Over the River and Through the Woods:

Examining the Relationship between Network Structure, Collaboration and Geography

Jaimie Elizabeth Edwards

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Public Administration/Public Affairs

Robin Lemaire, Chair

Adam Eckerd

Karen Hult

Laura Jensen

May 15, 2020

Blacksburg, Virginia

Keywords: purpose-oriented networks, geography, service-delivery networks, collaboration

Over the River and Through the Woods:

Examining the Relationship between Network Structure, Collaboration and Geography

Jaimie Elizabeth Edwards

ABSTRACT

This dissertation analyzes the relationship between network structure, collaboration, and geography among food security organizations in the New River Valley of Virginia. As a way to better understand how purpose-oriented, service-delivery networks, this case study of the Thrive network examines the relationship between geography and collaboration. The food security organizations within the region were mapped to determine the structure of the network and data was compared to the geography of the region. The findings suggest that food security organizations do find geography as a barrier to collaboration in three ways. First, these organizations see geography as a cost to collaboration due to the increased need for logistics and resources. Second, geography creates interorganizational political and cultural boundaries. Third, many food security organizations view geography as a barrier to collaboration in terms of its relationship between the organization and their clients. Organizations that saw value in collaboration between organizations within the network found ways to overcome the barriers of geography.

Over the River and Through the Woods:

Examining the Relationship between Network Structure, Collaboration and Geography

Jaimie Elizabeth Edwards

GENERAL AUDIENCE ABSTRACT

Networks enable organizations to work together in a way that helps solve social issues too large to be handled by single groups. This dissertation explores the way in which food security organizations collaborate in the New River Valley of Virginia and the ways in which this collaboration is impacted by geography. The findings suggest that geography is often an unclear concept that is conflated with multiple concepts such as organizational politics, client issues, and cultural boundaries, and that overcoming these barriers can be accomplished when goal congruence occurs.

DEDICATION

"A day without a friend is like a pot without a single drop of honey left inside." –Winnie the Pooh

I came to Virginia Tech for a degree and I am leaving with life-long friends. This dissertation is dedicated to the many people who made it possible and there are many.

To my wing-nuts and the best women I know:

Ashley: for listening to me rant about boys (and vice versa) and keeping me fit-you are my ride or die

Katie and Coco: for pushing me, talking me through the tears, and understanding my exhaustion-I miss you seeing you every day

Susan: for keeping me fed, keeping me laughing, and keeping me faithful-I hope to someday catch the party spirit you have

Thomas: for hanging out with us girls every Thursday night and being the voice of reason and kindness

To my GTFO women who are wise beyond the ivory towers:

Maria: for lifting me up, proof reading everything, and being the best cheerleader a girl could have (And to your Mom, for the beautiful cross-stich)

Lauren: for all of your support and for loaning me your little people (I love you, Grant and Lynley- Your pictures and videos always make me smile)-you are the most amazing mom and a superwoman

Meredith: my PhD mom who got me through the first few years and is Beyond amazing

To my family who has always been here for me:

Mushro and Jim: thank you for supporting me through all of this-cards during qualifying exams, phone calls with me in tears, faith in my abilities, and excitement for all of my successes. I am so grateful that we have had this time together to build an amazing relationship.

Bonnie: you are my favorite little sister and I will always be here if you need me

Dad: I miss you and love you-I know that you would be proud and amazed

Tim: your faith in me is incredible and I look forward to our future in Georgia-you came into my life when I needed you most and have never let me down

I love you all and my heart is full.

ACKNOWLEDGEMENTS

"If you get a chance, take it. If it changes your life, let it. Nobody said it'd be easy, they just promised it would be worth it." Dr. Seuss

Walking into the Thomas Conner House six years ago, I never could have imagined how different I would be when I left. I have grown as a scholar, as a woman, and as a person. I have a great many people to thank for this.

To my committee:

Robin Lemaire, for your patience and guidance, especially the summer you spent with me "creating" the network. I know that I haven't always been easy, but I am a better scholar because of your tough love and your kindness. To Laura Jensen, for your faith in me ("you've got the chops") and your compassion. To Adam Eckerd, for your expertise, humor, and willingness to introduce me to strangers at conferences. And to Karen Hult for not only improving my scholarship, but for allowing me to teach and for reminding me that I am good enough to make it through this crazy process.

To the CPAP faculty:

Eric Malczewski, David Bredenkamp, Brian Cook, Matt Dull, Joe Reese, Ray Zuinga, Stephanie Davis, and others. Each one of you has reached out to me at some point during this process in a way that has made me both a better scholar and a better person. I really have been blessed to be part of such a great community. To Sara Jordan, without whom I would not have made it through the first two years. And to Kelly, for keeping us all in line and lightening my load.

To my fellow CPAP student:

While I have been blessed to have learned from you all both inside and outside of the classroom, there are two students who really made it possible for me to graduate. Maria Ingram and Lauren McKeague. From GTFO to edits and writing hours together, this is an accomplishment for all of us.

Table of Contents

CHAPTER ONE

INTRODUCTION

The issues plaguing local communities are often complicated and require a multi-organizational approach. Kettl (2008) observed that this is due in part to the fact that "wicked problems" (Rittel and Weber, 1973, p. 135) are unable to be solved within the capacities of a single organization because these organizations "sit within the inter-organizational domain" (Trist, 1983; Huxham, Vangen, Huxham, and Eden, 2000, p. 338). As a result, inter-organizational networks are becoming more prominent as a structure of organizing that may be able to address complex problems that are wider in scope.

One such type of network is the purpose-oriented network. In many sectors, purpose-oriented networks are being formed as a way to allow multiple players to come together in a purposeful way to increase collaboration (Raab and Kenis, 2009). These networks provide an alternative to markets and bureaucracies (O'Toole, 1997) by allowing for flexibility that is less possible in government agencies (Powell, 1990). Purpose-oriented networks create a "joint-based effort for a common purpose" that benefits from collaboration among member organizations (Carboni, Saz-Carranza, Raab, and Isett, 2019, p. 210).

As the formation of purpose-oriented networks continues to grow in the public and non-profit sector, the research on these networks, and the theories surrounding them, is still lacking in certain areas. This lack of study means that network managers are missing tools that could impact network effectiveness (Raab and Kenis, 2009). This oversight in the literature may be due in part to the complexity of empirically examining networks which have many moving parts. In working with networks, managers cannot use the same techniques previously suggested in the organizational literature; instead,

network managers need more information to effectively work with many organizations and lead networks (Provan and Lemaire, 2012).

Adding to the complexity of purpose-oriented networks is the fact that they are not all created equally. Some of these networks work towards “information diffusion,” or the creation of a system that facilitates the free flow of information (Milward and Provan, 2006, p. 6). Some are “problem solving” in that they come together as a network to address an immediate crisis, such as in the case of emergency management. Others are “community capacity building networks” aimed at the creating and building of social capital to deal with future issues. Finally, some are “service implementation” or service-delivery networks, whose goal is to provide services to clients for the public good.

While all purpose-oriented networks are similar in that they are “comprised of three or more autonomous actors who participate in a joint effort based on a common purpose” (Carboni, et. al., 2019, p. 210), not all purpose-oriented networks face the same challenges in terms of collaboration. Purpose-oriented service-delivery networks, by their very nature, have to approach collaboration in a way that includes the needs of the client in the decision making process. As a result, service-delivery, purpose-oriented networks face specific challenges based on their mission to provide public service provisions.

For many of these service-delivery organizations, client service provision is the major driver of organizational activities. Collaboration with other organizations can often seem secondary to service-provision. Provan and Milward (2001) argued that collaboration among organizations within the social services field can lead to more effective outcomes for clients; however, this is usually attributed to the need of organizations to overcome limited resources (Huxham and Vangen, 2005) rather than seeing the benefit of collaboration as a goal in and of itself. Collaboration among

organizations can also be hindered by internal and external legitimacy issues (Human and Provan, 2000), the inability of the network to create a joint identity (Rometsch and Sydow, 2006), and the fact that these networks are often perceived as temporary in nature (Raab and Kenis, 2009). Also, limited resources and competition among organizations (Robinson, 2007: van Gorp, 2014), lack of consensus on goals or the way to implement these goals (Vangen, Hayes and Cornforth, 2015), and varying levels of organizational engagement (Poocharoen and Ting, 2015) are all possible barriers to collaboration that have been examined in the literature.

While all of the barriers discussed above are important for study, this dissertation will specifically focus on a single issue that many purpose-oriented, service-delivery networks must contend with: that of geography. There is an evident link between the physical and social spaces of networks that can be seen in the language used to describe them both. Distance refers not only to the space between two points on a map, but also the length of the path between two nodes in a network. Centrality, in the study of geography, is the distance between two spatial units which can also be determined by the attributes and distance of the unit (Li, Qian, and Liu, 2017). Similarly, centrality in the study of networks refers to the number of ties an actor has, or the visibility of an actor in the network (Wasserman and Faust, 1994). Other terms, such as density, reachability, path, and closeness are all terms that can describe both social and geographic spaces. These similarities suggest a connection that could help provide a clearer understanding of both spaces.

Scholars have primarily overlooked the role of geography in purpose-oriented networks, although geography has been studied in regards to other types of networks. Primarily, these scholars have looked at how geography affects the ability of organizations and individuals to collaborate, and under what conditions this occurs. For

example, Rallet and Torre (2000) argue that organizational proximity, in regards to sharing knowledge, is a necessary condition for collaboration. Noll, Beecham and Richardson (2010), when looking at software development networks, found that lack of proximity makes collaboration more difficult due to the fact that implicit knowledge is less likely to be shared due to the lack of informal encounters and personal relationships formed among network members. Informal encounters provide for a familiarity between network members, allowing them the opportunity to develop more personal relationships. Lack of these informal encounters can create issues due to the fact that social networks between members allow for the creation and exchange of social capital that can be leveraged at the organizational level (Knoke, 1999). As a result, many argue that geographic proximity is necessary for collaboration due to the need for direct interaction and informal communication (Torre and Gilly, 2000; Knoben and Oerlemans, 2006; Rallet and Torre, 2000).

In intercultural collaboration networks, geographic distance is seen as a disadvantage because it hinders the development of trust (Noll, Beecham, and Richardson, 2010). Nguyen, Wolf, and Damien (2008) argue that when working across distance, communication is delayed leading to a breakdown in trust among individuals. And when looking at scientific collaboration networks, Katz (1994) argues that distance reduces collaboration exponentially due to the increased facilitation costs associated with travel and time. Many of these findings may be reasonably extrapolated to purpose-oriented networks.

In addition to these findings, there may be some unique ways in which geography shapes collaboration in service-delivery, purpose-oriented networks. First, as participants in the public sphere, many organizations within service-delivery networks are constrained to a specific location based on the clients they serve or the types of

services they provide. Organizations within purpose-oriented service-delivery networks can also be tied to a location based on the political jurisdiction within which it operates. Funding for these organizations may be tied to municipalities that do not include all of the areas serviced by the network. While not all purpose-oriented, service-delivery networks are comprised of public, private and non-profit organizations, those networks that are have constraints placed on the way it shares resources with one another by the citizens, shareholders, and donors it represents, making collaboration across localities challenging. Therefore, purpose-oriented service-delivery networks, even more than other kinds of networks, need to be examined specifically to determine the ways in which geography shapes the structure of these networks and how it both helps and hinders collaboration.

This research thus is guided by the following questions: How does geography shape the overall structure of a purpose-oriented service-delivery network and what is the relationship between geography and collaboration within a purpose-oriented, service-delivery network? I hope to contribute to the literature a better understanding of how collaboration and geography are viewed by practitioners in purpose-oriented, service-delivery networks and well as to provide insight to network managers about the relationship between geography and network structures and the implications for managing networks to overcome observable and/or perceived challenges posed by geography. My approach to examining this relationship is to conduct a sequential, explanatory, mixed methods study. My dissertation will focus on the network as a whole rather than the individual relationships between organizations. The level of analysis for this project is the whole network, while the unit of observation is individual organizations. Conducting a single case study of the Thrive network, a food security network in rural southwest Virginia, my dissertation will consist of three parts. In part

one, I map the network by analyzing both its social and geographic structures, through network analysis and geographic information system (GIS) analysis respectively. Part two consists of my collection of the network's narrative through the compilation of strategic interviews with organizations in the network aimed at explaining the nature of the relationship between geography and their workings with other organizations. Finally, in part three I connect the organizational network survey findings, GIS data and interview results to produce findings about the relationship between networks and geography.

The Thrive network offers a valuable opportunity for the study of the relationship between geography and collaboration. The network members have identified the geography of their rural southwest Virginia region as a hindrance to their ability to collaborate across the whole network. My findings, however, suggest that organizations that see the value in collaborating with others in the network are much less likely to let geography discourage collaboration. Additionally, many organizations that view geography as a barrier tend to see this issue through the lens of collaboration with their clients, rather than with other organizations in the network. These findings offer important implications of the actual versus perceived challenges of geography within purpose-oriented service-delivery networks.

RESEARCH SITE

Situated in southwest Virginia, the New River Valley (NRV) is comprised of four counties (Floyd, Giles, Montgomery, and Pulaski) and the independent city of Radford. Defined as the Blacksburg-Christiansburg-Radford Metropolitan Statistical Area, the New River Valley is home to almost 200,000 people and two state universities (Onward New River Valley, 2019). According to 1980-2014 US Census Bureau American Community Survey 5-year estimate of the New River Valley, approximately 9.5 percent

of families live below the poverty line, compared with 8.2 percent in Virginia (New River Valley Regional Commission (NRVRC), 2019). The average per capita income was $22,250 compared to the state average of $33,958 (NRVRC, 2019).

In 2011, with the help of a $1 million grant from the Federal Partnership for Sustainable Communities, the community members in the New River Valley, Virginia created a plan for the future of the region by launching a livability study. This three year study led to the report *Livability in the New River Valley* that included 18 overarching goals and four themes: Enhancing Living and Working Environments, Preserving Rural Heritage and Community Character, Making the Business Environment More Productive and Resilient, and Building Healthy Communities. The Community Foundation of the NRV (CFNRV) committed to leading the implementation of the initiative in a partnership with the New River Valley Regional Commission (NRVRC) and created The Fund for the NRV in 2014 as a way to align grant-making efforts and the Livability study.

One of the groups that arose from this collaboration was the Thrive network. With its focus on food insecurity, Thrive is an initiative of the Fund for the NRV that will:

> develop a comprehensive understanding of hunger and nutrition-related organizations, programs and services in our region; reduce the number of organizations working in isolation and establish a food poverty and health network building on good practice; build long-term community capacity to address hunger and poverty, and to strengthen the local food system; expand funding for projects that will increase food access, improve food distribution, ensure the stability of the food supply, and teach healthy eating habits; and gather data and evidence to measure progress and to attract further investment (Thrive, 2018, Building a Culture of Health section, para.1).

Thrive is comprised of approximately 100 public, private, and nonprofit organizations that are seeking to provide “reliable access to nutritious, affordable food and the knowledge to make the best nutritional choices for themselves and their families” (Thrive, 2018, Supporting Nutrition and Health section, para. 1).

One of the first goals of Thrive was to increase the capacity for food security in the NRV through the creation of a formalized network. Network members believed that the creation of a network would allow for the sharing of best practices, the reduction of redundancy of services, and the possibility of pooling resources to better serve the community. As part of this initiative, the Thrive network began by hosting a series of community conversations in September 2016 at various locations in the NRV. These community conversations served as a way to introduce those working in the area of food security, share best practices, and talk about the building of the NRV Food Access Network. These conversations concluded in October 2017 and the decision was made to create a Food Access Network Survey. The data collected in this survey is one of the sources used for this dissertation.

DATA COLLECTION

Using the Thrive network as a single case study for this project, I conducted three major types of data collection for this dissertation. The three pieces consisted of an organizational survey used to collect data to map (socially) the network, geographic data to map (geographically) the network, and strategic interviews based on the results of the survey and geographic analysis of the network.

The first set of data were derived from the organizational survey. Data were collected on Thrive between December 2017 and April 2018 for the purpose of analyzing the network structure. The data were gathered using an online survey issued to organizations in the NRV focused on food security and food provision. The survey

data were then used to map the network in UCINET as well as to examine the relationships between network variables.

The second area of data collection for this dissertation was based on the spatial locations of the organizations in the network. To capture the spatial data, I gathered information needed to map the organizations from a variety of sources including the partner organizations themselves, websites, Google maps, etc. Once the location of each of the organizations was determined, the network was mapped using ArcGIS and I was able to calculate the driving distances between all of the organizations in the network.

Finally, the third area of data collection involved conducting strategic interviews. Since this is a sequential study, the organizations that were included in the interview process were based on the results of the organizational survey answers, GIS data, and through strategic sampling. Individual organizations were included that represented the multiple localities in the New River Valley, various positions in the network structure, such as core/periphery organizations, and organizations that were geographically located both centrally and remotely in comparison to other organizations in the network. I conducted all of the interviews in person, though I had a second graduate student participate with me in three of the conversations. Her purpose during these interviews was to gain a greater understanding of the perceptions of the Thrive network for her own research; however, some of the answers to questions she elicited were relevant to this work and used in this dissertation. These semi-structured interviews were guided by an initial list of questions. The goal of the interviews was to gain a better understanding of the ways in which organizations in the network viewed collaboration with other organizations, as well as gauge their thoughts on geography as a boundary to working together. Ten interviews were conducted representing eleven organizations

within the network. Each interview ranged from 30-120 minutes with the majority lasting one hour. Interviews were analyzed using both summative content analysis and modified grounded theory.

OVERVIEW OF CHAPTERS

Before presenting the empirical analysis of the dissertation, I first review the literature. Chapter 2 provides a review of the relevant literature on networks and geography, specifically purpose-oriented, service-delivery networks, geography, and collaboration. In Chapter 3, I describe the Thrive network and the research design.

Chapter 4 presents a quantitative analysis of the network in which I examine the relationship between the network activities, network structure and geography. First, using the responses from the organizational survey, I map out the relationships within the network. Then, based on these results and the geographic data collected, I map out the relationships between the organizations geographically. Using a variety of network analysis tools, including network and node level measures and quadratic assignment procedure (QAP), I describe the relationship between network tasks and distance in an effort to examine the relationship between geography and network structure.

Chapter 5 contains the qualitative analysis of the semi-structured interviews. Here, I focus specifically on why certain relationships exist or do not exist, and the role that geography plays in this determination. The interviews were coded using first qualitative summative content analysis followed by a modified grounded theory approach. Summative content analysis allows for the creation of keywords to be identified in the text both before and during the analysis of the data by looking both at the available literature and the interests of the researchers. Using summative content analysis allowed me to sort the qualitative data initially based on the parameters that were specific to this dissertation, namely geography and collaboration. By then

following with a modified grounded theory approach to analyze the data, I was able to look at the interview responses to find concepts that emerged from the data and were not included in the initial content analysis, as well as where the current literature on geography and collaboration could be expanded.

Chapter 6 concludes the dissertation and serves to connect the quantitative and qualitative data in a way that answers the question: What is the relationship between collaboration and geography in purpose-oriented service-delivery networks? The findings, discussed in the final chapter, provide a discussion of the implications of this dissertation for both theory and practice.

One contribution of my research to the literature is that it offers empirical evidence of the relationship between geography, collaboration, and network structure in purpose-oriented service-delivery networks. It advances the theory on how, when, and for what types of organizations geography is perceived as a barrier to collaboration. In addition, it examines when and how geography impacts the structure of the network, and when it does not.

Theoretically, while the results of this study may not be generalizable, this research finds that collaboration may mean different things to different organizations within purpose-oriented service-delivery networks. Many of the organizations spoke of their clients as the main group with which they collaborated and often stressed that geography was a barrier in this type of collaboration. When collaborating with other organizations in the network, the research shows that the largest factor determining whether organizations viewed geography as a barrier was not the driving distance, but instead, the value these organizations saw in the interactions with other organizations.

This dissertation also offers insight to practitioners and network leaders who are hoping to improve collaboration in purpose-oriented service-delivery networks. The

main finding from this research was that many organizations in purpose-oriented service-delivery networks do see geography as a barrier to collaboration. Yet how organizations view geography as a barrier, as well as the importance it places on collaboration, differs greatly among organizations. As it is described above, organizations that find value in collaboration are willing to find creative ways to overcome the barriers associated with geography. The second contribution is the acknowledgement that when organizations are only client focused, it is hard for them to move beyond the needs of their clients in able to see the value of collaboration. These two findings provide insight not only into the leadership needed for collaboration in purpose-oriented service-delivery networks, but also the importance of communicating the advantages of collaboration among members.

Common to most case studies, there are limitations to this study. The fact that this case study represents one network at one point in time means that it may not be generalizable to similar purpose-oriented, service-delivery networks. In addition, there is no implication of causality, merely correlations where stated. The empirical evidence, presented as a result of various types of analysis, is not comprehensive enough to be conclusive. However, this study provides insights for future research that could further test the relationship between geography and collaboration in other settings, as well as what additional barriers to collaboration could impact the network.

The research presented here only provides a first glimpse at the importance of the relationship between geography and collaboration. Future research could include examining networks similar to Thrive to assess if the findings shown here translate to other networks. Also of interest would be examining other food security networks in more urban regions. Do geographic factors, such as traffic, impact collaboration differently than distance? Finally, it would be interesting to revisit the Thrive network in

the future to once again measure if increased collaboration among organizations impacts their perceptions of geography.

CHAPTER TWO

LITERATURE REVIEW

The study of geography and the study of networks share a common terminology. Distance, in both contexts, is the space between two points, whether that be measured in miles for geography or edges in the study of networks. Geographic centrality is not only the distance between two objects, but is also comprised of the object's attributes and characteristics (Li, Qian, and Liu, 2017). Similarly, network centrality refers to the number of ties organizations have, or how connected organizations are to other organizations (Wasserman and Faust, 1994). Density is often used when describing population within a certain geographic boundary, such as a city, state, or country. In networks, density is the number of actual connections among network members divided by the number of possible connections (Wasserman and Faust, 1994). Both disciplines talk about walks and paths as corridors to traverse to get from one place or node to another.

It would seem, then, given these similar ways of describing their worlds, that there might be a relationship between geography and networks. Specifically, does geography affect the ways networks are structured or the ways in which nodes within these networks are able to reach each other? Is geography a wall that network members cannot cross, a windy road that makes collaboration more difficult, or a highway that leads them quickly to a common destination or goal?

As we are increasingly move "toward a society of networks" (Raab and Kenis, 2009, p. 198) as a way to solve "wicked problems" (Rittle and Weber, 1973, p. 135), the research on networks in the field of public administration is growing (Lemaire, Mannak, Ospina, and Groenleer, 2019; Hu, Khosa, and Kapucu, 2015). The study of purpose-oriented networks, which are "network[s] comprised of three or more autonomous actors

who participate in a joint effort based on a common purpose" (Carboni, Saz-Carranza, Raab, and Isett, 2019, p. 210), offers many opportunities for theoretical development given the "fragmented and diverse" state of the current literature (Lemaire et al., 2019, p. 198). Purpose-oriented network is a broad term and can encompass service delivery networks (Provan and Milward, 1995; Silva, 2011), emergency management networks (Moynihan, 2009) and problem solving and information sharing networks (Dutton, 2008; Sorenson, Rivkin, and Fleming, 2006; Quick and Feldman, 2014).

Purpose-oriented networks are groups that work together without a hierarchical governance structure to ensure coordination around a common purpose; as a result, there is often a need for collaboration among network members to ensure goal congruence (Provan and Kenis, 2003). While a "joint effort based on a common purpose" can often ensure organizations come together, collaboration in a purpose-oriented network can be hindered in a variety of ways (Carboni, Saz-Carranza, Raab, and Isett, 2019, p. 210). One limitation to working together that has been minimally examined in the literature is the relationship between geography and collaboration. Muller and Stewart (2016) suggest that there are three schools of thought on the impact of geography on collaboration: (1) proximity is critical for knowledge transfer; (2) technology has overcome the need for geographic proximity, and (3) occasional face-to-face contact is enough to encourage collaboration even when geographic proximity is unavailable. Building on these arguments, in the next three sections of the text I will examine the relationship between proximity and collaboration (including knowledge flow), the role that face-to-face contact plays in regard to collaboration in networks, and the ways in which technology can, and cannot, overcome geography as a barrier to collaboration. Finally, I conclude with the idea that geography may impact collaboration in two ways not mentioned by Muller and Stewart: features of geography other than

distance can impact collaboration and that there may be a relationship between geography and network structure.

PROXIMITY AND COLLABORATION

There are many reasons for organizations to collaborate in purpose-oriented networks, one of which is information sharing. Since information sharing is a key component in collaborative networks, examining the role of proximity on knowledge flow can further understanding for these networks. Knowledge flow conceptualizes knowledge as a tangible entity that can be transferred from one organization to another, and the path of this transfer, or flow, can be observed. The study of knowledge flow looks at the capacity to move “capability and expertise from where it resides to where it is needed” (Nissen, 2002, p. 251). Knowledge flow can be impacted by organizational size (Bontis, Bart, Serenko, and Hardie, 2007), social capital (Huggins, Johnston, and Thompson, 2012), and hierarchy of knowledge (Nissen, 2002). One of the main points of contention in the study of knowledge flow is the relationship between knowledge flow and geography and whether proximity is a necessary condition in the movement of knowledge (Feldman, 1994).

The concept of knowledge flow relates to the way in which knowledge moves in a geographic area or network. One specific way flow occurs is through knowledge spillover, which is the idea that an accumulation of knowledge in a geographic area leads to an increase in innovation, and that in specific sectors, the spread of knowledge seems to exponentially benefit a given economy (Fallah and Ibrahim, 2004). One of the factors that helps foster knowledge spillover is the physical co-location of areas working in the same sector (Johnson and Mareva, 2002). Knowledge spillovers are often seen as localized because proximity increases collaboration (Howells, 2002). An example of this would be Silicon Valley, where technology companies have gathered in close

proximity, or Hollywood, where film companies and related industries seem to be co-located (Fallah and Ibrahim, 2004). The advantages of such clusters of activity are a common specialized labor pool and the ability of employees to move between companies, sharing their insights (Krugman, 1991).

Social connection is also seen as needed when looking at knowledge spillover. Breschi and Lissoni (2003) found that geography was a key component in collaboration only when attached to some sort of personal relationship. They argue that knowledge travels with the individuals who possess it, and often these members of the network tend to congregate in the same geographic area. This clustering of individuals may be due in part to the fact that when employees leave organizations, they are most likely to move to similar jobs in similar organizations located in the same geographic space.

When looking at intra-national research collaboration in Canada, Australia, and the United States, Katz (1994) found that collaboration decreases exponentially as proximity decreases. Similarly, in a study exploring inter-regional scientific research collaboration, distance was found to be a hindrance, with a one percent increase in distance between collaborators leading to a 35 percent decrease in collaboration (Berge, 2005). Carmel (1999) states that the geographic distance between organizations can also create a separation between how members operate. Physical separation can lead to unclear goals among collaborators, because implicit knowledge must be made explicit (Noll, Beecham, and Richardson, 2010).

While geographic proximity is seen to benefit organizations as a result of knowledge flow, there may be limits to this advantage. Mascia, Pallotti, and Angeli (2017) found there was an inverted-u relationship for collaboration among organizations with niche overlap. They found that physical distance between the organizations mitigated their natural tendency to compete for resources and to embrace

differentiation. As a result, hospitals with less geographic proximity are more likely to work together unless there is direct competition for the same pool of resources (Mascia, Pallotti, and Angeli, 2017). This suggests that factors other than proximity, such as competition and resource distribution, also play a part in the relationship between geography and collaboration.

Face-to-Face Contact and Collaboration

Feldman (1994) argued that "knowledge traverses corridors and streets more easily than continents and oceans," suggesting that organizations more proximate to one another are more likely to share knowledge (p. 4). One of the reasons that proximity is seen as important is because proximity allows for the possibility of face-to-face interactions between organizations and organizational members, both through formal channels, such as scheduled network meetings and organizational events, and informally, through shared memberships and serendipitous interactions (Hansen and Lovas, 2004; Radil and Walther, 2019).

Informal relationships and previous encounters among team members have been found to mitigate the effects of geographic distance when looking at commercialization (Bercovitz and Feldman, 2011). The inability to communicate informally often leads to goal misalignment, potentially creating distrust among members. Face-to-face contact can help combat this distrust as it is considered easier to detect both lying and because it signifies the willingness of both parties involved to devote time resources by meeting in person (Storper and Venables, 2004).

In addition, unlike other types of communication, face-to-face contact creates multidimensional level that allows for participants to communicate not only verbally, but also share information in a non-verbal way where feedback is instantaneous (Storper and Venables, 2004; Nohria and Eccles, 1992). Face-to-face contact eases the spread

of knowledge (Howells, 2002; Hansen and Lovas, 2004; Knoben and Orleans, 2006; Radil and Walther, 2019) while verifying its accuracy (Storper and Venables, 2004), building trust among participants (Noll, Beecham and Richardson, 2010; Gertler, 2001; Carmel, 1999), and encouraging knowledge spillovers (Fallah and Ibrahim, 2004; Howells, 2002; Johnson and Mareva, 2002). Face-to-face contact also lowers the cost associated with adding new ideas and creativity to existing networks because it allows for new members to be more easily evaluated by current participants (Storper and Venables, 2004).

Freeman, Ganguli, and Murciano-Goroff (2014) argue that face-to-face meetings, when looking at co-authorship among scientific research scholars, are needed to both create and maintain collaboration. They found that when authors are co-located, the authors tend to meet face-to-face about 45 weeks per year. However, authors that are not co-located still meet 8 to 15 weeks per year (Freeman, Ganguli, and Murciano-Goroff, 2014). Authors are able to meet in part because of increases in mobility, such as individual travel, which have eliminated permanent co-location as a requirement for collaboration (Knoben and Oerlemans, 2006). Instead, Rallet and Torre (1999) argue that in cases of research and development, if individuals are willing to travel, permanent geographic proximity may not be necessary as long as there are scheduled times for coordination. They found that face-to-face contact is especially important when beginning collaboration, but the importance decreases over time (Rallet and Torree, 1999).

Face-to-face contact also matters for the spread of tacit and codified knowledge (Howells, 2002; Hansen and Lovas, 2004: Knoben and Orleans, 2006). Tacit knowledge, or knowledge that cannot be easily expressed in explicit ways (Polanyi, 1966), is often viewed as more difficult to share over distance than codified knowledge

(Grabher and Ibert, 2013; Knoben and Oerlemans, 2006; Rallet and Torre, 1999). Tacit knowledge is often shared informally between people, meaning that serendipitous interactions improve the likelihood of knowledge transfer (Gilly and Torre, 2000). As a result, tacit knowledge transfer is often seen as benefiting from frequent face-to-face contact and close geographic proximity (Storper and Venables, 2004).

Technology and Geographic Proximity

Technology has changed the world in which we live, work, and relate to one another. The internet has decreased the cost of communication, personal communication devices have allowed for greater individual mobility, increased competition has made goods and services cheaper and easier to both produce and purchase, and increased travel, both physical and virtual, has amplified the spread of ideas and cultures across the globe (Cairncross, 1996). Yet with all these improvements to modern life, Goldberg and Levy (2009) found that physical proximity has become increasingly important for social interactions despite the increase in technology. This need for proximity suggests that distance is not dead, instead remaining a challenge for organizations working together.

While technology has diminished the effects of distance in some cases, geography still matters. For example, Rallet and Torre (1999) found that while science and technology are capable of creating new tacit knowledge, time is necessary to make this knowledge codified. As a result, areas of innovation tends to be closely located geographically. Similarly, Johnson and Mareva (2002) found when analyzing biotechnology patents that, despite the fact that biotechnological information is not tacit and thus easily communicated via technology across long distances, geography still played a large part in determining partners in collaboration.

Mok, Wellman, and Carrasco (2009) illustrate the impact of proximity with their study on pre- and post-internet social networks in Toronto. They found that between 1978 and 2005, the internet has increased the mean distance between ties by 1.8 times while decreasing the median distance of ties by 2.1 miles. These findings suggest that while the internet allows for ties to be maintained over a greater distance, most of the ties remain largely localized. And while the authors found an increase in overall communication as a result of the introduction of email, the sensitivity to distance of all forms of communication were similar in 1978 and 2005 (Mok, Wellman, and Carrasco, 2009).

Online platforms also seem to be affected by geographic distance in spite of the rapidly decreasing barriers to participation for these avenues of collaboration. On Twitter, a recent analysis showed that 39 percent of ties formed on the platform is local to the user. This local usership is despite the fact that weak Twitter ties are low in both cost and time investment, and that the typical geographic barriers to collaboration are not present (Takhteyev, Gruzd, and Wellman, 2012). Similarly, eBay shows that even when negating the impact of shipping costs and delivery time, people still tend to prefer local vendors. These findings suggest there may be cultural reasons, rather than just economic ones, that trade more likely occurs on the local level even in online markets (Lendle, Olarreaga, Schropp, and Vezina, 2015).

Recent research suggests that technology may negatively impact dispersed teams, or groups of people in various areas working on a common project (Cramton, 2001). Crampton finds the use of technology often discounts the importance of mutual knowledge formation. Mutual knowledge is the idea of shared meaning (Clark, 1996), or similar knowledge that actors have in common and know they share (Krauss and Fussell, 1990). Geographically dispersed teams are seldom able to develop a mutual

knowledge-base and as a result, are faced with collaboration challenges including a "failure to communicate and retain contextual information, unevenly distributed information, differences in the salience of information, and relative differences in the speed of access to communication" (Cramton, 2001, p. 346).

While technology is becoming more commonplace, there are still situations when it is not a viable replacement for traditional ways of collaborating. For example, internet access and broadband in rural areas are limited, meaning that technology is not always available to span large distances (Shields, 2004). Roberts, Beel, Philip and Townsend (2017) argue that unequal access creates unequal opportunities, suggesting that the difficulties with collaboration in rural areas may be the result of a digital divide. Often, even if the infrastructure is available in these rural areas, the disproportionate number of elderly persons in rural areas, and their lack of confidence in the use of technology, can lead to even greater disparities (Castilla, et al., 2018). As a result, it is difficult not only for clients to interact with organizations, but also for organizations, particularly those staffed by older employees or volunteers, to interact with one another. Thus, technology does not alleviate the effects of geographic distance on collaboration in all cases.

Other Geographic Features that Impact Collaboration

Distance and proximity are not the only geographic factors that can influence collaboration among network members. Geographic distance can also be measured in terms of physical remoteness and different climates (Ghemawat, 2004). Geographic distance can be created by barriers such as natural land features, infrastructure limitations that hinder travel, and urban versus rural settings. With regard to natural topographic barriers, Palm and Ramsell (2007) studied emergency management in Sweden and found that collaboration was fettered by natural geographic features. In

this case, participants found Lake Sommen to be a deterrent to collaboration between Boxholm and Mjolby, communities which instead chose to partner with counties not separated from them by water.

Physical infrastructure can also impact collaboration. Face-to-face meetings that are often a key component of collaboration require that consideration of participant travel time. In rural areas, for example, collaboration is impacted by the lack of population density in certain areas which leads to an increased reliance on transportation infrastructure. Yet due to the deprioritization of these areas, roads and bridges are often lacking (Shields, 2004). Public transportation is also not available in many rural areas, making both collaboration and service delivery more complicated (Snavely and Tracy, 2000). In addition, climate may be a factor that affects infrastructure, making roads, bridges, and waterways impassable at certain times of the year.

