



Social Network Analysis: Building Partnerships for Healthy Communities

Maryland Department of Health and Mental Hygiene
Center for Chronic Disease Prevention and Control

September 30, 2015

**Social Network Analysis:
Building Partnerships for Healthy Communities**

Final Report

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Social Network Analysis: Building Partnerships for Healthy Communities

Maryland Department of Health and Mental Hygiene

EXECUTIVE SUMMARY

At the request of the Maryland Department of Health and Mental Hygiene (DHMH), the Schaefer Center for Public Policy at the University of Baltimore's College of Public Affairs conducted a web-based survey of healthcare organizations in five Maryland communities, spanning nine counties. The purpose of the study was to conduct a social network analysis of those healthcare organizations and their connections to each other.

Social network analysis (SNA) is a tool for uncovering and mapping relationships among actors within and across organizations and sectors. It can be used to assess strength, efficiency, and effectiveness of connections and it can reveal the means and direction of communication between actors. SNA is also used to examine the structure of network relationships, gauging the extent of connections among participants, the resilience of the network as a whole, and the efficiency of information and resource exchange within the network.

The primary focus of the research team was to use social network analysis to determine how well people and organizations in the counties worked towards a common goal; the degree of coordination and collaboration among healthcare organizations; and the rate and means of communication among them. Using these techniques, researchers were able to identify key sources of information and resources in each network and make recommendations to improve function across organizations in each of the five networks.

Overall, the primary goal of the research is to understand the healthcare networks in each community, how those networks operate, and the strength of those networks.

SOCIAL NETWORK ANALYSIS: KEY MEASURES

Analysis of each network incorporates two modes – quantitative analysis of network characteristics and visualization of each network. Quantitative analytic measures include:

- **Density** – the proportion of actual versus all possible ties within a network. This is a measure of how well connected the network is as a whole.
- **Degree Centrality** – the number of connections each organization has to others in the network. In-degree (incoming connections) and out-degree (outgoing connections) may be discovered. These identify important sources of information or resources on the one hand, and the drivers of the network – those who push information or resources out – on the other.

- **Betweenness Centrality** – this is used to discover organizations that lie along the shortest path between any two other organizations. Organizations like these play an important role in disseminating information or resources throughout a network. In particular, they often serve as “bridges” connecting otherwise distant parts of the network, and as such, they can help improve the flow of communications.

Visualizing the Networks

Network visualizations show organizational connections in a diagram, with organizations as dots (nodes) connected to others by a series of lines (vertices). A network visualization gives a graphic depiction of the measures listed above and can be a useful way to get an overview of the network, and for presenting the analysis in a more immediate and intuitive manner.

FINDINGS

Presented below are key findings from the study. Additional findings and analyses are presented in the each county’s section of the report.

BALTIMORE CITY

Baltimore City is the largest of the networks in the study, consisting of 287 organizations connected by 2,012 links. It is also the least densely-connected network. One of the central goals for growing this network will be to increase density without straining the capacity of organizations in the network.

There are several large organizations operating in Baltimore City, among them the City health department, state health department, and the Johns Hopkins University and Medical systems. However, the largest bloc consists of community and philanthropic organizations, making up one third of the entire network. Assessing intersectoral connections and growing intersectoral communication and collaboration may also lead to gains throughout the network.

Finally, while there is a strongly connected core to the network, there are a large number of peripheral organizations only weakly connected to the body of the network. Many of these are one-way connections, and lead from the core to the periphery. Developing these into reciprocal connections with partner organizations will improve collaboration; growing lateral connections between similar peripheral organizations will increase density and stability.\

WASHINGTON COUNTY

The Washington County network consists of 381 connections binding together 99 partner organizations. Healthcare systems make up one third of this network. Among these, divisions of Meritus are dominant, both in numbers, and in measures of centrality. The network also has an

unusually high level of participation from private businesses. This level of intersectoral partnership is a strength for this network.

One quarter of the network reports participating in a reciprocal connection with at least one partner organization, with the county health department most heavily involved in these types of partnerships. This degree of collaboration across sectors is an asset to this network, providing the basis for the continual development of strong collaborative partnerships.

WESTERN MARYLAND

The Western Maryland network is composed of 58 organizations across Allegany and Garrett counties, bound by 338 connections. It is the most densely connected network in the study; it also has the lowest proportion of weakly connected organizations among all networks. The network is dominated by health systems organizations, making up nearly half of the network.

However, the robustness of connections throughout the network keep this from hindering connections between organizations or sectors. The diverse roles in the network are reflected in centrality measures: while healthcare organizations are leaders in pushing information and resources out to the network, county health departments and affiliated organizations are the leading resources to which other organizations turn.

An additional measure of collaboration may be seen in the level of reciprocal relationships. Over one third of the organizations are involved in reciprocal partnerships. However, there is little participation of private businesses in the network, presenting an avenue for growing the network.

LOWER SHORE

The Lower Shore network is made up of organizations in Somerset, Wicomico and Worcester counties. In all, 68 organizations reported 257 connections. While government agencies are the dominant sector – they make up one third of the network – they also represent a more diverse range of government organizations than seen in other networks, including parks and recreation, and fire departments in several communities.

As may be expected, county health departments play a central role in connecting government agencies. Although the private sector is relatively well represented, private businesses are only weakly connected to the network. Encouraging more active collaboration with these partners may increase the stability of the network.

CAROLINE & DORCHESTER COUNTIES

Eighty-one organizations across Caroline and Dorchester counties reported 570 connections, making this the second most-densely connected network. However, this level of connectivity

may be influenced by the high geographic centrality of this network – nearly all network organizations are located in either Caroline or Dorchester’s county seat. Growing the network out into these sparsely populated counties may prove challenging.

Community and philanthropic organizations play a dominant role. They make up the largest bloc of organizations; they are also among the most centrally connected organizations. Leveraging those community connections may be a means of strengthening the network. Growing reciprocal partnerships may also strengthen the network. While 21 organizations – one quarter of the network – report a reciprocal partnership, these account for only 14% of all connections in the network. Growing reciprocal relationships, and strategic management to increase collaboration and the development of more ‘bridging’ organizations may improve the network.

SOCIAL NETWORK ANALYSIS: SURVEY OVERVIEW

In order to conduct the social network analysis, the Schaefer Center created a database of key healthcare organizations and representatives in the five county networks. The primary mode of data collection was a web-based survey of healthcare representatives in the targeted communities.

The initial goal was to contact these healthcare representatives and find out which organizations they worked with in terms of hypertension, diabetes, and heart health. Once the research team received the names of these organizations, they created a database of key healthcare providers and healthcare awareness organizations in each of the networks to examine for further study.

IDENTIFYING KEY HEALTHCARE ORGANIZATIONS

In order to identify key healthcare providers and healthcare awareness organizations for the study, snowball sampling was used to create a database of key providers in nine Maryland counties. Those nine counties were separated into the following networks:

- Network 1: Baltimore City
- Network 2: Washington County
- Network 3: Allegany and Garrett Counties
- Network 4: Somerset, Wicomico, and Worcester Counties
- Network 5: Caroline and Dorchester Counties

To start the data gathering process, the Schaefer Center contacted DHMH staff members in each of the five networks and asked them to provide a list of healthcare contacts/organizations that they work with to deliver healthcare or healthcare awareness. The first group of DHMH contacts were then asked to provide a list of organizations that they partnered with.

Each time a new contact was identified, they were asked to provide a list of organizations that they worked with, and so on. This enabled the Schaefer Center to create a database of key organizations, whose members were contacted and given the main survey via e-mail.

Once healthcare organizations responded to the main survey, researchers used that survey data as a foundation for the Social Network Analysis of each network.

SURVEY DATA COLLECTION

Table 1 below lists each survey type, the information it was used to gather, and how the information was used in the SNA study.

Table 1: Data Collection Methods

Type	Key Elements	How Utilized in the Study
Snowball Sampling	<ul style="list-style-type: none"> Started with 15 DHMH contacts in 9 counties Contact made via e-mail and phone Resulted in 1,011 separate points of contact Identified nearly 700 healthcare leaders 	<ul style="list-style-type: none"> Identification of key healthcare leaders and organizations Helped researchers assess the size and extent of each network Provided the sample set of organizations contacted for the online survey
Online Survey	<ul style="list-style-type: none"> 668 unique recipients received the survey Data recorded relating to nearly 600 organizations 	<ul style="list-style-type: none"> Results used to calculate the strength of each network Input for the SNA model Used to create a network visualization for each county that shows a diagram of all organizations and their connections to each other Used for qualitative and quantitative analysis of critical network measures such as organizational ties, bridge organizations, and structural gaps in each network

A copy of the snowball sample query letter, which was e-mailed to all potential respondents, can be found in Appendix A.

SNOWBALL SAMPLING RESULTS

Started with 15 contacts in nine counties -- ended with 1,011 points of contact in the 5 networks:

- Network 1: Baltimore City (486)
- Network 2: Washington County (185)
- Network 3: Allegany and Garrett Counties (73)
- Network 4: Somerset, Wicomico, and Worcester Counties (126)

- Network 5: Caroline and Dorchester Counties (141)

Total number of healthcare leaders identified: 668

Total number of healthcare organizations identified: 593

Once the snowball sample was complete, the data was used to create a panel – a list of healthcare providers and healthcare awareness organizations which would then receive the main, online survey.

ONLINE SURVEY

The online survey was designed to assess the types of and quality of connections between the organizations in each network. It was comprised of 12 questions divided into three sections and administered via the web using the Qualtrics survey platform. To ensure data integrity, each potential participant was e-mailed a unique link to the survey.

The online survey gathered responses in three main areas: information about the respondents' organization; selection of the specific organizations that they work with; and qualitative information about their relationships with the organizations they selected.

Section 1 asked respondents to answer the following demographic questions about where they worked:

- The organization's name
- Their department/division
- Job title
- Business sector of the organization
- Organization type
- Whether the organization was a Diabetes Program Partner (DPP)
- Whether they delivered healthcare services or developed healthcare awareness.

Section 2 asked respondents to view a list of healthcare organizations in their area, and select the organizations that they work with. This list was comprised of healthcare organization names that were gathered in the initial snowball sample. List networks and number of orgs?

Section 3 asked respondents to select multiple-choice answers that accurately described their relationship with the organizations that they previously selected. These questions dealt with:

- Nature of the relationship with each partner organization in terms of upstream/downstream referrals
- Length of their working relationship with each organization
- Frequency with which they communicate
- Their understanding of the skills and knowledge of each partner organization
- Primary means of contact between each organizations (phone, e-mail, in-person meetings)

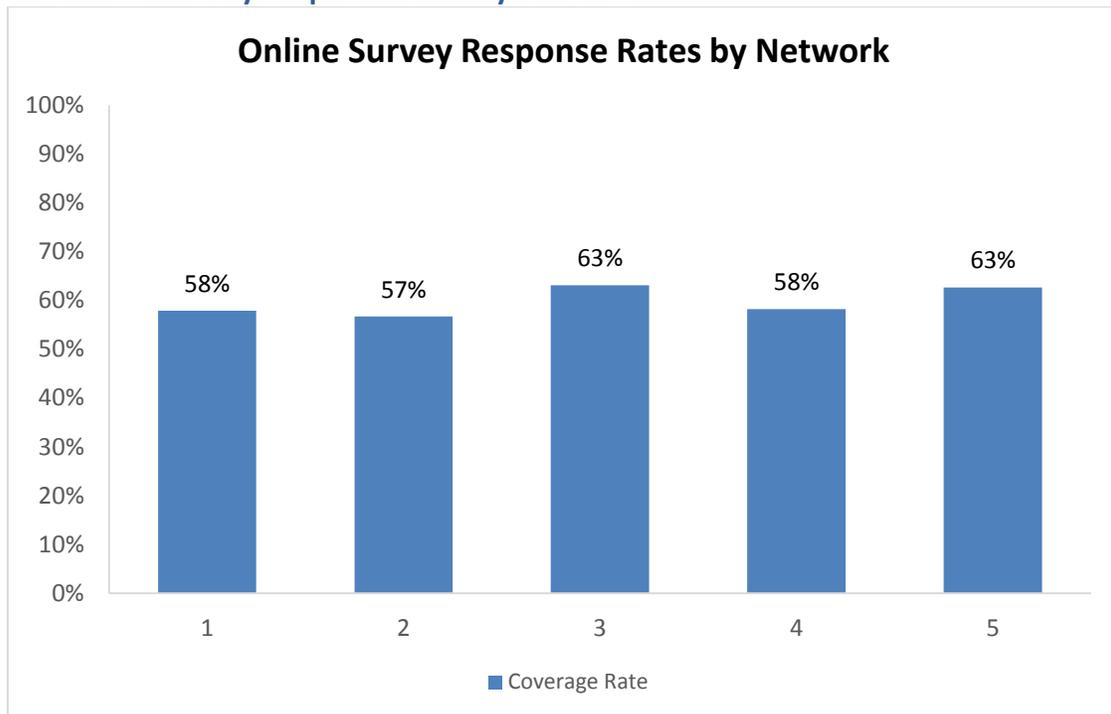
A complete copy of the online survey can be viewed in Appendix B.

ONLINE SURVEY RESPONSE RATES

While response rates for online surveys average between 15 and 20%, the overall response rate for this study was 59%. Data included all survey responses, the data from the snowball sample, plus data from respondents who did not finish the entire online survey, but completed the section about organizations they partner with.

In other words, the research team used 100% of the organizations to create the network, and a full 59% of those organizations provided data about how they work with other organizations in their network. All of the survey completion rates are listed by County Network in Figure 1, followed by a complete summary of survey recipients, organizations, and response rates in Table 2.

Figure 1: Online Survey Response Rates by Network



Network Key: 1: Baltimore City; 2: Washington County; 3: Allegany and Garrett Counties; 4: Somerset, Wicomico, and Worcester Counties; 5: Caroline and Dorchester Counties.

Table 2: Online Survey Response Data

Network	Organizations	Responses	Survey Recipients	Response Rate
1	288	195	337	58%
2	99	59	104	57%
3	58	41	65	63%
4	67	46	79	58%
5	81	52	83	63%
Total	593	393	668	59%

Network Key: 1: Baltimore City; 2: Washington County; 3: Allegany and Garrett Counties; 4: Somerset, Wicomico, and Worcester Counties; 5: Caroline and Dorchester Counties.

INTRODUCTION TO SOCIAL NETWORK ANALYSIS

Social network analysis is a tool for uncovering and mapping relationships among actors within and across organizations and sectors. It can be used to assess strength, efficiency, and effectiveness of connections as well as to reveal the means and direction of communication between actors.

Social network analysis is also used to examine the following:

- Structure of network relationships
- Gauge the extent of connections among partner organizations
- The resilience of the network as a whole
- The efficiency of information within the network
- Resource exchange within the network

As such, social network analysis is a useful way of exploring how well people and organizations work towards a common goal. Social network analysis focuses directly on the relationships between actors (who may be either individuals or organizations), rather than the qualities of discrete actors. This relational data can be presented graphically and analyzed using a number of statistical methods.

At its simplest, a network is simply a description of the connection (“link”) between two or more actors (“nodes”). Network connections can be depicted in a matrix, as in Table 3 below. These matrices form the basis for quantitative analysis of relationships between nodes.

SOCIAL NETWORK ANALYSIS: AN EXAMPLE

Table 3: Sample Network Matrix

	Andre	Beverly	Carol	Diane	Ed	Fernando	Garth	Heather	Ike	Jane
Andre	0	1	1	1	0	1	0	0	0	0
Beverly	1	0	0	1	1	0	1	0	0	0
Carol	0	0	0	1	1	1	0	0	0	0
Diane	0	0	0	0	1	1	1	0	0	0
Ed	0	0	0	0	0	0	1	0	0	0
Fernando	0	0	0	0	0	0	1	1	0	0
Garth	0	0	0	0	0	0	0	1	0	0
Heather	0	0	0	0	0	0	0	0	1	0
Ike	0	0	0	0	0	0	0	0	0	1
Jane	0	0	0	0	0	0	0	0	0	0

In this network, Andre reports relationships with Beverly, Carol, Diane, and Fernando (these are represented by the “1’s” shaded in light green). But Andre does not have a relationship with Ed, Garth, Heather, Ike or Jane (these are marked as “0” in Andre’s row).

Note that while Beverly also reports a relationship with Andre (shaded yellow), the others do not (shaded light red). This means that Andre’s links to Carol, Diane, and Fernando are each uni-directional. They only go in one direction, from Andre to the others. However, Andre’s link to Beverly is reciprocal – he reports a relationship with her (the “1” in bold and shaded green), and she reports a relationship with him (the “1” shaded yellow).

SOCIAL NETWORK ANALYSIS IN SOCIAL SETTINGS

The nature of these relationships depends on the type of network being examined. In a casual social setting, it may mean that Andre reports that he is friends with Carol, but Carol doesn’t feel that she is friends with Andre. In an organizational setting, it may mean that Andre sends information or resources to Carol, but that Carol doesn’t send information or resources back to Andre. Depending on the nature of the work relationship between Andre and Carol, this may be entirely appropriate. However, in many situations, it may be advantageous to close the loop by having Carol report back to Andre.

CREATING A NETWORK VISUALIZATION

Additionally, a variety of information about networks may also be communicated through a graphical depiction of the network. One way of depicting this sample network is shown in Figure 2.

Figure 2: Visualization of Sample Network

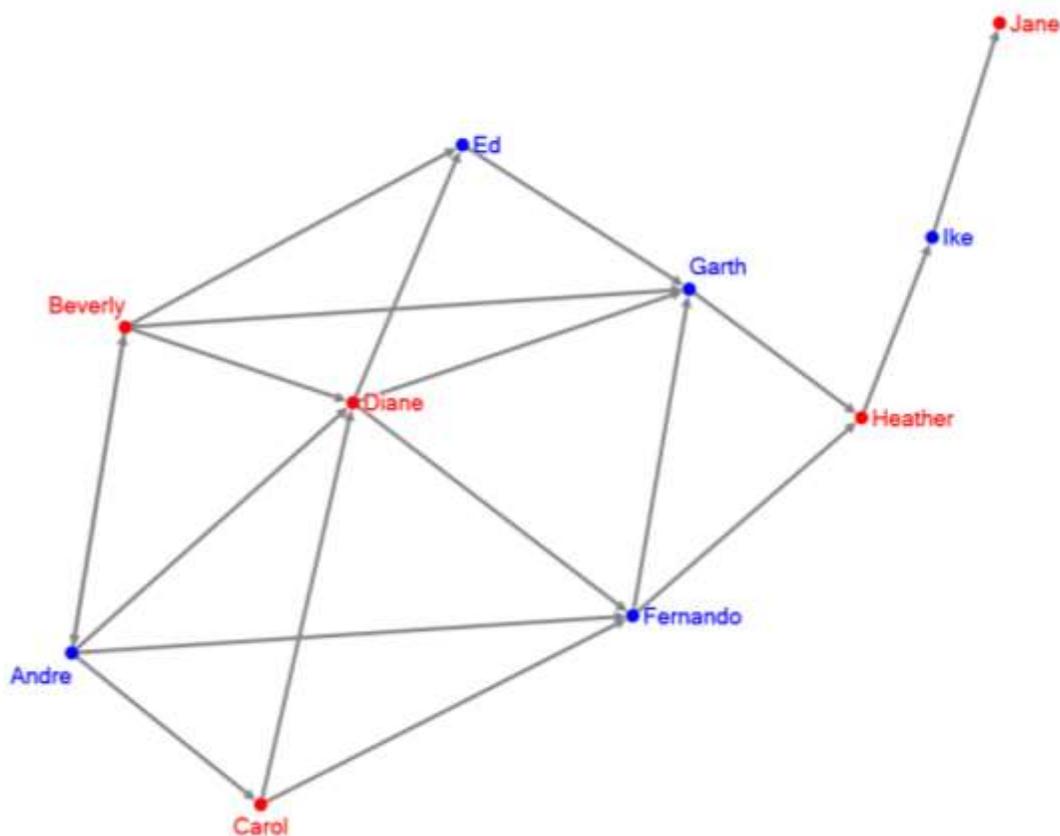


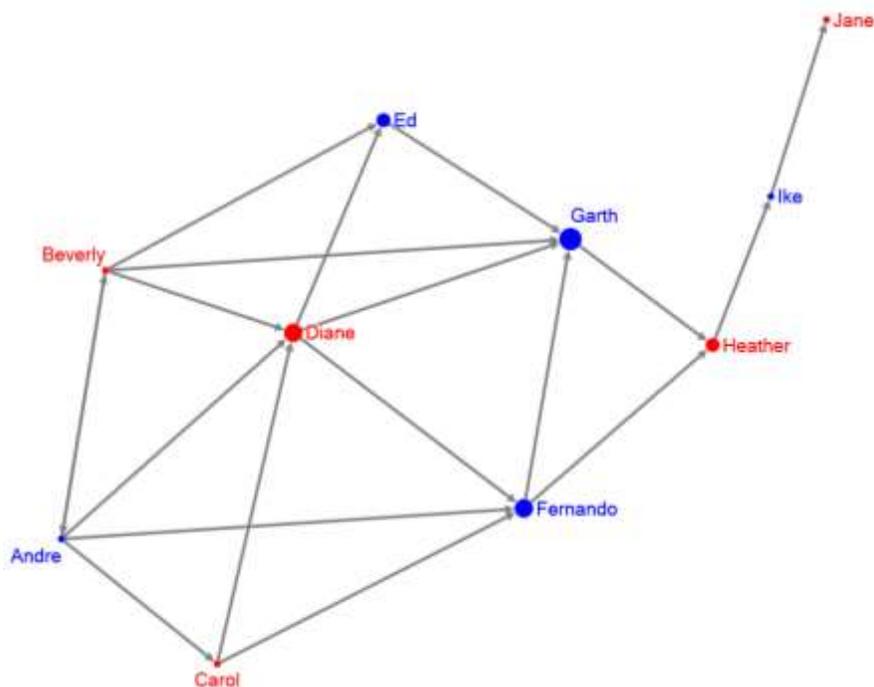
Figure 2 shows the connections between actors in the sample network and, through color-coding, gives some basic information about those actors. That is, they are driven by the connections between nodes.

Thus, it may be tempting to conclude that Diane is the most important person in this network, based on her position. However, networks are relational, not positional – Diane’s position at the center of this network is a function of the analytic software laying connections out for visual clarity. Network analysis assesses importance in terms of the qualities of connections between nodes. A variety of measures of ‘importance’, referred to as ‘centrality’ can be utilized to better understand the nature of relationships between nodes.

VISUALIZING THE NETWORK WITH INCOMING CONNECTIONS

For example, Figure 3 below shows the sample network drawn by proportion of in-coming connections. The positions of the actors have not changed; the relative size of each node now reflects the number of in-coming connections – in this case, the number of people that report being friends with a particular person. As may be seen, Garth is the most popular, with four people claiming him as a friend, followed by Fernando and Diane.

Figure 3: Sample Network, in-degree centrality



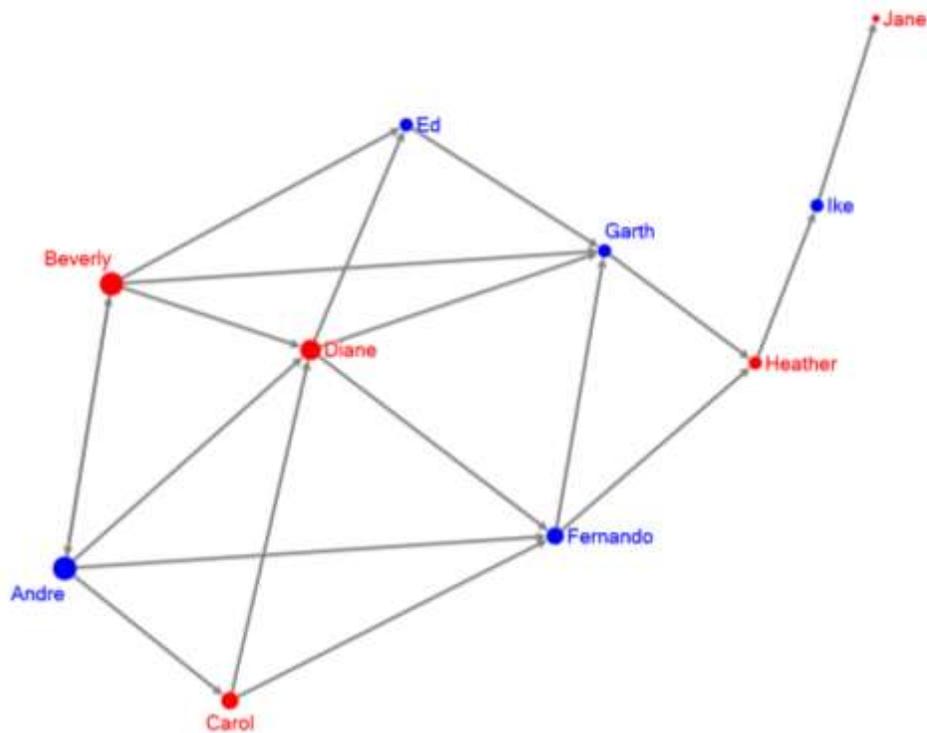
This measure of ‘popularity’ will be an important measure for local healthcare networks, as it reflects how many organizations report working with a particular agency. Bear in mind that increasing this measure of ‘popularity’, or other network measures, may not lead to greater effectiveness.

Raising an organization’s number of incoming connections beyond their capacity to handle the information or work coming from additional connections may simply overwhelm an organization. Rather, understanding the workload, capacity, and expectations of each organization is key to effective management of the network.

VISUALIZING THE NETWORK WITH OUTGOING CONNECTIONS

Figure 4 below presents an alternative way of looking at this network, ranking nodes by their outgoing connections. In this case, the figure emphasizes Andre and Beverly as the most outgoing people in the network. Because they have so many outgoing connections, they are effective means of spreading information quickly throughout the network.

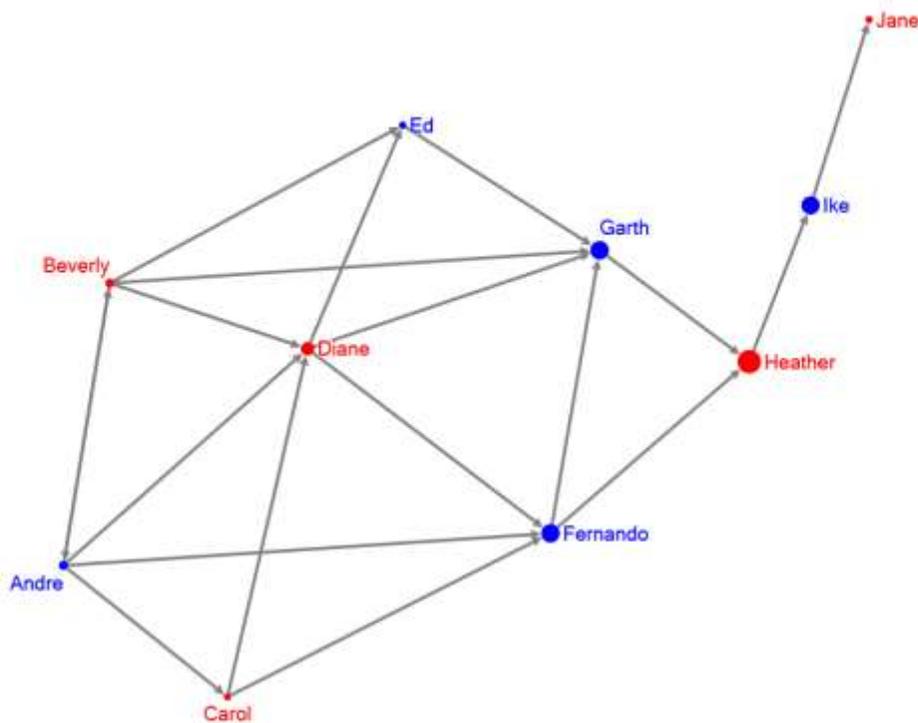
Figure 4: Sample Network, out-degree centrality



BETWEENNESS (GROUPS THAT ACT AS BRIDGES TO OTHERS)

One additional perspective on viewing networks is worth introducing here. Betweenness assesses how frequently a given node lies along the shortest path between two other nodes. Because information and resources are assumed to flow best along the quickest route, those nodes that facilitate quick communication play an important role.

Figure 5: Sample Network, betweenness centrality



In addition, betweenness emphasizes a bridging role – those nodes that serve to connect different parts of the network. As may be seen in Figure 5 above, Heather plays an important bridging role – she is the only path connecting Ike and Jane to the rest of the network.

There are redundant connections throughout the main body of the network; if anyone in the main body of the network left, it would still be possible to move from any node to any other node. However, if Heather leaves, Ike and Jane will be lost to the network as well. Here, too, identifying these bridging organizations can lead to more effective network management.

Data about these connections are gathered from surveys of network actors and can be assessed on a variety of measures. For this healthcare study, the network consists of organizations in government, non-profit and private sectors that collaborate on increasing awareness of, and

delivering services to treat, chronic disease. Information on the survey and network measures may be found below.

SOCIAL NETWORK ANALYSIS: KEY CONCEPTS

Network analysis quantifies relations between nodes in order to identify the structure of networks; reveal patterns of communication and exchange; and assess network robustness, strengths, and weaknesses; and, recommend strategies for increasing network efficiencies. NodeXL (Smith et al., 2010) was used to analyze survey responses, calculate network metrics, and generate network graphs.

NETWORK COMPOSITION

Networks are composed of two elements: the actors (individuals or organizations) working within a network, known as ‘nodes’, and the connections between those nodes, called ‘links’. The structure of a social network – its layout or pattern – is not fixed, but depends on the connections between the actors in a network. Understanding the qualities of these connections is critical to efficient management of a network, and for effective collaboration among network partners.

Network analysis uncovers information about the qualities of links in a network. It also addresses a basic question: “Which are the important nodes?”. To answer this question, network analysis proceeds from two fundamental points. First, there are a variety of ways of being important. Second, ‘importance’ is connected to ‘centrality’ – how close a given node is to the center of a network.

By this, network analysts are really asking “how close to the center of relationships is a particular node?”. Because network structure is not fixed, the center is also not fixed; it may change based on changes in the links forming the network. The center may also shift depending on which qualities of linkages are being examined. Of relevance to this report are measures of degree and betweenness centrality.

DENSITY

Network density is a measure of completeness: it counts the number of connections in a network and displays that total as a fraction of all of the possible connections within that network. It is a very basic metric that can provide a general sense of how well-connected a network is. Other measures provide more insight by assessing various qualities of the connections that do exist.

Note that higher density is not always better, particularly above a certain level. To illustrate, imagine your contacts file as a network. Consider the impact on that network if each of those

contacts was in regular communication with every other contact. Although low density can lead to poor information or resource transfer and runs the risk of network dissolution, high density can overwhelm individual nodes and bring a network to a halt.

DEGREE CENTRALITY

Degree centrality is simply the total count of links connecting a given node to the rest of the network. This may be thought of as roughly analogous to popularity; it measures the volume of connections for each node.

A high degree centrality indicates one measure of importance; it also signals particular management requirements. Nodes with high degree centrality are more connected. This means that they can more efficiently facilitate the flow of information and resources throughout a network. It also means that the volume of flow may overwhelm a node's capacity.

Consider an airport with high degree centrality, such as Newark or Atlanta. The domestic air network relies on these, and other hub airports, to move a large volume of passengers and freight. However, the high volume increases the complexity of operations at these airports. Additionally, the impact of a slowdown or shutdown of these hubs has a proportionally large effect on the whole network.

DIRECTION OF CONNECTIONS

Degree centrality may be further distinguished by the direction of connections. In figure 1, all nodes appear to have a degree of two. However, Carol shows three links, two incoming, and one outgoing. *In-degree centrality* measures the number of connections coming into each node, while *out-degree centrality* measures the number of connections originating with a particular node and going out towards other nodes in the network.

In-degree centrality reports how many other networks have a connection to a particular node. In this study, it ranks how many other nodes connect with a given node – how many organizations rely on a particular organization to help treat chronic disease. Those nodes may be important resources, providing information, support, or referrals. They may be the organizations to which partners turn. Conversely, out-degree assesses the degree to which a node pushes out information or resources to other organizations in the network.

BETWEENNESS CENTRALITY

Betweenness centrality is a measure of how often a given node sits on the shortest path between two other nodes. The underlying assumption is that information, resources, etc. will flow through the most direct path possible. Therefore, a node that lies on the shortest route will be included in more transactions and more information, resources, etc. will be available to it as a result. Nodes with high betweenness centrality can serve several important functions.

First, they may be thought of as clearinghouses, moving information or resources between a large number of nodes in a network. Second, they may serve as bridges – they may be one of only a few, or the only, connection between otherwise distant or unconnected parts of a network. In this context, they are central to the cohesion of the network as a whole. One implication of betweenness centrality is the impact of a node’s absence on the network – the extent to which removing a particular node would disrupt communication between other nodes, or disconnect them from the network entirely.

Finally, nodes connecting distant parts of a network often serve a valuable function of spreading information not otherwise readily available to a set of nodes. These ‘weak ties’ bring new information in and can significantly affect how nodes make use of the information and resources at their disposal. Consider, for example, the serendipity that can result from contacts at an outside agency, or from friend-of-a-friend connections.

BALTIMORE CITY: SOCIAL NETWORK ANALYSIS RESULTS

RESPONSE RATE

Ideally, network analysis will proceed from complete data. However, this is unusual to achieve in practice. The snowball sample identified 287 organizations, or divisions within organizations, and 337 recipients received the survey. Of that total, 195 responses were received. Partial data on the non-respondents was obtained from those completed surveys.

HEALTHCARE ORGANIZATION SECTORS

Table 1-1 shows the 287 organizations in the network, categorized by CDC sector. Where conceptual overlap between sectors was encountered, organizations were categorized as follows:

- Business and health system (e.g. private medical practice) – counted as health system
- Government and education (e.g. public school; Board of Education) – counted as government
- Nonprofit organizations not operating as a health system were categorized as philanthropies.
- Note: All network diagrams will use the colors below to represent their sector.

Table 1-1: Organization Totals by Sector

Sector	Number of Organizations
Business	23
Government	55
Health System	62
Education	37
Community	27
Philanthropy	83
Total organizations/divisions in network	287

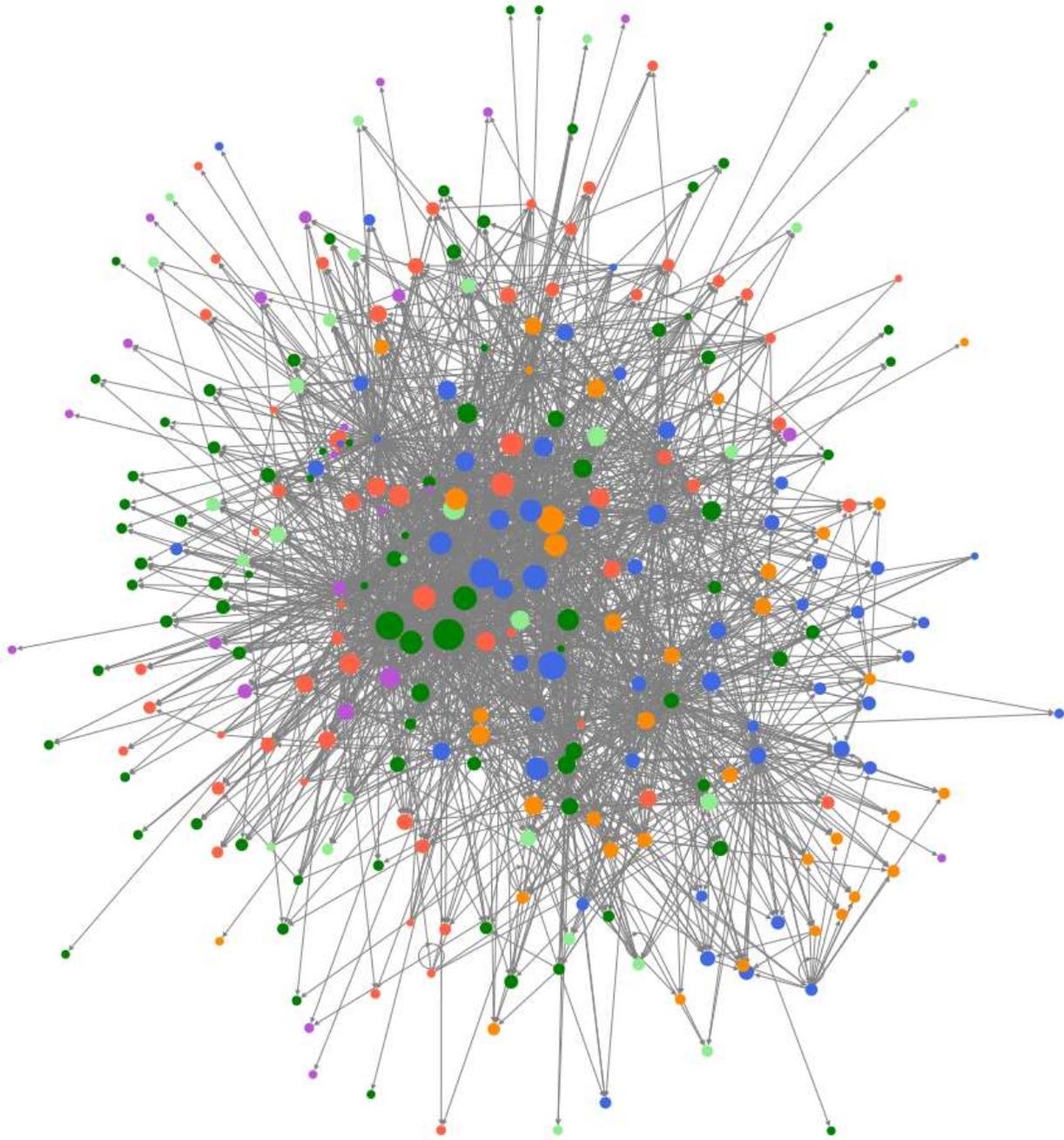
NETWORK DATA

DENSITY

The 287 organizations reported a total of 2,012 connections. In a network this size, there are 82,082 possible connections. The density of this network is .025. Overall, the network is not highly interconnected.

As the visualization of the Baltimore network shows in Figure 1-1 below, there is a dense web of connections at the core of the network. However, the majority of nodes are only loosely connected to the network.

Figure 1-1: Baltimore City – Network Visualization



These connections may indicate that the network connects organizations that otherwise would not work together; it may also be a point of attention in the management of the network, as some strategic monitoring may decrease the loss of any such weakly connected nodes or sections.

DEGREE CENTRALITY

Two measures of degree centrality were obtained. In-degree centrality is the count of all nodes in a network reporting a link to a particular node. Table 1-2 presents the most central organizations by in-degree count. In other words, the table lists organizations by how connected they are to other organizations.

By this measure, the American Heart Association is the most central organization, with 46 other organizations (approximately 17% of the entire network) reporting a connection to the AHA. For this study, the survey asked organizations to identify all partners “with which your organization worked on any of the following: hypertension, diabetes, blood pressure, weight management, or heart health initiatives.”

Table 1-2: Organization Totals by Sector In-degree Centrality, Baltimore City

Organization	Centrality
American Heart Association	46
Baltimore City Health Department	41
Maryland Department of Health (DHMH)	37
American Diabetes Association	37
Johns Hopkins - Bloomberg School of Public Health	34
Baltimore City - Department of Health - Office of Chronic Disease Prevention	28
Y of Central Maryland - Community Relations	26
American Heart Association - Cooking with Heart Kitchen	24
Maryland Department of Health - Chronic Disease Prevention and Control	24
Bon Secours - West Baltimore Health Enterprise Zone	24
Total Health Care, Inc. - Community Programs	24
Baltimore City - Office of Aging & Care Services	23
Baltimore City Health Department - B'more for Healthy Babies	23
MedStar Health and Hospital System	22
Morgan State University	22
Coppin State University	21
Baltimore City Health Department - Maternal and Child Health	21
American Cancer Society	21
Zeta Center Healthy Aging Partnership (Z-HAP)	21

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix C.

As may be seen in Table 1-2 above, in-degree centrality falls quickly. In-degree centrality falls by 50% over the course of the top 19 organizations – from the AHA at 46 down to Z-HAP at 21. Only 74 organizations in Baltimore City have an in-degree centrality of 10 or higher.

At the low end of the scale, 26 organizations report zero in-coming connections; and of that group, 14 report out-going connections to other organizations. While this is a relatively small percentage of the whole network, closer examination reveals an opportunity to improve network robustness.

Table 1-3, below, lists the 14 organizations with zero in-degree and some out-degree connections. In particular, the strong out-degree centrality of community-related programs with zero reported in-coming connections may indicate a need to close the loop by encouraging community partners to communicate more effectively with the community relations organizations listed here.

Table 1-3: Organizations with Out-Degree, but No In-Degree Centrality

Organization	In-degree count	Out-degree count
Baltimore City Health Department - Community Relations	0	94
American Diabetes Association - Community Outreach	0	53
Johns Hopkins - Community and Global Programs	0	52
Y of Central Maryland	0	50
MedStar Franklin Square Medical Center	0	26
Moveable Feast - Nutrition Services	0	22
Center for Grace-Full Living - Amazing Grace Evangelical Church	0	22
Baltimore City Health Department - Youth Health	0	13
Johns Hopkins AIDS Education and Training Center	0	12
MedStar Good Samaritan Hospital - Community Outreach	0	10
MedStar Good Samaritan Hospital	0	7
Total Health Care, Inc.	0	6
DHMH Comprehensive Cancer Control Program	0	5
MedStar Harbor Hospital	0	2

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix C.

OUT-DEGREE CENTRALITY

Organizations with the highest out-degree centrality are presented in Table 1-4 below. As the table shows, the Baltimore City Health Department's Office of Community Relations is the most central outwardly connected organization. It has connections with roughly 1/3 of the network.

As with in-degree centrality, the number of connections falls quickly, with only 60 organizations reporting more than 10 outgoing connections. A significant portion of the network reports no outgoing connections, although meaningful conclusions cannot be drawn, as non-responding organizations present as zero outgoing connections.

