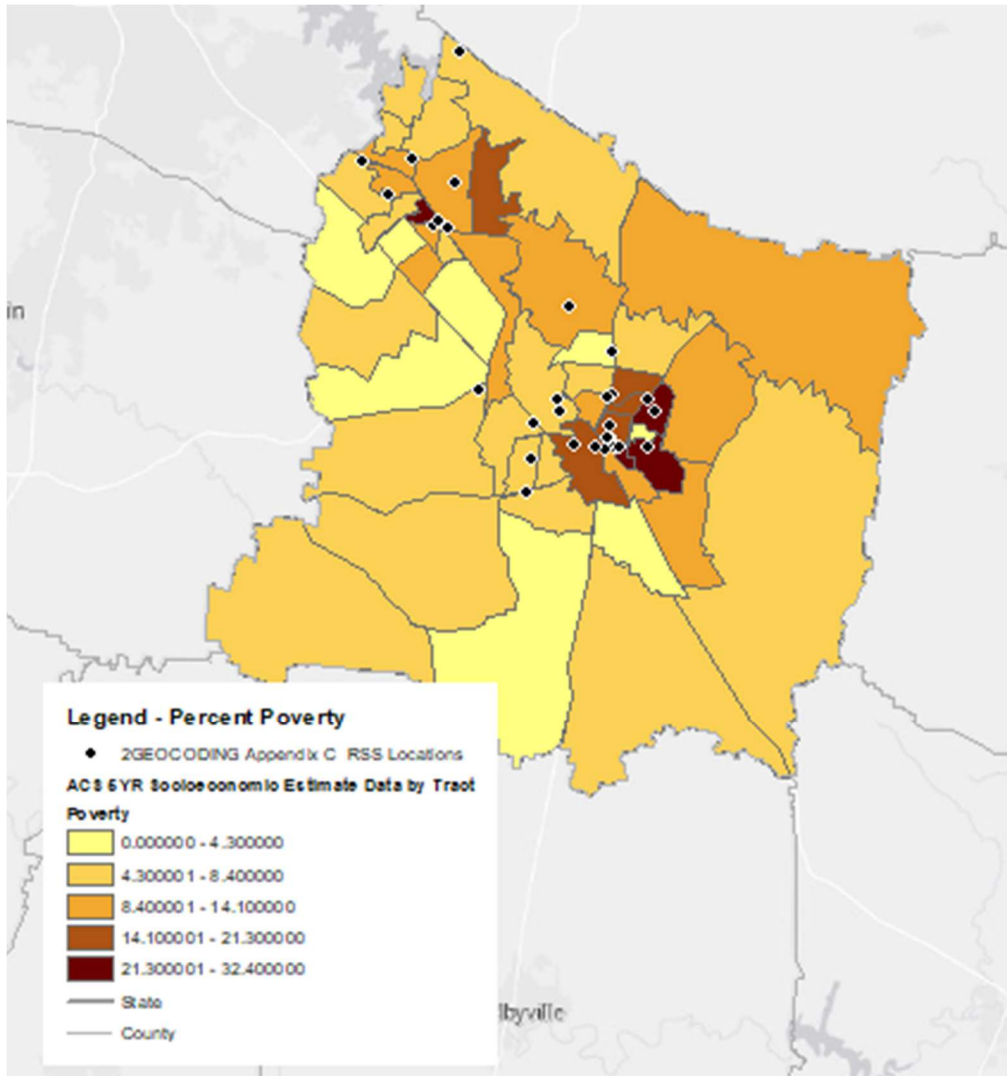
*ArcGIS Map of Recovery Support Services with 0.5 Mile Boundaries*



*Note.* Meeting Locations of Alcoholics Anonymous, Narcotics Anonymous, Celebrate Recovery, and Tennessee Certified Recovery Congregations with 0.5 mile boundaries and census tracts in Rutherford County, TN