Geography and Network Structure

The way that relationships are formed in a network, or the network structure, may be able to mitigate some of the effects of geography. When looking at inter-regional research collaboration, Berge (2017) found that network proximity can assuage the impact of geographic distance. He defines network proximity as the number of expected bridging paths between two regions and finds that there may be substitutability between network and geographic proximity. This idea of substitutability between network proximity and geography “reveals [that] the strength of network proximity rises when the benefits induced by geographic proximity wane” (Berge, 2017, p. 806). Furthermore, Autant-Bernard, Billand, Frachisse, and Massard (2007) found that in research and development networks in Europe, the number of direct and indirect ties a firm posed affected the possibility of collaboration more than geographic distance.

This finding, however, did not hold true in all of their research settings. When looking at the national level, they found that distance matters with both geography and networks.

The type of tie or relationship between organizations may also mitigate problematic geographic distance in collaborative relationships. When studying collaboration on patents in the semiconductor industry, Rosenkopf and Almedia (2003) found that tie type can have varying relationships with geography. Geographic distance is less of a factor in tie retention for informal rather than formal ties when looking at the individuals within the industry. Friendship ties, the authors suggest, have less trouble being maintained over distance, while professional ties are more susceptible to the challenges of working farther apart. Building on this, Bell and Zaheer (2007) examined the flow of knowledge and geographic proximity at the organizational level. When looking at organizations, several types of ties may be formed between members of different firms who sit on the same committees. They found that knowledge is more likely to flow between organizations that are more central to these networks, suggesting that network position has a greater impact on collaboration in this case then geographic proximity (Bell and Zaheer, 2007).

Network structure cannot mitigate all of the impacts of geography when organizations work together. With certain types of relationships, such as food sharing, structure makes little difference in the amount of time that is requires to transfer goods or use services. For example, when looking at trade, geographic distance disproportionately impacts certain types of goods. Perishable products such as fresh fruits and vegetables are more sensitive to geographic distance (Ghemawat, 2004). Price differentials must also be considered as a result of transport and trade costs for certain geographic markets (Kano, Kano, and Takechi, 2013). These increased costs of commerce can provide geographic barriers to collaboration among firms that trade

internationally. Organizational capacity can also sway collaborative opportunities and choices in terms of geographic reach. Huggins and Johnston (2010) found evidence that organizations with low absorptive capacity are less likely to collaborate globally, instead focusing on local collaboration. In all of these cases, distance has tangible effects on the collaborative efforts of network members.

PURPOSE-ORIENTED NETWORKS AND GEOGRAPHY

The above literature demonstrated the many possible relationships between geography and collaboration. Yet very little has be written about the specific ways that geography effects collaboration within purpose-oriented networks. Purpose-oriented networks are often seen as fulfilling multiple activities, namely public service provision, information sharing, problem solving, and capacity building in communities (Milward and Provan, 2006). As a result, organizations in these types of networks have different capacities for collaboration. Because anomalies may exist that are specific to purpose-oriented networks, this gap needs to be explored.

Purpose-Oriented Networks

Milward and Provan (2006) suggest that there are four main types of purpose-oriented networks: “information diffusion networks,” “problem solving networks,” “community capacity building networks,” and “service implementation networks” (Milward and Provan, 2006, p. 6). First, information diffusion networks are those whose primary purpose is to communicate across organizations with the goal of creating collaboration and the free flow of information. These networks also concentrate on building relationships. These networks often move into the next type of network which is problem solving networks. Problem solving networks often form to deal with problems that are not easily addressed by single organizations, such as incident response and

emergency management (Berthod and Segato, 2019). For example, Moynihan's (2009) description of the Incident Command Systems (ICS) discussed the network management of multiple organizations within a crisis scenario. Third, purpose oriented networks can be created as community capacity building networks whose main goal focuses on building social capital to address current problems as well as build capacity to deal with future issues (Milward and Provan, 2006).

Finally, service implementation networks, especially those that are created as a way to provide a public good to clients, are purpose-oriented. Examples of service implementation networks can include post-disaster response networks (Gillespie and Murty, 2006), mental health networks (Provan and Milward, 2001) and social service networks for the elderly (Tourigny, Durand, Bonin, Hebert, and Rochette, 2004). With this type of purpose-oriented network, no one organization has the ability to provide clients with every service they need resulting in the need for careful and planned collaborative efforts (Milward and Provan, 2006).

Service implementation networks, unlike the other types of purpose-oriented networks, may face specific challenges in regards to geography. First, face-to-face contact may be required, not just recommended, for certain activities. For example, certain types of relationships, or ties, such as resource sharing or program coordination may require physical co-location. In many cases, these types of collaboration are time sensitive, such as the sharing of perishable foods, or specific dates established for coordinated events.

In addition, purpose-oriented networks that provide services have less flexibility about their locations. Often, these organizations are located in the areas where their clients, or potential clients, are located (McPherson, 1983). While most of the literature focuses on interfirm collaboration with private organizations that are not necessarily

place-based, public organizations are often geographically tied to specific locations as a result of political jurisdiction. Resources are often place-based, in that they tied to municipalities or restricted by stakeholder, such as donors. These limitations can discourage, or even prohibit, collaboration with organizations in other jurisdictions.

These challenges provide a unique perspective on the relationship between geography and collaboration for purpose-oriented, service-delivery networks. Purpose-oriented, service-delivery networks are increasingly providing an arena for crossing organizational silos to improve outcomes and decision-making (Posner and Cvitanovic, 2019), meaning that increased investigation into the role of geography and collaboration in this area is important to informing public managers. This need for further examination is especially true in the public sector where policymakers benefit from collaboration with scientists (Posner and Cvitanovic, 2019; Coleman and Stern, 2018), social service providers (Wallace, Farmer, and McCosker, 2018), educators (Allen and Bull, 2018; McCuaig, Rossi, Enright, and Shelley, 2019), and even landscape architects participating in holistic flood risk management networks (van den Brink, et al., 2019).

CONCLUSION

The association between geography and networks suggests that there is a relationship that should be examined, especially when studying purpose-oriented networks. Identifying and understanding this commonality will advance our theoretical understanding of the influence of geography on both collaboration and network structure. Knowing how, why, when, and where geography impacts network structure will provide tools for network managers leading collaborative efforts and for policy makers mandating the use of purpose-oriented networks to address complex issues.

CHAPTER THREE

RESEARCH SETTING, RESEARCH DESIGN, AND DESCRIPTION OF THE THRIVE NETWORK

This dissertation is a relational and geographic study of the Thrive network. The study of collaboration and geography, prior to this work, has focused mainly on the need for face-to-face contact as a way to boost relationships; few have examined the way geography and collaboration interact by analyzing the network structure. Using Thrive as a single case study, this dissertation comprises three components of data collection. The three components consist of an organizational survey used to collect relationship data to map the social network, locational data to map the geography of the network, and strategic interviews based on both the relationship and geographic findings of the study to add depth and richness to the analysis of the other two components.

The data analyzed for this dissertation was collected between December 2017 and January 2020. Surveys were conducted between December 2017 and April 2018, GIS data and mapping was conducted between August and October 2019 and interviews were conducted in January 2020. The organizational survey took place early in the development of the network when goals were still being developed among members. The GIS data, which was conducted in the middle of the study, has remained relatively static since the network's inception to current day. The semi-structured interviews were conducted later in the network's development, however, at a crucial point in time when participant turnover created a need for Thrive to once again articulate its goals as a group.

In this chapter, I describe the research setting, as well as the research methods that provided data through the organizational survey, the GIS analysis, and the strategic interviews. Chapter four will contain an in-depth look at the structure of the network as

well as the relationship between the network structure and the geographic data. Chapter five will discuss the interviews and the analysis from this inquiry.

RESEARCH SETTING

Food insecurity is defined as a lack of access to adequate food as a result of limited funds or other resources (Coleman-Jensen, Rabbitt, Gregory, and Singh, 2019). According to the United States Department of Agriculture (USDA), 11.1 percent of US households were food insecure at some point during 2018, or 14.3 million people (USDA, 2019). Certain populations experienced higher food insecurity rates, including:

- All households with children (13.9 percent)
- Households with children under age 6 (14.3 percent)
- Households with children headed by a single woman (27.8 percent) or a single man (15.9 percent)
- Women living alone (14.2 percent) and men living alone (12.5 percent)
- Households with Black, non-Hispanic (21.2 percent) and Hispanic (16.2 percent) heads of households
- Households with incomes below 185 percent of the poverty threshold (29.1 percent)
- Households located in the South Census geographic region (12.0 percent)
- Households located outside of metropolitan areas (12.7 percent) (Coleman-Jensen et. al., 2019)

Food insecurity is often recurrent rather than constant in US households. For three-fourths of food insecure households, conditions of food insecurity were experienced in at least three months in 2018 (Coleman-Jensen et al., 2019).

Food insecurity is associated with a variety of wellness issues. For example, women who are food insecure, even at the lowest levels, are 30 percent more likely to be obese than women who are not food insecure, which in turn can lead to a variety of obesity-related health conditions such as heart disease and diabetes (Townsend, Peerson, Love, Achterberg, and Murphy, 2001). School-aged children who are food insecure are often observed as having “compromised psychosocial functioning” (Olson, 1999). Issues identified among these at-risk children include higher levels of absenteeism, poor behavior, increased hyperactivity, and poor academic performance (Murphy, Wehler, Pagano, Little, Kleinman, and Jellinek, 1998).

The Thrive network was created with the intention of addressing food insecurity in the New River Valley (NRV), a region in southwest Virginia comprised of four counties (Floyd, Giles, Montgomery, and Pulaski) and the independent city of Radford. Defined as the Blacksburg-Christiansburg-Radford Metropolitan Statistical Area, the New River Valley is home to almost 200,000 people and two state universities, Radford University and Virginia Polytechnic Institute and State University (Virginia Tech) (Onward New River Valley, 2019). According to the 1980-2014 US Census Bureau’s American Community Survey 5-year estimate of the New River Valley, approximately 9.5 percent of families in this region live below the poverty line, compared with 8.2 percent in Virginia as a whole (New River Valley Regional Commission (NRVRC), 2019). The average per capita income was $22,250 compared to the state average of $33,958 (NRVRC, 2019).

In 2011, with the help of a $1 million grant from the Federal Partnership for Sustainable Communities, community members in the New River Valley of Virginia launched a three-year livability study to inform creation of a plan for the future of the region. This study led to the publication of a report, *Livability in the New River Valley,*

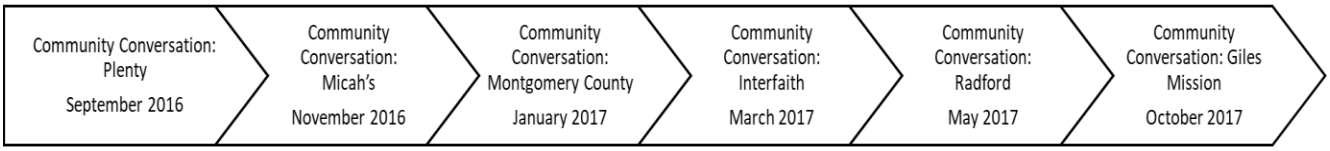
which identified 18 overarching goals and representing four overall themes for the plan: Enhancing Living and Working Environments, Preserving Rural Heritage and Community Character, Making the Business Environment More Productive and Resilient, and Building Healthy Communities. The Community Foundation of the NRV (CFNRV) committed to leading the implementation of the initiative in a partnership with the New River Valley Regional Commission (NRVRC) and created The Fund for the NRV in 2014 as a way to align grant-making efforts and the Livability study.

The Livability study concluded that food insecurity, and specifically access to healthy foods, is a problem for many families in the NRV. Ten percent of families and 1 in 5 children in the region experience hunger (Thrive, 2018). As a result of the Livability study, one of the groups that arose from this collaboration was the Thrive network. Thrive, with its focus on food insecurity, is an initiative of the Fund for the NRV that will:

- Develop a comprehensive understanding of hunger and nutrition-related organizations, programs and services in our region
- Reduce the number of organizations working in isolation and establish a food poverty and health network building on good practice
- Build long-term community capacity to address hunger and poverty, and to strengthen the local food system
- Expand funding for projects that will increase food access, improve food distribution, ensure the stability of the food supply, and teach healthy eating habits
- Gather data and evidence to measure progress and to attract further investment (Thrive, 2018).

One of the first goals of Thrive was to increase the capacity for food security in the NRV through the creation of a formalized network. As part of this initiative, the network, facilitated by the Community Foundation of the New River Valley, began by hosting a series of community conversations in September 2016 at various locations in the NRV. Figure 3.1 shows the timeline of events for these conversations.

Figure 3.1: Community Conversations Timeline



These community conversations served as a way to introduce those working in the area of food security to one another, share best practices, and talk about the building of Thrive. These conversations concluded in October 2017 with the creation of the Thrive leadership working group.

The Thrive leadership group identified the need for data about the network of providers, which resulted in the initiation of this dissertation research. Thrive leadership sought out Dr. Robin Lemaire, an expert on networks, to conduct data collection to help Thrive. Dr. Lemaire agreed to collaborate with Thrive in return for the ability to collect research data, including data that would be used in support of this dissertation project. The online organizational survey that was developed posed questions relevant to both the Thrive leadership working group and my research interests. One of the goals of the Thrive leadership was to help provide insight into the developing network. As a result, the survey sought not only map the network, but also to help define the priorities, challenges, and desires of member organizations. No financial support was provided for this project and the results of the network study were presented, as requested, to the Thrive network on September 18, 2018.

Because the Thrive network spans four counties and a city, and due to the fact that some of the tasks performed by the network require face-to-face contact, while others do not, it provides an interesting case study on the relationship between geography and collaboration and how it shapes network structure and collaboration. One of the key findings of the survey, the idea that geography was identified as an obstacle to working jointly, led to the focus of this dissertation project on the relationship between geography and network structure.

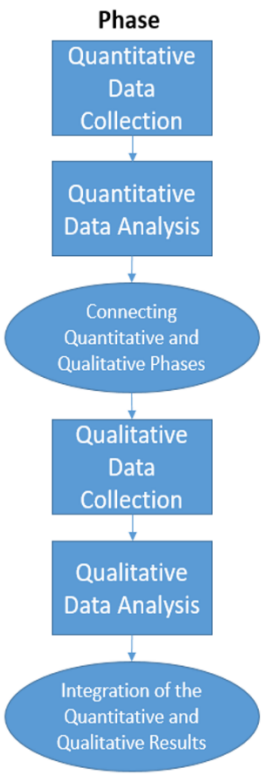
RESEARCH METHODS: USING A MIXED METHODS APPROACH

This study uses a sequential, mixed methods approach to help gain a greater understanding of the relationship between collaboration and geography among food security organizations within the New River Valley of Virginia. A mixed methods approach is one that not only uses quantitative and qualitative data as a way to examine a given hypothesis or question, but rather an approach that integrates the use of both to "leverage the strengths" of each method and gain a fuller understanding of the given phenomenon (Fetters, Curry, and Creswell, 2013, p. 2134).

According to Fetters, Curry, and Creswell (2013), there are three types of basic mixed-methods research designs: exploratory sequential design, explanatory sequential design, and convergent, or concurrent, design. This dissertation uses an explanatory sequential design. Explanatory sequential design is defined as a mixed-methods approach where quantitative data is collected first and the findings from these data are then used to formulate the subsequent qualitative data collection and analysis (Ivankova, Creswell, and Stick, 2006). The explanatory, sequential, mixed methods approach was chosen due to the fact that neither the quantitative, nor the qualitative, data was sufficient to fully answer the questions of this dissertation. Instead a more complete understanding of the relationship between geography and collaboration could

only come from the combination of both pieces of the study. In the study, the quantitative data was able to explain if there was a relationship between collaboration, geography and network structure while the qualitative data was needed to explain why there was a relationship, as well as the nuances of that relationship. Figure 3.2 lays out the overall research design of this dissertation.

Figure 3.2: Research Design[1]



Procedure	Product
• Web-based survey	• Numeric data • Network Data
• Network Analysis in UCINET • Correlations • GIS Analysis	• Network plots • Descriptive statistics • Centrality, multiplexity, and density
• Selection of interview participants based on location, organization type, organizational activity, etc. • Developing interview questions	• Interview cases (n=11) • Interview protocol
• In-depth interviews with 10 respondents for 11 organizations	• Text data (interview transcripts)
• Coding, content analysis and modified grounded theory approach	• Codes and themes • Visual model of themes and categories
• Interpretation and explanation of the quantitative and qualitative results • Integration of the findings	• Discussion • Implications • Future Research

For the quantitative section of the research design, the aim was to answer the basic question of how geography (in terms of driving distance) correlates with various aspects of the network structure and with specific tasks in the network. I expected to find that there would be a correlation between drive time and network structure. Given this hypothesis, my first step in setting up the study was to map the network structure

[1] Table adapted from: Table 1 on p. 16 found in Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field methods*, *18*(1), 3-20

and conduct correlation analysis between network structure, at various levels of analysis and drive time. I found that few of the results from analyzing various levels and operationalization of network structure supported a significant correlation between network structure and geography operationalized as drive time.

In sketching out the research design for this dissertation, I knew from the outset that there would be a qualitative component to the research. I had anticipated doing interviews prior to conducting the analysis for the quantitative portion of the study. However, as is true with an explanatory research design, the results of the quantitative data shaped both the results that needed to be explained and the selection of the interview subjects. In initially choosing to do interviews, I expected to ask interviewees about how geography affected their willingness to collaborate with other organizations. After analyzing the quantitative results, I found that despite the organizations' survey responses that indicated geography was a barrier to collaboration, the actual analysis found little to no correlation between drive time and collaboration. As a result, the interview questions became more focused on understanding the perception of geography as a barrier among food security organizations within the New River Valley. My findings, further discussed in Chapter Five, suggest that geography is a barrier to collaboration, but that this may be the result of conflating the concept of geography with other concepts not captured by drive time.

The integration of the quantitative and qualitative data occurs in Chapter Six. In Chapter Six, I seek to discuss the findings of both the quantitative and qualitative data, but also to synthesize the implications of each set of findings in a way that describes the contribution of this study to how geography matters in the context of purpose-oriented networks. Finally, in Chapter Six, I discuss the implications for future research.

In the remainder of this chapter, I first discuss the quantitative research methods in detail, including information about the organizational survey and GIS data collection. I then discuss the methods used in collecting qualitative data, specifically how the interviews were conducted. Chapter three concludes with an overview of the network demographics.

QUANTITATIVE RESEARCH METHODS: ORGANIZATIONAL SURVEY

Before beginning the network survey data collection, I was invited to attend and participate in meetings of both the whole network and the leadership group. I worked closely with the leadership team to create the organizational survey so that it included questions that would be relevant to Thrive as well as to my research. After gaining an understanding of what data the Thrive leadership team was interested in collecting, I created an organizational survey in Qualtrics and ensured the finalized results met the needs of the network. My research protocol was submitted through the Institutional Review Board (IRB) at Virginia Tech and received in December 2017. Consent for participation was obtained through the survey instrument. Confidentiality was ensured for individual respondents and results were aggregated to the organizational level of analysis. Surveys were stored digitally within the Qualtrics system and were accessible only to me and Dr. Lemaire. The data have been stored in compliance with the requirements set forth by the Virginia Tech Institutional Review Board. IRB documents can be found in the appendices: Appendix A is the IRB Approval Letter and Appendix B is the Informed Consent Form. The Community Foundation of the New River Valley and members of the Thrive leadership team did not have access to the raw data. Responses in aggregate were reported back to the network devoid of both personally identifiable and sensitive information. Sensitive information in the survey was defined as the relationship quality between organizations.

Bounding of the Network and Collection of Organizational Questionnaire Responses

Network studies, for purpose of data collection, must be bounded to include who is and who is not included in the network. The bounding of the study for Thrive was created by working with the leadership working group to create a list of all organizations within the New River Valley that have some involvement with food security. This involvement could include direct service provision, referrals, or support. Once the initial list was compiled, the list was distributed to various key organizations within Thrive to ensure that all organizations that met this criterion were included. Once the list was finalized, the survey was sent to all of the organizations listed. In some cases, individual respondents within organizations were targeted by the Thrive leadership working group, and in other cases, the organizations themselves decided who would be best qualified to respond to the survey. Potential network members were notified in advance at meetings and through email that the survey would be forthcoming. In addition, five sessions, one each in Floyd, Giles, Montgomery, and Pulaski counties, as well as the city of Radford, were conducted. In each of these sessions, various members of the leadership team and I provided participants a central location as well as access to iPads to complete the survey. Administering the survey in these centralized locations allowed participants the opportunity to ask clarification questions. In addition to these sessions, the link for the online survey was distributed via email to each of the organizations.

Organizational Questionnaire Response Rates

The majority of the surveys were completed online, with only about 15 percent of the organizations attending an in-person session. In order to ensure a high response rate, follow-up emails were made to potential respondents as well as other members of

the organizations not initially contacted. Following the emails, phone calls were made by myself and members of the leadership team, and a student intern, in order to encourage organizations to respond to the survey. The leadership team members were asked to reach out to organizations with which they already had a relationship, while the student intern, who worked as part of the Cooperative Extension program at Virginia Tech, reached out to organizations with which the leadership team had no existing contacts. These phone calls were continued on a weekly basis until surveys were complete or it became clear that the respondent was unwilling to complete it. Overall, 110 individuals representing 94 organizations responded. Data collected for organizations with more than one respondent were aggregated at the organizational level. Based on the information provided by the Thrive leadership team and other members of the food security community, 112 organizations were initially included in the list of possible respondents. Of these organizations, 94 responded to the organizational survey and 18 were non-respondents for a response rate of 81 percent.

High response rates are critical when conducting research in regards to whole networks since missing responses can alter the structure of the entire network (Scott, 2017). In most cases, the non-respondents were organizations that did not participate in the Thrive network: eight were churches that run small food pantries, two were national organizations that operate with only a tertiary relationship to organizations operating within the New River Valley, and two were seasonal organizations that did not operate with fulltime staffing. The remaining organizations (six) were either unable to be reached or unwilling to respond. The fact that the data included 18 non-respondents could create some bias; however, the organizations that were missing were represented in the sample by other organizations that were similar in both organizational type and services provided.

Bias could also be assumed in that only organizations included in the network were given the chance to respond to the survey. Outside organizations that are not directly involved in food security could have provided additional insight; however, given the limits of the study, these organizations were not included. The decision not to include these outside organizations was made because the Thrive leadership wanted to limit the study to organizations that were directly involved in food security in the region. In addition, organizations located outside of the New River Valley, specifically those located in the adjacent Roanoke Valley, were not given the opportunity to participate in the survey. Many of the organizations outside of the New River Valley collaborate with Thrive network members, but were again left out of the data collection efforts with the exception of one main player: Feeding America Southwest Virginia, which is seen as critical to the functions of the network. The decision to limit the scope to the New River Valley was made because the mission of the Thrive network is only the New River Valley region.

In addition, many of the organizations from which data was collected may be more peripheral to the Thrive network. Many organizations surveyed have limited involvement in Thrive network activities due to the fact that these organizations are small, have limited resources, and in some cases, are staffed entirely by volunteers. The lack of permanent staff in many of these organizations leads to frequent turnover, and the use of volunteers as program coordinators often means that an overall perspective of the entire organization, including collaboration with other organizations, is often limited to a single individual. As a result, attempts were made during the data collection process to minimize possible biases by including different perspectives wherever possible.

Organizational Questionnaire

The organizational survey questionnaire served as the data collection instrument for mapping the network. The questionnaire was adapted from network research by Lemaire (2012), Provan, Veazie, Staten, and Teufel-Shone (2005) and Provan and Milward (1995), as well as from input from the Thrive leadership working group, the Community Foundation of the New River Valley, Feeding America Southwest Virginia, and Dr. Robin Lemaire. The final draft of the questionnaire was piloted to members of the Thrive leadership team and changes were made prior to the final survey being issued to the identified target list.

The survey instrument can be found in Appendix D and the information sheet that was provided for survey respondents is located in Appendix C. The questionnaire contained six sections that each focused on a specific area of inquiry. The first section was used for identification purposes. In the second, respondents were asked about their prior experiences with the Thrive network. The third component of the organizational survey ask about the relationships, or ties, the organizations had with other food security organizations and provided the basis for mapping network structure. The fourth part of the questionnaire asked respondents to analyze the strengths and weaknesses of the Thrive network, as well as identify potential priorities of the network in the future. Questions about Feeding America Southwest Virginia were contained in the fifth part of the survey. The final section asked respondents to identify organizational demographics and capacity. The final questionnaire included 49 questions and took between 30 and 60 minutes for the majority of respondents to complete.

The first question in the survey was the consent form. Without consenting to the survey, respondents were not able to move forward with completing the questionnaire. The consent question stated the purpose of the research process, procedures, risks,

benefits, and the extent of anonymity and confidentiality. In addition to asking for consent, respondents were made aware of their freedom to withdraw from the study, as well as who to contact should they have questions or concerns.

The next three questions were used to identify the respondent for tracking purposes. Individuals were asked to include their names, as well as to select their organization from a prepopulated list of choices. Among the eventual respondents, there were two individuals who were not associated with organizations on the list, and upon further inquiry, could not be associated with an organization post response. As a result, these two responses were not included in the data moving forward.

Section two of the organizational survey was designed to characterize the experiences organizations had with the Thrive network up to the point of the survey issuance. This section included questions about attendance at the community conversations and whether or not they found these meetings to be valuable. In addition, survey respondents were asked about their perceptions of collective action.

The next 16 questions in section three of the survey assessed the relationships between organizations. Respondents were asked to identify all of the organizations that they had any relationship with related to food security services by selecting the names of those organizations from a drop-down menu using the roster method. The names of organizations were provided for a variety of reasons. The roster method is the commonly accepted way of collecting whole network data (Provan and Lemaire, 2012; Wasserman and Faust, 1994). First, by using the roster method, respondents were given the opportunity to see all of the possible organizations they might have a relationship with, which eliminated or minimized the chance that they might forget organizations. In this way, the list served as a reminder of food security related organizations. Second, by using the roster method, data collection and analysis were

made easier as the answers were uniform. Finally, drop-down menus serve as a way to save time for respondents which can increase response rates (Smyth, Dillman, Christian, and Stern, 2004).

Asking about overall relationships first served only to reduce the roster down to minimize response burden. Once the roster was reduced to the list of organizations the respondent indicated their organization maintains a relationship with, respondents were requested to indicate the type of relationships they have had with those organizations within the last year in regard to food access as defined by five activities. The five activities were: Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination. The definitions provided to respondents were as follows:

- Information Sharing: “exchanges of information (about available programs, services, best practices, funding opportunities, etc.) between program staff or volunteers”
- Food Exchange: “the sharing of food between two entities for the purpose of addressing food insecurity”
- Client Referral: “formal or informal processes for channeling and managing referrals of clients; could include sharing contact information, prescreening, joint client applications/intake, consent to share client information across agencies/programs, etc.”
- Shared Resources: “the sharing among organizations of financial or in-kind resources; could include staff, volunteers, expertise, space, funds, etc.”
- Program Coordination: “organizations working together to modify, expand, or enhance the capacities to do their jobs”

In addition to indicating relationships based on these defined activities, respondents were asked to rate the strength of the tie. The strength of the tie for Information Sharing, Food Exchange, and Client Referral relationships were based on the frequency of the interaction using the following scale: “1=low frequency (rare exchange); 2=moderate frequency (episodic exchange); or 3=high frequency (regular exchange).” Strength for Shared Resources and Program Coordination were measured by the quality of the relationship. Respondents were asked to consider the following questions when thinking about the quality of their relationships:

- Do you trust the organization to hold to their commitments?
- Do you feel the organizations has similar values to your own?
- Do you trust the organizations to do high quality work?
- Do you feel the organization has your own organization’s best interests in mind?

The scale for relationship quality was as follows: “1=poor relationship; 2=fair relationship; 3=good relationship; 4=very good relationship; 5=excellent relationship.” These responses allowed not only for the overall structure of the network to be mapped, but also the structure and strength of task specific relationships.

In addition to the matrix on relationships by activity, respondents were asked to list up to three organizations they consider as critical to their food access effort in each of the following categories: funders, local/regional government, state government, federal government, faith-based organizations, healthcare organizations, community-based organizations, and human services organizations. The nominator method (Stork and Richards, 1992) was used for this section as the aim was to understand which other organizations were important actors in the network and not to map the full structure of this broader network.

Section three of the survey concluded with three questions designed to help understand the influence of specific organizations. These questions aimed to elicit responses specifically about which organizations are seen as critical, influential, and admired within the New River Valley and are adapted from work by Lemaire (2012) and Provan and Milward (1995). Respondents were asked to indicate up to five organizations in the region with "whose needs, goals, decisions, and expectations are generally taken into consideration," which organizations "it is important to have a relationship with in the NRV community in general," and which organizations "do you most admire for doing especially good work in the NRV community in general."

The focus of the fourth section of the survey was on the challenges and priorities of the Thrive network as perceived by respondents. Common internal and external impediments to collaboration were listed and respondents were asked if these impediments were "a minor concern" or a "major concern." Respondents left the question blank if the listed challenge was not a concern for their organization. The external challenges listed were:

- Insufficient resources to support effective collaboration
- Loss of control/autonomy over decisions
- Frustration or aggravation in dealing with partners
- Insufficient credit given to my organization or unit
- Difficulty due to geographic distances
- Not enough support by another organization's leadership to support partnership work
- Difficulty evaluating outcomes with partnership work
- Other external conditions (respondents could list up to two additional challenges and cite as a minor or major concern)

Internal challenges, or those “due to internal (i.e. your own organization),” were:

- Diversion of time and resources from other activities
- Limited flexibility and freedom to work with other organizations
- Not enough support of my work with other organizations

Respondents were also provided blanks where they could list up to two additional challenges.

Respondents were also asked to prioritize the goals of Thrive and to list the top activities that the network should undertake in the future. While the goals were broad and overarching, the activities were specific action items theoretically linked to the broad goals, such as “compiling a common list of existing resources for food providers.” These questions were intended to help the Thrive leadership team understand where current energy and focus was located among food security organizations as a way to help harness momentum. Finally, this section of the organizational survey concluded with questions about specific barriers that hinder organizations ability to address food access in the region (physical, cultural, nutritional, and financial/organizational capacity).

The fifth section of the survey was included at the request of Feeding America of Southwest Virginia. Feeding America of Southwest Virginia partners with 42 percent of the organizations addressing food access in the New River Valley region, according to survey responses and, as a result, is considered central to food security efforts in the New River Valley. Organizations were asked to designate if it was, or had been, a Feeding America Southwest Virginia partner, and if so, to identify opportunities and challenges from their partnering.

The organizational survey concluded with the sixth section, which asked about organizational demographics. These questions include a breakdown of employees by full and part time, as well as the number of volunteers and percentage of work within the organization carried out by these volunteers. Funding and food sources were also requested; organizations that were direct food providers listed their approximation of the percent of food donated versus the percent of food purchased (through either Feeding America Southwest Virginia or from commercial retailers). Finally, the respondents were asked about the categories of clients they serve.

Organizational Questionnaire Data Coding

Data derived from the organizational survey were compiled through Qualtrics and exported directly into a single Microsoft Excel spreadsheet. The data was then cleaned and divided into different spreadsheets by survey section. The descriptive data (sections 2, 4, and 5) and demographic data (sections 1 and 6) used standard coding schemes such as categorical, continuous and dichotomous scales. The network data (section 3 of the organizational survey) was coded by creating separate matrices for each of the relationships being examined. Each of these matrices were created in separate Excel workbooks that captured both the existence and the intensity for each type of tie measured.

Although extensive multiple efforts were made to obtain missing information from respondents, doing so was not possible in all cases. Missing data was handled in a variety of ways, either through aggregation (see below) or by replacement (for network ties). When the missing data was connected to demographics, information previously provided by individual organizations to the Community Foundation of the New River Valley was used to supplement the organizational data. Other than those exceptions, missing data was eliminated from the study.

The network data was coded by creating a matrix for all relationships, as well as for each one of the activities that were being studied. These activities included Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination. Initially, each matrix consisted of 112 rows of data and 112 columns of data. This data was then aggregated at the organizational level to represent a total of 94 organizations and four individuals who chose the option “you as an individual” on the organizational survey. Two of the individuals on this list were contacted and connected to an organization; the remaining two were unidentifiable and discarded from the data set. Eighteen organizations did not respond to the survey but were added after the data had been aggregated. In addition, organizations that had more than one physical location were separated by geography for a total of 104 rows and columns of data.

All data was kept in both its raw and manipulated format. Each manipulation to the data was saved in a separate sheet of the workbook as a way to ensure that each transformation of the data could be recorded. The major manipulations to the data included aggregation of the data to the organizational level, the confirmation of network ties, and the reconstruction of non-respondent data for the network analysis.

Aggregation and Reconstruction

The unit of analysis for this dissertation is the organizational level. As a result, data collected from more than one respondent for a given organization had to be aggregated to the organizational level. Of the 94 organizations that responded to the survey, 16 organizations had more than one respondent. Twelve organizations had two respondents and four organizations had three respondents. If any member of the organization claimed to have a relationship with another organization, the relationship was captured as a “1” to indicate a relationship. Only if none of the members indicated a relationship was the tie left as “0” or no relationship. For example, if respondent 1

from organization A indicated a relationship with organization B, but respondent 2 from organization A did not indicate a relationship with organization B, the relationship between organization A and organization B was recorded. This method was used due to the fact that it was not always possible for all members of large organizations to know all of the relationships, or ties, their organization has will all other organizations. After this process was complete, new matrices were created in a separate Excel file collapsing the respondents by organization and creating sums to represent the presence or absence of a relationship between each dyad.

In the cases of Information Sharing, Food Exchange, and Client Referral, respondents were asked to state the frequency of the interaction between organizations. This meant that responses of "1 = low frequency (rare exchange); 2= moderate frequency (episodic exchange); and 3 = high frequency (regular exchange)." Ties for these relationships were indicated at the maximum frequency of the interaction indicated by any of the organization's respondent. The maximization process uses the higher of the two values when recording the frequency or quality of the relationship. (Wasserman and Faust, 1994).

In the organizational survey, respondents were asked to indicate the quality of the relationship for Shared Resources and Program Coordination by using the following scale: "1=poor relationship; 2=fair relationship; 3=good relationship; 4=very good relationship; 5=excellent relationship." In these metrics, I once again using the maximization process. If one respondent indicated a fair relationship and another indicated a good relationship, the tie was recorded as a good relationship. While this may make the responses more optimistic, it only applied in a few cases and there were never strong contradictions in organizational members' perceptions of the relationships.

Eighteen organizations did not respond to the survey. According to Stork and Richards (1992), non-respondents can be handled in a variety of ways including reconstruction. Reconstruction "does not add links to the data set where there were none. Rather, reconstruction simply allows the description supplied by one person [or organization] to be how the link between two people [or organizations] are described" (Stork and Richards, 1992, p.197). By using reconstruction, I was able to get a more accurate picture of the network than would have been provided if non-respondents were excluded from the network structure as a whole.

I used reconstruction for all of the network matrices. Reconstruction was carried out by replacing non-respondents results with the ties indicated by other organizations. For example, if organization A did not respond to the survey, but organization B indicated a relationship with organization A, I used the data from organization B. By reconstructing the network, it allowed ties that would have otherwise disappeared as a result of missing data to be accounted for in the mapping of the network. In addition, I also used the indicators about the strength and frequency of the relationship to be carried from the responding organization to the non-responding organization.

