

(FOOD) BANKING ON NETWORKS:
SOCIAL NETWORK ANALYSIS OF MARYLAND FOOD NETWORKS

by

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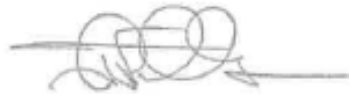
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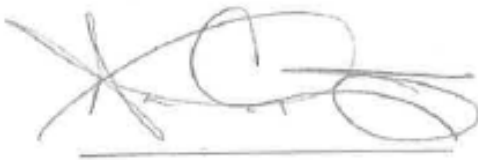
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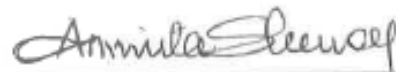
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ABSTRACT

(Food) banking on networks: Social network analysis of Maryland food networks

This study explored the existence and role of food networks in food access in Maryland, the significantly higher food insecurity rates in Allegany, Baltimore City, Dorchester, and Somerset Counties, and the relationship between food security rates and network structure. Despite significant literature on food security and equity, research on social networks addressing gaps in formal food systems is limited. Phase one of this study was in-person semi-structured interviews with staff from regional offices of the Maryland Food Bank and a representative of a nonprofit food pantry. Phase two was a snowball sample survey to identify relevant organizations in Maryland. Phase three was a social network analysis (SNA) survey of identified organizations to collect quantitative and qualitative data about networks. Phase four was semi-structured interviews with key hubs quantitatively identified by SNA survey data.

Five serendipitous regional networks and a centralized statewide network were identified. Qualitative data indicated the role of networks is vital for food security efforts in Maryland, yet quantitative data indicated that regional disparities are reflected in network structures. Quantitatively, network structure varied by region. Regions with greater inequities and disparities had simple and less connected. Those regional networks arguably reflected the inequities they served. There were concerning patterns between regional networks, food security rates, and regional inequities and disparities for the most insecure Maryland counties. Identifying these networks was a first step toward moral and ethical public administration obligations: using this information to address food security and social inequities to increase affordable and sustainable access to healthy food for low-income populations. Social networks represent an untapped resource addressing inequities for vulnerable populations.

Keywords: Food security, Social Network Analysis, social equity, regional disparities

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INTRODUCTION

Introduction

Every human must consume calories to survive and must eat healthily to thrive; quantity and quality of calories plays a fundamental role in whether a human survives or thrives. This universally accepted fact lies at the foundation of this dissertation. The U.S. Department of Health and Human Services (HHS) (2017) and the Centers for Disease Control and Prevention (CDC) (2018) emphasize the role of nutrition in preventing obesity, “heart disease, hypertension (high blood pressure), type 2 diabetes, osteoporosis, and certain types of cancer” (para. 5). Low-income and vulnerable populations are more likely to struggle with food security, which can affect diet choices. Healthy diets affect quality and length of lives while poor diets—commonly associated with low-income populations struggling with limited access to healthy foods—can have lifelong effects which extend beyond physical ailments. Poor diets can affect brain development as well as non-cognitive skills including “interpersonal relations, self-control, and approaches to learning” (Howard, 2011, p. 173). Healthy diets lead to healthy populations; low food security threatens lives and public health overall.

The motivation driving this dissertation is the desire to identify and understand the food security-related social networks present in Maryland. Networks deliver food where other systems fail. This will improve social equity in the long-term by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. This is important for low-income populations because food security will improve health outcomes, improve children’s physical and mental development, improve overall quality of life, and increase life expectancy (Hartline-Grafton & Dean, 2017). Food security challenges of low-income populations affect society at large; everyone from newborns to older populations are

affected by food security. Food security is one of the most basic elements of survival and cannot be ignored without detrimental effects on all populations regardless of income.

Understanding the social equity challenges of food security is a complex task with multiple layers, many of which exceed the scope of this study. While the scope of the study does not allow for an exhaustive understanding of the relationship between social equity and food security, it is essential to understand food security in the broader context of social equity. Research indicates a strong relationship between food security rates of a region and social inequities (Weiler, Hergesheimer, Brisbois, Wittman, Yassi, & Spiegel, 2015; Raja, 2020). The next few sections introduce social equity, food security in general, the rural-urban divide's effects on food security, food security in Maryland, and the study's research questions as well as the significance of this study.

Social Equity

The Black Law Dictionary (n.d.) defines equity as “the spirit and the habit of fairness, justness, and right dealing which would regulate the intercourse of [humans with other humans]” (para. 1). Fairness and justness are two vital concepts present from the very beginning of the United States as evidenced by the wording of the Declaration of Independence: “We hold these truths to be self-evident, that **all men are created equal**, that they are endowed by their Creator with **certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness**” (emphasis added) (National Archives, 2020, para. 2). As a nation, the United States identified equality as a fundamental building block of its society and government. It is irresponsible and unethical to leave equity out of administration. Social equity received significant attention and was recommended as a foundational tier of public administration in the late 1960s during a conference of young scholars in Minnowbrook, New York, marking a significant shift in theory from Wilson's (1887) politics-administration dichotomy. The social networks explored in this study are believed to fill in the gaps left by traditional administration failing to address equity.

Wilson's (1887) politics-administration dichotomy was founded on the belief that administration is a business function and should be kept separate from politics, but this approach leaves little room for considering equity in policymaking and administration. Advocates of the shift in theory from value-neutral to equity-based administration argued

that administration cannot be valueless and must instead reflect the values of the population served with emphasis on addressing inequality while striving for social equity (Norman-Major, 2011). The National Academy of Public Administration formally identified social equity as the fourth pillar of public administration in 2005 (Norman-Major, 2011). Equity continues to receive less attention than the three other pillars which include “economy, efficiency, and effectiveness when developing and implementing public policies” (Norman-Major, 2011, p. 234). This lack of attention to equity affects millions of U.S. citizens, particularly as it comes to food security-related policies.

Social equity encompasses several problems which far exceed the scope of this dissertation. Food security is one element of the much bigger picture of social equity and the primary focus of this dissertation. The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland which affect food security. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland.

Food Security

Social equity is complex, but perhaps one of the most straightforward indicators of social equity is a population’s overall food security. In an equitable society, two random individuals would have the same access to healthy, culturally acceptable foods through culturally acceptable means (i.e., food security). Food security is affected by a wide range of variables ranging from individual characteristics to the built world around them; “[h]ealth, income, mobility, and other inequities are institutionalized in policies and practices that disproportionately limit opportunity and assign burden to groups based on race, age, gender, sexual orientation, immigration status, religion, or disability” (American Planning Association, n.d., para. 1). Institutionalized and systemic barriers make food security an unacceptable life-altering struggle for low-income and vulnerable populations struggling to survive in a world rife with inequity.

Whether or not everyone has affordable, reliable access to food is a clear indicator of how equitable life is for someone regardless of the family or neighborhood into which they were born. The definition of food security has changed over time but at its most basic level it speaks to an individual’s ability to consistently access a sufficient quantity

and quality food (National Agricultural Statistics Service, 2019). Low food security and hunger affect “more than 820 million people in the world” (FAO, IFAD, UNICEF, WFP, & WHO, 2019, p. 3). Low food security affected 11.1% of households in the United States on average from 2016-2018 (Coleman-Jensen, Gregory, & Rabbitt, 2019). In 2018, 11.1% (2,322,000) of households in Maryland were food insecure and 5.2% (1,098,700) had very low food security (Food Research & Action Center, 2019, p. 1). Low food security and very low food security consistently result in diets high in saturated fats and sugar, highlighting the quantity versus quality issue with calories and nutrition (Tomayko, Mosso, Cronin, Carmichael, Kim, Parker, Yaroach, & Adams, 2017; Nguyen, Shuval, Bertmann, & Yaroach, 2017). High numbers of poor-quality calories may enable someone to survive but they are unlikely to thrive. The combination of poverty, low food security, and resulting poor diets have compounding effects that keep low-income populations in cycles of poverty and poor health, particularly vulnerable populations such as those experiencing homelessness or living with disabilities (Finney Rutten, Yaroach, Colón-Ramos, Johnson-Askew, & Story, 2010; Parpouchi & Somers, 2019). Social equity, or lack thereof, is apparent in the number of people who struggle to feed themselves and their families safely, consistently, and healthily. While many associate social inequities with urban populations, these inequities carry over into rural areas as well.

Rural versus Urban Food Security

Rural and urban are concepts which receive too little attention in food security and food policy discussions. Living in a rural setting is vastly different from urban living in many ways; housing, job opportunities, economic stability, education, and food shopping options are drastically different than in urban settings. Limited options for groceries force some rural populations to drive significant distances to get food, using a cooler to keep frozen and cold foods safe by the time they get home. Urban residents may have closer proximity to more shopping and grocery options, but may not have access to transportation, live in a low-income or high crime neighborhood, and may only have access to low-paying employment in their area. The differences in challenges are important to consider when discussing food security; rural and urban food security are

two different issues with some overlap on different scales due to bigger-picture social inequities.

Low-income and vulnerable populations exist in both rural and urban settings, but their experiences differ. Urban populations are commonly considered to be populations larger than 2,500 residents in “[c]ore census block groups or blocks that have a population density of at least 1,000 people per square mile and surrounding census blocks that have an overall density of at least 500 people per square mile” (Cromartie, 2019, p. 10). USDA ERS emphasizes the diverse range of ideas for what constitutes a rural population but notes that common variables used include population density and geographic isolation. The U.S. Census Bureau bases its definition of rural on population density, and “[a]ccording to the current delineation [r]ural areas comprise open country and settlements with fewer than 2,500 residents” (Cromartie, 2019, para. 12). The Rural Maryland Council identifies counties as rural by identifying those with “common characteristics that set them apart from their suburban and urban counterparts, such as geographic isolation, lack of transportation, and lack of access to and availability of health care” (Rural Maryland Council, 2020, para. 5). Eighteen of Maryland’s 24 counties (75%) are considered rural. Rural Maryland counties include: Allegany, Calvert, Caroline, Carroll, Cecil, Charles, Dorchester, Frederick, Garrett, Harford, Kent, Queen Anne’s, Somerset, St. Mary’s, Talbot, Washington, Wicomico, and Worcester Counties (Rural Maryland Council, 2020, para. 6). The remaining six counties (25%) are considered urban or suburban and include: Anne Arundel, Baltimore, Baltimore City, Howard, Montgomery, and Prince George’s Counties (Rural Maryland Council, 2020).