Figure 7

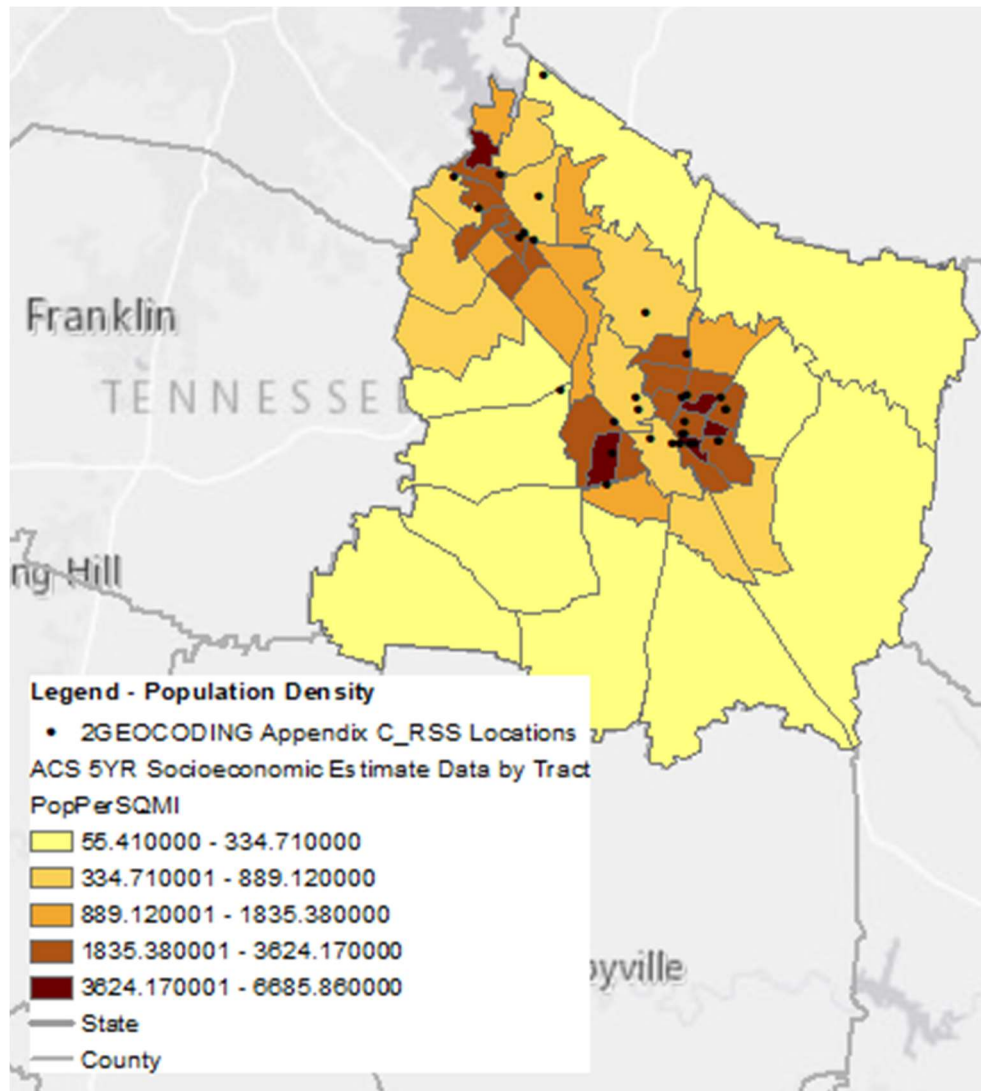
*ArcGIS Map of Recovery Support Services and Percent Poverty*



*Note.* Meeting Locations of Alcoholics Anonymous, Narcotics Anonymous, Celebrate Recovery, and Tennessee Certified Recovery Congregations and census tracts in Rutherford County, TN with overlay of percent of persons living at or below the federal poverty level.

Figure 8

*ArcGIS Map of Recovery Support Services and Population Density*



*Note.* Meeting Locations of Alcoholics Anonymous, Narcotics Anonymous, Celebrate Recovery, and Tennessee Certified Recovery Congregations and census tracts in Rutherford County, TN with overlay of estimated population per square mile.

Logistic Regression Analysis. The population demographics of Rutherford County can be seen in Table 8. Demographics include measures of social determinants of unemployment, SNAP benefits, and poverty.

Table 8

*Rutherford County, TN Population Demographic Characteristics*

Characteristic	N	%
Total Population	315,815	100
Total Square Mileage	624.05	100
Percent Female	160,118	50.7 $\pm$ 0.1
Population Demographics		
Unemployed, age 16 years and older	7,623 $\pm$ 850	3.1 $\pm$ 0.3
Households receiving food stamps/SNAP Benefits	9,660	8.7
Persons with annual income below FPL, adults over 18 years	23,834	10.1 $\pm$ 0.7
Race		
Hispanic or Latino of any race	25,329	8.0%
Black, not Hispanic or Latino	45,871 $\pm$ 929	14.5 $\pm$ 0.3
White, not Hispanic or Latino	223,482 $\pm$ 266	70.8 $\pm$ 0.1

*Note.* From Census Bureau American Community Survey Tables 2019 5 Year Estimates; SNAP = Supplemental Nutrition Assistance Program; FPL=Federal Poverty Limit

Each of the 49 census tracts was classified as having no recovery support services or having one or more recovery support services. The buffer areas surrounding the recovery support service was used to classify the census tracts. If the census tract contains any part of the buffer area, the tract was classified as having a recovery support service. Of the 49 total census tracts, 31 contain one

or more recovery support service and 18 contain no recovery support services.

Descriptive statistics by census tract type can be seen in Table 9.