Confirmation

The original data was directional, meaning that each organization was asked to list the other organizations with which it had a relationship. The confirmation of ties helps to minimize variation and increase reliability in responses (Lemaire and Provan, 2018). The minimization process was used to confirm the ties. The minimization process is used to transform variables so that recorded responses are an indication that both organizations within the dyad have indicated a relationship (Lemaire and Provan, 2018; Wasserman and Faust, 1994). In this case, if organization one states a "1=rare exchange" of information and organization two responds there is a "3=frequent

exchange", the tie strength for this relationship is recorded as a "1=rare exchange." Using Excel, a new workbook was created with confirmed ties. Separate workbooks were then created for each of the tasks, or types of relationships asked about in the survey. These included Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination.

Density is measured by the number of total ties reported divided by the total number of possible ties for the network. The density for the whole network for any relationship confirmed was 4.9 percent. This is about a third of the overall density of the network with unconfirmed relationships, which is 13.2 percent. While this loss of density, and a large number of ties, may seem to alter the structure of the network, using confirmed ties improves the reliability of the responses (Marsden, 1990). Since perception of relationships and not objective indications is the basis of the data, the confirmation of ties increases the reliability by only recording those ties that both members of the dyad indicate as existing.

QUANTITATIVE RESEARCH METHODS: GEOGRAPHIC INFORMATION SYSTEM (GIS)

In order to map the geography of the network, data regarding the physical location of each of the organizations was collected in a variety of ways. In most cases, address data was provided by the individual organizations themselves; however, for organizations that had not provided this information, Google Maps and Facebook were used to find the locations for organizations. Once all of the physical addresses were collected, this data was converted into latitude and longitude coordinates using geocoding services from Texas A & M Geoservices (Texas A & M, 2013). The coordinates were uploaded into ArcGIS Pro. Output was generated from running the ESRI Ready to Use Generate Origin Cost Matrix Tool. The default settings were used

and did not include original readable place names for locations, but instead included only the Object ID for locations. The data included drive times and distances between all locations. Once the data was completed, the data was updated to include original human readable place names for locations and the data included drive times and distances between each of the locations for every organizational dyad. The result was 10,816 individual lines of data expressing both the drive times and the driving distance, rather than straight line distance, between each pair of organizations included in the Thrive organizational survey.

The output was then moved to an Excel file where the drive time for each of the organizations was averaged to create a file. This data was them arranged from shortest mean drive time to longest mean drive time all of the organizations. The results are shown in Table 3.1 below. The shortest average drive time for any organization was 21.475 minutes for MDSS and the longest average drive time was 55.976 minutes for CH. The mean score for all of the organizations was 30.327 minutes and the median drive time was 29.822.

Using the average (mean) drive times as a guide, organizations were divided into two groups: those that are geographically central to the network and those that are not geographically central. Organizations that were an average of 25 minutes or less from all other organizations were considered to be geographically central. This drive time was determined by picking the top third of the organizations in lowest drive time. Thirty-five organizations were denoted as geographically central.

Table 3.1: Thrive Network Average Drive Time by Organization

	Mean	Median	Maximum	Minimum
Drive Time	30.327	29.822	55.976	21.475

QUALITATIVE RESEARCH METHODS: INTERVIEWS

Given the constraints of time and resources, all 104 organizations identified by the Thrive leadership team could not be interviewed for this project. However, it was important that a representative sample of the population be included in the interview process. To accomplish this, an interview matrix (Appendix F) was created using the following criteria: ranking of geographic concerns for collaboration, geographically central, whether or not the organizations was considered in the core of the network structure, organization location by county, organizations type, service provided, multiplexity, and isolates. The roster of possible interview organizations was not solely comprised of organizations that had responded to the organizational survey. In fact, intentional effort was made to include organizations that had not responded to the survey. The list was then shared with my dissertation chair and the roster was finalized.

Upon completing the roster, individuals were contacted via email, sent an introductory letter, and information required for their consent. A total of ten interviews were conducted on behalf of eleven organizations with one respondent representing two organizations in different capacities. Requests were initially sent to fourteen organizations for interviews. Of the initial requests, five organizations agreed to be interviewed, two organizations declined to participate, and seven organizations did not respond to the email. An additional set of emails was then sent to nine organizations, of which six agreed to be interviewed, one declined and 2 did not respond.

Most of the interviews were conducted in a one on one setting between the interviewer and interviewee. However, in three cases, two interviewers were present, collecting data for two projects simultaneously. In addition, one of the interviews had two members of one organization being interviewed at the same time. In this case, both respondents were working together to answer the interview questions.

The format of the interviews was semi-structured. I conducted all of the interviews and asked the questions for the other interviewer, a fellow PhD student, when she participated. At the end of the interviews, she was given a chance to clarify responses or ask additional questions as needed; however, the basic script for the interviews consisted of the same questions. Audio recordings and notes were collected for each of the interviews.

The interviews lasted between 25 minutes and 2 hours. The interviews were transcribed using Sonix. Sonix is an automated transcription service that “transcribes, timestamps, and organizes” audio files (Sutherland, 2020). Interviews were then analyzed for clarity to ensure that the transcription was accurate. The initial transcription and clarity analysis were transcribed word-for word; however, quotes that were used in this dissertation were cleaned for clarity. One interview was recorded only in part due to a recording malfunction. Notes were taken during this interview and findings are in the analysis due to the critical information provided by this organization; however, quotes from this organization are not provided outside of those that were recorded.

Interviews were coded by hand instead of using computer software. This process required multiple iterations. Interviews were analyzed using qualitative summative content analysis first, followed by a modified grounded theory approach. Content analysis was chosen for this project for two reasons. First, the text required little interpretation; the answers given by the interviewees were clear and straight forward making this approach preferable to grounded theory (Vaismoradi, Turunen, and Bondas, 2013). Second, the interviews include a large amount of information about collaboration among members of the network, as well as about their perceptions of the network itself that was not relevant to this dissertation. Following the initial content

analysis, the content analysis approach was used to systematically draw themes from the interviews and identify phenomena related to geography and collaboration.

Content analysis was originally considered as a way to quantify qualitative data (Morgan, 1993), but its use has been expanded because it allows researchers to focus the “content or contextual meaning” of the text being examined (Hsieh and Shannon, 2005, p. 1278). There are various methods of conducting qualitative content analysis including conventional content analysis, directed content analysis and summative content analysis (Hsieh and Shannon, 2005). Summative content analysis, unlike the others, allows for the creation of keywords to be identified in the text both before and during the analysis of the data by looking both at the available literature and the interests of the researchers. Since the focus of the study came from the original survey questionnaire, rather than from the interview responses, summative content analysis was used to help filter the content.

Grounded theory is a methodology that allows for researchers to “develop theory that is grounded in data systematically gathered and analyzed…through constant comparative analysis” (Strauss and Corbin, 1994, p. 273). Corbin (2009) suggests that a modified approach to grounded theory allows for the consideration of previous conceptual frameworks and research. The modified grounded theory approach includes multiple steps. First, the data is analyzed through the open coding process where line-by-line coding results in substantive codes (Glaser, 1978). From these substantive codes, core categories are created by looking at similarities and difficulties within the data (Hernandez, 2009). These core categories lead to the creation of theoretical codes that “conceptualize how the substantive codes may relate to each other as hypotheses to be integrated into the theory” (Glaser, 1978, p. 55). In other words, by breaking apart the data through substantive codes, one is able to use the theoretical

codes to join the data into a “story” (Glaser, 1998, p. 163). By using modified grounded theory to analyze the data, I was able to analyze the interview responses to find concepts that emerged from the data and were not included in the initial content analysis, as well as where the current literature on geography and collaboration could be expanded.

DESCRIPTION OF THE FOOD SECURITY NETWORK

Before delving into the relationship between geography and network structure in Chapter Four, this section will describe the food security network in terms of the individual demographic characteristics of the organizations address food access in the NRV region. Chapter Four will then examine the network as a whole network structure, including the density, centralization, and multiplex relationships.

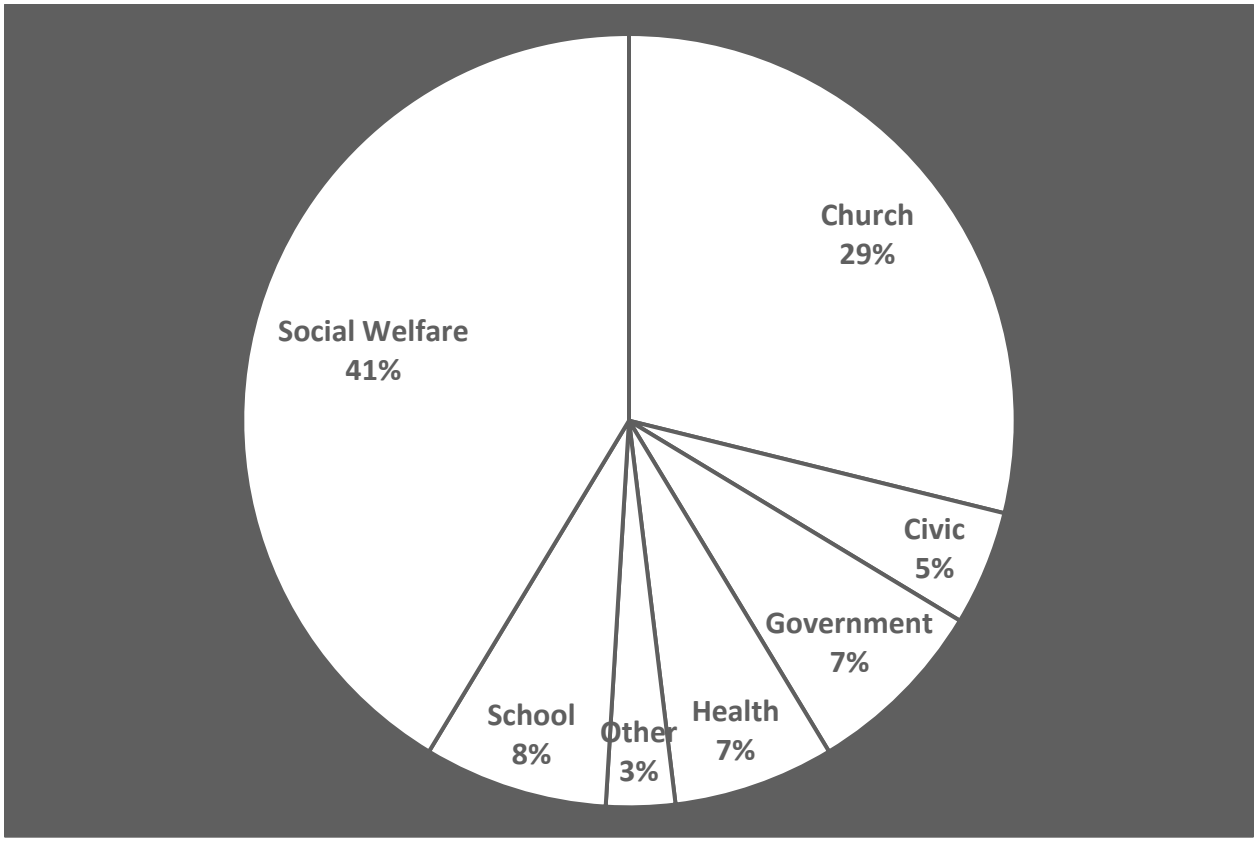
Organizational Demographics

Basic data was collected about each organization as part of the organizational survey. No individual demographic data was collected, but respondents were asked to answer questions about their organization. For non-respondents, organizational demographic data was collected using information provided to the Thrive leadership team as part of a food security organization directory and by the Community Foundation of the New River Valley. If information was not available through these sources, organizational websites and Facebook pages were accessed in an attempt to have as much data as possible.

The target of the Thrive survey was food security organizations across the New River Valley. These organizations were heterogeneous in both the type of organization it was and what type of services it provided. To gain a clearer understanding of how organizations work together in the region, the organizations were coded as Social Welfare, Churches, Schools, Healthcare, Government, Civic Organizations, and those I

defined as Others. Of the organizations that responded to the Thrive network survey, Social Welfare organizations represented the largest percentage (41%) while Civic Organizations were the lowest percentage (4.8%). Social Welfare organizations are those "operated exclusively to promote social welfare… [And] to further the common good and general welfare of the people of the community (such as by bringing about civic betterment and social improvements" (Internal Revenue Service, 2019). Government entities, including those at the federal, state, and local level, Schools, Healthcare organizations, including hospitals and community health programs, are shown below in Figure 3.3.

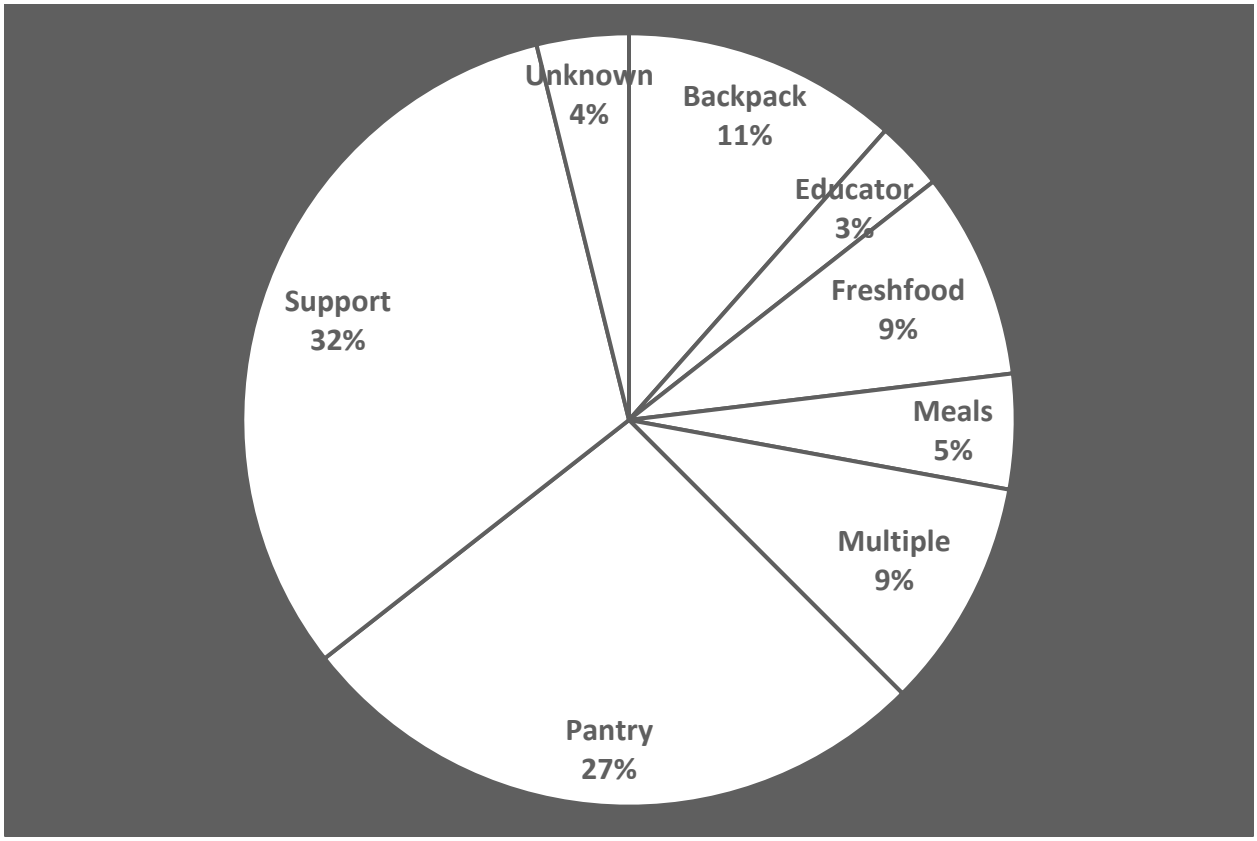
Figure 3.3: Thrive Survey Respondents by Organization Type



In addition to type of organization, data was collected on the types of food access efforts provided by each organization (Figure 3.4). Food access efforts were characterized as Support, Pantry, Backpack, Multiple Fresh-Food Providers, Meals,

Educational Support, and Unknown. Support organizations do not directly provide client services in the area of food security; instead these organizations interact as part of the network by providing client referrals, offering capacity building, and providing financial tools and resources. Pantry organizations are those organizations that provide primarily shelf-stable foods to clients. Backpack programs provide food to children for weekends and in the summer. Fresh Food providers include community gardens, farmers' markets and glean teams that generally supply fresh produce, both directly to clients and to other organizations within the region. Organizations that are categorized as Meals organizations provide hot meals at least once a week. Finally, Educators are organizations that work to ensure individuals and families with food security issues have the knowledge to make healthy choices and prepare nutritious meals. Some organizations were characterized as Unknown because these organizations did not share the types of services provided and clarification was unavailable through their websites or Facebook pages. The majority of the respondents were from Support organizations (32%) while Educators represented the smallest percentage (3%).

Figure 3.4: Thrive Survey Respondents by Service Provided



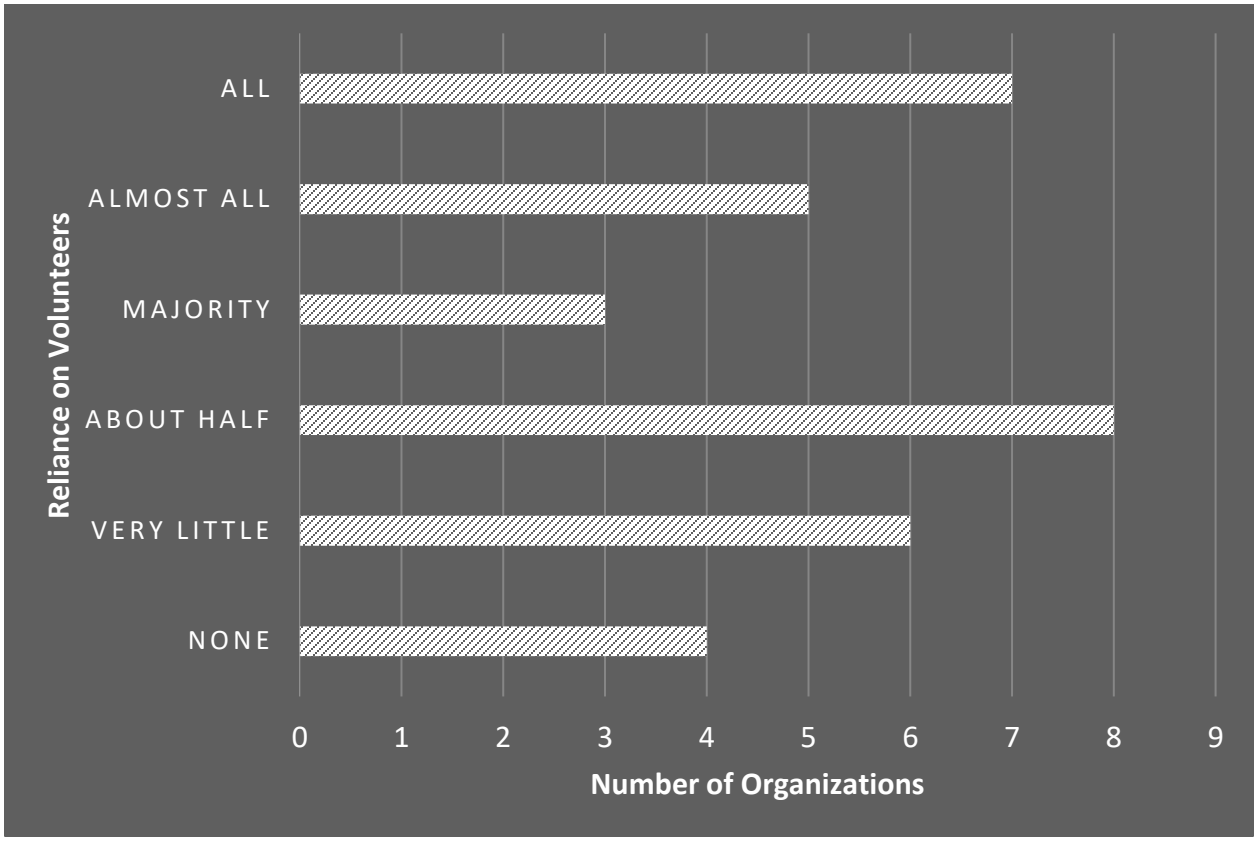
According to survey responses, one of the challenges many face is the lack of full and part time staff. Table 3.3 below show the organizations' staff demographics. Organizational study respondents were asked "what is the total number of full-time and part-time equivalent employees working in your food access program? Please estimate if you are unsure of the exact number." As shown below, of the 94 organizations that responded to the Thrive network survey, 68% of the organizations have no full time staff, and only 57.7% of the organizations have part time staff dedicated to the mission of food security in the New River Valley.

Table 3.3: Thrive Member Organizations Staffing by Type

Question	Total Number	Mean	Minimum	Maximum
Full time employees	183	1.79	0	75
Part time employees	381.5	3.74	0	200

While some organizations seem to have staff in these areas, most of the organizations surveyed are dependent on volunteers for their mission. In addition to the question about paid personnel, respondents were asked “how reliant is your organization on volunteer hours?” A Likert scale was used with “1=none; 2=very little; 3=about half; 4=majority; 5=almost all; and 6=all.” As shown in Figure 3.5, the majority of respondents (about 70 percent) responded that almost half or more of their organization’s hours came from volunteers. The mean response was 3.61 with a standard deviation of 1.70 and a variance of 2.91. As will be discussed in future sections of the dissertation, organizations reliant primarily on volunteer staff often experience some of the challenges identified by the Thrive network.

Figure 3.5: Thrive Survey Respondents' Volunteer Reliance



The final demographic collected on the survey for respondents was the county or counties within which the organization is physically located. Table 3.4 below shows the number of organizations within each county (or city, in the case of Radford) as well as the need for food security efforts in the region. The poverty data listed here does not include "institutionalized persons, persons in military group quarters and in college dormitories, and unrelated individuals under 15 years old" (New River Valley Regional Commission, 2019). The City of Radford and Pulaski County have the highest levels of families living in poverty, while Montgomery County has the most organizations that provide some sort of food security assistance. Floyd County, with only 6.8 percent of its residents living below the poverty line, has the least amount of food insecurity organizations within its footprint. Every other county served by the network has a

poverty level well over the state average of 8.2 percent (New River Valley Regional Commission, 2019).

Table 3.4: Thrive Survey Respondents by County or City

County or City	Number of Organizations per County (based on response to survey)	Population (2015)[2]	Percent of Families Below Poverty Level (2014)[3]
Floyd	9	15,430	6.8
Giles	18	17,179	9.0
Montgomery	38	98,121	9.3
Pulaski	21	34,841	10.1
Radford	15	17,420	12.4
Other	3	N/A	8.2[4]

Based on the data collected by the Thrive network, 94 heterogeneous organizations provide food security services within the New River Valley. The service type, services provided, staffing sizes and volunteer needs of the entities involved show that food security organizations within the region are a diverse group that could participate in the Thrive network. Chapter 4 will investigate the overall structure of the network as suggested by the organizational survey, giving the Thrive network a complete overview of how it might look based on current relationships among food security organizations in the New River Valley.

[2] Weldon Cooper Population Estimates (1960-2015) https://demographics.coopercenter.org/virginia-population-estimates. Retrieved from New River Valley Regional Commission on 1/2/2020 at http://nrvrc.org/datadashboard/population.html

[3] US Census Bureau American Community Survey 5-Year Estimate 1980-2014 https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml Retrieved from New River Valley Regional Commission on 1/2/2020 at http://nrvrc.org/datadashboard/economic.html#poverty

[4] Figure for state of Virginia

CHAPTER FOUR

NETWORK AND GIS ANALYSIS

This chapter has a three-fold purpose. The first is to describe the structure of the food security network in the NRV, including an analysis of five types of ties: Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination. The second is to examine the geography underlying the network. The third is to use network data from the organizational surveys and GIS data gathered from Thrive survey respondents to examine the relationship between network structure and geography as it pertains to organizational collaboration.

WHOLE NETWORK STRUCTURE RESULTS

The network structure is derived from the data collected as part of the organizational surveys. In addition to mapping All Relationships, there were five types of specific relationships explored in the study: Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination. The next section contains first an explanation of the types of analysis that was conducted for each relationship, followed by the key features of each of these networks.

Density

As discussed in Chapter Three, the density of a network is measured by the number of ties there are in a given network divided by the total number of possible ties (Kilduff and Tsai, 2003). A density of 1.0 would mean that every organization in the network was connected, or ties, to every other organization in the network. Density is a straight-forward measure, but a complicated concept when studying organizational networks, for a variety of reasons. The interpretation of density can be counter-intuitive. For instance, Provan and Sebastian (1998) found that high density led to less effectiveness in mental health networks, while Ahuja, Soda and Zaheer (2012) argued

that higher density within a network may lead to the development of shared norms and greater homogeneity.

There is not a “perfect” number for density in a network; instead, the ideal density of a network is determined by the needs of the members and the type of relationship. For example, higher densities may be important in an information sharing network because higher density decreases the probability that information fails to flow throughout the network, but it can be negative in program coordination because of increased redundancy and duplication of effort. In addition, density is hard to compare across networks unless both are similar in size. In the case of the Thrive network, there was not another network that could be used for comparison. As a result, density was instead used to gauge the ways in which relationships were formed in the network for the various activities.

Table 4.1: Density by Relationship Type

	Unconfirmed Density	Confirmed Density
Information Sharing	0.084	0.041
Food Exchange	0.055	0.014
Client Referral	0.077	0.032
Shared Resources	0.085	0.032
Program Coordination	0.078	0.022
All Relationships	0.137	0.067

As shown in Table 4.1, the overall network had a density value of 0.137 for All Relationships unconfirmed. All Relationships unconfirmed is the total number of ties reported by all of the respondents for any type of activity. Specifically, the question asked on the organizational survey was: “We would like to know which organizations, if any, your organization has partnered with over the past 12 months to support your services, programs, or activities supporting food access.” As is normal, when these

relationships were confirmed, the density of the network decreased by almost half, to a density score of 0.067.

Information Sharing had the most dense activity with a density value of 0.041. Information Sharing may be the most dense action of the network because information sharing serves as a “gateway” into the network for members (Koliba, Wiltshire, Scheinert, Turner, Zia, and Campbell, 2017). It requires fewer resources to accomplish and information is not a finite resource that limits organizations. In addition, overlap in information sharing ties is ideal because it ensures that information flows freely between organizations and is not collected or stopped by a single organization (Hatala and Lutta, 2009).

Client Referral had the second greatest density with a density score of 0.032, likely for the same reasons that the Information Sharing network was so dense. Client referrals, like information sharing require no finite resources and can be accomplished through multiple ways, including telephone calls, emails, and in-person meetings. Shared Resources tied with Client Referral as the second most dense network at 0.032 density score; however, with unconfirmed ties it ranked first with a density score of 0.085. This decrease in density upon confirmation may be because 1) many organizations are unaware of how it shares resources or 2) respondents did not consider the reciprocity of sharing resources and only acknowledged ties going in one direction, whether that be giving or receiving resources.

Program Coordination had the second lowest density score at .018. Program coordination is often time intensive, and like resource sharing, it includes tasks that may require some face-to-face interaction between organizations. Unlike food exchange, some of the tasks involved in shared resources and program coordination can be conducted at a distance. In addition, information sharing, client referral, shared

resources, and program coordination all provide opportunities for support organizations not directly providing food to clients to participate meaningfully in the given action.

Food Exchange was the least dense network with a score of .014. Food exchange, unlike all of the other types of relationships explored in the organizational survey, requires face-to-face contact among participants. Furthermore, this face-to-face contact requires organizations to orchestrate transportation, time, and staffing to secure food and return it to their organizations. Food exchange, in many cases, depends on an organization having food storage capacity. Food storage becomes a critical consideration when hot food needs to be kept to temperature, or cold food that requires refrigeration or freezers. When sharing perishable food, organizations must also be able to act quickly to ensure that food is shared before the end of its shelf life. Finally, not all of the organizations that participate in food security operations in the New River Valley are involved in the actual provision of food to clients or other organizations, further explaining why this type of collaboration has the lowest density.

Degree Centralization

While density examines the "general level of cohesion" in a network, centralization examines the "extent to which this cohesion is organized around particular focal points" (Hanneman and Riddle, 2005, p. 85-86). Network centralization, therefore, can offer further insight into network structure. At the node level, degree centrality measures the number of connections, or ties, a node has.

At the whole network level, degree centralization is used to measure how much of the network is connected through a few central actors or nodes (Freeman, 1979). A network that is fully centralized is one where all of the ties between nodes pass through a central node in order to gain access to one another. This concept is often called a star network structure (O' Malley and Marsden, 2009). When networks are highly

centralized, organizations are very dependent upon the central organizations to reach other organizations.

Provan and Milward (1995) found that high levels of centralization improved the effectiveness of mental health networks when assessed based on client perceptions, but not necessarily when assessed from the perspective of case workers. This disagreement between client and case worker perceptions may be because in networks with high centralization, power can be concentrated within the few centrally located organizations, making them the gate keeper (both intentionally and unintentionally) of information and other resources for the network.

Table 4.2 shows the degree centralization for the various activity networks. For the All Relationships Confirmed network, the overall centralization of the network is 0.288. The centralization is rather low and suggests that there might be a few key organizations that are holding the overall network together. The organizational activity with the highest centralization was the Information Sharing network with a value of 0.275. The lowest degree centralization occurred in the Client Referral network with a value of 0.125. The high centralization and high density in the Information Sharing network suggests there are a few highly central organizations that are highly connected to others in the network in regards to information sharing. The direct connections between organizations in the network are substituted for a central organization that many organizations connect to for information sharing. The low centralization and low density values in the Client Referral network suggests that many of the organizations are not connected to one another in terms of client referral, and also that there is not a single organization within the network playing a central role and connecting others. Instead, client referral seems to be diffused among multiple organizations within the network.

Table 4.2: Degree Centralization by Relationship Type

	Degree Centralization
Information Sharing	0.275
Food Exchange	0.144
Client Referral	0.125
Shared Resources	0.146
Program Coordination	0.146
All Relationships Unconfirmed	0.425
All Relationships Confirmed	0.288

Moving forward, all of the relationship ties being discussed are confirmed ties and the discussion of network structure will be based on the responses to the organizational questionnaire. In this chapter, the term “network” does not just include the organizations that are formally involved in the Thrive network, but all of the food security organizations within the New River Valley that either responded to the survey, or were indicated to have a relationship with one of the respondents that participated in the organizational survey.

All of the following network diagrams were generated using UCINET and NetDraw (Borgatti, Everett, and Freeman, 2002; Borgatti, 2002). The nodes are color coded by geography. Organizations that were non-respondents to the organizational survey are depicted with thicker rimmed nodes, such as GS, HF, and PCS in Figure 4.1. The nodes are sized by degree centrality, with the larger nodes being more central to the network. In addition, each of the network maps shows the centralization and density values for the network depicted, as well as the number of organizations that are isolates in the network. Table 4.3 is a list of the organizations, as well as their corresponding codes used in the network depictions below.

Table 4.3: Organization Names and Codes

Organization Name	Organization Code
Auburn United Methodist Church	AUMC
Beans and Rice Radford	BRR
Beans and Rice Pulaski	BRP
Belview UMC Backpack Program	BUMC
Big Brothers, Big Sisters	BBBS
Blacksburg Breakfast Lions Club	BL
Blacksburg Farmers Market	BFM
Blacksburg Interfaith Food Pantry	BIFP
Blacksburg Refugee Partnership	BR
Bobcat Backpacks Program, Radford Public Schools	BBP
Cavalry Baptist	CB
Carilion Clinic	CC
Christ Lutheran Church	CL
Christiansburg Farmers Market	CFM
Community Foundation of the New River Valley	CFNRV
Community Health Center Montgomery	CHCM
Community Health Center Giles	CHCG
Community Health Center Radford/Pulaski	CHCRP
Community Housing Partners	CHP
Copper Hill Church of the Brethren	CH
Council of Community Services	CCS
Department of Social Services Montgomery	MDSS
Department of Social Services Radford	RDSS
Department of Social Services Pulaski	PDSS
Department of Social Services Giles	GDSS
Department of Social Services Floyd	FDSS
Dublin United Methodist Church	DUMC
Eagle's Nest	EN
Eastern Elementary Backpack Program, Christiansburg Rotary	EEBP
Emergency Needs Task Force of Pulaski County	ENTF
Fairlawn Presbyterian Church	FP
Feeding America Southwest Virginia	FASWV
Fieldstone Church, (The Giving Tree Food Pantry)	FIE
Gethsemane Baptist Church	GB
Giles Community Garden	GG
Giles County Christian Service Mission	GCM
Giles County FOCUS	GCF
Giles Shelter	GS
Giles County Summer Lunch Program	GCS
Giles Health and Family Center	GHF

Organization Name	Organization Code
Giles Youth Adult Partnership (GYAP)	GYAP
Glade	GLA
Healthy Floyd	HF
Helping Hands	HH
Heritage Cares	HC
Holy Family Catholic Church, Justice and Peace Committee	HFC
It's All About Jesus Ministries	IAJ
Jordan's Chapel Feed My Lambs, Backpack & Food Pantry	JC
Meadowbrook Public Library Backpack Program	MBL
Montgomery County Christmas Store	MCCS
Montgomery County Emergency Assistance Program (MCEAP)	MCEAP
New Harvest	NH
New Life	NL
NRCA, Floyd County Emergency Assistance Program	NRCAF
NRCA, Giles County Emergency Assistance Program	NRCAG
NRCA, Head Start	NRCAHS
NRCA, Montgomery County Emergency Assistance Program	NRCAM
NRCA, Pulaski County Emergency Assistance Program	NRCAP
NRCA, Radford County Emergency Assistance Program	NRCAR
New River Community College	NRCC
New River Family Shelter	NRFS
New River Health District, Pharmacy Garden	FARM
New River Valley Agency on Aging	NRVA
New River Valley Community Services Floyd	NRVCSF
New River Valley Community Services Giles	NRVCSG
New River Valley Community Services Montgomery	NRVCSM
New River Valley Community Services Pulaski	NRVCSP
New River Valley Community Services Radford	NRVCSR
New River Valley Senior Services	NRVS
Newport UMC	NUMC
Pearisburg Church of God	PCOG
Pearisburg Community Market, (Farmer’s Market)	PFM
Pearisburg First United Methodist Church, (Macy's Backpack Ministries)	MACY
Pearisburg Junior Women's Club Backpack Program	PW
Plenty!	PLE
Prices Fork Incubator Kitchen	PFI
Pulaski Church of God	PLCOG
Pulaski County Christmas Store	PCCS
Pulaski County Schools	PCS
Pulaski Daily Bread	PDB

Organization Name	Organization Code
Pulaski Grow	PG
Radford University	RU
Radford Worship Center	RW
Radford-Fairlawn Daily Bread	RFDB
Radford Church of God	RCOG
Shawsville Lay Ministerial Association Food Pantry	SFP
So Fresh	SOF
Spiritual Roots Community Food Bank	SR
St Mary's Catholic Justice & Peace (The Glean Team)	GT
St. Jude Church, Radford	SJ
St. Michael's Lutheran Church, (Micah's)	MBP
Salvation Army	SA
United Methodist Women of Pembroke	UMCP
United Way of the New River Valley	UW
Unity Church	UC
Valley Interfaith Child Care Center	VICCC
Virginia Cooperative Extension	VCE
Virginia Tech Family Nutrition Program	VTFNP
VT Campus Kitchen	VTK
Warm Hearth Village	WH
White Memorial United Methodist Church	WUMC
Women's Resource Center of the New River Valley	WRC
YMCA at Virginia Tech	YMCA
YMCA Community Garden	YMCACG

All Relationships

A depiction of All Relationships is shown in Figure 4.1. The centralization score for the All Relationships network was 0.288 and the density score was 0.067. Seven organizations, or 6.7 percent of the included food security organizations, were isolates, meaning these organizations are not connected to any other organization within the network. The high density of this network is a positive indicator because it suggests a high degree of connectedness among organizations. The limited number of isolates also indicates that most of the food security organizations within the New River Valley have a relationship with at least one other food security organization.