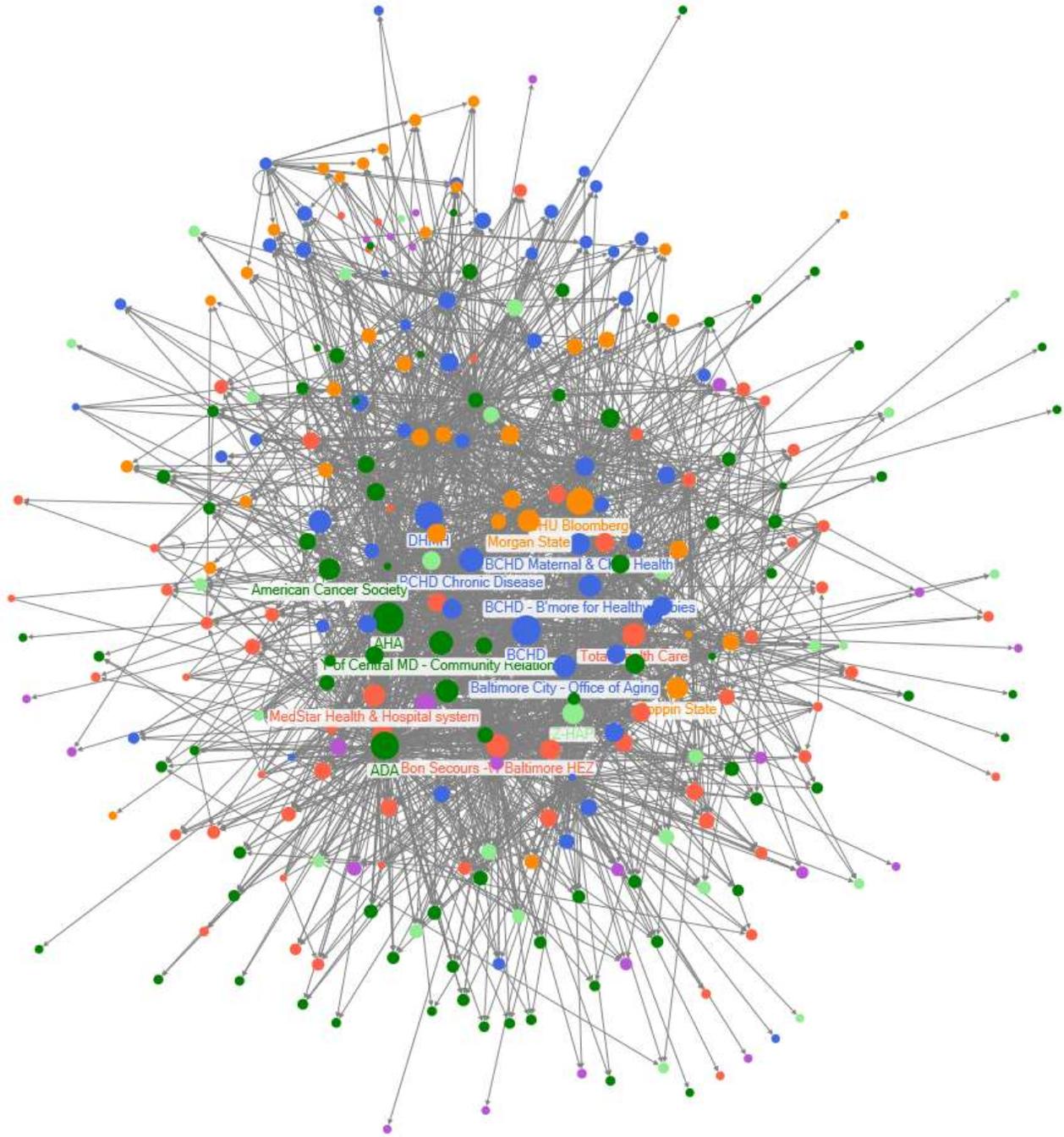
Table 1-4: Out-Degree Centrality, Baltimore City

Organization	Out-degree count
Baltimore City Health Department - Community Relations	94
Maryland Hunger Solutions	92
American Diabetes Association	79
American Heart Association	69
Zeta Center Healthy Aging Partnership (Z-HAP)	61
James Long Fitness	61
University of Maryland Extension	59
Total Health Care, Inc. - Community Programs	57
Bon Secours - West Baltimore Health Enterprise Zone	53
Baltimore City Health Department - B'more for Healthy Babies	53
Johns Hopkins - Community and Global Programs	52
MDQuit Tobacco Resource Center	51
Johns Hopkins - Bloomberg School of Public Health	50
Y of Central Maryland	50
Central Baptist Church	45

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix C.

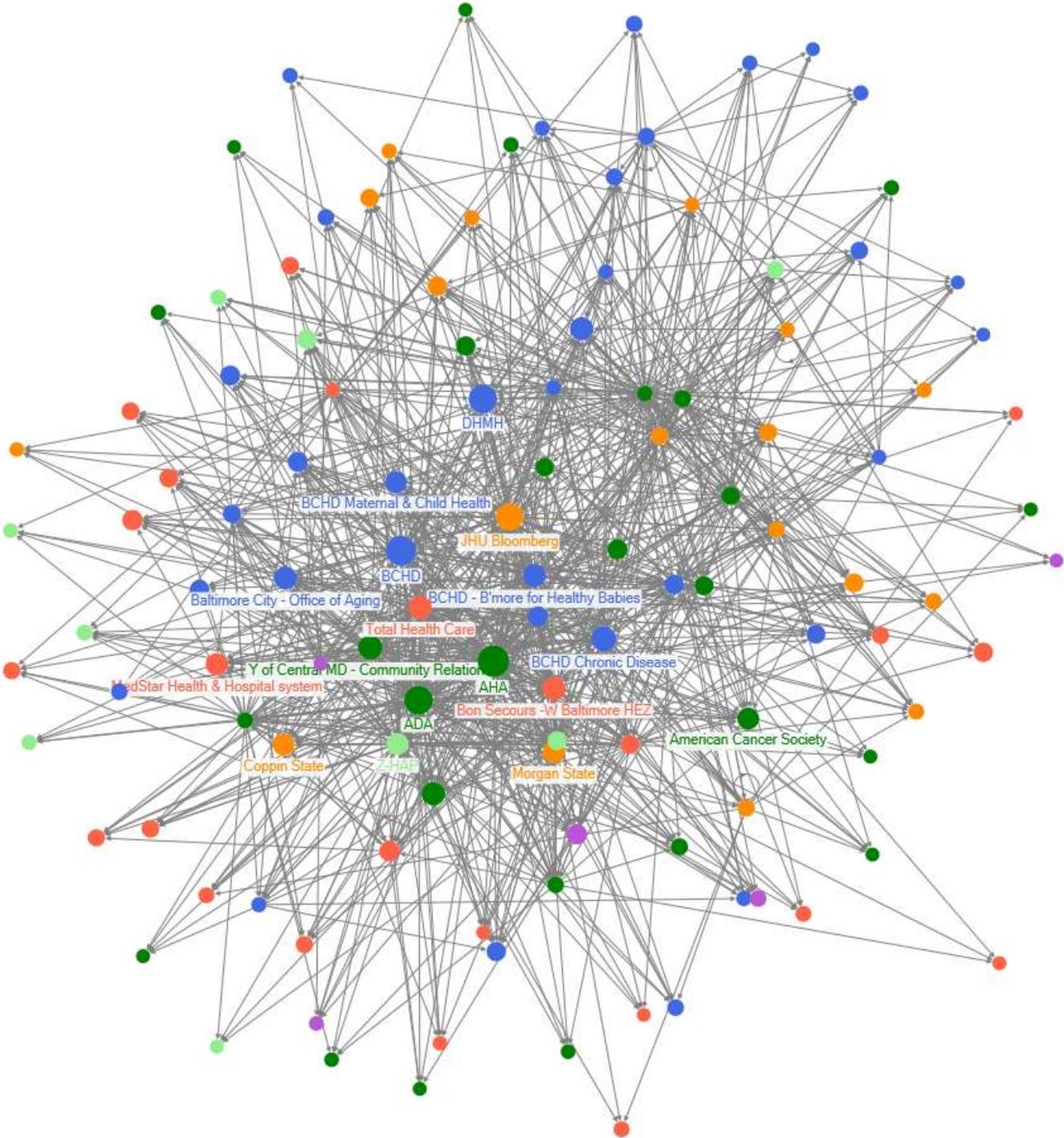
Figure 1-2 on the following page shows all 287 organizations collaborating in the Baltimore City network as well as all connections reported between these partners. In this figure, node size increases with in-degree centrality – as more organizations report working with a particular partner, that node increases in size in this figure.

Figure 1-2: Baltimore City, Node Size by In-Degree Centrality



Because the Baltimore City network is so large, it can be difficult to observe relationships due to the density of the graphics. Figure 1-3 on the next page shows a partial and less-dense network. Only those nodes with eight or more in-coming connections are shown.

Figure 1-3: Baltimore City, In-Degree Count of 7 or Higher



BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS)

Betweenness centrality assesses how frequently a given node lies along the shortest path between any two other nodes in the network. Betweenness tends to identify nodes that serve as ‘bridges’ connecting clusters within a community.

These bridges are particularly important, as they bring a network closer together and disseminate information to parts of a network that may be otherwise distant from one another.

Betweenness, as calculated in Node XL, often follows a power law, so it tends to drop very quickly, and is a normal feature of networks. Put simply, networks seek to work through ‘hubs’ – nodes with high betweenness. An important consideration for network management is to identify which nodes serve as such hubs and to ensure that they have sufficient capacity to handle the load of information flowing through them. Table 1-5 below presents the organizations with the highest betweenness centrality in Baltimore City’s network.

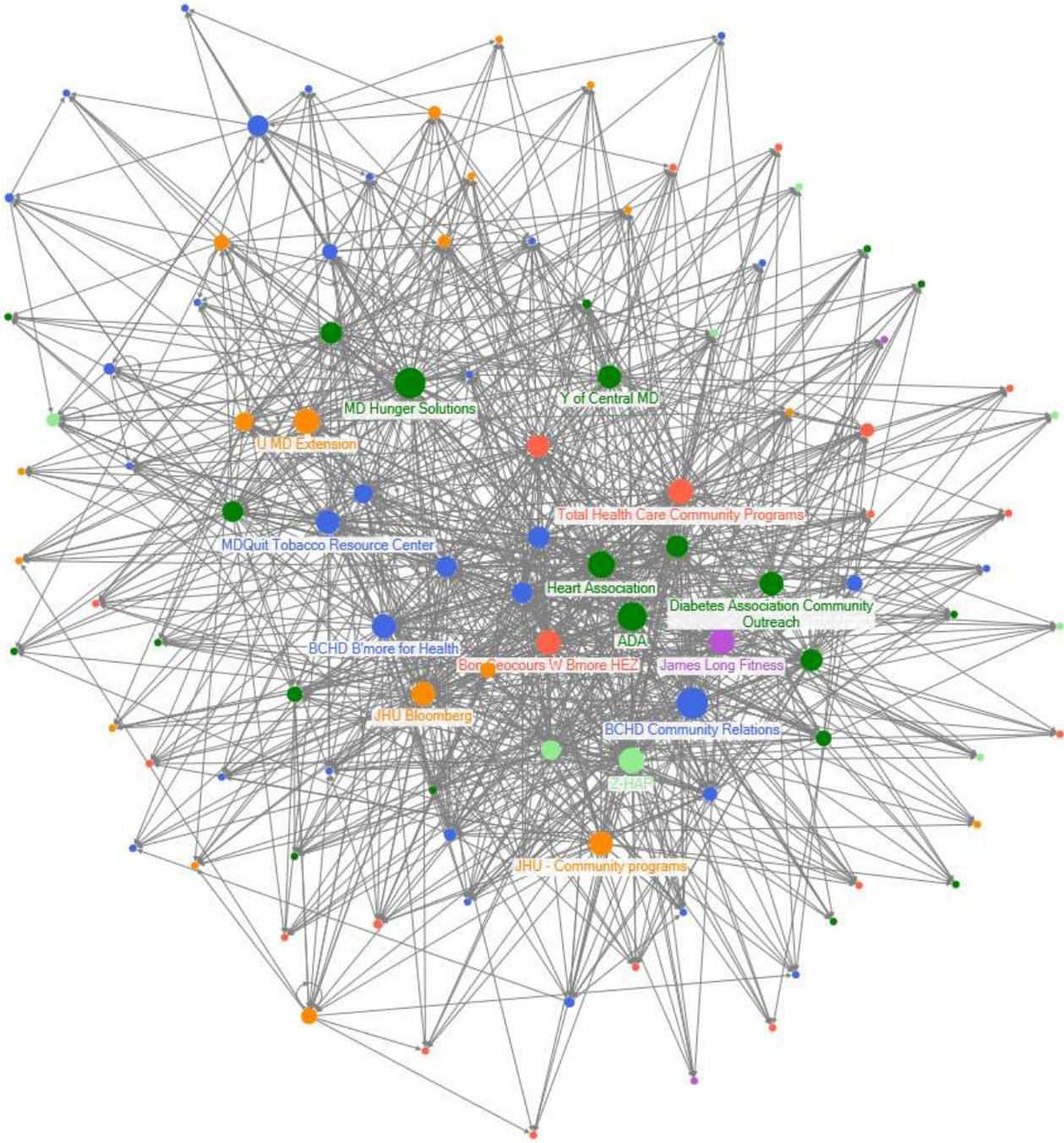
Table 1-5: Betweenness Centrality, Baltimore City

Organization	Betweenness
Baltimore City Health Department - Community Relations	7995.081
Maryland Hunger Solutions	7056.278
American Diabetes Association	7026.511
American Heart Association	5438.999
Johns Hopkins - Community and Global Programs	4210.666
Johns Hopkins - Bloomberg School of Public Health	4004.001
Zeta Center Healthy Aging Partnership (Z-HAP)	3350.614
James Long Fitness	3151.394
University of Maryland Extension	3125.039
Baltimore City Health Department - B'more for Healthy Babies	3119.361
MDQuit Tobacco Resource Center	3115.362
Total Health Care, Inc. - Community Programs	2686.378
Baltimore City Health Department	2502.670
University of Maryland Medical Center	2207.931
Bon Secours - West Baltimore Health Enterprise Zone	2082.892

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix C.

Figure 1-4 below shows the Baltimore City network, with nodes sized by betweenness centrality. For clarity, the figure shows a simplified depiction of the network, excluding outlying nodes.

Figure 1-4: Baltimore City, Betweenness by Sector



MAPPING OUT THE LOCATIONS OF HEALTHCARE ORGANIZATIONS IN BALTIMORE CITY

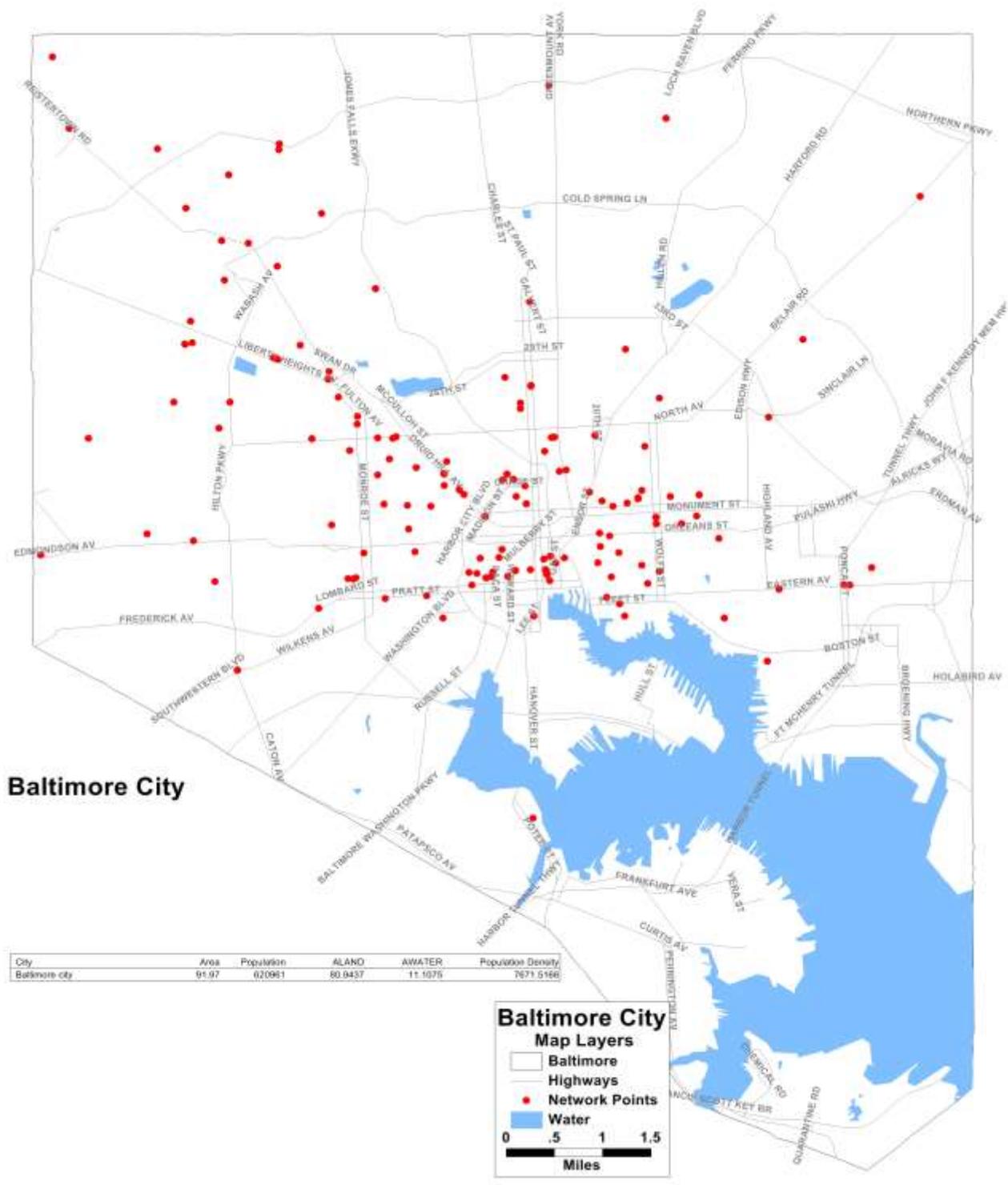
Figure 1-5, on the following page, shows the geographical distribution of network organizations within Baltimore City. Each red dot in the figure marks the address of at least one network organization. Note that any organizations with an address outside of the city limits is not shown; also, that any organizations sharing the same address will only be marked by a single dot. Thus, 63 network partners located outside the city are not shown.

Additionally, duplicate addresses comprise a significant portion of the network. These are primarily concentrated among large organizations, including divisions of the City Health Department, the State Department of Health and Mental Hygiene, and arms of Johns Hopkins. However, a good sense of the distribution of network partners throughout the city can readily be made.

Many of the organizations in the Baltimore network are large organizations with a state, regional, or national scope. These may be expected to serve clients across the city. However, there are also a significant number of local and community organizations that play a key role in the health of the network, and in delivering services, information, and resources to citizens.

Although the dots of the Baltimore City Map do not differentiate among these types of organizations, the concentration of organizations located in Central and Western Baltimore is striking. Future development of the network will include strategic assessment to better understand this distribution as well as to identify communities most in need of services in Southern, Eastern and Northern Baltimore and to develop a plan to grow the network in those regions of the city.

Figure 1-5: Distribution of Healthcare Organizations in Baltimore City



BALTIMORE CITY: DISCUSSION & RECOMMENDATIONS

Baltimore City's network consists of 287 discrete nodes bound together by 2,102 linkages. As was previously shown in Table 1-1, nonprofit and community organizations make up the largest bloc, accounting for 1/3 of all nodes.

Table 1-1's count of organizations slightly masks the proliferation of nonprofit and community organizations in the network, as the next two largest blocs (health systems and government) each have significant clusters – several divisions within larger organizations. Notable among these are offices within the city health department and divisions of the Johns Hopkins University and Hospital systems. These clusters will be examined in greater detail below.

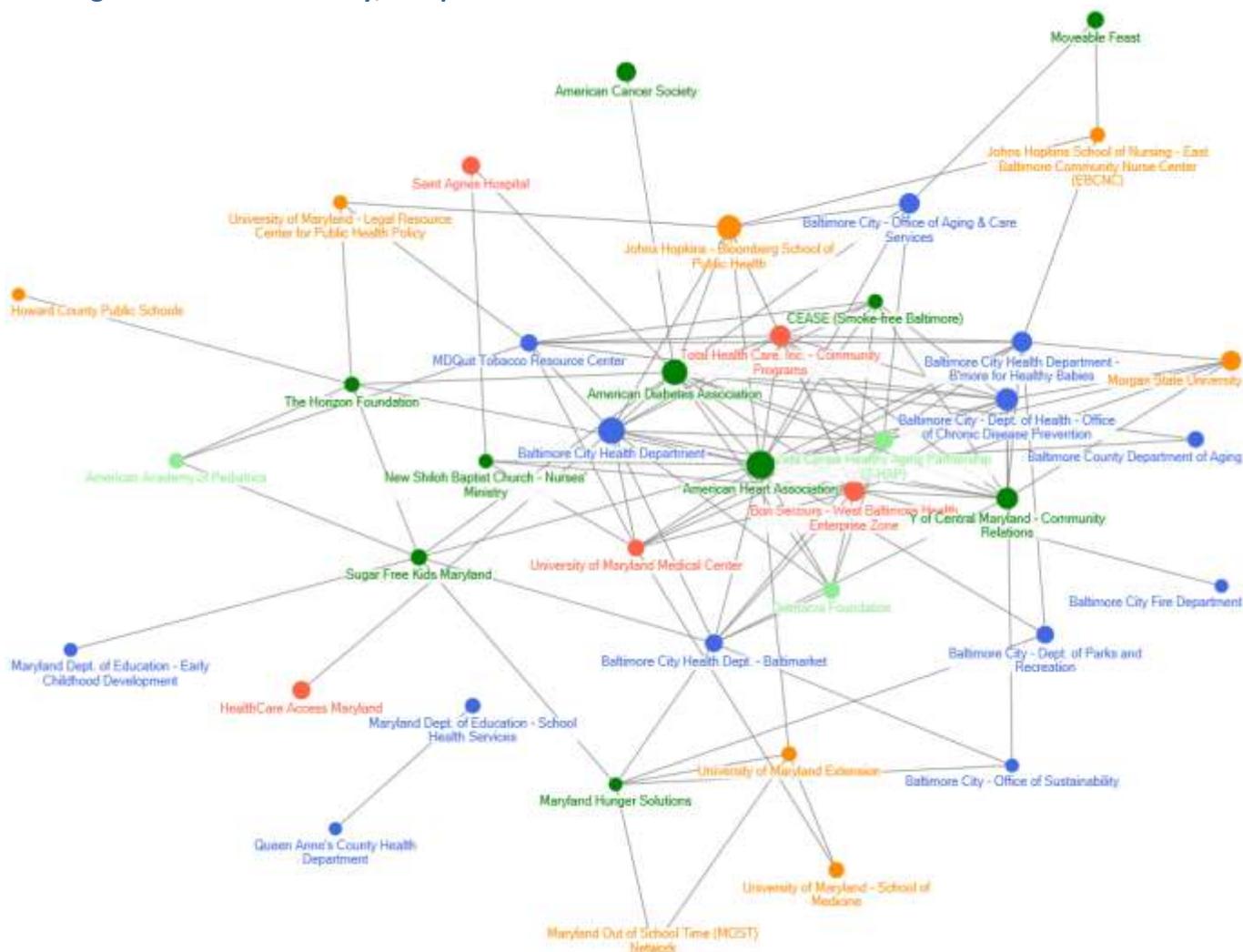
One of the challenges for managing this network, and maintaining healthy collaborations, will be to partner effectively both with these large regional and national organizations as well as with much smaller, community-based organizations. Facilitating clear communication and effective coordination between organizations of such different scope, size and resources, will require careful attention to each organization's needs and capacities.

This challenge is reflected in the network's density. Although the largest network, it is the least dense. Density is the proportion of reported connections to all possible connections. While a fully connected network is not desirable – it would likely be overwhelming to participants – the low density in this network indicates the potential to grow collaboration by increasing lateral connections between organizations. The low density may be seen in Figure 1-1, in the outer ring of organizations only weakly connected to the network.

RECIPROCAL RELATIONSHIPS

Another perspective on this may be gained by examining only those reciprocated connections – those cases where each partner reports a mutual connection with another. Those connections are shown in Figure 1-6 on the following page.

Figure 1-6: Baltimore City, Reciprocal Connections



As may be seen in the figure above, 39 organizations are involved in 146 reciprocal connections. These mutually-acknowledged partnerships account for only 14% of all organizations and 7% of all connections in the network. Efforts to increase reciprocal relationships should strengthen the network and bring significant increases in efficiency and effectiveness.

This may particularly be valuable for smaller organizations with limited capacity and resources. Strategies for increasing reciprocal connections should focus not only on growing new connections, but fostering an awareness of mutual partnerships that may already exist but were not acknowledged as such by one partner.

In other words, making network organizations conscious of their partners, as well as of potential new partners, should yield valuable results.

CLUSTERED ORGANIZATIONS WITHIN BALTIMORE CITY

Multiple departments of the Baltimore City Health Department (BCHD) and the Maryland Department of Health and Mental Hygiene (DHMH) were reported as unique nodes in this network, as were various divisions of the Johns Hopkins University and Hospital systems.

Figure 1-10 groups divisions of each of those large umbrella organizations into a single node, showing the dominance of these three organizations in the network. In the figure, Johns Hopkins is the large red cluster node, DHMH is the dark blue cluster node, and BCHD is the light blue cluster node. Another means of assessing the impact of these three larger organizations on the network is to remove them from the network, as is shown in figure 1-7 on the next page.

Figure 1-7: Baltimore City, Large Organizations Grouped Together

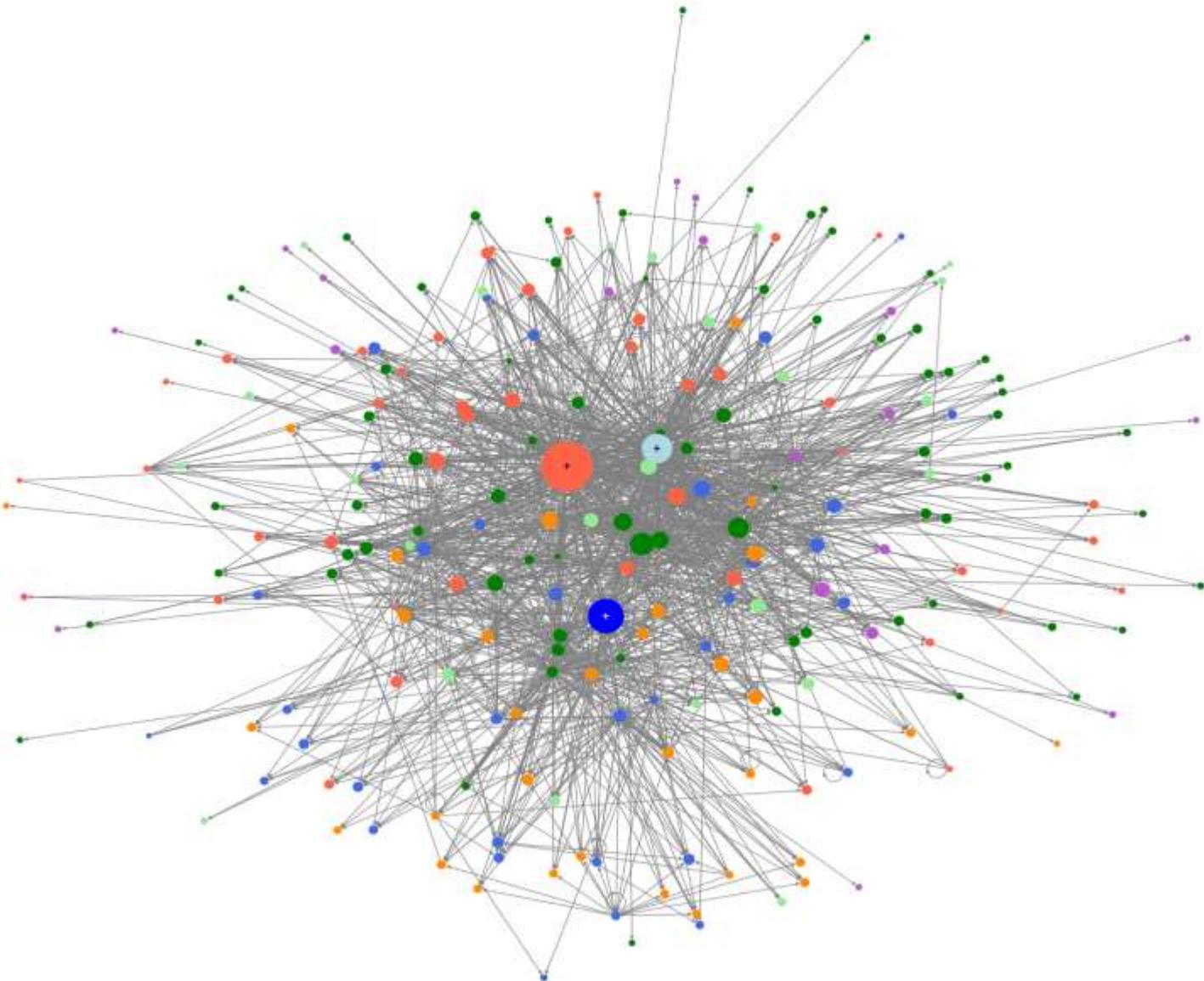
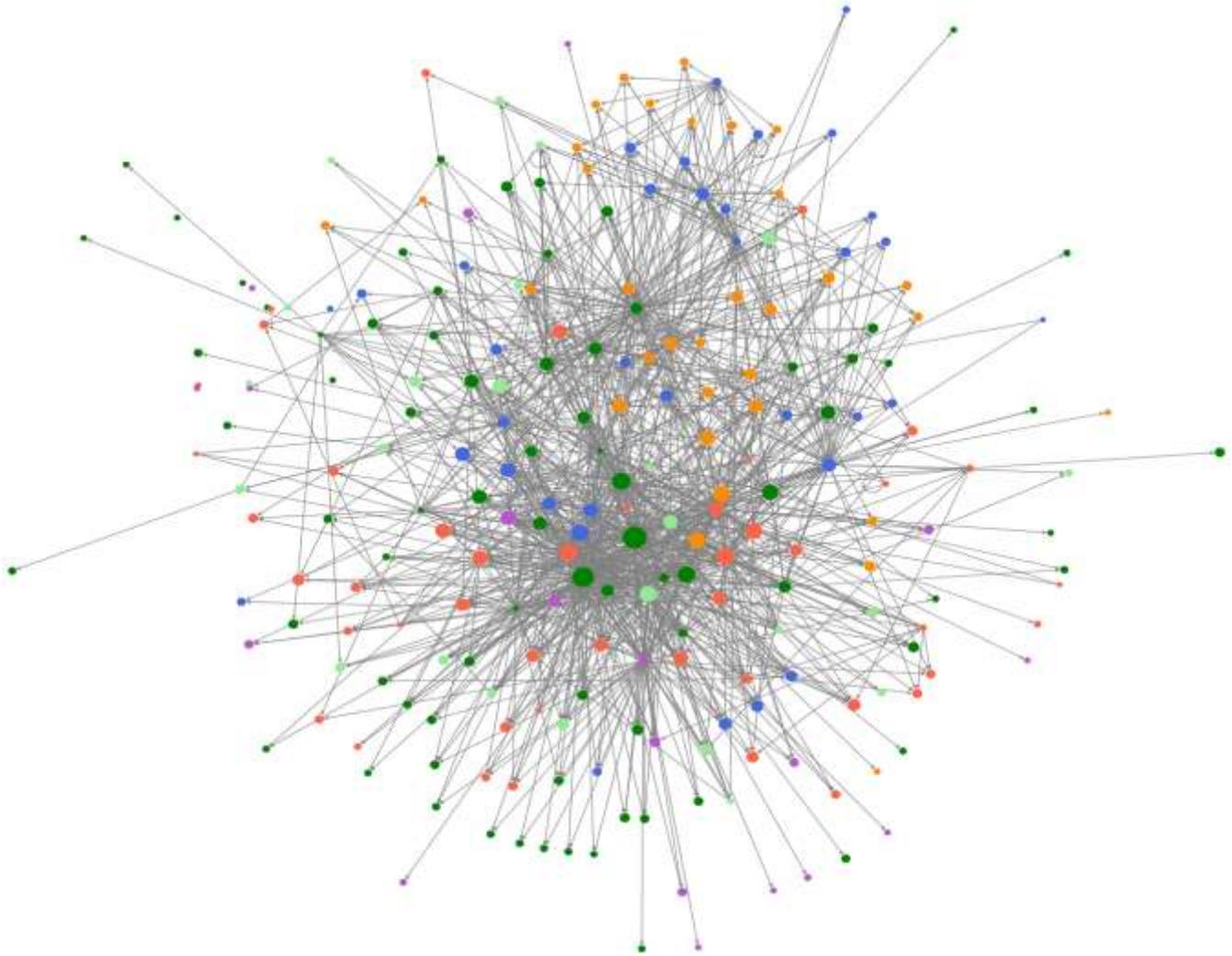


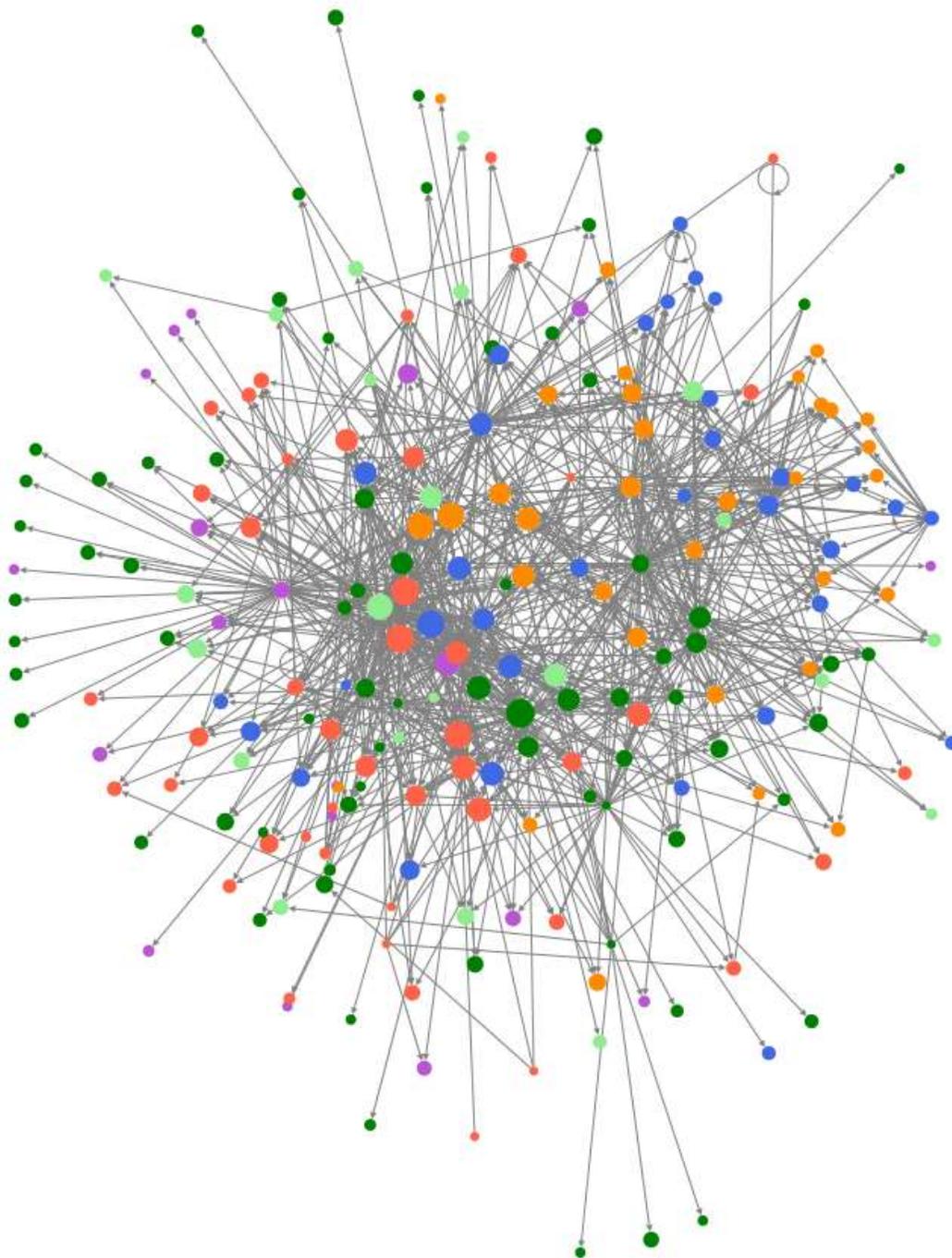
Figure 1-8: Baltimore City, Large Organizations Removed



As seen in the figure above, the overall network becomes less dense, and the number of weakly connected nodes rises slightly. However, only a few nodes are disconnected from the network. Interestingly, the two most central organizations remaining are the American Heart Association and the American Diabetes Association – the two large dark green nodes in the lower center of Figure 1-8, above.

While these are important partners in the fight against chronic disease, they are also large national organizations. To examine the structure of local partners in the network, Figure 1-9 on the following page shows the Baltimore City network with these two organizations also removed.

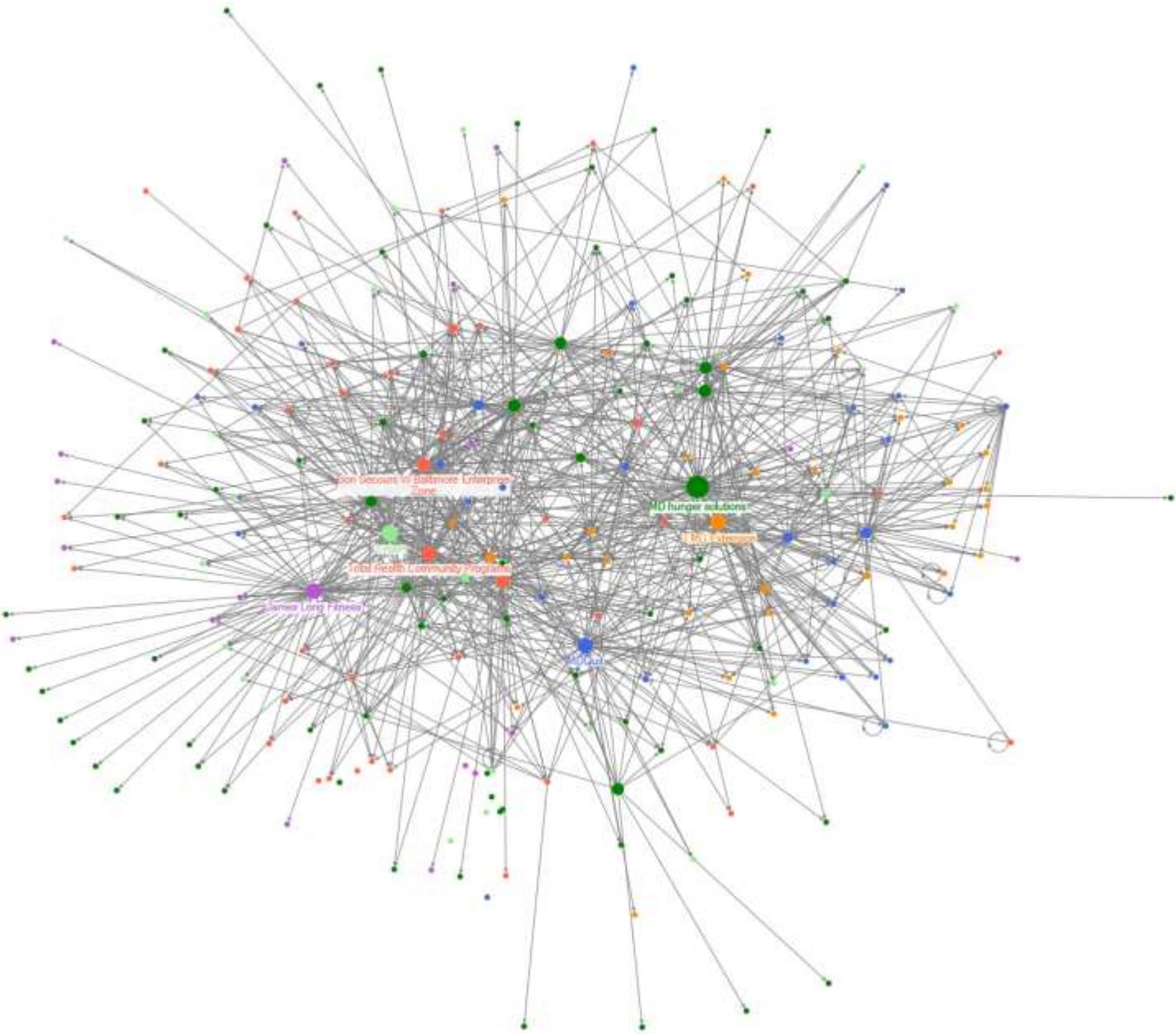
Figure 1-9: Baltimore City: No Cluster Organizations, American Heart Association or American Diabetes Association



As the default view, Figure 1-9 sizes nodes by in-degree centrality, emphasizing the number of incoming connections to that node. As so many connections have been eliminated with the removal of large resource-rich organizations, the role of passing information among the remaining nodes becomes more significant.

Figure 1-10 shows the same portion of the Baltimore City network as in the previous figure, but ranks the nodes by betweenness centrality, emphasizing those nodes that play a connecting role between other organizations in the network. The most central such nodes have been labeled in the figure.

Figure 1-10: Partial Baltimore City Network by Betweenness Centrality



LEVERAGE OPPORTUNITIES ARISING FROM THIS STUDY

Basic benefits from the fundamental act of mapping the network should not be overlooked. These include:

NETWORK EVALUATION

The size and composition of the network is now overt. In addition to recommendations made here, local health officials can undertake their own evaluation of how well suited the current partnerships are towards advancing the goals of chronic disease prevention. Strategic planning to incorporate new organizations into the network, or shift the capacity, centrality, or role of existing partners, can be made.

PARTNER AWARENESS

Partner organizations are now aware that they are part of a larger network. The view from the ground is necessarily constrained and often focused closely on an individual organization's specific mission and focus. Participation in the survey made respondents aware that they are part of a larger network, and presents an opportunity to strengthen and grow the network.

- Disseminate a list of network partners throughout the network. Doing so encourages increased communication and collaboration among partner organizations. Discussion with some respondents revealed the existence of local partners in the neighborhood that were unknown to the respondent. Collecting and publishing basic information on the partner organizations is an easy way to more fully inform the network as to who everyone is and what they are doing; may cut down on redundancies; and, can lead to the growth of lateral connections between partner organizations.
- Develop a communication forum for the network. A formal publication, either in print or online, may suffice. An open forum, such as a discussion board, email listserv or wiki, facilitates two-way communication among participating organizations. A combination of centralized distribution (e.g. newsletter or email blast) to push significant milestones, achievements, or updates to the network, along with maintenance of a discussion forum for network-wide input, may be desirable.
- Develop a strategy for managing clusters within the network. These may be based on geography, service provision, mission focus, or some other relevant characteristic. As noted above, at least some organizations in a neighborhood were unaware of nearby network partners. Additionally, organizations dispersed across the network may not be aware of all other similar partner organizations. This may be particularly apt for community organizations working within a specific area and serving a focused population.
- Developing awareness of the network and acknowledging participation may be particularly important for smaller and community-oriented organizations on the

periphery of the network. Many of these organizations are only weakly connected to the network, and may benefit not only from increased connections, but from increased recognition as well. Several respondents from small organizations expressed sentiments of inferiority: A perception that 'the real work' is being done by larger, more central organizations; that the flow of communication is largely 'outward' from those large central organizations; and, that more recognition of the needs and accomplishments of small peripheral organizations is needed.

ENCOURAGE THE GROWTH OF LATERAL CONNECTIONS ON THE PERIPHERY

The previous point addressed relations between central and peripheral organizations. Relationships among peripheral organizations, particularly those sharing a set of common characteristics (size, audience, mission, etc.) have different needs and require a different management strategy. Capturing those organizations and their needs can be difficult.

Some local organizations reported not being aware of organizational or contact names in the network. Convincing small organizations that their partnership is a valued contribution to the network can be challenging. Limited response rates from small organizations may be one indicator of this. That response rate limited analysis of the periphery and showed a higher level of uni-directional connections from the center to the periphery than may be the case in actuality.

Put simply, it is to be expected that peripheral organizations have more ties than are shown. This is supported by discussion with some respondents from small peripheral organizations who report a strong sense of collaborative partnership with other such organizations.

These relationships were described as frequent, consisting of collaborative back-and-forth, and multi-modal (email bolstered with calls and in-person meetings). Additionally, these collaborations were attributed in part to a lack of resources and a resultant need to work together for mutual success. To the extent possible, these collaborative partnerships should be acknowledged and encouraged.

SURVEY RESPONDENTS AND ORGANIZATIONS

The survey respondents represented a wide range of healthcare provider and awareness organizations in Baltimore City. Overall, 287 organizations in Baltimore City were contacted for the survey. Survey results show that a wide cross-section of organizations was represented. Examples of several key organizations include the following:

- National organizations: American Heart Association, American Diabetes Association, American Lung Association
- State and local government: Maryland Department of Health and Mental Hygiene (DHMH), Baltimore City Health Department
- Major hospital/university systems: Johns Hopkins University, University of Maryland
- Area universities: Morgan State, Coppin State
- City government: Baltimore City Health Department
- Insurance and Managed Care organizations: Amerigroup, Priority Partners MCO

SURVEY COMPLETION RATES FOR MAJOR ORGANIZATIONS

Using the survey results, researchers were able to determine which organizations in Baltimore City had the highest number of in-degree and out-degree centrality. In other words, these organizations had the highest number of incoming and outbound connections to others in the network and most of them completed the survey. The range goes as follows: 10 out of the top 10, 27 out of the top 30, and 42 out of the top 50 organizations all completed the survey.

They also provided important information about their relationships with other, less well-connected organizations, providing the research team with a stronger view into how the Baltimore City Network operates.