Table 9

*Rutherford County, TN Population Demographic Characteristics of Census Tracts by Recovery Support Service*

Characteristic	0 Recovery Support Services in census tract	≥1 Recovery Support Service(s) in census tract
Total Number of Census Tracts (%)	18 (36.7)	31 (63.3)
Total Population (%)	113,987 (36.1)	201,828 (63.9)
Total Square Mileage (%)	426.20 (68.3)	197.85 (31.7)
Population Demographics		
Unemployed, age 16 years and older (%)	2,351 (30.8)	5,272 (69.2)
Number households receiving food stamps/SNAP Benefits (%)	2,790 (28.9)	6,870 (71.1)
Persons with annual income below FPL, adults 18 or older (%)	5,775 (24.2)	18,059 (75.8)
Race		
Hispanic or Latino of any race (%)	8,685 (34.3)	16,644 (65.7)
Black, not Hispanic or Latino (%)	12,048 (26.3)	33,823 (73.7)
White, not Hispanic or Latino (%)	86,541 (38.7)	136,941 (61.3)

*Note.* SNAP = Supplemental Nutrition Assistance Program; FPL=Federal Poverty Limit

A logistic regression analysis was conducted to examine if socioeconomic characteristic of the census tract measured by percent of population with income at the federal poverty level, percent households receiving Supplemental Nutrition Assistance Program (SNAP) assistance, and percent unemployed while

controlling for square mileage, population total, and percent race/ethnic minority (Hispanic/Latino or Black/African American).

Collinearity among the independent variables was examined and was found to be acceptable. The VIF value was not higher than 10 and the condition index was low for each independent variable. No collinearity issues were detected. Overall, the presence of absence of recovery support services in a census tract was predicted with 67.3% accuracy (Table 10).

Table 10

*Logistic Regression with Continuous Independent Variables Classification Table*

Observed	Predicted		Percent Correct
	0 Recovery Support Services in census tract	$\geq 1$ Recovery Support Service(s) in census tract	
0 Recovery Support Services in census tract	7	11	38.9
$\geq 1$ Recovery Support Service(s) in census tract	5	26	83.9
Full Model	—	—	67.3

The logistic regression results including coefficients, Wald statistic, and degrees of freedom are presented in Table 11. The full model significantly predicted the presence of a recovery support service in the census tract ( $n = 49$ ,  $\chi^2 = 16.490$ ,  $df = 7$ ,  $p = .021$ ).

Table 11

*Logistic Regression with Continuous Independent Variables Results (n = 49)*

	b (SE)	Odds Ratio	95% CI		Wald Statistic	p-value
			Lower	Upper		
Federal Poverty Level	.131 (.111)	1.139	.916	1.417	1.376	.241
Unemployment	-.337 (.290)	.714	.404	1.260	1.350	.245
Food Stamps/SNAP	.033 (.105)	1.033	.842	1.269	.098	.754
Square Mileage	-.082 (.039)	.921	.854	.994	4.432	.035
Total Population	.000 (.000)	1.000	1.000	1.000	.186	.666
Hispanic/Latino	-.061 (.055)	.941	.844	1.049	1209	.271
Black/African American	.019 (.053)	1.020	.920	1.131	.136	.712
Constant	1.079 (1.621)				2.941	

*Note.* Model Chi Square = 16.490, df = 7 (p = .021), CI = Confidence Interval for Odds Ratio, SNAP = Supplemental Nutrition Assistance Program

A second logistic regression was conducted with the following independent variables re-coded in SPSS into categorical variable with the higher levels of social determinants of health compared to the county level coded as '1' and lower levels of social determinants of health compared to or equal to the county level coded as '0'. The recoded variables are described in Table 12.

Table 12

*Re-coded Independent Variables*

Variable	Recoded to 0	Recoded to 1
Number unemployed, age 16 years and older (%)	$\leq 3.1$	$>3.2$
Number households receiving food stamps/SNAP Benefits (%)	$\leq 8.7$	$>8.8$
Persons with annual income below FPL, adults 18 or older (%)	$\leq 10.1$	$>10.2$

*Note.* SNAP = Supplemental Nutrition Assistance Program, FPL=Federal Poverty Limit

Collinearity among the independent variables was examined and was found to be acceptable. The VIF value was not higher than 10 and the condition index was low for each independent variable. No collinearity issues were detected.

Overall, the presence of absence of recovery support services in a census tract was predicted with 73.5% accuracy (Table 13). The overall prediction accuracy was better in the logistic regression with the categorical independent variables at 73.5% compared to 67.3% in the model with continuous independent variables. Both models were statistically significant.



Table 13

*Logistic Regression Classification Table with Categorical Independent Variables*

Observed	Predicted		Percent Correct
	0 Recovery Support Services in census tract	$\geq 1$ Recovery Support Service(s) in census tract	
0 Recovery Support Services in census tract	10	8	55.6
$\geq 1$ Recovery Support Service(s) in census tract	5	26	83.9
Full Model	—	—	73.5

The logistic regression results including coefficients, Wald statistic, and degrees of freedom are presented in Table 14. The full model significantly predicted the presence of a recovery support service in the census tract ( $n = 49$ ,  $\chi^2 = 16.032$ ,  $df = 7$ ,  $p = .025$ ).