The high centralization score of the network suggests that the network is dominated by a few nodes that are central to the network. The organizations in the network map are sized by centrality, with the CFNRV and FASWV being the most central players in the network. The high degree of centrality by these two actors suggests that many of the organizations within the network are connected through these organizations.

While the network does have a high degree of centralization and is highly dense, this does not suggest the network structure has no weak areas. The placement of FASWV in the network plot depicts this clearly. Organizations, such as BBP, GB, RCOG, and CH are only connected to other organizations in the network through their relationship with FASWV. Using the core/periphery function in UCINET to further analyze the data, it was determined that most of the organizations within the All Relationship network (77.9 percent) are peripheral organizations, meaning that only 23 organizations were core organizations (22.1 percent).

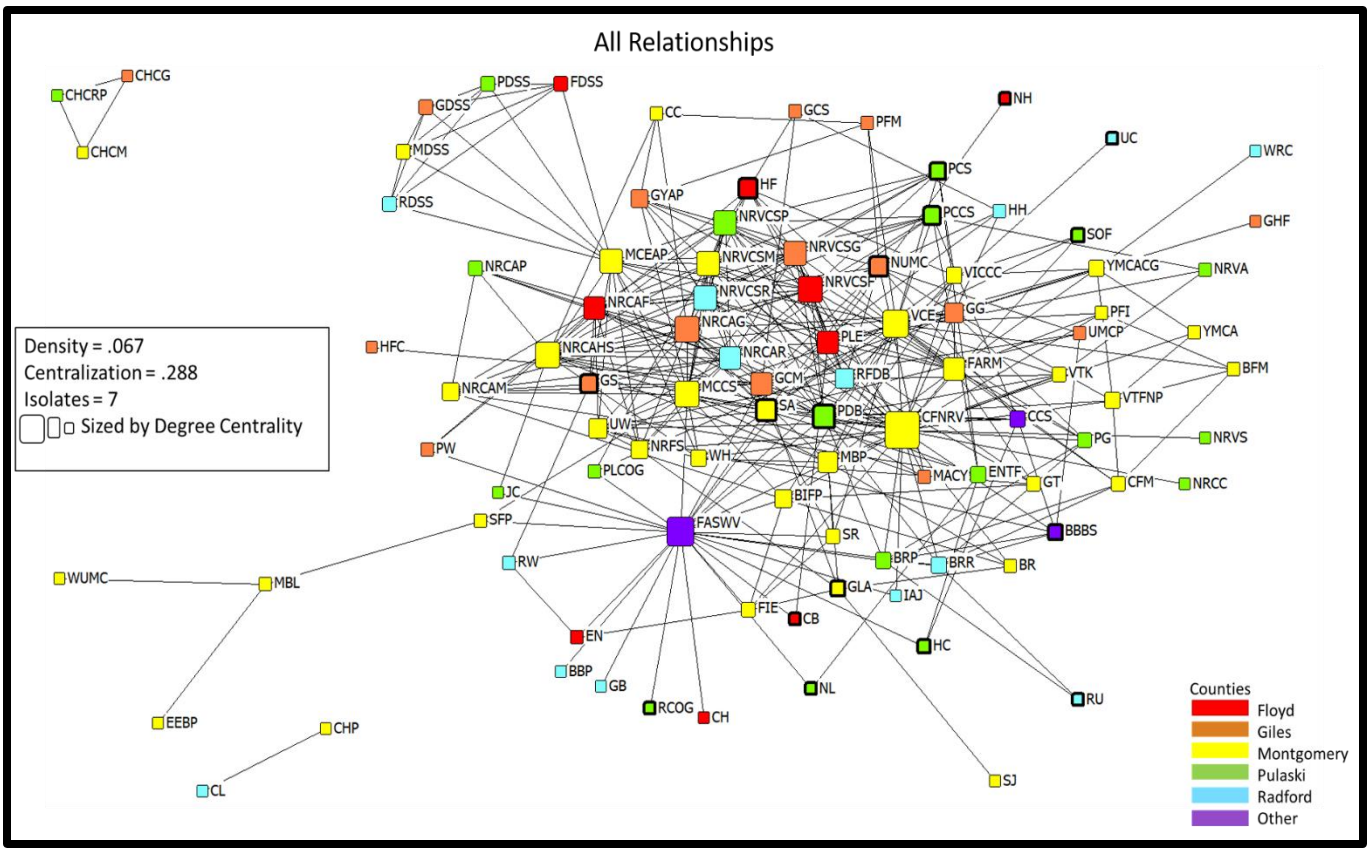
A core/periphery structure suggests that the core organizations in the network structure are those nodes that have maximal connections with other core organizations, while those in the periphery are not tightly connected and lack high levels of cohesion to the core (Borgatti and Everett, 1999). While centrality measures the connectedness of nodes to the entire network, core organizations are those that are highly connected to one another. The core/periphery structure in this network demonstrates that there are 23 organizations within the network that are highly connected to one another.

Also, for All Relationships, there are two fragments or components that are not connected to the network as a whole. One of these is comprised of CHCG, CHCM, and CHCRP, which are three separate, geographically-located organizations that are connected through a common parent organization. The second fragment, CL and CHP,

are not related to one another through a parent organization. As a way to further understand the All Relationships network, the “Girven-Newman” test was used to examine the community structure of the network (Girven and Newman, 2002).

The findings suggest that there are four communities within this network structure. Communities are groups of organizations, or nodes, within the network that are tightly connected to one another, but only loosely connected to other groups of nodes in the network. In addition to the CHCG, CHCM, and CHCRP and CL, CHP communities listed above, a third community comprised of MBL, WUMC, and EEBP is only loosely connected to the other nodes in the network. While it might be that the community of CHCG, CHCM, and CHCRP are connected by their common parent organization, and that MBL, WUMC, and EEBP might work together as a result of a common location in Montgomery County, the community comprised of CL and CHP is more difficult to understand. The two organizations are not located in the same county, nor are these organizations similar in their organizational sector as CL is a church and CHP is a civic organization.

Figure 4.1: All Relationships



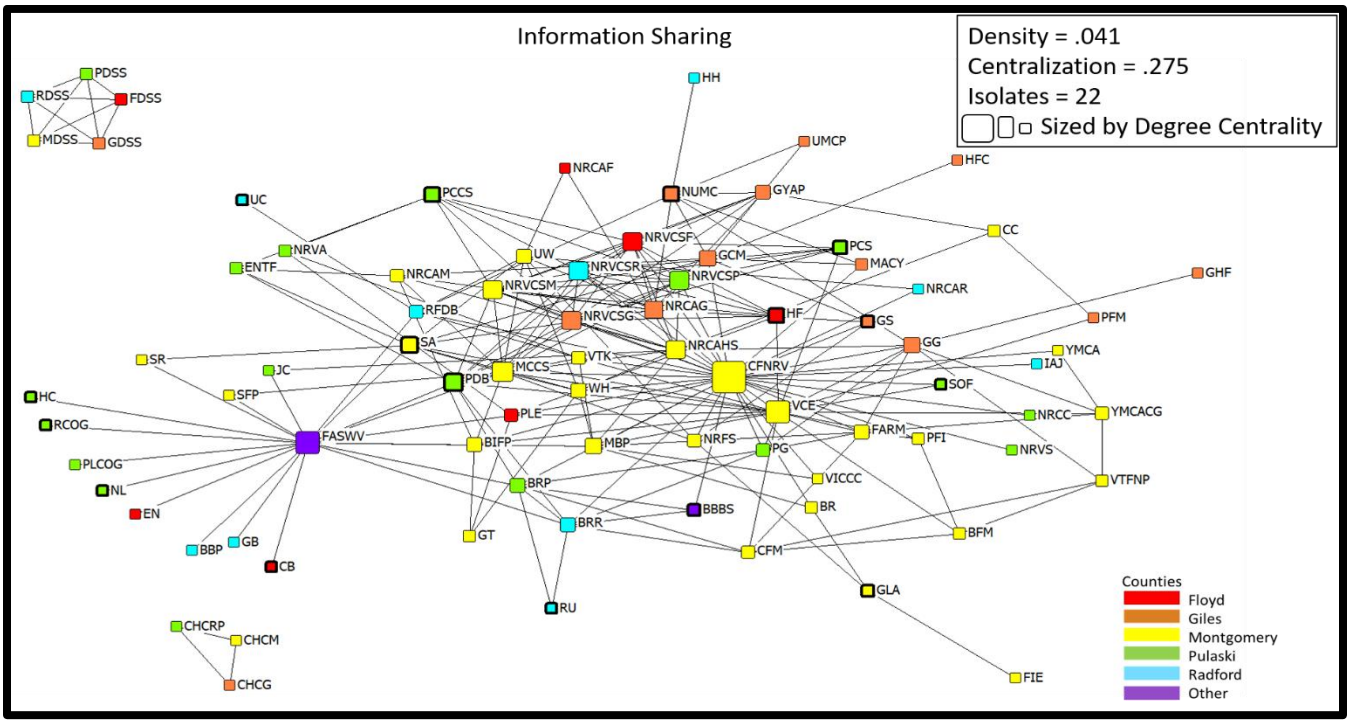
Examining the network structure by sector, the network plots indicate that the most central organizations to the network are social welfare organizations, which may be because these organizations are critical in connecting clients and organizations within the network. Social welfare organizations also represent the largest percent of organizations within the network, as 41 percent of the organizations are classified as Social Welfare organizations.

In addition, organizational activity appears to play a role in some collaboration among food security organizations. Fresh food organizations are highly interconnected to one another. Also, the support and pantry organizations are highly central to the network, while those that provide backpack services and meals are less central.

Information Sharing

After All Relationships, Information Sharing has both the most centralized network with a centralization value of 0.275 and the densest network with a density value of 0.041. The Information Sharing network included 22 isolate organizations that do not have confirmed information sharing relationships with any of the other organizations in the network. The data suggest that 21.1 percent of the food security organizations within the New River Valley do not give or receive information from other food security organizations. Figure 4.2 depicts the Information Sharing network. Organizations in the network map are sized by centrality and color-coded based on their location.

Figure 4.2: Information Sharing



Information Sharing had the highest centralization score, yet this does not necessarily indicate an information bottleneck within the network. Instead, given that Information Sharing also has the greatest density, it means that there are only a few

organizations within the network that are key in sharing information with the other organizations. These organizations, such as CFNRV, FASWV, and VCE serve as 'information hubs' and are key components in sharing information broadly throughout the network. Again, similarly to A11 Relationships, FASWV serves as the sole connector of multiple organizations (HC, RCOG, PLCOG, NL, EN, BBP, GB, and CB) to the remainder of the network. Additionally, there are two components that are not connected to the main network structure and both consist of organizations that share a parent organization.

While this hub and spoke structure may be positive for the network because it reduces effort duplication among organizations involved in information sharing, this also may be a point of structural weakness in the network because it can easily eliminate the ability to share information. For example, FASWV is in a position of responsibility as the only provider of information for a large number of organizations, which can create problems if FASWV chooses to withhold information intentionally (brokerage power), unintentionally is unable to share information (bottleneck), or exits the network.

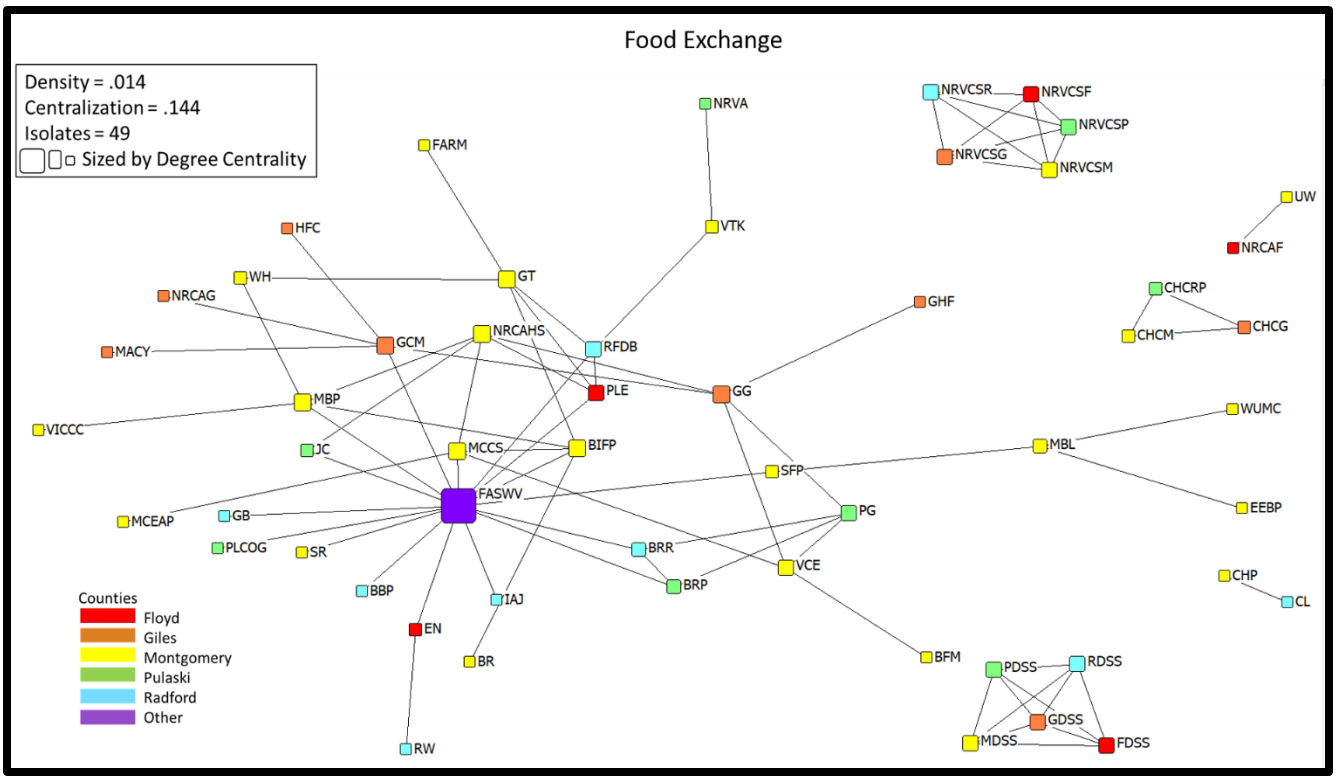
In the Information Sharing network, social welfare organizations remain central, while churches and government organizations seem to have relationships more within its own sector than across. FASWV once again plays a brokerage role in the network, serving as the only connection between eight organizations and the rest of the network. Brokerage positions are those in which two or more organizations are connected to another organization, but not connected to one another. In these instances, the organization within the brokerage position has power due to the fact that it possess multiple, non-redundant sources of information or resources (Burt, 1992). While this structure may be useful to the organization in the brokerage position, it can suggest potential weaknesses for the network as a whole. For cross-activity relationships,

Information sharing has similar findings to Any Relationship in that fresh food organizations seem to be well connected to one another. Likewise, FASWV seems to be connected to many of the other pantry organizations in the network, making it highly central in the network.

Food Exchange

Food Exchange as an activity has a density value of 0.014 and a centralization value of 0.144. Food Exchange has both low centralization and low density. This type of finding can occur for a variety of reasons. Not all food security organizations within the New River Valley participate in food exchange. Specifically, most support organizations refer clients to food providers, as well as share information and provide resources, but do not engage in actual food provision. This assumption is, in a large part, confirmed by the number of isolates in the Food Exchange network. Forty-nine (47.1 percent) organizations were not engaged in food exchange relationships with other food security networks.

Figure 4.3: Food Exchange



In addition, food exchange occurred mainly between core organizations, such a FASWV. Figure 4.3 shows that FASWV is highly central to the network. Thirteen organizations within this structure serve as cutpoints in the network: FASWV, MBP, GCM, GT, RFDB, VTK, GG, SFP, MBL, VCE, EN, MCCS, and BIFP. Cutpoints are nodes that if removed, would alter the links and connectivity of the network (Berge, 1966). Specifically, these nodes hold critical positions when it comes to the exchange of food in the network. Network structures with large numbers of cutpoints can be seen as weaker because these networks are more dependent upon actors that are brokers to connect organizations (Hanneman and Riddle, 2005).

Food Exchange has five components that are not connected to the main network component. Additionally, food exchange is one of the key organizational activities conducted by the food security organizations within the New River Valley, yet not one that is heavily participated in by many of the individual organizations. Many of the

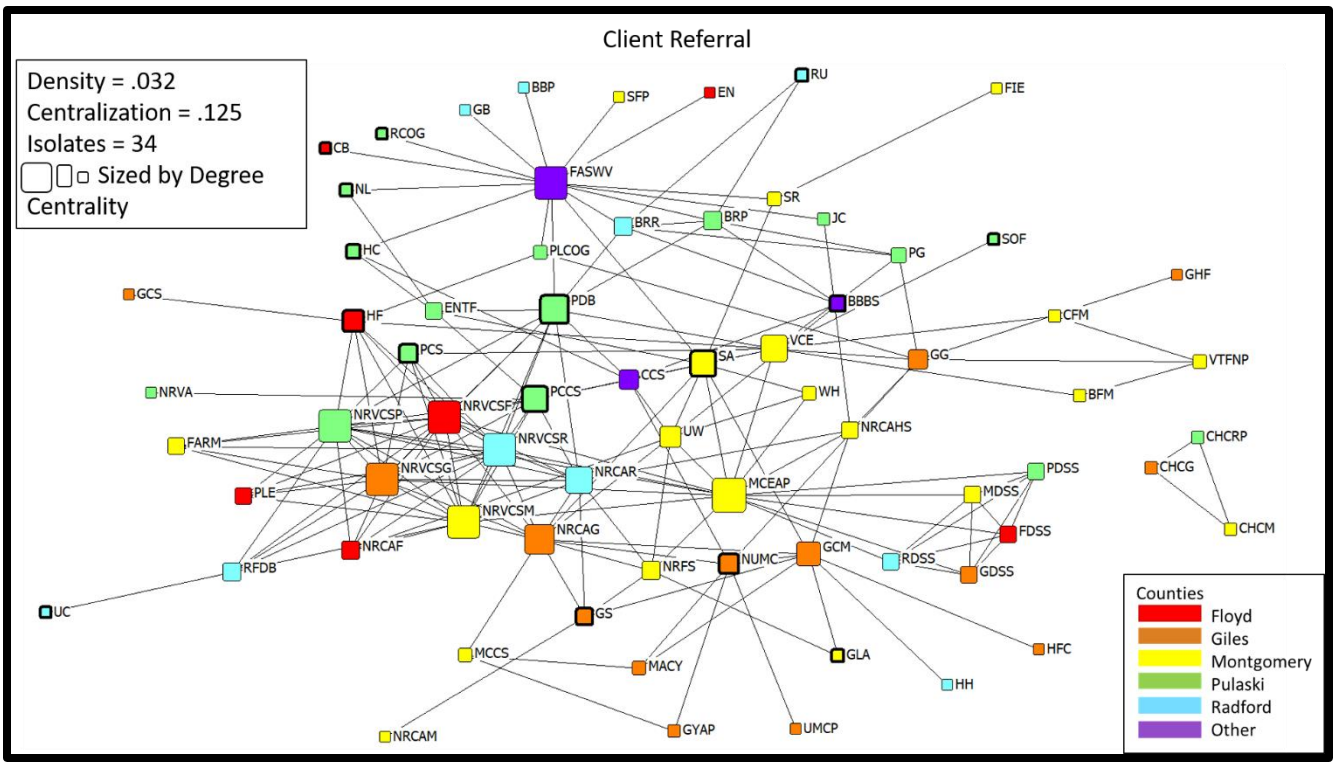
organizations identified as food security organizations serve in support roles rather than as direct providers which explains the lack of organizational participation. The support organizations that are present in the Food Exchange network are typically those organizations that have multiple branches and share only within their collective organizational structure, such as the NRVCS, DSS, and CHC groups.

With Food Exchange, it is clear that the central organization in the network is FASWV. Many of the organizations in the network are only tied to one other organization, meaning that the density of the Food Exchange network is very low. While some of the fresh food and hot meal organizations are connected to each other, the activity type does not seem to have a great impact on collaboration. Also, although three of the component structures are made up of support organizations, for the most part, this type of organization does not participate greatly in food exchange.

Client Referral

Client Referral has the lowest centralization with a value of 0.125, but does not have the lowest density value, which is 0.032. Having such a low centralization score suggests that the connections among organizations in this network are highly dispersed, but the density value suggests that the organizations in the network are still moderately connected. Figure 4.4 depicts the Client Referral network. As the figure demonstrates, many organizations have high centrality scores and are connected within the network. One reason for this may be that organizations often refer clients to more than one organization, creating the need for a highly connected structure. Client referral can also occur at various levels of the organizations, unlike information sharing, which usually relies on “hubs” for knowledge dissemination.

Figure 4.4: Client Referral



The Client Referral network has 34 isolates. The Client Referral network also has multiple players that are highly central to the network, including FASWV, NRVCSG, NRVCSF, NRVCSM, NRVCSR, NRVCSP, NRCAG, and MCEAP. Only one component of this network is not connected to the larger network structure, CHCG, CHCM, and CHCRP, and the organizations in this component are members of a larger parent organization.

There are areas of weakness in the network structure for the Client Referral network. Eleven cutpoints exist: RFDB, HF, PCCS, VCE, GG, MCEAP, NUMC, GS, SR, GCM, and FASWV. FASWV is once again the single connection for six organizations in the network. Additionally, there are only two community structures within the Client Referral network structure (Girven and Newman, 2002). Both the prevalence of cutpoints and the creation of separate community structures can suggest

weakness as these cutpoints indicate places where individual organizations can become disconnected from the network.

The Client Referral network consists of a large number of social welfare organizations because these organizations are most likely to deal with clients facing multiple issues, including food insecurity. Many of these social welfare organizations are central to the network, specifically FASWV, which plays a brokerage role, and MCEAP, VCE, and GCM, which serve in bridging capacities. Bridging ties are those "nonredundent connections between firms located in different network communities" and these ties often serve to connect subgroups of the network structure together (Sytch, Tatarynowicz and Gulati, 2012, p. 1658).

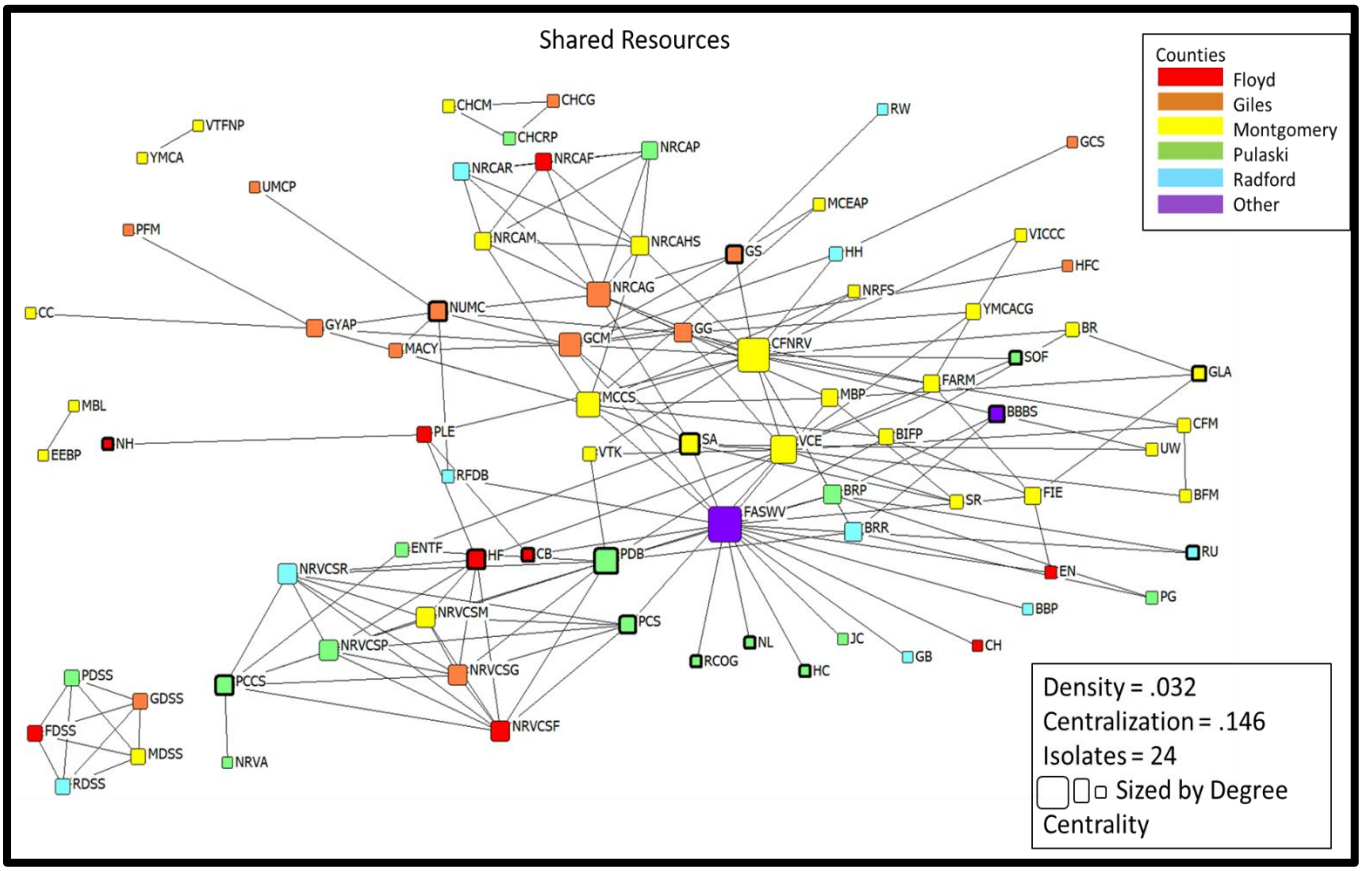
In the Client Referral network, organizational activity seems to play a key role in some of the exchanges that occur between food security organizations. The fresh food organizations are seen to be highly interconnected. Similarly, the organizations that provide backpack services are generally connected to one another. Support and pantry organizations are highly central, working as key points of contact in the network for client referrals. The central nature of educators in this network is also interesting, because it is something that has not been seen with the other relationship activities.

Shared Resources

The Shared Resources network structure has a centralization value of 0.146 and a density value of 0.032. Among the different types of relationship activities examined, both values are in the median of the values calculated. Of the thirty-four organizations considered to be mapped for this network are isolates, or 32.69 percent. In addition, the Shared Resources network structure has five community structures (Girven and Newman, 2002). The Shared Resources network structure has fewer weaknesses than most of the other activity networks in that there are only eight cutpoints in the network:

FASWV, PCCS, PLE, NUMC, GYAP, GCM, GS, and HH. FASWV again serves as the only point of contact for sharing resources as seven organizations have their connection to the network brokered through FASWV.

Figure 4.5: Shared Resources



In the organizational survey, respondents were asked about the giving and receiving of resources which included “the sharing among organizations of financial or in-kind resources; could include staff, volunteers, expertise, space, funds, etc.” This finding suggests that about one third of the food security organizations within the New River Valley have an opportunity for relationship building in the area of shared resources. The lack of centralization in the network may be the result of a dispersed network for shared resources, which can be explained by the fact that many food security organizations that are participating in the sharing of resources do so more

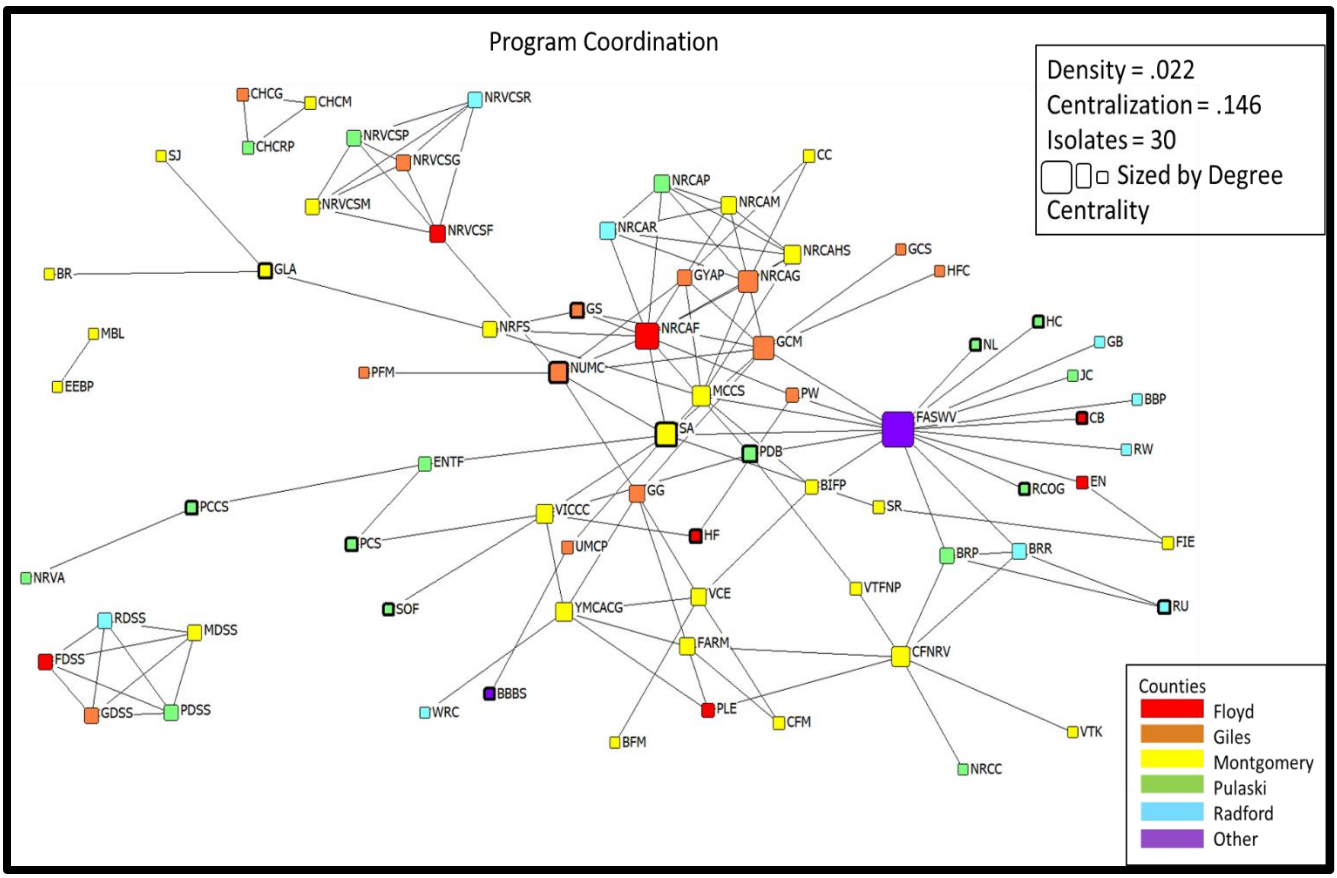
broadly. In addition, because the measure of resource sharing is not directional, there may be some organizations that tend to provide resources, while there are others that tend generally to be the recipients of resources. FASWV and CFNRV are the most central organizations to the network, however, other organizations, such as PCB, VCE, GCM, NRCAG, and MCCS are also key. It makes sense that CFNRV is highly central because it serves as one of the major funders of nonprofit organizations in the New River Valley. There are four components that are not attached to the main network structure. Two of them, FDSS, GDSS, MDSS, PDSS, and RDSS and CHCM, CHCRP, and CHCG, are organizations with parent organizations, while the other two, YMCA and VTFNP and MBL and EEBP, are not connected through a parent organization. YMCA and VTFNP and MBL and EEBP are both cross-sector collaborations.

In the Shared Resources network structure, most of the highly central organizations are social welfare organizations. Social welfare organizations are key connectors for sharing resources across the network. While some collaboration does occur between pantries in this network, for the most part organizational activity seems to matter little in the relationships formed among organizations. This lack of relationships between food security organizations that operate in the same service sphere may be in part due to the fact that organizations that provide similar services view other organizations as competition for resources. Many of the organizations that share resources across sector do so in a way that enhances the mission of each organization. For example, in many cases fresh food organizations are sharing with pantry organizations and pantry organizations are working with meal and backpack programs. This collaboration suggests that cross-activity collaborators may be more willing to share resources with services dissimilar to their own organization as may not view these organizations as competition.

Program Coordination

Program Coordination in the organizational survey was defined as “organizations working together to modify, expand, or enhance the capacities to do their jobs” in meaningful ways to address food insecurity in the New River Valley. The Program Coordination network has a density value of 0.022 and a centralization value of 0.146. These values are in the median range of other activity networks described in this dissertation, suggesting that in Program Coordination network organizations are neither highly connected nor largely dominated by a single organization. The Program Coordination network (shown in Figure 4.6) may be one of the more complex tasks evaluated in the organizational survey as it typically involves more than a single interaction, such as with information sharing, and can require communication at a face-to-face level, like food exchange.

Figure 4.6: Program Coordination



In addition to being more complex than some other activities performed by food security organizations, program coordination is another task where FASWV plays a highly central role in the network. FASWV connects eight organizations to the network that do not have any other connections in Thrive. NRCAF, NRCAG, NUMC, SA, and GCM are also relatively central to the network.

In the Program Coordination network, there are three components that are not connected to the whole network. These are also community structures, as is the additional community structure represented by organizations NRVCSF, NRVCSG, NRVCSM, NRVCSP, and NRVCSR (Girven and Newman, 2002). These five community structures represent places where the network may have potential weaknesses. Cutpoints are also plentiful in the Program Coordination network with 14

nodes representing places where the network structure may be weaker. These include: GLA, PCCS, NRVCSF, NRFS, NUMC, GCM, SA, VICCC, UMCP, YMCAGC, VCE, CFNRV, and FASWV.