SURVEY QUESTIONS AND ANSWERS

Overall, the online survey was used to gather information about healthcare organizations in Baltimore City, find out who they partnered with, whether those organizations were in Baltimore City or elsewhere, and to collect quantitative and qualitative information about those relationships. The entire online survey can be viewed in Appendix B.

SECTION 1: BALTIMORE CITY HEALTH ORGANIZATIONS

Section 1 asked survey recipients several demographic questions about the organization they worked for. The questions asked for the following information:

- The organization's name
- The respondent's particular division or department
- The respondent's job title
- Business sector of the organization
- Whether the organization was a Diabetes Program Partner (DPP)
- Whether their organization delivered healthcare services or developed healthcare awareness

QUESTIONS 1 AND 2: HEALTHCARE ORGANIZATIONS: NAMES/DIVISION/DEPARTMENT

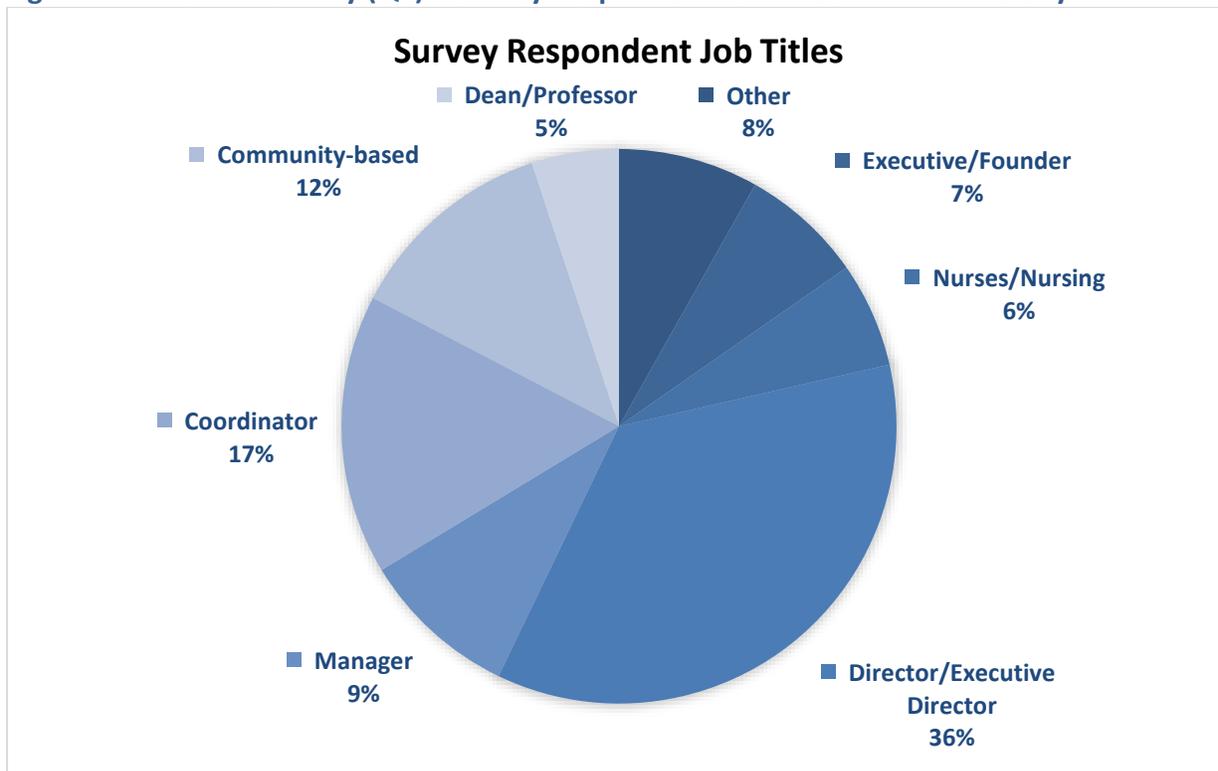
Specifically, Questions 1 and 2 asked survey respondents to list their organization's name and the department or division they worked in.

QUESTION 3: SURVEY RESPONDENTS' JOB TITLES

Question 3 asked survey respondents to list their official job title. In Baltimore City, the survey was completed by a wide variety of decision makers with various job titles that referenced managerial or executive capacity. The most common job title was Director or Executive Director (36%).

When including executives, organization founders, managers, and Deans/Professors, a full 57% of decision makers at high levels completed the survey for Baltimore City. All survey respondents' job titles are listed by percentage in Figure 1-11 on the following page.

Figure 1-11: Online Survey (Q3) – Survey Respondent Job Titles in Baltimore City



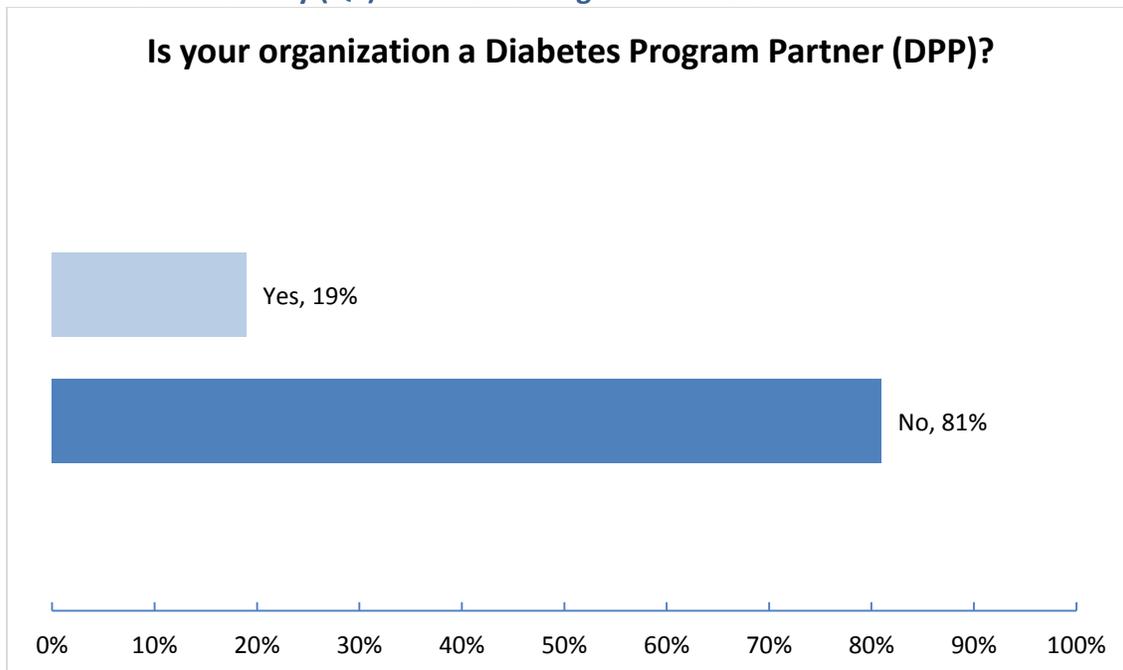
QUESTION 4: HEALTHCARE ORGANIZATIONS: BUSINESS SECTOR

Question 4 asked survey respondents to view seven business sector categories and choose which one best described their organization. The organization sectors were listed as follows: Government, Health System, Education/Academia, Community organization, Business, Philanthropy, or Diabetes Program Partner (DPP).

QUESTION 5: DIABETES PROGRAM PARTNERS (DPP)

The next question asked survey respondents to state whether their organization was a Diabetes Program Partner (DPP) or not. In Baltimore City, the majority of respondents (81%) said no. The remaining 19% said they were a DPP. Totals are listed in Figure 1-12 on the following page.

Figure 1-12: Online Survey (Q5) – Diabetes Program Partners



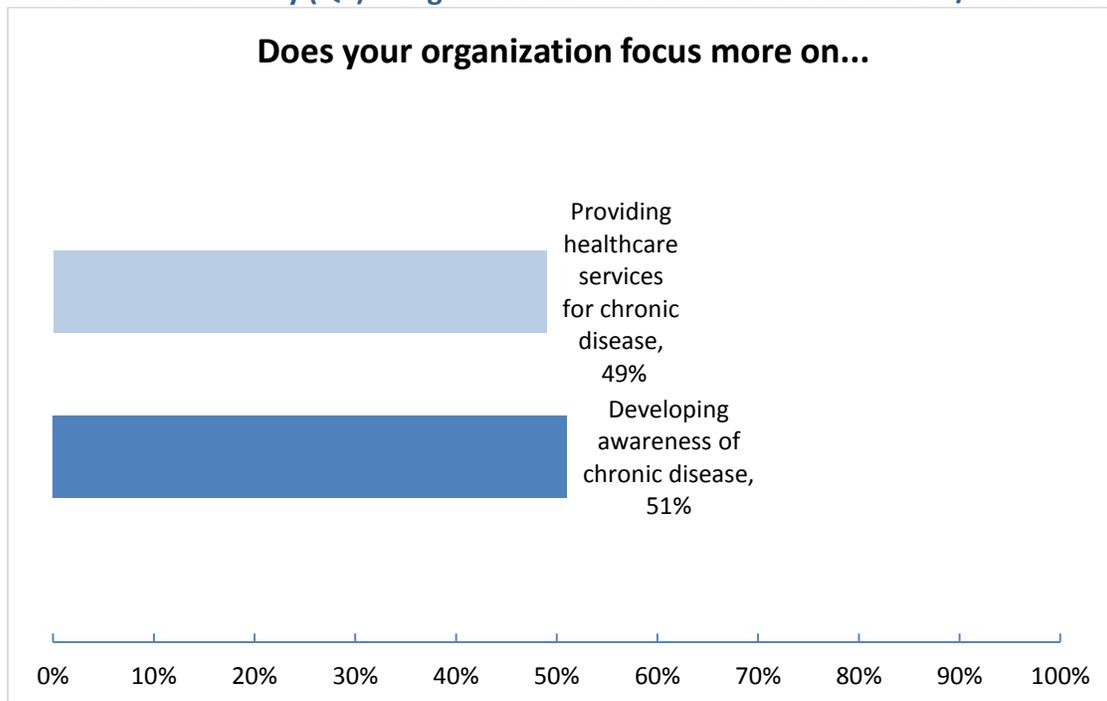
For Baltimore City, the organizations that identified themselves as Diabetes Program Partners (DPP) are listed below.

- American Diabetes Association
- Baltimore City Health Department
- Black Nurses Association of Baltimore, Inc. (BNAB)
- Delmarva Foundation
- James Long – Coppin State fitness program
- Johns Hopkins University – Bloomberg School of Public Health
- Johns Hopkins Health System
- Maryland State Department of Education
- MedStar Good Samaritan Hospital
- New Shiloh Baptist Church Nurse's Ministry
- Saint Agnes Hospital
- University of Maryland Medical System
- Y of Central Maryland
- Zeta Healthy Aging Partnership (Z-HAP)

QUESTION 6: HEALTHCARE ORGANIZATIONS: FOCUS

The last question in Section 1 asked respondents if their organization focused more on providing healthcare services or developing healthcare awareness with respect to hypertension, diabetes, or heart health. The Baltimore City results were a virtual tie, with 49% of survey respondents saying their focus was on healthcare provision or service delivery. The remaining 51% said they focused on developing awareness of chronic health issues. The answers about organization focus are represented in Figure 1-13 below.

Figure 1-13: Online Survey (Q6) – Organization Focus: Healthcare Awareness/Service Delivery



SECTION 2: BALTIMORE CITY HEALTH ORGANIZATIONS: RELATIONSHIPS

Section 2 presented survey respondents with a list of healthcare organizations in Baltimore City and asked them to select the ones they partnered with.

QUESTION 7: HEALTHCARE ORGANIZATIONS' FREQUENT PARTNERS

Question 7 asked survey respondents to view a list of healthcare organizations in Baltimore City and select the ones that they partnered with on various chronic health issues. This enabled the research team to compile a list of the most frequently selected healthcare organizations in the city, according to the survey respondents.

Table 1-6 below lists the Top 25 most frequently selected healthcare organizations in Baltimore City, ranked by the percentage of survey respondents who listed them as a partner. For example, the first entry on the list is the American Heart Association, with 53% – this means that a full 53% of the organizations surveyed said the American Heart Association was one of their partners.

Table 1-6: The Top 25 Healthcare Organizations in Baltimore City (by % selected in the survey)

Organization	% Selected
1. American Heart Association	53%
2. Baltimore City Health Department	47%
3. American Diabetes Association	43%
4. Maryland Department of Health (DHMH)	42%
5. Johns Hopkins – Bloomberg School of Public Health	40%
6. Baltimore City Health Department – Office of Chronic Disease Prevention	31%
7. Y of Central Maryland	30%
8. American Heart Association - Cooking with Heart Kitchen	28%
9. Maryland Department of Health (DHMH) Ctr. for Chronic Disease Prevention and Control	27%
10. Total Healthcare	27%
11. Bon Secours Health System	27%
12. Baltimore City Health Department – Office of Aging & Care Services	26%
13. Morgan State University	26%
14. B'more for Healthy Babies	26%
15. MedStar Health and Hospital System	26%
16. Baltimore City Health Department – Maternal & Child Health	24%
17. Coppin State University	23%
18. Zeta Healthy Aging Partnership (Z-HAP)	23%
19. American Cancer Society	23%
20. St. Agnes Hospital	21%
21. Health Care Access Maryland	21%
22. Bmore Fit	20%
23. Baltimore City Health Department – Baltimarket	19%
24. MD QUIT	19%
25. Chase Brexton	19%

The top 25 organizations listed above are very well-connected, so they are key organizations that serve the city, but there are several smaller organizations on the list that are well-connected despite their relatively smaller size. The Zeta Healthy Aging Partnership and Bmore Fit are two examples of this, and were the smallest organizations represented in the list above.

RELIGIOUS ORGANIZATIONS IN BALTIMORE

The importance of religious organizations in Baltimore cannot be overstated. A full 11% of the organizations in the network are churches, parishes, ministries or affiliated with such. This rate is higher than the other networks in the study. While Baltimore's large population means there will be more religious organizations, the ones in Baltimore are active in their communities and have a wide variety of events, programs, and initiatives.

SECTION 3: BALTIMORE CITY HEALTH ORGANIZATIONS: RELATIONSHIP QUALITY

Section 3 of the survey asked Baltimore City organizations about the type of relationships they had with the partner organizations they selected in Section 2. For every specific organization they selected, respondents were able to provide information about that partner with regard to upstream/downstream relationships, the length of their relationship, the frequency with which they communicated with partners, their understanding of their partners' skills and knowledge, and finally, their primary means of communication with partners.

QUESTION 8: UPSTREAM AND DOWNSTREAM RELATIONSHIPS

After survey respondents selected the organizations they worked with, subsequent survey questions asked them to provide information about the nature of their relationship with those partners. The first question in Section 3 asked respondents to name which organizations gave them information (also known as an "upstream" relationship) and which organizations they sent information to (also known as a "downstream" relationship.)

The list of the top organizations in Baltimore City in terms of having the most downstream partners is listed in Table 1-7. According to survey respondents, the organizations on this list are distributing information or providing referrals (downstream) to others on a frequent basis.

Table 1-7: Organizations with the Highest Number of Downstream Partners

Organization	# of Partners
1. American Diabetes Association	30
2. American Heart Association	26
3. Maryland Department of Health (DHMH)	16
4. American Heart Association - Cooking with Heart Kitchen	12
5. Baltimore City Health Department	12
6. Johns Hopkins - Bloomberg School of Public Health	11
7. American Cancer Society	10
8. Maryland Department of Health (DHMH) - Center for Chronic Disease	9
9. Baltimore City Health Department - Office of Chronic Disease	8
10. Baltimore City - Office of Aging & Care Services	8

QUESTION 9: LENGTH OF RELATIONSHIPS BETWEEN ORGANIZATIONS

Question 9 asked survey respondents about the length of the relationships with the organizations they named as partners. A scale with 5 options was presented, with “Less than 1 year” to define the briefest relationship, and “More than 10 years” to define the longest-lasting relationships.

In Baltimore, survey respondents reported that the more established, larger health organizations were the ones they tended to have the longest relationships with. The organizations with the highest number of long-lasting relationships are listed in Table 1-8 below.

Table 1-8: Organizations with the Highest Number of Partner Relationships Longer Than 10 Years

Organization	# of Relationships
1. Baltimore City Health Department	17
2. American Heart Association	17
3. Maryland Department of Health (DHMH)	16
4. American Diabetes Association	9
5. American Cancer Society	9
6. Maryland Department of Education - School Health Services	9
7. Johns Hopkins - Bloomberg School of Public Health	8
8. Maryland Department of Health (DHMH) - CCDPC	8
9. Maryland Department of Health (DHMH) - Ctr. for Tobacco Prevention, Ctrl.	8
10. American Lung Association	8
11. St. Agnes Hospital	7
12. Maryland Department of Health (DHMH) - Office of School Health	7
13. Johns Hopkins - School of Nursing	6
14. University of Maryland	6
15. Bon Secours Health System	6

QUESTION 10: FREQUENCY OF COMMUNICATION BETWEEN ORGANIZATIONS

Question 10 asked survey respondents how often they communicated with other organizations in their network. A scale with 4 options was presented, with “Frequently” to define the highest level of contact, followed by “Sometimes,” “Seldom,” or “Never” to describe less frequent levels of contact.

In Baltimore, survey respondents reported that the more established, larger health organizations were the ones they tended to communicate with the most. The organizations with the highest levels of “Frequent” communication are listed in Table 1-9 below.

Table 1-9: Organizations with the Highest Level of Frequent Contact with their Partners

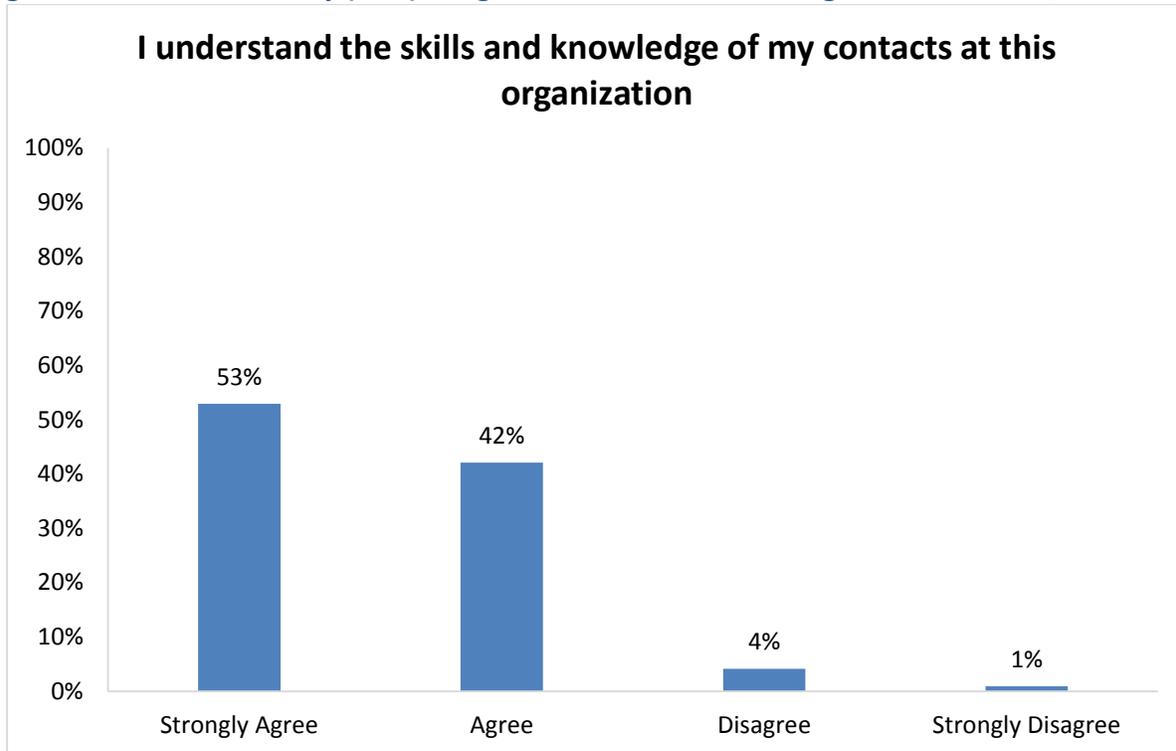
Organization	# of Partners
1. Baltimore City Health Department	23
2. Maryland Department of Health (DHMH)	18
3. American Heart Association	18
4. Johns Hopkins - Bloomberg School of Public Health	15
5. Baltimore City Health Department - Office of Chronic Disease Prevention	14
6. American Diabetes Association	13
7. Total Healthcare	12
8. Baltimore City Health Department - Baltimarket	11
9. Zeta Healthy Aging Partnership (Z-HAP)	10
10. Maryland Department of Health (DHMH) – CCDPC	10
11. Baltimore City Health Department - Office of Aging & Care Services	10
12. Baltimore City Health Department - Maternal & Child Health	9
13. Bon Secours Health System	9
14. Health Care Access Maryland	8
15. American Cancer Society	8
16. University of Maryland	8
17. B'more for Healthy Babies	8
18. MedStar Health and Hospital System	8
19. Amerigroup MCO	8
20. St. Agnes Hospital	8
21. University of Maryland - School of Public Health	7
22. Baltimore City Health Department - Tobacco Use, CVD Prevention	7
23. University of Maryland Medical Center	7
24. Bmore Fit	7
25. Y of Central Maryland	7

QUESTION 11: ORGANIZATIONS' UNDERSTANDING OF PARTNER SKILL AND KNOWLEDGE

Question 11 asked survey respondents if they understood the skills and knowledge of each of the organizations they selected as partners. They were able to choose from a scale from highest to lowest, starting from “Strongly Agree, Agree, Disagree, or Strongly Disagree.” Overall, the largest group of respondents (53%) said they “strongly agree” that they understand the skills/knowledge of the organizations they deal with.

In total, 95% of survey respondents agreed or strongly agreed that they understood the skills and knowledge of the contacts at the organizations they partner with. The responses, listed by percentage, are shown in Figure 1-14 below.

Figure 1-14: Online Survey (Q11) - Organizations' Understanding of Partner Skills/Knowledge

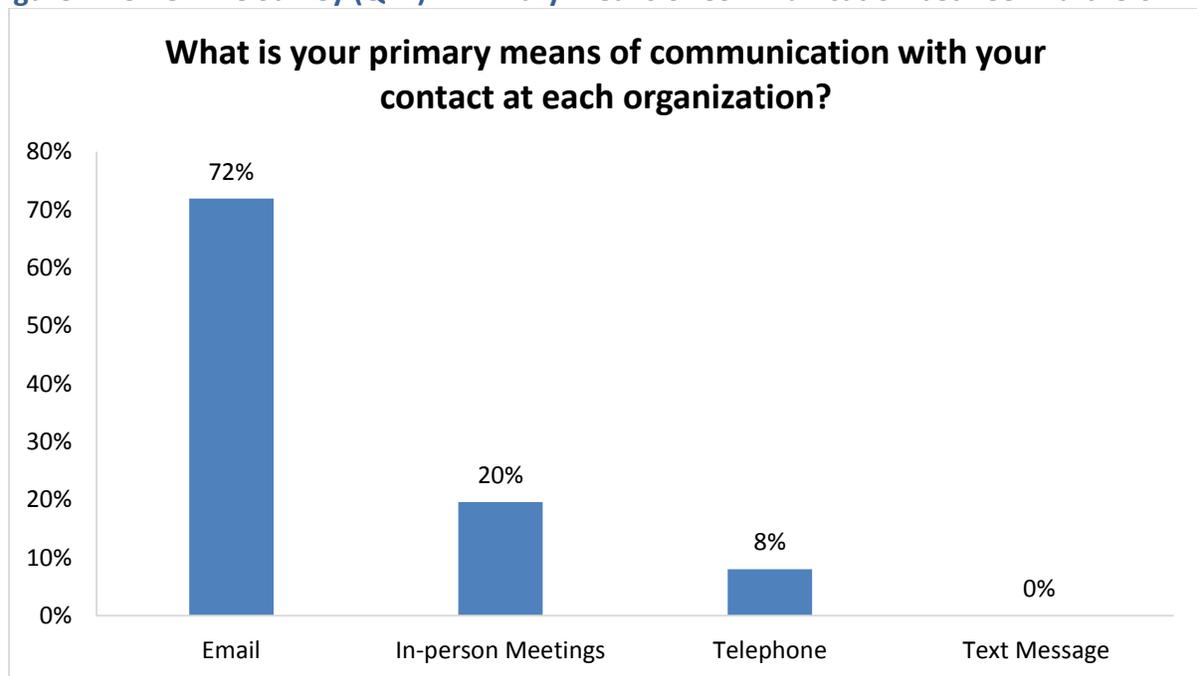


QUESTION 12: HEALTHCARE ORGANIZATIONS: COMMUNICATION

Question 12 asked survey respondents what their primary means of communication was with their partners – whether via telephone, text message, e-mail, or in-person meetings. Each survey respondent was given an opportunity to answer the question specifically for each organization they deal with, the overall numbers showed a clear pattern. E-mail was the primary means of communication for most of the organizations, at 72%. In-person meetings were second, with 20%. Telephone contacts were 8% and text messages were less than one percent.

One standout from the survey results is that the vast majority of communication between healthcare organizations in Baltimore City is via e-mail. In-person and telephone contact is relatively low (in comparison to other networks). The full results are listed in Figure 1-15 below.

Figure 1-15: Online Survey (Q12) – Primary Means of Communication between Partners



IN-PERSON MEETINGS

Given that a fair amount of contact between healthcare partners in Baltimore City is done in-person (according to the organizations surveyed), the research team used the results to find out which organizations had the most in-person contact. According to survey respondents, the organizations listed in Table 1-10 below had the highest number of in-person meetings as their primary means of contact with that organization.

Table 1-10: Top 25 Organizations where In-Person Meetings are the Primary Means of Communication with Survey Respondents

Organization	# of Respondents
1. Zeta Healthy Aging Partnership (Z-HAP)	10
2. Baltimore City Health Department	8
3. Johns Hopkins - Bloomberg School of Public Health	8
4. Y of Central Maryland	8
5. Baltimore City Health Department - Office of Chronic Disease Prevention	6
6. University of Maryland - School of Social Work	6
7. Bon Secours Health System	5
8. Total Healthcare	5
9. Morgan State University	5
10. Baltimore City Health Department - Tobacco Use, CVD Prevention	5
11. Waxter Center for Senior Citizens	5
12. American Heart Association	4
13. B'more for Healthy Babies	4
14. Baltimore City Health Department - Baltimarket	4
15. Johns Hopkins - School of Nursing	4
16. Family League of Baltimore	4
17. Amerigroup MCO	4
18. Maryland Department of Education - School Health Services	4
19. Maryland Department of Health - Office of School Health	4
20. Latino Providers Network	4
21. American Heart Association - Cooking with Heart Kitchen	3
22. Coppin State University	3
23. Bmore Fit	3
24. Baltimore City Health Department - Maternal & Child Health	3
25. St. Agnes Hospital	3

WASHINGTON COUNTY: SOCIAL NETWORK ANALYSIS RESULTS

RESPONSE RATE

Ideally, network analysis will proceed from complete data. However, this is unusual to achieve in practice. The snowball sample identified 99 organizations, or divisions within organizations, and 104 recipients received the survey. Of that total, 59 responses were collected. Partial data on the non-respondents was obtained from those completed surveys.

HEALTHCARE ORGANIZATION SECTORS

Table 2-1 shows the 99 organizations in the network, categorized by CDC sector. Where conceptual overlap between sectors was encountered, organizations were categorized as follows:

- Business and health system (e.g. private medical practice) – counted as health system
- Government and education (e.g. public school; Board of Education) – counted as government
- Nonprofit organizations not operating as a health system were categorized as philanthropies.
- Note: All network diagrams will use the colors below to represent their sector.

Table 2-1: Network Organization Count by Sector

Sector	Number of Organizations
Business	18
Government	11
Health System	35
Education	8
Community	12
Philanthropy	15
Total organizations/divisions in network	99

DENSITY

The 99 organizations reported a total of 381 connections. In a network this size, there are 9,702 possible connections. Thus, this network has a density of .039. In other words, 3.9% of all possible connections have been made. As figure 2 shows below, there is a web of fairly dense connections at the center of this network. However, a significant portion of the network is only weakly connected to the larger network. In particular, the number of nodes connected by only a single link may warrant attention.

IN-DEGREE CENTRALITY

Two measures of degree centrality were obtained. In-degree centrality is the count of all nodes in a network reporting a link to a particular node. Table 3 presents the most central organizations by in-degree count.

As shown in Table 2-2 below, the Washington County Health Department is the most central organization by in-degree centrality, with 17 other nodes (17% of the entire network) reporting connections to the Health Department. In-degree centrality drops quickly, with only 10 organizations showing 10 or more incoming connections.

Table 2-2: In-degree Centrality, Washington County

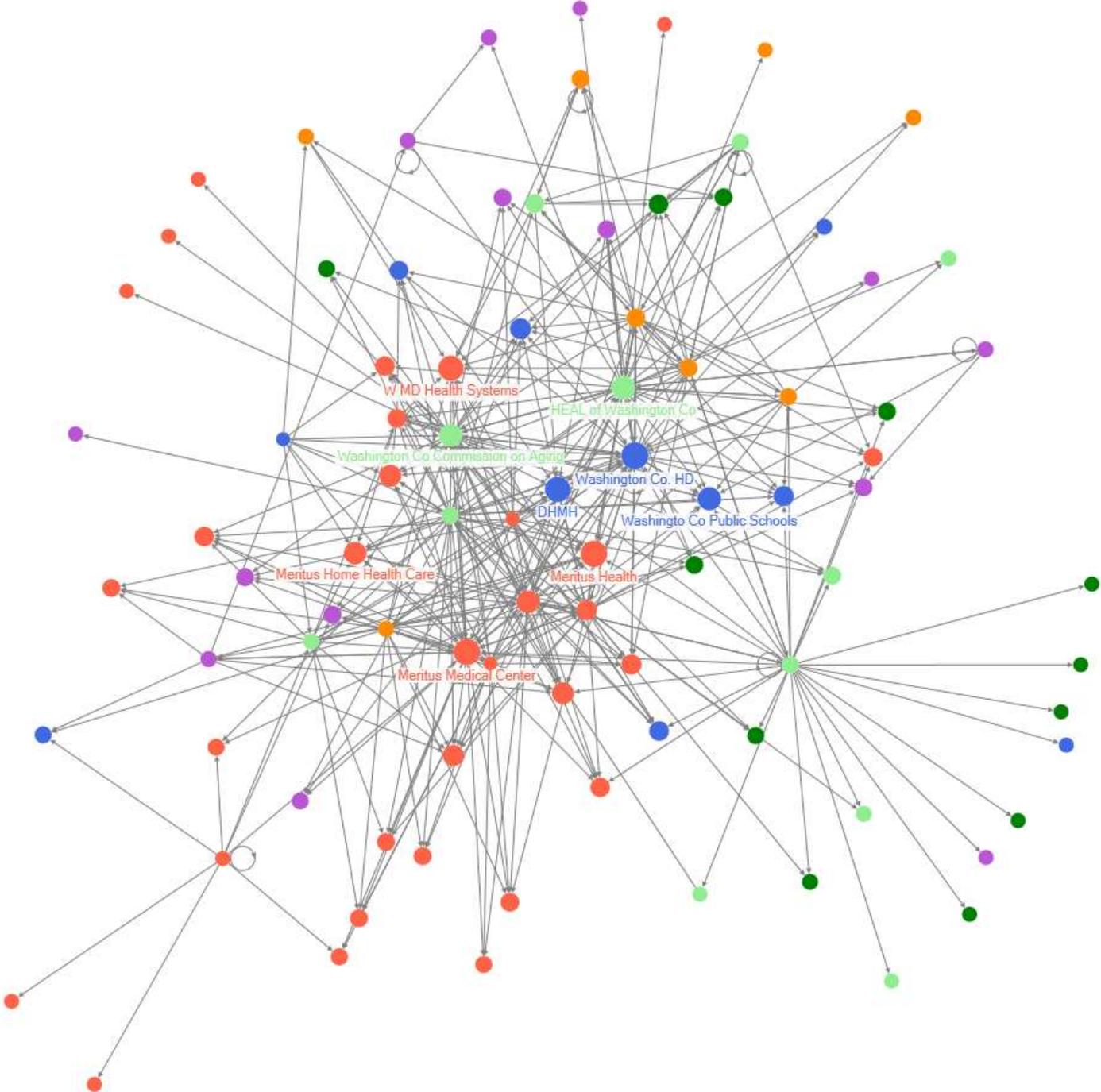
Organization	In-Degree Centrality
Washington County Health Department	17
Meritus Health	16
Meritus Medical Center	16
Maryland Department of Health	14
Western Maryland Health Systems	14
HEAL of Washington County	11
Washington County Public Schools	11
Washington County - Commission on Aging	10
Meritus Home Health Care	10
Walnut Street Community Health Center	10

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix D.

IN-DEGREE CENTRALITY: A VISUALIZATION

Figure 2-1 on the following page shows all 99 organizations collaborating in the network as well as all connections reported between these partners. In this figure, node size increases with in-degree centrality; as more organizations report working with a particular partner, that node increases in size in this figure. In other words, the largest nodes in this figure are those listed in Table 2-2 above.

Figure 2-1: Washington County, Size by In-degree Centrality



ORGANIZATIONS WITH OUTGOING CONNECTIONS

Organizations reporting the most connections going to other nodes in the network are shown below, in Table 2-3. The leading organizations report connections to nearly 1/3 of the entire network. However, the rate of outgoing connections quickly drops off. Only 14 organizations report 10 or more connections, with the majority of the network reporting zero outgoing connections.

This suggests opportunities to further collaboration by developing reciprocal paths of communication throughout the network. It may also indicate that the leading organizations do not have sufficient capacity to do more than maintain existing outgoing connections, although further study is needed in order to make a determination.

Table 2-3: Out-degree Centrality, Washington County

Organization	Out-Degree Centrality
HEAL of Washington County	29
The Arc of Washington County	29
Washington County - Commission on Aging	28
Brothers United Who Dare to Care	28
Meritus Health - Parish Nursing	26
Washington County Health Department	25
Meritus Medical Center	22
University of MD Extension Office	20
Walnut Street Community Health Center	19
Meritus Medical Center - Behavioral & Community Health	19
Meritus Medical Center - Community Health, Education & Wellness	18
Western MD AHEC	15
Johns Hopkins University - Comstock Center	15
Way Station Behavioral Health	13

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix D.

Table 2-4: Organizations with Outgoing Connections, but No Reported Incoming Connections

Organization	Outgoing Connections
Meritus Medical Center - Behavioral & Community Health	19
Meritus Medical Center - Community Health, Education & Wellness	18
Washington County Department of Social Services	9

Only three organizations that reported outgoing connections had no incoming connections. The table above lists those organizations. The relatively strong out-degree centrality of these community-related programs with zero reported in-coming connections may indicate a need to close the loop by encouraging community partners to communicate more effectively with these three organizations, particularly as the Meritus Medical Center divisions report connections to a significant portion of the network.

The table above shows three organizations which reported significant out-going connections to other organizations. However, no organizations within the network reported working with these 3 nodes. This does not mean that other organizations do not work with these three nodes; it could mean that survey respondents are other organizations are not aware of partnerships with these organizations; it could also mean that these three nodes link with organizations that did not respond to the survey; or that partner organizations are not familiar with the work done by these three nodes. Regardless, this discrepancy does highlight the importance of making collaborative partnerships overt, and maintaining good working relationships with clear understanding of the role played by each organization in the network.

BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS)

Betweenness centrality assesses how frequently a given node lies along the shortest path between any two other nodes in the network. Betweenness tends to identify nodes that serve as ‘bridges’ connecting clusters within a community.

These bridges are particularly important, as they bring a network closer together and disseminate information to parts of a network that may be otherwise distant from one another. Betweenness, as calculated in Node XL, often follows a power law, so it tends to drop very quickly, and is a normal feature of networks.

Put simply, networks seek to work through ‘hubs’ – nodes with high betweenness. An important consideration for network management is to identify which nodes serve as such hubs and to ensure that they have sufficient capacity to handle the load of information flowing through them. Table 2-6, on the following page, presents the organizations with the highest betweenness centrality in Washington County’s network.

Table 2-5: Betweenness Centrality, Washington County

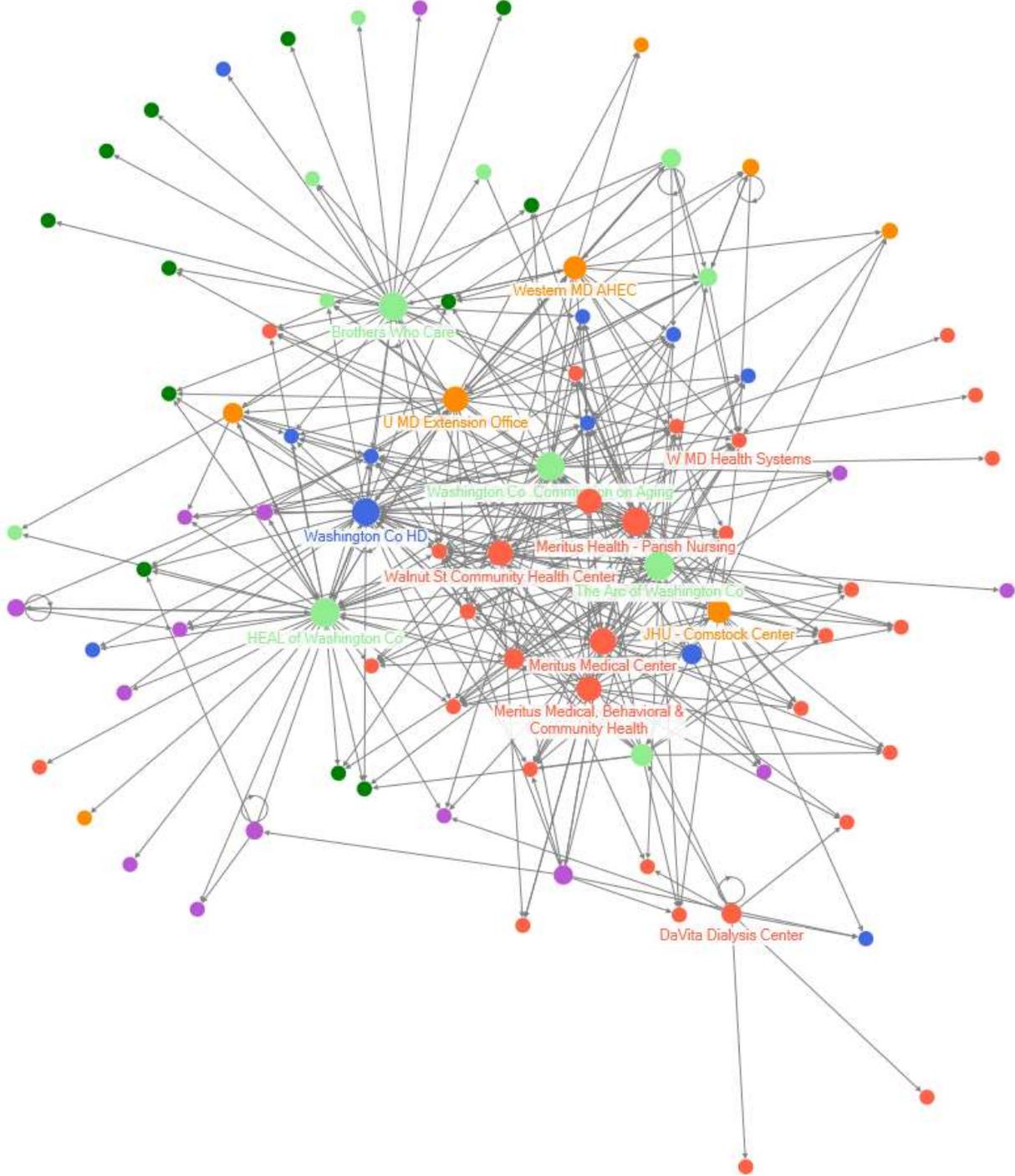
Organization	Betweenness Centrality
Brothers United Who Dare to Care	1610.316
HEAL of Washington County	1384.887
Meritus Medical Center	1075.934
Washington County - Commission on Aging	1035.100
Washington County Health Department	916.616
The Arc of Washington County	805.329
Meritus Health - Parish Nursing	505.011
Walnut Street Community Health Center	464.454
DaVita Dialysis Center	375.867
University of MD Extension Office	282.761
Western MD AHEC	271.794
Johns Hopkins University - Comstock Center	221.033
Meritus Medical Center, Behavioral & Community health	192.706
Western Maryland Health Systems	166.939

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix D.

BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS VISUALIZATION)

Figure 2-2 shows the Washington County network, with nodes sized by betweenness centrality. For clarity, the figure shows a simplified depiction of the network, excluding outlying nodes. Note the strong bridging role played by community organizations.

Figure 2-2: Washington County, Betweenness by Sector



NETWORK GEOGRAPHICS

Figure 2-3 shows the geographical distribution of network organizations within Washington County. Each red dot in the figure marks the address of at least one network organization. Note that any organizations with an address outside of the county boundaries is not shown; also, that any organizations sharing the same address will only be marked by a single dot. However, a good sense of the distribution of network partners throughout this network can readily be made.

Organizations are highly centralized around Hagerstown, the county seat and largest center of population in the county. However, distribution appears to match towns across the county.

Because many of these towns have only one or two network organizations, strategic development of those partners to more efficiently and effectively serve their populations may result in gains in stability and service delivery across the network. Additionally, a strategic growth plan for the network may help continue the pattern of network distribution across the county.

Figure 2-3: Distribution of network organizations in Washington County



WASHINGTON COUNTY: DISCUSSION & RECOMMENDATIONS

The Washington County Network is comprised of 99 partner organizations with 381 connections. There are a number of unusual features to the make-up of this network.

One third of the network is made up of healthcare and health system organizations. Among these, Meritus plays a significant role. Eight divisions of Meritus were identified by survey respondents (nearly 10% of the entire network). Many of these divisions rank highly in one or more measures of centrality, indicating the extent to which they drive the network.

With 18 organizations, private businesses comprise the second largest type of node. The number and diversity of businesses included in the network exceed those found in other networks and indicate a high level a high level of inter-sector collaboration. Table 2-6 lists these organizations, along with their centrality measures.