Table 14

*Logistic Regression with Categorical Independent Variables Results (n = 49)*

	b (SE)	Odds Ratio	95% CI		Wald Statistic	p-value
			Lower	Upper		
Federal Poverty Level	1.572 (.957)	4.816	.738	31.436	2.697	.101
Unemployment	-.887 (.870)	.412	.075	2.266	1.040	.308
Food Stamps/SNAP	.006 (.997)	1.006	.143	7.101	.000	.995
Square Mileage	-.078 (.036)	.925	.861	.993	4.599	.032
Total Population	.000 (.000)	1.000	1.000	1.000	.340	.560
Hispanic/Latino	-.042 (.056)	.959	.860	1.069	.570	.450
Black/African American	.023 (.055)	1.024	.919	1.140	.182	.670
Constant	.968 (1.395)				.481	

*Note.* Model Chi Square = 16.032, df = 7 (p = .025), CI = Confidence Interval for Odds Ratio, SNAP = Supplemental Nutrition Assistance Program

The independent variables and measures of social determinants were not statistically significant predictors in either of the two logistic regression models.

The square mileage of the census tract was a statistically significant predictor in both models (Table 6 and Table 9). The 18 census tracts with no recovery support services occupy 68.3% of the square mileage in the county.

Comparatively, the 31 census tracts with one or more recovery support services occupy only 31.7% of the county. Unlike square mileage, the population is equally distributed. The 18 census tracts with no recovery support services

equates to 36.1% of the 49 total census tracts. These census tracts contain 36.7% of the total population in the county. The 31 census tracts with one or more recovery support service equates to 63.3% of the 49 total census tracts. These census tracts contain 63.9% of the total population (Table 4). The disproportional distribution in square mileage and proportional distribution of population indicates that recovery support services are located in the census tracts with denser populations and smaller square mileage. Figure 9 shows that the majority of recovery support services are located in two areas with dense populations.

The poverty variable measured by adults age 18 or older living at or below the federal poverty level had the highest adjusted odds ratio. When controlling for the other variables in the model, the odds of a census tract containing one or more recovery support services was 4.8 times higher for census tracts with a higher proportion than the county average of adults living at or below the federal poverty level. The census tracts with denser populations also have higher proportions of adults living at or below the federal poverty level.

#### Discussion

In Rutherford County, TN, mutual aid recovery support services and 12-step programs are located in areas with smaller census tract square mileage and denser populations. The areas with these recovery support services also have higher proportions of adults living in poverty and families enrolled in SNAP. These social determinants were not statistically significant predictors when controlling for other variables including census tract size in square miles.

This spatial analysis shows an uneven distribution of mutual aid recovery support services. Across the US, rural areas often lack accessible services of many types including primary care providers, mental and behavioral health services, substance use disorder treatment, emergency care due to closures of hospitals in rural areas, dental care, and public health services. This is compounded by additional challenges including transportation barriers, poverty, and low health literacy in rural areas (The Rural Information Hub, 2019).

The US Census Bureau defines areas as urban, urban cluster, or rural. Urban areas have populations of 50,000 or more. Urbanized clusters have populations of 2,500 to 50,000. Areas that do not meet the urban area or cluster criteria are classified as rural. Other considerations in the classification by the Census Bureau includes population density at the block level and land use such as proportion of paved area. At the census block level, 1,000 persons per square mile is an indicator of an urban area (Ratcliffe et al., 2016).

Rutherford County has a mix of urban and rural areas resulting in a useful example to compare services in urban versus rural areas. The population density of the county in 2010 was 424 persons per square mile (Census Quick Facts, 2020). The census tract with the densest population is tract FIPS code 47149041402 with a density estimated at 6,685.86 persons per square mile followed by tract FIPS code 47149041900 with a density estimated at 5,258.54 persons per square mile. In contrast, the least dense tracts are FIPS code 47149040600 with 55.42 persons per square mile and FIPS code 47149040810 with 63.30 persons per square mile.

Studies of addiction treatment aftercare programs indicate distance to the service reduces likelihood of engaging in the service. This is an important consideration for residents in rural areas that travel further distances for services. In a study of veterans receiving in-patient addiction treatment at a Veterans Affairs facility, Schmitt et al. (2003) found that traveling ten miles or less made patients 2.6 times more likely to attend mental health aftercare appointments when compared to patients traveling 50 or more miles (Schmitt et al., 1993). Fortney et al. (1995) examined patient demographic factors and likelihood of utilizing mental health services following completion of inpatient alcoholism treatment in a Veterans Affairs program. The findings indicate older patients and those living in rural areas were less likely to utilize aftercare services due to distance to the service (Fortney et al., 1995).