The six urban and suburban Maryland counties have drastically different food security challenges than rural counties. Figure 1 is a map of low food security rates by county in Maryland. Most of the counties in the state are a light green, which indicates a low food security rate between four percent and 14%. Four counties are one indicator level darker and have a low food security rate between 15% and 19%. The four counties with the greatest low food security rates are noteworthy because one out of four is an urban area (Baltimore City) while the other three are rural areas in western and southeastern Maryland. This pattern of primarily rural land areas in Maryland struggling with issues of and related to food security is demonstrated throughout this dissertation.

Figure 2 provides an overview of low food security data in Maryland, highlighting that there were 667,110 food insecure people in 2018 for a total state rate of approximately 11% (Feeding America, 2020). Table 1 shows the breakdown of food security rates by county and notes whether the county is rural or urban. In addition to county-level low food security rates, pockets known as healthy food priority access areas within more food secure areas may have higher rates of low food security.

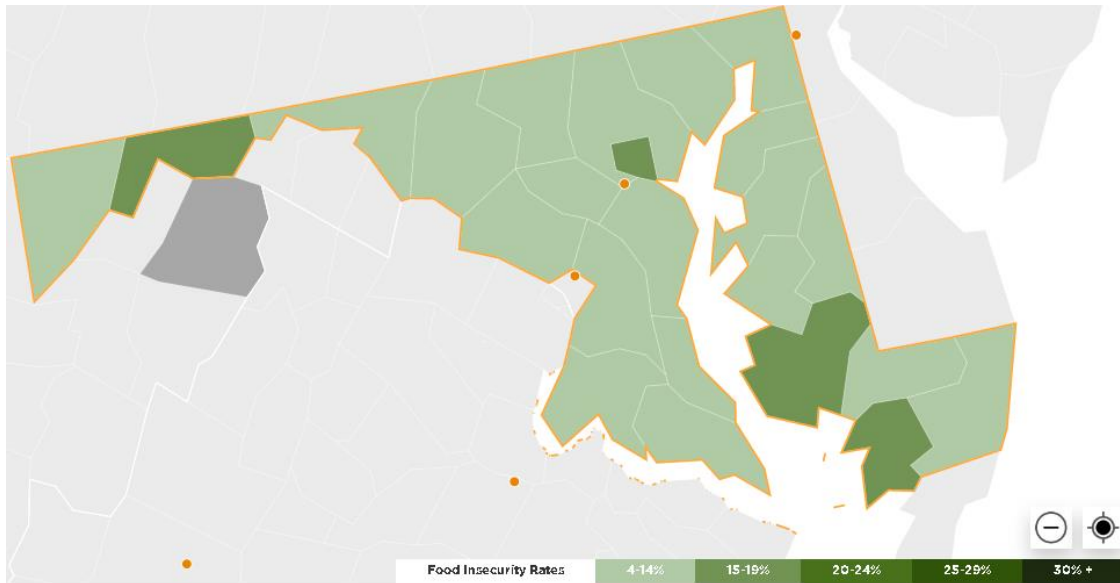


Figure 1: 2018 food security rates in Maryland

Source: Feeding America. (2020). Food Insecurity in Maryland.

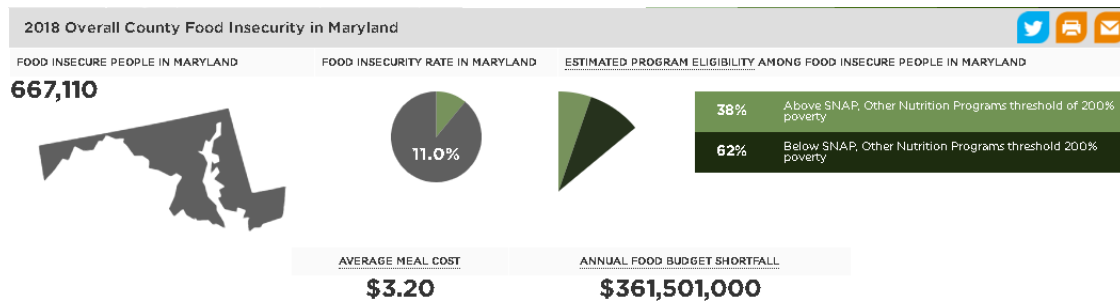


Figure 2: 2018 overall county food security in Maryland

Source: Feeding America. (2020). Food Insecurity in Maryland.

Table 1: Maryland counties by urbanness and food security rate (2020)

Maryland County	Rural or Urban	Population	County Food Security Rate (%)
Allegany County	Rural	71,977	15.1
Anne Arundel County	Urban	567,696	8.5
Baltimore City	Urban	614,700	18.0
Baltimore County	Urban	827,625	11.0
Calvert County	Rural	91,082	8.0
Caroline County	Rural	32,875	12.8
Carroll County	Rural	167,522	8.1
Cecil County	Urban	102,517	11.0
Charles County	Rural	157,671	8.9
Dorchester County	Rural	32,261	14.8
Frederick County	Rural	248,472	8.9
Garrett County	Rural	29,376	12.2
Harford County	Rural	251,025	9.3
Howard County	Urban	315,327	7.4
Kent County	Rural	19,593	12.3
Montgomery County	Urban	1,040,133	8.0
Prince George's County	Urban	906,202	10.3
Queen Anne's County	Rural	49,355	8.0
St. Mary's County	Rural	111,531	10.3
Somerset County	Rural	25,737	16.6
Talbot County	Rural	37,211	11.0
Washington County	Rural	149,811	13.1
Wicomico County	Rural	102,172	13.3
Worcester County	Rural	51,564	13.3

Source: Feeding America. (2020). Food Insecurity in Maryland.

An important element to consider in analysis of the food security challenges in both rural and urban Maryland is the demographic makeup by county. Demographic statistics help identify trends which may indicate specific, localized inequities in a county and can help to better understand the scenario in each of the four counties identified with higher rates of low food security. Maryland is a relatively diverse state with 51.4% Caucasian, 29.3% black, 9.8% Hispanic, and 6.2% Asian residents. The remaining 3.3% of residents statewide include 0.2% Native American/Alaska Native, less than one tenth of a percent Native Hawaiian/Other Pacific Islander, 0.3% some other race, and 2.8% two or more races (Ficenec & Gourrier, 2020).

Rural and urban Maryland county demographic data may play a role in the social inequities currently addressed by informal social networks. As shown in Table 2, Allegany County's racial and ethnic demographics are markedly different from statewide data with 35.7% more Caucasian residents and 21.1% fewer black residents as well as a

significantly smaller proportion of Hispanic and Asian residents. Baltimore City, unlike Allegany, has a significantly higher proportion of black residents than Caucasian residents compared to statewide data. Dorchester has a higher proportion of Caucasian residents and comparable proportion of black residents, but lower Hispanic and Asian populations. Somerset County is comparable and relatively proportionate to statewide racial and ethnic demographic data. From a racial and ethnic demographic perspective, two of the four counties differ from state averages while two do not. This may indicate localized inequities, or it may indicate that demographics play a minor or negligible role in food security and social equity of counties in Maryland.

Table 2: Four Maryland counties by race and ethnicity

	Caucasian	Black	Hispanic	Asian
Allegany County	87.1%	8.2%	1.8%	0.9%
Baltimore City	27.5%	61.9%	5.1%	2.6%
Dorchester County	63.3%	26.8%	5.3%	1.0%
Somerset County	51.5%	41.9%	3.5%	1.0%
Statewide	51.4%	29.3%	9.8%	6.2%

Source: Ficenec & Gourrier. (2020). The impacts of the benefits cliff on Maryland working families.

Maryland is almost evenly split between male and female residents. Females in Maryland account for 51.8 percent of the population. The age breakdowns for the state are shown in Table 3. Allegany County is very close to statewide gender and age demographics, but Baltimore City has a higher population under 18, ages 21-29, and ages 30-39. Baltimore City's population of 65+ is lower than the statewide average. Dorchester County has a higher population under 18, a lower population ages 18-20, and a slightly higher population for ages 60-64 compared to statewide data. Somerset County is similar to state rates except for a higher percentage of the population between 21-29 and lower population of 65+ compared to statewide data. Somerset County Food Supplement Program recipients are fairly similar to statewide data, but Allegany County, Baltimore City, and Dorchester County have a lower percentage of children (under 18) receiving benefits compared to statewide data. Allegany County's rate is 8% lower than the statewide data (Ficenec & Gourrier, 2020).

Table 3: Four Maryland counties by gender and age

	Female	Under 18	18-20	21-29	30-39	40-49	50-59	60-64	65+
Allegany County	50.6%	17.5%	6.3%	12.6%	11.6%	12.4%	14.0%	6.0%	19.6%
Baltimore City	53.4%	20.9%	4.3%	15.8%	15.6%	11.1%	13.0%	6.0%	13.2%
Dorchester County	52.6%	21.2%	2.5%	11.0%	10.3%	11.9%	15.4%	7.3%	20.5%
Somerset County	54.5%	17.0%	7.4%	17.0%	12.85 %	10.7%	12.5%	6.8%	15.8%
Statewide	51.8%	17.5%	6.3%	12.6%	11.6%	12.4%	14.0%	6.0%	19.6%

Source: Ficenec & Gourrier. (2020). The impacts of the benefits cliff on Maryland working families.

Asset Limited, Income Constrained, Employed, or ALICE, refers to households in which individuals work but “their incomes are insufficient for predictably sustained economic viability” (Ficenec & Gourrier, 2020, p. 1). ALICE households balance on a tightrope that can easily snap due to an accident, illness, or unexpected bill. *Table 4* shows the ALICE survival budgets and stability budgets for Maryland households of different compositions. As the names imply, a survival budget is the lowest income a household can earn to cover basic survival expenses. Table 5 outlines the minimum essentials of a survival budget by household composition. A stability budget looks one step further by accounting for “slightly more necessities and even some funds for savings” (Ficenec & Gourrier, 2020, p. 116).