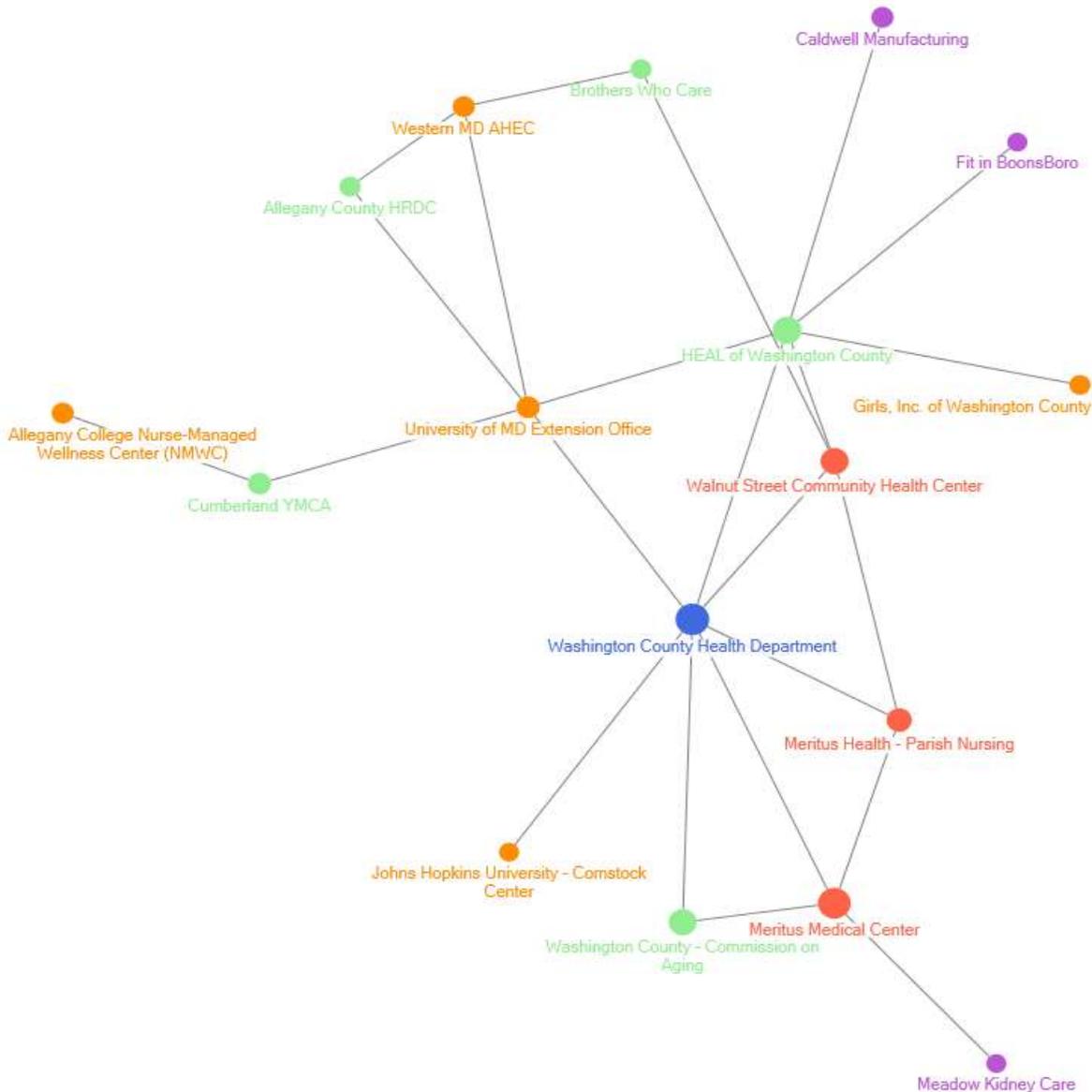
Table 2-6: Private Business Organizations in the Washington County Network

Organization	In-degree centrality	Out-degree centrality	Betweenness centrality
Blossom School of Etiquette	0	0	0.000
Caldwell Manufacturing	4	2	2.354
Ellsworth Electric	0	0	0.000
Fahrney Keedy Home and Village	4	0	61.594
Fit in BoonsBoro	2	4	0.500
Hagerstown Volvo Group/Staywell Program	4	0	2.106
HBP, Inc.	1	1	0.000
Hub Labels	2	0	5.586
International Corporate Training and Marketing	0	0	0.000
Keller Stonebraker	2	4	18.657
Maugansville Garden Apartments	1	0	0.000
Meadow Kidney Care	2	7	63.684
Planet Fitness	1	0	0.000
Potomac Towers	3	0	0.461
Ruff Fitness	4	0	7.760
Staples Distribution	0	0	0.000
Steve Swayne Insurance	1	0	0.000
Walnut Towers	4	0	1.022

RECIPROCAL RELATIONSHIPS

Twenty-three reciprocal relationships among 17 organizations were reported. That is, in 23 instances, both partner organizations reported a mutual connection. While not a formal measure of centrality, reciprocal relationships can be useful in assessing the cohesiveness of a network by identifying collaborative ties with 2-way connections. These reciprocal linkages are shown in the figure below.

Figure 2-4: Reciprocal Connections in Washington County



LEVERAGING OPPORTUNITIES ARISING FROM THIS STUDY

Basic benefits from the fundamental act of mapping the network should not be overlooked. These include the following:

NETWORK EVALUATION

The size and composition of the network is now overt. In addition to recommendations made here, local health officials can undertake their own evaluation of how well suited the current partnerships are towards advancing the goals of chronic disease prevention. Strategic planning to incorporate new organizations into the network, or shift the capacity, centrality, or role of existing partners, may now be made.

PARTNER ORGANIZATIONS

Partner organizations are now aware that they are part of a larger network. The view from the ground is necessarily constrained and often focused closely on an individual organization's specific mission and focus. Participation in the survey made respondents aware that they are part of a larger network, and presents an opportunity to strengthen and grow the network.

- Disseminate a list of network partners throughout the network. Doing so encourages increased communication and collaboration among partner organizations. Discussion with some respondents revealed the existence of local partners in the neighborhood that were unknown to the respondent. Collecting and publishing basic information on the partner organizations is an easy way to more fully inform the network as to who everyone is and what they are doing; may cut down on redundancies; and, can lead to the growth of lateral connections between partner organizations.
- Develop a communication forum for the network. A formal publication, either in print or online, may suffice. An open forum, such as a discussion board, email listserv or wiki, facilitates two-way communication among participating organizations. A combination of centralized distribution (e.g. newsletter or email blast) to push significant milestones, achievements, or updates to the network, along with maintenance of a discussion forum for network-wide input, may be desirable.
- Develop a strategy for managing clusters within the network. These may be based on geography, service provision, mission focus, or some other relevant characteristic. As noted above, at least some organizations in a neighborhood were unaware of nearby network partners. Additionally, organizations dispersed across the network may not be aware of all other similar partner organizations. This may be particularly apt for community organizations working within a specific area and serving a focused population.

- Developing awareness of the network and acknowledging participation may be particularly important for smaller and community-oriented organizations on the periphery of the network. Many of these organizations are only weakly connected to the network, and may benefit not only from increased connections, but from increased recognition as well.
- Several respondents from small organizations expressed sentiments of inferiority: A perception that ‘the real work’ is being done by larger, more central organizations; that the flow of communication is largely ‘outward’ from those large central organizations; and, that more recognition of the needs and accomplishments of small peripheral organizations is needed.

ENCOURAGE THE GROWTH OF LATERAL CONNECTIONS ON THE PERIPHERY

The previous point addressed relations between central and peripheral organizations. Relationships among peripheral organizations, particularly those sharing a set of common characteristics (size, audience, mission, etc.) have different needs and require a different management strategy. Capturing those organizations and their needs can be difficult.

Some local organizations reported not being aware of organizational or contact names in the network. Convincing small organizations that their partnership is a valued contribution to the network can be challenging. Limited response rates from small organizations may be one indicator of this. That response rate limited analysis of the periphery and showed a higher level of uni-directional connections from the center to the periphery than may be the case in actuality.

Put simply, it is to be expected that peripheral organizations have more ties than are shown. This is supported by discussion with some respondents from small peripheral organizations who report a strong sense of collaborative partnership with other such organizations. These relationships were described as frequent, consisting of collaborative back-and-forth, and multi-modal (email bolstered with calls and in-person meetings). Additionally, these collaborations were attributed in part to a lack of resources and a resultant need to work together for mutual success. To the extent possible, these collaborative partnerships should be acknowledged and encouraged.

WASHINGTON COUNTY SURVEY RESPONDENTS

The survey respondents represented a wide range of healthcare provider and awareness organizations in Washington County. Overall, 99 organizations in Washington County were contacted for the survey. Survey results show that a wide cross-section of organizations was represented. Examples of several key organizations include the following:

- State and local government: Maryland Department of Health and Mental Hygiene (DHMH), Washington County Health Department
- Major hospital/university systems: Meritus, University of Maryland Extension
- Area universities: Frostburg State University
- City government: Hagerstown

Washington County Organization Types

Government health departments and government-affiliated organizations, along with community health organizations had a significant presence in the survey results.

SURVEY COMPLETION RATES FOR MAJOR ORGANIZATIONS

Using the survey results, researchers were able to determine which organizations in Washington County had the highest number of in-degree and out-degree centrality. In other words, these organizations had the highest number of incoming and outbound connections to others in the network and most of them completed the survey. The range goes as follows: Nine out of the top 10 and 15 out of the top 25 in terms of network centrality completed the survey.

They also provided important information about their relationships with other, less well-connected organizations, providing the research team with a stronger view into how the network operates.

SURVEY QUESTIONS AND ANSWERS

Overall, the online survey was used to gather information about healthcare organizations in Washington County, find out who they partnered with, whether those organizations were in the County or elsewhere, and to collect quantitative and qualitative information about those relationships. The entire online survey can be viewed in Appendix B.

SECTION 1: WASHINGTON COUNTY HEALTH ORGANIZATIONS

Section 1 asked survey recipients several demographic questions about the organization they worked for. The questions asked for the following information:

- The organization's name
- The respondent's particular division or department
- The respondent's job title
- Business sector of the organization
- Whether the organization was a Diabetes Program Partner (DPP)
- Whether their organization delivered healthcare services or developed healthcare awareness

QUESTIONS 1 AND 2: HEALTHCARE ORGANIZATIONS: NAMES/DIVISION/DEPARTMENT

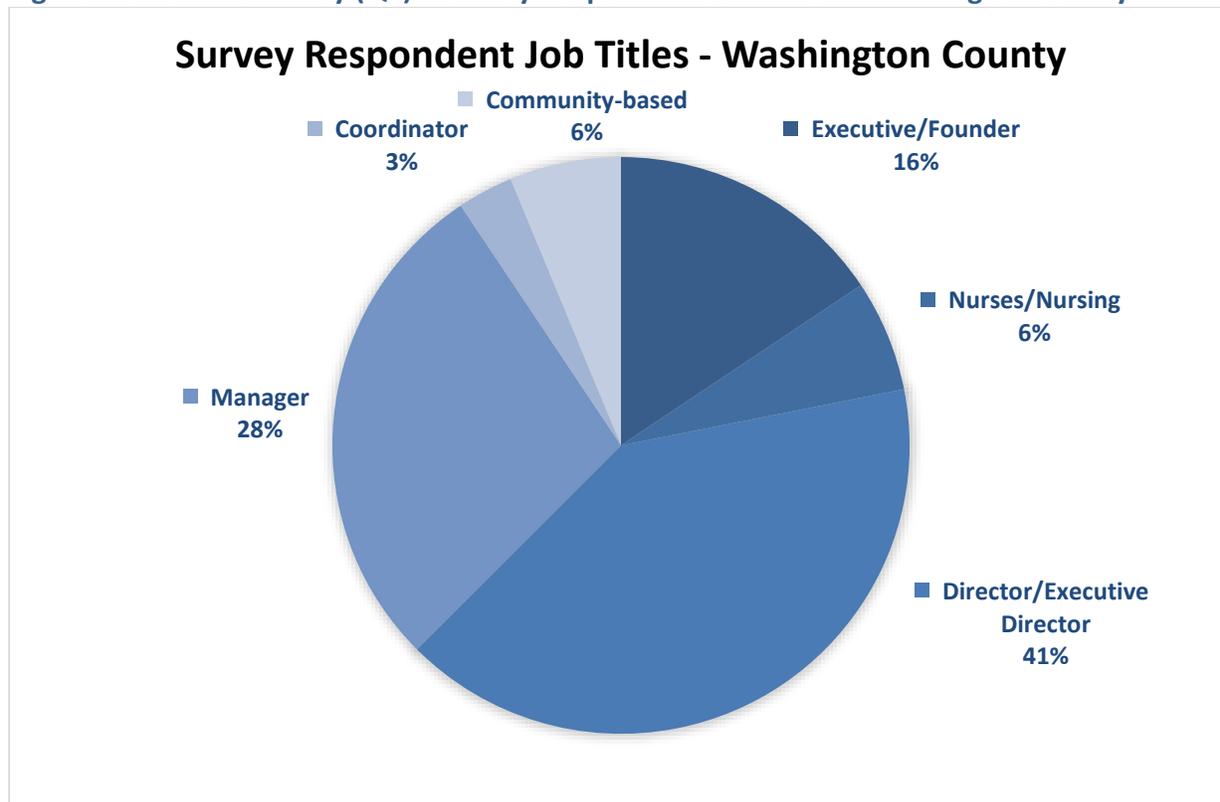
Specifically, Questions 1 and 2 asked survey respondents to list their organization's name and the department or division they worked in.

QUESTION 3: SURVEY RESPONDENTS' JOB TITLES

Question 3 asked survey respondents to list their official job title. In Washington County, the vast majority of responses were completed by decision makers with job titles that referenced managerial or executive capacity. The most common job title was Director or Executive Director (41%).

When including executives/founders, managers, and directors, a full 85% of decision makers at high levels completed the survey for Washington County. All survey respondents' job titles are listed by percentage in Figure 2-5 on the following page.

Figure 2-5: Online Survey (Q3) – Survey Respondent Job Titles in Washington County



QUESTION 4: HEALTHCARE ORGANIZATIONS: BUSINESS SECTOR

Question 4 asked survey respondents to view seven business sector categories and choose which one best described their organization. The organization sectors were listed as follows: Government, Health System, Education/Academia, Community organization, Business, Philanthropy, or Diabetes Program Partner (DPP).

QUESTION 5: DIABETES PROGRAM PARTNERS (DPP)

The next question asked survey respondents to state whether their organization was a Diabetes Program Partner (DPP) or not. In Washington County, no organization identified itself as such.

QUESTION 6: HEALTHCARE ORGANIZATIONS: FOCUS

The last question in Section 1 asked respondents if their organization focused more on providing healthcare services or developing healthcare awareness. The Washington County results were a virtual tie, with 49% of survey respondents saying their focus was on healthcare provision or service delivery. The remaining 51% said they focused on developing awareness of chronic health issues. The answers about organization focus are represented in Figure 2-6 below.

Figure 2-6: Online Survey (Q6) – Organization Focus: Healthcare Awareness or Service Delivery



SECTION 2: WASHINGTON COUNTY HEALTH ORGANIZATIONS: RELATIONSHIPS

Section 2 presented survey respondents with a list of healthcare organizations in Washington County and asked them to select the ones they partnered with.

QUESTION 7: HEALTHCARE ORGANIZATIONS' FREQUENT PARTNERS

Question 7 asked survey respondents to view a list of healthcare organizations in Washington County and select the ones that they partnered with on various chronic health issues. This enabled the research team to compile a list of the most frequently selected healthcare organizations in the County, according to the survey respondents.

Table 2-7 below lists the most frequently selected healthcare organizations in Washington County, ranked by the percentage of survey respondents who listed them as a partner. For example, the first entry on the list is the Washington County Health Department, with 60% – this means that a full 60% of the organizations surveyed said the Washington County Health Department was one of their partners.

Table 2-7: Top 20 Healthcare Organizations in Washington County (by % selected in the survey)

Organization	% Selected
1. Washington County Health Department	60%
2. Meritus Medical Center	57%
3. Meritus Health	53%
4. Maryland Department of Health (DHMH)	50%
5. Western Maryland Health Systems	47%
6. Washington County Public Schools	37%
7. HEAL of Washington County	37%
8. Walnut Street Community Health Center	33%
9. Meritus Home Health Care	33%
10. Washington County - Commission on Aging	33%
11. Community Free Clinic	30%
12. Western MD Hospital	30%
13. Robinwood Family Practice	27%
14. Tri-State Community Health Center	27%
15. Maryland Department of Aging	27%
16. Meritus Health - Parish Nurse Organization	23%
17. City Of Hagerstown	23%
18. Hagerstown Heart	20%
19. Hospice of Washington County	20%
20. United Way	20%

The organizations listed above are very well-connected, so they are key organizations that serve the County, but there are several smaller organizations on the list that are well-connected despite their relatively smaller size. The Community Free Clinic and the Hospice of Washington County are two examples of small organizations who play a large role in the network.

Aside from important government organizations like DHMH (at the state and county level), Meritus Health and its various divisions are a large part of the network structure.

SECTION 3: WASHINGTON COUNTY HEALTH ORGANIZATIONS: RELATIONSHIP QUALITY

Section 3 of the survey asked Washington County organizations about the type of relationships they had with the partner organizations they selected previously in Section 2.

For every organization they selected, survey respondents were able to provide information about that partner with regard to upstream/downstream relationships, the length of their relationship, the frequency with which they communicated with partners, their understanding

of their partners’ skills and knowledge, and finally, their primary means of communication with partners.

QUESTION 8: UPSTREAM AND DOWNSTREAM RELATIONSHIPS

After survey respondents selected the organizations they worked with, subsequent survey questions asked them to provide information about the nature of their relationship with those partners. The first question in Section 3 asked respondents to name which organizations gave them information (also known as an “upstream” relationship) and which organizations they sent information to (also known as a “downstream” relationship.)

The list of the top organizations in terms of downstream partners is listed below in Table 2-8. According to survey respondents, the organizations on this list are distributing information or providing referrals to others (downstream) on a frequent basis.

Table 2-8: Top 20 Organizations with the Highest Number of Downstream Partners

Organization	# of Partners
1. Washington County Health Department	11
2. Meritus Health	10
3. Maryland Department of Health (DHMH)	10
4. Meritus Medical Center	9
5. Western Maryland Health Systems	8
6. Maryland Department of Aging	6
7. Washington County - Commission on Aging	5
8. Western MD Hospital	5
9. HEAL of Washington County	4
10. Community Free Clinic	4
11. Cumberland YMCA	4
12. Meritus Home Health Care	4
13. Maryland Department Of Social Services	4
14. Brooklane Hospital	4
15. United Way	3
16. Tri-State Community Health Center	3
17. Robinwood Family Practice	3
18. VA Medical Center, Martinsburg WV	3
19. University of MD Extension Office	3
20. Washington County Public Schools	3

One of the standouts on the list is the Veterans Administration Medical Center in Martinsburg, West Virginia, located just across the border from Washington County. Again, quite a few of the organizations listed are smaller or community-based organizations.

QUESTION 9: LENGTH OF RELATIONSHIPS BETWEEN ORGANIZATIONS

Question 9 asked survey respondents about the length of the relationships with the organizations they named as partners. A scale with 5 options was presented, with “Less than 1 year” to define the briefest relationship, and “More than 10 years” to define the longest-lasting relationships.

In Washington County, survey respondents reported that the more established, larger health organizations were the ones they tended to have the longest relationships with. The organizations with the highest number of long-lasting relationships are listed in Table 2-9 below.

Table 2-9: Organizations with the Highest Number of Partner Relationships Longer Than 10 Years

Organization	# of Relationships
1. Meritus Medical Center	13
2. Washington County Health Department	13
3. Meritus Health	12
4. Maryland Department of Health (DHMH)	11
5. Western Maryland Health Systems	7
6. Meritus Home Health Care	7
7. Washington County - Commission on Aging	6
8. Western MD Hospital	5
9. Maryland Department Of Social Services	5
10. Maryland Department of Aging	5
11. United Way	5
12. Tri-State Community Health Center	4
13. Community Free Clinic	4
14. Walnut Street Community Health Center	4
15. Washington County Public Schools	4
16. Brooklane Hospital	4
17. City Of Hagerstown	3
18. Brothers United Who Dare to Care	3
19. Robinwood Family Practice	3
20. Meritus Total Rehab Care - Wellness Center	3

QUESTION 10: FREQUENCY OF COMMUNICATION BETWEEN ORGANIZATIONS

Question 10 asked survey respondents how often they communicated with other organizations in their network. A scale with 4 options was presented, with “Frequently” to define the highest level of contact, followed by “Sometimes,” “Seldom,” or “Never” to describe less frequent levels of contact.

Overall, survey respondents reported that the more established, larger health organizations were the ones they tended to communicate with the most. The organizations with the highest levels of “Frequent” communication are listed in Table 2-10 below.

Table 2-10: Organizations with the Highest Level of Frequent Contact with their Partners

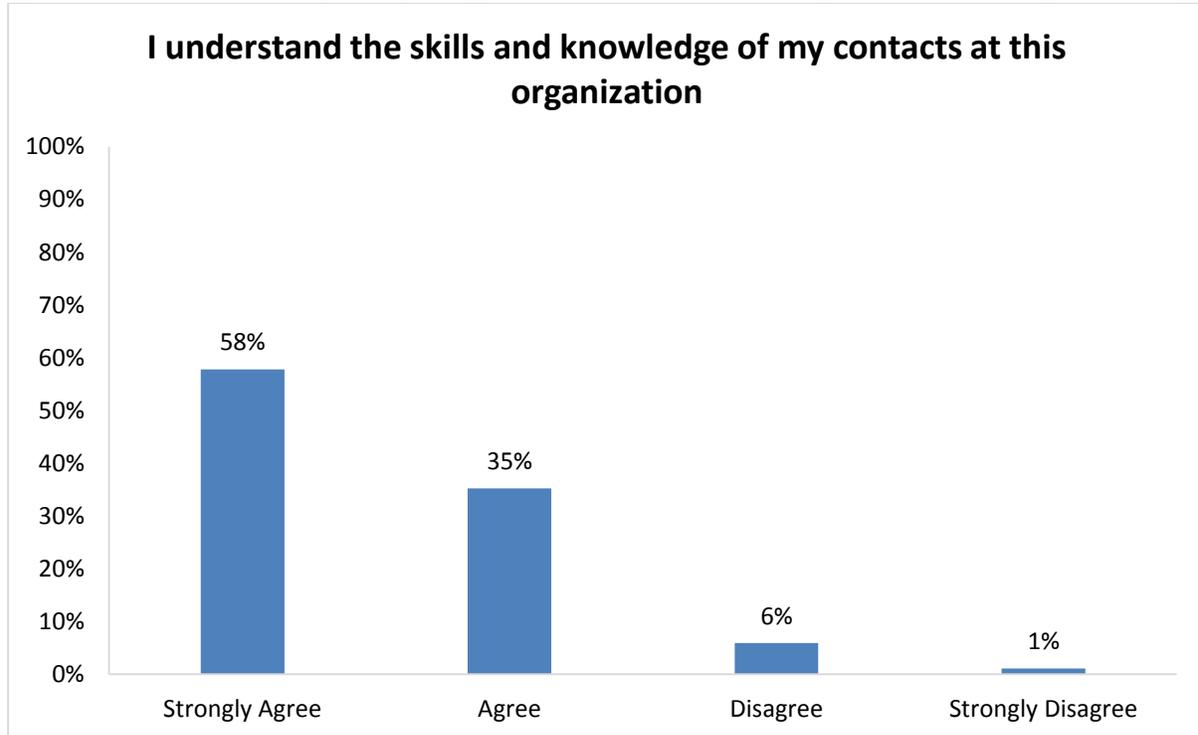
Organization	# of Partners
1. Meritus Health	14
2. Washington County Health Department	13
3. Meritus Medical Center	12
4. Maryland Department of Health (DHMH)	9
5. HEAL of Washington County	7
6. Western Maryland Health Systems	7
7. Meritus Home Health Care	6
8. Washington County - Commission on Aging	5
9. Meritus Health - Parish Nurse Organization	5
10. Western MD Hospital	4
11. Robinwood Family Practice	4
12. Maryland Department Of Social Services	4
13. Maryland Department of Aging	4
14. Meritus Weight Loss Center	4
15. City Of Hagerstown	3

QUESTION 11: ORGANIZATIONS’ UNDERSTANDING OF PARTNER SKILL AND KNOWLEDGE

Question 11 asked survey respondents if they understood the skills and knowledge of each of the organizations they selected as partners. They were able to choose from a scale from highest to lowest, starting from “Strongly Agree, Agree, Disagree, or Strongly Disagree.” Overall, the largest group of respondents (58%) said they “strongly agree” that they understand the skills/knowledge of the organizations they deal with.

In total, 93% of survey respondents agreed or strongly agreed that they understood the skills and knowledge of the contacts at the organizations they partner with. The responses, listed by percentage, are shown in Figure 2-7 below.

Figure 2-7: Online Survey (Q11) - Organizations' Understanding of Partner Skills/Knowledge

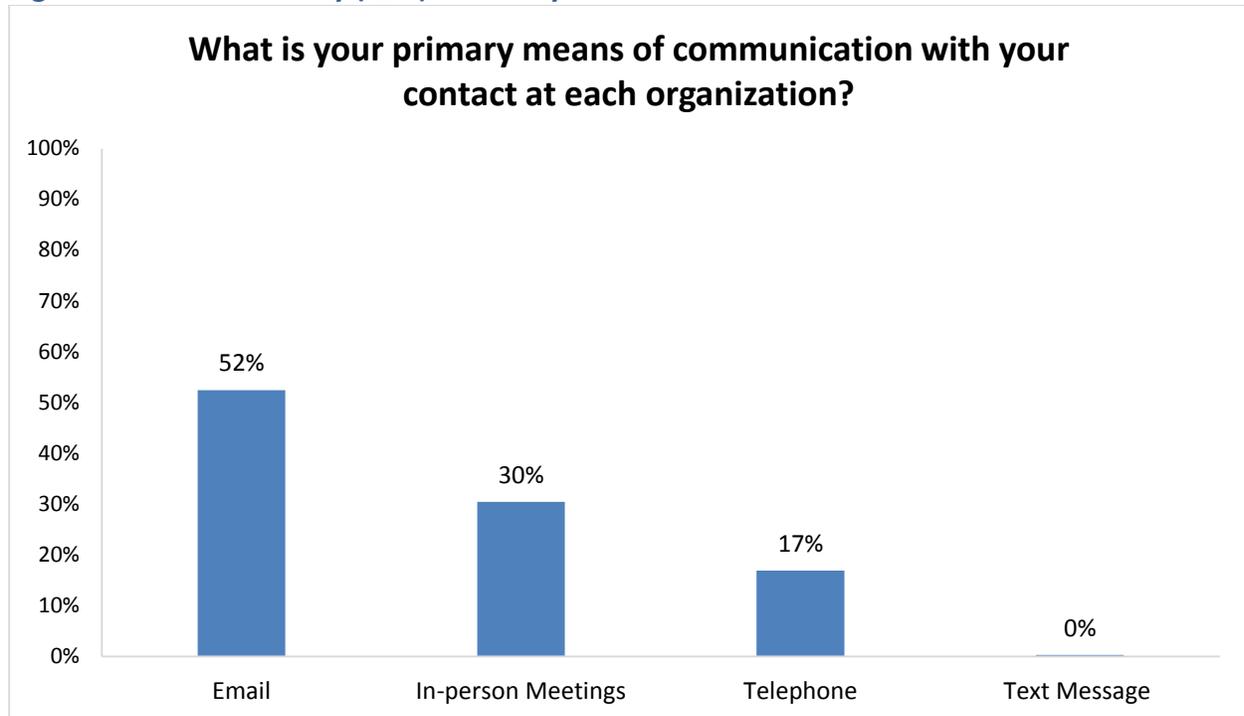


QUESTION 12: HEALTHCARE ORGANIZATIONS: COMMUNICATION

Question 12 asked survey respondents what their primary means of communication was with their partners – whether via telephone, text message, e-mail, or in-person meetings. Each survey respondent was given an opportunity to answer the question specifically for each organization they deal with, and the overall numbers showed a clear pattern.

Like the other networks, e-mail was the primary means of communication for most of the organizations, at 52%. In-person meetings were second, with 30%. Telephone contacts were 17% and text messages were less than one percent. One standout from the survey results is that healthcare organizations in Washington County communicate with each other in-person at a high rate. The results are listed in Figure 2-8 below.

Figure 2-8: Online Survey (Q12) – Primary Means of Communication between Partners



IN-PERSON MEETINGS

Given that a good amount of contact between healthcare partners in Washington County is done in-person (according to the organizations surveyed), the research team used the results to find out which organizations had the highest number of in-person meetings. According to survey respondents, the organizations listed in Table 2-11 below had the highest number of in-person meetings as their primary means of contact with that organization.

Table 2-11: Organizations where In-Person Meetings are the Primary Means of Communication with Survey Respondents

Organization	# of Respondents
1. Meritus Medical Center	7
2. Meritus Health	7
3. HEAL of Washington County	5
4. Maryland Department of Health (DHMH)	4
5. Washington County - Commission on Aging	4
6. Meritus Health - Parish Nurse Organization	4
7. Washington County Health Department	3
8. Walnut Street Community Health Center	3
9. Community Free Clinic	3
10. Tri-State Community Health Center	3
11. Meritus Total Rehab Care - Wellness Center	3
12. Western Maryland Health Systems	2
13. Meritus Home Health Care	2
14. Western MD Hospital	2
15. Robinwood Family Practice	2

ALLEGANY/GARRETT COUNTIES: SOCIAL NETWORK ANALYSIS RESULTS

RESPONSE RATE

Ideally, network analysis will proceed from complete data. However, this is unusual to achieve in practice. The snowball sample identified 58 organizations, or divisions within organizations, and 65 recipients received the survey. Of that total, 41 responded. Partial data on the non-respondents was obtained from those completed surveys.

HEALTHCARE ORGANIZATION SECTORS

Table 2 shows the 58 organizations in the network, categorized by CDC sector. Where conceptual overlap between sectors was encountered, organizations were categorized as follows:

- Business and health system (e.g. private medical practice) – counted as health system
- Government and education (e.g. public school; Board of Education) – counted as government
- Nonprofit organizations not operating as a health system were categorized as philanthropies.
- Note: All network diagrams will use the colors below to represent their sector.

Table 3-1: Network Organization Count by Sector

Sector	Number of Organizations
Business	3
Government	10
Health System	25
Education	11
Community	5
Philanthropy	4
Total organizations/divisions in network	58

DENSITY

The 58 organizations reported a total of 338 connections. In a network this size, there are 3,306 possible connections, leading to a network density of .098. While only approximately 10% of all possible connections have been made, Allegany/Garrett has the highest density of all networks in the study. The network is robust, as may be seen in Table 3-2, on the following page. Only a small minority of nodes are weakly connected (by one or two links).

DEGREE CENTRALITY

Two measures of degree centrality were obtained. In-degree centrality is the count of all nodes in a network reporting a link to a particular node.

Table 3-2, below, presents the most central organizations by in-degree count. As shown in the table, the Allegany County Health Department and the Western Maryland Health System are the most central organizations by this metric, with 15 other organizations reporting connections to each of these nodes.

Table 3-2 lists all organizations with 10 or more connections. However, 40% of the network has an in-degree centrality of at least 7, meaning that nearly half of the network is reported to be in partnership with at least 12% of the whole network.

Table 3-2: In-degree Centrality, Western Maryland

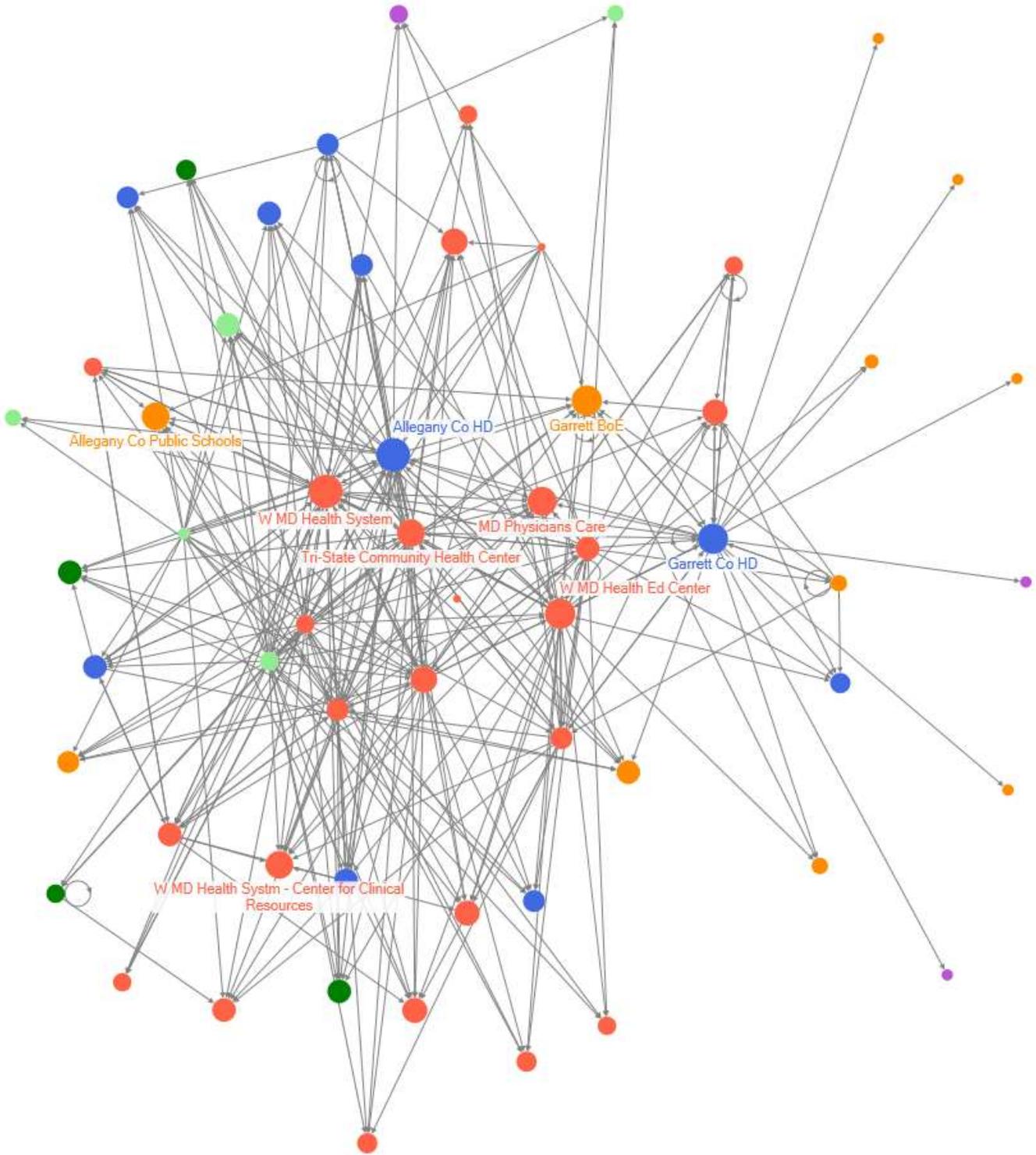
Organization	In-Degree Centrality
Allegany County Health Department	15
Western Maryland Health System	15
Garrett County Board of Education	12
Garrett County Health Department	12
Western Maryland Area Health Education Center	12
Maryland Physicians Care	11
Allegany County Public Schools	10
Tri-State Community Health Center	10
Western MD Health System - Center for Clinical Resources	10

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix E.

Figure 3-1 on the following page shows all 58 organizations collaborating in the network as well as all connections reported between these partners. In this figure, node size increases with in-degree centrality; as more organizations report working with a particular partner, that node increases in size in this figure. In other words, the largest nodes in this figure are those listed in the table above.

IN-DEGREE CENTRALITY: A VISUALIZATION

Figure 3-1: Western MD, Size by In-degree Centrality



OUT-DEGREE CENTRALITY

Table 3-3 below presents the leading organizations by out-degree centrality – those organizations reporting the largest number of connections to the network. These top 13 organizations account for 83% of the connections in the network. Further assessment of out-degree centrality is limited by the survey completion rate. With only 50% response rate, it is to be expected that additional out-going connections were not captured due to non-response.

Table 3-3: Out-degree Centrality, Western Maryland

Organization	Out Degree Centrality
Western Maryland Health System	32
Associated Charities of Cumberland	30
Tri-State Community Health Center	29
Archway Station	26
Allegany County Health Department	25
Western Maryland Area Health Education Center	24
PharmaCare	24
Mid-Atlantic Healthcare	22
Western Maryland Regional Health Center, Outpatient Dialysis	22
Garrett County Health Department	19
Carver Community Center	14
Mountain Laurel Medical Center	13

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix E.

BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS)

Betweenness centrality assesses how frequently a given node lies along the shortest path between any two other nodes in the network. Betweenness tends to identify nodes that serve as ‘bridges’ connecting clusters within a community. These bridges are particularly important, as they bring a network closer together and disseminate information to parts of a network that may be otherwise distant from one another.

Betweenness, as calculated in Node XL, often follows a power law, so it tends to drop very quickly, and is a normal feature of networks. Put simply, networks seek to work through ‘hubs’ – nodes with high betweenness. An important consideration for network management is to identify which nodes serve as such hubs and to ensure that they have sufficient capacity to handle the load of information flowing through them.

Table 3-4 below presents the organizations with the highest betweenness centrality in Western Maryland’s network.

Table 3-4: Betweenness Centrality, Western MD

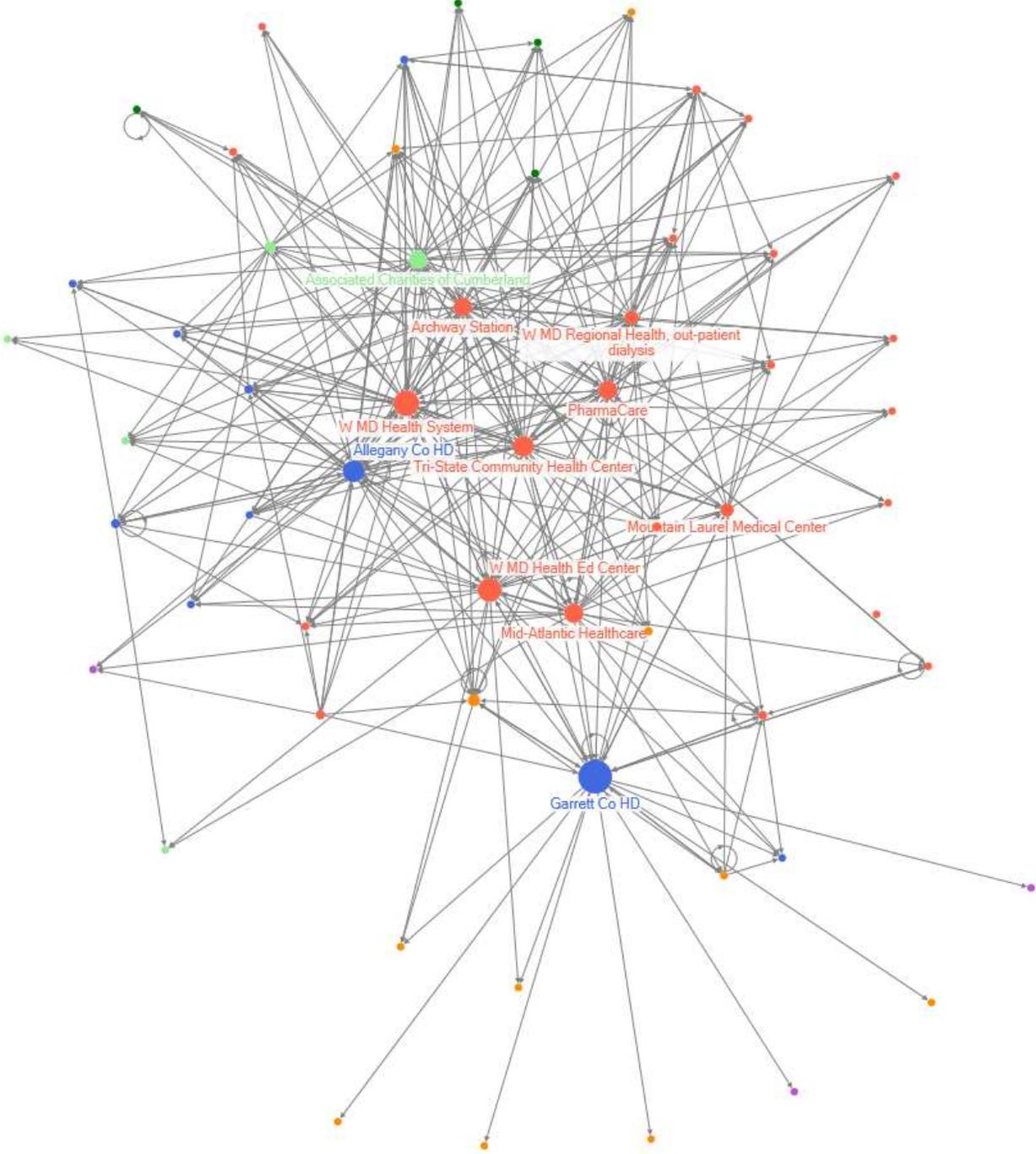
Organization	Betweenness Centrality
Garrett County Health Department	738.967
Western Maryland Health System	407.424
Western Maryland Area Health Education Center	346.746
Allegany County Health Department	282.746
Tri-State Community Health Center	250.353
Mid-Atlantic Healthcare	211.854
PharmaCare	199.295
Associated Charities of Cumberland	186.505
Archway Station	182.591
Western Maryland Regional Health Center, Outpatient Dialysis	89.877
Mountain Laurel Medical Center	84.539

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix E.

BETWEENNESS CENTRALITY: A VISUALIZATION

Figure 3-2 shows the Western Maryland network, nodes sized by betweenness centrality. For clarity, the figure shows a simplified depiction of the network, excluding outlying nodes. Garrett and Allegany county health departments figure as prominent nodes, as do several health systems. The central community association (large light green node) is the Associated Charities of Cumberland.

Figure 3-2: Western Maryland, Betweenness by Sector



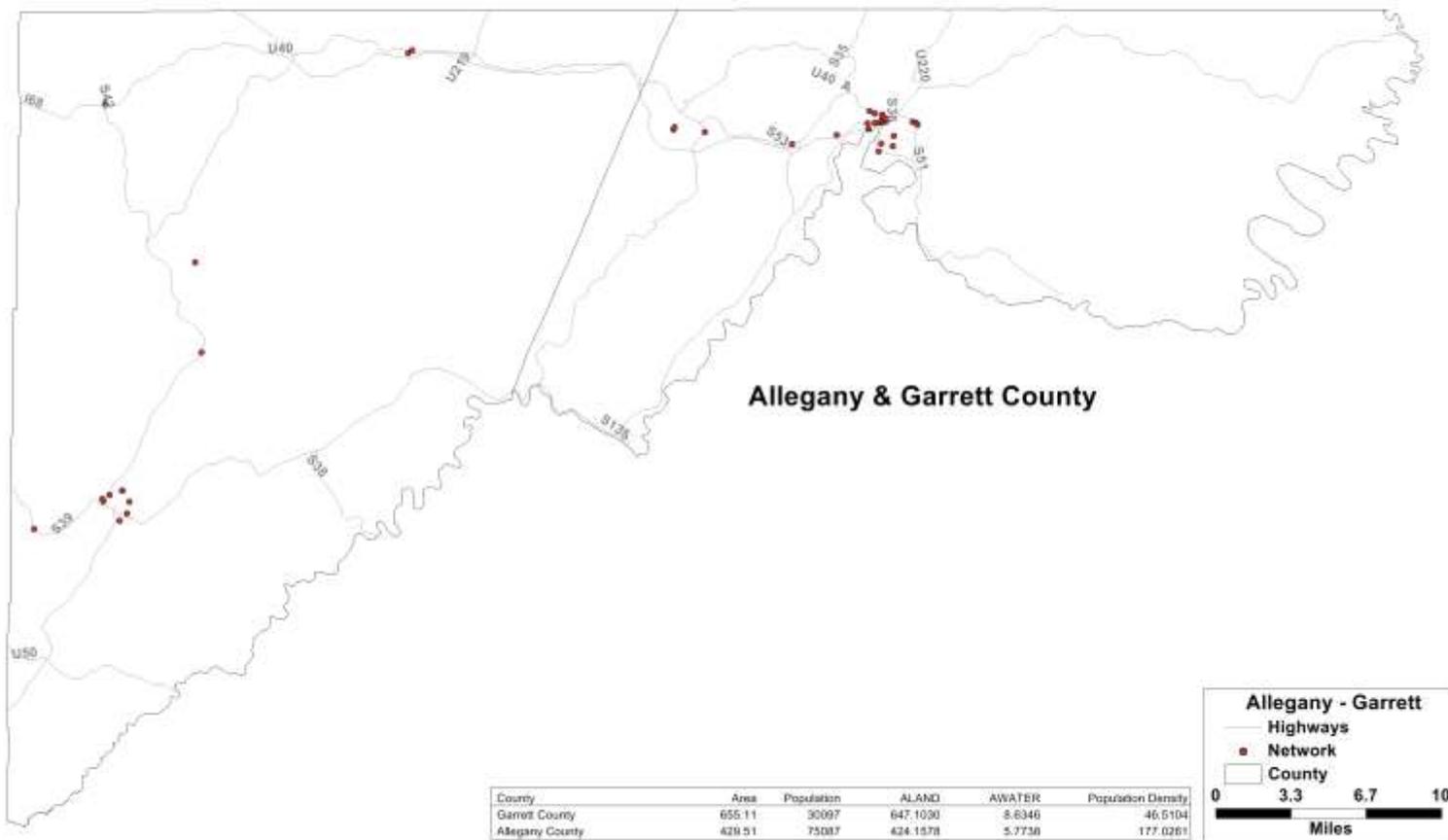
NETWORK GEOGRAPHICS

Figure 3-3 shows the geographical distribution of network organizations within Allegany and Garrett counties. Each red dot in the figure marks the address of at least one network organization. Note that any organizations with an address outside of the county boundaries is not shown; also, that any organizations sharing the same address will only be marked by a single dot. However, a good sense of the distribution of network partners throughout the two counties can readily be made.