Access to a vehicle or public transportation are transportation barriers in addition to travel distance. These barriers are not well studied in relation to mutual aid and 12-step programs. In Rutherford County, only 2.9% of households do not have access to a vehicle (Census Bureau ACS, 2019). This may reduce the transportation barriers when traveling short distances from a rural to urban area within a county.

In a qualitative literature review, Young et al. (2015) identified 14 barriers limiting access to recovery in rural areas. For 12-step programs, the five barriers experienced by rural residents identified were distance to meetings, meeting availability, diversity of meeting types, and diversity of participants in meetings including gender and specific populations such as LGBTQ or persons speaking

languages other than English. The fifth barrier identified is lack of reliable sponsorships which relates specifically to the importance of the peer relationship offered by 12-step programs (Young et al., 2015).

In a national study of a representative sample, Edmond et al. (2015) found differences in quality between substance use disorder treatment facilities in rural and urban areas. Rural facilities were less likely to provide meeting space for 12-step programs compared to facilities in urban areas. Available program meeting locations is another barrier for rural areas (Edmond et al., 2015).

Morton (2019) proposes that community-level stigma is a significant factor in the location of mutual aid recovery support services. Morton's study of 12-step program locations in New Hampshire found a significant positive relationship between program location and areas of social deprivation. A proposed reason for location of these programs in areas higher in social deprivation is due to stigma surrounding these programs and substance use disorder in general. This study did not include population density variables (Morton, 2019). The Rural Health Information Hub describes a unique challenge in that stigma related to substance use disorder in rural areas that is intensified due to the lack of anonymity (The Rural Health Information Hub, 2020). Likewise, Young et al. (2015) describes lack of anonymity as a barrier for rural areas. Lack of anonymity increases stigma and reduces the likelihood of seeking treatment services and recovery support services such as 12-step groups (Young et al., 2015).

The lower number of services in rural areas is compounded by high rates of substance use disorder and alcohol use disorder in these locations. The opioid

epidemic started in rural Appalachia with the rapid rise in opioid pain reliever prescriptions and opioid deaths (CDC Opioid Overdose, 2020). Utilizing data from the National Survey on Drug Use and Health, Mack et al. (2017) found overdose deaths in rural areas increased by 325% from 1999 to 2015 compared to an 198% increase in metropolitan areas. Although further analysis shows a complicated picture when examining rural and urban differences in genders, age groups, other demographic characteristics, and over time since 1999 (Mack et al., 2017). Alcohol use disorder prevalence is equally complicated when examining rural versus urban areas. A SAMHSA report found that 49.5% of treatment facility admissions were for a primary disorder of alcohol use in rural areas compared to 36.1% in urban areas (SAMHSA, 2012). In contrast, the lowest rates of alcohol use are also found in rural areas. The low usage rates in rural areas intersect with religious and cultural variables (Dixon and Chartier, 2016).

More research is needed to understand accessibility to mutual aid recovery support services. The diverse population in Rutherford County, TN made this county a useful case to examine population demographics in areas with and without a mutual aid recovery support service. Larger spatial studies are needed to better understand access in rural and urban areas and other important population demographics including social determinants. The literature contains few studies examining accessibility to mutual aid recovery support services and very few utilizing geographic information systems. Future studies should consider intersecting cultural factors and barriers to these services related to stigma.

Religious institutions often provide free meeting space for recovery support programs. For rural areas high in religiosity but low in service availability, leveraging the faith-based community is an important opportunity to expand access.

Study Limitations. This geographic information study was limited in scope to one county. A larger area of analysis is needed to better understand availability and accessibility of services. The logistic regression analyses were limited to the variables available in the Census Bureau's American Community Survey. Other important factors contributing to the location of recovery support services may have been omitted. This study examined locations of Alcoholics Anonymous, Narcotics Anonymous, Celebrate Recovery, and the TDMHSAS certified recovery congregation programs. Other peer to peer, mutual-aid, and 12-step groups may exist in some areas and were not included in this study. Peer-to-peer services are complex with various populations of focus, sizes, and substances of focus. An available and accessible peer-to-peer program does not guarantee that the program is a good fit for all persons living in close proximity seeking a program. Studies utilizing a variety of methods including but not limited to geographic information systems are needed to better understand barriers to program access.