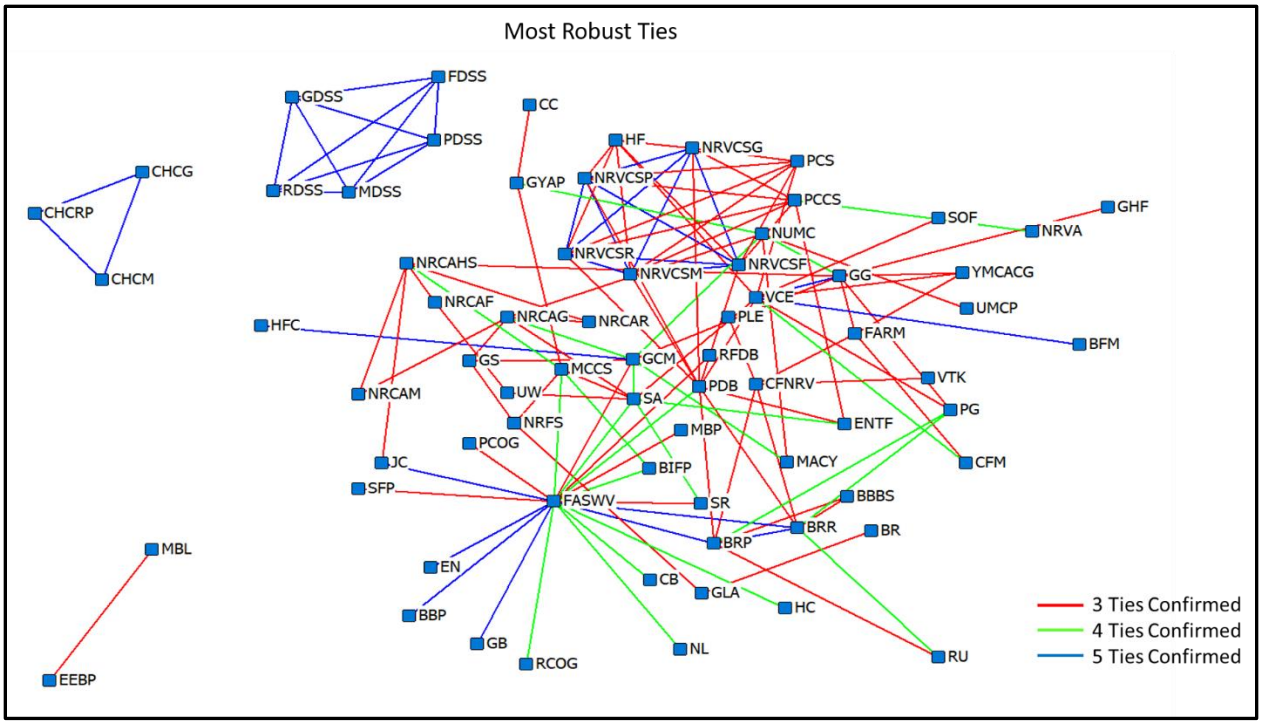
Program Coordination largely occurs between social welfare organizations within the network. The major exception to this is FASWV, which serves in a brokerage roll for many of the church programs within the network. NUMC and NRFS serve as bridging organizations for the Program Coordination network. Organizational task plays a large role in the relationships formed between organizations. For example, most of the pantry organizations seem to work together, with relationships connected to the highly central FASWV. Fresh food organizations are also tightly clustered, with GG, YMCACG, FARM, CFM, and BFM, all interconnected. In the components of the network, organizational activity binds all three of the networks. In two cases, this is due to the fact that the organizations are cross-locations within the same organization. However, the third cluster shows the relationship between EEBP and MBL, two organizations that provide backpack services to children in need.

Organizational type seemed to have very little impact on collaboration among food security organizations except for relationships between religious organizations. Churches were much more likely to collaborate with one another, even across geographical boundaries and program types. Similarly, organizational activity seems to most affect only relationships in certain subgroups, such as fresh food. These subgroups may be affected because these organizations often plant, grow and harvest fruits and vegetables and, as a result, have more of a need to collaborate regarding growing, the sharing of seeds, and assorted best practices than other types of organizations.

Multiplexity

Provan and Lemaire (2012) argued that multiplex ties “are stronger and more intensive than single ties because they represent multiple interests” (p. 643). Multiplexity is the idea that organizations work together in multiple ways and it measures the overlap in ties between organizations. These multiplex ties are often considered a measure of the robustness of the relationship between two organizations in a network because when one type of tie dissolves in the relationship, there are still other types of relationships holding the dyad together. For example, if organization A and organization B engage in food sharing, information sharing and program coordination with one another, even if it discontinues its food sharing relationship, it is still connected through information sharing and program coordination. Figure 4.7 depicts food security organizations that work together in three or more of the five activity areas (Information Sharing, Food Exchange, Client Referral, Shared Resources, or Program Coordination). Seven organizations are isolates and are not connected to the network in any way, but 26 additional organizations are isolates when examining multiplex ties because these organizations do not have a multiplex tie of three or higher. Twenty-five organizations have multiplex ties based on three activities, 21 have multiplex ties based on four activities, and 25 organizations maintain confirmed ties based on all five activities. Thus, nearly seventy percent of the organizations within the network have multiplex relationships of three or more ties.

Figure 4.7: Thrive Network Multiplexity of Organizations with Three or More Ties



There are three components that are not attached to the main network structure. Two of these, CHCP, CHCG, and CHCM and GDSS, FDSS, PDSS, RDSS, and MDSS, represent multiple branches of the same overarching organization, suggesting that the multiplex relationship may be the result of their internal organizational structure. The third component, MBL and EEBP, is not comprised of organizations that are internally connected.

Networks with high degrees of multiplexity are often seen as more collaborative. Organizations with multiplex ties are required to have continuous relationships that allow them to participate in repeated interactions (Lee and Monge, 2011). In many cases, multiplexity demonstrates that organizations within the network have "commitments to multiple collaborative activities" (Provan and Milward, 2001) and that this willingness to collaborate may contribute to network longevity (Kapucu and Hu, 2016).

GEOGRAPHY AND COLLABORATION: ANALYSIS AND RESULTS

As stated in Chapter 3, respondents to the organizational survey were asked about collaborative challenges due to external conditions. One of the more interesting findings was the perception that geographic distance affected the willingness or ability of organizations to collaborate. Respondents were asked:

> "Below is a list of common impediments that organizations sometimes face when working with other organizations. We would like to know which impediments you perceive as significant. For each possible impediment listed, please indicate whether the impediment listed is a minor or major concern to your organization when working with other organizations. If you do not find the listed impediment to be a concern at all, please leave the response blank."

"Difficulty due to geographic distances" was listed as one of the challenges due to external conditions.

Results were aggregated at the organizational level based on the responses to the organizational survey. The aggregation occurred using the maximization process; for example, if one respondent stated there was no concern, while another respondent in the same organization indicated a minor concern, the organizational response was recorded as a minor concern. Maximization was used to ensure that any response indicating geography was a challenge was recorded. Once aggregated, the findings were recorded in Table 4.4. The responses demonstrate that geography is a concern for over 50 percent of the respondents, and a major concern for 41.9 percent of the respondent organizations.

Table 4.4: Concern about Geographic Distance for Thrive Survey Respondents

	Major Concern	Minor Concern	Not a Concern
Number of Respondents	36	21	29
Percent of Total Respondents	41.9%	24.4%	33.7%
n=86; non-respondents = 18			

Based on the finding that approximately 65% of the organizations responding to the survey stated that geographic distance was a barrier to working with other food security organizations in the New River Valley, I was then interested in how collaboration at the network level was impacted. Given the geographic distances covered by the organizations responding to the Thrive survey, I hypothesized that organizations further away from the center of the New River Valley might judge the distance as an issue, but that it could be seen as either a minor concern or not a concern for organizations located within the geographic center of the network.

Drive times were calculated by converting physical address for each of the organization into latitude and longitude coordinates using Texas A&M geocoding services. These coordinates were then entered in to ArcGIS Pro and output was generated using the ESRI Ready to Use Generate Origin Cost Matrix Tool. The data included drive times and distances between every dyad of organizations. The dyadic data was then averaged to find the mean drive time for each organizations. Using the average drive time data, I was able to compare this data with respondents' perceptions of geography as a major or minor concern when collaborating. The data in Table 4.5 indicates that respondents' overall perception that geography is a barrier to working together. The findings suggest that average drive time is slightly higher for organizations that view geography as a major or minor concern. However, this

difference is less than four minutes for the mean and seven minutes for the median. The closeness between the actual averages of drive times suggests that perception of drive time, rather than the actual drive time, may have more impact on collaboration. When looking at the minimum and maximum drive times for each level of concern indicated in the organizational survey, there seems to be no connection between drive time and level of concern.

Table 4.5: Respondents Drive Time by Level of Concern

	Mean	Median	Minimum	Maximum
Major Concern	28.99919	33.76218	21.6487	48.50491
Minor Concern	29.59183	27.50869	22.41652	47.83472
Not a Concern	26.91205	26.91205	21.47518	55.97646

Finding that there is little difference in actual drive time and level of concern about geography, I wanted to next determine if there is a relationship between driving distance and the five network activities (Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination). With network data, the quadratic assignment procedure (QAP) is used to test correlation due to the fact that the data is not independent, and as result, standard statistical techniques cannot be used (Krackhardt, 1987; 1988). QAP overcomes the issue of autocorrelation by "generating all correlations that result from permuting the rows and columns of one of the structural matrices… [to] determine the distribution of all possible correlations given the structure of the two matrices" (Krackhardt, 1988, p. 362-363).

The QAP required multiple steps. First, Pearson's correlation coefficients are calculated for the two matrices. Then, random permutations are performed on the rows and columns of one of the matrices. Finally, the original correlation is comparted to the

random sample correlations to determine the similarity of the two correlations (Zagenczyk, Scott, Gibney, Murrell, and Thatcher, 2010). By conducting the comparison, it is possible to assess the statistical differences between the actual correlation coefficient and the correlation coefficient that would occur by chance. QAP was conducted for each of the relationships using UCINET (Borgatti and Freeman, 2002).

Most of the relationships between shared activities among food security organizations within the New River Valley are only moderately correlated. This moderate correlation suggests that the network structure of the various activity networks is structurally different. The most correlated organizational activity networks are the Shared Resources and the Information Sharing networks and the Shared Resources and the Program Coordination networks, both at 0.584. The least correlated organizational activity networks are the Client Referral and the Food Exchange networks at 0.180. Based on the nature of these activities, the results do follow a certain logic. Typically, food security organizations that are referring clients do so because these organizations do not provide food in the first place, which makes them significantly less likely to participate in food sharing.

Table 4.6: Correlation between Drive Time and Activity Type

	Drive Time	Information Sharing	Food Exchange	Client Referral	Shared Resources	Program Coordination
Drive Time	1.000					
Information Sharing	-0.054***	1.000				
Food Exchange	-0.007	0.355***	1.000			
Client Referral	-0.043*	0.374***	0.180***	1.000		
Shared Resources	-0.039*	0.584***	0.186***	0.343***	1.000	
Program Coordination	0.011	0.362***	0.207***	0.190***	0.584***	1.000
*p≤0.05; **p≤0.01; ***p≤0.001						

In order to evaluate the relationship between geography and collaboration among food security organizations within the New River Valley, I also wanted to examine the correlation between drive time and the various organizational activities. To assess the correlation, all of the dyads in the network were examined. Each drive time distance was calculated between the two dyads and was correlated to the intensity or frequency of the relationship between the two. Drive Time was negative and statistically significant at 0.05 for the Information Sharing, Client Referral, and Shared Resources networks. Organizations participating in these activities were more likely to collaborate with organizations that were geographically close to them. However, the relationships between Drive Time and the Food Exchange network and Drive Time and the Program Coordination network were not significant, suggesting that drive time did not impact collaboration in terms of food exchange and program coordination for food security organizations within the New River Valley.

Analysis of Relationship between Network Structure and Geography

There is a self-evident link between the physical and social spaces of networks that can be seen in the language used to describe them both. This section seeks to determine which, if any, relationships exist between geography and network structure. The following paragraphs will examine the following network structures at three levels of analysis. First, at the node level of analysis, I will examine the relationship between organizational centrality and distance. Then, at the sub-network level, I will explore how geography impacts cliques and network structure. Finally, core/periphery structures will be examined at the network level.

Node level Analysis

Proximity is often seen as a key factor in collaboration because face-to face contact increases trust, allows for the creation of informal relationships (Bercovitz and Feldman, 2011), and eases the spread of knowledge between parties (Howells, 2002; Hansen and Lovas, 2004; Knoben and Orleans, 2006; Radil and Walther, 2019). If it is true that proximity is key in increasing collaboration, then it should hold that organizations that are more proximate to other organizations within the network will have an easier time forming relationships. As a result, these organizations would be more central to the network.

In this study, not all relationships are created equally, and consequently, not all will be affected in the same way by the relationship between centrality and drive time. Some of the relationships being examined, such as information sharing and client referral, require no face-to-face contact between food security organizations, while others, such as food exchange, demand that in-person interaction occur. Organizational activities such as resource sharing and program coordination may not require face-to-face interaction but are often improved when some sort of in-person

contact occurs. Given these differences in the way organizations might collaborate for certain activities, there should be a difference in correlation for activity types and drive time.

Centrality scores were calculated for each of the organizations in the network for each type of tie using UCINET. Drive time, calculated in ArcGIS, was the average (mean) distance between each organization to all other organizations within the network. Using these two calculations, the data was entered into Excel and a Pearson correlation was conducted. These results in Table 4.7 depict the relationship between centrality in the various organizational activity types and drive time.

Table 4.7: Drive Time and Centrality

	DT	IS	FE	CR	SR	PC
Drive Time	1.000					
Information Sharing	-0.556	1.000				
Food Exchange	0.0957	0.4753***	1.000			
Client Referral	-0.023	0.4257***	0.1964*	1.000		
Shared Resources	0.0437	0.8493***	0.3869***	0.8023***	1.000	
Program Coordination	0.0988	0.5740***	0.4212***	0.2824***	0.8023***	1.000
*p≤0.05; **p≤0.01; ***p≤0.001						

The findings show that all of the correlations between drive time and centrality are not significant at .05. For information sharing and client referral, this may be because organizations are able to use other means of communication that do not require physical contact. For activities such as food exchange and shared resources, distance may not be considered when collaborating because highly central organizations have resources to share that overcome the problems associated with a lack of geographic proximity. For example, FASWV is highly central to the Food

Exchange network with a centrality score of 38, but also has one of the least proximate drive time scores at 47.83472. The fact that this organization is the major supplier of food to organizations in the area seems to suggest that their ability to provide a much needed resource overcomes the inconvenience of having to travel to access their services.

Given the high degree of centrality of FASWV, Table 4.8 shows the relationships between each type of tie and the network centrality without FASWV. Again, none of the relationships correlate with any significance to Drive Time.

Table 4.8: Drive Time and Centrality without FASWV

	DT	IS	FE	CR	SR	PC
Drive Time	1.000					
Information Sharing	0.1518	1.000				
Food Exchange	0.1258	0.327***	1.000			
Client Referral	0.0516	0.4133***	0.1651	1.000		
Shared Resources	0.0420	0.8262***	0.1794	0.0420	1.000	
Program Coordination	0.0108	0.4883***	0.0913	0.258***	0.7682***	1.000
*p≤0.05; **p≤0.01; ***p≤0.001						

Sub-Network Level Analysis

A clique in a network is defined as “a subset of points [organizations] in which every possible pair of points is directly connected by a line and the cliques is not contained in any other clique” (Scott, 2000, p.14). Because all of the members of a clique must be interconnected, it would make sense for these organizations to be closely located geographically, if geography is in fact a barrier to collaboration.

In order to find the correlation between cliques and drive time, the first step was to determine the cliques for each type of tie. Using UCINET, cliques were calculated

with a minimum size of three. The minimum size determines the smallest number of organizations that must be interconnected to qualify as a clique. Three was used because it was the smallest number a group could have without being a dyad. This analysis results in the creation of a clique overlap matrix containing co-membership among organizations within the cliques. For each type of tie, a QAP was run between the drive time matrix and the clique matrix. The results are shown in Table 4.9.

Table 4.9: Drive Time and Cliques

	DT	IS	FE	CR	SR	PC
Drive Time	1.000					
Information Sharing	-0.049*	1.000				
Food Exchange	0.019	0.499***	1.000			
Client Referral	0.002	0.731***	0.514***	1.000		
Shared Resources	-0.016	0.805***	0.533***	0.685***	1.000	
Program Coordination	0.010	0.448***	0.485***	0.376***	0.623***	1.000
*p≤0.05; **p≤0.01; ***p≤0.001						

A negative significant relationships was found between drive time and cliques in the Information Sharing network suggests as drive time increases, clique membership decreases. Information sharing requires less resources to conduct and is more easily accomplished and less involved than any of the other organizational activities discussed in this dissertation. As a result, it makes sense that cliques are not necessarily needed for information sharing. Information sharing also does not require face-to-face contact which helps to explain the negative correlation.

Network Level Analysis

Networks can be structured in a core/periphery structure which is indicated by a dense group of organizations that are the core, surrounded by more peripheral

organizations that are connected to the core, but seldom to other peripheral organizations (Borgotti and Everett, 2000). Core organizations are densely connected to one another, meaning that these organizations have a high percentage of ties to other members of the core and to those in the periphery (Borgotti, Everett, and Johnson, 2013). Core members are also highly central to the network resulting in shorter paths to other members of the network (Rombach, Porter, Fowler, and Mucha, 2014).

Since organizations that are considered to be core to the network are also highly central to the network, it would suggest that proximity may be a factor in making them core. Organizations with more than one location in the New River Valley should not only be core to the network but may also serve to bridge organizations in different locales. Geographic proximity may play a part in which organizations are core to the network as these organizations have greater possibilities for informal relationships and casual encounters, making relationships easier to form.

In order to examine the relationship between core organizations and geography, a coreness score was calculated for each organization in UCINET. Coreness was calculated by creating a continuous degree of coreness for each organization for all of the relationships. The degrees of coreness were then entered into Excel along with the average Drive Time for the individual organizations. In Excel, I ran a Pearson Correlation between the degrees of coreness and Drive Time calculations for each of the organizational activities. In addition, Pearson correlations were conducted between each of the individual types of ties. The results are shown in Table 4.10.

Table 4.10: Drive Time and Core / Periphery

	DT	IS	FE	CR	SR	PC
Drive Time	1.000					
Information Sharing	0.1085	1.000				
Food Exchange	0.2124***	0.1371	1.000			
Client Referral	0.0208	0.3719***	0.0186	1.000		
Shared Resources	0.0084	0.3119***	0.0005	0.1774	1.000	
Program Coordination	0.0144	0.1232	0.0141	0.1633***	0.9367***	1.000
*p≤0.05; **p≤0.01; ***p≤0.001						

The findings show that there is a statistically significant relationship between Drive Time and Food Exchange. The positive relationship indicates that higher drive time means that organizations are less likely to be part of the core. Given that FASWV plays a highly central role in the Food Exchange network, as well as the fact that it is geographically an outlier from most of the network, I decided to run the correlation between drive time and core/periphery again without FASVW. The results are below in Table 4.11.

Table 4.11: Drive Time and Core / Periphery without FASWV

	DT	IS	FE	CR	SR	PC
Drive Time	1.000					
Information Sharing	0.1425	1.000				
Food Exchange	0.0756	0.0636	1.000			
Client Referral	0.0175	0.377***	0.0169	1.000		
Shared Resources	0.0103	0.314***	0.0560	0.1776	1.000	
Program Coordination	0.0155	0.125	0.0763	0.1633	0.9367***	1.000
*p≤0.05; **p≤0.01; ***p≤0.001						

Removing FASWV from the calculations resulted in there no longer being a correlation between drive time and coreness for organizations in the Food Exchange network.

Summary of Quantitative Findings

In Chapter 4, I provided a description and analysis of the Thrive network. I expected to find that organizations located geographically close to one another would be more likely to collaborate. Based on this expectation, I began the data analysis of the food security organizations in the New River Valley. Five types of ties were examined: Information Sharing, Food Exchange, Client Referral, Shared Resources, and Program Coordination. I found that in most situations, drive time (used as a measure of geography) did not correlate with collaborative activities. The exceptions were a slight, statistically significant correlation between drive time and the Information Sharing, Client Referral and Shared Resources networks. However, these correlations do not provide strong evidence of a relationship between certain types of collaboration and perceived geographic barriers.

Considering the lack of a strong relationship between geography and organizational activity, additional tests were performed to investigate different conceptions of the relationships. In those analyses, I found that drive time mattered in some instances, but not in others. First, when looking at centrality and drive time at the node level, I found no correlation between any of the organizational activities and drive time. Even when removing FASWV, an organization that was highly central in all of the networks but located outside of the New River Valley in nearby Salem, Virginia, I did not find a correlation. I had expected to find, given the concerns of survey respondents about geography as a barrier to collaboration, that the organizations that were most central to the network would also be the most geographically central. After all, if centrality is a measure of the number of ties an organization has, then it would follow

that organizations with less geographic barriers have more collaborative partners. My analysis instead raised a further question: why was this not the case?

In addition to the node-level analysis, I also analyzed the sub-network level to explore a potential relationship between collaboration and geography. Cliques, which are “a subset of points in which every possible pair of points is directly connected” to all of the other organizations within the clique, represent a subset of the network (Scott, 2000, p.14). I believed there would be a correlation between geography and cliques in that organizations closely located to one another would be more likely to be interconnected. However, while there was a slightly negative (-0.049), statistically significant relationships between the Information Sharing network and Drive Time, the data still did not explain the suggestion by survey respondents that geography was a barrier to collaboration.

Finally, at the network level of analysis, I tested the relationship between geography and the core/periphery structure of each organizational activity. With this test, I found that Food Exchange and Drive Time were strongly, significantly, and positively correlated (0.2124). This correlation between Food Exchange and Drive Time suggests that the greater the coreness value for the network, the more Drive Time organizations are willing to endure in order to collaborate in areas of food exchange. However, knowing that FASWV was highly central to the Food Exchange network, I ran the correlation again after removing FASWV and found that there was no longer a relationship between the coreness of the Food Exchange network and Drive Time.

CONCLUSION

The findings of the quantitative analysis in the section demonstrate that geography, as expressed in drive time, does not have as much of an effect on collaboration as suggested by respondents to the organizational survey. One would

expect, given that 65 percent of the respondents rated geography as either a major or a minor external impediment to collaboration, that all of the organizational activities would be in some way affected by drive time. Instead, the results show only a small, statistically significant negative relationship between drive time and the Information Sharing network and drive time and the Client Referral network. Neither of these organizational activities require face-to-face contact, so it is unclear why information sharing and client referral increase when drive time decreases. In addition, one might expect to see a correlation between organizational activities that actually require, or benefit from, in-person interaction and drive time. However, this was not the case when looking at food exchange, shared resources and program coordination.

Additionally, the relationship between geography and network structure was not as strong as I anticipated based on survey responses. When looking at the node level of analysis, I found no relationship between geography and centrality for any of the organizational activities. At the sub-network level, the only statistically significant relationship was in the Information Sharing network. Here there was a negative correlation between information sharing and drive time suggesting that as driving times increase, clique membership decreases. Finally, at the network level, once FASWV is removed from the network, the core/periphery structure has not relationship to drive time for any of the organizational activities.

Given that there seems to be a disconnect between the level of concern in regards to geography as a barrier to collaboration and the quantitative findings revealed in this chapter, further inquiry is necessary. In Chapter 5, using quantitative analysis of respondents' interviews, I hope to find out the relationship between collaboration and geography for food security organizations in the New River Valley.

CHAPTER FIVE

QUALITATIVE ANALYSIS

In chapter four, I quantitatively examined the food security organizations that were identified as participants in or of interest to the Thrive network. I found that despite the fact that over 65 percent of the respondents indicated that geography was a major or minor barrier to collaboration in the organizational survey, only Information Sharing, Client Referral, and Shared Resources had a correlation to Drive Time. These ties, which were found to be negative and significant, did not provide a strong relationship, but still suggested a barrier to collaboration when sharing information, referring clients and coordinating programs. For the Food Exchange and Program Coordination networks, however, no significant relationship was found between these activities and drive time. With little evidence that geography is a barrier to collaboration found quantitatively, the question that remains is: Why is geography perceived to be a barrier to collaboration for some ties (especially those that do not need face-to-face contact, like information sharing) while not being a barrier for food exchange, which necessitates in person contact?

In this chapter, I examine further the role of geography in collaboration qualitatively through interviews. The aim of this analysis is to better understand how food security organizations in the New River Valley perceive geography as a barrier to collaboration, and to gain a more specific understanding of their issues regarding collaboration. The ultimate goal of the analysis is to dive deeper into what issues related to geography are actually creating collaborative barriers.

QUALITATIVE ANALYSIS

The methods used to code the interviews was discussed previously in Chapter 3. To sort the data into categories, the data was analyzed several times. I was the solo coder for this process and two different techniques for coding were used. First, by means of summative content analysis, the data was searched for terms related to geography. The documents were culled for words such as distance, drive time, and transportation. Once these sections of the interviews were selected, these sections were moved into a second document to be open coded by means of modified grounded theory. The results of the summative content analysis are listed below in Table 5.1.

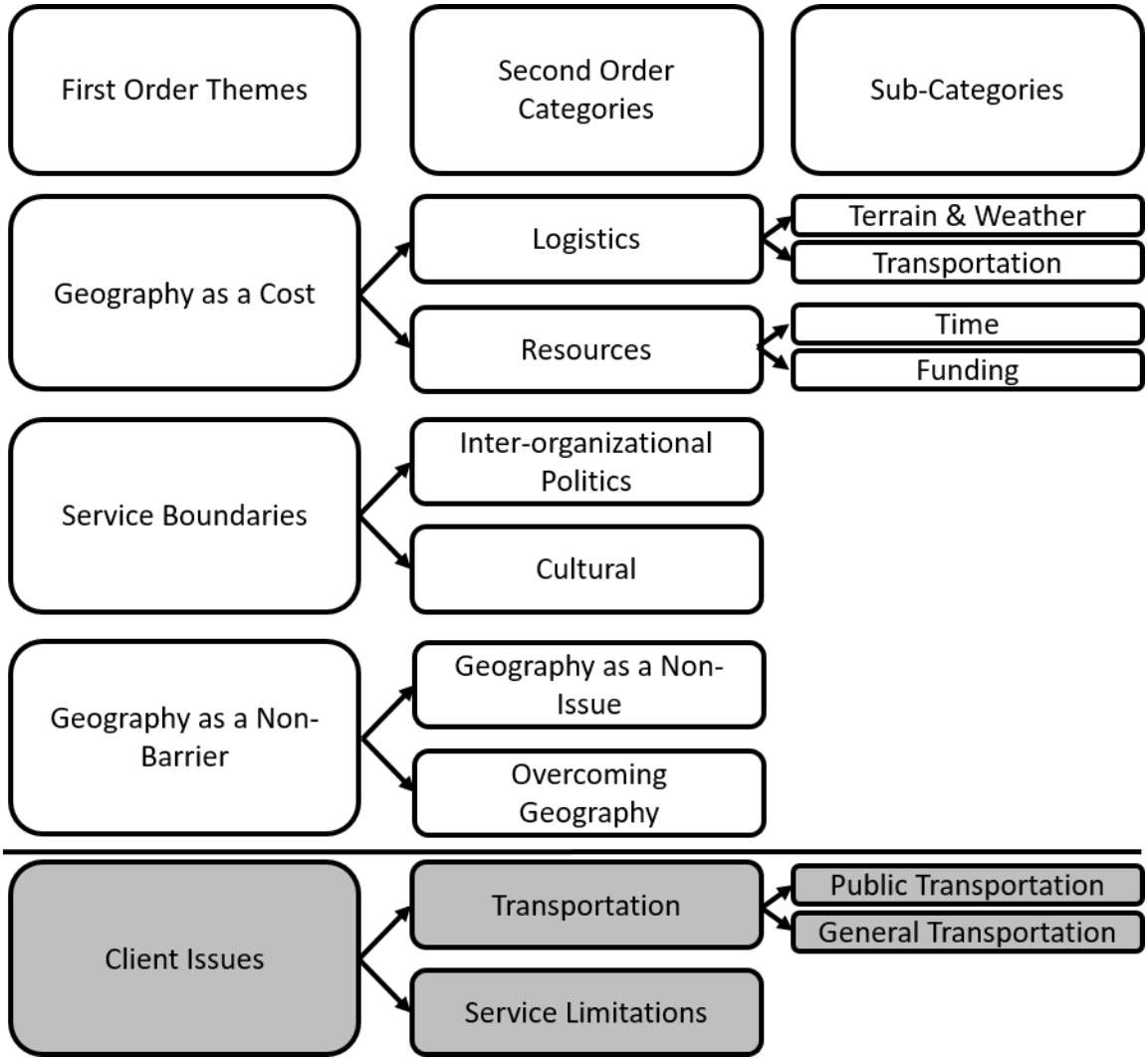
Table 5.1: Initial summative content analysis results

No barrier to collaboration created by geography	Limiting service area of organization by geography
Driving time as a barrier to collaboration	Limited capacity as a result of geography
Driving distance as a barrier to collaboration	Politics of resources
Client resources scarce as a result of geography (gas, childcare)	Different cultures across the region
Inter-organizational politics as a barrier to collaboration (not friendly/treated as important)	Centrality of meeting spaces
Client lack of transportation	Frequency of meetings
Poor public transportation across the region	Organizational capacity
Weather	Purpose of collaborative meetings

Once the summative content analysis was complete, I read through all of the passages that had been selected as containing geographic terms and annotated key words or themes that seem to encapsulate the quotes. Building off of these key words, I

examined the theories that had emerged, and found that several common ideas presented themselves. These ideas were then divided into first order themes, second order categories, and sub-categories. Figure 5.1 below shows the resulting themes, categories and sub-categories.

Figure 5.1: Coding Themes and Categories



The first order categories consisted of geography as a cost, service boundaries, geography as a non-barrier, and client issues. These categories represent the overarching concepts that were revealed through the interviews. The second order themes, which are logistics, resources, inter-organizational politics, cultural, geography as a non-issue, overcoming geography, transportation, and service limitations, denote

the more specific concepts within those first order categories as expressed directly from the interview respondents. The sub-themes, which are terrain and weather, transportation, time, funding, public transportation, and general transportation, are used to further capture the thoughts of the respondents. Detailed discussion of the categories, themes, and sub-themes will be provided in the next section.

QUALITATIVE RESULTS

Interviewees were asked specifically about barriers to collaboration. Those who did not mention geography, or a theme related to geography, were then asked if geography was a barrier to collaboration. The findings from the qualitative analysis supports the idea that geography is a barrier to collaboration. However, the data also demonstrates that these barriers are not limited to issues of collaboration and that, in many cases, organizations' perception of geographic barriers focus more on their direct service delivery relationship with clients than with their collaboration with other organizations.

The impacts of geography on collaboration between food insecurity organizations within the New River Valley will be discussed first. The themes that emerged in this area are (1) geography as a cost and (2) service boundaries. Also emerging was the idea of geography as a non-issue, where organizations either did not view geography as a barrier to collaboration, or were able to overcome this barrier in some way. Finally, the theme of client issues, as it pertains to the geography of the region, will also be examined. It is in this discussion that the idea of client relationships as collaborative efforts is discussed.

Geography as a Cost to Collaboration

Geography as a cost to collaboration surfaced as one of the key themes in the organizational interviews. This theme suggests that collaboration among organizations

requires extra resources to conduct as a result of the imposition of geography in the New River Valley region. These resources include time and funding. Time and funding to collaborate across the region is costly because of the logistical issues regarding weather and transportation. Of the eleven organizations that were interviewed, seven (63.6 percent) identified geography as a detriment to collaborating with other organizations. Under this theme, two main categories emerged. This first category was logistics, with seven of the eleven (63.6 percent) of the organizations citing logistics as a barrier to collaboration. The second category identified resources as necessary to collaborate with other food security organizations in the New River Valley. Six of the eleven (54.5 percent) indicated that geography reduced resources available for collaboration. Table 5.2, below, provides selected quotes that represent geography as a cost at both the logistical and resource level.

Table 5.2: Profile of Interview Quotes Regarding Geography as a Cost to Collaboration

Geography as a Cost to Collaboration	
Logistics	
Weather and Terrain	
1 Driving Safety	“And it might be older adults who don't drive at night if it's an evening meeting, you know, maybe don't feel comfortable driving. We have to have meetings in the afternoon like on a Sunday afternoon or something so they can participate because driving after dark is not their thing.” (Backpack)
2 Terrain	“It was recently it was a mass something. I said I don't even think I can get that down our driveway. I said, can't you call Organization A. And they said, they couldn't take it. They couldn't because it was too small and they were too far. [But it went to waste because we couldn’t take delivery and the organization that could was too far away]” (Food Bank)
3 Weather	“Interviewer: Do you have a hard time getting people to come out here and share food? Respondent: We get what we need and we send it on out to our clients. It works really well. Unless there's a storm. Then the balance is thrown [because people can’t get here].” (Food Bank)
Transportation	

4 Planning	“There has to be some preplanning [if we are going to help other organizations with transportation]. We do try to utilize our central system that we have in place for drivers that are paid to do that. Just because we've got the vans and we're going to make deliveries and whatnot. It doesn't mean that we can always just link up, swing by and pick up whatever it is that people have to give out and give it out on a whim.” (Service Organization)
5 Planning	“Working with Organization X is [hard]…If we could purchase from them at a discount and know what was going to be there. To know, do we need to bring one car or two cars? It's a 35 minute drive, 40 minute drive. What else are we going to need to also order from Food Lion to supplement what you don't have available?” (Backpack Program)
6 Inconvenience	“So it's I think there is a perception that this, you've got to drive and get there for a meeting. And so there is an inconvenience factor thereof, you know, be honest to say there are times I Gosh, I wish that meeting wasn't all the way over.” (Food Bank)
7 Parking	“I think that trying to find central locations to have meetings is helpful. Obviously, I would say Tech, but parking is such an issue at Tech. So unless parking is somehow thought into the process...” (Backpack Program)
Resources	
8 Time	“Even if it's a meeting, there's always that. How much time do you spend in the car or if it's how much time you engage with a community partner? And what's that tradeoff like? I think distance is a huge barrier for me and I would think for our program and future collaboration.” (Food Distribution Program)
9 Funding	“But, you know, if you got to go to a meeting all the way in say Pulaski, then I've got to justify the gas. You know, time and stuff, but so you've got to be kind of intentional and the geography does play into that.” (Backpack Program)
10 Capacity	“We only have X number of student leaders. So to add more collaboration would mean that we would need to increase our student leaders. Not sure that we're there yet to serve more [organizations].” (Food Distribution Program)
11 Burden on Volunteers	“We don't use volunteers for delivery. Main thing is because of the geography. I mean, you're not going to have a volunteer usually that's willing to drive their own vehicle 40 miles roundtrip every day.” (Service Organization)

Two sub-themes emerged from the logistics category. The first involves weather and terrain. Cells 1-3 are examples of weather and other geographic features being a barrier to collaboration with other organizations as a result of geography. Cells 4-7

illustrate other logistical areas, including issues associated with transportation logistics. Specifically, Cells 4-5 are organizational discussions about transportation planning and collaboration while Cells 6-7 talk about convenience factors related to travel, transportation, and parking.

The second category that was identified under geography as a cost was the issue of resources. Cell 8's respondent discussed the time needed to collaborate, specifically mentioning the amount of time spent in the car driving to meetings for the purpose of collaboration. Cells 9, 10, and 11 focus on funding as a barrier to collaboration, including the cost of gas, the need to pay student leaders (i.e. those that drive the vehicles for delivering food), and the inability to use volunteers in order to increase collaboration across the region.

In Chapter 4, the findings suggest that there is a statistically significant correlation between Drive Time and the Information Sharing, Client Referral and Shared Resources networks. These correlations are both negative and very weak and suggest a barrier to collaboration in these organizational activities. The correlations for the Food Exchange and the Program Coordination networks with Drive Time are not significant. These findings suggest that for activities that require (or are more easily accomplished as is the case of program coordination) face-to-face contact, there are other factors that override the geographic barriers to collaboration. For example, when asked about meeting locations:

> Interviewer: So if we if we moved the meetings to different places, would that still be something you would be interested in? As long as sometimes they were [in your locality], would that be easier?
>
> Respondent: For me, it's just so helpful because this is all new to me. I'm learning so much from participating. And so I appreciate it. From a

> development standpoint, it is just to learn the biz, because this wasn't about my background. I'm new to the area. So I learn about the nuances of the different counties and its populations. And so that's very helpful to me. [So going to meetings at different organization's locations] would have the extra motivation which would be I'd be seeing another setting. So that would be worth the drive. Worth the drive. (Food Bank)

Here, the respondent reveals that while geography has a time cost associated with it in terms of collaboration, there can also be benefits when meetings are planned strategically. In this case, the interviewee acknowledges that she is much more willing to drive to meeting locations that are less centrally located when there is a secondary purpose to the meeting, such as learning best practices or visiting facilities of similar organizations in the network.