Table 4: Maryland ALICE survival and stability budgets by family composition

Household Size	ALICE Survival Budget			ALICE Stability Budget		
	Monthly	Annual	Hourly	Monthly	Annual	Hourly
1 Adult	\$2,171	\$26,052	\$13.03	\$3,374	\$40,488	\$20.24
Married Couple	\$3,033	\$36,396	\$18.20	\$5,527	\$66,324	\$33.16
1 Adult, 1 Infant, 1 Preschooler	\$4,221	\$50,655	\$25.32	\$6,837	\$82,044	\$41.02
2 Adults, 1 Infant, 1 Preschooler	\$5,806	\$69,672	\$34.84	\$10,839	\$130,068	\$65.03
2 Adults, 2 School-Age Children	\$5,163	\$61,956	\$30.98	\$9,567	\$114,804	\$57.40

Source: Ficenec & Gourrier. (2020). The impacts of the benefits cliff on Maryland working families.

Table 5: Maryland ALICE household survival budget by monthly expenses

	1 Adult Household	1 Adult, 2 Children Household	2 Adults, 2 Children Household
Monthly Costs			
Housing	\$827	\$1,063	\$1,165
Child Care	\$0	\$764	\$1,252
Food	\$182	\$321	\$603
Transportation	\$337	\$472	\$667
Health Care	\$217	\$584	\$811
Miscellaneous	\$197	\$384	\$528
Technology	\$55	\$62	\$75
Taxes	\$356	\$572	\$705
Totals			
e	42,171	\$4,221	\$5,806
Annual Total	\$26,052	\$50,655	\$69,672
Hourly Wage	\$13.03	\$25.32	\$34.84

Source: Ficenec & Gourrier. (2020). The impacts of the benefits cliff on Maryland working families.

Comparing ALICE survival and stability budgets against summative county demographics for Allegany County, Baltimore City, Dorchester County, and Somerset County is eye-opening (Table 6). Median household income is lower in all four regions (although this could be a nonissue depending on household composition), the share of individuals in poverty ranges 6.8% to 12.8% higher than statewide levels, unemployment is 0.8% to 2.1% higher than statewide levels, and the percent of each population receiving Food Supplement Program (FSP) benefits is 10.0% to 47.1% higher than statewide levels.

Table 6: Summative county demographics

	Pop.	Median household income	ALICE survival budget: 2 adults, 2 children	Gap: median household income, ALICE budget	Percent individuals in poverty	Unempl. rate (Nov. 2019)	Percent pop. receiving FSP
Allegany County	71,977	\$44,065	\$51,432	- \$7,367	16.4%	4.6%	24.7%
Baltimore City	614,700	\$48,840	\$64,392	- \$15,552	21.8%	4.6%	36.1%
Dorchester County	32,261	\$52,145	\$59,088	- \$6,943	15.8%	4.2%	30.7%
Somerset County	25,737	\$42,165	\$53,664	- \$11,499	20.4%	5.5%	61.8%
Statewide	6,003,435	\$81,868	\$69,672	+ \$12,196	9.0%	3.4%	14.7%

Adapted from: Ficenec & Gourrier. (2020). The impacts of the benefits cliff on Maryland working families.

From a racial and ethnic demographic perspective, two of the four counties differ from state averages while two do not. Somerset County Food Supplement Program recipients are similar to statewide data, but Allegany County, Baltimore City, and Dorchester County have a lower percentage of children (under 18) receiving benefits compared to statewide data. All four counties have a median household income below their county ALICE survival budget (for two adult, two child family). All four counties have notably higher rates of poverty, unemployment, and percent of their population receiving Food Supplement Program benefits. Each of these variables alone could be cause for concern, but collectively they compound on each other and paint a dire picture for residents of Allegany County, Baltimore City, Dorchester County, and Somerset County. Demographics tell part of the story, but it is important to consider other indicators such as healthy food priority access areas alongside demographics to develop a fuller understanding of the food security challenges in these areas.

Healthy Food Priority Access Areas

Healthy food priority access areas¹ in urban settings are defined as:

an area where the average Healthy Food Availability Index (HFAI) score for all food stores is low (0-9.5), the median household income is at or below 185 percent of the Federal Poverty Level, over 30 percent of

¹ Commonly known as food deserts. Terms may be used interchangeably.

households have no vehicle available, and the distance to a supermarket is more than 1/4 mile (Misiaszek, Buzogany, & Freishtat, 2018, para. 4).

Healthy food priority access areas (food deserts) in rural areas have a different definition than in urban areas due to the distinct differences between urban and rural areas (e.g., geographical spreading, limited transportation, lower population density). Rural food deserts are “low-income tracts with a significant number or share of residents more than 10 miles from a supermarket or large grocery store” (Ver Ploeg, Nulph, & Williams, 2011, para. 7). The difference between a quarter mile and ten miles is apparent and signals to the geographical spreading combined with lower population density which are two key elements of the difference between rural and urban areas. Both scenarios highlight social inequities relating to access to healthy foods and related health outcomes.

Rural and urban low-income populations are both likely to be plagued with access to cheap and poor nutritional quality foods. Rural low-income populations are more likely to struggle with “geographic isolation, lack of transportation, and lack of access to and availability of health care” (n.d., para. 5), all of which drastically affect an individual’s ability to obtain healthy, nutritious foods in sufficient quantities and get sufficient healthcare to know when their diets need to change for survival. Figure 3 shows areas with limited access to supermarkets as well as areas identified by the USDA as being both low access and low income. While difficult to see at this scale, Figure 3 also shows healthy food priority areas exclusively in Baltimore City. The areas identified align with the four counties identified as having the most significant food security challenges in Maryland. Food security is at the heart of this dissertation and understanding the differences in barriers for populations struggling with food security is essential to increasing access to affordable and healthy food. These differences can be used to guide policy by allowing for focusing resources where they are most needed rather than relying on one-size-fits-all blanket policies.

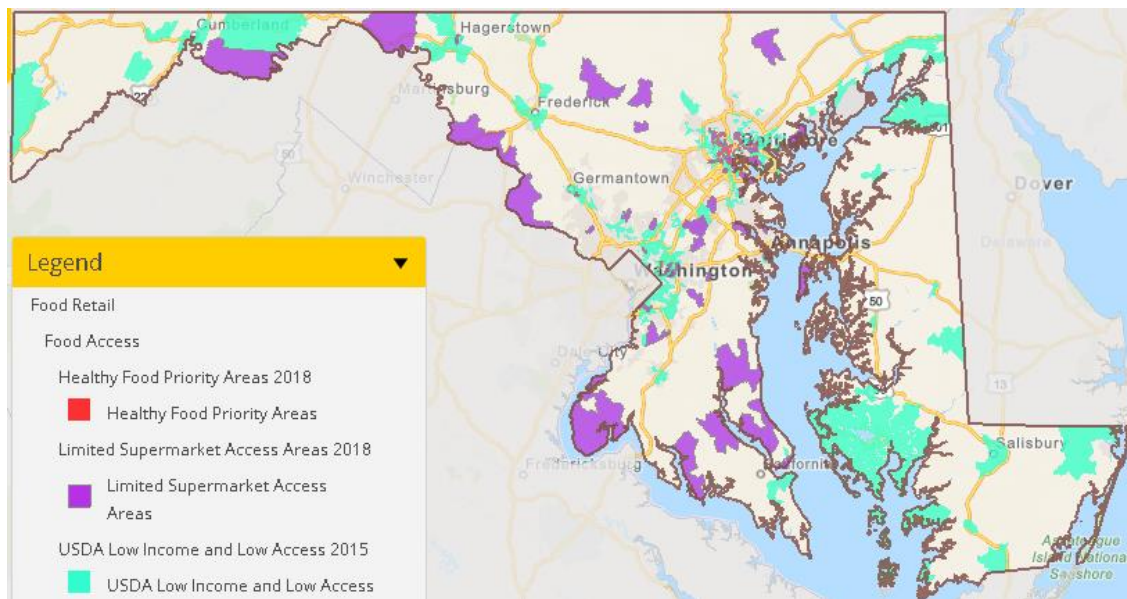


Figure 3: Limited food access and/or low-income areas in Maryland

Source: Johns Hopkins Center for a Livable Future. (n.d.). Maryland Food System Map. Retrieved from <https://mdfoodsystemmap.org/>.

Urban food security challenges are well represented in research (Ackerman, Conard, Culligan, Plunz, Sutto & Whittinghill, 2013; Ikejima, 2018; Pawlowski, 2018; Rogus, 2015), but rural food security receives less attention (despite sharing many of the same challenges on different scales of distance, density, and access). This significant representation of urban food security challenges in research is demonstrated by the fact that healthy food priority areas are only identified in the Baltimore City area in Figure 3. Ruralness is important to consider when exploring access to healthy food in Maryland. Dutko, Ver Ploeg, and Farrigan (2012) suggest “the most important factor in rural areas [is] lack of transportation infrastructure” (p. 4). Limited transportation infrastructure combined with increased geographic distances, fewer and lower-paying jobs, and limited technical resources such as internet access and equipment for card-based transactions at farmers markets (Bertmann, Ohbri-Vachaspati, Buman, & Wharton, 2012, p. e53) create a challenging environment for populations to access healthy, affordable food. Social interaction and resulting social networks play a vital role in rural areas; these networks provide “camaraderie and relationship building; education; resource sharing; economic and financial exchange; community ownership; and conflict resolution” (Alia, Freedman, Brandt, & Browne, 2014, p. 342). In other words, **people have learned to rely on each**

other in social networks to make ends meet. This increases chances of survival but not chances of populations overcoming hurdles to thrive.