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## APPENDICES



## APPENDIX A

### Institutional Review Board

**IRB**  
**INSTITUTIONAL REVIEW BOARD**  
Office of Research Compliance,  
010A Sam Ingram Building,  
2269 Middle Tennessee Blvd  
Murfreesboro, TN 37129



#### IRBN014 – NON-RESEARCH DESIGNATION NOTICE

Wednesday, October 21, 2020

<i>Study Title</i>	<b><i>An Examination of the Social and Community Context of Substance Use Disorder Recovery Support Services in Rutherford County, Tennessee</i></b>	
<i>New ID</i>	<b>21-0048 NR</b>	<i>OLD IRB ID</i> <b>21-1048 5qv</b>
<i>Principal Investigator</i>	<b>Sarah Murfree</b> (Student)	
<i>Co-Investigators</i>	Bethany Wrye (FA), Angie Bowman and DeAnne Priddis	
<i>Investigator Email(s)</i>	sarah.murfree@mtsu.edu; bethany.wrye@mtsu.edu	
<i>Department</i>	Health and Human Performance	
<i>Funding</i>	<b>NONE</b>	

Dear Investigator(s),

The above identified research proposal has been reviewed by the MTSU Institutional Review Board (IRB). Based on the information provided to the IRB, this study either does not involve the data collection from living human subjects, or your proposed data collection is not done using a systematic approach to derive generalizable knowledge, or both. The proposed study does not fit the definition of human subjects' research as stated by OHRP (45 CFR 46.102. Since the protocol only involves "Evaluation or Effectiveness of Standard Operating Procedures of Public Organizations" (45 CFR 46.102f - non-human subjects), it is therefore **EXCLUDED** from IRB review and oversight.

Although this study is excluded from the IRB's oversight, we encourage you to adopt best practices in your research, which includes: informed consent; autonomy to participate/decline or to withdraw without retribution; and the right to remain anonymous, for all those who interact with you during this study.

We appreciate your time and we wish you very best with your proposal.

Sincerely,

Institutional Review Board  
Middle Tennessee State University

IRBN014

Version 1.0

Revision Date 03.20.2018

## APPENDIX B

### Semi-Structured Interview Guide

<b>Interview Date:</b>
<b>Start / Stop Time:</b>
<b>Interviewee Name:</b>
<b>Job Title:</b>
<b>Organization:</b>
<b>Location:</b>
Question: What is the size and demographics of the congregation (program description)?
Answer:
Question: When was the organization founded (program history)?
Answer:
Question: Describe how the organization has changed over time and other important organizational history. (program history, program description)
Answer:
Question: To what extent are you personally involved in the Recovery Congregation Program?
Answer:
Question: Does the organization have a mission statement, vision statement, or other description (program description; leadership support and culture)?
Answer:
Question: When was the Recovery Congregation program started (program description, program history)?
Answer:
Question: Why was the Recovery Congregation program started (program description; program history; leadership support and culture; organization decision-making and capacity for change; major change agents)?
Answer:

Question: Describe the leadership and congregation's initial and current level of support for the Recovery Congregation program (leadership support and culture; resources, funding, facilities; organization decision-making and capacity for change)?
Answer:
Question: What services or programs are offered as part of the Recovery Congregation program (resources, funding, facilities)?
Answer:
Question: Approximately how many individuals attend the Recovery Congregation's programs (program description)?
Answer:
Question: Describe the Recovery Congregation's resources and challenges or facilitators and barriers (resources, funding, facilities)?
Answer:
Questions: What other services related to health and wellbeing does your organization offer (leadership support and culture; major change agents; resources, funding, facilities; organization decision-making and capacity for change)?
Answer:
Question: What organizations are the most important partners in the Recovery Congregation program (list 10 to 15 partners including a contact name and email) (partnerships with other organizations):
Answer:
Question: Is there anything else I should know about the Recovery Congregation program?
Answer:

## APPENDIX C

### Recovery Congregation Social Network Questionnaire

#### Recovery Support System Network

---

##### Start of Block: Default Question Block

The purpose of this survey is to better understand the organizational relationships created as part of the Recovery Congregation in Murfreesboro, TN. You are receiving this survey because of the relationship between your organization and the Recovery Congregation program.

This survey is part of a project at Middle Tennessee State University in the Department of Health and Human Performance. The survey collects information about organizational relationships and not about individual people. Only one survey should be completed for your organization. The survey should be completed by the person most familiar with the Recovery Congregation program.

This survey is entirely voluntary. If you agree to complete this survey, please answer each question honestly. Your organization will remain anonymous if the survey results are published. Please contact Sarah Murfree at [sarah.murfree@mtsu.edu](mailto:sarah.murfree@mtsu.edu) or 615-668-3629 with any questions or concerns.

- Yes, I agree to complete the survey (4)
  - No, I do not agree to complete the survey (5)
-

Are you age 18 years or older?

- Yes (1)
- No (2)

---

Optional - Provide your name and email address for further follow-up.

---

Select your organization from the list:

---

Page Break

Section 1: General Information about the Recovery Congregation

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Page Break

Please indicate what your organization contributes to the Recovery Congregation in Murfreesboro, TN (choose as many as apply).