What clearly emerged from examining geography as a cost to collaboration is that some organizations do believe that collaboration comes at the expense of their other duties in the form of either time or money. Others perceive the costs to collaboration as the logistics of working across a dispersed geographical region. However, despite these costs, as seen in the last quote, there are still reasons organizations want to work with other food security organizations in the New River Valley.

Service Boundaries

The second theme that emerged from the interviews deals was service boundaries. Service boundaries are limitations created on how and when organizations collaborate. Nine organizations (81.8 percent) identified service boundaries as a barrier to collaboration. Service boundaries were divided into two categories. The first is inter-organizational politics and the second is culture.

Five organizations (45.5 percent) indicated that inter-organizational politics had hindered their ability or willingness to collaborate with other organizations in the network. The Thrive network is comprised of five different local political jurisdictions, as well as the state and federal governments. As a result, there are often issues that arise for organizations that are working across these different areas in the New River Valley. These geopolitical boundaries can create barriers to collaboration. In addition, organizations may have issues with other organizations that are not political in nature, but that hinder their willingness to work together.

Cultural practices in the New River Valley have also created an environment that is not always conducive to collaboration among organizations. Seven organizations (63.6 percent) indicated that culture has created a collaborative barrier. The New River Valley is located in Appalachia, which has created, as a result of the geography, different pockets of individuals who have, over time, create unique and distinct cultures that may not encompass the region wholly. Some of these issues are the result of organizational cultures not being shared; in other cases, the culture of Appalachia hinders collaboration. Table 5.3 displays some of the quotes linked to service boundaries and geography.

Table 5.3: Profile of Interview Quotes Regarding Service Boundaries, Geography and Collaboration

Service Boundaries and Collaboration	
Inter-organizational politics	
1 Working across geopolitical boundaries	“I go and speak to the board of supervisors talking about what we do and funding and I finished with the board of Supervisors and get asked: But you're not in XXX County, are you? We have been doing medical transportation meals, in-home services. But we weren’t formed in XXX. We aren't located in XXX. It’s just, that’s just the mentality.” (Service Organization)
2 Working across geopolitical boundaries	**“**And I was at a transportation meeting there last week, and they're grappling with our transportation needs.

	One of their board of supervisors was there…and we're talking about transportation and maybe ways that we can have a small rural transit under our umbrella that serves [our] town and county. And so I was talking about ways that maybe we can look at, you know, getting a consultant and DRPT grant and trying to find out what really the needs are because they're all over the place right now. And this came out of his mouth, "You're good people, but we don't want anybody outside of XXX to come in and tell us what we need to do." I'm just like, how do you know? But when you figure out what you need, if there's some way we can help you, just let me know. It's just very bizarre. Very closed." (Service Organization)
3 Working across geopolitical boundaries	"Now, I was really upset that County A was laying off so many people. I know how we can help them. Nobody is interested in getting involved, first of all, we only serve County B. How do you go to County A and say, I'm only going to help the people [who have been laid off and are living] in County B? And we didn't end up doing it." (Food Bank)
Cultural	
4 Culture as a deterrent to collaboration	"They're open [to working with other organizations in the region], as long as it doesn't trample on [their beliefs]. I absolutely respect their culture and I get that [they have their own way of doing things]. But when you aren't willing to open up and try to figure out how we can work together. You know, I can really meet the needs of your citizens." (Fresh Food)
5 External decision makers not collaborating with local decision makers	"I mean, I've had people come in. They're going to come into our county and do this, this and that. And they have no clue that, you know, we already have some networks going on. We already have some things. It's like help us tie into what we're doing. And rather than coming in and starting your own thing, because we already have these relationships that we've developed. And so, you know, it kind of bothers me when somebody decides, oh, we're going to go in and make this big change, you know, make a big difference. They have no clue. They've not really met anybody from here. They don't know how people work and it's a slower process than that." (Food Bank)
6 Anti-Regionalism	"There isn't much outside of our county that I would need sharing from. From who? From a standpoint of who is serving local people. Are there some?" (Food Bank)
7 Regionalism	"Here because of the regionalism and the colloquialism of the New River Valley, geography is perceived as a problem. For me, having grown up in a damn Yankee

	land of Philadelphia, when I got down here, part of my life was spent literally on the road." (Fresh Food)

Inter-organizational politics are discussed in Cells 1-3. Cells 1 and 2 specifically deal with issues of working across geopolitical lines within the New River Valley. The interviewees discuss their difficulties in collaborating with organizations in other counties as a result of the political boundaries. These comments could reflect multiple motivations, such as a lack of distrust of outside organizations, animosity between counties, or even an unwillingness to give up control in regards to the suggested programs that would occur because of collaboration.

The interviewee in Cell 3 suggests another type of inter-organizational politics as a barrier to collaboration. In this case, the respondent talks about the unwillingness of their organization to expand its coverage areas to include another county despite the need that has developed there. In this scenario, the organization did not address the need of this additional service area because it was worried about inter-organizational politics becoming an issue.

The second category that emerged in the service boundary category was that of culture. Cultural issues included barriers to collaboration that were not limited merely to geopolitical and inter-organizational boundaries, but instead were the result of the attitudes and beliefs held by the people of the New River Valley. Cells 4-6 focus on the autonomy of the individual counties. In Cells 4-5, issues of control are discussed and the respondents argue that organizations are sometimes unwilling to give up control in their locality for fear of external influences taking over. Cell 6 addresses the lack of need to move outside of their county for support. Cell 7's respondent made the argument that many of the barriers to collaboration that occur in the New River Valley are more the result of the perceptions of geography rather than the actuality of it. This

respondent discuss the fact that the culture of Appalachia has more of an impact on the willingness of people to work together than the actual drive time between organizations.

Geography as a Non-Issue/Overcoming Geography as a Challenge

The third theme that materialized when analyzing the data deals with geography as a non-issue or organizations that have found a way to overcome geography as a challenge to collaboration. Three of the eleven (27.3 percent) organizations that were interviewed discussed aspects of collaboration where geography was not a barrier. Two of the eleven organizations (18.2 percent) mentioned ways in which geography as a challenge has been overcome. The quotes in Table 5.4 are representative of these themes.

Table 5.4: Profile of Interview Quotes Regarding Geography as a Non-Barrier

Geography as a Non-Barrier	
Geography as a Non-Issue	
1 Using Personnel Effectively	“Well, you know, we've got two retired guys who go down there twice a month to pick up and they both have trucks. So it's not too bad, but it's not that big a deal.” (Backpack Program)
2 Distance as a Perception	“In my opinion, distance is merely a perception among people in this area. The only thing I think that you can really do in the long term is present an opportunity and then hope that it's bought into. And part of it is I see the issue with the transportation going back and forth and spreading outside of ourselves. Is that a conversation that recognizes we really need each other?” (Backpack Program)
3 Positives of Terrain	“It's a beautiful drive. Yeah. And it's pleasant and I can drive at a constant speed.” (Food Bank)
Overcoming Geography as a Barrier	
4 Creative Solutions	“Yeah, we have we have worked out this elaborate pick up where the gleanings are left beside the red jeep in the such and

	such parking lot we go there." (Food Bank)
5 Staying Engaged	"I mean, information sharing, it seems like you can do without geography, but that could be done so many different ways. And then we do try to stay engaged because we're a regional agency, so to speak. It does take time, but we try to go into the communities for the meetings and the organizations that they have where there's that shared information time." (Service Organization)

The quotes in Cells 1-3 illustrate that for many of the food security organizations in the New River Valley, geography is not a barrier to their willingness to collaborate. The respondent in Cell 1 talks about making use of personnel who are willing to traverse distances while the interviewee. The respondent quoted in Cell 2 talks about the fact that geographic barriers are only a perception of the organizations in the network, and that if these organizations can find value in collaborating, the distance between them will seem less daunting. The respondent mentioned getting buy-in about the importance of the Thrive network as a way of changing attitudes among food security organizations within the New River Valley. The respondent in Cell 3 speaks about some of the advantages of the terrain and the beauty of travelling in the New River Valley. All seem to come to the conclusion that geographic distance in the New River Valley is a given, but that the necessary interactions between members of the network are not hindered by the travel required.

The quotations in the second category demonstrate ways in which geography has or could be overcome in collaborative efforts. In Cell 4, the respondent discusses one way in which their organization works with another organization in the network. The two groups "meet" at a common location between the two to transfer food so that the distance is halved. As a way to overcome geography as a barrier, the respondent in

Cell 5 mentions the ability to share information despite distance while emphasizing that the need for face-to-face contact, while inconvenient, is also critical. The respondent argues that while geography may be a challenge, she sees importance in remaining engaged with other food security organizations in the New River Valley.

All three themes listed above focus on the relationship between geography and collaboration and seem to answer the interview question of "Do you see any barriers to collaboration in the network? And if so, what would you identify as the main barriers to collaboration for your organization? Is geography a barrier to collaboration for your organization?" However, a final theme emerged from these interviews that seemed to focus less on the role of geography and collaboration, and more on the relationships between clients and organizations within the network, and how these relationships are affected by geography. These responses will be examined further in the next section.

Client Issues

Interviewees, as mentioned above, were asked specifically about if and how geography was a barrier to collaboration. When this question was asked, it was expected that the responses would address how geography and distance impacted their work with other organizations that focus on food security in the New River Valley. However, over fifty percent (six of eleven) of the respondents answered first with concerns about dealing with client issues in regards to geography, rather than its impact on working with other organizations. Nine of the eleven (81.8 percent) respondents mentioned that geography was a barrier for their clients to receive services. The reoccurrence of this theme suggested a need to analyze the responses.

Two main categories emerged: transportation and service limitations. The transportation responses fell into two subcategories. In the first, public transportation, interviewees focused on both the lack of public transportation in the area and the

inefficiencies of the limited public transportation that is available. The second subcategory focuses more generally on issues that clients face in getting to service locations that provide food, such as lack of vehicles, gas prices, etc. Representative quotes dealing with client issues are shown in Table 5.5 below.

Table 5.5: Profile of Interview Quotes Regarding Client Issues, Geography and Collaboration

Client Issues	
Transportation	
Public Transit	
1 Lacking Infrastructure	"But because of the routes, it's so if you were working at XXX University and you live on West end, the bus is not going to help you. They also don't have benches and covers at the bus stops, and I said we need to treat people with dignity. And if it's raining or snowing or cold, you know, these folks should not be sitting on the ground or standing in the rain." (Backpack Program)
2 Lacking Infrastructure	"[The bus line in that county] doesn't have any stops out XXX Road, where you have people that have genuine transportation needs to get to work. You know, if [the bus] would just put a stop down there and run morning and afternoon a couple of times over to the industrial park around the corner, that would help people a lot that don't have reliable transportation, that live in those trailer parks down there." (Food Bank)
3 Different Priorities	"But why does [bus system 1] not serve really the low income folk that do live within the town limits that are working, say, like at the industrial park or something like that? So the lines that we have are mainly for college kids who get to [another town]. It's almost exclusively college, the [other bus system 2]. They don't really connect much to each other." (Backpack Program)
Transportation in General	
4 Lack of Reliable Transportation	"They don't have reliable transportation. There's really no options. They lose their ride. Then they lose their job and then they're back in the cycle of poverty again. So communication, working, getting ride shares, whatever it looks like." (Food Bank)
5 Dispersed Service Locations	"I don't know how many, but there's a fair number of people that depend on us that have transportation problems, challenges. And so in the old days, they used to have to go to Town A [to get screened for

	services]. And then come to us on one of the mornings or afternoons that we are open." (Food Bank)
6 Dispersed Service Locations	"So, you know, getting that person from point A to the intake center and we transport then the homeless to the church, the host site, as we call it that night. You know, getting one person from here to there can be very challenging." (Food Bank)
7 Transportation as a Deterrence to Services	"I think geography, it makes it very difficult. It makes it difficult because many of the areas transportation is the biggest deterrence or hindrance or whatever you want to call it for persons needing services." (Service Organization)
8 Organizational Liability	"That's the positive side of transportation issues. The negative side is we more or less have a policy of not transporting our client. We feel like there is liability. So we even have a sign on the front door that says in effect, if you know you don't have a ride home, we can't serve you today. You'll have to come back when you have a ride." (Food Bank)
Service Limitations	
9 Localization	"We run basically this zip code. So it includes XXX. There's some gray area because the schools, the County schools, for example, they are taking some students who technically live in [another town so it] gets a little gray sometime, but they bring in their I.D. for eligibility, we look at zip codes. Yeah, we're pretty localized." (Food Bank)
10 Localization	"If you need services in City A, the office that you would go to our assistance location in City A. Now funding for those each locality, for instance, if I lived in the City B and I needed emergency assistance services, I would have to go to the emergency assistance location in City B, so that's where the borders kind of come in with some of the funding. You have to get services in the area that you live for emergency assistance." (Service Organization)
11 Localization	"The only requirement is that you're a resident of the county. And for the delivery part there's an additional requirement that you don't have transportation as transportation is a big problem in [our] county." (Food Bank)
12 Localization	"People will come a long ways. And we, if they show up and they're not from here, they're from County A or County B or City C, and they come here. And they'll say, we're stuck, so we load them up. You can shop this one time, but [not in the future. So we try to tell them where they go in their own county]." (Food Bank)

13 Barriers to full service implementation	"[Geography is] not a barrier with our with our established meal delivery. Well, I say it's not a barrier. We have a lot of folks on frozen meals. Just because we can't get out to [the various places that they live within two hours of making the hot meals]" (Service Organization)

Though the New River Valley is considered to be a rural area (USDA, 2019; New River Valley Regional, 2015), it also has the advantage of containing two major universities, each of which facilitate a public transportation system. One of these systems is located in Blacksburg, which is the largest town in Montgomery County and home to Virginia Tech. The other bus system is located in the City of Radford, which is where Radford University is located. Additionally, Pulaski County has a bus system with limited hours.

Three of the eleven (27.3 percent) organizations interviewed specifically mentioned public transportation as a key issue in the New River Valley when it comes to providing services to clients. In Cells 1-3, respondents discuss the issues related to public transportation in the area. Respondents in this category note that the bus services in both of these regions focuses on the needs of the students, suggesting that despite the availability of these services, the transit systems provide little help to clients served by the Thrive network.

In addition to public transportation as a barrier for clients, one of the key items discussed is clients finding transportation that would give them access to the services provided by food security and other social welfare organizations within the New River Valley. Six of the eleven organizations interviewed (54.5 percent) stated that transportation was an issue. Cells 4-8 provide examples of the responses that were given when asked about geography and collaboration that applied to client transportation issues. The quotation in Cell 4 is representative of organizations that

talked about the lack of reliable transportation that many clients in the area face, as well as the consequences of continued poverty when this occurs. In Cell 5, the respondent discusses discontinuing collaboration with another organization due to a lack of transportation for clients in the New River Valley. Previously, the organization had sent clients to a more centralized location to be screened; however, the organization eventually had to create its own screening process because clients were unable to secure the necessary transportation to get to the other town for screening. Cells 6-8 offer quotes from organizations that have had issues with transporting clients. The respondents represented in Cells 6 and 7 mention the burden placed on clients by geography. The organization quoted in Cell 8 discussed the need for their organization to create a policy in regards to client transportation to reduce potential risk it may face. “We feel like there is liability. And we've had some scary things happen with women volunteers. Man /woman issues” (Food Bank).

The final category under the client issue theme deals with service limitations as a result of geography. Seven of the eleven organizations (63.6 percent) acknowledged some limitations places on their services to clients based on geography. In some cases, organizations limited their services only to clients in a certain geographic region as a way of ensuring these organizations are able to successfully address the needs of their clients. Other organizations discuss the challenges of providing specific services, such as hot food delivery, because of food safety regulations, food sourcing, and the required time needed to deliver to several of the rural areas in the New River Valley. A sample of the quotes from interviewees are shown in Cells 9-13. Cells 9-11 show sample quotes from organizations that limit their service areas, usually by county, but also by need, as a way of dealing with the challenges of distance. In Cell 12, the respondent talks about how they deal with clients who are from outside of their service

area. While the organization will help clients once, these organizations are unwilling to continue to provide services to these clients in the future. In a region like the New River Valley, this can create burdens on clients as the closest pantry may not always serve the county in which they reside. Finally, in Cell 13, the respondent notes that their services are diminished by the geography of the region. This organization wants to provide hot meals to all of its clients, but given the 2 hour limit for keeping food hot to insure safe handling, and the fact that many clients live in some of the more remote areas of the New River Valley, this organization is often only able to provide frozen meals. Geography, therefore, is impacting the ability of the service providers in the region to provide services to clients.

Summary of Qualitative Findings

While the quantitative findings, specifically the correlations between geography and the different types of ties, suggest that there are some weak relationships between geography and network structure, these relationships do not seem to rise to the level of concern about geography as expressed by survey respondents. In Chapter 5, I used qualitative analysis of interviews to further delve into the idea that geography has an impact on collaboration for food security organizations within the New River Valley. Four key themes emerged from the interviews.

First, the geography of the New River Valley increases the cost of collaboration for many organizations in the network. Second, organizations often impose, or have placed upon them, jurisdictional boundaries imposed upon their service-delivery areas. Third, some respondents either do not see geography as a barrier or have found ways to overcome the issue of geography. Finally, many respondents interviewed see the question of geography and collaboration as a client issue, which may be the most significant finding. Taking each one of these in turn, the remainder of this section will

discuss these findings and the related implications for collaboration when geographic barriers exist.

It is true, based on the interviews, that every organization saw some cost imposed by the geography of the New River Valley when it comes to collaborating with other food security organizations. For some, geography was something that must be considered in terms of time spent. One respondent mentioned that collaboration with others "becomes 'What is your ratio of driving time?' Even if it's a meeting, there's always that" (Food Distributor). For others, geography created the need to make a choice in the use of resources. "If you've got to go to a meeting all the way in County A, then I've got to justify the gas and be kind of intentional" (Backpack Program).

The influence of politics and culture on collaboration emerges further as the second theme identified from the qualitative analysis. The second theme is the idea that service boundaries are often created by food security organizations within the New River Valley based on political and cultural lines that are drawn within the region. Some boundaries are explicit, such as those related to the multiple geopolitical entities that govern the area. Despite the fact that the region has been given an identity by being named the "New River Valley," the region is actually separate counties, cities, and towns all have different jurisdictional areas that impact collaboration by creating service boundaries. As one respondent stated, "I think there's this wall there that shouldn't be. Sometimes there's a perceived idea that those people in City A are university college people. So they're liberal elitists and whatnot. So I think sometimes the weight of these self-imposed [burdens], there really aren't obstacles. But we impose them as obstacles. We erect them like a natural boundary. So it comes back to perceptions" (Backpack Program)

Some boundaries are more implicit. The discussion of service boundaries also touched on the issue of interorganizational politics. Multiple respondents mentioned issues in collaborating with other organizations in the Thrive network due to conflicts over power. In fact, one of the reasons that the Thrive network was formed originally was due to the perception many food security organizations had about one of the major organizational players in the region. Many providers believed that although they were supposed to work with this organization for food provision, they were being ignored.

The third theme to emerge from the qualitative analysis was geography as a non-barrier. This theme demonstrates that there are some food security organizations within the New River Valley that either do not see geography as a problem or that have found a way to overcome it. Some interview responses show that respondents who did not see geography as a barrier are those that found value in collaboration and the Thrive network structure. As one respondent noticed, "Just having a personal connection through Thrive with that person from Organization A…We could face to face or phone to phone…Just that connection, that exchange of food, has become so much better. So geography doesn't matter as much" (Food Bank).

Whether their responses to the survey indicated this or not, organizations throughout the region have found a variety of creative ways to overcome geography as a barrier. Food security organizations have figured out ways to share food and make use of resources. In speaking about a collaboration between a local university, a food delivery program, and her own organization, one respondent noted "You know, we worked really hard to get this egg delivery added to the Organization A's delivery so that we wouldn't have to be going to City 1 to get all the eggs, because it is time away" (Food Bank). The interviews suggest that the organizations that see a benefit in the collaboration are more willing to not let geography hinder their activities. One

respondent argued that “as a group, deciding there’s something tangible that we’re going to continue to work towards, [that’s] why we are coming together to collaborate” (Fresh Food).

The interview responses also indicate that most organizations understand collaboration as something that happens between them and their clients, not between them and the other organizations within the network. When asked about geography as a barrier to collaboration in the region, most respondents immediately began by describing their clients’ transportation issues. Some discussed the lack of available public transit systems, others talked about their clients’ personal lack of reliable transportation, and a few mentioned problems in regards to localization of services and its effects on their clients. Again, when asked about how geography affects collaboration among food security organizations in the New River Valley, most of the organizations do not immediately identify collaboration within the network as their work with other organizations. These organizations are instead focused on their clients; so much so, in many cases, that these organizations may fail to move beyond their client-based lens to see how network collaboration with other food security organizations can further help their clients. In this regard, their understanding of what it means to collaborate within the network, as well as the potential benefits of that collaboration, is more of an actual barrier to accomplishing their overall mission than is geography.

The preceding discussion demonstrates where geography is an actual barrier and when there is only the perception of geography as a barrier. Building relationships among the food security organizations within the New River Valley is what is needed to make the Thrive network successful. Given that the network is large, heterogeneous and geographically dispersed, there are many challenges that network leaders will have to address. My qualitative analysis shows that of key importance is the additional issue

of how network leaders can encourage client-centric organizations to see collaboration as something that must be done with network partners as well as with those these organizations serve.

CONCLUSIONS

While the quantitative correlations conducted in Chapter Four showed little connection between geography and network structure, the qualitative analysis indicates geography is indeed a barrier to collaboration for many food security organizations within the New River Valley. Collaboration is considered harder to accomplish because the geography of the region means that logistic planning is required, weather and terrain can prevent meetings, and time and funding are already in short supply. Culture and politics of the region also hinder collaborative efforts as groups from different parts of the New River Valley do not always find commonality in their efforts to serve clients.

Not all of the food security organizations within the region view geography as a barrier to collaboration. Some believe it is only the perception of distance that hinders collaboration, while other organizations have found ways to overcome the geography of the region. Creative solutions, such as creating midway meeting points or maximizing personnel, have been used to increase collaboration in the New River Valley.

Another finding from the interviews was that many of the respondents focused not so much on geography as a barrier to collaborating with other organizations, but the burden it poses on serving their clients. The discussion of client issues was a finding that I did not expect when initially conducting this research and the focus on clients seems to deter organizations from focusing on collaborating with other food security organizations in the New River Valley. In over fifty percent of the interviews, questions regarding collaboration were addressed first in terms of collaboration with clients. Network managers may be able to successfully increase collaborative efforts within the

Thrive network among member and non-member organizations by framing the conversation around meeting client needs in terms of service delivery.

The previous two chapters examined the relationship between geography and collaboration from both quantitative and qualitative perspectives. The remaining chapter, Chapter Six, seeks to bring together the findings from the network, GIS, and interview data. Bringing together all three components, I draw more definite conclusions about how collaboration is impacted by geography among food security organizations within the New River Valley.

CHAPTER 6

CONCLUSION

The purpose of this dissertation was to examine the relationship between geography and collaboration in a purpose-oriented, service delivery network. The research question driving the study emerged from the findings of an organizational survey of the Thrive network, a food insecurity network in southwest rural Virginia. Survey respondents indicated a concern that geography in the region was an impediment to collaboration. In this chapter, I seek to integrate the data collected from the network organizational survey, the network analysis, the GIS data, and the interviews conducted to discuss the broader implication of this study. The chapter is organized as follows. First, I will talk about the implications of this dissertation for theory and for practice. Then, I will examine the limitations of this study. Finally, I will conclude with future directions for this research.

INTEGRATIVE DISCUSSION AND IMPLICATIONS FOR THEORY AND PRACTICE

Kettl (2008) observed that “wicked problems” (Rittel and Weber, 1978) are seldom able to be solved by the work of one organization and that local communities increasingly are using a multi-organizational approach to leverage more capacity through collaboration. Organizations can collaborate in many ways, one of which is through the creation of formalized networks. Purpose-oriented networks are a type of organizing structure that leverages collaboration among member organizations to create a “joint-based effort for a common purpose.” (Carboni, Saz-Carranza, Raab, and Isett, 2019, p. 210). Purpose-oriented networks allow multiple actors to collaborate for specific tasks and shared goals (Raab and Kenis, 2009). Purpose-oriented networks, like all networks, also provide an alternative to markets and hierarchies (O’Toole, 1998)

by allowing for flexibility in organizing that is less possible for government agencies (Powell, 1990).

While purpose-oriented networks are often depicted as the solution to “wicked problems,” there are many tensions and barriers that must be addressed when both creating and maintaining these potentially complicated structures (Provan and Kenis, 2008; McGuire and Arganoff, 2011). Collaboration among organizations that provide social services can lead to more effective outcomes for clients (Provan and Milward, 2001); however, this can be attributed to the need of organizations to overcome limited resources (Huxham and Vangen, 2005) rather than a direct result of collaboration itself. Competition among organizations (van Gorp, 2014), issues of external and internal legitimacy (Human and Provan, 2000), lack of goal consensus (Vangen, Hayes and Cornforth, 2015) and various levels of organizational engagement (Poocharoen and Ting, 2015) have all been cited as barriers to collaboration.

One of the commonly identified barriers to collaboration is geography. However, geography and its impact on collaboration, has received limited attention in the empirical study of networks. Scholars have noted the importance of face-to-face contact in creating informal relationships (Bercovitz and Feldman, 2011), recognized the need for physical proximity in knowledge sharing networks (Katz, 1994; Carmel, 1999; Noll, Beecham, and Richardson, 2010), and observed that geographic features can impede collaboration in emergency management networks (Palm and Ramsell, 2007). Existing research on the relationship between geography and purpose-oriented, service-delivery networks is particularly limited.

As previously stated, purpose-oriented, service-delivery networks have a mission to provide a public good to clients (Milward and Provan, 2006). Unlike other types of purpose-oriented networks, service-delivery networks face unique geographical

challenges. For example, in some activities, face-to-face contact is necessary, such as in the exchange of resources. In addition, many of the social service organizations within service-delivery networks have reduced flexibility regarding physical service locations. Successful mission completion often requires that these organizations must be located in the same areas as their clients (McPherson, 1983). Finally, many social service organizations have resources that are place-based, limited to specific municipalities or jurisdictions.

I witnessed the perception that geography was a barrier to collaboration during my early work with the Thrive network, and this sparked my interest in the subject. What I saw drew me to the idea of researching the relationship between geography and collaboration for purpose-oriented, service-delivery networks. Prior to starting this dissertation, I worked with the network to analyze the structure of different relationships that existed among food security organizations within the New River Valley. As a result, I noticed that one of the key complaints being voiced at meetings was that geography and lack of transportation in the region made collaboration difficult. After conducting the organizational survey and finding that almost 60 percent of the respondents identified geography as a major or minor external barrier to collaboration, I was convinced this relationship deserved a deeper exploration.

The Thrive network provides the opportunity for an interesting case study. The Thrive network does not include all of the food security organizations in the New River Valley. Instead, Thrive is a network within the system of food security organizations in the region that is actively working to create a formalized network to encourage collaboration. Thrive seeks to include these organizations within its network in a variety of ways-from information sharing to program coordination. Because of the different food security organizations within the region, the potential Thrive network is large in size,

heterogeneous, and geographically spread out across the New River Valley. Networks that are large are often hard to govern (Provan and Kenis, 2008), making the creation of strong connections impractical (Lemaire and Provan, 2009).

In addition, considerable network heterogeneity results because organizations from different sectors perform multiple intersecting tasks with varying levels of resources. Churches, government organizations, healthcare groups, schools, social welfare organizations and civic groups all perform key tasks over a range of activities, such as operational support, backpack programs, fresh food and meal provision, pantries and education. And all of these organizations have diverse resource gaps, including limited funding, no paid staff, and food storage limitations.

Yet despite these difference and these challenges, food security organizations from four counties, Floyd, Giles, Montgomery, and Pulaski, as well Radford city, have come together to feed community members across the New River Valley. Why then, have 60% of these organizations determined that geography is a barrier to collaboration within this network? How have these organizations overcome this perceived barrier and how might these organizations, and potentially networks, do so in the future?

IMPLICATIONS TO PURPOSE-ORIENTED, SERVICE DELIVERY NETWORKS

The goal of this research was to examine the relationship between geography and collaboration in purpose-oriented, service delivery networks. In Chapter Two, I examined the literature in regards to the relationship between geography and collaboration. I asserted that due to the service-delivery component of the Thrive network geography would play an important part in the relationships in this network. The previous chapters detail the quantitative and qualitative findings of the research while this section examines the implications of these findings and how they might apply to the

field of public administration generally. Here, I will make the argument for lessons learned about the role of geography in purpose-oriented service delivery networks.

Proximity, Collaboration, and Goal Congruence

Organizational proximity is often seen as a key factor in collaboration (Breschi and Lissoni, 2003; Katz, 1994; Feldman, 1994). In the study of knowledge flow, or information sharing, proximity is seen as important because it allows for the possibility of face-to-face contact through both formal and serendipitous interactions (Hansen and Lovas, 2004; Radil and Walther, 2019). Seeing this connection between geography and collaboration in knowledge flow networks, I asserted that in the Thrive network, not only would proximity matter for information sharing, but that the correlation between proximity and collaboration would be even greater for activities that required face-to-face contact.

What I found through the examination of the Thrive network was that proximity as a barrier is relevant. While Feldman (1994) argues that "knowledge traverses corridors and streets more easily than continents and oceans," organizations that value collaboration can turn oceans into ponds. In other words, while proximity matters, organizations that find value in the collaborative process see geography as an inconvenience rather than a barrier. While a lack of proximity can lead to unclear goals among collaborators (Noll, Beecham, and Richardson, 2010), this study suggests that when goals are common among organizations, collaboration transcends geographic barriers.

One area where this manifests specifically for purpose-orientated networks is in the area of service-delivery. Organizations tend to focus first on client outcomes, rather than on collaboration in and of itself. Alter and Hage (1993) argued that client outcomes would be enhanced if organizations that provided services in the realm of healthcare

and human services would collaborate to create a network for service delivery. Provan and Sebastian (1998) contend that, while this might be the case, it is often the actions of a few organizations within the network, rather than the network as a whole, that can improve client outcomes. This study found that while collaboration may improve client outcomes, if this is not clearly articulated to service providers, geography becomes a reason not to collaborate.

Collaboration among organizations within purpose-oriented, service-delivery networks requires goal congruence and this study suggests that focusing on client issues is one way to create buy-in among participants. Milward and Provan (2006) noted that this type of network is often created due to the fact that no one organization has the ability to provide clients with all of the services they need. As a result, collaboration is needed. When goals are not client focused, but instead focused on other outputs, many service providers fail to see the benefit of collaboration within the network, and in turn, are unwilling to use their limited resources to participate in the network.

Geography seems to come into play when looking at the reasons that organizations may not collaborate, but seems to be more of a focus for organizations that do not find an inherent value in the collaborative process. In the examination of the food security organizations in this study, organizations that found value in working with others found creative ways to overcome distance. In addition, face-to-face contact that occurred at Thrive meetings seemed to encourage collaboration. The literature suggests that face-to-face contact helps to build trust (Noll, Beecham, and Richardson, 2010; Gertler, 2001; Carmel, 1999) and that proximity helps to increase face-to-face contact. However, this study demonstrated that organizations that found meaning in collaboration were more likely to attend Thrive meetings, and that through these

meetings, organizational members were able to connect and establish relationships. The underlying building of this trust was not geographic, but rather the willingness to participate in the network activities that builds collaboration. As one respondent noted, "just having that personal connection through Thrive…that was good. We could face-to-face or phone-to-phone…we could iron stuff out because of just knowing each other through Thrive" (Food Bank). Freeman, Ganguli, and Murciano-Goroff (2014) demonstrated this need for face-to-face contact in creating and maintaining collaboration among scientific researchers; this study demonstrates that face-to-face contact may also be crucial in purpose-oriented, service-delivery networks as well.

Collaboration as a Process

The study of the Thrive network also demonstrated that goal congruence in purpose-oriented, service delivery networks may need to ensure a focus on process and outcomes, rather than outputs. Outputs, often defined as "agreements reached, plans drafted, and programs implemented," are different from outcomes and outputs in that they tend to focus more on the short term accomplishment of tasks (Ulibarri, 2019, p. 580). Conversely, outcomes are the "effects of the collaborative process and its outputs on changing social and environmental conditions" (Mandarano, 2008, p. 457). These outcomes are often less studied and harder to measure due to the fact that outcomes are less concrete than outputs (Thomas and Koontz, 2011; Koontz and Thomas, 2006). Service-delivery organizations, especially in the food security realm, tend to have big visions and missions; as one respondent noted, "we are trying to work ourselves out of a job" (Service Organization). These large and overarching goals, and the effects of collaboration on these goals, need to be clearly defined within the network.

The idea of focusing on process may help organizations see a greater benefit to collaboration. First, the process of collaborating often brings various participants to the table who have different skills, as well as social and political capital that can benefit both member organizations and the network as a whole (Connick and Innes, 2003). The process of collaborating also builds “collaborative capacity” (Bardach, 1998, p. 20) in that it allows participants in the collaborative process the ability to draw on the work of others and enhance their learning capacity (Connick and Innes, 2003). By encouraging a focus on the process of collaboration, rather on the outputs, purpose-oriented, service-delivery networks may be more effective in recruiting and involving organizations.

Geography as an Impure Concept

Respondents to both the survey and interviews indicated that geography was a barrier to collaboration. However, one of the key conclusions drawn from this study is that geography is not a pure concept and that it is often conflated with other ideas. Ghemawat (2004) found that climate and physical remoteness were also important when discussing geographic distance, while Palm and Ramsell (2007) noticed that collaboration in emergency management is often fettered by natural geographic features. Both of these findings suggest that geography is not tied specifically to distance or proximity.

In this study, it can be argued, the idea of geography was often conflated with both interorganizational relationships and political jurisdictions. This conflation may provide useful information when looking at purpose-oriented, service-delivery networks. First, the findings suggest that who is involved in collaboration may matter. Organizations are not entities unto themselves when collaboration occurs; instead, the individuals representing the organization may play a factor in the creation and

maintenance of a relationship. Personal relationships and characteristics matter. In addition, networks that span jurisdictional boundaries may face additional challenges. These challenges may not be the result of the physical distance between organizations, but rather because of the needs and goals of differing government structures. Governments that are more inclusive in their decision making process may be easier to collaborate with and more willing to join purpose-oriented, service-delivery networks.

In addition, geography can be seen more as an excuse to justify not working with other organizations that are difficult. As seen in Chapter 5, one respondent used drive time as a reason not to work with one organization due to the quality of the relationship. In this instance, the issue was not the geography that was a problem, but rather the unwillingness of the respondent to work with an organization where the staff had been unaccommodating in the past. It is likely that the justification of geography as a barrier could be a proxy for other barriers to collaboration.

Generalizability

While case study research may not be generalizable in a statistical sense, Yin (1981) suggests that case studies may provide theoretical constructs that can help with future investigation. My research shows that collaboration may mean different things to different organizations within purpose-oriented service-delivery networks. Many of the organizations view clients as the main group with whom these organizations collaborated and often stressed that geography was a barrier in this type of collaboration. When collaborating with other organizations in the network, the research shows that the largest factor determining whether organizations viewed geography as a barrier was not the driving distance, but rather the value of the interactions.