Maryland Food Security

Resource allocations and food policy should be guided by carefully developed approaches which account for the differences in rural and urban counties as well as challenges faced by different communities. Social equity must be a fundamental, prioritized priority in policy. Maryland had a 2016-18 household low food security rate of approximately 11% (Coleman-Jensen, Rabbitt, Gregory, & Singh, 2018). This means that one in 10 individuals in Maryland suffered from low food security. The state's pockets of low-income and low-access areas cluster in the northwest, central, and southeastern regions of the state, much like what is shown in Figure 1. The northwest and southeastern regions of Maryland are rural while central Maryland is urban. The pockets of low-income and low-access populations in the northwest and southeast parts of Maryland are in rural areas while the central low-income and low-access populations in the Baltimore area and southcentral Maryland near Washington, D.C., are urban. The presence of food deserts in both rural and urban tracts emphasizes the importance of improving and sustaining access to healthy food across the state for low-income and low-access populations in Maryland, not just in population centers like Baltimore City. These areas consistently struggle across all indicators (e.g., food security, health services and access, income). Social equity is a challenge that necessitates policies adjusted to reflect the unique needs and barriers of populations; policymakers have a moral and ethical obligation to meet populations at their level and address systemic, institutionalized inequities.

Social networks and interactions in both rural and urban areas play a vital role in filling in the gaps in formal food networks (e.g., farmer sells products to distributor, distributor sells products to supermarkets, supermarkets sell products to consumers). It is difficult to overstate the role that informal social networks play. For organizations, “[social networks] enable[e] ... access [to] external resources and overcom[ing] internal constraints” (Henchion & Sorenson, 2012, p. 376); for individuals, the same concept applies as social networks enable individuals and their families to access resources and overcome barriers that otherwise may have proven insurmountable. Social networks and

interactions can lead to better outcomes for low-income and vulnerable populations where social equity fails them. Given that any genuine change in systemic or institutionalized inequities will take considerable time, the role of social networks becomes even more significant in addressing food security inequities.

Research Questions

Maryland's prevalence of populations struggling with a combination of barriers to food security including low-income, limited access to transportation, and limited access to supermarkets must find ways to obtain enough food to survive. One way that they achieve this is through the development of informal networks. Organizations throughout Maryland recognize this need and seek to improve food security for struggling Marylanders. They have come together to form networks to share resources. Understanding what those networks look like and how far resources are shared is vital information for guiding future resource allocations and influencing food policy discussion.

This dissertation is a mixed-methods study of Maryland's food access and food information social networks. This dissertation will explore and evaluate how formal and informal social networks provide food to low-income and vulnerable populations in Maryland. The following research questions will guide the study:

Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information social networks in Maryland?

Research Question 2 (RQ2): What role do social networks play in food access in Maryland?

Research Question 3 (RQ3): Does the structure of networks vary by region in Maryland?

Research Question 4 (RQ4): Does network structure vary with regional food security rates?

Each of these research questions will explore food security and the natural evolution of networks to improve food security outcomes for low-income and vulnerable populations. RQ1's focus on the way organizations interact will provide insights into patterns of communication. RQ2 focuses on a higher level, exploring how large (or small) a role social networks play in getting food into the hands of the populations which need it most. RQ3 considers the diversity of Maryland with rural and urban regions and explores whether the structure of networks vary by region. A natural continuation of RQ3 is to ask how regions interact with each other. Finally, RQ4 explores the effects (or lack thereof) of social networks on social inequity in Maryland by evaluating if network structure affects regional food security.

Significance

Social equity and food security go hand-in-hand. Many organizations and programs, government or otherwise, provide food to low-income and vulnerable populations. The cycle of poverty, food insecurity, and resulting poor diets have compounding effects that keep low-income populations in cycles of poverty and poor health, particularly vulnerable populations. The fact that “one out of three chronically ill adults [are] unable to afford medicine, food, or both” (Hartline-Grafton & Dean, 2017, p. 2) highlights that food security is a complex, multifaceted issue which permeates all elements of life. The goal of any charity or social service program should be to work itself out of business because it should not only address immediate concerns but also address the causes. Otherwise, the cycle of unmet need perpetuates, and the system continues to fail. One of the biggest challenges of addressing causes of low food security is the limitation of resources. This research will improve understanding of informal networks in Maryland that serve to communicate and transfer resources (e.g., food, food-related information) to areas which need them most. Improving the efficiency and efficacy of food networks will decommit resources which can be refocused on addressing systemic causes of food insecurity.

Conclusion

The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food

security for low-income populations in Maryland. Chapter 2 of this dissertation includes a review of food security literature including: rural versus urban food access, discrepancies and disparities, and vulnerable populations; the effects of low food security on public health, youth education, and the economy; and strategies to address low food security including the Supplemental Nutrition Assistance Program, food banks, nonprofit organizations, religious organizations, farmers markets, and urban agriculture followed by a discussion of the failings of each strategy. After exploring the literature, Social Network Analysis (SNA) is introduced in Chapter 3 as the theoretical framework of this dissertation based primarily on the inherently complex nature of networks and SNA's ability to provide a richer understanding of networks. The study's design including instrument design, study parameters, target population, and sampling is explained in Chapter 4. Chapter 5 discusses the methodology of the study including instrument administration and data analysis.

Social network analysis provides an opportunity to explore the formal and informal networks that have evolved to fill in the gaps in food systems for low-income and vulnerable populations in Maryland. Social networks are inherently complex, and a richer understanding will ensure useful data and results. Public administrators have a moral duty to conduct work which will benefit the public. Healthy diets lead to healthy populations; low food security threatens lives and public health overall. Understanding networks that help low-income and vulnerable populations access food will provide vital information for guiding future resource allocations and influencing food policy discussion in Maryland.

REVIEW OF THE LITERATURE

Introduction

The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. Due to food security playing such a fundamental role in survival, the effects of low food security are life-threatening and can impact a life from birth to death, not to mention the typical intergenerational effect on future generations. This literature review explores the topic of food security in general and its current impact in Maryland before exploring the differences in rural and urban food security challenges. Building from rural and urban food security differences, the next logical step is to explore the effects of discrepancies and disparities, both in rural and urban tracts, and commonalities between tracts with low-income populations. Finally, vulnerable populations and their unique experiences compounded by low food security are explored to understand the bigger picture of food security in Maryland. Each of these elements serves to underscore the pervasive effects of low food security and social inequities. Systemic and institutionalized inequities play a key role in the how different populations experience life in Maryland. This chapter looks first at food security challenges as they affect different populations, then the effects of low food security on society, followed by existing strategies to address low food security and their failings.

Social Equity

Social equity is at the heart of this dissertation because food security is an equity problem. There are different perspectives in food security and equity literature about what equity lens is most appropriate; some suggest that food security is a gender equity issue (Feeley, 2020; Harris-Fry, Nur, Shakar, Zanello, Srinivasan & Kadiyala, 2020;

Gorrepati, 2016), others suggest that it is a racial equity issue (Nitschke, 2017; Center for Social Inclusion, 2013; Burton, Espinoza, Fox, & Flores, 2018), and still others point to food security as a general equity issue with emphasis on rural and isolated communities, low-income or unemployed populations, and vulnerable or marginalized populations (Kirschner, 2016; Harris & Nisbett, 2018; Marguerite Casey Foundation, 2016). The breadth and depth of literature tying food security and different categories of social equity provides an overarching factor and fundamental principal of food security. Food security is a social equity problem.

Social equity received significant attention and was recommended as a foundational tier of public administration in the late 1960s during a conference of young scholars in Minnowbrook, New York, marking a significant shift in theory from Wilson's (1887) politics-administration dichotomy. The Black Law Dictionary (n.d.) defines equity as "the spirit and the habit of fairness, justness, and right dealing which would regulate the intercourse of [humans with other humans]" (para. 1). Fairness and justness are two vital concepts present from the very beginning of the United States as evidenced by the wording of the Declaration of Independence: "We hold these truths to be self-evident, that **all men are created equal**, that they are endowed by their Creator with **certain unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness** [emphasis added]" (National Archives, 2020, para. 2). As a nation, the United States identified equality as a fundamental building block of its society and government. It is irresponsible and unethical to leave equity out of administration.

Wilson's (1887) politics-administration dichotomy was founded on the belief that administration is a business function and should be kept separate from politics, but this approach leaves little room for considering equity in policymaking and administration. Advocates of the shift in theory from neutral to equity-based administration argued that administration cannot be valueless and must instead reflect the values of the population served with emphasis on addressing inequality while striving for social equity. The National Academy of Public Administration formally identified social equity as the fourth pillar of public administration in 2005 (Norman-Major, 2011). Equity continues to receive less attention than the three other pillars which include "economy, efficiency, and effectiveness when developing and implementing public policies" (Norman-Major, 2011,

p. 234). This lack of attention to equity affects millions of U.S. citizens, particularly as it comes to food security-related policies.

Food security as a social equity issue is supported extensively by literature in both the food security and social equity fields. Terms such as food justice and food sovereignty emerged to describe perspectives on how to identify and address food inequities. Food justice refers to “a holistic and structural view of the food system that sees healthy food as a human right and addresses structural barriers to that right” (FoodPrint, n.d., para. 5). Food sovereignty was coined by La Via Campesina in Mexico in 1996 and refers to the “view [of] food security as the right of peoples to define their own food and agriculture systems with limited corporation intervention” (Lin, 2017, p. 667). Food sovereignty gained a stronger foothold in the literature after being “inducted into China in 2013 just as China’s agricultural systems were shifting toward a more corporate-centric structure that increasingly exploit[ed] the small-scale farmers” (Lin, 2017, p. 667).

Food security and social equity naturally extend to include the connection between food security and health inequities. The relationship is straightforward: limited or no access to healthful foods leads to poor health outcomes and poor health outcomes have lifelong, often transgenerational, effects (Alia et al., 2013). Weiler, Hergesheimer, Brisbois, Wittman, Yessi & Spiegel (2015) emphasize that “social determinants such as gender, racialization, indigeneity, poverty, citizenship and HIV status tend to exacerbate or qualitatively alter people’s experience of health inequities in the food system” (p. 1083). Figure 4 is a representation of “pathways to health (in)equity through the food system” (Weiler et al., 2015, p. 1087). Depending on what pathway a population has access to, health impacts vary greatly. Systemic and institutionalized health inequities “are situated within deep imbalances of political, economic and social power in the food system” and create barriers for overcoming transgenerational inequities (Weiler et al., 2015, p. 1087). Struggles with low food security and social inequities in Maryland emphasize Weiler et al.’s (2015) assertion that these two variables have created cyclical, transgenerational challenges that are difficult to escape without intervention.