- Funding/ Donations or Paid Staff (1)

- In-Kind Resources (e.g., meeting space) (2)
- Volunteers and Volunteer staff (3)
- Specific health expertise (4)
- Expertise an area other than in health (5)
- Community connections (6)
- Send and/or receive referrals (7)
- Facilitation/Leadership (8)
- Advocacy (including raising awareness) (9)
- Other contribution (10) \_\_\_\_\_
- I am not familiar with Recovery Congregation (11)

What is your organization's most important contribution to the recovery congregation program in Murfreesboro, TN (choose one).

- Funding/ Donations or Paid Staff (1)
- In-Kind Resources (e.g., meeting space) (2)
- Volunteers and Volunteer staff (3)
- Specific health expertise (4)
- Expertise an area other than in health (5)
- Community connections (6)
- Send/ receive referrals (7)
- Facilitation/Leadership (8)
- Advocacy (including raising awareness) (9)
- Other Contribution (11) \_\_\_\_\_
- I am not familiar with the Recovery Congregation (10)

Outcomes of the Recovery Congregation program's work include or could potentially include:  
(choose all that apply).

- Improved services for individuals with substance use disorder (1)
- Reduction of substance use disorder rates (2)
- Improved services for individuals with a mental health disorder (3)
- Increase in shared knowledge (4)

- Increased community support (5)
- Increased public awareness (6)
- Changes to policy, laws and/or regulations (7)
- Improved health outcomes (8)
- Other outcome(s) (11) \_\_\_\_\_
- I am not familiar with the Recovery Congregation (10)

What aspects of collaboration contribute to the desired outcomes of the Recovery Congregation program? (Choose all that apply)

- Bringing together diverse stakeholders (1)
- Meeting regularly (2)
- Exchanging information and knowledge (3)
- Sharing resources (4)
- Informal relationships created (5)
- Collective decision-making (6)
- Having a shared mission or goals (7)
- Other contribution (8) \_\_\_\_\_
- I am not familiar with the Recovery Congregation program (9)



Do you have any additional comments about the Recovery Congregation program?

---

Page Break

## Section 2 - Organizational Relationships

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Page Break

Since January 1, 2019, how frequently has your organization worked with the Recovery Congregation on any activities related to their Recovery Congregation program?

- Not applicable; this is my organization (1)
- Never/We only interact on issues unrelated to the recovery friendly congregation program (2)
- Once a year or less (3)
- About once a quarter (4)
- About once a month (5)
- Every or almost every week (6)
- Every or almost every day (7)

What kinds of activities does your relationship with the Recovery Congregation entail related to the Recovery Congregation program? (Choose all that apply)?

- None (1)
  - Exchanging information and/or attending meetings together related to the Recovery Congregation program. (2)
  - Jointly planning, coordinating, or implementing an activity, training, event, or other program; and/or intentional efforts to enhance each other's capacity for the benefit of the Recovery Congregation program. (3)
  - Implementing services together such as sending referrals to or receiving referrals from the Recovery Congregation program. (4)
  - A written agreement is in place to define the relationship for the benefit of the Recovery Congregation program. (5)
-

Since January 1, 2019, how frequently has your organization worked with Recovery Congregation program on any other activity?

- Never (1)
- Once a year or less (2)
- About once a quarter (3)
- About once a month (4)
- Every or almost every week (5)
- Every or almost every day (6)

---

Page Break

Since January 1, 2019, how frequently has your organization worked with <<Organization 1 to 16>> on any activities related to the Recovery Congregation program?

- Not applicable; this is my organization (1)
  - Never/We only interact on issues unrelated to the recovery congregation program (2)
  - Once a year or less (3)
  - About once a quarter (4)
  - About once a month (5)
  - Every or almost every week (6)
  - Every or almost every day (7)
-

What kinds of activities does your relationship with <<Organization 1 to 16>> entail related to the Recovery Congregation program? (Choose all that apply)?

- None (1)
- Exchanging information and/or attending meetings together related to the Recovery Congregation. (2)
- Jointly planning, coordinating, or implementing an activity, training, event, or other program; and/or intentional efforts to enhance each other's capacity for the benefit of the Recovery Congregation program. (3)
- Implementing services together such as sending referrals to or receiving referrals from the Recovery Congregation program. (4)
- A written agreement is in place to define the relationship for the benefit of the Recovery Congregation program. (5)

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Page Break

Section 3: Closing questions related to Recovery Congregation program

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Page Break

What benefits have occurred or could occur from cooperating or collaborating with other organizations on initiatives related to substance use disorder recovery support services (Choose all that apply)?

- Ability to serve my clients better (1)
- Greater capacity to serve the community as a whole (2)
- Acquisition of additional funding or other resources (3)
- Acquisition of new knowledge or skills (4)
- Better use of my organization's services (5)
- Building new relationships helps my organization (6)
- Heightened public profile of my organization (7)
- Enhanced influence in the community (8)
- Increased ability to reallocate resources (9)
- Other benefits (10) \_\_\_\_\_

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What drawbacks have occurred or could occur from cooperating or collaborating with other organizations on initiatives related to substance use disorder recovery support services (Choose all that apply)?