The Thrive network was created as a way to increase communication, share resources, and collaborate with food security organizations within the New River Valley.

For some organizations included in the study, the importance of this collaboration still has not been realized. Going back to Provan and Milward's (1995) discussion of network effectiveness, collaboration is a means to create better service delivery, rather than an end unto itself. With the growing study of networks, it is important for network managers to understand that collaboration may mean something very different to service-delivery organizations than the managers expected. So, too, might geography.

This dissertation also offers insight to practitioners and network leaders who are hoping to improve collaboration in purpose-oriented service-delivery networks. The main finding from this research was that many organizations in purpose-oriented service-delivery networks do see geography as a barrier to collaboration. Yet how these organizations view geography as a barrier, as well as the importance placed individually on collaboration, differed greatly among organizations. As described above, the finding that organizations that have truly embraced collaboration in the network do not care about the distance it must overcome in order to work together is important to network managers. The second contribution for practitioners is the acknowledgement that in being client focused, many service providing organizations find it difficult to move beyond the immediate needs of their clients to see the value of collaboration. Finally, network managers need to understand that issues of geography are not always the result of driving distance, but are instead political or resource dependent. Being able to differentiate between these factors will allow network managers, as well as individual food security organizations, a clearer picture of barriers to collaboration. These findings provide insight not only into the leadership needed for collaboration in purpose-oriented service-delivery networks, but also points to the importance of fully communicating the advantages of collaboration among members.

STUDY LIMITATIONS

There are three major limitations to this study that limit its contribution to both scholars and practitioners. First, the data collected represents a single network at a single point in time. In case study research, statistical generalizability is often a problem (Yin, 2003). The intention of this dissertation, therefore, was not to generalize, but to seek to gain a greater understanding of an individual case through a multi-step, multi-method process. Context for the case study is important. Thrive is located in a rural region and addresses the specific issue of food insecurity. Trying to compare the findings in this setting to networks in other settings may result in findings that are incompatible with the findings here.

The size of the study also creates some limitations within the data. While the response rate for the organizational survey provided a fairly good picture of the network, a larger response rate could have netted more accurate results. In addition, the number of interviews conducted was small and did not represent the ideal distribution of respondents. Several organizations that were initially contacted for interviews responded that they were not interested in participating in the study because the organization was not interested in being involved with Thrive. Had these organizations been interviewed about why they had these opinions, it might have resulted in interesting discussions. Also, while eleven organizations were interviewed, increasing this number may have expanded the contribution of the study.

The responses to both the organizational survey and the interviews were perceptual. In an ideal setting, observation would also have been included in the study to verify and describe relationships from an outside perspective. Additionally, some outside indicator about the ability of the network to collaborate and organizational effectiveness in doing so would have enhanced the data. While the study was not an

attempt to measure the effectiveness of the collaboration within Thrive, the finding that organizations that valued collaboration were more likely to overcome the geographic challenges might have provided insight to network managers. However, resources, including time, funding and personnel, for this study were limited.

FUTURE RESEARCH

Despite the limitations of this research, I believe that the findings contribute to the network literature by illuminating certain factors important to exploring the relationships between geography, network structure, and collaboration. In addition, my analysis of how organizations view collaboration can provide insight into the way in which purpose-oriented, service-delivery networks might operate more effectively in the future. Future research is needed to pursue this line of inquiry further. For example, can network leadership change the perceptions of collaboration among organizations that are client-centric? For the Thrive network, based on the survey, geography was perceived by the majority of the organizations to be a major barrier to collaboration; yet these results did not hold up when empirically tested. An important question remains to be answered: Were the initial barriers to collaboration, as expressed in the survey, measuring collaboration among service providers, or between service providers and their clients? Though the question explicitly asked about collaboration between food security organizations in the region, further research could help determine the difference between client barriers and collaborative barriers between organizations.

The main focus of research for this dissertation was initially on the role of geography as a barrier to collaboration in a purpose-oriented, service delivery network. Building off of this case study, moving from a rural to an urban setting might provide greater insight into this question. Issues of traffic, population density, and the number of organizations in the network could all be interesting variables to examine in regards to

the impact of geography on collaboration. Finally, while Thrive is not a new network, it is still working to make clear its mission to the greater New River Valley food security organizations. Studying a network more fully defined in its mission might provide new revelations into the role that distance plays in organizations' willingness to collaborate. More formalized networks might result in organizations having more purposeful collaboration.

In conclusion, this examination of the case of the Thrive network offers a deeper understanding of the role of geography in network structure and collaboration. By examining this purpose-oriented, service-delivery network both quantitatively and qualitatively, I have found that despite the fact that the majority of the network views geography as a barrier to collaboration, this did not accurately describe the reality, but rather, was a false perception. Instead, the barriers are threefold. First, food security organizations in the New River Valley see geography as a cost to collaboration and have to have a meaningful reason to overcome it, such as resource acquisition. Next, geography is often conflated with other issues when discussing interorganizational collaboration. Third, Thrive has not, as of yet, convinced food security organizations in the New River Valley about the value of collaboration beyond client-services. This dissertation offers an initial, windy road of discovery into the relationship between geography and collaboration that has the possibility to one day be a highway of findings.

Works Cited

Ahuja, G., Soda, G., & Zaheer, A. (2012). The genesis and dynamics of organizational networks. *Organization science*, *23*(2), 434-448.

Allard, S. W. (2004). *Access to social services: The changing urban geography of poverty and service provision*: Brookings Institution, Metropolitan Policy Program.

Allen, K., & Bull, A. (2018). Following policy: A network ethnography of the UK character education policy community. *Sociological Research Online*, *23*(2), 438-458.

Autant-Bernard, C., Billand, P., Frachisse, D., & Massard, N. (2007). Social distance versus spatial distance in R&D cooperation: Empirical evidence from European collaboration choices in micro and nanotechnologies. *Papers in regional Science, 86*(3), 495-519.

Bardach, E. (1998). *Getting agencies to work together: The practice and theory of managerial craftsmanship*. Brookings Institution Press.

Belkhodja, O., & Landry, R. (2007). The Triple-Helix collaboration: Why do researchers collaborate with industry and the government? What are the factors that influence the perceived barriers? *Scientometrics, 70*(2), 301-332.flow. *Organization Science, 18*(6), 955-972.

Bercovitz, J., & Feldman, M. (2011). The mechanisms of collaboration in inventive teams: Composition, social networks, and geography. *Research Policy, 40*(1), 81-93.

Berge, Claude. (1966). *The Theory of Graphs.* New York: John Wiley and Sons.

Bergé, L. R. (2017). Network proximity in the geography of research collaboration. *Papers in regional Science, 96*(4), 785-815.

Berthod, O., & Segato, F. (2019). Developing Purpose-Oriented Networks: A Process View. *Perspectives on Public Management and Governance*, *2*(3), 203-212.

Bontis, N., Bart, C. K., Serenko, A., & Hardie, T. (2007). Organizational size and knowledge flow: a proposed theoretical link. *Journal of intellectual capital*.

Borgatti, S.P. 2002. NetDraw: Graph Visualization Software. Harvard: Analytic Technologies

Borgatti, S.P., Everett, M.G. and Freeman, L.C. 2002. Ucinet 6 for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

Borgatti, S. P., Everett, M. G., & Johnson, J. C. (2018). *Analyzing social networks*. Sage.

Breschi, S., & Lissoni, F. (2003). *Mobility and social networks: Localised knowledge spillovers revisited*: Università commerciale Luigi Bocconi.

Burt, R. S. (2009). *Structural holes: The social structure of competition*. Harvard university press.

Cairncross, F. (1997). *The death of distance: how the communications revolution will change our livesThe death of distance: how the communications revolution will change our lives*: Harvard Business School.

Carboni, J. L., Saz-Carranza, A., Raab, J., & Isett, K. R. (2019). Taking Dimensions of Purpose-Oriented Networks Seriously. *Perspectives on Public Management and Governance*, *2*(3), 187-201.Carmel, E. (1999). *Global software teams: collaborating across borders and time zones*. Prentice Hall PTR.

Carley, K. M., & Krackhardt, D. (1996). Cognitive inconsistencies and non-symmetric friendship. *Social networks*, *18*(1), 1-27.

Castilla, D., Botella, C., Miralles, I., Bretón-López, J., Dragomir-Davis, A. M., Zaragoza, I., & Garcia-Palacios, A. (2018). Teaching digital literacy skills to the elderly using a social network with linear navigation: A case study in a rural area. *International Journal of Human-Computer Studies, 118*, 24-37.

Clark, H. H. (1996). *Using language*: Cambridge University press.

Coleman, J. S. (1988). Social capital in the creation of human capital. *American journal of sociology, 94*, S95-S120.

Coleman-Jensen, Rabbitt, Gregory, and Singh. (2019). Household food security in the United States in 2018. United States Department of Agriculture. Economic Research Service. Economic Research Report Number 270.

Connick, S., & Innes, J. E. (2003). Outcomes of collaborative water policy making: Applying complexity thinking to evaluation. *Journal of environmental planning and management*, *46*(2), 177-197.

Cramton, C. D. (2001). The mutual knowledge problem and its consequences for dispersed collaboration. *Organization Science, 12*(3), 346-371.

Crotty, M. M., Henderson, J., & Fuller, J. D. (2012). Helping and hindering: perceptions of enablers and barriers to collaboration within a rural South Australian mental health network. *Australian journal of rural health*, *20*(4), 213-218.

Drejer, I., & Vinding, A. L. (2005). Location and collaboration: Manufacturing firms' use of knowledge intensive services in product innovation. *European Planning Studies, 13*(6), 879-898.

Dutton, W. H. (2008). The wisdom of collaborative network organizations: Capturing the value of networked individuals. *Prometheus, 26*(3), 211-230.

Esri. "Topographic" [basemap]. Scale Not Given. "World Topographic Map". February 19, 2012. http://www.arcgis.com/home/item.html?id=30e5fe3149c34df1ba922e6f5bbf808f. (May 25, 2017).

Fallah, M. H., & Ibrahim, S. (2004). *Knowledge spillover and innovation in technological clusters.* Paper presented at the Proceedings, IAMOT 2004 Conference, Washington, DC.

Feldman, M. P. (1994). *The geography of innovation* (Vol. 2). Springer Science & Business Media.

Fetters, M. D., Curry, L. A., & Creswell, J. W. (2013). Achieving integration in mixed methods designs—principles and practices. *Health services research*, *48*(6pt2), 2134-2156.

Freeman, L. C. (1978). Centrality in social networks conceptual clarification. *Social networks*, *1*(3), 215-239.

Freeman, R. B., Ganguli, I., & Murciano-Goroff, R. (2014). Why and wherefore of increased scientific collaboration. In *The changing frontier: Rethinking science and innovation policy* (pp. 17-48): University of Chicago Press.

Gabriel-Petit, P., & Overcoming Common Barriers to Collaboration. (2017). Part 1. *Leadership Matters*.

Gertler, M. S. (2001). Best practice? Geography, learning and the institutional limits to strong convergence. *Journal of Economic Geography, 1*(1), 5-26.

Ghemawat, P. (2001). Distance still matters. *Harvard business review, 79*(8), 137-147.

Glaser, B. (1978). Theoretical sensitivity. *Advances in the methodology of grounded theory*.

Glaser, B. G. (1998). *Doing grounded theory: Issues and discussions*. Sociology Press.

Gillespie, D. F., & Murty, S. A. (1994). Cracks in a postdisaster service delivery network. *American Journal of Community Psychology*, *22*(5), 617-638.

Gilly, J.-P., & Torre, A. (2000). Proximity relations. Elements for an analytical framework. *Industrial networks and proximity*, 1-16.

Grabher, G., & Ibert, O. (2013). Distance as asset? Knowledge collaboration in hybrid virtual communities. *Journal of Economic Geography, 14*(1), 97-123.

Granovetter, M. S. (1977). The strength of weak ties. In *Social networks* (pp. 347-367): Elsevier.

Gray, B. (1985). Conditions facilitating interorganizational collaboration. *Human relations, 38*(10), 911-936.

Greer, R. A., & Scott, T. A. (2019). A Network Autonomy Framework: Reconceptualizing Special District Autonomy in Polycentric Systems. *Perspectives on Public Management and Governance*.

Hanneman R. A. & Riddle M. (2005). Introduction to social network methods. Riverside, CA: University of California, Riverside. Retrieved on January 31, 2020 from http://faculty.ucr.edu/~hanneman/

Hansen, M. T., & Løvås, B. (2004). How do multinational companies leverage technological competencies? Moving from single to interdependent explanations. *Strategic Management Journal, 25*(8-9), 801-822.

Hatala, J. P., & George Lutta, J. (2009). Managing Information Sharing within an organizational setting: A social network perspective. *Performance Improvement Quarterly*, *21*(4), 5-33.

Heanue, K., & Jacobson, D. (2001). Organizational proximity and institutional learning: the evolution of a spatially dispersed network in the Irish furniture industry. *International Studies of Management & Organization, 31*(4), 56-72.

Hernandez, C. A. (2009). Theoretical Coding in Grounded Theory Methodology. *Grounded Theory Review*, *8*(3).

Howells, J. R. (2002). Tacit knowledge, innovation and economic geography. *Urban studies, 39*(5-6), 871-884.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative health research*, *15*(9), 1277-1288.

Hu, Q., Khosa, S., & Kapucu, N. (2016). The intellectual structure of empirical network research in public administration. *Journal of public administration research and theory*, *26*(4), 593-612.

Hudson, B., Hardy, B., Henwood, M., & Wistow, G. (1999). In pursuit of inter-agency collaboration in the public sector: What is the contribution of theory and research? *Public Management an International Journal of Research and Theory, 1*(2), 235-260.

Huggins, R., Johnston, A., & Thompson, P. (2012). Network capital, social capital and knowledge flow: how the nature of inter-organizational networks impacts on innovation. *Industry and Innovation, 19*(3), 203-232.

Human, S. E., & Provan, K. G. (2000). Legitimacy building in the evolution of small-firm multilateral networks: A comparative study of success and demise. *Administrative science quarterly*, *45*(2), 327-365.

Huxham, C., Vangen, S., Huxham, C., & Eden, C. (2000). The challenge of collaborative governance. *Public Management an International Journal of Research and Theory*, *2*(3), 337-358.

Ibarra, H. (1995). Race, opportunity, and diversity of social circles in managerial networks. *Academy of management journal*, *38*(3), 673-703.

Internal Revenue Service. (2019). Social welfare organizations. Retrieved on December 30, 2019 from https://www.irs.gov/charities-non-profits/other-non-profits/social-welfare-organizations.

Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in Public Administration Scholarship: Understanding Where We Are and Where We Need to Go. *Journal of Public Administration Research and Theory, 21*(suppl_1), i157-i173. doi:10.1093/jopart/muq061

Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in Public Administration Scholarship: Understanding Where We Are and Where We Need to Go. *Journal of Public Administration Research and Theory, 21*(suppl_1), i157-i173. doi:10.1093/jopart/muq061

Isett, K. R., Mergel, I. A., LeRoux, K., Mischen, P. A., & Rethemeyer, R. K. (2011). Networks in public administration scholarship: Understanding where we are and where we need to go. *Journal of Public Administration Research and Theory, 21*(suppl_1), i157-i173.

Ivankova, N. V., Creswell, J. W., & Stick, S. L. (2006). Using mixed-methods sequential explanatory design: From theory to practice. *Field methods*, *18*(1), 3-20.

Johnson, D. K., & Mareva, M. (2002). *Its a Small (er) World: The Role of Geography and Networks in Biotechnology Innovation*. Retrieved from

Kano, K., Kano, T., & Takechi, K. (2013). Exaggerated death of distance: Revisiting distance effects on regional price dispersions. *Journal of International Economics*, *90*(2), 403-413.

Kapucu, N., & Hu, Q. (2016). Understanding multiplexity of collaborative emergency management networks. *The American Review of Public Administration*, *46*(4), 399-417.

Katz, J. S. (1994). Geographical proximity and scientific collaboration. *Scientometrics, 31*(1), 31-43.

Kenis, P., & Knoke, D. (2002). How organizational field networks shape interorganizational tie-formation rates. *Academy of Management Review*, *27*(2), 275-293.

Kettl, D. F. (2008). *The next government of the United States: Why our institutions fail us and how to fix them*. WW Norton & Company.

Kilduff, M., & Tsai, W. (2003). *Social networks and organizations*. Sage.

Knoben, J., & Oerlemans, L. A. (2006). Proximity and inter-organizational collaboration: A literature review. *International Journal of Management Reviews, 8*(2), 71-89.

Koliba, C., Wiltshire, S., Scheinert, S., Turner, D., Zia, A., & Campbell, E. (2017). The critical role of Information Sharing to the value proposition of a food systems network. *Public Management Review*, *19*(3), 284-304.

Koontz, T. M., & Thomas, C. W. (2006). What do we know and need to know about the environmental outcomes of collaborative management?. *Public administration review*, *66*, 111-121.

Krackhardt, D. (1987). Cognitive social structures. *Social networks*, *9*(2), 109-134.

Krackhardt, D. (1988). Predicting with networks: Nonparametric multiple regression analysis of dyadic data. *Social networks*, *10*(4), 359-381.

Krauss, R. M., & Fussell, S. R. (1990). Mutual knowledge and communicative effectiveness, Intellectual teamwork: social and technological foundations of cooperative work, L. In: Erlbaum Associates Inc., Hillsdale, NJ.

Krugman, P. (1991). Increasing returns and economic geography. *Journal of political economy*, *99*(3), 483-499.

Lavrac, N. (n.d.). Knowledge management. Retreived on January 12, 2020 from http://kt.ijs.si/PetraKralj/IPSKnowlegeManagement/Seminar/Fabjan_brokerage.ppt

Lee, S., & Monge, P. (2011). The coevolution of multiplex communication networks in organizational communities. *Journal of Communication*, *61*(4), 758-779.

Lemaire, R. (2012). The functions of the network executive: A case study of network management, leadership and governance.

Lemaire, R. H., Mannak, R. S., Ospina, S. M., & Groenleer, M. (2019). Striving for state of the art with paradigm interplay and meta-synthesis: Purpose-oriented network research challenges and good research practices as a way forward. *Perspectives on Public Management and Governance*, *2*(3), 175-186.

Lemaire, R. H., & Provan, K. G. (2009, October). Network governance in a publicly funded child and youth health network: Sub-network embeddedness, cohesiveness, and the role of brokers. In *Public Management Research* Conference.

Lemaire, R. H., & Provan, K. G. (2012). *Managing collaborative effort: A dyadic analysis of a public goal-directed network*. Working Paper. Available at: https://www. researchgate. net/profile/Keith_Provan/publication/228509005_Managing_C

ollaborative_Effort_A_Dyadic_Analysis_of_a_Public_Goaldirected_Network/links/5626849f08ae4d9e5c4d342d. pdf.

Lendle, A., Olarreaga, M., Schropp, S., & Vézina, P. L. (2016). There goes gravity: eBay and the death of distance. *The Economic Journal, 126*(591), 406-441.

Malecki, E. J. (2015).Economic geography. In International Encyclopedia of Social and Behavioral Sciences, 2 (7), 33-37.

Mandarano, L. A. (2008). Evaluating collaborative environmental planning outputs and outcomes: restoring and protecting habitat and the New York—New Jersey harbor estuary program. *Journal of planning education and research*, *27*(4), 456-468.

Marsden, P. V. (2015). Measures of network centrality. *International Encyclopedia of the Social and Behavioral Sciences, 2 (16),* 532-539.

Mascia, D., Pallotti, F., & Angeli, F. (2017). Don't stand so close to me: competitive pressures, proximity and inter-organizational collaboration. *Regional Studies, 51*(9), 1348-1361.

McCuaig, L., Rossi, T., Enright, E., & Shelley, K. (2019). Schools, student health and family welfare: Exploring teachers' work as boundary spanners. *British Educational Research Journal*.

McPhee, P. & Bare, J. (2001). Introduction. *Building capacity in nonprofit organizations*. C. J. De Vita, & C. Fleming (Eds.). Washington, DC: Urban Institute, 1-3.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual review of sociology, 27*(1), 415-444.

Milward, H. B., & Provan, K. G. (2006). *A manager's guide to choosing and using collaborative networks* (Vol. 8). Washington, DC: IBM Center for the Business of Government.

Min, J., & Mitsuhashi, H. (2012). Retracted: Dynamics of Unclosed Triangles in Alliance Networks: Disappearance of Brokerage Positions and Performance Consequences. *Journal of Management Studies*, *49*(6), 1078-1108.

Mok, D., Wellman, B., & Carrasco, J. (2010). Does distance matter in the age of the internet? *Urban studies, 47*(13), 2747-2783.

Morgan, D. L. (1993). Qualitative content analysis: a guide to paths not taken. *Qualitative health research*, *3*(1), 112-121.

Moynihan, D. P. (2009). The network governance of crisis response: Case studies of incident command systems. *Journal of Public Administration Research and Theory*, *19*(4), 895-915.

Müller, M., & Stewart, A. (2016). Does temporary geographical proximity predict learning? Knowledge dynamics in the Olympic Games. *Regional Studies, 50*(3), 377-390.

Murphy, J. M., Wehler, C. A., Pagano, M. E., Little, M., Kleinman, R. E., & Jellinek, M. S. (1998). Relationship between hunger and psychosocial functioning in low-income American children. *Journal of the American Academy of Child & Adolescent Psychiatry*, *37*(2), 163-170.

New River Valley Regional Commission (NRVRC). (2019). Explore the data. Retrieved on December 19, 2019 from http://nrvdata.org/

New River Valley Regional Commission. (2015). Population. Retrieved on March 13, 2020 from http://nrvrc.org/wp-content/uploads/2015/07/Population.pdf.

Nissen, M. E. (2002). An extended model of knowledge-flow dynamics. *Communications of the Association for Information Systems, 8*(1), 18.

Nohria, N., & Eccles, R. G. (1992). Networks and organizations: Structure, form, and action.

Noll, J., Beecham, S., & Richardson, I. (2010). Global software development and collaboration: barriers and solutions. *ACM Inroads, 1*(3), 66-78.

Nowell, B. L., & Kenis, P. (2019). Purpose-oriented networks: The architecture of complexity. *Perspectives on Public Management and Governance*, *2*(3), 169-173.

O'Leary, R., & Bingham, L. B. (Eds.). (2009). *The collaborative public manager: New ideas for the twenty-first century*. Retrieved from https://ebookcentral.proquest.com

O'Malley, A. J., & Marsden, P. V. (2008). The Analysis of Social Networks. *Health services & outcomes research methodology*, *8*(4), 222–269. doi:10.1007/s10742-008-0041-z

O'Toole Jr, L. J. (2015). Networks and networking: The public administrative agendas. *Public Administration Review, 75*(3), 361-371.

Olson, C. M. (1999). Nutrition and health outcomes associated with food insecurity and hunger. *The Journal of nutrition*, *129*(2), 521S-524S.

Onward NRV. (2019). Virginia's New River Valley: Regional data. Retrieved on December 20, 2019 from https://www.newrivervalleyva.org/data/

Palm, J., & Ramsell, E. (2007). Developing local emergency management by co-ordination between municipalities in policy networks: Experiences from Sweden. *Journal of Contingencies and Crisis Management, 15*(4), 173-182.

Pfeffer, J., & Salancik, G. R. (1978). The external control of organizations: A resource dependence perspective. New York: Harper and Row.

Polanyi, M. (1966). The logic of tacit inference. *Philosophy*, *41*(155), 1-18.

Posner, S. M., & Cvitanovic, C. (2019). Evaluating the impacts of boundary-spanning activities at the interface of environmental science and policy: A review of progress and future research needs. *Environmental science & policy, 92*, 141-151.

Powell, W. (2003). Neither market nor hierarchy. *The sociology of organizations: classic, contemporary, and critical readings, 315*, 104-117.

Provan, K. G. (1984). Interorganizational cooperation and decision-making autonomy in a consortium multi-hospital system. Academy of Management Review, 9(3), 494-504.

Provan, K. G., & Kenis, P. (2008). Modes of network governance: Structure, management, and effectiveness. *Journal of Public Administration Research and Theory, 18*(2), 229-252.

Provan, K. G., & Lemaire, R. H. (2012). Core concepts and key ideas for understanding public sector organizational networks: Using research to inform scholarship and practice. *Public Administration Review*, *72*(5), 638-648.

Provan, K. G., & Milward, H. B. (1995). A preliminary theory of interorganizational network effectiveness: A comparative study of four community mental health systems. *Administrative science quarterly*, 1-33.

Provan, K. G., & Milward, H. B. (2001). Do networks really work? A framework for evaluating public-sector organizational networks. *Public administration review*, *61*(4), 414-423.

Provan, K. G., & Sebastian, J. G. (1998). Networks within networks: Service link overlap, organizational cliques, and network effectiveness. *Academy of Management journal*, *41*(4), 453-463.

Provan, K. G., Veazie, M. A., Staten, L. K., & Teufel-Shone, N. I. (2005). The use of network analysis to strengthen community partnerships. *Public Administration Review*, *65*(5), 603-613.

Raab, J., & Kenis, P. (2009). Heading toward a society of networks: Empirical developments and theoretical challenges. *Journal of management inquiry, 18*(3), 198-210.

Radil, S. M., & Walther, O. J. (2019). Social networks and geography: a review of the literature and its implications. Retrieved from https://arxiv.org/abs/1805.04510?

Rallet, A., & Torre, A. (1999). Is geographical proximity necessary in the innovation networks in the era of global economy? *GeoJournal, 49*(4), 373-380.

Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, *4*(2), 155-169.

Roberts, A. R., & Bowblis, J. R. (2017). How does rurality influence the staffing of social service departments in nursing homes? *The Gerontologist, 58*(3), 540-545.

Rittel, H. W., & Webber, M. M. (1973). Dilemmas in a general theory of planning. *Policy sciences*, *4*(2), 155-169.

Rometsch, M., & Sydow, J. (2006). On identities of networks and organizations-The case of franchising. *Advances in organization studies*, *20*, 19.

Rosenkopf, L., & Almeida, P. (2003). Overcoming local search through alliances and mobility. *Management science, 49*(6), 751-766.

Selden, S. C., Sowa, J. E., & Sandfort, J. (2006). The impact of nonprofit collaboration in early child care and education on management and program outcomes. *Public Administration Review*, *66*(3), 412-425.

Scott, J. (2017). Social network analysis. 4th edition. Los Angeles: Sage Publications.

Shields, J. F. (2005). Does rural location matter? The significance of a rural setting for small businesses. *Journal of Developmental Entrepreneurship, 10*(01), 49-63.

Siciliano, M. D. (2016). Ignoring the experts: networks and organizational learning in the public sector. *Journal of Public Administration Research and Theory, 27*(1), 104-119.

Singh, J. (2005). Collaborative networks as determinants of knowledge diffusion patterns. *Management science, 51*(5), 756-770.

Smyth, J. D., Dillman, D. A., Christian, L. M., & Stern, M. J. (2004, May). How visual grouping influences answers to internet surveys. In *Annual Meeting of the American Association for Public Opinion Research. Phoenix*.

Snavely, K., & Tracy, M. B. (2000). Collaboration among rural nonprofit organizations. *Nonprofit Management and Leadership, 11*(2), 145-165.

Sørensen, E., & Torfing, J. (2009). Making governance networks effective and democratic through metagovernance. *Public Administration, 87*(2), 234-258.

Span, K. C., Luijkx, K. G., Schalk, R., & Schols, J. M. (2012). What governance roles do municipalities use in Dutch local social support networks? *Public Management Review, 14*(8), 1175-1194.

StataCorp. 2019. *Stata Statistical Software: Release 16*. College Station, TX: StataCorp LLC.

Stork, D., & Richards, W. D. (1992). Nonrespondents in communication network studies: Problems and possibilities. *Group & Organization Management*, *17*(2), 193-209.

Storper, M., & Venables, A. J. (2004). Buzz: face-to-face contact and the urban economy. *Journal of Economic Geography, 4*(4), 351-370.

Sytch, M., Tatarynowicz, A., & Gulati, R. (2012). Toward a theory of extended contact: The incentives and opportunities for bridging across network communities. *Organization Science*, *23*(6), 1658-1681.

Tatarynowicz, A., Sytch, M., & Gulati, R. (2016). Environmental demands and the emergence of social structure: Technological dynamism and interorganizational network forms. *Administrative science quarterly, 61*(1), 52-86.

Ter Wal, A. L., Alexy, O., Block, J., & Sandner, P. G. (2016). The best of both worlds: The benefits of open-specialized and closed-diverse syndication networks for new ventures' success. *Administrative science quarterly, 61*(3), 393-432.

Texas A&M. (2013). Geocoding Services. Retrieved on July 13, 2019 from http://geoservices.tamu.edu/Services/Geocode/.

Thomas, C. W., & Koontz, T. M. (2011). Research designs for evaluating the impact of community-based management on natural resource conservation. *Journal of Natural Resources Policy Research*, *3*(2), 97-111.

Thrive. (2018) Thrive/food access network. Retrieved on December 20, 2019 from https://cfnrv.org/partnerships-initiatives/fund-for-the-nrv/thrive/

Tourigny, A., Durand, P. J., Bonin, L., Hébert, R., & Rochette, L. (2004). Quasi-experimental study of the effectiveness of an integrated service delivery network for the frail elderly. *Canadian Journal on Aging/La Revue canadienne du vieillissement*, *23*(3), 229-243.

Townsend, M. S., Peerson, J., Love, B., Achterberg, C., & Murphy, S. P. (2001). Food insecurity is positively related to overweight in women. *The Journal of Nutrition*, *131*(6), 1738-1745.

Trist, E. (1983). Referent organizations and the development of inter-organizational domains. *Human relations*, *36*(3), 269-284.

Tushman, M. L. (1977). Special boundary roles in the innovation process. *Administrative science quarterly*, 587-605.

Ulibarri, N. (2015). Collaboration in federal hydropower licensing: Impacts on process, outputs, and outcomes. *Public Performance & Management Review*, *38*(4), 578-606.

United States Department of Agriculture (USDA) Economic Research Service. (2019). Food security in the U.S.: Key statistics and graphics. Retrieved on December 20, 2019 from https://www.ers.usda.gov/topics/food-nutrition-assistance/food-security-in-the-us/key-statistics-graphics.aspx

Uzzi, B. (1997). Social structure and competition in interfirm networks: The paradox of embeddedness. *Administrative science quarterly*, 35-67.

Van den Brink, M., Edelenbos, J., van den Brink, A., Verweij, S., van Etteger, R., & Busscher, T. (2019). To draw or to cross the line? The landscape architect as boundary spanner in Dutch river management. *Landscape and Urban Planning, 186*, 13-23.

Van de Ven, A. H. (1976). On the nature, formation, and maintenance of relations among organizations. *Academy of management review*, *1*(4), 24-36.

Vangen, S., & Huxham, C. (2005). Managing to collaborate: The theory and practice of collaborative advantage. *Oxon: Routledge*.

Waite, T. (2019). What is the difference between a food bank and a food pantry? Feeding America. Retrieved on January 19, 2020 from https://www.feedingamerica.org/hunger-blog/what-difference-between-food-bank-and-food-pantry

Wallace, C., Farmer, J., & McCosker, A. (2018). Community boundary spanners as an addition to the health workforce to reach marginalized people: a scoping review of the literature. *Human resources for health, 16*(1), 46.

Wasserman, S., & Faust, K. (1994). *Social network analysis: Methods and applications* (Vol. 8): Cambridge University press.

Yin, R. K. (1981). The case study crisis: Some answers. *Administrative science quarterly*, *26*(1), 58-65.

Yin, R. K. (2017). Case study research and applications: Design and methods. Sage publications.

Zagenczyk, T. J., Scott, K. D., Gibney, R., Murrell, A. J., & Thatcher, J. B. (2010). Social influence and perceived organizational support: A social networks analysis. *Organizational Behavior and Human Decision Processes*, *111*(2), 127-138.

APPENDIX A:

IRB APPROVAL LETTER

MEMORANDUM

DATE: December 19, 2019

TO: Robin Hargroder Lemaire, Jaimie Elizabeth Edwards, Sarah Anne Misyak, Huishan Yang

FROM: Virginia Tech Institutional Review Board (FWA00000572, expires October 29, 2024)

PROTOCOL TITLE: New River Valley (NRV) Food Access Network

IRB NUMBER: 17-988

Effective December 19, 2019, the Virginia Tech Institution Review Board (IRB) approved the Amendment request for the above-mentioned research protocol.

This approval provides permission to begin the human subject activities outlined in the IRB-approved protocol and supporting documents.

Plans to deviate from the approved protocol and/or supporting documents must be submitted to the IRB as an amendment request and approved by the IRB prior to the implementation of any changes, regardless of how minor, except where necessary to eliminate apparent immediate hazards to the subjects. Report within 5 business days to the IRB any injuries or other unanticipated or adverse events involving risks or harms to human research subjects or others.

All investigators (listed above) are required to comply with the researcher requirements outlined at: https://secure.research.vt.edu/external/irb/responsibilities.htm

(Please review responsibilities before beginning your research.)

PROTOCOL INFORMATION:

Approved As: Expedited, under 45 CFR 46.110 category(ies) 6,7

Protocol Approval Date: December 11, 2019

Protocol Expiration Date: December 10, 2020

Continuing Review Due Date*: November 19, 2020

*Date a Continuing Review application is due to the IRB office if human subject activities covered under this protocol, including data analysis, are to continue beyond the Protocol Expiration Date.

ASSOCIATED FUNDING:

The table on the following page indicates whether grant proposals are related to this protocol, and which of the listed proposals, if any, have been compared to this protocol, if required.

IRB Number 17-988 page 2 of 2 Virginia Tech Institutional Review Board

SPECIAL INSTRUCTIONS:

This amendment, submitted December 13, 2019, updates data collection instruments to provide a finalized list of interview questions.

If this protocol is to cover any other grant proposals, please contact the HRPP office (irb@vt.edu) immediately.

APPENDIX B:

INFORMED CONSENT FORM

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Participants

in Research Projects Involving Human Subjects

Title of Project: New River Valley Food Access Network Project

Investigator(s): Robin Lemaire, PhD: rlemaire@vt.edu / 540-231-0664

Jaimie Edwards, MPA: jedwar35@vt.edu / 678-480-7361

Sarah Misyak, PhD: smisyak@vt.edu / 540-231-8541

I. Purpose of this Research Project

The purpose of this study is to document the current state of collaboration between and integration among organizations working to address hunger within the New River Valley community. This study also seeks to understand the challenges that organizations face in the areas of service delivery, information sharing, and resource sharing. The information obtained in this research will be used to determine where opportunities exist to increase existing capacity and assist organizations as these organizations work together to solve issues of food insecurity in the region. It will also be used to identify areas of overlap and gaps in service as a way to make collaboration more efficient.

It is expected that up to 100 survey participants will be involved in the research. The aggregated research results will be shared with all participants, used for dissertation purposes, and may be published in academic journals. Aggregated results will be made available to the NRV Food Access Network and study participants in 2018.

II. Procedures

By clicking “I agree” below, you will be led through an online survey that should require approximately 30 minutes to complete. The survey consists of questions inquiring which organizations your organization works with and your perceptions of the challenges, strengths, and needs of your organization and the NRV community in enhancing its efforts to address food access.

III. Risks

There are no apparent physical, mental, or emotional risks resulting associated with participation in this research.

IV. Benefits

There are no direct monetary benefits or individual recognition resulting from participation in this research. The findings, however, will inform the organizations involved in food access how to improve the way they work together to advance the goals of impacting those faced with issues of food insecurity across the region.

No promise or guarantee of benefits has been made to encourage you to participate.