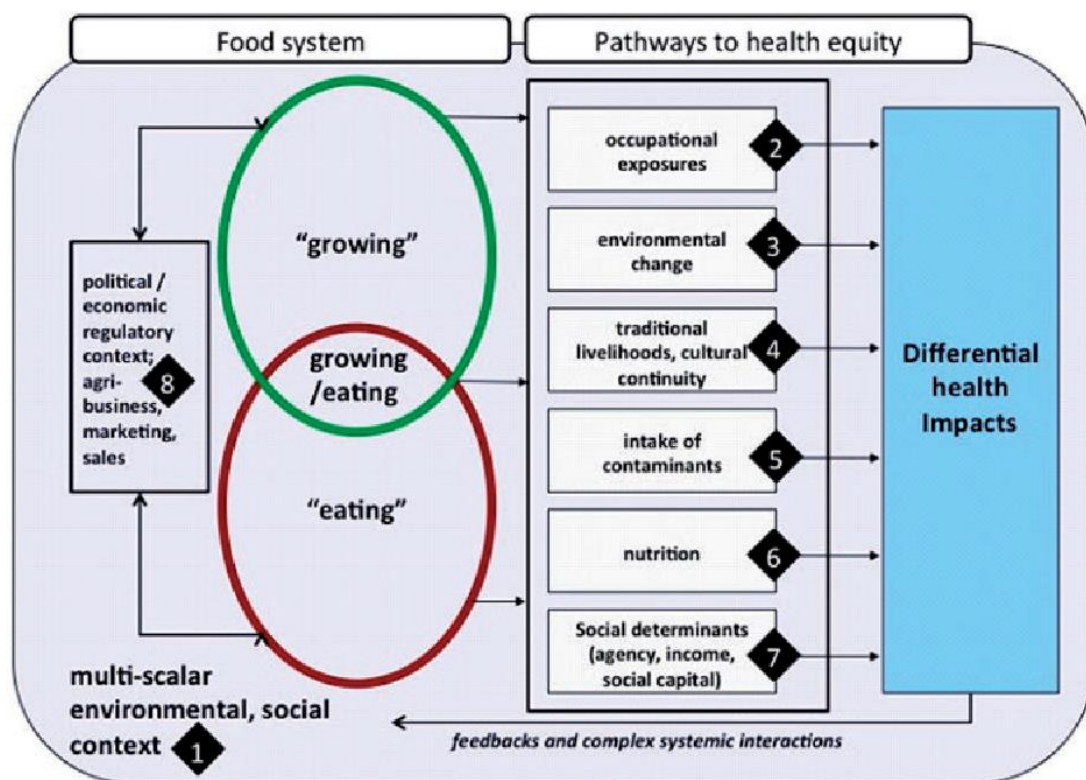


Figure 4: Pathways from food system processes to health equity

Source: Weiler et al. (2015). *Food sovereignty, food security and health equity: A meta-narrative mapping exercise*.

Social equity encompasses several problems which far exceed the scope of this dissertation. Food security is one element of the bigger picture of social equity and is the primary focus of this dissertation. The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland which affect food security. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland.

Food Security

Food security is a fundamental element of social equity. Low-income populations unable to consistently feed themselves and their families in a healthy manner struggle in ways that populations with livable incomes do not. Children who grow up in low-income households with insufficient food supply have higher “rates of asthma [and] dental caries,” and studies show that “by the time these children become teenage[rs] ... they have increased rates of aggression, mental health problems and delinquent behaviors, as

well as lower reading and math scores” (Lieberman & Merrick, 2009, p. 2). Children from low-income households are more likely to stop going to school before graduating high school (Lieberman & Merrick, 2009). These are just a few of many side-effects of low food security and social inequity, but the effects are pervasive, detrimental to overall quality of life, and cyclical for low-income populations. A child struggling with low food security is more likely to experience poor health and reduced benefits from education due to missing school and struggling to pay attention. That same child may grow up and raise a family in the same struggling area and never escape the food security cycle. This cyclical struggle with food security and resulting poor health, education, and income outcomes emphasize the systemic and institutionalized nature of social inequities.

Food security was defined in 1990 by the Life Sciences Research Office as:

access by all people at all times to enough food for an active, healthy life and includes at a minimum: 1) the ready availability of nutritionally adequate and safe foods, and b) the assured ability to acquire acceptable foods in socially acceptable ways (“Core indicators”, 1990, p. vi).

The USDA uses a simpler definition of low food security: “the limited or uncertain availability of nutritionally adequate and safe foods or limited or uncertain ability to acquire acceptable foods in socially acceptable ways” (Coleman-Jensen et al., 2019, para. 5). Food access is defined by the Agriculture and Development Economics Division of the Food and Agriculture Organization of the United Nations (2006) as “[a]ccess by individuals to adequate resources (entitlements) for acquiring appropriate foods for a nutritious diet” (p. 1). The mention of *socially acceptable* food acquisition is key. Humans are social beings and the weight of being poor has documented detrimental psychological effects (Santiago, Wadsworth, & Stump, 2011; Huston, 1999). The stress of worrying about where one’s next meal will come from compounded by psychological effects is an incredible burden.

The Economic Research Service (ERS) developed four conceptual levels of food security including high food security, marginal food security, low food security, and very low food security (Coleman-Jensen et al., 2019). Table 7 shows the levels of food security identified by the USDA ERS and definitions of the four levels. USDA ERS

updated food security definitions in 2006 to better clarify levels of food security; each food security level has its previously used label indicated in Table 7.

Table 7: USDA ERS levels of food security

Label	Definition
Food security	
High food security (Former label: food security)	No reported indications of food access problems or limitations.
Marginal food security (Former label: food security)	One or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house. Little or no indication of changes in diets or food intake.
Food insecurity	
Low food security (Former label: food insecurity without hunger)	Reports of reduced quality, variety, or desirability of diet. Little or no indication of reduced food intake.
Very low food security (Former label: food insecurity with hunger)	Reports of multiple indications of disrupted eating patterns and reduced food intake.

Source: Coleman-Jensen et al. (2019). Household food security in the United States in 2018.

High food security is the most food secure category and is defined by “[n]o reported indications of food-access problems or limitations,” followed by marginal food security with “[o]ne or two reported indications—typically of anxiety over food sufficiency or shortage of food in the house” (Coleman-Jensen et al., 2019, p. 1). Moving toward the other end of the spectrum, low food security is identified by “[r]eports of reduced quality, variety, or desirability of diet” and very low food security, the lowest level of food security, is identified by “[r]eports of multiple indications of disrupted eating patterns and reduced food intake” (Coleman-Jensen et al., 2019, p. 1).

From a more holistic perspective, Hamm and Bellows (2003) define community food security “as a situation in which all community residents obtain a safe, culturally acceptable, nutritionally adequate diet through a sustainable food system that maximizes community self-reliance and social justice” (p. 37). Here again, notice the emphasis on cultural acceptability as an important element of food security. Low food security can be broken down into two distinct populations: those with limited access to food due to distance, and those with limited access to food due to affordability (Jablonski, McFadden, & Colpaart, 2016; Ma, Sharpe, Bell, Liu, White, & Liese, 2018). The two populations are not mutually exclusive, but they have different challenges. Even if transportation could

be arranged, a different issue may emerge in which transportation may prove too costly on top of food prices. Limited access due to distance raises questions about transportation options and the feasibility of attracting a new supermarket to the area. Limited access due to affordability raises issues with pricing products and income.

These two distinct populations are found in both urban and rural settings. The scales of measurement to evaluate the impact of distance and affordability will be different when evaluating urban and rural food security, but the fundamental principle remains the same. The scale for evaluating distance in an urban setting as compared to a rural setting is evident when reviewing the definition of healthy food access priority areas. For urban areas, a mere quarter of a mile is the standard by which distance traveled is measured (Misiaszek et al., 2018). Rural areas measure food security against a scale in miles—ten miles distance to a supermarket, to be exact (Ver Ploeg et al., 2011). While affordability is not specifically discussed in the definitions of food deserts and healthy food priority access areas, both average income and average food prices are typically higher in urban areas than they are in rural areas (United States Census Bureau, 2012).

Social networks can help individuals bridge the gap created by social inequities in both limited access populations (e.g., distance, affordability) by allowing for sharing resources such as transportation or cutting costs by buying in bulk and dividing the cost among several people. The USDA ERS identifies “five characteristics ... most strongly associated with the likelihood of experiencing food insecurity: low levels of education, **weak social networks**, limited social capital, low household income, and being unemployed” (Smith & Meade, 2019, para. 17). Developing stronger social networks increases chances of survival and improves quality of life in areas where systemic problems are causing individuals to struggle. Networks play an incredible role in how a society functions; “it is through these networks that small-scale interaction becomes translated into large-scale patterns” (Granovetter, 1973, p. 1360). This appreciation for how interpersonal relationships and interactions can influence entire communities is key for understanding the role of social networks in food security. Alternative food networks (AFNs), an emerging trend in addressing food security, refer to “newly emerging networks of producers, consumers, and other actors that embody alternatives to the more standardized industrial mode of food supply” (Renting, Marsden, & Banks, 2003, p. 393).

AFNs will be discussed in greater detail in subsequent sections. These natural phenomena are an indication of how important social networks are for addressing issues such as food security.

Maryland struggles with an 11% low food security rate (Food Research & Action Center, 2019, p. 1). One in ten people unable to secure “nutritionally adequate and safe foods in a socially acceptable way” daily (Coleman-Jensen et al., 2019, para. 5). Moving beyond those solely falling into the low food security bracket, the combined burden of poverty and social inequity is detrimental to the mental and physical health and well-being of 2.3 million households (3,420,700 people) in Maryland (Food Research & Action Center, 2019, p. 1). There is significant potential to improve lives and public health by increasing food security in the state, which in turn may improve overall poverty and equity for those who fall just above the low food security criterion. Given the differences in rural and urban food security challenges, any plans to improve lives and public health must consider and adjust for the differences in barriers.