- Takes too much time and resources (1)
- Loss of control / autonomy over decisions (2)
- Strained relations within my organization (3)
- Difficulty in dealing with partners (4)
- Not enough credit given to my organization (5)
- Other drawbacks (6) \_\_\_\_\_

End of Block: Default Question Block

## APPENDIX D

### Recovery Support Service Locations

Narcotics Anonymous in Rutherford County, TN				
Name	Address	City	State	Zip
By the Book	2022 E. Main Street	Murfreesboro	TN	37130
Finding a New Way to Live	561 Old Nashville Highway	Lavergne	TN	37086
Never Alone	1700 Medical Center Parkway	Murfreesboro	TN	37129
Promise of Freedom	405 Smyrna Square Drive	Smyrna	TN	37167
Rutherford County Night Owls	521 Mercury Blvd.	Murfreesboro	TN	37130
Spiritual Solutions	745 South Church Street	Murfreesboro	TN	37130
The Ties that Bind	315 John R. Rice Blvd.	Murfreesboro	TN	37130
Narcotics Anonymous, Narcotics Anonymous Meetings Heart of Tennessee Area. Retrieved from <a href="https://hotascna.org/home/narcotics-anonymous-meetings/">https://hotascna.org/home/narcotics-anonymous-meetings/</a>				
Alcoholics Anonymous in Rutherford County, TN				
Name/ Group	Address	City	State	Zip
Murfreesboro Group	801 N. Maney Ave.	Murfreesboro	TN	37130
New Beginnings	404 East Main Street	Murfreesboro	TN	37130
Serenity Group	435 S. Molloy Lane	Murfreesboro	TN	37129
The Basement Bunch	315 East Main Street	Murfreesboro	TN	37130
Primary Purpose	4380 Manson Pike	Murfreesboro	TN	37129
Back to the Book Group	745 South Church Street	Murfreesboro	TN	37127
LaVergne Solutions Group	188 Old Nashville Highway	LaVergne	TN	37086
Gratitud	406 College Street	Smyrna	TN	37167
Smyrna Gratitude Group	298 Fitzhugh Blvd.	Smyrna	TN	37167
Alcoholics Anonymous, Alcoholics Anonymous Nashville Meeting Times. Retrieved from <a href="http://www.aanashville.org/cgi-bin/meetingdb/mtgsearch.cgi">http://www.aanashville.org/cgi-bin/meetingdb/mtgsearch.cgi</a>				
Celebrate Recovery				
Name/ Group	Address	City	State	Zip
Experience Community Church	521 Old Salem Road	Murfreesboro	TN	37129
North Boulevard Church of Christ	1112 North Rutherford Blvd.	Murfreesboro	TN	37130
Celebrate Recovery, Find a Group. Retrieved from <a href="https://locator.crgroups.info/">https://locator.crgroups.info/</a>				
Tennessee Certified Recovery Congregations				
Name/ Group	Address	City	State	Zip
Family Worship Center	3045 Memorial Blvd	Murfreesboro	TN	37129
Fellowship United Methodist	2511 New Salem Hwy	Murfreesboro	TN	37128
First Baptist	738 E. Castle Street	Murfreesboro	TN	37130
God's House of Promise Ministries	2910 Wellington Place	Murfreesboro	TN	37128
Kingwood Church of Christ	111 E. MTCS Road	Murfreesboro	TN	37129
Lantern Lane Farm	6210 Corinth Road	Mount Juliet	TN	37122
Lost and Found	210 Heritage Circle	LaVergne	TN	37086
New Vision Prison Ministry	1750 North Thompson Lane	Murfreesboro	TN	37129
North Boulevard Church of Christ	1112 North Rutherford Boulevard	Murfreesboro	TN	37130
Real Life Community Church of the Nazarene	2022 East Main Street	Murfreesboro	TN	37130
The Barnabas Vision	141 MTCS Road	Murfreesboro	TN	37129
The Pentecostals of Murfreesboro	1800 New Lascassas Pike	Murfreesboro	TN	37130
The Refuge Outreach Center	102 Front Street	Smyrna	TN	37167
Warrior 180 Foundation	120 Rockingham Drive	Murfreesboro	TN	37129
TN Department of Mental Health and Substance Abuse Services, Fast Facts: Certified Recovery Congregation Locations. (2018). <a href="https://www.tn.gov/behavioral-health/research/tdmhsas-fast-facts-test-3/fast-facts--faith-based-initiatives-recovery-congregations.html">https://www.tn.gov/behavioral-health/research/tdmhsas-fast-facts-test-3/fast-facts--faith-based-initiatives-recovery-congregations.html</a>				



## APPENDIX E

### ArcGIS Workflow Diagram