V. Extent of Anonymity and Confidentiality

All data collected through surveys will be kept confidential. Only essential information that identifies individual respondents will be collected and this information will only be used for tracking purposes (name, physical or mailing addresses, email address, phone number, etc.). This information is collected only to allow researchers to differentiate between multiple responses from the same organization. The research team will have exclusive access to the data during the collection and analysis process, and all stored data will be password protected. The aggregate data for organizations (void of person, individual identifying information) may be shared with the NRV Food Access Network and survey participants. A visual depiction of organizational network ties will be shared with all study participants in a way that is possible to identify the type, number, intensity,

and reciprocity of ties. Sensitive data related to relationship quality will not be depicted in ways that identify individual responses and will only be shared in aggregate form.

The Virginia Tech (VT) Institutional Review Board (IRB) may view the study's data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VII. Subject's Consent

I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent (please confirm by clicking "I have read the attached consent form and agree to participate in this research" below).

VIII. Freedom to Withdraw

You are free to withdraw from this study at any time without penalty. You are free to choose not to answer any questions that you choose, or not respond to what is being asked of you, without penalty. Please answer questions to the best of your ability

Please note that there may be circumstances under which the investigator may determine that a subject should not continue as a subject.

IX. Questions or Concerns

Should you have any questions about this study, you may contact one of the research investigators whose contact information is included at the beginning of this document.

Should you have any questions or concerns about the study's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the Virginia Tech Institutional Review Board, irb@vt.edu or 540-231-3732.

APPENDIX C:

SURVEY HANDOUT

NRV Food Access Network Survey Results

Handout to Accompany Presentation

Organization Roster:

Organization	ID
Auburn United Methodist Church	Auburn UMC
Beans and Rice	Beans and Rice
Belview UMC Backpack Program	Belview UMC
Big Brother Big Sister	BBBS
Blacksburg Breakfast Lions Club	Lions
Blacksburg Farmers Market	Bburg FM
Blacksburg Interfaith Food Pantry	BIFP
Blacksburg Refugee Partnership	BRP
Bobcat Backpacks Program, Radford Public Schools	Bobcat BP
Cavalry Bap	Cavalry Bap
Carilion Clinic	Carilion
Christ Lutheran Church	Christ Luth
Christiansburg Farmers Market	Cburg FM
Community Foundation of the New River Valley	CFNRV
Community Health Center	CHC
Community Housing Partners	CHP
Copper Hill Church of the Brethren	Copper Hill
Council of Community Services	CCS
Department of Social Services	DSS
Dublin United Methodist Church	Dublin UMC
Eagle's Nest	Eagle's Nest
Eastern Elementary Backpack Program, Christiansburg Rotary	Eastern Elem BP
Emergency Needs Task Force of Pulaski County	ENTF
Organization	**ID**
Fairlawn Presbyterian Church	Fairlawn Pres
Feeding America Southwest Virginia	FASWV
Fieldstone Church, (The Giving Tree Food Pantry)	Fieldstone
Gethsemane Baptist Church	Gethsemane Bap
Giles Community Garden	Giles Garden
Giles County Christian Service Mission	Giles Mission
Giles County FOCUS	FOCUS
Giles Shelter	Giles Shelter
Giles County Summer Lunch Program	Giles Summer
Giles Health and Family Center	Giles Health/Family

Giles Youth Adult Partnership (GYAP)	GYAP
Glade Church	Glade
Healthy Floyd	Healthy Floyd
Helping Hands	Helping Hands
Heritage Cares	Heritage Cares
Holy Family Catholic Church, Justice and Peace Committee	Holy Family Cath
It's All About Jesus Ministries	All About Jesus
Jordan's Chapel Feed My Lambs, Backpack & Food Pantry	Jordan's
Meadowbrook Public Library Backpack Program	MB Lib
Montgomery County Christmas Store	MCCS
Montgomery County Emergency Assistance Program (MCEAP)	MCEAP
Montgomery County Christmas Store	MCCS
New Harvest	New Harvest
New Life church of the Nazarene	New Life
New River Community College	NRCC
New River Family Shelter	NR Fam Shelter
New River Health District, Farmacy Garden	Farmacy
New River Valley Agency on Aging	NRV Aging
New River Valley Community Services	NRVCS
New River Valley Senior Services	NRV Senior
Newport UMC	Newport UMC
NRCA	NRCA

NRCA, Head Start	NRCA, HS
Pearisburg Church of God	Pburg CoG
Pearisburg Community Market, (Farmer's Market)	Pburg FM
Pearisburg First United Methodist Church, (Macy's Backpack Ministries)	Macy's BP
Pearisburg Junior Women's Club Backpack Program	Pburg Women's
Plenty!	Plenty!
Prices Fork Incubator Kitchen	PF Incubator
Pulaski Church of God	Pulaski CoG
PC Christmas Store	PC Christmas
PC Schools	PC School
Pulaski Daily Bread	Pulaski DB
Pulaski Grow	Pulaski Grow
Radford University	RU
Radford Worship Center	Radford Worship
Radford-Fairlawn Daily Bread	RF Daily Bread
Riverview CoG	Riverview CoG
Shawsville Lay Ministerial Association Food Pantry	Shawsville FP
SO Fresh	SO Fresh
Spiritual Roots Community Food Bank	Spiritual Roots
St Mary's Catholic Justice & Peace (The Glean Team)	Glean Team
St. Jude Church, Radford	St. Jude
St. Michael's Lutheran Church, (Micah's)	Micah's
Salvation Army	Sal Army
United Methodist Women of Pembroke	UMC Pembroke

United Way of the New River Valley	United Way
Unity Christian Church	Unity Christian
Valley Interfaith Child Care Center	VICCC
Virginia Cooperative Extension	VCE
Virginia Tech Family Nutrition Program	VTFNP
VT Campus Kitchen	VT Kitchen

Warm Hearth Village	Warm Hearth
White Memorial United Methodist Church	White UMC
Women's Resource Center of the New River Valley	WRCNRV
YMCA at Virginia Tech	YMCA VT
YMCA Community Garden	YMCA CG

Coding for Network Pictures:

Color of Square (Organization)	**County**	**Line Thickness**	**Intensity (Strength)**	**Node Rim**	**Response**
Red	Floyd	Thin	Low Frequency (Rare Exchange)	Thin	Partial/No information
Yellow	Giles	Medium	Moderate Frequency (Episodic Exchange)	Thick	Full information
Green	Montgomery	Thick	High Frequency (Regular Exchange)		
Light Blue	Pulaski				
Dark Blue	Radford				
Purple	NRV/Multiple				
Size of Square		**Line Color**	**Robustness**		
Centrality	Larger Size= Greater Centrality	Blue	3 Ties Confirmed		
		Purple	4 Ties Confirmed		
		Red	5 Ties Confirmed		

Types of Ties and Tie Strength:

Type of Tie:

Information sharing-exchanges of information (about available programs, services, best practices, funding opportunities, etc.) between program staff or volunteers

Food exchange-the sharing of food between two entities for the purpose of addressing food insecurity

Client referral-formal or informal processes for channeling and managing referrals of clients; could include sharing contact information, prescreening, joint client applications/intake, consent to share client information across agencies/programs, etc.

Tie Strength: 1 = Low frequency (rare exchange); 2 = Moderate frequency (episodic exchange); 3 = High frequency (regular exchange)

Type of Tie:

Sharing resources-the sharing among organizations of financial or in-kind resources; could include staff, volunteers, expertise, space, funds, etc.

Program coordination-organizations working together to modify, expand, or enhance their capacities to do their jobs

Tie Strength: 1 = poor relationship; 2 = fair relationship; 3 = good relationship; 4 = very good relationship; 5 = excellent relationship

Network Priorities:

Network Priorities- Overall (Ranked)	
1	Increase opportunities for community outreach, education, and technical assistance
2	Implement a food hub (centralized food storage and distribution with refrigeration)
3	Further define the goals and structure for the NRV Food Access Network
4	Expand access to bulk food purchasing
Network Priorities- Action Items (Ranked)	
1	Compile a list of existing resources for clients
2	Compile a list of educational resources
3	Identify what items are of greatest need to network

	members and at what frequency
4	Examine the current distribution of food across the region and how best to make improvements, along with identifying potential locations and partners in the NRV
Network Priorities- Action Items (Ranked-cont.)	
5	Compile a list of existing resources for food providers
6	Develop educational programming to benefit network members and their clients
7	Plan to define the group's mission, vision, network structure and strategic plan
8 (tie)	Access extra storage space needs, including needs to process and store fresh produce within the region
8 (tie)	Facilitate collaborative action, education and training, and implement shared priorities
8 (tie)	Identify who could offer bulk purchasing at the best price and if there are limitations to who could be served
11	Set up a structure for decision making and information sharing
12	Develop shared ordering processes as well as centralized storage of bulk items
13	Create a common qualification process

APPENDIX D:

SURVEY

Food security Survey Flow

Block: Your name (39 Questions)

Standard: Block 1 (3 Questions)

VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY

Informed Consent for Participants in Research Projects Involving Human Subjects

Title of Project: New River Valley Food Access Network Project

Investigator(s): Robin Lemaire, PhD: rlemaire@vt.edu / 540-231-0664

Jaimie Edwards, MPA: jedwar35@vt.edu / 678-480-7361

Sarah Misyak, PhD: smisyak@vt.edu / 540-231-8541

I. Purpose of this Research Project Food insecurity is an issue that faces many Americans, with about 12 percent of the population facing some type of food insecurity in 2016. This complex problem, while the focus of many governmental and nongovernmental organizations, is too big to be addressed by single organizations and can better address when groups of organizations work in collaboration. The purpose of this study is to document the current state of collaboration between and integration among organizations within the New River Valley community. In addition to looking at the current collaborations, this study seeks to understand the challenges that

organizations face in the areas of service delivery, information sharing, and resource sharing. The information obtained in this research will be used to determine where opportunities exist to increase existing capacity and assist organizations as they work together to solve issues of food insecurity in the region. It will also be used to identify areas of overlap and gaps in service as a way to make collaboration more efficient. It is expected that up to 100 survey participants will be involved in the research. The aggregated research results will be used for dissertation purposes, may be published in academic journals and provided in a report to the Community Foundation of the New River Valley (CFNRV) to support its efforts to initiate and support integration initiatives.

II. Procedures By clicking "I agree" below, you will be led through an online survey that should require approximately 30 minutes to complete. The survey consists of questions inquiring which organizations your organization works with and your perceptions of the challenges, strengths, and needs of your organization and the NRV community in enhancing its efforts to address food access.

III. Risks There are no apparent physical, mental, or emotional risks resulting associated with participation in this research.

IV. Benefits There are no direct monetary benefits or individual recognition resulting from participation in this research. The findings, however, will inform the organizations involved in food access how to improve the way they work together to advance the goals of impacting those faced with issues of food insecurity across the region. No promise or guarantee of benefits has been made to encourage you to participate.

V. Extent of Anonymity and Confidentiality All data collected through surveys and interviews will be kept confidential. Only essential information that identifies individual

respondents will be collected (name, physical or mailing addresses, email address, phone number, etc.). The research team will have exclusive access to the data during the collection and analysis process, and all stored data will be password protected. The aggregate data (void of identifying information) may be shared with the CFNRV. The Virginia Tech (VT) Institutional Review Board (IRB) may view the study's data for auditing purposes. The IRB is responsible for the oversight of the protection of human subjects involved in research.

VII. Subject's Consent I have read the Consent Form and conditions of this project. I have had all my questions answered. I hereby acknowledge the above and give my voluntary consent (please confirm by clicking "I have read the attached consent form and agree to participate in this research" below).

VIII. Freedom to Withdraw You are free to withdraw from this study at any time without penalty. You are free to choose not to answer any questions that you choose, or not respond to what is being asked of you, without penalty. Please note that there may be circumstances under which the investigator may determine that a subject should not continue as a subject.

IX. Questions or Concerns Should you have any questions about this study, you may contact one of the research investigators whose contact information is included at the beginning of this document. Should you have any questions or concerns about the study's conduct or your rights as a research subject, or need to report a research-related injury or event, you may contact the VT IRB Chair, Dr. David M. Moore at

moored@vt.edu or (540) 231-4991.

I have read this consent form and agree to participate in this research (1)

The purpose of this study is to document the current state of collaboration between and integration among organizations within the New River Valley community. In addition to looking at the current collaborations, this study seeks to understand the challenges that organizations face in the areas of service delivery, information sharing, and resource sharing. The information obtained in this research will be used to determine where opportunities exist to increase existing capacity and assist organizations as they work together to solve issues of food insecurity in the region. It will also be used to identify areas of overlap and gaps in service as a way to make collaboration more efficient.

Q1 How important do you believe collective action is for improving food access in the NRV?

- ○ Very important (1)
- ○ Somewhat important (2)
- ○ Not at all important (3)
- ○ Not sure (4)

Q2 Which "community conversations" did you attend, if any?

- ☐ Plenty-Floyd County (September 2016-barriers and challenges) (1)
- ☐ St. Michael's Lutheran Church/Micah's Backpack-Blacksburg (November 2016-software and defined needs) (2)
- ☐ Montgomery County Government Center-Christiansburg (January 2017-volunteers and community) (3)
- ☐ Interfaith Food Pantry-Methodist Church-Blacksburg (March 2017-available resources) (4)
- ☐ Radford Government Center-Radford (May 2017-analysis and mapping) (5)
- ☐ Giles Christian Mission-Giles County (October 2017-priorities and decisions (6)
- ☐ I have not attended any "community conversations" (7)

Display This Question:

If Q2 != 7

Q3 How valuable have you found the NRV Food Access Network meetings been to date?

- ○ Very valuable (1)
- ○ Moderately valuable (2)
- ○ Somewhat valuable (3)
- ○ Not valuable (5)
- ○ Not sure (4)

Display This Question:

If Q2 != 7

Q4 What have you gained from the meetings?

- ○ Enhanced communication (1)
- ○ Learning about other NRV programs (2)
- ○ Developed new or strengthened existing relationships (3)
- ○ Learned a new skill (how to collect data, expand educational offerings, etc.) (4)
- ○ Learned about a new resource (grant opportunity, education program, resource expert, software, infrastructure, etc.) (5)
- ○ Other: (6) _____

Display This Question:

If Q2 = 7

Q5 You indicated that you have not attended meetings. What are the most important reasons why you have not attended any meetings?

_____

Display This Question:

If Q3 = 5

Q6 You indicated that you have not found the meetings to be valuable. Please explain why you believe the meetings have not led to much value.

_____

_____

Q7 Listed below are organizations involved in food access. We would like to know which organizations if any, your organization has maintained a relationship with over the past 12 months. In subsequent questions, we will ask more details about the ways you engage with this organizations, including sharing food, client referrals, sharing information, sharing resources, and program coordination. But for now, please select all those organizations with whom your organization has an established relationship.

If your organization does not maintain a relationship with any of these listed, please leave this question blank and move onto the next. If there are other organizations you

feel are missing from the list, you will have a chance to provide the names of those organizations as a response to another question.

☐ Roster of Organizations here (1)

Carry Forward Selected Choices from "Q7"

Q8 Please go through the list of organizations you selected in the previous question and indicate which ones your organization has been involved with for the provision or support of services, programs or activities related to food access over the past 12 months for each of the types of activities listed below. **Please only consider those relationships that have value to your organization and are more than incidental**. Details about the types of activities to consider are provided below:

Food exchange-need definition

Client referral-need definition: formal and informal process

Also or each of these activities, indicate the frequency of the interaction using the following scale:

1 = Low frequency (rare exchange)

2 = Moderate frequency (episodic exchange)

3 = High frequency (regular exchange)

If a relationship does not exist between you and an organization related to the activity, please leave the response blank.

Low frequency (rare exchange) (1)	▼ Click to write Scale point 1 (1) ... Click to write Scale point 3 (3)
Moderate frequency (episodic exchange) (2)	▼ Click to write Scale point 1 (1) ... Click to write Scale point 3 (3)
High frequency (regular exchange) (3)	▼ Click to write Scale point 1 (1) ... Click to write Scale point 3 (3)
Roster of Organizations here (x1)	▼ Click to write Scale point 1 (1) ... Click to write Scale point 3 (3)

Q9 Provided below is the same list, but this time we would like you to consider different types of relationships. Please again consider relationships related to food access over the past 12 months and only consider those relationships that have value to your

organization and are more than incidental. Details about the types of relationships to consider are provided below:

Sharing information-sharing information about grant opportunities as well as what each program is doing, program materials

Sharing resources-grant writing, staff, funding, expertise, space, equipment, vehicle

Program coordination-coordinating volunteers, transporting food, identifying and covering target populations

○ Same roster as above (1)

Q10 Considering the set of organizations in the previous questions, and the people who work for these organizations, please answer the questions below using the following scale:

	Absolutely none (1)	Hardly any (2)	Less than half (3)	About half (4)	More than half (5)	Almost all (6)	Every single one (7)
How many organizations do you trust to hold to their commitments? (1)	○	○	○	○	○	○	○
How many organizations do you feel have similar values to your own? (2)	○	○	○	○	○	○	○
How many of the organizations do you trust to do high quality work? (3)	○	○	○	○	○	○	○

How many of the organizations do you feel have your own organization's best interest in mind? (4)	○	○	○	○	○	○	○

Q11 We would now like you to indicate the other types of organizations with which you currently have a relationship with in regard to food access that were not included in the previous list. In this question, we will not ask you about specific types of ties, but you

should consider the same types of ties as in question 6 (sharing information, sharing resources, and program coordination).

- ☐ Funders (1)
- ☐ Local/regional government (2)
- ☐ State government (3)
- ☐ Federal government (4)
- ☐ Faith-based organizations (5)
- ☐ Health care organizations (6)
- ☐ Community-based organizations (7)
- ☐ Human service organizations (8)

Carry Forward Selected Choices from "Q11"

Q12 In the previous question, you indicated you work with the following groups of organizations. Please list up to three specific groups that you feel are most critical to your organization's work related to food access.

- ▢ Funders (1)
- ▢ Local/regional government (2)
- ▢ State government (3)
- ▢ Federal government (4)
- ▢ Faith-based organizations (5)
- ▢ Health care organizations (6)
- ▢ Community-based organizations (7)
- ▢ Human service organizations (8)

Q13 Because most organizations are involved with other organizations in one way or another, they must often consider those other organizations when making decisions. Please list up to five organizations whose needs, goals, decisions, and/or expectations are generally taken into consideration by your organization when major decisions are made related to the activities it undertakes regarding food access. If you feel that your organization's decisions about food access are affected by fewer than five other organizations, list only those.

- ○ Organization 1 (1) _____
- ○ Organization 2 (2) _____
- ○ Organization 3 (3) _____
- ○ Organization 4 (4) _____
- ○ Organization 5 (5) _____

Q14 Which organizations do you feel it is important to have a relationship with in the NRV community in general? Again, please list up to five.

- ○ Organization 1 (1) _____
- ○ Organization 2 (2) _____
- ○ Organization 3 (3) _____
- ○ Organization 4 (4) _____
- ○ Organization 5 (5) _____

Q15 Which organizations, other than your own, do you most admire for doing an especially good job of their work in the NRV community in general? Again, please list up to five.

- ○ Organization 1 (1) _____
- ○ Organization 2 (2) _____
- ○ Organization 3 (3) _____
- ○ Organization 4 (4) _____
- ○ Organization 5 (5) _____

Q16 Below is a list of common impediments that organizations sometimes face when working with other organizations. We would like to know what impediments you perceive as significant. For each possible impediment listed, please indicate whether the impediment listed is a minor or major concern to your organization when working

with other organizations. If you do not find the listed impediment to be a concern at all, please leave the response blank.

	A minor concern (1)	A major concern (2)
Insufficient resources to support effective collaboration (1)	○	○
Loss of control/autonomy over decisions (2)	○	○
Frustration or aggravation in dealing with partners (3)	○	○
Insufficient credit given to my organization or unit (4)	○	○
Difficulty due to geographical distances (5)	○	○
Not enough leadership support of partnering work in partner organizations (6)	○	○
Difficulty evaluating outcomes of more challenging partner work (7)	○	○

Other external condition; (8)	○	○
Other external condition: (9)	○	○

Q17 Below is a list of common impediments that organizations sometimes face when working with other organizations. We would like to know what impediments you perceive as significant. For each possible impediment listed, please indicate whether the impediment listed is a minor or major concern to your organization when working

with other organizations. If you do not find the listed impediment to be a concern at all, please leave the response blank.

	A minor concern (1)	A major concern (2)
Diversion of time and resources from other activities (1)	○	○
Limited flexibility and freedom to work with other organizations (2)	○	○
Not enough support of my work with other organizations (3)	○	○
Other internal condition: (4)	○	○
Other internal condition: (5)	○	○

Q18 From discussions at the previous Food Access Network sessions, five priorities for the initiative have emerged. We would like to know which of these you believe are the highest priority for developing next steps for the network. Please rank these priorities based on which ones you think should be the highest priority to the least.

_____ Develop a "hunger relief" network (1)

_____ Increase outreach and education (2)

_____ Implement a food hub (centralized food storage and distribution with refrigeration) (3)

_____ Improve bulk purchasing (4)

_____ Other: (5)

Q19 Below is a list of activities that have been proposed for the network to do. Please drag and drop into the box on the right up to five activities that your organization is willing and able to contribute staff time and/or other resources. Once you have your five activities in the box on the right, please rank your willingness to contribute to these activities in order from the greatest to the least.

Click to write Group 1

_____ Planning to define the group's mission, vision, network structure, and action plan (1)

_____ Setting up a structure for decision making and information sharing (2)

_____ Facilitate collaborative action, education and training, and implement shared priorities (3)

_____ Compiling a common list of existing resources for clients (4)

_____ Compiling a common list of existing resources for food providers (5)

_____ Compiling a list of educational resources (nutrition education, food safety, etc.) (6)

_____ Developing educational programming to benefit network members and their clients (a wide range of topics from technical tools for data tracking, to nutrition, to managing volunteers) (7)

_____ Assessing extra storage space needs, including needs to process and store fresh produce within the region (8)

_____ Creating a common qualification process (9)

_____ Examine the current distribution of food across the region and how best to make improvements, along with identifying potential locations and partners in the NRV (10)

_____ Identifying what items are of greatest need to network members and at what frequency (11)

_____ Identifying who could offer bulk purchasing at the best price and if there are limitations to who could be served (12)

_____ Developing shared ordering processes as well as centralized storage of bulk items (13)

_____ Other: (14)

Q20 Other than more general operation funds, what are the top challenges hindering your program's success? Check all that apply.

- ☐ The need for food donations fluctuates based on the time of year (1)
- ☐ It is hard to sustain paid staff (2)
- ☐ Hard to find consistent and regular volunteers (3)
- ☐ Hard to sustain volunteer leadership (4)
- ☐ Lack of good board leadership (5)
- ☐ Lack of financial contributions (6)
- ☐ Fewer corporate food donations as businesses like Walmart become more efficient (7)
- ☐ If you are not a Feeding America Southwest Virginia (FASWV) partner, then you are often not eligible to receive donations from some major food suppliers (8)
- ☐ The lack of effective record keeping and tracking program data/metrics (9)
- ☐ Lack of cold storage for fresh food (10)

☐ Lack of transportation to pick up and distribute food (11)

☐ Maintaining equipment used to support feeding programs (12)

☐ Food spoilage during transportation and delivery (13)

☐ It is difficult for families with insecure access to transportation to pick up food (14)

☐ There is no distribution center based in the NRV (15)

☐ It is hard to know what food is available at the Feeding America Southwest Virginia Distribution Center (16)

☐ Disconnect between programs offered and utility of programs (17)

☐ Lack of education on what to do with fresh food (18)

☐ Changing food habits of clients (parents and children) is difficult (19)

☐ Misconception of food cost for healthy versus junk food (20)

☐ Children don't like to be identified as Free and Reduced lunch recipients (21)

☐ Difficulty getting the word out about the programs offered to the people that need them (22)

☐ Negative perceptions about who is receiving assistance and what their hardships are (23)

☐ Food donations don't always match the need or nutritional standards for a balanced meal (24)

☐ Clients lack the ability to prepare foods with higher nutritional value (25)

☐ Food service provider's lack of ability to prepare a nutritious and tasty meal (26)

☐ Clients lack the knowledge of how to prepare meals with higher nutritional value (27)

☐ Nutritious foods are cost prohibitive (28)

☐ Finding foods that a child can transport and prepare themselves that are also nutritious/whole food options (29)

Q21 How necessary/important/valuable is it for the current Food Access Network leaders (CFNRV, VCE, FNP, and Health District) to continue to play a leadership role in the network?

- ○ Extremely important (1)
- ○ Very important (2)
- ○ Moderately important (3)
- ○ Slightly important (4)
- ○ Not at all important (5)

Q22 Would you be willing to be a part of the Food Access Network leadership team?

- ○ Yes (1)
- ○ Maybe (2)
- ○ No (3)

Q23 Are you currently a Feeding America Southwest Virginia (FASWV) partner?

- ○ Yes (1)
- ○ No (2)

Display This Question:

If Q23 = 1

Q24 What benefits do you receive from your partnership?

_____

Display This Question:

If Q23 = 1

Q25 If you could change three things about your relationship with FASWV, what would they be?

_____

Display This Question:

If Q23 = 2

Q26 If you are not a current partner, have you partnered with FASWV in the past?

- ○ Yes (1)
- ○ No (2)
- ○ Unknown (3)

Display This Question:

If Q26 = 2

Q27 What has prevented you from partnering with FASWV?

_____

Display This Question:

If Q26 = 1

Q28 Why are you no longer a partner with FASWV?

_____

Q29 What is the total number of full-time and part-time equivalent employees working in your food access program?

_____

Q30 How reliant is your organization on volunteer hours?

- ○ none (1)
- ○ very little (2)
- ○ about half (3)
- ○ majority (4)
- ○ almost all (5)
- ○ all (6)

Q31 Approximately what percentage of your total operating budget comes from the following sources:

- ○ Grants (1) _____
- ○ Donations (2) _____
- ○ Service/Program fees and revenues (3) _____
- ○ Other (4) _____

Q32 Select all the categories of target clients which you serve.

- ☐ Seniors (1)
- ☐ Youth (2)
- ☐ Families (3)
- ☐ Individuals (4)

Q33 Do you require your clients to qualify before you are able to serve them?

_____

Q34 Please indicate the percentage of your clients served in each county.

_____

Q35 Please indicate the percentage of food purchased versus donated to your organization to distribute to clients.

- ○ Percent Purchased (1) _____
- ○ Percent Donated (2) _____

Q36 Please indicate the percentage of your purchases that come from the following sources:

- ○ Retail prices (1) _____
- ○ Discounted for bulk purchases (2) _____
- ○ Discounted for charitable purchases (3) _____
- ○ Charity-specific distribution centers (4) _____
- ○ Other (5) _____

Q37 Where do you get your non-individually donated food?_____

End of Block: Your name

Start of Block: Block 1

Q38 The purpose of this research is to document the relationships between and among organizations across the NRV that are committed to food access across the NRV. No effort to produce collaborative, community-supported change will be effective without support from the myriad of players involved, so we greatly appreciate your willingness to share your knowledge, insights, and input. The purpose of this survey is to understand the current capacity of the food access efforts in the NRV, as well as the challenges and opportunities. For this purpose, food access is defined as...

Q39 Your Name (for tracking responses only):

_____

Q40 Name of your organization/program

▼ Click to write Choice 1 (1) ... Click to write Choice 3 (3)

APPENDIX E:

INTERVIEW QUESTIONS

1. Please describe which organization you represent and what your position is in the organization. (I will also ask about confirmation about service type, organization type, and service provision to ensure accuracy with data collection by leaderships group).

Affiliation

2. Are you involved in any other networks like Thrive?

Collaborative Motivation

3. Why your organization become involved in Thrive?
    a. Follow-up question 1
        i. For instance, some organizations join networks for more resources?
        ii. /Increasing visibility (influence) of your organization?
        iii. /Dealing with the pressure from peers/institutions?
        iv. /Achieving shared goals?
        v. /Relationship with other organizations?
    a. Follow- up question 2
        i. (ask this question if interviewees indicate all reasons are important)
        ii. Among all the motivations, what is the most important one for you to join Thrive?
4. Why do your organization join xxx (other network' name)? Are the reasons similar or different as join Thrive?

(ask this question If interviewees are part of other networks as well)

Perception of Network Characteristics

5. How would you describe Thrive as a network?
    a. Follow-up questions
        i. Would you describe it as a large or small network?
        ii. Would you describe it as a diverse or homogeneous network?
        iii. Would you describe it as a mandated or voluntary/emerging network?
        iv. Would you describe it as a mature network or early in its development?
        v. Is there a leading organization or is the role shared by members?
    a. Are the members connected to each other or connected by key hubs, or connected in small clusters?
    b. (If they use previous network analysis result as answers, ask them if they agree or disagree with the result)
    c. What do you like about Thrive network generally?

6. Do you see any barriers to collaboration in the network?
    a. What would you identify as the main barriers to collaboration for your organization?
        i. Resources
        ii. Staff

iii. Lack of knowledge of other organizations in the area

iv. Other external influences

v. If not mentioned, geography as a lead into question 5.

7. Is geography a barrier to collaboration for your organization? (see flow chart for more information)
    a. If yes, how so? When? How? (If specific incidents are shared, look to the question six)
    b. If no, was it ever a barrier?
        i. No-why or why not?
        ii. Yes-how did you overcome the barrier? In what areas might it still be a barrier?
    c. If the interviewee is unsure, remind them that their organization marked geography as a (minor, major, not at all) barrier to collaboration. If the answer is different than originally stated, ask about why it has changed.
8. What conditions affect collaboration?
    a. Distance, road conditions, weather, seasonal, travel time, resources (access to staff, vehicles, etc.)
9. You were asked about your relationship with other organizations doing certain tasks, specifically information sharing, client referral, food sharing, resource sharing, and program coordination.
    a. Does geography affect certain types of activities more than others?
    b. Which activities are more or less affected? Why?
10. Are you more likely to collaborate with organizations in your area?

a. If so, why?

b. Does political geography, such as city and county affiliation, affect collaboration with other organizations?

c. Are there other external factors that affect which organizations you collaborate with?

11. Can the Thrive network help your organization overcome geographic barriers to collaboration?

    a. If yes, how so?

    b. If no, why not?

APPENDIX F:

INTERVIEW MATRIX

	Major	Minor	Not a Concern	Geographic Center	Core Any Tie	Core FS	Core IS	Core PC
Floyd	EN NRCAF NRVCSF	PLE	CB CH FDSS HF NH		NRCAF NRVCS PLE	PLE	NRVCSF HF	NRCAF
Giles	GCM GYAP NRCAG NRVCSG MACY UMCP	GHF PFM	CHCG GDSS GG GCF GS GCS HFC NUMC PCOG PW		NRCAG NRVCSG		NRCAG NRVCSG GG GCM NUMC GYAP	NRCAG
Montgomery	CC CFNRV FIE MBL NRCAHS NRCAM FARM NRVCSM SR GT MBP UW VICCC VCE VTFNP VTK WH YMCA	BL BIFP BR EEBP MCEAP PFI SFP YMCA CG	AUMC BFM CFM CHCM CHP MDSS GLA MCCS NRFS SJ SA WUMC	CFNRV FIE NRCAM FARM SR GT MBP UW VICCC VCE VTK BL MCEAP PFI CFM CHCM CHP MDSS MCCS NRFS SJ SA	NRVCS NRCAM BIFP CFNRV FARM MCCS MBP VCE MCEAP	MBP BIFP NRCAHS GT	NRVCSM NRCAHS NRCAM SA MCCS VCE CFNRV	NRCAHS NRCAM

Pulaski	FP JC NRCAP NRVA NRVCSP PLCOG	BRP DUMC ENTF NRCC NRVSPG	CHCRP PDSS HC NL PCCS PCS PDB RCOG SOF	FP DUMC NRCC CHCRP	NRCAP NRVCSP		PDB PCCS NRVCSP	NRCAP
Radford	CL NRCAR NRVCSR	BRR HH RFDB	BUMC BBP RDSS GB IAJ RU RW UC WRC	CL NRCAR NRVCSR BRR BUMC BBP RDSS GB IAJ RU UC WRC	NRCAR NRVCSR	RFDB	NRVCSR	NRCAR
Other		FASWV	BBBSCCS		FASWV	FASWV	FASWV	

	Core SR	Core CR	Church	Civic	Government	Health	Other Type	School	Social Welfare
Floyd	NRCA F HF	NRVC SF	CB CH		FDSS	EN HF		NH	NRCA F NRVC SF PLE
Giles	NRCA G GG NUMC GCM	NRCA G NRVC SG	MAC Y UMC P HFC NUM C PCO G	PW	GDSS GCF	CHC G	PF M		GCM GYAP NRCA G NRVC SG GHF GG GS GCS
Montgomery	SA NRCA HS NRCA M FARM MCCS VCE CFNR V	NRVC SM MCEA P	BIFP SFP AUM C GLA WUM C FIE SR GT MBP SJ CFN RV	CFN RV BL CHP	BLP VCE MDSS	CC FAR M CHC M	BF M	VTF NP EEB P VTK	NRCA HS NRVC SM WH YMCA BR YMCA CG NRCA M UW VICCC MCEA P PFI MCCS NRFS SA
Pulaski	NRCA P PDB	PDB PCCS NRVC SP	JC PLC OG HC NL RCO G FP		PDSS	CHC RP		PCS SOF	NRCA P NRVA NRVC SP BRP ENTF NRVS

			DUMC						PG PCCS PDB NRCC
Radford	NRCAR	NRVCSR	RW CL BUMC GB IAJ UC		RDSS			BBP RU	HH RFDB NRCAR NRVCSR BRR WRC
Other	FASWV								

	Back pack	Educator	Fresh food	Meal	Multiple	Pantry	Support	Unknown Services
Floyd		HF			EN PLE	CB CH NH NRCAF	FDSS NRVCSF	
Giles	MACY HFC NUMC		PFM GG	GCS	PCOG GHF	GCM NRCAG	UMCP GDSS GCF CHCG GYAP NRVCSG GS	
Montgomery	MBL EEBP		GT FARM BFM CFM YMCA YMCACG	VTK WH	PFI SA	BIFP SFP FIE SR CHP NRCAHS NRCAM MCEAP MCCS	CFNRV BL VCE MDSS CC CHCM VTFNP NRVCSM BR UW VICCC NRFS	AUMC GLA WUMC SJ
Pulaski	FP DUMC	SOF PDB	PC	NRVA	JC BRP	PLCOG HC NL RCOG NRCAP ENTF PCCS	PDSS CHCRP PCS NRVCSP NRVS NRCC	
Radford	BUMC BBP				RFDB BRR	RW GB IAJ HH NRCAR	RDSS RU NRVCSR WRC	CL UC
Other						FASWV	CCS BBBS	

	Multiplexity	Non respondents
Floyd	EN PLE NRCAF (2)	HF CB NH
Giles	GG (7) GCM (5) GHF GYAP HFC NRCAG (2) MACY	NUMC GS
Montgomery	BFM (2) BIFP (2) CC CFM (3) CFNRV (3) EEBP MBL MCCS (4) NRCAHS (3) NRCAM (2) NRFS FARM (3) SFP SR MBP UW VCE (4) VTFNP (3) VTK	SA GLA
Pulaski	BRP (3) JC (2) NRCAP (2) PLCOG PG (3)	SOF PDB HC NL RCOG PCCS PCS
Radford	BRR (3) BBP GB NRCAR (2) RFDB	RU UC
Other	FASWV (14)	BBBS