Rural versus Urban Food Access

Rural and urban populations experience different lifestyles, benefits, and challenges. When it comes to food access, Feeding America (2020) reported that “[r]ural communities make up 63% of counties in the United States and 78% of counties with the highest rates of overall food insecurity,” adding that “84% of the counties with the highest percentage of children at risk for food insecurity are rural” (para. 1). Rural food security issues cannot be ignored. Maryland overall is on the lower end of the low food security scale nationally, but still has a significant portion of its population is suffering. Rural western, central, and eastern areas and the urban Baltimore City area, which together make up 10.5-12.9% of Maryland’s population, are struggling to consistently feed themselves (Coleman-Jensen et al., 2018). The U.S. Census Bureau (2012) reported that Maryland had a rural population of approximately 740,000 (13%) in 2010 compared to its urban population of 5,034,331 people (87%). The rural population is a significant portion of Maryland’s population and should be considered in all discussions of food security.

Low-income and vulnerable populations exist in both rural and urban settings, but their experiences differ. Eighteen of Maryland's 24 counties (75%) are considered rural. The remaining six counties (25%) are considered urban or suburban. The six urban and suburban Maryland counties have drastically different food security challenges than rural counties. Figure 5 highlights the patterns of low food security, limited access to food retail, and low-income populations clustering in the same areas across Maryland, most of which are rural areas. Baltimore City is an exception as a concentrated urban population center, but it struggles with the same variables in different manifestations. Urban healthy food priority access areas, or food deserts, are areas with low median household income (at or below 185% of Federal Poverty Level), one-third or more of households lack transportation, and grocery stores are at least one-quarter mile away (Misiaszek et al., 2018). In addition to food deserts, the Los Angeles Food Policy Council (2020) identifies three other categories of food access (and inequities):

- Food swamps: “the over-allocation of unhealthy food in a neighborhood”(para. 4);
- Food apartheid: “the structural inequality of food available to affluent and white communities compared to low-income and communities of color” (para. 4); and
- Food mirage: “when healthy food options are present, but unaffordable or otherwise out of reach for low-income residents” (para. 4).

Behrens, Simons, Harding & Milli (n.d.) mapped food swamps in Baltimore, Maryland, by identifying food deserts, corner stores, fast food restaurants and carry out restaurants. In this map (see Figure 6), clusters of carryout and fast-food restaurants (represented by filled and unfilled, respectively) indicate food swamps. The presence of food swamps within or close to food deserts highlights the issue of access to healthful foods compounded by social inequities in those clustered areas. Food swamps can occur in urban and rural settings but are perhaps more likely to occur in urban settings due to higher population density attracting businesses.

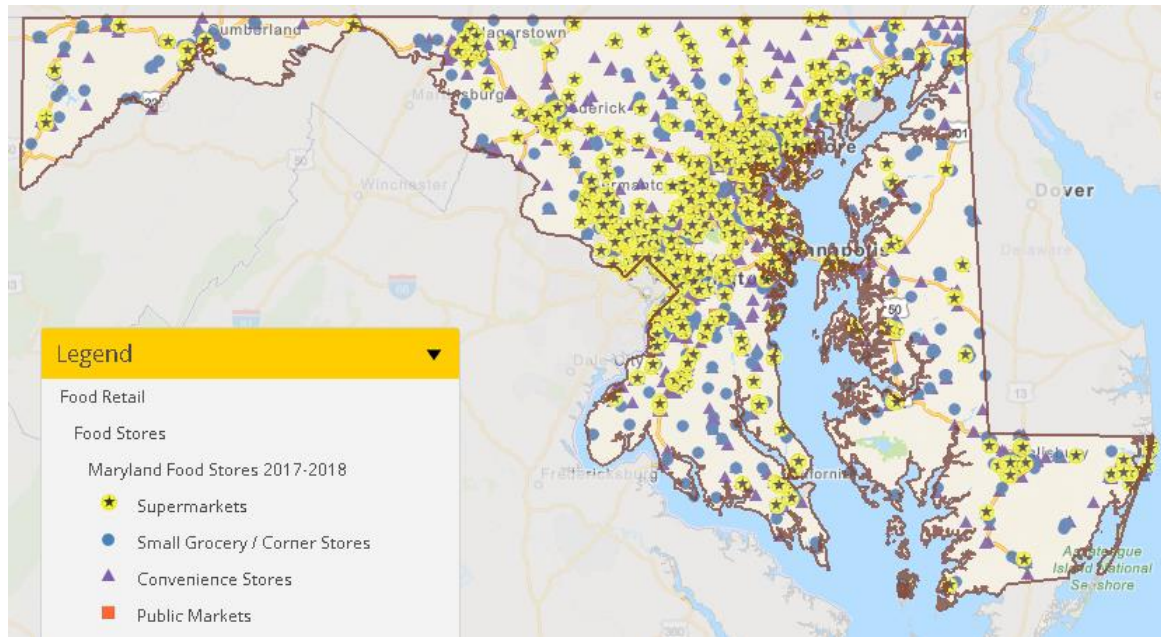


Figure 5: Food retail in Maryland

Source: Johns Hopkins Center for a Livable Future. (n.d.). Maryland Food System Map.

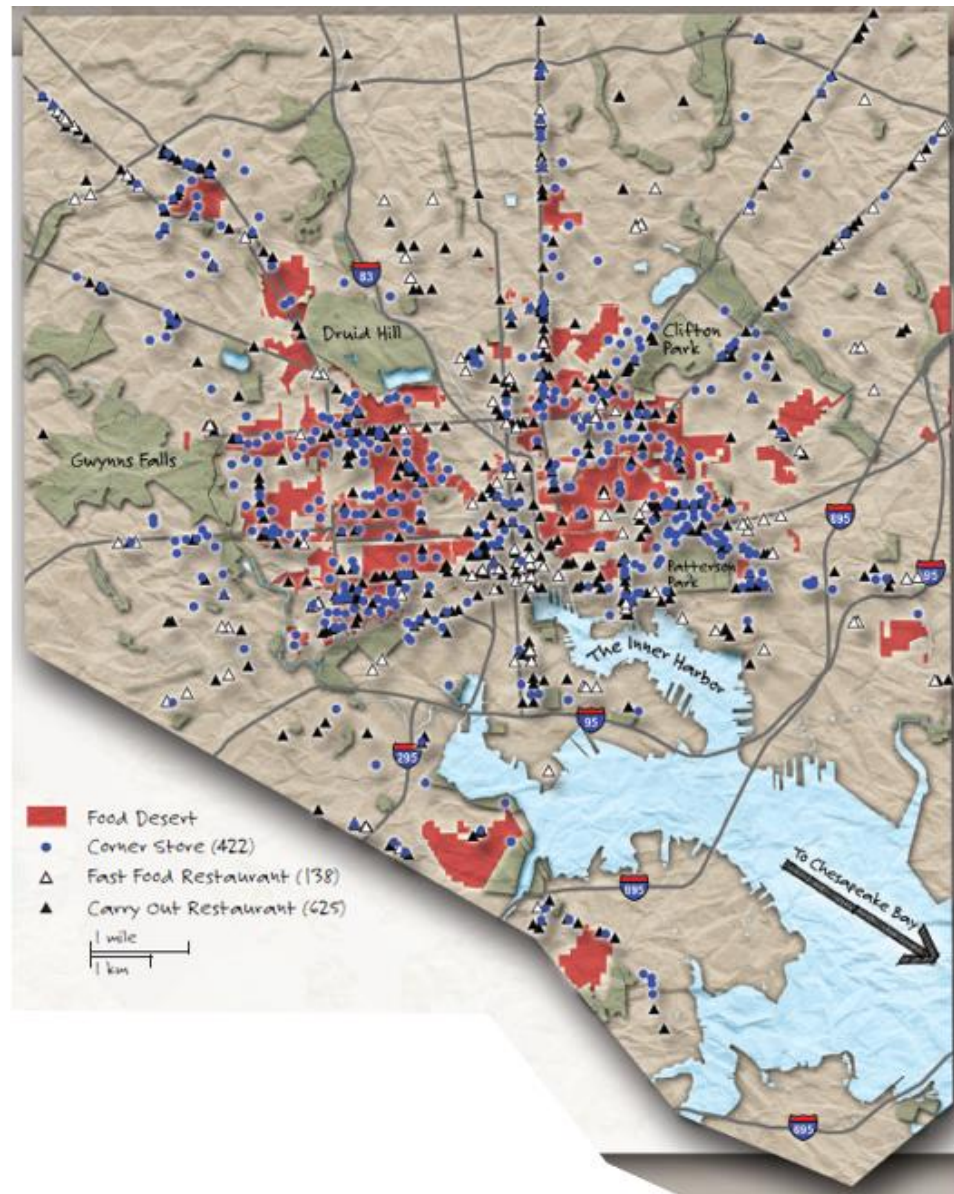


Figure 6: Baltimore food swamps and food deserts

Source: Behrens, A., Simons, J., Harding, J., & Milli, M. (n.d.). Baltimore City Food Swamps. Center for a Livable Future, Johns Hopkins University.

Urban low-income populations are more likely to be plagued with access to cheap and poor nutritional quality foods rather than high-quality, nutritious foods. Rural low-income populations are more likely to struggle with lagging recovery from the 2008 recession (meaning high levels of unemployment and underemployment), employment “concentrated in low-wage work,” significant geographic distances to the nearest supermarket, limited transportation, and a “diminishing number of stores [increasing the] distance between stores in rural areas, creating ‘food deserts’” (Piontak & Schulman,

2014, p. 76). Regardless of which situation an individual faces, the effects of low food security are life-long. Relying on networks of family, friends, or neighbors may be the only way for some individuals to survive. The differences between rural and urban food security challenges are summarized in Table 8.

Table 8: Comparison of rural and urban food security challenges

	Transportation	Retail Access	Affordability/Income
Rural	<ul style="list-style-type: none"> • Greater geographic spreading of population and essential businesses • Limited or no public transportation system • Food desert - Distance of 10 miles or greater to supermarket 	<ul style="list-style-type: none"> • Limited access to food retail in general • High levels of access to cheap, poor nutritional quality foods • Decreasing number of food retailers, entire region 	<ul style="list-style-type: none"> • Lower-paying and fewer jobs
Urban	<ul style="list-style-type: none"> • Limited transportation system depending on neighborhood • Food desert - Distance of 0.25 miles or greater to supermarket 	<ul style="list-style-type: none"> • High levels of access to cheap, poor nutritional quality foods • Low levels of access to high quality, nutritious foods • Decreasing number of food retailers, often neighborhood-specific 	<ul style="list-style-type: none"> • Higher cost for healthy food

Social networks play a vital role for food security in both urban and rural settings. As discussed previously, limited access due to distance and limited access due to affordability can exist in both rural and urban populations and are not mutually exclusive barriers to food security. The informal social networks formed in rural and urban settings to address one or both types of barriers may very well be saving lives where formal networks and structures fail. These failures are apparent in the health and economic discrepancies and disparities that significantly affect low-income and vulnerable populations. Systemic and institutionalized inequities play a key role in how different populations experience life in Maryland.