Distribution appears to be driven primarily by population. The majority of organizations are located in more populous Allegany County; the largest concentration of organizations occurs in and around Cumberland. Relatively few organizations are located in Garrett County, with a small cluster around Oakland, the county seat. Both counties are relatively sparsely populated. Although Allegany County is the larger of the two, nearly one-quarter of its population lives in Cumberland. For this network, effectively delivering services to a sparse and dispersed population is expected to pose ongoing challenges.

Strategic management of network resources may be able to ensure efficient delivery. For this to happen, inter-governmental cooperation will be key, as will effective collaboration between public, nonprofit, and private sector partners.

Figure 3-3: Distribution of network organizations in Allegany and Garrett Counties



DISCUSSION & RECOMMENDATIONS

The Western Maryland network includes organizations from Garrett and Allegany counties and is comprised of 338 connections between 58 organizations. Health systems are the largest sector – with 25 nodes – nearly half of the network consists of healthcare organizations.

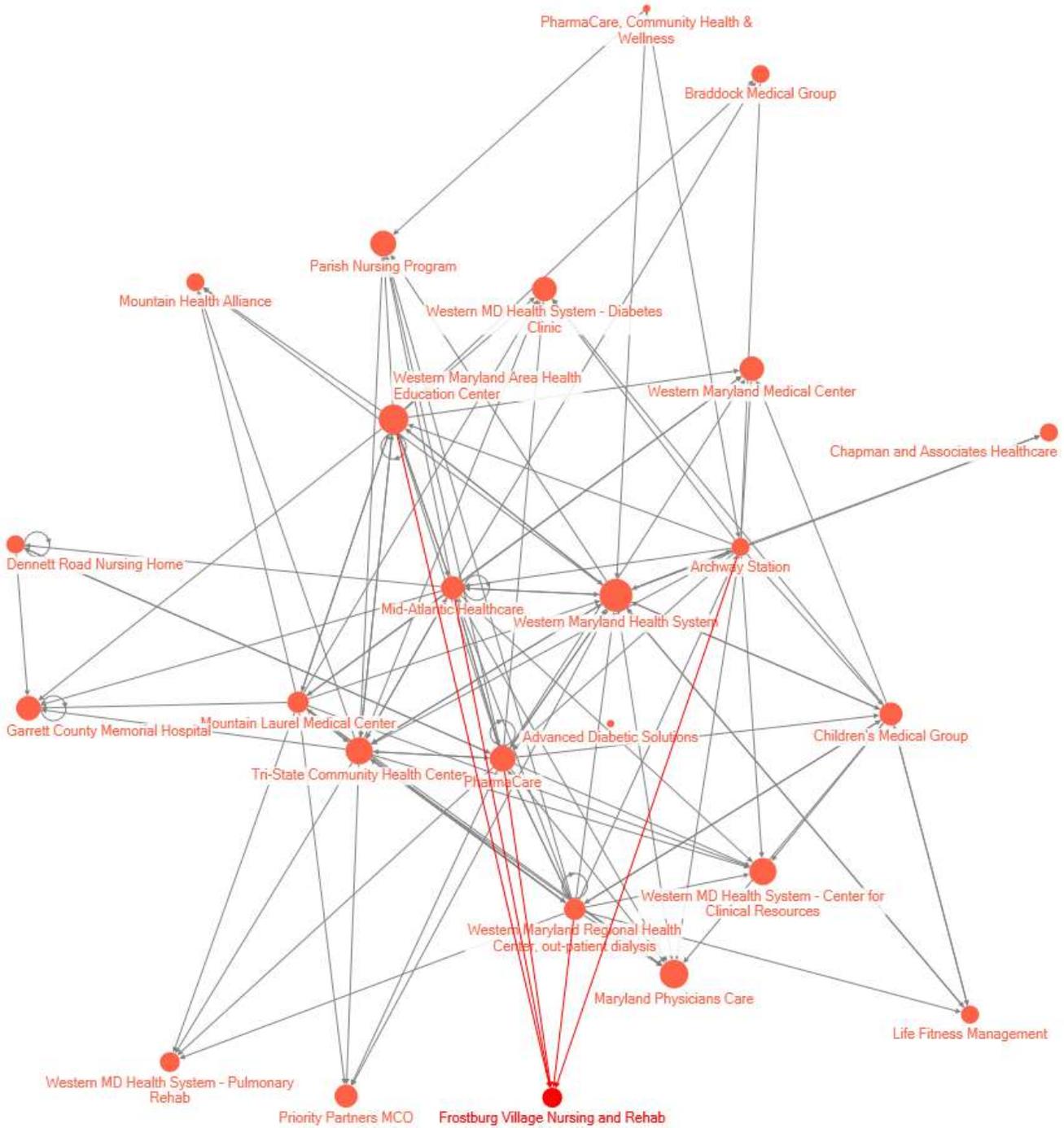
As may be seen in Figures 3-4 and 3-5 on the following pages, the preponderance of health systems organizations does not compromise the network. Figure 3-3 shows only the health systems organizations. As may be expected, there are robust connections between health systems.

Note that only a single health system organization has only one connection to the larger health system network (see upper left quadrant of Figure 4). All other nodes show connections to at least three other health system nodes. However, figure 5 shows that when health systems are removed, no organizations are lost to the overall network.

In other words, health systems do not dominate the lanes of communication – no organizations depend solely on a health systems organization for inclusion in the network. This suggests a robustness of connections throughout the network; that organizations connect to one another through a diverse range of sectors.

WESTERN MD NETWORK (HEALTH SYSTEMS ONLY)

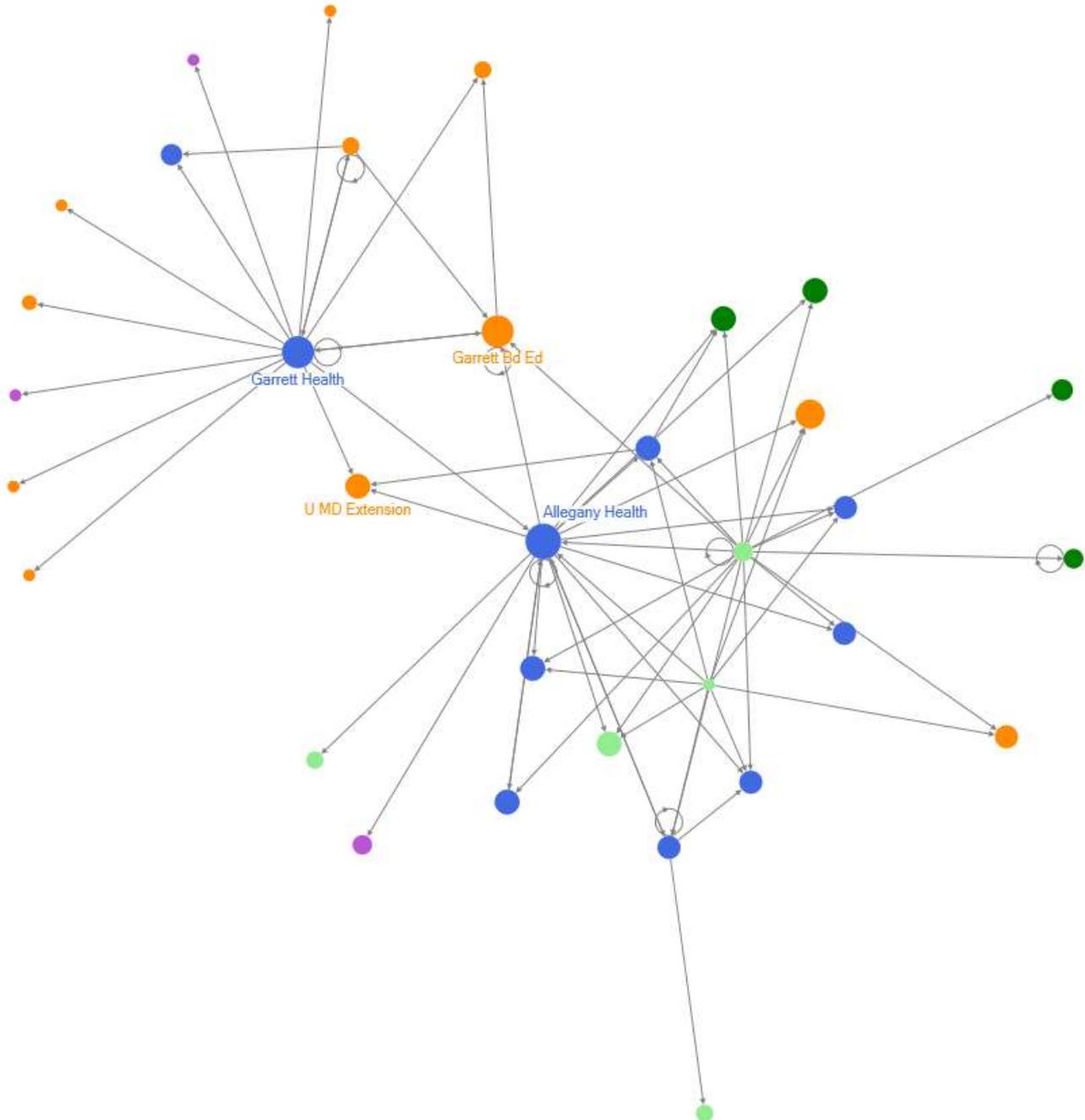
Figure 3-4: Western Maryland Network – (Health Systems Organizations Only)



WESTERN MD NETWORK – WITHOUT HEALTH SYSTEMS ORGANIZATIONS

Figure 3-5 below shows a visualization of the network *without* Health Systems organizations.

Figure 3-5: Western Maryland Network, Excluding Health Systems



This figure allows the central roles of the Garrett and Allegany County Health Departments to be clearly seen. Note also the bridging role between counties played by the University of Maryland Extension and Garrett County Board of Education.

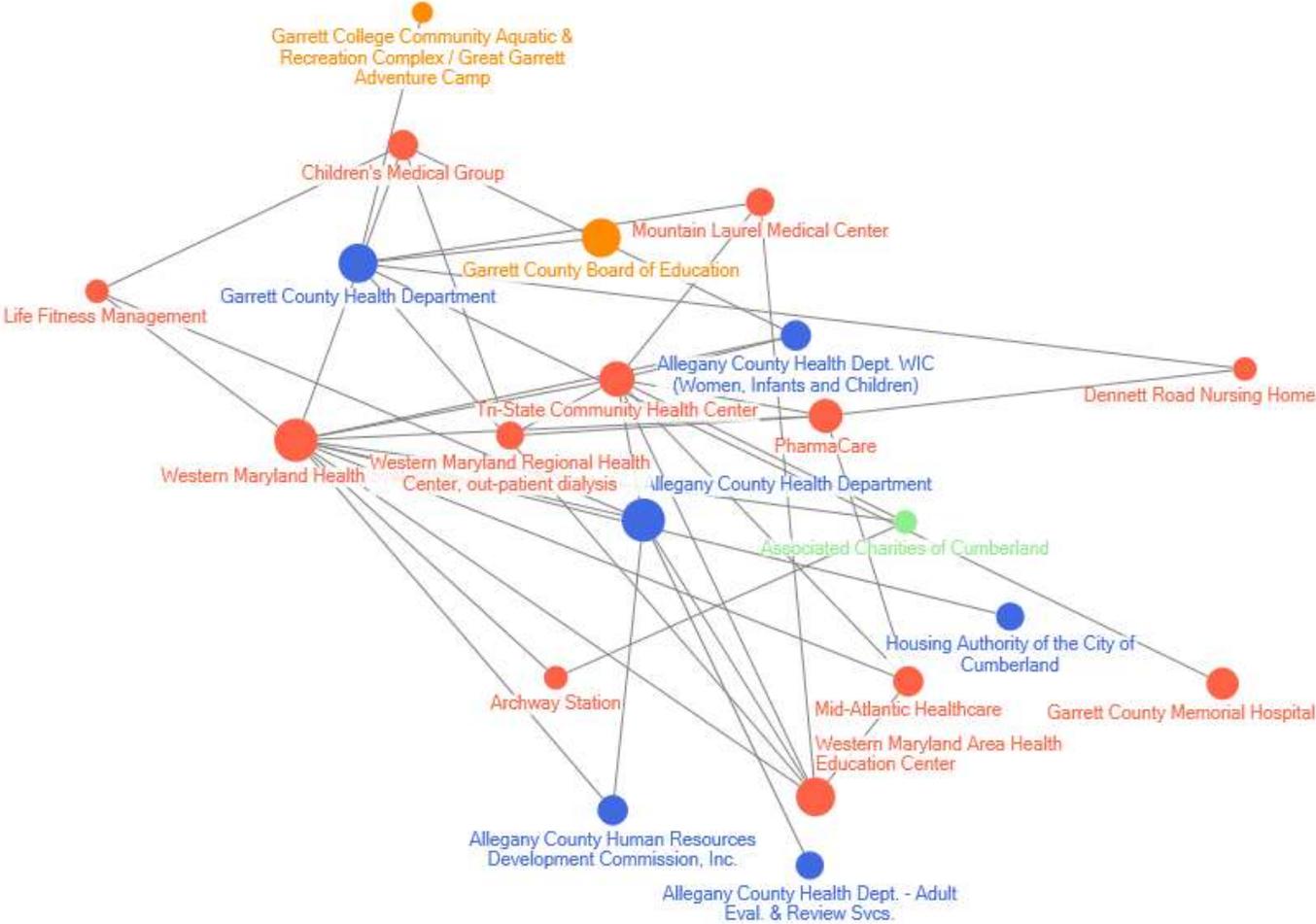
While Health Systems organizations are the largest bloc in the Allegany/Garrett Counties, community, nonprofit, and private businesses are each sparsely represented in the network. In particular, only three private organizations are active in the network – the Allegany Radio Corporation, Fechheimer Shirt Factory, and Uno Pizzeria and Grill.

As a whole, the network exhibits a relatively high level of cohesiveness, with robust connections. In comparison, private businesses are only weakly connected; none report connections back to the network. Increasing connections with the private sector, and encouraging private enterprises to see themselves as active partners in chronic disease prevention, may be a means of significantly growing and strengthening this network.

RECIPROCAL RELATIONSHIPS

Another measure of the cohesiveness of the network may be seen by isolating reciprocal links – those connections where both partners report working collaboratively. There are 39 such 2-way connections in Western Maryland involving 21 organizations. These reciprocal linkages are shown in Figure 3-6 below.

Figure 3-6: Reciprocal Connections in Western Maryland



LEVERAGE OPPORTUNITIES ARISING FROM THIS STUDY

Basic benefits from the fundamental act of mapping the network should not be overlooked. These include:

NETWORK EVALUATION

The size and composition of the network is now overt. In addition to recommendations made here, local health officials can undertake their own evaluation of how well suited the current partnerships are towards advancing the goals of chronic disease prevention. Strategic planning to incorporate new organizations into the network, or shift the capacity, centrality, or role of existing partners, may now be made.

PARTNER ORGANIZATIONS

Partner organizations are now aware that they are part of a larger network. The view from the ground is necessarily constrained and often focused closely on an individual organization's specific mission and focus. Participation in the survey made respondents aware that they are part of a larger network, and presents an opportunity to strengthen and grow the network.

- Disseminate a list of network partners throughout the network. Doing so encourages increased communication and collaboration among partner organizations. Discussion with some respondents revealed the existence of local partners in the neighborhood that were unknown to the respondent. Collecting and publishing basic information on the partner organizations is an easy way to more fully inform the network as to who everyone is and what they are doing; may cut down on redundancies; and, can lead to the growth of lateral connections between partner organizations.
- Develop a communication forum for the network. A formal publication, either in print or online, may suffice. An open forum, such as a discussion board, email listserv or wiki, facilitates two-way communication among participating organizations. A combination of centralized distribution (e.g. newsletter or email blast) to push significant milestones, achievements, or updates to the network, along with maintenance of a discussion forum for network-wide input, may be desirable.
- Develop a strategy for managing clusters within the network. These may be based on geography, service provision, mission focus, or some other relevant characteristic. As noted above, at least some organizations in a neighborhood were unaware of nearby network partners. Additionally, organizations dispersed across the network may not be aware of all other similar partner organizations. This may be particularly apt for community organizations working within a specific area and serving a focused population.

- Developing awareness of the network and acknowledging participation may be particularly important for smaller and community-oriented organizations on the periphery of the network. Many of these organizations are only weakly connected to the network, and may benefit not only from increased connections, but from increased recognition as well.
- Several respondents from small organizations expressed sentiments of inferiority: A perception that ‘the real work’ is being done by larger, more central organizations; that the flow of communication is largely ‘outward’ from those large central organizations; and, that more recognition of the needs and accomplishments of small peripheral organizations is needed.

ENCOURAGE THE GROWTH OF LATERAL CONNECTIONS ON THE PERIPHERY

The previous point addressed relations between central and peripheral organizations. Relationships among peripheral organizations, particularly those sharing a set of common characteristics (size, audience, mission, etc.) have different needs and require a different management strategy.

Capturing those organizations and their needs can be difficult. Some local organizations reported not being aware of organizational or contact names in the network. Convincing small organizations that their partnership is a valued contribution to the network can be challenging. Limited response rates from small organizations may be one indicator of this. That response rate limited analysis of the periphery and showed a higher level of uni-directional connections from the center to the periphery than may be the case in actuality.

Put simply, it is to be expected that peripheral organizations have more ties than are shown. This is supported by discussion with some respondents from small peripheral organizations who report a strong sense of collaborative partnership with other such organizations. These relationships were described as frequent, consisting of collaborative back-and-forth, and multi-modal (email bolstered with calls and in-person meetings). Additionally, these collaborations were attributed in part to a lack of resources and a resultant need to work together for mutual success. To the extent possible, these collaborative partnerships should be acknowledged and encouraged.

ALLEGANY/GARRETT COUNTY SURVEY RESPONDENTS

The survey respondents represented a wide range of healthcare provider and awareness organizations in the Counties. Overall, 58 organizations in Washington County were contacted for the survey. Survey results show that a wide variety of organizations were represented. Examples of several key organizations include the following:

- State and local government: Maryland Department of Health and Mental Hygiene (DHMH), Allegany and Garrett County Health Departments
- Major hospital/university systems: Western Maryland Health System, University of Maryland Extension
- Community Organizations: YMCA, County United Way

Allegany/Garrett County Organization Types

Government and Health Systems organizations are numerous in the network, such as the Allegany and Garrett County Health Departments, and the Western Maryland Health System.

SURVEY COMPLETION RATES FOR MAJOR ORGANIZATIONS

Using the survey results, researchers were able to determine which organizations in Western Maryland had the highest number of in-degree and out-degree centrality. In other words, these organizations had the highest number of incoming and outbound connections to others in the network and most of them completed the survey. The range goes as follows: 9 out of the top 10, and 22 out of the top 30 organizations all completed the survey.

They also provided important information about their relationships with other, less well-connected organizations, providing the research team with a stronger view into how the Allegany/Garrett Network operates.

SURVEY QUESTIONS AND ANSWERS

Overall, the online survey was used to gather information about healthcare organizations in Allegany/Garrett County, find out who they partnered with, whether those organizations were in the County or elsewhere, and to collect quantitative and qualitative information about those relationships. The entire online survey can be viewed in Appendix B.

SECTION 1: ALLEGANY/GARRETT COUNTY HEALTH ORGANIZATIONS

Section 1 asked survey recipients several demographic questions about the organization they worked for. The questions asked for the following information:

- The organization's name
- The respondent's particular division or department
- The respondent's job title
- Business sector of the organization
- Whether the organization was a Diabetes Program Partner (DPP)
- Whether their organization delivered healthcare services or developed healthcare awareness

QUESTIONS 1 AND 2: HEALTHCARE ORGANIZATIONS: NAMES/DIVISION/DEPARTMENT

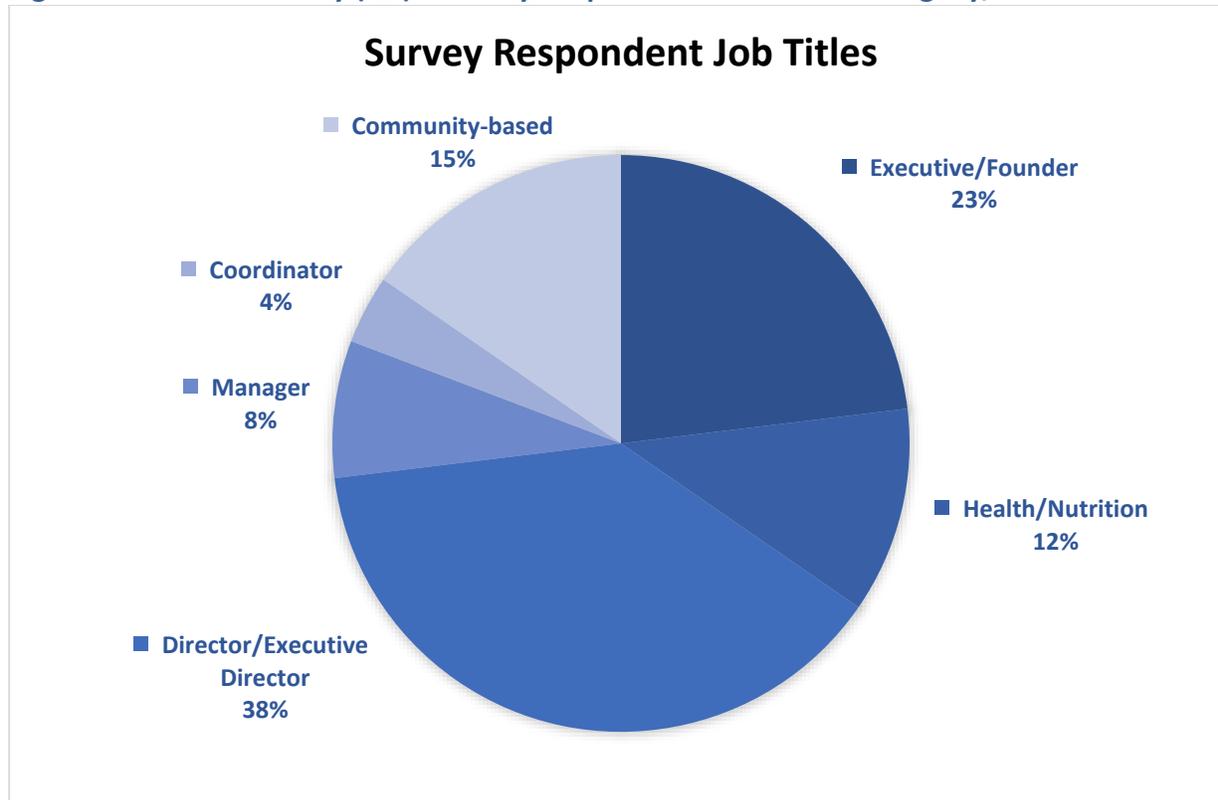
Specifically, Questions 1 and 2 asked survey respondents to list their organization's name and the department or division they worked in.

QUESTION 3: SURVEY RESPONDENTS' JOB TITLES

Question 3 asked survey respondents to list their official job title. In Allegany/Garrett County, the vast majority of responses were completed by decision makers with job titles that referenced managerial or executive capacity. The most common job title was Director or Executive Director (38%).

When including executives/founders, managers, and directors, 69% of decision makers at high levels completed the survey for Allegany/Garrett County. All survey respondents' job titles are listed by percentage in Figure 3-7 on the following page.

Figure 3-7: Online Survey (Q3) – Survey Respondent Job Titles in Allegany/Garrett Counties



QUESTION 4: HEALTHCARE ORGANIZATIONS: BUSINESS SECTOR

Question 4 asked survey respondents to view seven business sector categories and choose which one best described their organization. The organization sectors were listed as follows: Government, Health System, Education/Academia, Community organization, Business, Philanthropy, or Diabetes Program Partner (DPP).

QUESTION 5: DIABETES PROGRAM PARTNERS (DPP)

The next question asked survey respondents to state whether their organization was a Diabetes Program Partner (DPP) or not. In Allegany/Garrett Counties, no organization identified itself as a DPP.

QUESTION 6: HEALTHCARE ORGANIZATIONS: FOCUS

The last question in Section 1 asked respondents if their organization focused more on providing healthcare services or developing healthcare awareness. In total, 60% of survey respondents said their organization’s focus was on delivering healthcare services. The remaining 40% said they focused on developing awareness of chronic health issues. The answers about organization focus are represented in Figure 3-8 below.

Figure 3-8: Online Survey (Q6) – Organization Focus: Healthcare Awareness or Service Delivery



SECTION 2: HEALTHCARE ORGANIZATIONS: RELATIONSHIPS

Section 2 presented survey respondents with a list of healthcare organizations in Allegany/Garrett County and asked them to select the ones they partnered with.

QUESTION 7: HEALTHCARE ORGANIZATIONS' FREQUENT PARTNERS

Question 7 asked survey respondents to view a list of healthcare organizations in Allegany/Garrett County and select the ones that they partnered with on various chronic health issues. This enabled the research team to compile a list of the most frequently selected healthcare organizations in the Counties, according to the survey respondents.

Table 3-5 below lists the most frequently selected healthcare organizations in Allegany/Garrett County, ranked by the percentage of survey respondents who listed them as a partner. For example, the first entry on the list is the Allegany County Health Department, with 64% – this means that a full 64% of survey respondents said the Allegany County Health Department was one of their partners.

Table 3-5: Most-Connected Healthcare Organizations in Allegany/Garrett County (by % selected in the survey)

Organization	% Selected
1. Allegany County Health Department	64%
2. Western Maryland Health System	60%
3. Garrett County Board of Education	52%
4. Western Maryland Area Health Education Center	52%
5. Garrett County Health Department	48%
6. Maryland Physicians Care	44%
7. Tri-State Community Health Center	40%
8. Western MD Health System - Center for Clinical Resources	40%
9. Allegany County Public Schools	40%
10. Pharmicare	36%
11. Western MD Health System - Parish Nursing Program	36%
12. Garrett County Memorial Hospital	36%
13. Western Maryland Medical Center	32%
14. Western MD Health System - Diabetes Clinic	32%
15. University of Maryland Extension	32%
16. Mountain Laurel Medical Center	28%
17. Priority Partners MCO	28%
18. Allegany County Human Resources Development Commission	28%
19. County United Way	28%
20. Children's Medical Group	28%
21. Allegany County Department of Social Services	28%
22. Allegany Health Nursing & Rehab	28%
23. Allegany County Health Department WIC (Women, Infants and Children)	28%
24. YMCA Cumberland	28%
25. Allegany Health Right	28%

The organizations listed above are very well-connected, so they are key organizations that serve the Counties, but there are several smaller organizations on the list that are well-connected despite their relatively smaller size. The Tri-State Community Health Center and the Children's Medical Group are two examples.

Another standout is that the Allegany and Garrett Health Departments, other government and education organizations including both counties' Boards of Education, the Western Maryland Health System, and Western Maryland AHEC all account for 50% of the most well-connected organizations and are a large part of the network structure.

SECTION 3: HEALTHCARE ORGANIZATIONS: RELATIONSHIP QUALITY

Section 3 of the survey asked Allegany/Garrett County organizations about the type of relationships they had with the partner organizations they previously selected in Section 2.

For every organization they selected, survey respondents were able to provide information about that partner with regard to upstream/downstream relationships, the length of their relationship, the frequency with which they communicated with partners, their understanding of their partners' skills and knowledge, and finally, their primary means of communication with partners.

QUESTION 8: UPSTREAM AND DOWNSTREAM RELATIONSHIPS

After survey respondents selected the organizations they worked with, subsequent survey questions asked them to provide information about the nature of their relationship with those partners. The first question in Section 3 asked respondents to name which organizations gave them information (also known as an “upstream” relationship) and which organizations they sent information to (also known as a “downstream” relationship.) The list of the top organizations in terms of downstream partners is listed below in Table 3-6. According to survey respondents, the organizations on this list are distributing information or providing referrals to others (downstream) on a frequent basis.

Table 3-6: Organizations with the Highest Number of Downstream Partners

Organization	# of Partners
1. Allegany County Health Department	11
2. Western Maryland Health System	11
3. Garrett County Board of Education	5
4. Western Maryland Area Health Education Center	8
5. Garrett County Health Department	7
6. Maryland Physicians Care	6
7. Allegany County Public Schools	5
8. Western MD Health System - Center for Clinical Resources	6
9. Tri-State Community Health Center	7
10. Western MD Health System - Parish Nursing Program	2
11. Pharmacare	3
12. Garrett County Memorial Hospital	7
13. Western MD Health System - Diabetes Clinic	4
14. University of Maryland Extension	4
15. Western Maryland Medical Center	4
16. Allegany Health Right	3
17. Allegany Health Nursing & Rehab	3
18. Allegany County Department of Social Services	4
19. Mountain Laurel Medical Center	4
20. Allegany County Human Resources Development Commission	4

QUESTION 9: LENGTH OF RELATIONSHIPS BETWEEN ORGANIZATIONS

Question 9 asked survey respondents about the length of the relationships with the organizations they named as partners. A scale with 5 options was presented, with “Less than 1 year” to define the briefest relationship, and “More than 10 years” to define the longest-lasting relationships.

In Allegany/Garrett County, survey respondents reported that the more established, larger health organizations were the ones they tended to have the longest relationships with. The organizations with the highest number of long-lasting relationships are listed in Table 3-7 below.

Table 3-7: Organizations with the Highest Number of Partner Relationships Longer Than 10 Years

Organization	# of Relationships
1. Allegany County Health Department	13
2. Western Maryland Area Health Education Center	9
3. Western Maryland Health System	9
4. Garrett County Board of Education	8
5. Garrett County Memorial Hospital	7
6. Garrett County Health Department	7
7. Allegany Health Right	6
8. Allegany County Department of Social Services	6
9. Allegany County Health Department WIC (Women, Infants and Children)	6
10. University of Maryland Extension	6
11. Allegany County Public Schools	6
12. Allegany County Health Department - Cancer Prevention	5
13. Allegany County Health Department - Adult Eval. & Review Svcs.	5
14. Allegany County Human Resources Development Commission	5
15. Children's Medical Group	5

The trend of larger, government and large health systems organizations is prevalent in the results for this category.

QUESTION 10: FREQUENCY OF COMMUNICATION BETWEEN ORGANIZATIONS

Question 10 asked survey respondents how often they communicated with other organizations in their network. A scale with 4 options was presented, with “Frequently” to define the highest level of contact, followed by “Sometimes,” “Seldom,” or “Never” to describe less frequent levels of contact.

Overall, survey respondents reported that the more established, larger health organizations were the ones they tended to communicate with the most. Those organizations, with the highest levels of “Frequent” communication, are listed in Table 3-8 below.

Table 3-8: Top 20 Organizations with Highest Level of Frequent Contact with their Partners

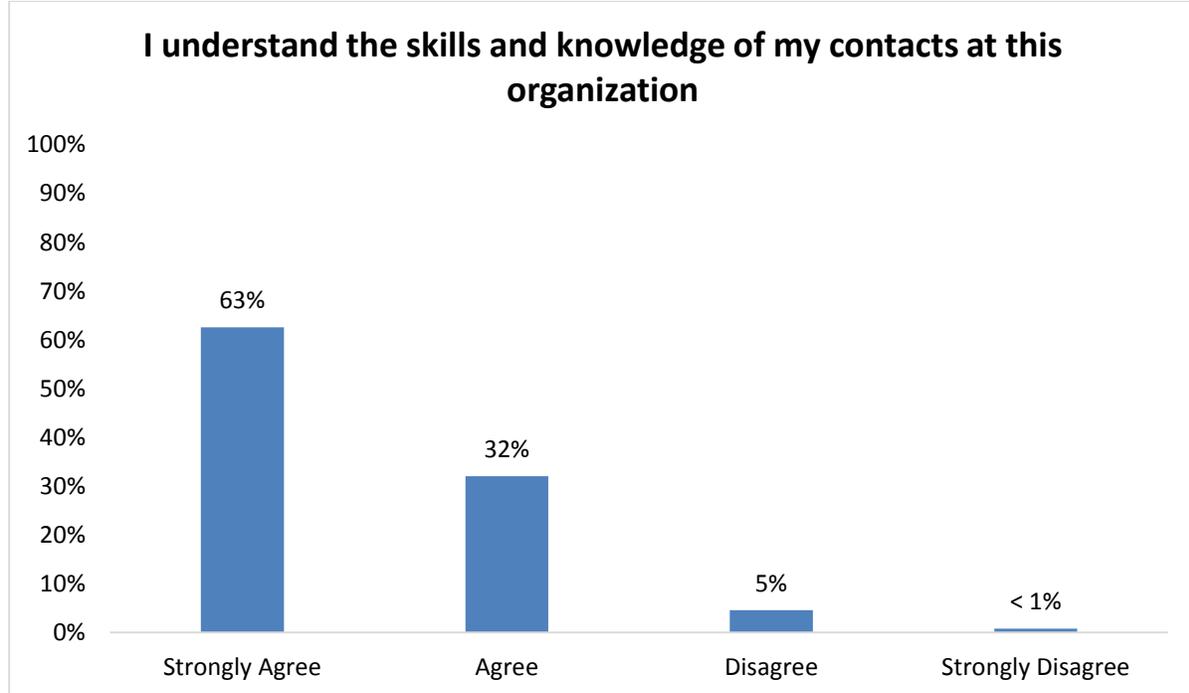
Organization	# Partners
1. Western Maryland Health System	12
2. Allegany County Health Department	10
3. Garrett County Health Department	8
4. Tri-State Community Health Center	7
5. Western Maryland Medical Center	7
6. Garrett County Memorial Hospital	6
7. Allegany County Department of Social Services	6
8. Western Maryland Area Health Education Center	5
9. Garrett County Board of Education	5
10. Allegany County Human Resources Development Commission	5
11. Western MD Health System - Center for Clinical Resources	5
12. Maryland Physicians Care	4
13. University of Maryland Extension	4
14. Pharmacare	4
15. Children's Medical Group	4
16. Allegany Health Right	4
17. Allegany County Health Department WIC (Women, Infants and Children)	3
18. Allegany Health Nursing & Rehab	3
19. Western MD Health System - Parish Nursing Program	3
20. Allegany County Health Department - Adult Eval. & Review Svcs.	3

QUESTION 11: ORGANIZATIONS' UNDERSTANDING OF PARTNER SKILL AND KNOWLEDGE

Question 11 asked survey respondents if they understood the skills and knowledge of each of the organizations they selected as partners. They were able to choose from a scale from highest to lowest, starting from “Strongly Agree, Agree, Disagree, or Strongly Disagree.” Overall, the largest group of respondents (63%) said they “strongly agree” that they understand the skills/knowledge of the organizations they deal with.

In total, 95% of survey respondents agreed or strongly agreed that they understood the skills and knowledge of the contacts at the organizations they partner with. The responses, listed by percentage, are shown in Chart 11 below.

Figure 3-9: Online Survey (Q11) - Organizations' Understanding of Partner Skills/Knowledge

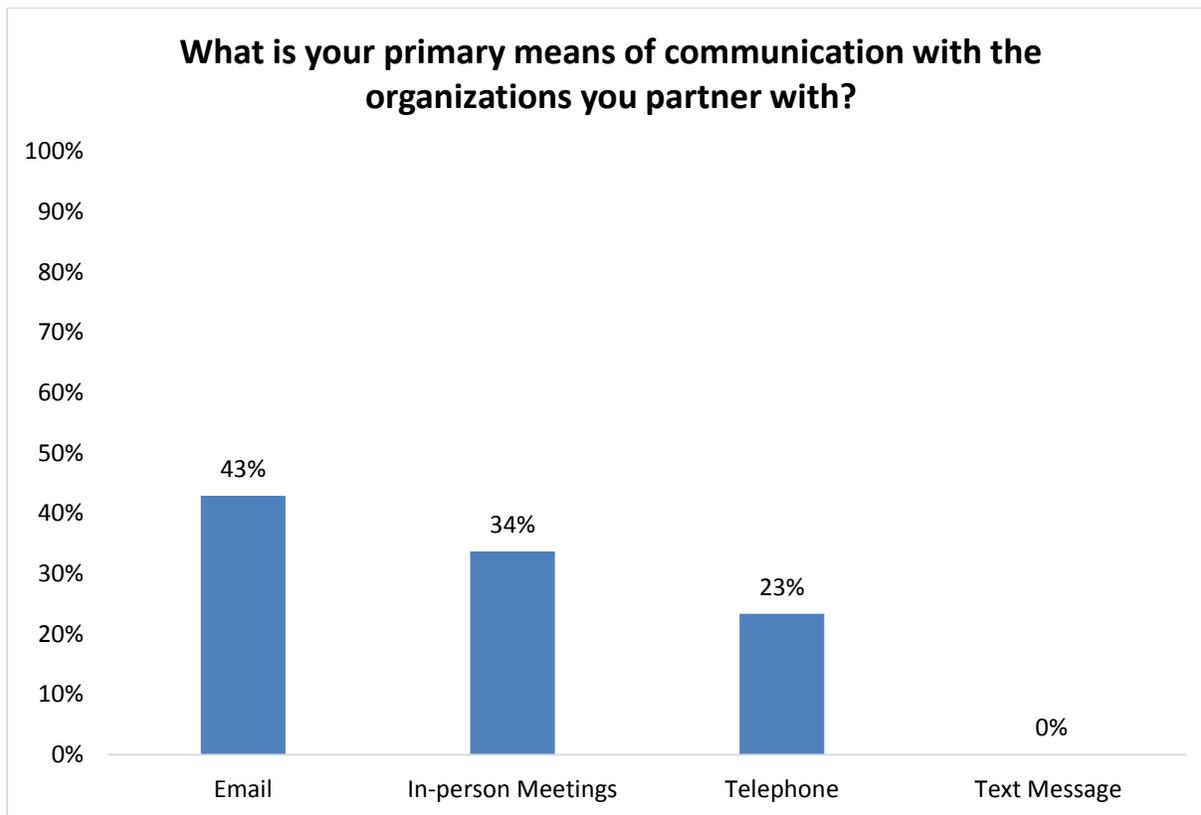


QUESTION 12: HEALTHCARE ORGANIZATIONS: COMMUNICATION

Question 12 asked survey respondents what their primary means of communication was with their partners – whether via telephone, text message, e-mail, or in-person meetings. Each survey respondent was given an opportunity to answer the question specifically for each organization they deal with, and the overall numbers showed a clear pattern.

Like the other networks, e-mail was the primary means of communication for most of the organizations, at 52%. In-person meetings were second, with 30%. Telephone contacts were 17% and text messages were less than one percent. The full results are listed in Figure 3-10 below.

Figure 3-10: Online Survey (Q12) – Primary Means of Communication between Partners



IN-PERSON MEETINGS

Given that a relatively large amount of contact between healthcare partners in Allegany/Garrett County is done in-person (according to the organizations surveyed and when compared to other networks), the research team used the results to find out which organizations had the highest number of contacts who reported having in-person meetings with them.

The organizations listed in Table 3-9 below had the highest number of survey respondents who said in-person meetings were their primary means of contact with that organization.

Table 3-9: Organizations where In-Person Meetings are the Primary Means of Communication with Survey Respondents

Organization	# Respondents
1. Western Maryland Health System	6
2. Allegany County Health Department	5
3. Allegany County Public Schools	4
4. County United Way	4
5. Allegany Radio Corporation	4
6. Tri-State Community Health Center	4
7. Western Maryland Area Health Education Center	4
8. University of Maryland Extension	4
9. Garrett County Board of Education	3
10. Garrett County Health Department	3
11. Housing Authority of the City of Cumberland	3
12. Garrett College	3
13. Allegany County Health Department - Cancer Prevention	3
14. Allegany County Chamber of Commerce	3
15. Allegany Health Right	3
16. Allegany County Health Department WIC (Women, Infants and Children)	3
17. Western MD Health System - Diabetes Clinic	2
18. Alzheimer's Association	2
19. Garrett County Memorial Hospital	2
20. Allegany Health Education Center	2

SOMERSET, WICOMICO, AND WORCESTER COUNTIES: SOCIAL NETWORK ANALYSIS RESULTS

RESPONSE RATE

Ideally, network analysis will proceed from complete data. However, this is unusual to achieve in practice. The snowball sample identified 68 organizations, or divisions within organizations, and 79 representatives received the survey. Of that total, 46 responded to the survey. Partial data on the non-respondents was obtained from the completed surveys.

NETWORK DEMOGRAPHICS

Table 2 shows the 68 organizations in the network, categorized by CDC sector. Where conceptual overlap between sectors was encountered, organizations were categorized as follows:

- Business and health system (e.g. private medical practice) – counted as health system
- Government and education (e.g. public school; Board of Education) – counted as government
- Nonprofit organizations not operating as a health system were categorized as philanthropies.
- Note: All network diagrams will use the colors below to represent their sector.

Table 4-1: Network Organization Count by Sector

Sector	Number of Organizations
Business	10
Government	24
Health System	12
Education	8
Community	7
Philanthropy	7
Total organizations/divisions in network	68

DENSITY

The 68 organizations reported a total of 257 connections. In a network this size, there are 4,556 possible connections, thus this network has a density of .055. This may mean that the network brings together organizations that may otherwise not work together.

As may be seen in Figure 4-1 (pg. 107), this network has a number of weakly connected nodes. However, it does show evidence of significant bridging nodes as well as the development of

lateral connections throughout the outer network. Both may warrant strategic management for optimal network growth and stability.

DEGREE CENTRALITY

Two measures of degree centrality were obtained. In-degree centrality is the count of all nodes in a network reporting a link to a particular node. Table 4-2 presents the most central organizations by in-degree count.

As may be seen, by this metric, the Worcester County Health Department is the most central organization, with 14 other nodes (20% of the network) reporting a connection to the Health Department. The network is relatively small and does not exhibit a high level of in-degree centrality. However, the decline in centrality is relatively slow, with a quarter of the network reaching at least seven incoming connections from other nodes.

Table 4-2: In-degree Centrality, Lower Shore

Organization	In-Degree Centrality
Worcester County Health Department	14
Wicomico County Health Department	12
Peninsula Regional Medical Center	12
Three Lower Counties - Main	9
Lower Shore Family YMCA	9
American Heart Association	9
Maintaining Active Citizens (MAC)	8
Salisbury University	8
Atlantic General Hospital	8
Carefirst BlueCross BlueShield	8
Three Lower Counties - Community Services	8
McCready Foundation	8
WBOC-TV 16	7
WMDT-TV 47	7
Somerset County Health Department	7

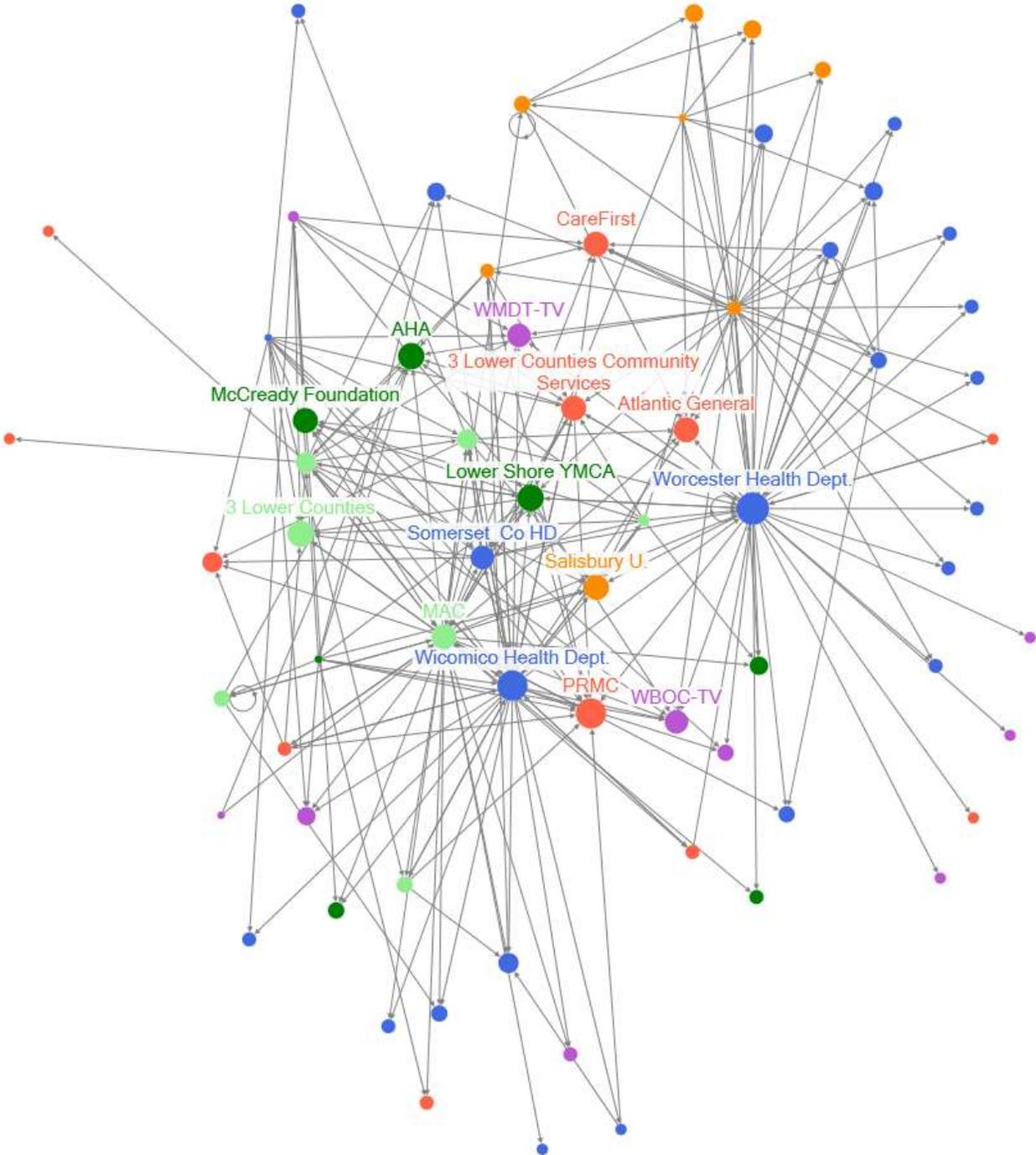
Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix F.