Discrepancies and Disparities

Health and economic discrepancies, the epitome of social inequity, are well documented challenges for low-income populations (Downs, Lowenstein, & Wisdom, 2009; Ikejima, 2018; Pawlowski, 2018). These inequities increase food security barriers. There is a catch-22 situation in which “low-income people have no choice but to

purchase less food (and thus starve) or cheap fast food (and thus become obese)” (Ikejima, 2018, p. 470). The “[c]oexistence of food insecurity and obesity is expected given that both are consequences of economic and social disadvantage” (Frongillo & Bernal, 2014, p. 284), yet this relationship also presents the ultimate irony. Low-income populations choose the cheapest and most easily accessible foods as a matter of survival and ultimately face the health challenges of obesity because of it. Over the course of several decades leading up to the early 2000s, the increasing prevalence of obesity raised alarms and led to warnings that “obesity may soon overtake smoking as the leading preventable cause of death” (Downs et al., 2009, p. 159).

The U.S. Health Resources & Services Administration (HRSA) determines the definition of medically underserved areas. HRSA (n.d.) defines medically underserved areas or populations as “areas or populations designated by HRSA as having too few primary care providers, high infant mortality, high poverty or a high elderly population” (para. 1). Medically underserved zip codes in Maryland are almost exclusively in western and southeastern Maryland with a few small pockets near Baltimore (HRSA, n.d.); these same areas are primarily rural, struggle with food security, and also happen to be identified as high deprivation census tracts (Figure 8). Low-income populations may largely be surviving through low food security challenges, but they are not thriving. This negatively affects public health. Figure 5 is a map of food retail (2017-2018) in Maryland. The cluster of supermarkets in central Maryland (including just north of Washington, D.C.) and north toward Baltimore are logical given the high population density of those urban areas. Despite what may appear to be sufficient access to food retail, food security is still an issue for 11% of people in Maryland (Coleman-Jensen et al., 2018). Food security challenges commonly lead to health challenges.

Figure 7 shows the 2018 mortality rate for nutrition-related illnesses such as obesity, diabetes, and heart disease in Maryland. As can be expected based on every other map of Maryland shown, the pockets of higher overall mortality rates align with low food security, low food access, and large populations of vulnerable populations. While urban areas like Baltimore have a concerning high rate, so, too, do the rural areas of western and southeastern Maryland. The seemingly paradoxical coexistence of low food security and obesity should come as no surprise; people eat to survive, and the cheapest options

are typically the least nutritious. Health and economic disparities go hand in hand as income directly affects the types of food a household can afford, which in turn affects health outcomes.

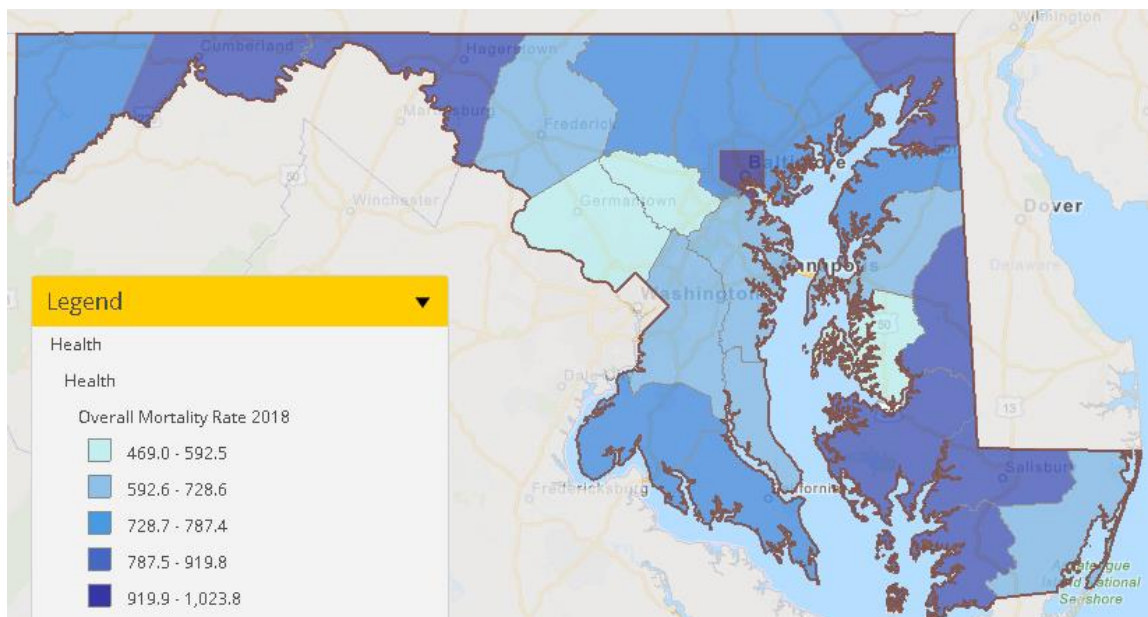


Figure 7: Overall mortality rate of nutrition-related illnesses in Maryland (2018)

Source: Johns Hopkins Center for a Livable Future. (n.d.). Maryland Food Systems Map.

Economic disparities play a key role in the challenges associated with health discrepancies for low-income populations. Examples of economic disparities include pockets of low-income populations with income disparities and disparities by ethnicity in which minority populations have a significant, measurable difference in income or access to services compared to non-minority populations. Low-income and vulnerable populations may live further away from grocery stores or not make enough money to afford healthy food options. Schaeffer (2020) of the Pew Research Center noted several economic inequality issues in the U.S. including:

- 1) “the highest-earning 20% of U.S. households have steadily brought in a larger share of the country’s total income” (para. 1);
- 2) the U.S.’s income inequality exceeds that of all other G7 nations²;

² A G7 nation, or Group of Seven nation, is an informal organization of the seven most industrialized countries in the world including Canada, France, Germany, Italy, Japan, the United Kingdom, and the U.S. (Council on Foreign Relations, 2019).

- 3) the income gap between U.S. black and white populations “has persisted over time” (para. 6);
- 4) from 1989 to 2016, “[t]he wealth gap between America’s richest and poorer families more than doubled” (para. 10); and
- 5) upper-tier incomes continue to grow at a faster rate than middle-class incomes.

Each of these issues highlights the pervasive, systemic, and institutionalized nature of economic disparities and social inequities at the national level which affect food security in Maryland. Alternatives to established food sources are inevitable given these factors and humans’ basic survival needs.

Several alternatives to large-scale grocery stores have been proposed and attempted with varying amounts of success. Farmers markets are often discussed as a silver bullet for increasing access to healthy food for low-income populations and are the source of an abundance of research and literature; unfortunately, even studies with positive findings note the challenges and shortcomings of this approach including location in relation to public transportation, affordability of products, and infrastructure for accepting electronic benefits such as SNAP (e.g., food stamps) (Freedman, et al., 2015; Lowery, Sloane, Payán, Illum, & Lewis, 2016). Farmers markets will be discussed in greater depth in subsequent sections, but it is important to note that farmers markets do little to address economic and health discrepancies and disparities due to issues of access, payment, and transportation.

Low food access and food security levels can be expected based on socioeconomic status of neighborhoods within a population center, making any single approach to addressing food access unrealistic (Pawlowski, 2018). Neighborhoods struggling with lower-paying jobs, limited access to basic services (e.g., medical care, education) also tend to be neighborhoods that struggle with food security. Factoring in known disparities in plans for addressing food security will improve the chance for sustainable success. Economic disparities and social inequities cannot be ignored if any sustainable progress toward social equity is to be achieved.

Discrepancies and disparities in health and economic outcomes are important factors to consider when discussing food security. As mentioned previously, food security is an element of the much bigger picture of social equity problems that far

exceed the scope of this dissertation; however, discrepancies and disparities in healthcare and economic stability compounded with food security create a perfect storm in which low-income and vulnerable populations struggle to survive. Low-income and vulnerable populations rely on social networks to overcome or work around barriers created by health and economic discrepancies and disparities.

Vulnerable Populations

The World Health Organization (2020) identifies specific populations as vulnerable including “[c]hildren, pregnant women, elderly people, malnourished people, and people who are ill or immunocompromised ...” adding that “[p]overty – and its common consequences such as malnutrition, homelessness, poor housing and destitution – is a major contributor to vulnerability” (para. 1). Vulnerable populations have numerous additional variables to consider for their survival on top of food security (e.g., dependents, health issues, housing); survival will inevitably take precedent over raising voices in food security-related policy arenas to initiate change for themselves. Systemic and institutionalized social inequities are painfully apparent when exploring their effects on vulnerable populations. Going a step beyond the challenges of low-income populations, vulnerable populations (who often are also low-income) have additional or different needs that make surviving and thriving even more challenging. Vulnerable populations may struggle to be independent and therefore rely more heavily on their social networks to survive. Vulnerable populations exist in both rural and urban settings, and they tend to live in the same areas that are identified as areas of high deprivation, low-income, and limited access to basic services.

Rural and urban vulnerable populations face different challenges, but the results are the same: vulnerable populations are more likely to struggle with food security. Vulnerable populations are defined by the Centers for Disease Control and Prevention (2018) as people who have difficulty communicating or accessing medical care, “may need help maintaining independence,” “require constant supervision,” or “may need help accessing transportation” (p 2). People must choose between eating unhealthy foods, which slowly kill them, or healthy foods that they cannot afford or struggle to access in sufficient quantities to thrive. Vulnerable populations are important to consider when addressing food security because they are highly susceptible to food security problems.