IN-DEGREE CENTRALITY

Figure 4-1 below shows all 68 organizations collaborating in the network as well as all connections reported between these partners. In this figure, node size increases with in-degree

centrality; as more organizations report working with a particular partner, that node increases in size in this figure. In other words, the largest nodes in this figure are those listed in Table 4-2.

Figure 4-1: Lower Shore, Size by In-degree Centrality



OUT-DEGREE CENTRALITY

Table 4-3 below shows the level of out-degree centrality, or number of connections from each node to other partner organizations. As the table shows, the number of outgoing connections drops quickly, although this may be due in part to the survey response rate.

With only 50% of the network responding, it may be expected that additional outgoing connections exist but were not reported. The connections shown in Table 4-3 account for 2/3 of all reported network connections, giving a sense of the impact that these organizations have as drivers of the network and its partnerships.

Table 4-3: Out-degree centrality, Lower Shore

Organization	Out-Degree Centrality
Maintaining Active Citizens (MAC)	33
Worcester County Health Department	32
Wicomico County Health Department	30
Worcester County Board of Education	25
Richard A. Henson YMCA	13
Somerset County Health Department, Behavioral Health	12
YMCA of the Chesapeake	11
Health and Outreach Point of Entry (HOPE)	10
Worcester County Public Schools	10

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix F.

BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS)

Betweenness centrality assesses how frequently a given node lies along the shortest path between any two other nodes in the network. Betweenness tends to identify nodes that serve as ‘bridges’ connecting clusters within a community. These bridges are particularly important, as they bring a network closer together and disseminate information to parts of a network that may be otherwise distant from one another.

Betweenness, as calculated in Node XL, often follows a power law, so it tends to drop very quickly, and is a normal feature of networks. Put simply, networks seek to work through ‘hubs’ – nodes with high betweenness. An important consideration for network management is to identify which nodes serve as such hubs and to ensure that they have sufficient capacity to handle the load of information flowing through them.

Table 4-4 presents the organizations with the highest betweenness centrality in the Lower Shore network.

Table 4-4: Betweenness Centrality, Lower Shore

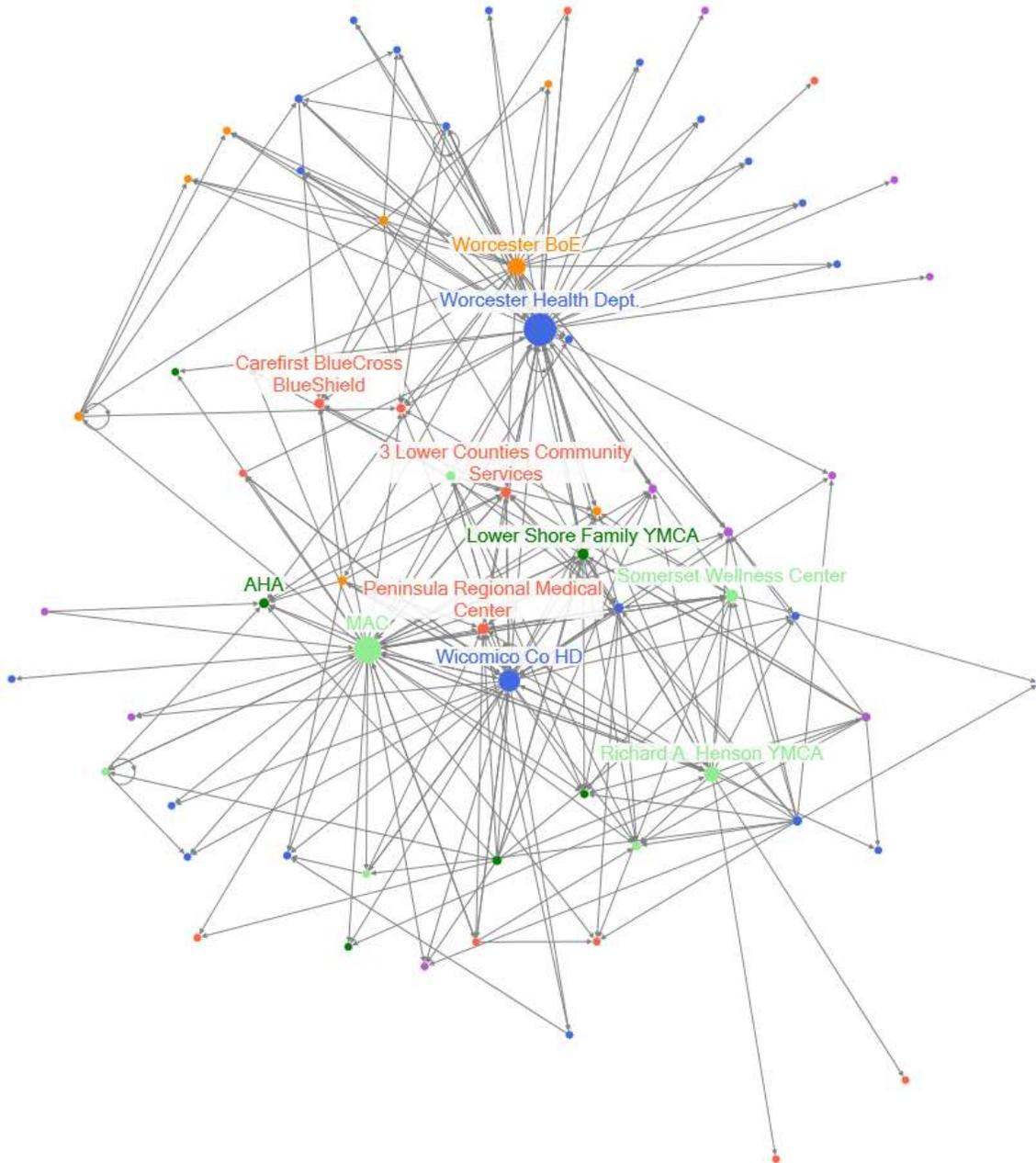
Organization	Betweenness Centrality
Worcester County Health Department	1711.331
Maintaining Active Citizens (MAC)	1132.430
Wicomico County Health Department	716.179
Worcester County Board of Education	445.454
Richard A. Henson YMCA	310.380
Somerset Wellness Center	163.223
Lower Shore Family YMCA	116.522
Peninsula Regional Medical Center	101.553
Three Lower Counties Community Services	70.716
American Heart Association	69.785
Carefirst BlueCross BlueShield	66.293

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix F.

BETWEENNESS CENTRALITY: A VISUALIZATION

Figure 4-2 shows the network with nodes sized by betweenness centrality. For clarity, the figure shows a simplified depiction of the network, excluding outlying nodes.

Figure 4-2: Lower Shore, Betweenness by Sector



Wicomico and Worcester County Health Departments are the most central government agencies in this figure. The large orange node represents the Worcester County Board of Education, while the two largest community nodes (light green) are the Richard A. Henson YMCA and Maintaining Active Citizens (MAC).

NETWORK GEOGRAPHICS

Figure 4-3 shows the geographical distribution of network organizations within Somerset, Wicomico, and Worcester counties. Each red dot in the figure marks the address of at least one network organization. Note that any organizations with an address outside of the counties' boundaries are not shown; also, any organizations sharing the same address will only be marked by a single dot. However, a good sense of the distribution of network partners throughout the three counties can readily be made.

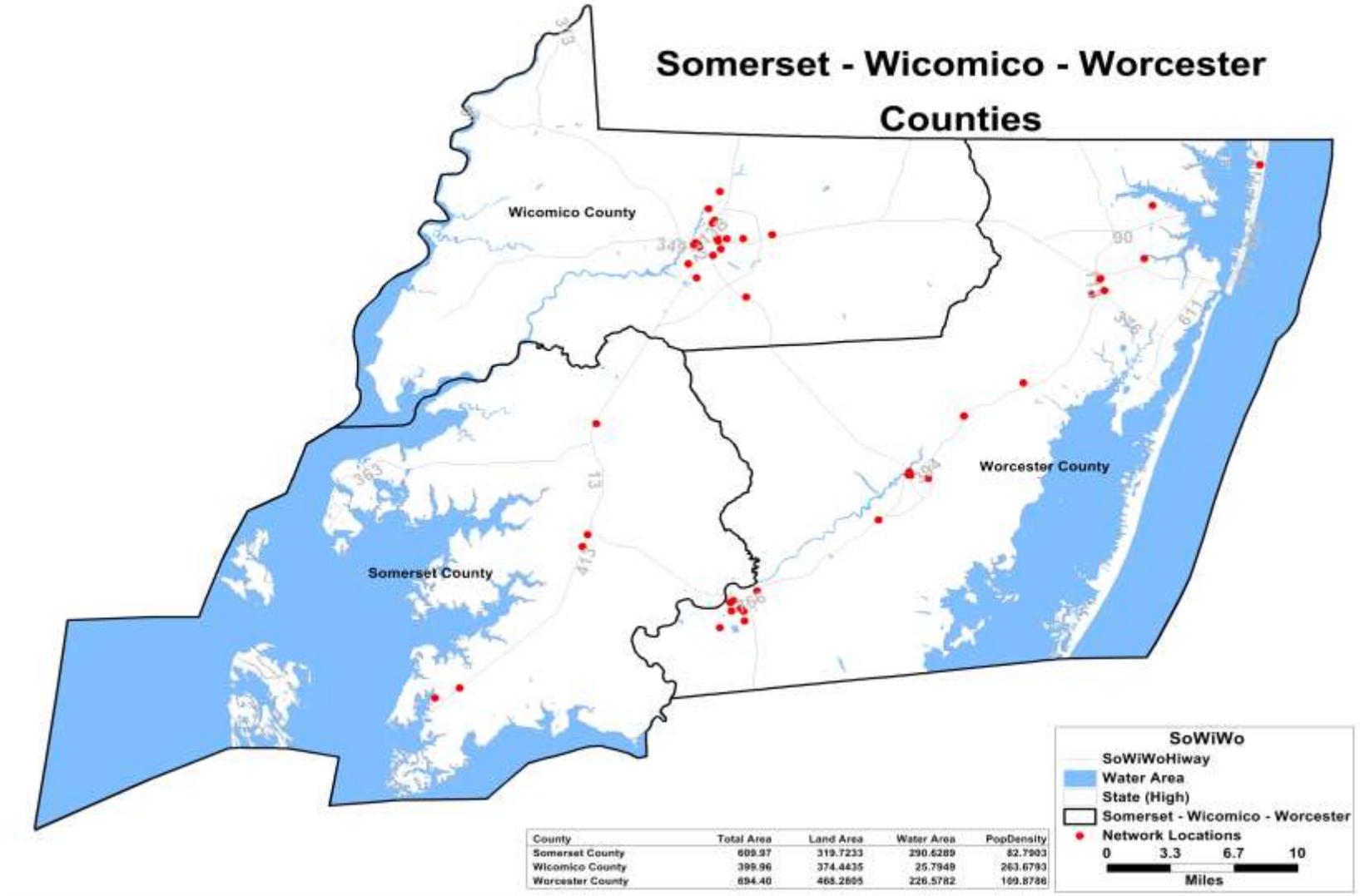
Somerset County is only lightly represented by network organizations as may be seen on the map. A particular concern will be to ensure that residents of this county are adequately served by partner organizations located in either Wicomico or Worcester counties.

Worcester County, with roughly twice the population as Somerset, is home to significantly more network organizations, most located along the Route 113 corridor. While this means that organizations are relatively well dispersed throughout the county, particularly across major roads and population centers, Wicomico shows a cluster of networks in and around Salisbury.

While Salisbury is home to one-third of the county's residents, adequate coverage should be given to the remaining population. Strategic development of this network should include careful consideration of how to effectively grow the network so as to increase coverage to a dispersed citizenry in these relatively sparsely populated counties.

In order to deliver services effectively across this area, close intergovernmental cooperation will be required. Additionally, nonprofit organizations should be utilized as effectively as possible and relationships with key private businesses grown.

Figure 4-3: Distribution of Network Organizations, Lower Shore

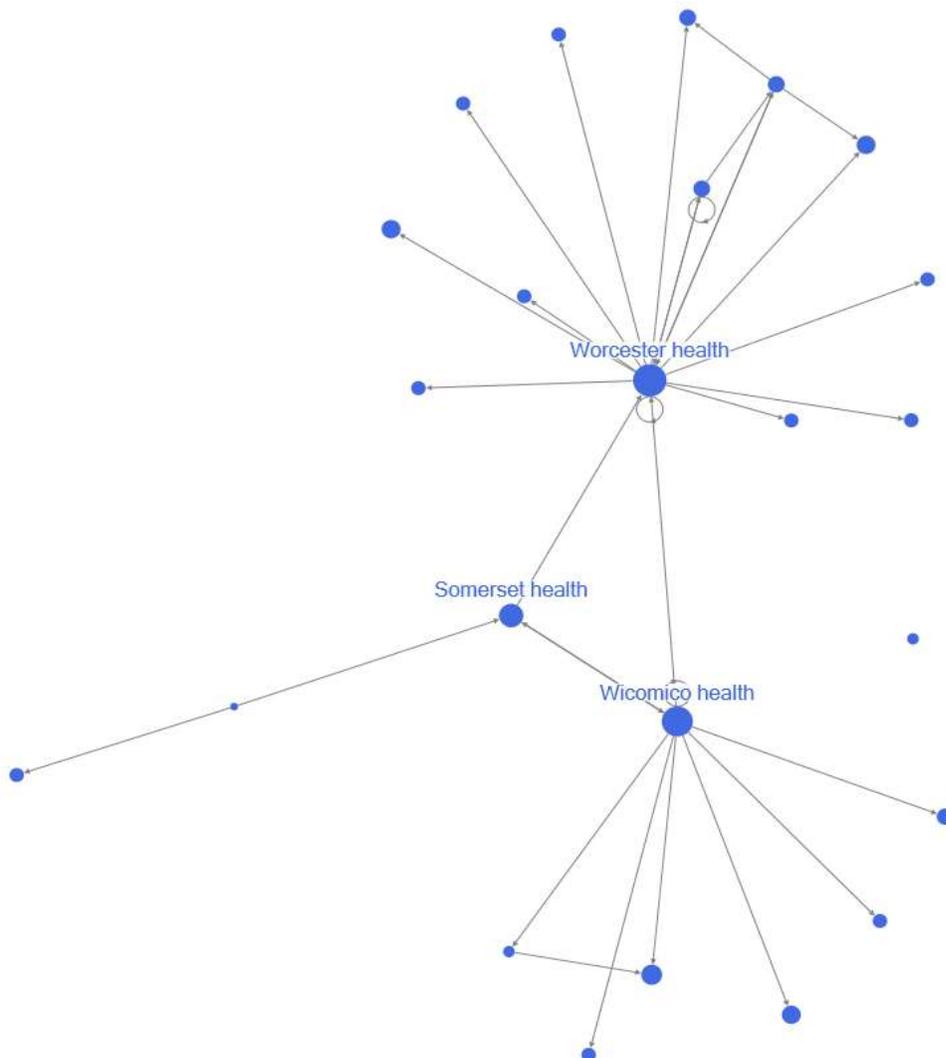


LOWER SHORE: DISCUSSION & RECOMMENDATIONS

The Lower Shore network covers Somerset, Wicomico, and Worcester counties and is made up of 257 connections between 68 partner organizations. Government agencies are the largest bloc within the network, making up one-third of the network and encompassing a wide array of organizations.

In particular, this network has greater participation of Parks and Recreation, and Fire Departments than do other networks. This broad outreach through a variety of government services is a strength for this network. Figure 4-4 below shows the connections between government agencies in this network. As the figure shows, county health departments play a critical role in maintaining connections among government agencies.

Figure 4-4: Government Agencies in the Lower Shore network

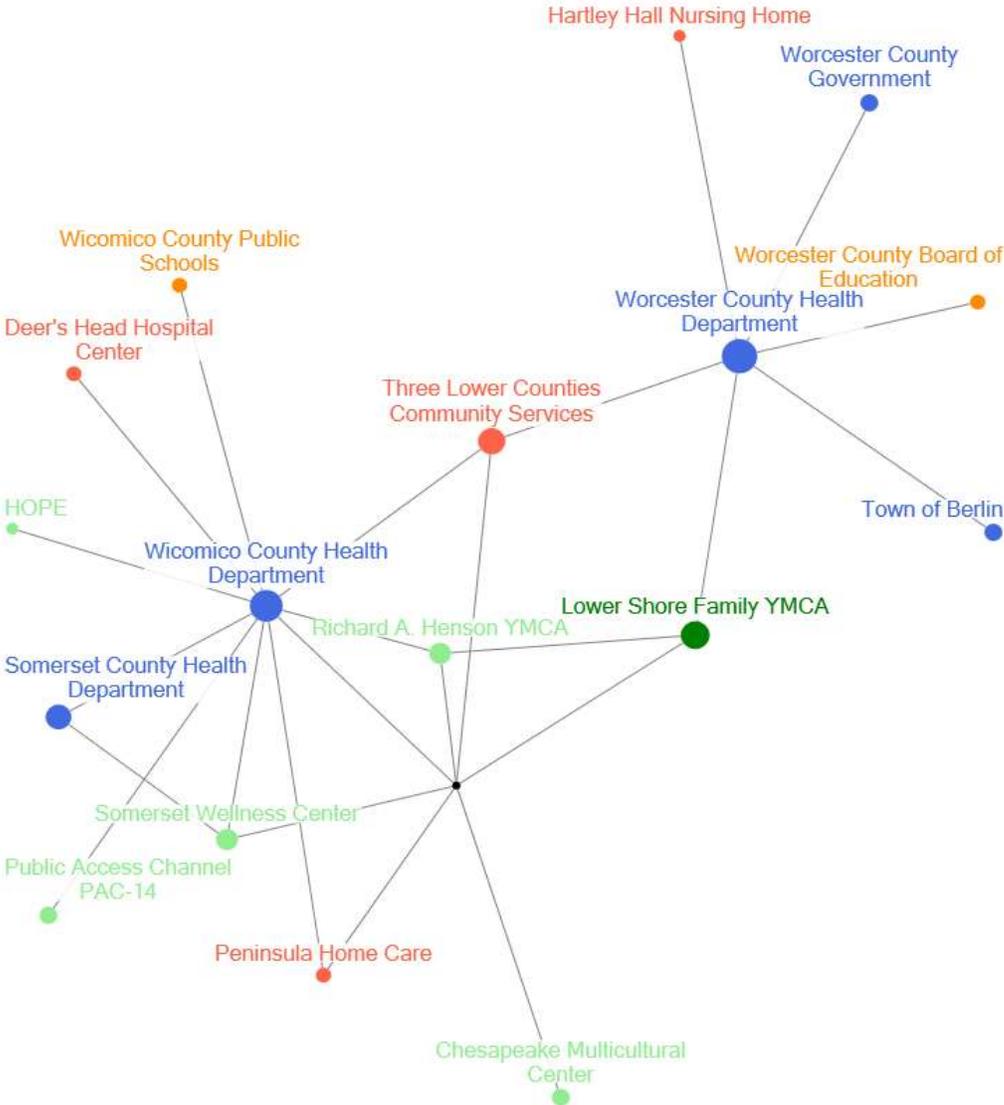


The private sector is well-represented, compared to other local health networks in the study. However, the majority of private businesses are only weakly connected to the network, and there does not appear to be a pattern to those connections. Development of a coordinated strategic plan among all three counties to more effectively incorporate private sector organizations may be a means of strengthening this network and more effectively delivering services and information to citizens.

RECIPROCAL RELATIONSHIPS

A sense of the cohesiveness of the network may be gained by isolating reciprocal connections. These are linkages where two partners each report working together. In other words, these are the two-way connections. Figure 4-5 presents all reciprocal links reported in the Lower Shore network.

Figure 4-5: Reciprocal Linkages in the Lower Shore Network



This figure highlights the central role played by county health departments in this network, as well as of the strong bridging role of the Three Lower Counties Community Services. Also of note are the broad representation of organizations from different sectors, an indicator of strong cross-sector collaboration. Twenty-three reciprocal relationships among 17 organizations were reported. One quarter of the network partners, representing 18 percent of all connections, were reciprocal.

LEVERAGING OPPORTUNITIES ARISING FROM THIS STUDY

Basic benefits from the fundamental act of mapping the network should not be overlooked. These include:

NETWORK EVALUATION

The size and composition of the network is now overt. In addition to recommendations made here, local health officials can undertake their own evaluation of how well suited the current partnerships are towards advancing the goals of chronic disease prevention. Strategic planning to incorporate new organizations into the network, or shift the capacity, centrality, or role of existing partners, may now be made.

PARTNER ORGANIZATIONS

Partner organizations are now aware that they are part of a larger network. The view from the ground is necessarily constrained and often focused closely on an individual organization's specific mission and focus. Participation in the survey made respondents aware that they are part of a larger network, and presents an opportunity to strengthen and grow the network.

- Disseminate a list of network partners throughout the network. Doing so encourages increased communication and collaboration among partner organizations. Discussion with some respondents revealed the existence of local partners in the neighborhood that were unknown to the respondent. Collecting and publishing basic information on the partner organizations is an easy way to more fully inform the network as to who everyone is and what they are doing; may cut down on redundancies; and, can lead to the growth of lateral connections between partner organizations.
- Develop a communication forum for the network. A formal publication, either in print or online, may suffice. An open forum, such as a discussion board, email listserv or wiki, facilitates two-way communication among participating organizations. A combination of centralized distribution (e.g. newsletter or email blast) to push significant milestones, achievements, or updates to the network, along with maintenance of a discussion forum for network-wide input, may be desirable.

- Develop a strategy for managing clusters within the network. These may be based on geography, service provision, mission focus, or some other relevant characteristic. As noted above, at least some organizations in a neighborhood were unaware of nearby network partners. Additionally, organizations dispersed across the network may not be aware of all other similar partner organizations. This may be particularly apt for community organizations working within a specific area and serving a focused population.
- Developing awareness of the network and acknowledging participation may be particularly important for smaller and community-oriented organizations on the periphery of the network. Many of these organizations are only weakly connected to the network, and may benefit not only from increased connections, but from increased recognition as well. Several respondents from small organizations expressed sentiments of inferiority: A perception that ‘the real work’ is being done by larger, more central organizations; that the flow of communication is largely ‘outward’ from those large central organizations; and, that more recognition of the needs and accomplishments of small peripheral organizations is needed.

ENCOURAGE THE GROWTH OF LATERAL CONNECTIONS ON THE PERIPHERY

The previous point addressed relations between central and peripheral organizations. Relationships among peripheral organizations, particularly those sharing a set of common characteristics (size, audience, mission, etc.) have different needs and require a different management strategy. Capturing those organizations and their needs can be difficult.

Some local organizations reported not being aware of organizational or contact names in the network. Convincing small organizations that their partnership is a valued contribution to the network can be challenging. Limited response rates from small organizations may be one indicator of this. That response rate limited analysis of the periphery and showed a higher level of uni-directional connections from the center to the periphery than may be the case in actuality.

Put simply, it is to be expected that peripheral organizations have more ties than are shown. This is supported by discussion with some respondents from small peripheral organizations who report a strong sense of collaborative partnership with other such organizations. These relationships were described as frequent, consisting of collaborative back-and-forth, and multi-modal (e-mail bolstered with calls and in-person meetings). Additionally, these collaborations were attributed in part to a lack of resources and a resultant need to work together for mutual success. To the extent possible, these collaborative partnerships should be acknowledged and encouraged.

SOMERSET, WICOMICO, AND WORCESTER COUNTIES: SURVEY RESULTS AND KEY INFORMATION

SURVEY RESPONDENTS

The survey respondents represented a wide range of healthcare provider and awareness organizations in the Counties. Overall, 67 organizations in the Counties were contacted for the survey. Survey results show that a wide variety of organizations were represented. Examples of several key organizations include the following:

- State and local government: Somerset, Wicomico, and Worcester Health Departments
- Major hospital/university systems: Peninsula Regional Medical Center
- Community Organizations: Maintaining Active Citizens (MAC), Lower Shore YMCA

Somerset, Wicomico, and Worcester County Organization Types

The Counties have a very diverse group of organizations, including city and town governments, schools, and media organizations.

SURVEY COMPLETION RATES FOR MAJOR ORGANIZATIONS

Using the survey results, researchers were able to determine which organizations in the Counties had the highest number of in-degree and out-degree centrality. In other words, these organizations had the highest number of incoming and outbound connections to others in the network and most of them completed the survey. The range goes as follows: 9 out of the top 10 and 16 out of the top 25 most central organizations all completed the survey.

They also provided important information about their relationships with other, less well-connected organizations, providing the research team with a stronger view into how the Lower Shore Network operates.

SURVEY QUESTIONS AND ANSWERS

Overall, the online survey was used to gather information about healthcare organizations in Lower Shore Counties, find out who they partnered with, whether those organizations were in the Counties or elsewhere, and to collect quantitative and qualitative information about those relationships. The entire online survey can be viewed in Appendix B.

SECTION 1: SOMERSET/WICOMICO/WORCESTER COUNTIES HEALTH ORGANIZATIONS

Section 1 asked survey recipients several demographic questions about the organization they worked for. The questions asked for the following information:

- The organization's name
- The respondent's particular division or department
- The respondent's job title
- Business sector of the organization
- Whether the organization was a Diabetes Program Partner (DPP)
- Whether their organization delivered healthcare services or developed healthcare awareness

QUESTIONS 1 AND 2: HEALTHCARE ORGANIZATIONS: NAMES/DIVISION/DEPARTMENT

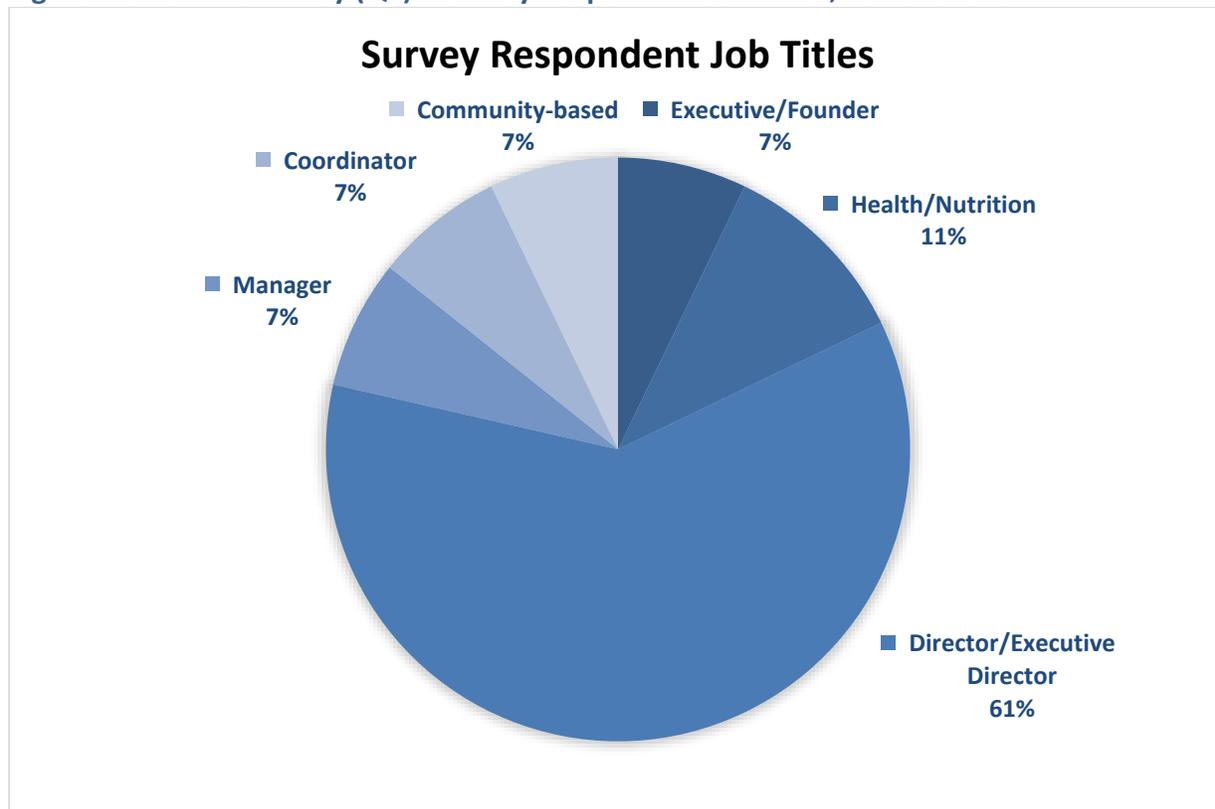
Specifically, Questions 1 and 2 asked survey respondents to list their organization's name and the department or division they worked in.

QUESTION 3: SURVEY RESPONDENTS' JOB TITLES

Question 3 asked survey respondents to list their official job title. In Somerset/Wicomico/Worcester Counties, the vast majority of responses were completed by decision makers with job titles that referenced managerial or executive capacity. The most common job title was Director or Executive Director (61%).

When including executives/founders, managers, and directors, 75% of decision makers at high levels completed the survey. All survey respondents' job titles are listed by percentage in Figure 4-6 on the following page.

Figure 4-6: Online Survey (Q3) – Survey Respondent Job Titles, Lower Shore



QUESTION 4: HEALTHCARE ORGANIZATIONS: BUSINESS SECTOR

Question 4 asked survey respondents to view seven business sector categories and choose which one best described their organization. The organization sectors were listed as follows: Government, Health System, Education/Academia, Community organization, Business, Philanthropy, or Diabetes Program Partner (DPP).

QUESTION 5: DIABETES PROGRAM PARTNERS (DPP)

The next question asked survey respondents to state whether their organization was a Diabetes Program Partner (DPP) or not. In Somerset/Wicomico/Worcester Counties, no organization identified itself as a DPP.

QUESTION 6: HEALTHCARE ORGANIZATIONS: FOCUS

The last question in Section 1 asked respondents if their organization focused more on providing healthcare services or developing healthcare awareness. In total, 56% of survey respondents said their organization's focus was on delivering healthcare services. The remaining 44% said they focused on developing awareness of chronic health issues. The answers about organization focus are in Figure 4-7 below.

Figure 4-7: Online Survey (Q6) – Organization Focus: Healthcare Awareness or Service Delivery



SECTION 2: HEALTHCARE ORGANIZATIONS: RELATIONSHIPS

Section 2 presented survey respondents with a list of healthcare organizations in the Counties and asked them to select the ones they partnered with.

QUESTION 7: HEALTHCARE ORGANIZATIONS' FREQUENT PARTNERS

Question 7 asked survey respondents to view a list of healthcare organizations in the Counties and select the ones that they partnered with on various chronic health issues. This enabled the research team to compile a list of the most frequently selected healthcare organizations in the Counties, according to the survey respondents.

Table 4-5 below lists the most-frequently selected healthcare organizations in the Counties, ranked by the percentage of survey respondents who listed them as a partner. For example, the first entry on the list is the Peninsula Regional Medical Center, with 50% – this means that a full 50% of the organizations surveyed said the Center was one of their partners.

Table 4-5: Most-Connected Healthcare Organizations, Lower Shore (by % selected in the survey)

Organization	% Selected
1. Peninsula Regional Medical Center	50%
2. Wicomico County Health Department	46%
3. Three Lower Counties - Main	39%
4. Worcester County Health Department	39%
5. Maintaining Active Citizens (MAC)	36%
6. Somerset County Health Department	32%
7. American Heart Association	32%
8. Three Lower Counties - Community Services	32%
9. Lower Shore Family YMCA	32%
10. Carefirst BlueCross BlueShield	32%
11. WBOC-TV 16	29%
12. McCready Foundation	29%
13. Salisbury University	29%
14. Atlantic General Hospital	29%
15. WMDT-TV 47	25%
16. Somerset Wellness	21%
17. Wicomico County Government	21%
18. Richard A. Henson Family YMCA	21%
19. Crisfield Clinic	21%
20. Wicomico County Board Of Education	18%

The top 20 organizations listed above are very well-connected, so they are key organizations that serve the Counties, but there are several smaller organizations on the list that are well-connected despite their relatively smaller size. Maintaining Active Citizens (MAC) and Somerset Wellness are two examples.

IMPORTANCE OF NON-TRADITIONAL ORGANIZATIONS

Other standouts are the presence of non-traditional organizations such as WBOC, WMDT, and the Daily Times. In addition, there are four different Departments of Parks and Recreation that play an important role in this network (Somerset, Wicomico, Worcester, and Snow Hill). There is also a strong multi-location YMCA presence, and other non-traditional organizations present such as Taylor Bank, Pizzeria Uno, and the Casino at Ocean Downs.

SECTION 3: HEALTHCARE ORGANIZATIONS: RELATIONSHIP QUALITY

Section 3 of the survey asked Lower Shore organizations about the type of relationships they had with the partner organizations they selected previously in Section 2. For every organization they selected, survey respondents were able to provide information about that partner with regard to upstream/downstream relationships, the length of their relationship, the frequency with which they communicated with partners, their understanding of their partners' skills and knowledge, and finally, their primary means of communication with partners.

QUESTION 8: UPSTREAM AND DOWNSTREAM RELATIONSHIPS

After survey respondents selected the organizations they worked with, subsequent survey questions asked them to provide information about the nature of their relationship with those partners. The first question in Section 3 asked respondents to name which organizations gave them information (also known as an "upstream" relationship) and which organizations they sent information to (also known as a "downstream" relationship.)

The list of the top organizations in terms of downstream partners is listed below in Table 4-6. According to survey respondents, the organizations on this list are distributing information or providing referrals to others (downstream) on a frequent basis.

Table 4-6: Organizations with the Highest Number of Downstream Partners

Organization	# of Partners
1. Peninsula Regional Medical Center	9
2. Carefirst BlueCross BlueShield	8
3. Three Lower Counties - Main	8
4. Three Lower Counties - Community Services	6
5. Salisbury University	5
6. McCreedy Foundation	5
7. Atlantic General Hospital	5
8. Worcester County Health Department	5
9. Maintaining Active Citizens (MAC)	5
10. Crisfield Clinic	5
11. Lower Shore Family YMCA	4
12. Somerset County Health Department	4
13. Wicomico County Health Department	4
14. Worcester County - Local Management Board	4
15. Worcester County Parks and Recreation	3
16. American Heart Association	3
17. Somerset County Department of Parks & Recreation	3

QUESTION 9: LENGTH OF RELATIONSHIPS BETWEEN ORGANIZATIONS

Question 9 asked survey respondents about the length of the relationships with the organizations they named as partners. A scale with 5 options was presented, with “Less than 1 year” to define the briefest relationship, and “More than 10 years” to define the longest-lasting relationships.

In the Counties, survey respondents reported that the more established, larger health organizations were the ones they tended to have the longest relationships with. The organizations with the highest number of long-lasting relationships are listed in Table 4-7 below.

Table 4-7: Organizations with the Highest Number of Partner Relationships Longer Than 10 Years

Organization	# of Relationships
1. Worcester County Health Department	8
2. Wicomico County Health Department	7
3. Peninsula Regional Medical Center	6
4. Wicomico County Government	5
5. Lower Shore Family YMCA	5
6. WMDT-TV 47	5
7. Somerset County Health Department	5
8. McCready Foundation	5
9. WBOC-TV 16	4
10. Pocomoke High School	4
11. Worcester County Parks and Recreation	3
12. Pocomoke Elementary School	3
13. Wicomico County Public Schools	3
14. Pocomoke Middle School	3
15. The Daily Times	3
16. Three Lower Counties - Community Services	3
17. Three Lower Counties - Main	3
18. Salisbury University	3
19. Atlantic General Hospital	3
20. Carefirst BlueCross BlueShield	3

While many of the long-term relationships here are with the larger government and health systems organizations, there are quite several non-traditional organizations with a long record of relationships, including the two television stations, two school systems, and the Daily Times.

QUESTION 10: FREQUENCY OF COMMUNICATION BETWEEN ORGANIZATIONS

Question 10 asked survey respondents how often they communicated with other organizations in their network. A scale with 4 options was presented, with “Frequently” to define the highest level of contact, followed by “Sometimes,” “Seldom,” or “Never” to describe less frequent levels of contact.

Overall, survey respondents reported that the more established, larger health departments, medical centers/hospitals and large community organizations were the ones they tended to communicate with the most. Those organizations, with the highest levels of “Frequent” communication, are listed in Table 4-8 below.

Table 4-8: Top 20 Organizations with Highest Level of Frequent Contact with their Partners

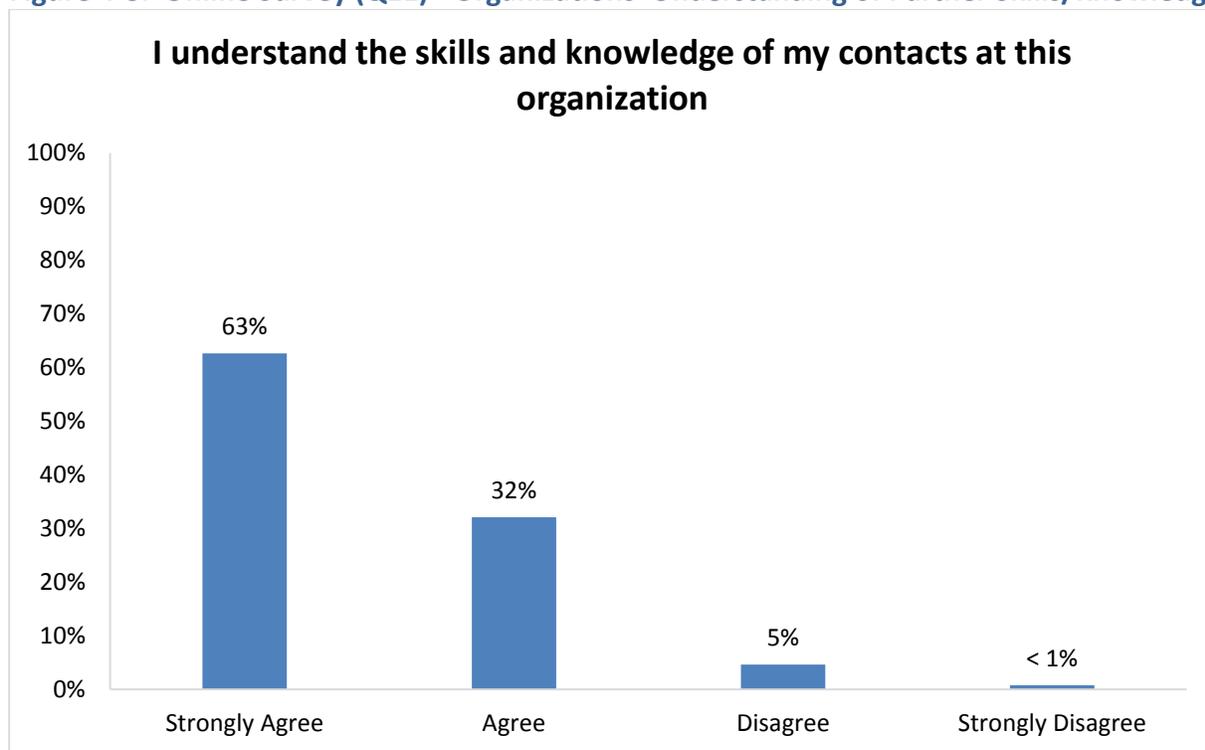
Organization	# of Partners
1. Wicomico County Health Department	8
2. Peninsula Regional Medical Center	7
3. Maintaining Active Citizens (MAC)	7
4. Worcester County Health Department	7
5. Atlantic General Hospital	7
6. Somerset County Health Department	5
7. Three Lower Counties - Community Services	4
8. Lower Shore Family YMCA	4
9. Three Lower Counties - Main	4
10. Salisbury University	4
11. Pocomoke Middle School	4
12. Wicomico County Government	3
13. Pocomoke Elementary School	3
14. Somerset Wellness	3
15. Wicomico County Board Of Education	3
16. Carefirst BlueCross BlueShield	3
17. Pocomoke High School	3
18. Town of Berlin	3
19. Snow Hill Volunteer Fire Department	2
20. Wicomico County Department of Recreation, Parks, and Tourism	2

QUESTION 11: ORGANIZATIONS' UNDERSTANDING OF PARTNER SKILL AND KNOWLEDGE

Question 11 asked survey respondents if they understood the skills and knowledge of each of the organizations they selected as partners. They were able to choose from a scale from highest to lowest, starting from “Strongly Agree, Agree, Disagree, or Strongly Disagree.” Overall, the largest group of respondents (63%) said they “strongly agree” that they understand the skills/knowledge of the organizations they deal with.

In total, 95% of survey respondents agreed or strongly agreed that they understood the skills and knowledge of the contacts at the organizations they partner with. The responses, listed by percentage, are shown in Figure 4-8 below.

Figure 4-8: Online Survey (Q11) - Organizations' Understanding of Partner Skills/Knowledge

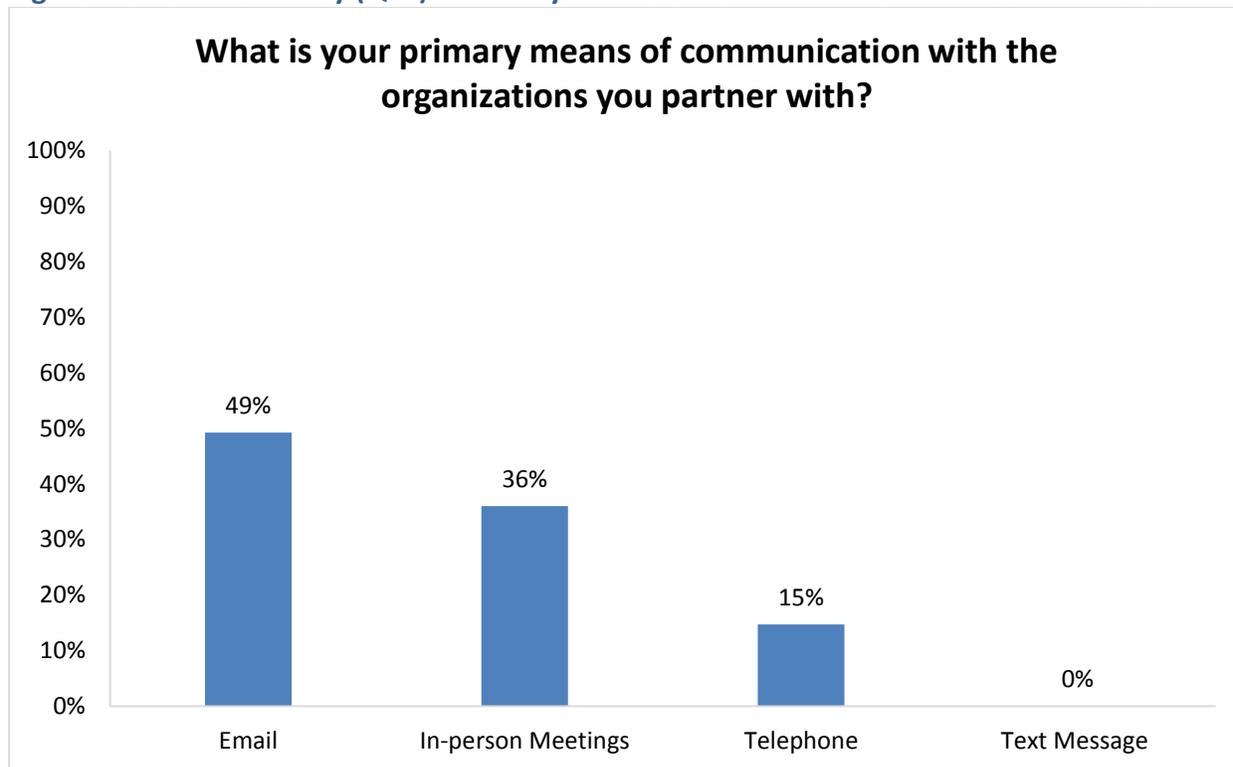


QUESTION 12: HEALTHCARE ORGANIZATIONS: COMMUNICATION

Question 12 asked survey respondents what their primary means of communication was with their partners – whether via telephone, text message, e-mail, or in-person meetings. Each survey respondent was given an opportunity to answer the question specifically for each organization they deal with, and the overall numbers showed a clear pattern.

Like the other networks, e-mail was the primary means of communication for most of the organizations, at 49%. In-person meetings were second, with 36%. Telephone contacts were 15% and text messages were zero. The full results are listed in Figure 4-9 below.

Figure 4-9: Online Survey (Q12) – Primary Means of Communication between Partners



IN-PERSON MEETINGS

Given that a fair amount of contact between healthcare partners in the Counties is done in-person (according to the organizations surveyed), the research team used the results to find out which organizations had the highest number of contacts who reported having in-person meetings with them.

The organizations listed in Table 4-9 below had the highest number of survey respondents who said in-person meetings were their primary means of contact with that organization.

Table 4-9: Top 20 Organizations where In-Person Meetings are the Primary Means of Communication with Survey Respondents

Organizations	# of Respondents
1. Wicomico County Health Department	6
2. Peninsula Regional Medical Center	5
3. Richard A. Henson Family YMCA	4
4. Maintaining Active Citizens (MAC)	4
5. Three Lower Counties - Main	4
6. Lower Shore Family YMCA	4
7. Worcester County Health Department	4
8. Pocomoke Middle School	3
9. Pocomoke Elementary School	3
10. Public Access Channel PAC-14	3
11. Deer's Head Center	3
12. Wicomico YMCA	3
13. Worcester County - Local Management Board	2
14. Worcester County Board of Education	2
15. Wicomico County Public Schools	2
16. Somerset Wellness	2
17. Pocomoke High School	2
18. St. Paul's United Methodist Church	2
19. Wicomico County Board Of Education	2
20. Wicomico County Government	2

CAROLINE AND DORCHESTER COUNTIES: SOCIAL NETWORK ANALYSIS RESULTS

RESPONSE RATE

Ideally, network analysis will proceed from complete data. However, this is unusual to achieve in practice. The snowball sample identified 81 organizations, or divisions within organizations, and 83 survey recipients. Of that total, 52 responded to the survey. Partial data on the non-respondents was obtained from the completed surveys.

HEALTHCARE ORGANIZATIONS BY SECTOR

Table 2 shows the 81 organizations in the network, categorized by CDC sector. Where conceptual overlap between sectors was encountered, organizations were categorized as follows:

- Business and health system (e.g. private medical practice) – counted as health system
- Government and education (e.g. public school; Board of Education) – counted as government
- Nonprofit organizations not operating as a health system were categorized as philanthropies
- Note: All network diagrams will use the colors below to represent their sector.

Table 5-1: Network Organization Count by Sector

Sector	Number of Organizations
Business	3
Government	16
Health System	17
Education	10
Community	9
Philanthropy	26
Total organizations/divisions in network	81

DENSITY

The 81 organizations reported a total of 570 connections. In a network this size, there are 6,480 possible connections. Thus, this network has a density of .086. In other words, nearly 9% of all possible connections have been made.

As may be seen in Figure 5-1, below, this has resulted in a densely connected inner core with a significant portion of the network only weakly connected to that center. This may indicate that this network is successful at bringing in organizations that otherwise have no connection to each

other. Strategic management of this network may increase lateral connections among these nodes.

DEGREE CENTRALITY

Two measures of degree centrality were obtained. In-degree centrality is the count of all nodes in a network reporting a link to a particular node. Table 5-2 presents the most central organizations by in-degree count. As may be seen, Associated Black Charities is, by this metric, the most central node, with 20 (25% of the network) reporting connections to this organization. Centrality declines moderately: 25% of the network has an in-degree centrality of at least 11 connections, while 2/3 of the network has five or more incoming connections.

Table 5-2: In-degree Centrality, Caroline & Dorchester Counties

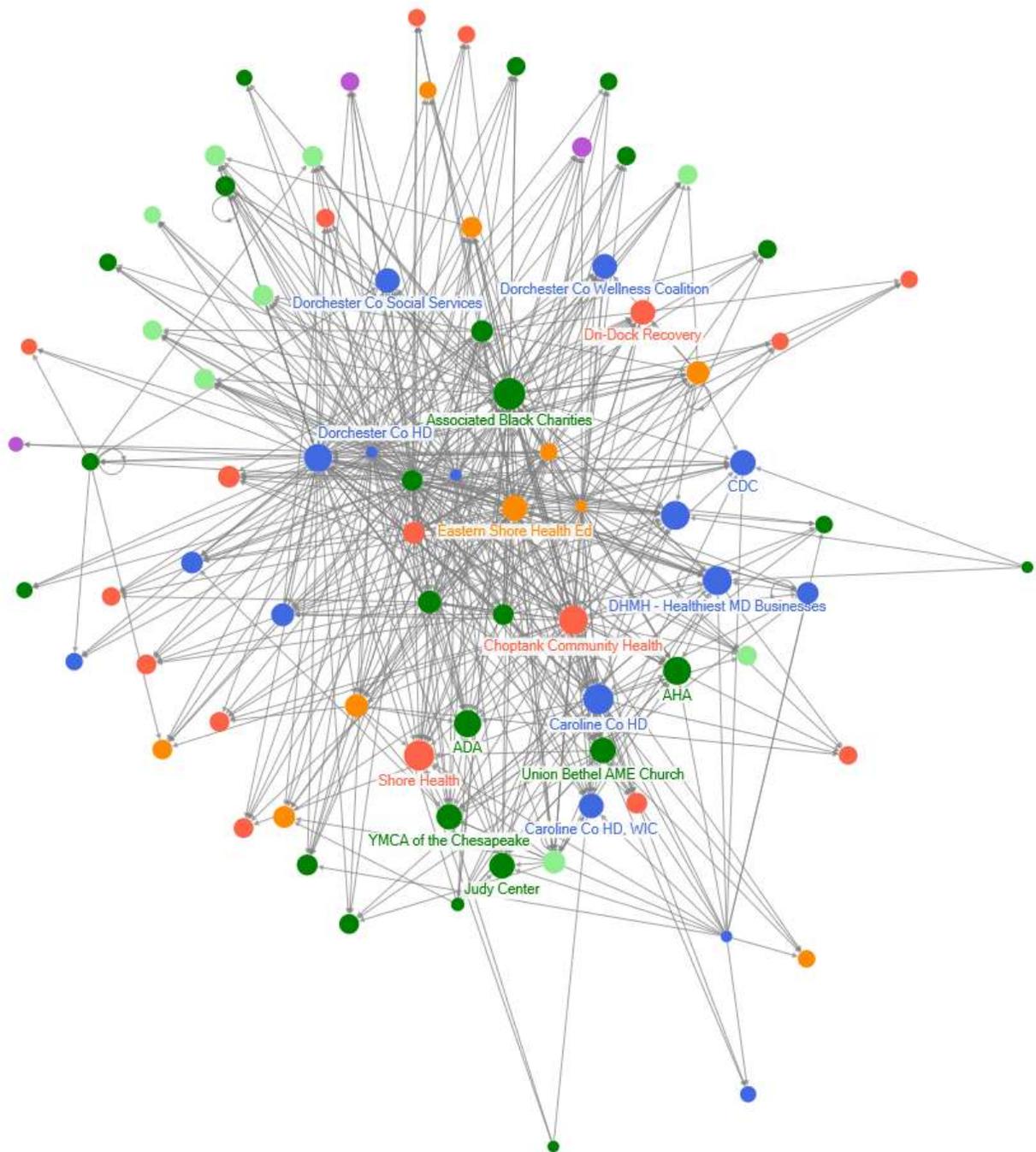
Organization	In-Degree Centrality
Associated Black Charities	20
Caroline County Health Department	18
Shore Health Systems	18
DHMH - Healthiest Maryland Businesses - Lower Eastern Shore	16
Dorchester Co. Health Department Health Enterprise Zone	16
Choptank Community Health Systems	16
Dorchester County Health Department	15
American Heart Association	15
American Diabetes Association	14
Eastern Shore Area Health Education Center	12
Centers for Disease Control	12
Union Bethel AME Church	12
YMCA of the Chesapeake	12
Judy Center	12
Caroline County Health Department - Women, Infants, and Children (WIC)	11
Dorchester County Department of Social Services	11
Dorchester County Wellness Coalition	11
Dri-Dock Recovery and Wellness Center	11

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix G.

IN-DEGREE CENTRALITY: A VISUALIZATION

Figure 5-1 below shows all 81 organizations collaborating in the network as well as all connections reported between these partners. In this figure, node size increases with in-degree centrality; as more organizations report working with a particular partner, that node increases in size in this figure. In other words, the largest nodes in this figure are those listed in table 3.

Figure 5-1: Caroline & Dorchester Counties, size by in-degree centrality



OUT-DEGREE CENTRALITY

Table 5-3: Out-degree centrality, Caroline & Dorchester Counties

Organization	Out-Degree Centrality
Maryland Health Connection - Dorchester Navigator	59
Dorchester County Health Department - Health Education	58
Dorchester County Health Department	50
Associated Black Charities	45
University of Maryland - Shore Regional Health	43
Eastern Shore Area Health Education Center	37
Choptank Community Health Systems	34
Dorchester County Health Department - Community Outreach	34
University of Maryland Eastern Shore - School of Pharmacy - Evaluation	21
Dorchester County YMCA	19

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix G.

Table 5-3, above, presents the leading organizations by out-degree centrality – those organizations reporting the largest number of connections to the network. These top 10 organizations account for 70% of the connections in the network. Further assessment of out-degree centrality is limited by the survey completion rate. With only a 50% response rate, it is to be expected that additional out-going connections were not captured due to non-response.

BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS)

Betweenness centrality assesses how frequently a given node lies along the shortest path between any two other nodes in the network. Betweenness tends to identify nodes that serve as ‘bridges’ connecting clusters within a community. These bridges are particularly important, as they bring a network closer together and disseminate information to parts of a network that may be otherwise distant from one another.

Betweenness, as calculated in Node XL, often follows a power law, so it tends to drop very quickly, and is a normal feature of networks. Put simply, networks seek to work through ‘hubs’ – nodes with high betweenness. An important consideration for network management is to identify which nodes serve as such hubs and to ensure that they have sufficient capacity to handle the load of information flowing through them.

Table 5-4 presents the organizations with the highest betweenness centrality in the Caroline & Dorchester Counties network.

Table 5-4: Betweenness Centrality, Caroline & Dorchester Counties

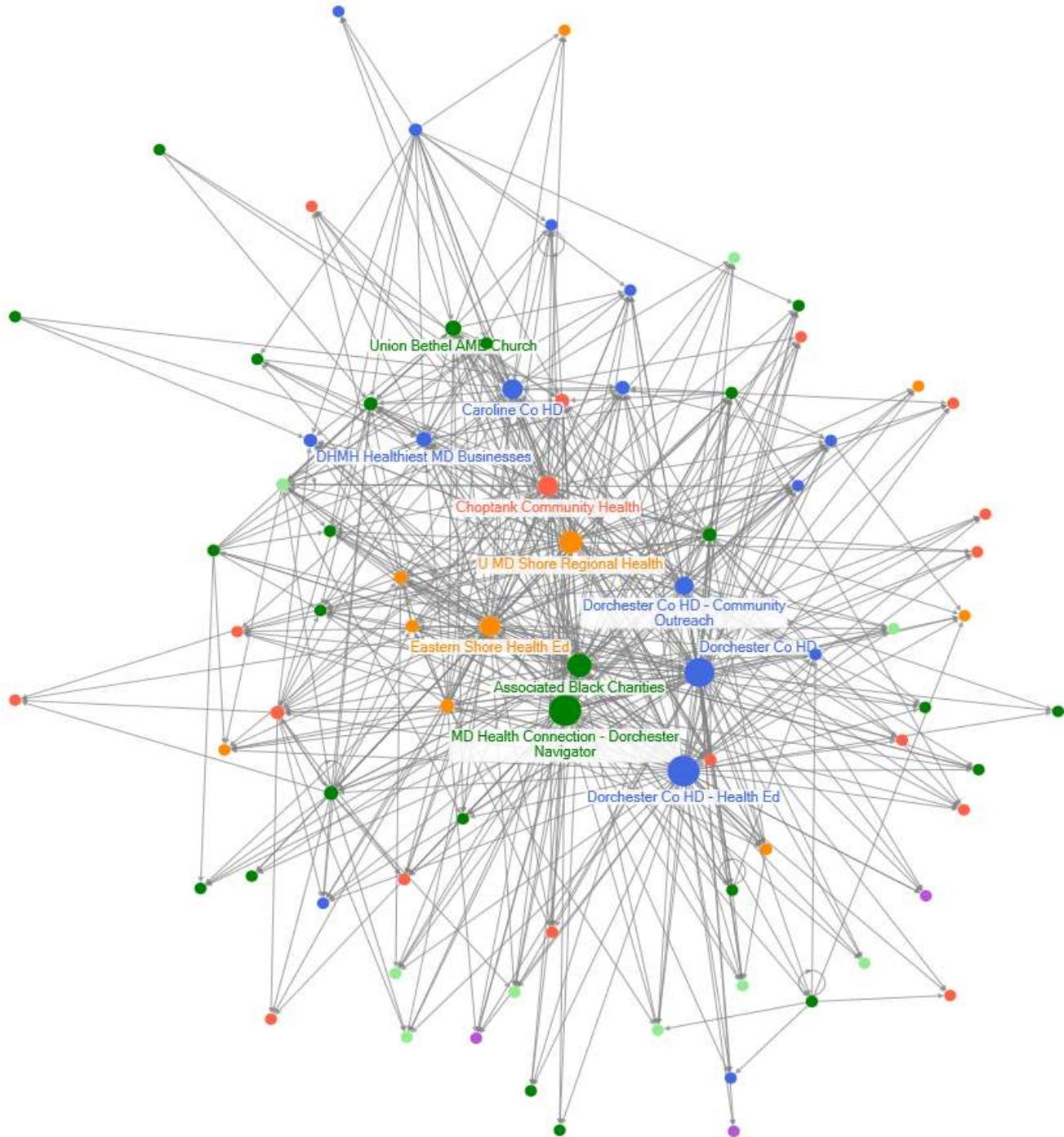
Organization	Betweenness Centrality
Maryland Health Connection - Dorchester Navigator	979.414
Dorchester County Health Department - Health Education	966.513
Dorchester County Health Department	828.210
Associated Black Charities	493.092
University of Maryland - Shore Regional Health	420.130
Caroline County Health Department	311.947
Choptank Community Health Systems	311.345
Eastern Shore Area Health Education Center	303.653
Dorchester County Health Department - Community Outreach	233.808
Union Bethel AME Church	126.351
DHMH - Healthiest Maryland Businesses - Lower Eastern Shore	102.615

Note: A full listing of all organization in this network, along with in-degree, out-degree, and betweenness centrality scores, may be found in Appendix G.

BETWEENNESS CENTRALITY: A VISUALIZATION

Figure 5-2 shows the Caroline & Dorchester counties network, nodes sized by betweenness centrality. For clarity, the figure shows a simplified depiction of the network, excluding outlying nodes.

Figure 5-2: Caroline & Dorchester Counties, Betweenness by Sector



The five largest government agencies (blue nodes) include the Maryland Health Exchange, Caroline and Dorchester County Health Departments as well as the Community Outreach and Health Education divisions of the Dorchester County Health Department.

Choptank Community Health System features prominently as do the University of Maryland's Shore Regional Health and the Eastern Shore Area Health Education Center. The Associated Black Charities is the most central nonprofit organization in this network.

NETWORK GEOGRAPHICS

Figure 5-3 shows the geographical distribution of network organizations within this network. Each red dot in the figure marks the address of at least one network organization. Note that any organizations with an address outside of the city limits is not shown; also, that any organizations sharing the same address will only be marked by a single dot. However, a good sense of the distribution of network partners throughout the city can readily be made.

Distribution of network organizations is driven by population. Nearly the entirety of this network is located in the county seats, with only three organizations based outside of these two communities. The county seats are the most populous towns in each county.

Cambridge, in Dorchester County, accounts for just over one-third of the county population. However, a significant portion of each county lives outside these two communities. A central challenge for this highly centralized geographically located network will be to ensure that the rural population is adequately served. Intergovernmental coordination will be needed to make effective use of resources. In addition, nonprofit partners will play a key role in serving citizens.

Figure 5-3: Distribution of network organizations in Caroline and Dorchester Counties

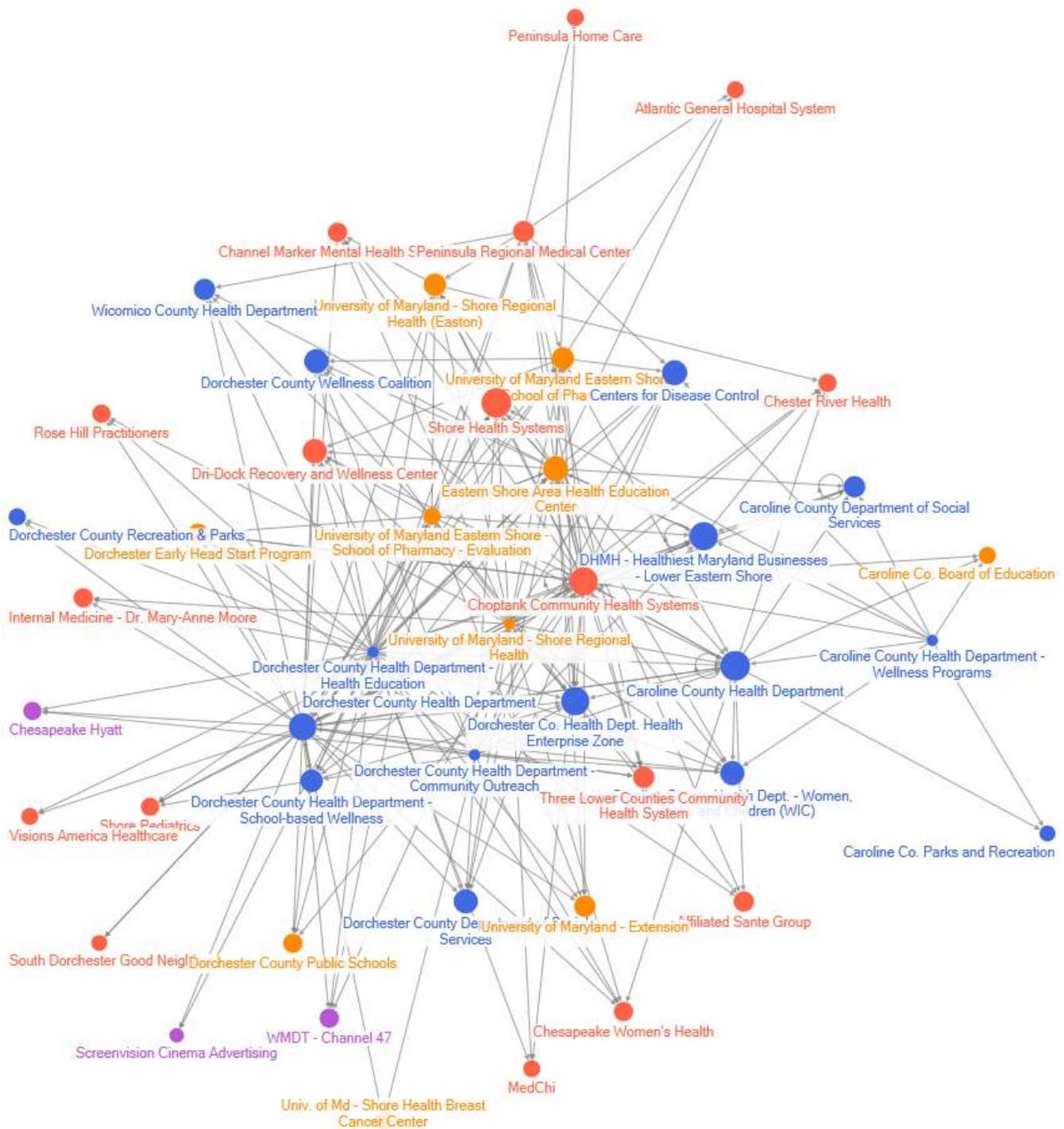


DISCUSSION & RECOMMENDATIONS

The chronic disease local health network in Caroline and Dorchester counties is comprised of 81 distinct organizations or divisions of organizations, connected through 570 linkages. Community and nonprofit organizations are the largest sectors, accounting for 45% of the organizations in the network.

While these sectors dominate the network numerically, that dominance does not compromise the network. As may be seen in Figure 5-4 on the following page, removing the nonprofit and community organizations does not result in the loss of any other organizations from the network. In fact, Figure 5-4 shows a robust set of connections between organizations in other sectors; none are isolated and all are connected to at least two other organizations.

Figure 5-4: Caroline & Dorchester Counties, Excluding Nonprofit & Community Organizations



Government, Health System, and Education sector organizations are also well-represented. The business sector is the least well-represented sector, with only three private organizations involved in the network. One avenue of growth for this network is to develop strategies for including a wider variety of private businesses into the network. In particular, some networks

have developed effective partnerships with local employers and industries; a tactic that may work well here.

However, taken as a whole, the network shows robust connections throughout as well as good cross-sector collaboration. This network is the second densest network in the study, closely following Western Maryland.

RECIPROCAL RELATIONSHIPS

Another perspective on the network may be gained by looking only at the reciprocal linkages – those connections where both partners report a mutual connection. Forty-one reciprocal links were reported, involving 21 organizations.

All together, this accounts for one-quarter of the organizations in the network, and only 14% of all reported connections. Encouraging more mutual connections may be an effective way to increase the effectiveness and the stability of the network. One possible explanation for the low level of reciprocal connections reported in this network may be a lack of awareness of network partners.

Thus, publicizing the network to all partner organizations, and educating organizations on the mission of partner organizations may be an easy way to increase collaboration. Figure 5-2 (pg. 133), showed the network by betweenness centrality – increasing the size of those nodes who tended to act as ‘bridges’ by existing along the shortest path between other nodes.

BETWEENNESS CENTRALITY (BRIDGE ORGANIZATIONS)

Graphic depictions of networks can provide much useful information, but also have limitations. In this case, examining the betweenness scores reveals the state of the network more clearly. As may be seen in Table 5-5, the first three organizations have very high betweenness scores – but they drop significantly, from the high 900’s down to 828, then a dramatic drop to 493.

Table 5-5: Betweenness Centrality Scores for Caroline & Dorchester Counties

Organization	Betweenness Centrality
1. Maryland Health Connection - Dorchester Navigator	979.414
2. Dorchester County Health Department - Health Education	966.513
3. Dorchester County Health Department	828.210
4. Associated Black Charities	493.092
5. University of Maryland - Shore Regional Health	420.130
6. Caroline County Health Department	311.947
7. Choptank Community Health Systems	311.345
8. Eastern Shore Area Health Education Center	303.653

This more clearly allows the central role of government agencies, particularly those located in Dorchester County, to be seen. The Dorchester County Health Department (#2 and 3) plays a critical role in maintaining information flow throughout the network. Bringing Caroline County into a more central role may improve network effectiveness. Similarly, effective management and communication with Associated Black Charities is recommended in order to maintain collaborative partnerships with that organization's bridge partners.

LEVERAGING OPPORTUNITIES ARISING FROM THIS STUDY

Basic benefits from the fundamental act of mapping the network should not be overlooked. These include:

NETWORK EVALUATION

The size and composition of the network is now overt. In addition to recommendations made here, local health officials can undertake their own evaluation of how well suited the current partnerships are towards advancing the goals of chronic disease prevention. Strategic planning to incorporate new organizations into the network, or shift the capacity, centrality, or role of existing partners, may now be made.

PARTNER ORGANIZATIONS

Partner organizations are now aware that they are part of a larger network. The view from the ground is necessarily constrained and often focused closely on an individual organization's specific mission and focus. Participation in the survey made respondents aware that they are part of a larger network, and presents an opportunity to strengthen and grow the network.

- Disseminate a list of network partners throughout the network. Doing so encourages increased communication and collaboration among partner organizations. Discussion with some respondents revealed the existence of local partners in the neighborhood that were unknown to the respondent. Collecting and publishing basic information on the partner organizations is an easy way to more fully inform the network as to who everyone is and what they are doing; may cut down on redundancies; and, can lead to the growth of lateral connections between partner organizations.
- Develop a communication forum for the network. A formal publication, either in print or online, may suffice. An open forum, such as a discussion board, email listserv or wiki, facilitates two-way communication among participating organizations. A combination of centralized distribution (e.g. newsletter or email blast) to push significant milestones, achievements, or updates to the network, along with maintenance of a discussion forum for network-wide input, may be desirable.

- Develop a strategy for managing clusters within the network. These may be based on geography, service provision, mission focus, or some other relevant characteristic. As noted above, at least some organizations in a neighborhood were unaware of nearby network partners. Additionally, organizations dispersed across the network may not be aware of all other similar partner organizations. This may be particularly apt for community organizations working within a specific area and serving a focused population.
- Developing awareness of the network and acknowledging participation may be particularly important for smaller and community-oriented organizations on the periphery of the network. Many of these organizations are only weakly connected to the network, and may benefit not only from increased connections, but from increased recognition as well. Several respondents from small organizations expressed sentiments of inferiority: A perception that ‘the real work’ is being done by larger, more central organizations; that the flow of communication is largely ‘outward’ from those large central organizations; and, that more recognition of the needs and accomplishments of small peripheral organizations is needed.

ENCOURAGE THE GROWTH OF LATERAL CONNECTIONS ON THE PERIPHERY

The previous point addressed relations between central and peripheral organizations. Relationships among peripheral organizations, particularly those sharing a set of common characteristics (size, audience, mission, etc.) have different needs and require a different management strategy. Capturing those organizations and their needs can be difficult.

Some local organizations reported not being aware of organizational or contact names in the network.

Convincing small organizations that their partnership is a valued contribution to the network can be challenging. Limited response rates from small organizations may be one indicator of this. That response rate limited analysis of the periphery and showed a higher level of uni-directional connections from the center to the periphery than may be the case in actuality.

Put simply, it is to be expected that peripheral organizations have more ties than are shown. This is supported by discussion with some respondents from small peripheral organizations who report a strong sense of collaborative partnership with other such organizations. These relationships were described as frequent, consisting of collaborative back-and-forth, and multi-modal (e-mail bolstered with calls and in-person meetings). Additionally, these collaborations were attributed in part to a lack of resources and a resultant need to work together for mutual success. To the extent possible, these collaborative partnerships should be acknowledged and encouraged.

SURVEY RESPONDENTS

The survey respondents represented a wide range of healthcare provider and awareness organizations in the Counties. Overall, 81 organizations in the Counties were contacted for the survey. Survey results show that a wide variety of organizations were represented. Examples of several key organizations include the following:

- State and local government: Caroline and Dorchester Health Departments
- Health systems: Choptank Community Health Systems, Eastern Shore Area Health Center
- Community Organizations: Associated Black Charities, YMCA of the Chesapeake

Caroline and Dorchester County Organization Types

The Counties have a wide variety of government and large health-system affiliated organizations, and a smaller amount of large, national organizations. There are also several coalition-based groups like the Dorchester Wellness Coalition and the Partnership for a Drug-Free Dorchester, among others. There are also several government/county organizations, including county Social Service Departments.

SURVEY COMPLETION RATES FOR MAJOR ORGANIZATIONS

Using the survey results, researchers were able to determine which organizations in the Counties had the highest number of in-degree and out-degree centrality. In other words, these organizations had the highest number of incoming and outbound connections to others in the network and most of them completed the survey. The range goes as follows: Nine out of the top 10 and 20 out of the top 25 most central organizations all completed the survey.

They also provided important information about their relationships with other, less well-connected organizations, providing the research team with a stronger view into how the local network operates.

SURVEY QUESTIONS AND ANSWERS

Overall, the online survey was used to gather information about healthcare organizations in Caroline/Dorchester Counties, find out who they partnered with, whether those organizations were in the Counties or elsewhere, and to collect quantitative and qualitative information about those relationships. The entire online survey can be viewed in Appendix B.

SECTION 1: HEALTHCARE ORGANIZATIONS: INFORMATION

Section 1 asked survey recipients several demographic questions about the organization they worked for. The questions asked for the following information:

- The organization's name
- The respondent's particular division or department
- The respondent's job title
- Business sector of the organization
- Whether the organization was a Diabetes Program Partner (DPP)
- Whether their organization delivered healthcare services or developed healthcare awareness

QUESTIONS 1 AND 2: HEALTHCARE ORGANIZATIONS: NAMES/DIVISION/DEPARTMENT

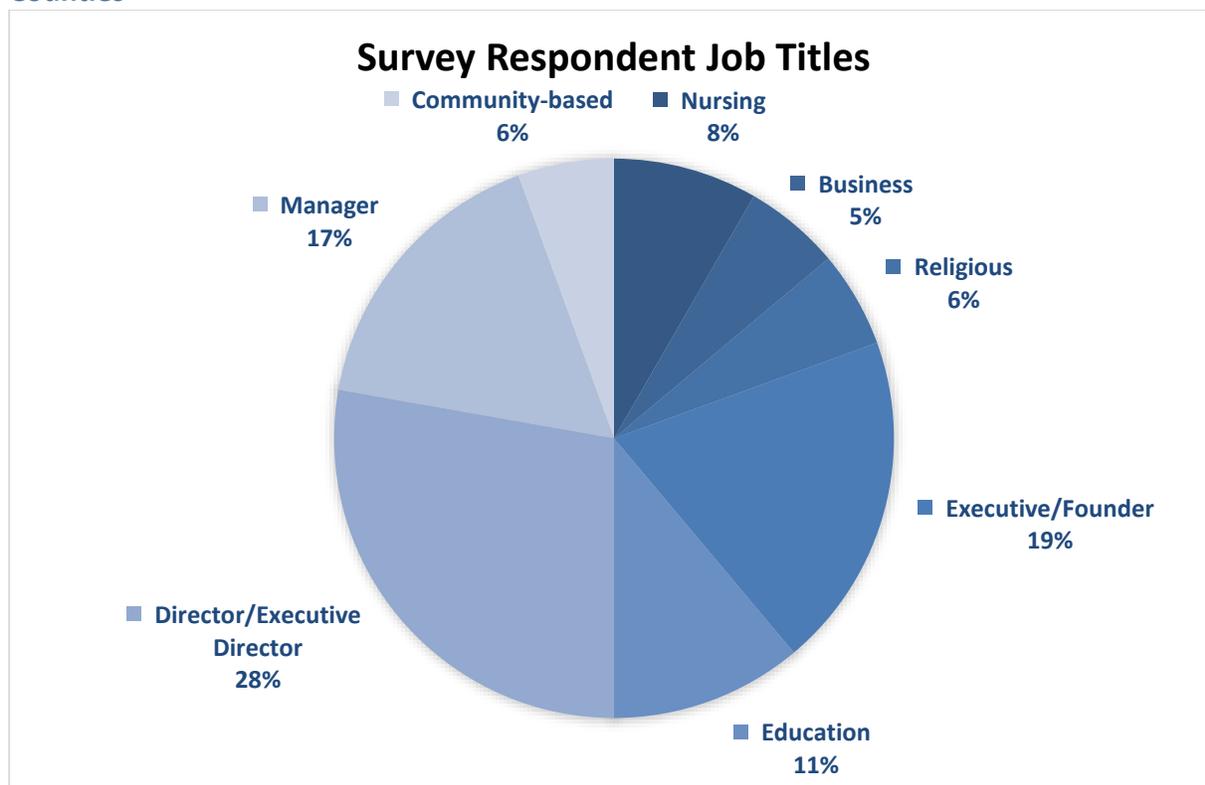
Specifically, Questions 1 and 2 asked survey respondents to list their organization's name and the department or division they worked in.

QUESTION 3: SURVEY RESPONDENTS' JOB TITLES

Question 3 asked survey respondents to list their official job title. In Caroline/Dorchester Counties, the vast majority of responses were completed by decision makers with job titles that referenced managerial or executive capacity. The most common job title was Director or Executive Director (28%).

When including executives/founders, managers, and directors, 64% of decision makers at high levels completed the survey for Caroline/Dorchester Counties. All survey respondents' job titles are listed by percentage in Figure 5-5 on the following page.

Figure 5-5: Online Survey (Q3) – Survey Respondent Job Titles in Caroline/Dorchester Counties



QUESTION 4: HEALTHCARE ORGANIZATIONS: BUSINESS SECTOR

Question 4 asked survey respondents to view seven business sector categories and choose which one best described their organization. The organization sectors were listed as follows: Government, Health System, Education/Academia, Community organization, Business, Philanthropy, or Diabetes Program Partner (DPP).

QUESTION 5: DIABETES PROGRAM PARTNERS (DPP)

The next question asked survey respondents to state whether their organization was a Diabetes Program Partner (DPP) or not. In Caroline/Dorchester Counties, no organization identified itself as a DPP.

QUESTION 6: HEALTHCARE ORGANIZATIONS: FOCUS

The last question in Section 1 asked respondents if their organization focused more on providing healthcare services or developing healthcare awareness. Organizations in the Counties tied: 50% of survey respondents said their organization’s focus was on delivering healthcare services and 50% said they focused on developing awareness of chronic health issues. The answers about organization focus are represented in Figure 5-6 below.

Figure 5-6: Online Survey (Q6) – Organization Focus: Healthcare Awareness or Service Delivery



SECTION 2: HEALTHCARE ORGANIZATIONS: RELATIONSHIPS

Section 2 presented survey respondents with a list of healthcare organizations in Caroline/Dorchester Counties and asked them to select the ones they partnered with.

QUESTION 7: HEALTHCARE ORGANIZATIONS’ FREQUENT PARTNERS

Question 7 asked survey respondents to view a list of healthcare organizations in Caroline and Dorchester Counties and select the ones that they partnered with on various chronic health issues. This enabled the research team to compile a list of the most frequently selected healthcare organizations in the Counties, according to the survey respondents.

Table 5-6 below lists the most-frequently selected healthcare organizations in the Counties, ranked by the percentage of survey respondents who listed them as a partner. For example, the

first entry on the list is Associated Black Charities, with 65% – this means that a full 65% of the organizations surveyed said that Associated Black Charities was one of their partners.

Table 5-6: Top 20 Healthcare Organizations in Caroline/Dorchester Counties (by % selected in the survey)

Organization	% Selected
1. Associated Black Charities	65%
2. Shore Health Systems	58%
3. Caroline County Health Department	58%
4. DHMH - Healthiest Maryland Businesses - Lower Eastern Shore	52%
5. Choptank Community Health Systems	52%
6. Dorchester County Health Department	48%
7. American Heart Association	48%
8. American Diabetes Association	45%
9. Dorchester County Health Department - HEZ Network	42%
10. Maryland Department of Health - Minority Outreach (MOTA)	39%
11. YMCA of the Chesapeake	39%
12. Judy Center	39%
13. Eastern Shore Area Health Center (ES AHEC)	39%
14. Centers for Disease Control	39%
15. Dorchester County Department of Social Services	35%
16. Dorchester County Wellness Coalition	35%
17. Dri-Dock Recovery and Wellness Center	35%
18. Caroline County Health Department - Women, Infants, and Children (WIC)	35%
19. University of Maryland Eastern Shore - School of Pharmacy	29%
20. University of Maryland Shore Regional Health	29%

The top 20 organizations listed above are very well-connected and tend to be government or major health system-affiliated, but there are several smaller organizations on the list that are well-connected despite their relatively smaller size. Associated Black Charities and Dri-Dock Recovery and Wellness Center are two examples.

SECTION 3: HEALTHCARE ORGANIZATIONS: RELATIONSHIP QUALITY

Section 3 of the survey asked healthcare organizations about the type of relationships they had with the partner organizations they selected previously in Section 2.

For every organization they selected, survey respondents were able to provide information about that partner with regard to upstream/downstream relationships, the length of their relationship, the frequency with which they communicated with partners, their understanding

of their partners’ skills and knowledge, and finally, their primary means of communication with partners.

QUESTION 8: UPSTREAM AND DOWNSTREAM RELATIONSHIPS

After survey respondents selected the organizations they worked with, subsequent survey questions asked them to provide information about the nature of their relationship with those partners. The first question in Section 3 asked respondents to name which organizations gave them information (also known as an “upstream” relationship) and which organizations they sent information to (also known as a “downstream” relationship.)

The list of the top organizations in terms of downstream partners is listed on the following page in Table 5-7. According to survey respondents, the organizations on this list are distributing information or providing referrals to others on a frequent basis.

Table 5-7: Organizations with the Highest Number of Downstream Partners, Caroline and Dorchester Counties

Organization	# of Partners
1. American Heart Association	12
2. Shore Health Systems	11
3. Caroline County Health Department	10
4. Centers for Disease Control	10
5. American Diabetes Association	8
6. DHMH - Healthiest Maryland Businesses - Lower Eastern Shore	8
7. Choptank Community Health Systems	7
8. Eastern Shore Area Health Center (ES AHEC)	6
9. Associated Black Charities	6
10. Rose Hill Practitioners	5
11. University of Maryland - Extension	5
12. Three Lower Counties Community Health System	5
13. University of Maryland Eastern Shore - School of Pharmacy	5
14. Dorchester County Health Department - HEZ Network	4
15. Dorchester County Health Department	4
16. Peninsula Regional Medical Center	4
17. University of Maryland Shore Regional Health	4
18. Dri-Dock Recovery and Wellness Center	4
19. Dorchester County Department of Social Services	4
20. Dorchester County Wellness Coalition	3

QUESTION 9: LENGTH OF RELATIONSHIPS BETWEEN ORGANIZATIONS

Question 9 asked survey respondents about the length of the relationships with the organizations they named as partners. A scale with 5 options was presented, with “Less than 1 year” to define the briefest relationship, and “More than 10 years” to define the longest-lasting relationships.

In Caroline/Dorchester Counties, survey respondents reported that the more established, larger health organizations were the ones they tended to have the longest relationships with. The organizations with the highest number of long-lasting relationships are listed in Table 5-8 below.

Table 5-8: Organizations with the Highest Number of Partner Relationships Longer Than 10 Years

Organization	# of Relationships
1. Dorchester County Health Department	11
2. Caroline County Health Department	9
3. Dorchester County Department of Social Services	8
4. Centers for Disease Control	7
5. Caroline County Health Department - Social Services	6
6. Shore Health Systems	6
7. Choptank Community Health Systems	5
8. Dorchester Early Head Start Program	5
9. Judy Center	5
10. Maryland Department of Health - Minority Outreach (MOTA)	5
11. Caroline County Health Department - Women, Infants, and Children (WIC)	5
12. American Heart Association	5
13. American Diabetes Association	5
14. Dorchester County Public Schools	4
15. Dorchester Co. School-based Wellness Programs	4
16. Wicomico County Health Department	4
17. Dorchester County Recreation & Parks	3
18. Shore Pediatrics	3
19. University of Maryland Extension - 4-H Youth Development	3
20. Dorchester County Wellness Coalition	3

QUESTION 10: FREQUENCY OF COMMUNICATION BETWEEN ORGANIZATIONS

Question 10 asked survey respondents how often they communicated with other organizations in their network. A scale with 4 options was presented, with “Frequently” to define the highest level of contact, followed by “Sometimes,” “Seldom,” or “Never” to describe less frequent levels of contact.

Overall, survey respondents reported that the more established, larger health departments, medical centers/hospitals and large community organizations were the ones they tended to communicate with the most. Those organizations, with the highest levels of “Frequent” communication, are listed in Table 5-9 below.

Table 5-9: Top 20 Organizations with Highest Level of Frequent Contact with their Partners

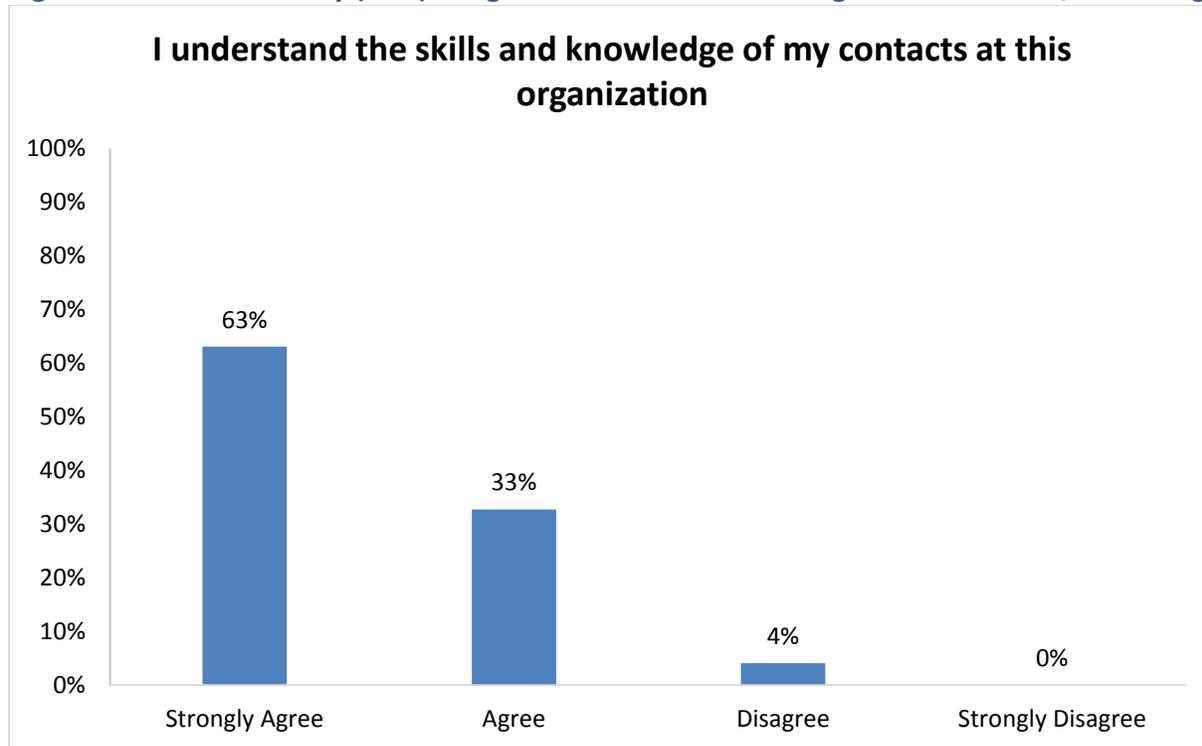
Organization	# Partners
1. Associated Black Charities	16
2. Choptank Community Health Systems	14
3. Dorchester County Health Department	14
4. Caroline County Health Department	11
5. Dorchester Co. Health Department Health Enterprise Zone	11
6. Maryland Department of Health - Minority Outreach (MOTA)	11
7. Dorchester County Department of Social Services	9
8. Caroline County Health Department - Social Services	7
9. Dorchester County Wellness Coalition	7
10. Dri-Dock Recovery and Wellness Center	7
11. Shore Health Systems	7
12. Dorchester Co. School-based Wellness Programs	7
13. University of Maryland Shore Regional Health	6
14. Three Lower Counties Community Services	6
15. Maintaining Active Citizens (MAC)	6
16. Judy Center	6
17. Eastern Shore Area Health Center (ES AHEC)	6
18. Dorchester County Public Schools	6
19. Dorchester County YMCA	6
20. University of Maryland Eastern Shore - School of Pharmacy	5

QUESTION 11: ORGANIZATIONS’ UNDERSTANDING OF PARTNER SKILL AND KNOWLEDGE

Question 11 asked survey respondents if they understood the skills and knowledge of each of the organizations they selected as partners. They were able to choose from a scale from highest to lowest, starting from “Strongly Agree, Agree, Disagree, or Strongly Disagree.” Overall, the largest group of respondents (63%) said they “strongly agree” that they understand the skills/knowledge of the organizations that they partner with.

In total, 96% of survey respondents agreed or strongly agreed that they understood the skills and knowledge of the contacts at the organizations they partner with. The responses, listed by percentage, are shown in Figure 5-7 below.

Figure 5-7: Online Survey (Q11) - Organizations' Understanding of Partner Skills/Knowledge

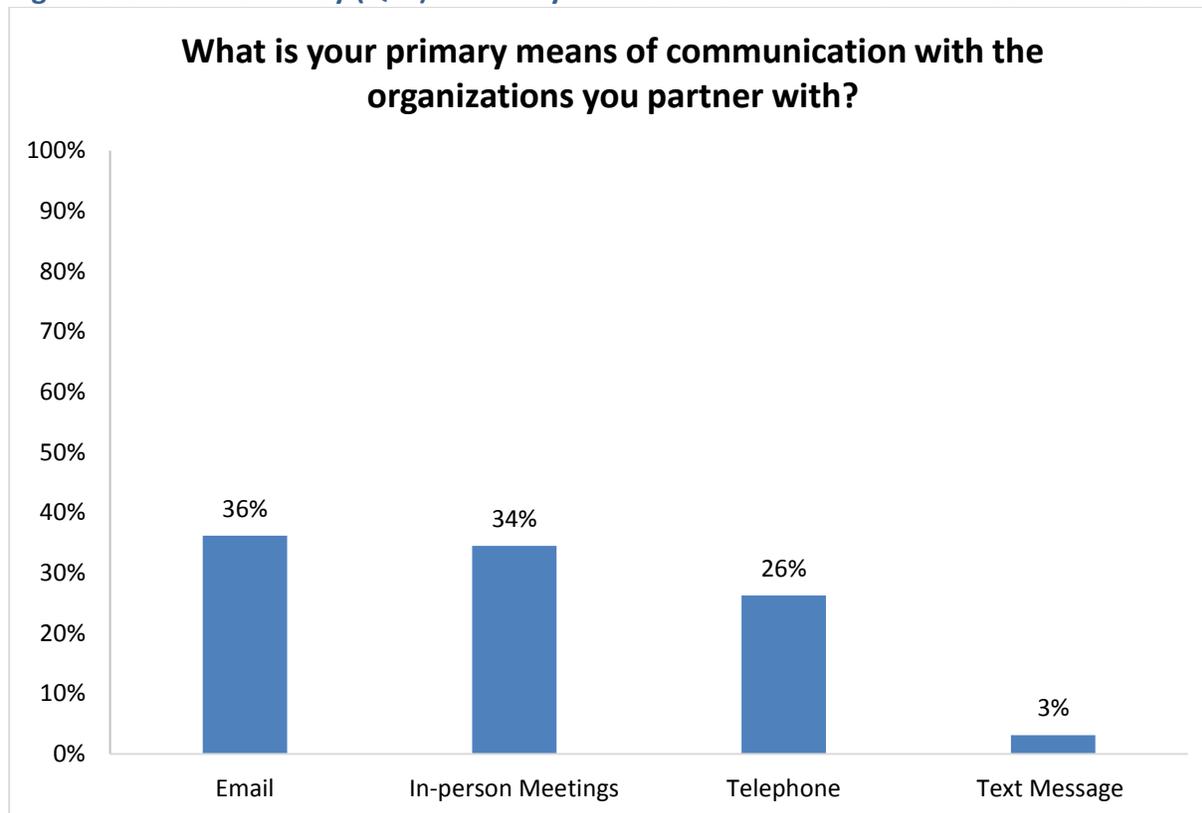


QUESTION 12: HEALTHCARE ORGANIZATIONS: COMMUNICATION

Question 12 asked survey respondents what their primary means of communication was with their partners – whether via telephone, text message, e-mail, or in-person meetings. Each survey respondent was given an opportunity to answer the question specifically for each organization they deal with.

Like the other networks, e-mail was the primary means of communication for most of the organizations, at 36%. In-person meetings were second, with 34%. Telephone contacts were 26% and text messages were three percent. Text messages, while small, was the highest reported number of all networks. The full results are listed in Figure 5-8 below.

Figure 5-8: Online Survey (Q12) – Primary Means of Communication between Partners



IN-PERSON MEETINGS

Given that a good amount of contact between healthcare partners in Caroline/Dorchester Counties is done in-person (according to the organizations surveyed), the research team used the results to find out which organizations were reported to have frequent in-person meetings with their contacts.

The organizations listed in Table 5-10 below had the highest number of survey respondents who said in-person meetings were their primary means of contact with that organization.

Table 5-10: Organizations where In-Person Meetings are the Primary Means of Communication with Survey Respondents

Organization	# of Respondents
1. Caroline County Health Department	10
2. Dorchester County Health Department	9
3. Associated Black Charities	9
4. Dorchester County Wellness Coalition	7
5. Choptank Community Health Systems	7
6. Dorchester County Health Department - HEZ Network	7
7. Dorchester County Department of Social Services	6
8. Shore Health Systems	6
9. Dri-Dock Recovery and Wellness Center	6
10. Maryland Department of Health - Minority Outreach (MOTA)	6
11. Eastern Shore Area Health Center (ES AHEC)	5
12. Affiliated Sante Group	5
13. Caroline County Health Department - Social Services	5
14. YMCA of the Chesapeake	5
15. University of Maryland Eastern Shore - School of Pharmacy	5
16. Maryland Health Exchange - Dorchester County Navigator	4
17. Maryland Healthy Weighs	4
18. Dorchester County YMCA	4
19. Chesapeake Multicultural Resource Center	4
20. Partnership for a Drug Free Dorchester	4

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APPENDIX A: QUERY LETTER FOR SNOWBALL SAMPLE

Dear ____:

The Maryland Department of Health and Mental Hygiene has partnered with the University of Baltimore Schaefer Center for Public Policy to examine how local health organizations work together to deliver health services related to diabetes and hypertension prevention, weight management, blood pressure management, and heart health efforts.

The research team is conducting a social network analysis to map the network of the organizations involved in local health initiatives.

Your organization has been identified by the Maryland Department of Health and Mental Hygiene Department of Chronic Disease and Prevention as an organization working to address these chronic health issues.

We are contacting you to invite you to be part of this analysis by completing the attached spreadsheet to identify the organizations you work with to address these chronic health issues. The spreadsheet already includes some of the organizations involved in your local health network. Please extend this list by adding up to 20 additional organizations with whom you work on hypertension and diabetes management.

In about three weeks, you and representatives of the organizations you identify will be contacted to complete a short survey about the organizations you work with. Your participation in the survey is completely voluntary. The names of the organizations identified in this survey will be included in the social network report produced through this research.

If you have questions about this research, please contact:

Aaron Wachhaus, Ph.D. Principal Investigator Assistant Professor, University of Baltimore College of Public Affairs 1420 N. Charles Street Baltimore, MD 21201 410-837-6113 awachhaus@ubalt.edu	Kristi Pier, MHS, MCHES Director, Center for Chronic Disease Prevention and Control Maryland Department of Health and Mental Hygiene 201 W. Preston St Baltimore, MD 21201 410-767-6722 kristi.pier@maryland.gov
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This research has been review and approved by the University of Baltimore and the Maryland Department of Health and Mental Hygiene’s Institutional Review Boards. If you have questions

about your rights as a participant in this research study, contact the following Institutional Review Board coordinators:

University of Baltimore
IRB Coordinator

Ms. Jocelyn Kucar, CRA
IRB Administrator
University of Baltimore
1420 N. Charles Street
Baltimore, MD 21201
410-837-6199
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Department of Health and Mental Hygiene
IRB Coordinator

Ms. Gay Hutchen
IRB Administrator
Institutional Review Board
201 W. Preston Street
Baltimore MD 21201
410-767-8448
gay.hutchen@maryland.gov

Thank you for your participation in this important research.

Sincerely,

Aaron Wachhaus, Ph.D.
Principal Investigator
Assistant Professor,
University of Baltimore

Introduction

The Maryland Department of Health and Mental Hygiene (DHMH) has partnered with the University of Baltimore Schaefer Center for Public Policy to examine how local health organizations work together to deliver health services related to diabetes and hypertension prevention, weight management, blood pressure management, and heart health efforts.

The research team is conducting a healthcare network analysis to map the network of organizations collaborating on these issues. Your organization has been identified by DHMH as an important organization working to address these chronic health issues. We are inviting you to be a part of this study by completing a short survey about the organizations you work with to address these chronic health issues. The survey data will be used to strengthen the network.

Your participation in the survey is completely voluntary. The names of the organizations identified in this survey will be included in the report produced through this research.

- If you wish to proceed with this survey, please click [here](#).
- If you do not wish to proceed with this survey, you may exit by clicking [here](#).

Demographic Information

- What is the name of your organization?
- If applicable, the division or department you work at in this organization.
- What is your title at this organization?

Which sector best describes this organization?

- Business
- Health System
- National DPP
- Government
- Community
- Education/Academia
- Philanthropy

Is your organization a Diabetes Program Partner (DPP)?

- Yes
- No

Does your organization focus more on:

- developing awareness of hypertension, diabetes, or heart health
- delivering services to prevent or mediate hypertension, diabetes, or heart health

Of the organizations that you previously selected in the last question, please indicate which are: "downstream" from you - organizations that you send information or resources to - or "upstream" from you - organizations that you get referrals, information or resources from.

- Downstream (1)
- Upstream (2)

The next series of questions are about each organization that you selected earlier.

How long have you had a working relationship with each organization?

- Less than 1 year (1)
- 1-3 (2)
- 3-6 (3)
- 6-10 (4)
- More than 10 (5)

What is the frequency with which you typically communicate with each organization?

- Never (1)
- Seldom (2)
- Sometimes (3)
- Frequently (4)

I understand the skills and knowledge of my main contacts at this organization:

- Strongly Agree (1)
- Agree (2)
- Disagree (3)
- Strongly Disagree (4)

What is your primary means of communication with your main contact at each organization?

- Telephone (1)
- Text Message (SMS) (2)
- Email (3)

- In-person Meetings (4)

The survey has ended. Your time and effort is appreciated, and will help us better understand this collaborative network. Thank you for participating.

APPENDIX C: BALTIMORE CITY ORGANIZATIONS – DEGREE AND CENTRALITY SCORES

Organization	In-Degree	Out-Degree	Betweenness Centrality
Access to Wholistic & Productive Living Institute, Inc. (AWPLI)	3	0	0.118
Advocates for Children and Youth (ACY)	9	0	22.573
Advocates for Survivors of Torture and Trauma (ASTT)	3	0	2.152
Allegany County Health Dept.	5	5	24.620
Alliance for a Healthier Generation	5	0	3.003
American Academy of Pediatrics	12	12	641.338
American Cancer Society	21	3	562.559
American Diabetes Association	37	79	7026.511
American Diabetes Association - Community Outreach	0	53	1969.881
American Heart Association	46	69	5438.999
American Heart Association - Cooking with Heart Kitchen	24	0	121.837
American Legacy Foundation	7	0	3.735
American Lung Association	16	0	112.363
Amerigroup MCO	13	0	89.115
Anne Arundel County Health Department	5	0	2.572
Ashland Commons Multi-dwelling Apartments	1	0	0.000
Asylum Women's Enterprise (AWE)	1	0	0.000
Baltimore American Indian Center	1	0	0.000
Baltimore City - Dept. of Health - Office of Chronic Disease Prevention	28	38	1461.371
Baltimore City - Dept. of Parks and Recreation	17	10	254.618
Baltimore City - Mayor's Office of Neighborhoods	17	0	170.744
Baltimore City - Office of Aging & Care Services	23	16	412.888
Baltimore City - Office of Sustainability	9	31	441.288
Baltimore City - Wellness Program	11	0	7.402
Baltimore City Community College	5	0	2.130
Baltimore City Dept. of Health - Tobacco Use, CVD Prevention	16	0	64.092
Baltimore City Fire Department	9	5	12.746
Baltimore City Health Department	41	39	2502.670
Baltimore City Health Department - B'more for Healthy Babies	23	53	3119.361
Baltimore City Health Department - Community Relations	0	94	7995.081
Baltimore City Health Department - Immunization	0	0	0.000
Baltimore City Health Department - Maternal and Child Health	21	0	123.711
Baltimore City Health Department - Youth Health	0	13	60.545
Baltimore City Health Dept. - Baltimarket	17	43	1813.279
Baltimore Community Foundation	10	0	55.797
Baltimore County Department of Aging	14	20	1098.414

Organization	In-Degree	Out-Degree	Betweenness Centrality
Baltimore County Health Dept. - Clinical Services	6	0	15.168
Baltimore County Public Schools	9	0	60.296
Baltimore Curriculum Project	4	0	2.794
Baltimore Medical System, Inc.	13	0	26.110
Baltimore Stops	4	0	0.047
Baltimore-Washington United Methodist Church	2	0	1.815
Behavioral Health System Baltimore, Inc.	12	0	46.595
Bel-Park Towers	1	0	0.000
Bernard E. Mason Assisted Living/Food Pantry	0	0	0.000
Bethel AME Church	7	0	5.139
Bi-Rite Grocery Store	1	0	0.000
Black Mental Health Alliance	9	0	27.765
Black Nurses Association of Baltimore, Inc. (BNAB)	5	7	102.448
Bmore Fit	18	0	46.416
Bon Secours - West Baltimore Health Enterprise Zone	24	53	2082.892
Bozzuto Homes	1	0	0.000
Breast and Cervical Cancer Diagnosis and Treatment Program	6	0	5.693
Calvert County Public Schools	4	0	5.946
Carefirst Blue Cross Blue Shield	12	0	99.170
Caroline Center	1	0	0.000
Caroline County Public Schools	5	2	25.414
Carroll County Public Schools	3	5	7.491
Catholic Charities Headstart	6	9	99.313
Catholic Charities of Maryland	9	0	19.773
CEASE (Smoke-free Baltimore)	11	20	232.616
Cecil County Public Schools	4	1	8.551
Celebration Church	2	0	0.000
Center for Grace-Full Living - Amazing Grace Evangelical Church	0	22	1724.716
Center for Urban Families	7	0	12.681
Central Baptist Church	5	45	857.181
CHAI - Northwest Neighbors Connecting	1	7	8.501
Charles County Health Department	7	0	8.189
Chase Brexton	16	0	197.039
Civic Works Real Food Farm	5	10	184.932
Clay Pots Baltimore	1	0	0.000
Coppin State University	21	0	153.253
Cor-les Consultants	1	0	0.000
Dance and Be More	2	0	0.413
DDC Total Health	4	0	0.257
Delmarva Foundation	15	33	716.620

Organization	In-Degree	Out-Degree	Betweenness Centrality
DHMH Comprehensive Cancer Control Program	0	5	1.530
DHMH Environmental Health Bureau (Asthma Control Program)	8	19	418.852
DHMH Surveillance and Policy Analysis	2	0	0.395
Diabetic Retinopathy Program – Johns Hopkins	0	0	0.000
Dorchester County Public Schools	4	0	5.946
Druid Heights Community Development Corp.	8	0	14.059
East Baltimore Medical Center	10	0	66.622
Edmondson Heights 7th Day Adventist Church	0	0	0.000
Equity Matters	4	0	1.598
Evangelical Lutheran Church in America	1	0	0.000
Faith Baptist Church	5	0	8.874
Faith Lutheran Evangelical Church	1	0	0.000
Family League of Baltimore	16	0	64.189
Family Planning Comprehensive Clinic/Healthy Teens & Young Adults	0	0	0.000
Fleming Senior Center	2	0	0.000
Food Depot	7	0	15.114
Forest Park Reformed Church	0	0	0.000
Frederick County Health Department	4	0	2.478
Fulton Baptist Church	3	0	1.155
FutureCare Sandtown/Winchester	6	11	74.299
Garrett County Public Schools	5	0	7.091
General Growth Properties - Mondawmin Mall	2	0	0.000
Gilmore Homes	6	0	19.352
Good Will - Chesapeake	4	0	6.901
Green & Healthy Homes Initiative	7	0	40.734
Harford County Public Schools	5	0	13.737
Healing Connections	0	0	0.000
Health Freedom, Inc.	8	0	5.672
HealthCare Access Maryland	18	2	133.168
Healthy Heartbeats	5	0	1.137
Helping Up Mission	8	0	41.728
Higher Dimension Christian Center	2	0	1.155
Holistic Life Foundation	2	0	0.000
HOPE Project	3	0	2.740
Housing Authority of Baltimore City (HABC)	16	0	117.601
Howard County Public Schools	8	11	208.720
Impacting Tomorrow Health Center	0	0	0.000
Institute for Integrative Health	7	0	12.522

Organization	In-Degree	Out-Degree	Betweenness Centrality
Institute for Public Health Innovation	5	2	13.688
Institute of Human Virology - Project Shalem (Faith Based)	0	0	0.000
Ivy Family Services	2	0	1.604
James Long Fitness	7	61	3151.394
Johns Hopkins - Bloomberg School of Public Health	34	50	4004.001
Johns Hopkins - Broadway Center for Addiction	5	10	138.744
Johns Hopkins - Center for a Livable Future	12	0	12.946
Johns Hopkins - Center for Adolescent Health	7	37	1390.596
Johns Hopkins - Center To Eliminate Cardiovascular Health Disparities	5	23	816.145
Johns Hopkins - Community and Global Programs	0	52	4210.666
Johns Hopkins - Environmental Justice Partnership	1	0	0.000
Johns Hopkins - Henderson-Hopkins Health and Wellness Fair	3	0	6.902
Johns Hopkins - Kimmel Cancer Center	5	0	3.200
Johns Hopkins - Priority Partners MCO	7	0	10.951
Johns Hopkins - School of Nursing	14	0	126.791
Johns Hopkins - The Access Partnership (TAP)	3	0	0.000
Johns Hopkins - The Welch Center	2	0	0.000
Johns Hopkins - Women, Infants, and Children Program (WIC)	7	0	23.387
Johns Hopkins AIDS Education and Training Center	0	12	78.309
Johns Hopkins Hospital	13	0	164.776
Johns Hopkins Nutrition	4	0	17.165
Johns Hopkins Office of Community Health/Belair-Edison Healthy Community Coalition, Inc.	6	18	277.364
Johns Hopkins School of Nursing - East Baltimore Community Nurse Center (EBCNC)	12	21	926.145
Johnston Square Apartments	5	0	15.082
Kent County Health Department - School Health	6	4	10.808
Keystone Pharmacy	0	0	0.000
Latino Providers Network	7	0	10.309
Les Gemmes Social Club	0	0	0.000
Lexington Market	11	0	33.502
Liberty Senior Center	4	0	0.000
Life Restoration Ministry	1	0	0.000
Lifebridge Health	12	0	28.862
Light Health	4	0	11.496
Lillian Jones Apartments	2	0	1.202
Living Classrooms	8	0	12.848
Macedonia Baptist Church	2	5	7.748
Manna Bible Baptist Church	3	0	1.155

Organization	In-Degree	Out-Degree	Betweenness Centrality
Maryland Academy of Nutrition and Dietetics	5	0	9.412
Maryland Assoc. of Student Councils	4	0	3.250
Maryland Dental Action Coalition	5	10	15.173
Maryland Dept. of Education - Curriculum, Assessment, and Accountability	5	13	91.393
Maryland Dept. of Education - Early Childhood Development	9	3	32.123
Maryland Dept. of Education - Nutrition Environment & Services	9	0	15.213
Maryland Dept. of Education - School Health Services	12	41	1399.679
Maryland Dept. of Education - Student, Family, and School Support	4	30	1059.208
Maryland Dept. of Health - Behavioral Health Admin.	9	0	37.417
Maryland Dept. of Health - Cancer and Chronic Disease Bureau	12	0	91.213
Maryland Dept. of Health - Chronic Disease Prevention and Control	24	0	273.945
Maryland Dept. of Health - Ctr. for Tobacco Prevention & Control	15	0	138.280
Maryland Dept. of Health - Maternal and Child Health	9	0	16.440
Maryland Dept. of Health - Nutrition Environment & Services	6	0	7.955
Maryland Dept. of Health - Office of Population Health Improvement	5	0	3.196
Maryland Dept. of Health - Office of Population Health Improvement - State Health Improvement Process (SHIP)	4	0	4.872
Maryland Dept. of Health - Office of School Health	11	0	41.561
Maryland Dept. of Health - Women, Infants, & Children (WIC)	13	0	86.053
Maryland Dept. of Health (DHMH)	37	0	1272.023
Maryland Dept. of Public Safety and Correctional Services	9	0	50.990
Maryland Environmental Health Network	4	0	1.535
Maryland Family Network	7	0	30.011
Maryland Hunger Solutions	9	92	7056.278
Maryland Out of School Time (MOST) Network	8	18	242.696
Maryland Physicians Care MCO	5	0	10.964
Maryland State - Department of Human Resources	11	0	125.340
Maryland State Department of Education, Community Nutrition Branch	7	0	11.808
MDQuit Tobacco Resource Center	16	51	3115.362
MedChi	6	0	6.990
MedStar Franklin Square Medical Center	0	26	476.593
MedStar Good Samaritan Hospital	0	7	16.271
MedStar Good Samaritan Hospital - Community Outreach	0	10	57.338
MedStar Harbor Hospital	0	2	0.263
MedStar Health and Hospital System	22	0	447.005
Men and Families Center	6	0	28.478
Meritus Health System - School Health Services	1	6	14.722
Mobile Optical, Inc.	2	9	40.719

Organization	In-Degree	Out-Degree	Betweenness Centrality
Montgomery County Health Department	5	0	3.420
Monumental City Medical Society	3	13	42.062
Morgan State University	22	19	858.824
Mosaic Community Services	4	17	260.680
Moveable Feast	15	19	870.777
Moveable Feast - Nutrition Services	0	22	312.304
Mt. Lebanon Baptist Church	5	0	2.238
National Alliance on Mental Illness	3	0	2.764
National Institutes of Health (NIH)	11	0	21.664
National Kidney Foundation of Maryland	4	0	4.233
New Christian Memorial Church	2	0	0.000
New Psalmist Baptist Church	8	0	4.042
New Shiloh Baptist Church - Nurses' Ministry	10	44	1269.834
New Song Community Church	6	0	15.934
New Vision House of Hope	6	0	0.143
Newborn Community of Faith	3	0	1.114
No Boundaries Coalition	6	5	65.621
North West Round Table	0	0	0.000
O Herbals	0	0	0.000
Omega Psi Phi Fraternity	7	0	3.962
OWEL (Older Women Embracing Life)	3	0	6.483
Park Heights Community Health Alliance	10	0	12.540
Parkview Apartment for Seniors	5	0	20.745
PATH (People Acting Together in Howard)	2	0	0.000
Paul's Place	12	0	55.904
Payne Memorial AME Church	5	0	2.082
Pharmacy Solutions	1	0	0.000
Pleasant View Gardens Senior Building	8	0	28.549
Pratt Library - Orleans Street	4	0	2.632
Pratt Library - Southeast Anchor	1	0	0.000
Prince George's County Public Schools	5	0	7.061
Priority Partners MCO	10	0	52.986
Promise Heights	6	0	2.962
Queen Anne's County Health Department	8	8	76.794
Radical Life Coach	0	0	0.000
Real Food for Kids - Montgomery County	4	7	50.548
Riverside Health MCO	10	0	46.587
Saint Agnes Hospital	18	14	663.051
Sandtown Foot and Ankle	0	0	0.000
Share Our Strength	9	0	7.083

Organization	In-Degree	Out-Degree	Betweenness Centrality
Shepherd's Clinic for the Uninsured	5	2	65.062
Sheppard Pratt Health System	7	0	32.741
Shiloh A.M.E. Church	3	0	0.000
Shoppers Food (Mondawmin Mall)	5	0	0.000
Sinai Hospital	15	0	94.614
Sisters Together And Reaching (STAR)	17	0	206.078
Somebody Cares Baltimore	1	0	0.000
Somerset County Public Schools	5	4	16.577
St. Mark's Institutional Baptist Church	2	0	0.000
St. Agnes Hospital - Maryland Metabolic Institute	6	0	3.310
St. Bernardine's Parish	1	0	0.000
St. Joseph Free Will Baptist Church	1	0	0.000
St. Mary's County Public Schools	4	12	259.901
Stratford University	1	0	0.000
Sugar Free Kids Maryland	14	40	1595.551
Talbot County Health Department	7	0	18.685
The Danya Institute, Inc.	3	11	64.456
The Horizon Foundation	12	43	1896.394
The Parents' Place of Maryland	1	0	0.000
The Tabernacle of the Lord	4	0	0.000
The Women's Housing Coalition	2	0	0.000
Timothy Baptist Church	2	0	0.000
Total Health Care, Inc.	0	6	7.006
Total Health Care, Inc. - Community Programs	24	57	2686.378
Total Health Now	2	0	0.000
Towson University - Dept. of Kinesiology	3	0	12.310
Transformation Church	3	0	1.155
Trinity Baptist Church	5	0	8.798
UC San Francisco - Smoking Cessation Leadership Center	2	0	0.000
Union Baptist Church	7	0	5.880
United Health Care MCO	6	0	31.210
University of Maryland	16	0	132.506
University of Maryland - Center for Diabetes and Endocrinology	5	0	8.414
University of Maryland - Center for School Mental Health (CSMH)	5	0	13.388
University of Maryland - Center for Substance Abuse Research	1	0	0.000
University of Maryland - Institute for a Healthiest Maryland	10	0	23.646
University of Maryland - Legal Resource Center for Public Health Policy	10	29	620.377
University of Maryland - Nutrition and Food Science	9	0	7.819
University of Maryland - School of Medicine	13	10	328.971

Organization	In-Degree	Out-Degree	Betweenness Centrality
University of Maryland - School of Pharmacy	9	0	25.774
University of Maryland - School of Public Health	15	0	143.895
University of Maryland - School of Social Work	11	0	117.988
University of Maryland College Park	6	0	5.100
University of Maryland Extension	12	59	3125.039
University of Maryland Medical Center	15	44	2207.931
University of Maryland Medical Center - STAR TRACK Program	4	0	9.715
Urban Farmers	6	0	2.401
Urban League	6	0	26.712
Waters A.M.E.	3	0	10.079
Waters Towers	1	0	0.000
Waxter Center for Senior Citizens	14	0	47.879
Wayland Baptist Church	5	0	1.395
Wicomico County Board of Education	4	0	4.245
Women Accepting Responsibility	5	0	1.622
Woodlawn Senior Center	5	0	4.717
Y of Central Maryland	0	50	1633.496
Y of Central Maryland - Community Relations	26	44	1968.919
Zeta Center Healthy Aging Partnership (Z-HAP)	21	61	3350.614

APPENDIX D: WASHINGTON COUNTY ORGANIZATIONS – DEGREE AND CENTRALITY SCORES

Organization	In-Degree	Out-Degree	Betweenness Centrality
Allegany College Nurse-Managed Wellness Center (NMWC)	4	3	0.000
Allegany County HRDC	3	8	7.000
Asbury United Methodist Church	3	0	9.586
Big Brothers Big Sisters	3	0	0.000
Blossom School of Etiquette	0	0	0.000
Brooklane Hospital	6	0	5.651
Brothers Who Care	3	28	1610.316
Caldwell Manufacturing	4	2	2.354
Calvary Temple Apostolic Church	0	0	0.000
Capital Women's Care	5	9	30.505
Cardiovascular Center of Hagerstown	4	0	1.579
Chase Brexton	0	0	0.000
Children In Need	1	0	0.000
City of Hagerstown	7	0	23.082
College View Nursing Home	1	0	0.000
Community Foundation of Washington County	2	0	0.000
Community Free Clinic	9	0	7.681
Cumberland YMCA	5	6	41.432
Datta Endocrine & Wellness Center	3	0	0.000
DaVita Dialysis Center	1	9	375.867
Doleman Black Heritage	0	0	0.000
Ellsworth Electric	0	0	0.000
Fahrney Keedy Home and Village	4	0	61.594
Fit in BoonsBoro	2	4	0.500
Francis Murphy Senior Nutrition Site	0	0	0.000
Frederick Memorial Hospital	3	0	4.095
Frostburg State University - Brady Health Center	2	2	2.808
Garrett College	2	0	0.000
Girls, Inc. of Washington County	3	9	111.321
Greater Campher Temple	1	0	0.000
Hagerstown Heart	6	0	2.765
Hagerstown Volvo Group/Staywell Program	4	0	2.106
Hagerstown YMCA	4	0	2.941
Hancock Senior Nutrition Site	1	0	0.000
HBP, Inc.	1	1	0.000

Organization	In-Degree	Out-Degree	Betweenness Centrality
Head Start of Washington County	4	0	12.668
HEAL of Washington County	11	29	1384.887
Hispanic Association of Hagerstown	2	0	1.449
Hospice of Washington County	6	0	17.531
Hub Labels	2	0	5.586
International Corporate Training and Marketing	0	0	0.000
Johns Hopkins - Community Physicians	4	0	4.419
Johns Hopkins University - Comstock Center	2	15	221.033
Kaplan University	1	0	0.000
Kassandra's Cultural Center	1	1	4.831
Keller Stonebraker	2	4	18.657
Maryland Department of Aging	8	0	24.267
Maryland Department of Health	14	0	154.300
Maryland Department Of Social Services	6	0	17.531
Maryland Diversity Center	1	0	0.000
Maugansville Garden Apartments	1	0	0.000
Meadow Kidney Care	2	7	63.684
Meritus Health	16	0	122.234
Meritus Health - Parish Nursing	7	26	505.011
Meritus Home Health Care	10	0	27.076
Meritus Medical Center	16	22	1075.934
Meritus Medical Center, Behavioral & Community Health	0	19	192.706
Meritus Medical Center, Community Health Education & Wellness	0	18	138.147
Meritus Total Rehab Care - Wellness Center	4	0	1.834
Meritus Weight Loss Center	5	0	0.250
Merkle	1	0	0.000
NAACP - Washington County	1	0	0.000
Northampton Manor Rehab Center	1	0	0.000
Planet Fitness	1	0	0.000
Potomac Towers	3	0	0.461
Priority Partners MCO	5	0	35.138
Progressive Men's Club	1	0	0.000
Robert W. Johnson Community Center	4	0	9.205
Robinwood Family Practice	8	0	10.963
Robinwood Heart	4	0	0.536
Ruff Fitness	4	0	7.760
San Mar Children's Home	4	0	14.956
Second Christian Church	1	0	0.000

Organization	In-Degree	Out-Degree	Betweenness Centrality
Smithsburg Senior Nutrition Site	1	0	0.000
Soul Food Ministries	1	0	0.000
Southeastern Senior Nutrition Site	0	0	0.000
Staples Distribution	0	0	0.000
Steve Swayne Insurance	1	0	0.000
The Arc of Washington County	3	29	805.329
The Kidney Center of Hagerstown	3	0	19.717
Town of Williamsport	2	0	0.000
Tri-State Community Health Center	7	1	11.046
United Health Care	0	0	0.000
United Way	6	0	25.499
University of MD Extension Office	5	20	282.761
VA Medical Center, Martinsburg, WV	3	0	8.583
Walnut Street Community Health Center	10	19	464.454
Walnut Towers	4	0	1.022
Washington County - Board of Education	5	0	1.449
Washington County - Commission on Aging	10	28	1035.100
Washington County Department of Social Services	0	9	42.263
Washington County Health Department	17	25	916.616
Washington County Public Schools	11	0	102.089
Way Station Behavioral Health	2	13	147.256
Western Maryland Health Systems	14	0	166.939
Western MD AHEC	4	15	271.794
Western MD Hospital	9	0	48.393
Williamsport Senior Nutrition Site	1	0	0.000
Zion Baptist Church	2	0	1.449

APPENDIX E: WESTERN MARYLAND ORGANIZATIONS – DEGREE AND CENTRALITY SCORES

Organization	In-Degree	Out-Degree	Betweenness Centrality
Advanced Diabetic Solutions	4	0	0.458
Allegany County Chamber of Commerce	1	0	0.000
Allegany County Department of Social Services	1	0	0.000
Allegany County Health Department	7	0	1.294
Allegany County Health Dept. - Adult Eval. & Review Svcs.	3	0	0.550
Allegany County Health Dept. - Cancer Prevention	4	30	186.505
Allegany County Health Dept. WIC (Women, Infants and Children)	1	14	36.354
Allegany County Human Resources Development Commission, Inc.	3	0	0.000
Allegany County Public Schools	10	0	5.947
Allegany Health Education Center	6	0	0.722
Allegany Health Right	1	0	0.000
Allegany Radio Corporation	1	0	0.000
Alzheimer's Association	3	6	2.028
Archway Station	12	3	58.291
Associated Charities of Cumberland	1	0	0.000
Braddock Medical Group	3	0	0.000
Carver Community Center	2	0	0.000
Chapman and Associates Healthcare	7	0	7.284
Children's Medical Group	1	0	0.000
County United Way	6	0	1.517
Crellin Elementary School	7	0	1.197
Dennett Road Nursing Home	15	25	282.746
Evergreen Heritage Center	6	6	18.243
Family Junction	6	0	0.612
Fechheimer Shirt Factory	7	5	4.859
Friendsville Elementary School	7	4	7.257
Frostburg Village Nursing and Rehab	5	0	0.793
Garrett College Community Aquatic & Recreation Complex / Great Garrett Adventure Camp	12	19	738.967
Garrett County - Area Agency on Aging	6	2	0.355
Garrett County Board of Education	0	0	0.000
Garrett County Health Department	4	26	182.591
Garrett County Memorial Hospital	4	0	0.167
Grantsville Elementary School	4	0	0.000
Hope Station	7	8	12.005
Housing Authority of the City of Cumberland	4	4	0.454

Organization	In-Degree	Out-Degree	Betweenness Centrality
Life Fitness Management	5	0	0.230
Maryland Physicians Care	8	4	11.889
Mid-Atlantic Healthcare	4	5	1.709
Mountain Health Alliance	11	0	13.274
Mountain Laurel Medical Center	7	22	211.854
Northern High School	4	0	0.000
Western MD Health System - Parish Nursing Program	6	13	84.539
PharmaCare	9	0	4.606
PharmaCare, Community Health & Wellness	9	24	199.295
Priority Partners MCO	0	9	19.988
Southern High School	7	0	6.021
Tri-State Community Health Center	10	29	250.353
University of Maryland Extension	12	24	346.746
Uno Pizzeria & Grill	15	32	407.424
Western Maryland Area Health Education Center	8	0	3.380
Western Maryland Health System	6	22	89.877
Western Maryland Medical Center	10	0	4.781
Western Maryland Regional Health Center, out-patient dialysis	8	0	4.090
Western MD Health System - Center for Clinical Resources	5	0	0.529
Western MD Health System - Diabetes Clinic	7	0	0.355
Western MD Health System - Pulmonary Rehab	5	0	0.000
YMCA	4	2	1.122
Yough Glades Elementary School	7	0	0.743

APPENDIX F: LOWER SHORE ORGANIZATIONS – DEGREE AND CENTRALITY SCORES

Organization	In-Degree	Out-Degree	Betweenness Centrality
American Heart Association	9	0	69.785
Atlantic General Hospital	8	0	43.337
Carefirst BlueCross BlueShield	8	0	66.293
Casino at Ocean Downs	1	0	0.000
Chesapeake Multicultural Center	3	4	3.204
Chesapeake Pediatrics	1	0	0.000
Children’s Medical Group	1	0	0.000
City of Salisbury Government	2	0	1.425
Clear Channel Outdoor	3	0	6.955
Crisfield Clinic	5	0	4.339
Deer's Head Hospital Center	2	2	0.000
Hartley Hall Nursing Home	1	2	1.867
Herschel S. Horowitz Center for Health Literacy, University of Maryland	3	5	37.129
HOPE	1	10	48.352
Kent County Health Department	3	0	2.167
Lower Shore Family YMCA	9	9	116.522
Maintaining Active Citizens (MAC)	8	33	1132.430
McCready Foundation	8	0	15.749
Mt. Zion United Methodist Church	2	0	0.000
Ocean Pines Association	1	0	0.000
Peninsula Home Care	2	5	3.666
Peninsula Regional Medical Center	12	0	101.553
Pocomoke Elementary School	4	0	6.031
Pocomoke High School	3	0	0.000
Pocomoke Middle School	4	0	6.031
Pocomoke River State Park	2	0	0.000
Pocomoke Senior Center	1	0	0.000
Pocomoke Volunteer Fire Dept.	2	0	0.000
Public Access Channel PAC-14	3	3	5.981
Queen Anne's County Dept. of Aging (M4A)	1	0	0.000
ReConnections	1	8	37.714
Richard A. Henson YMCA	5	13	310.380
Salisbury Area Chamber of Commerce	2	0	0.000
Salisbury University	8	0	35.864
Shore Health Regional Medical Center	2	0	1.104

Organization	In-Degree	Out-Degree	Betweenness Centrality
Snow Hill Volunteer Fire Department	2	0	0.000
Somerset County Dept. of Parks & Recreation	2	0	0.000
Somerset County Health Department	7	7	49.460
Somerset County Health Department, Behavioral Health	0	12	59.074
Somerset Wellness Center	5	9	163.223
St. Paul's United Methodist Church	4	0	2.349
Taylor Bank	1	0	0.000
The Daily Times	4	0	6.010
Three Lower Counties (FQHC)	9	0	25.957
Three Lower Counties Community Services	8	7	70.716
Town of Berlin	3	5	4.341
Town of Ocean City - Parks and Recreation	2	0	0.000
Town of Snow Hill	2	0	0.000
VQHC	0	2	0.000
WBOC-TV 16	7	0	28.949
Wicomico County Board Of Education	4	0	10.409
Wicomico County Dept. of Recreation, Parks, and Tourism	2	0	0.000
Wicomico County Government	5	0	9.023
Wicomico County Health Department	12	30	716.179
Wicomico County Public Schools	2	7	35.835
Wicomico Public Libraries	1	2	0.400
Wicomico YMCA	3	0	4.098
WMDT-TV 47	7	0	52.189
Worcester County Board of Education	2	25	445.454
Worcester County Commission on Aging	3	0	6.856
Worcester County Department of Recreation and Parks	2	0	0.000
Worcester County Developmental Center	2	0	0.000
Worcester County Government	3	4	15.384
Worcester County Health Department	14	32	1711.331
Worcester County Local Management Board	4	0	1.458
Worcester County Parks and Recreation	4	0	1.733
Worcester County Public Schools	0	10	31.736
YMCA of the Chesapeake	0	11	47.960

APPENDIX G: CAROLINE AND DORCHESTER COUNTY ORGANIZATIONS – DEGREE AND CENTRALITY SCORES

Organization	In-Degree	Out-Degree	Betweenness Centrality
4-H Cooperative Extension	6	0	0.881
Access to Wholistic & Productive Living Institute, Inc. (AWPLI)	1	10	11.322
Affiliated Sante Group	7	0	0.166
American Diabetes Association	14	0	8.389
American Heart Association	15	0	14.429
Associated Black Charities	20	45	493.092
Atlantic General Hospital System	4	0	0.000
Caroline Co. Board of Education	4	0	0.000
Caroline Co. Parks and Recreation	3	0	0.000
Caroline County Department of Social Services	8	2	2.472
Caroline County Family YMCA	0	3	0.133
Caroline County Health Department	18	17	311.947
Caroline County Health Department - Wellness Programs	0	15	38.613
Caroline County Health Dept. - Women, Infants, and Children (WIC)	11	0	7.498
Centers for Disease Control	12	0	47.292
Channel Marker Mental Health Support	6	0	0.000
Chesapeake Hyatt	5	0	0.293
Chesapeake Multicultural Resource Center	9	10	14.539
Chesapeake Voyagers, Inc.	5	0	0.166
Chesapeake Women's Health	6	0	0.311
Chester River Health	5	0	0.611
Choptank Community Health Systems	16	34	311.345
Choptank Transport	4	2	1.866
Community Foundation of the Eastern Shore	6	0	0.000
Crossroads Community Incorporation	7	0	0.505
DHMH - Healthiest Maryland Businesses - Lower Eastern Shore	16	9	102.615
Dorchester Childcare Association	4	0	0.159
Dorchester Co. Health Dept. Health Enterprise Zone	16	0	62.308
Dorchester County Department of Social Services	11	0	7.134
Dorchester County Health Department	15	50	828.210
Dorchester County Health Department - Community Outreach	0	34	233.808
Dorchester County Health Department - Health Education	0	58	966.513
Dorchester County Health Department - School-based Wellness	9	4	10.138
Dorchester County Public Schools	6	0	1.260

Organization	In-Degree	Out-Degree	Betweenness Centrality
Dorchester County Recreation & Parks	4	0	0.000
Dorchester County Wellness Coalition	11	0	1.976
Dorchester County YMCA	9	19	60.390
Dorchester County YMCA - Chronic Disease Prevention	0	3	0.604
Dorchester Early Head Start Program	7	4	2.286
Dorchester Ministerial Association	7	0	2.131
Down To Earth Deliverance Ministries	3	0	0.000
Dri-Dock Recovery and Wellness Center	11	0	2.036
Eastern Shore Area Health Education Center	12	37	303.653
Good Shepherd's Ministerial Association	4	0	0.159
Harvesting Hope	5	1	0.159
Internal Medicine - Dr. Mary-Anne Moore	6	0	0.320
Judy Center	12	0	11.045
Komen Foundation Breast Cancer Consortium	5	0	1.380
Maryland ACO of Western Maryland	0	0	0.000
Maintaining Active Citizens (MAC)	8	16	69.827
Maryland Health Connection - Dorchester Navigator	7	59	979.414
Maryland Healthy Weighs	7	12	16.746
Maryland Rural Health Association	6	0	0.186
Meant to Be	3	0	0.065
MedChi	4	0	0.061
N. Dorchester African & All Americans Indep. Growth Alliance	6	0	0.727
Old Trinity Church	4	6	6.953
Partnership for a Drug-Free Dorchester	7	0	0.061
Peninsula Home Care	4	0	0.000
Peninsula Regional Medical Center	8	11	54.334
Rose Hill Practitioners	5	0	0.166
Screenvision Cinema Advertising	2	0	0.000
Shore Health Systems	18	0	65.115
Shore Pediatrics	5	0	0.500
South Dorchester Good Neighbor	3	0	0.000
St. Luke's Church	7	0	6.269
Sugar Free Kids Maryland	4	0	0.000
Three Lower Counties Community Health System	8	0	2.084
Union Bethel AME Church	12	15	126.351
Univ. of Md - Shore Health Breast Cancer Center	4	0	0.000
University of Maryland - Extension	8	0	3.057
University of Maryland - Shore Regional Health	0	43	420.130
University of Maryland - Shore Regional Health (Easton)	9	8	30.792

Organization	In-Degree	Out-Degree	Betweenness Centrality
University of Maryland Eastern Shore - School of Pharmacy	9	10	39.420
University of Maryland Eastern Shore - School of Pharmacy - Evaluation	4	21	53.267
Visions America Healthcare	4	0	0.000
Waugh Chapel United Methodist Church	6	5	0.493
Wicomico County Health Department	8	0	1.131
WMDT - Channel 47	6	0	0.299
YMCA of the Chesapeake	12	7	57.911
Zeta Phi Beta Sorority - Stork's Nest Program	7	0	0.493