Food access “is a complex process requiring a location to access food, adequate financial and transportation resources, and the cognitive ability to plan and carry out accessing food” (Huang, Rosenberg, Simonovich, & Belza, 2012, p. 1). Vulnerable populations in both urban and rural settings may struggle with any combination of these variables, adding to the food security challenge.

Maryland is no stranger to the challenges of meeting the needs of vulnerable populations, particularly as it relates to food security and social justice. Figure 8 is a map of Maryland with 2012 American Community Survey data identifying high deprivation areas. The U.S. Department of Health and Human Services uses deprivation areas to identify vulnerable populations. The same areas identified as high deprivation and therefore a higher density of vulnerable populations almost perfectly mirror the food insecure areas identified in Figure 1 and Figure 2. Food security is one element of a much larger and complex social equity problem that exceeds the scope of this dissertation, but it is important to be cognizant of the overlapping challenges faced by low-income and vulnerable populations.

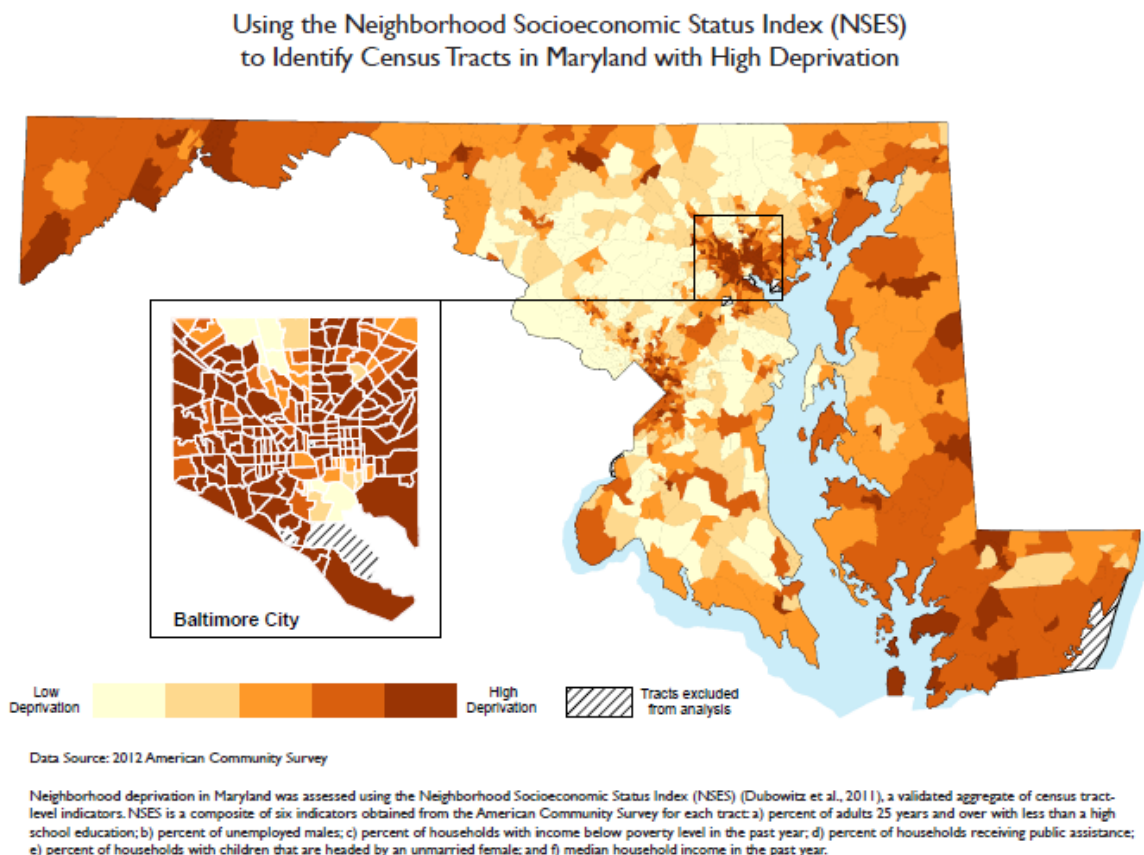


Figure 8: Maryland census tracts with high deprivation as indication of vulnerable populations

Source: U.S. Department of Health and Human Services. (2019). Using the Neighborhood Socioeconomic Status Index (NSES) to identify census tracts in Maryland with high deprivation.

Another challenge for incorporating vulnerable populations into the discussion of improving food access and social equity is the limited amount of data available on vulnerable populations. Data informs food security policy and resource allocations. Designing and administering surveys to collect data about vulnerable populations' food security experiences is challenging. Sampling groups "such as [persons experiencing homelessness], migrant workers, institutionalized persons, and Native Americans living on reservations" presents unique challenges that often mean they are underrepresented in data and policy discussions ("Core indicators", 1990, p. 1). This lack of representation compounds food security struggles even further. Considering the underrepresentation and unique needs of vulnerable populations, access to affordable, and healthy food for entire communities is particularly vital for public health. It is essential to keep in mind that "the

corporate food system influences not only what American consumers eat but where and how much, with a resulting increase in diet-related health problems, such as heart disease, obesity, and diabetes” (Campbell, 2004, p. 345). In other words, the corporate food system decides what will be priced affordably, and this in turn has created an environment that is overtly detrimental to public health. Vulnerable populations will eat what they have access to and can afford; in regions in which unhealthy options are the cheapest and most accessible food sources, it should come as no surprise that health issues are rampant. Food security challenges disproportionately affect already vulnerable populations.

Food security is a problem which affects all aspects of an individual’s life and is compounded by existing inequities. It is an incredible challenge to address both rural and urban food access issues in Maryland while considering existing discrepancies and disparities as well as the unique situations faced by vulnerable populations. The effects of low food security are significant and impact public health, youth education, and the economy.

Effects of Low Food Security

Food security is a social problem that permeates all aspects of society. Public health is an obvious connection, but youth education and the economy are also affected. It is essential to understand how these pieces interact and to anticipate the long-term effects of low food security overall. It is important to keep in mind that food security barriers and related challenges are cyclical and pervasive. Figure 9 looks at the issue from the cyclical perspective. The key takeaway is that the effects of low food security radiate outward and affect every aspect of an individual’s life. The cycle shows how food security moves beyond an individual’s experience to affect entire families and future generations. Food security cannot be underestimated if lives are ever to be improved in low-income and vulnerable populations.

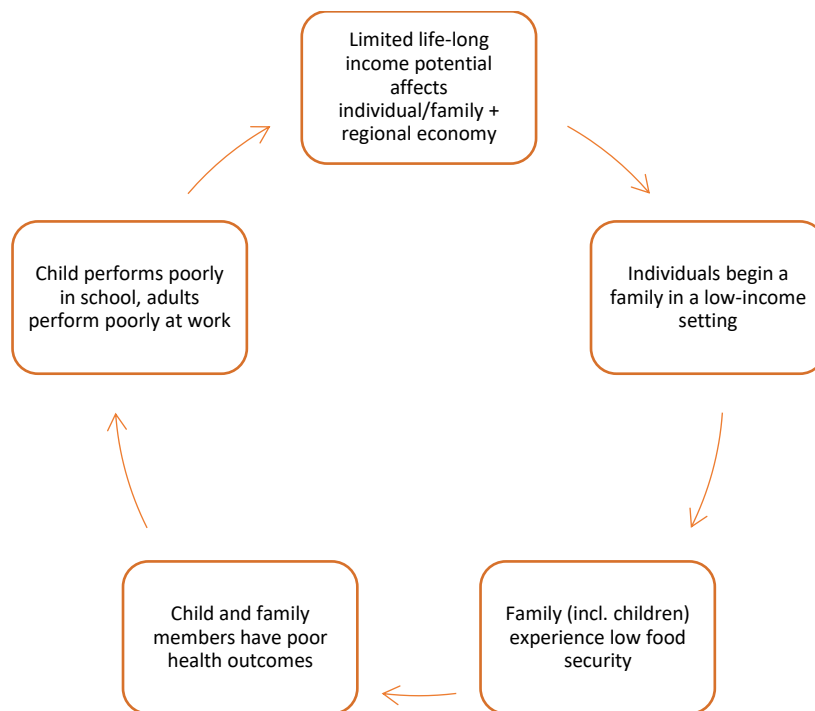


Figure 9: Cycles of low food security (Downs et al., 2009; Robles, Montes, Nobari, Wang & Kuo, 2016; Coleman-Jensen et al., 2018; Iowa Food Bank Association, n.d.)

Public Health

Low food security in Maryland disproportionately affects disadvantaged, underserved, and vulnerable populations. Numerous variables influence public health, but few directly affect a population like the combination of low socioeconomic status and limited access to healthy foods. Previous sections discussed health discrepancies and disparities from the lens of limited access to care disproportionately affecting low-income and vulnerable populations. This section focuses on the direct link between food security, nutritional decisions, and health outcomes related to social inequities.

Major urban areas commonly struggle with significant public health challenges such as obesity and diabetes, both of which are associated with diet and nutrition. Poverty influences lives in ways beyond the immediately obvious. Insufficient nutrition makes it more difficult for children to pay attention in school, and some children may be working to help support their families. Families may be struggling with health challenges due to poor nutrition and limited access to healthcare. Significant disparities exist, particularly for obesity- and nutrition-related health issues, when comparing low-income and

minority populations against wealthier and white populations (Robles, Montes, Nobari, Wang, & Kuo, 2016).

It is irresponsible to ignore the connections between food systems and public health, particularly as both are symptoms of inequity. The paradox of low food security and obesity coexisting is a troubling social issue but is the natural outcome of low-income populations focusing on survival by eating what they can afford. Obesity rates skyrocketed from the 1960s to the early 2000s as food systems provided higher-calorie options for lower prices (Downs et al., 2009). The United Nations (UN) policy on food is that it “is a basic human right” and the UN recommended that “its member nations [should] create equitable health-promoting environments that empower individuals, families, and communities to make sound health-oriented choices” (Ikejima, 2018, p. 469). The existence of food deserts in rural and urban settings alike highlights Maryland’s failure to create an equitable food system. While programs focused on educating youth about nutrition and healthy eating exist (Ellsworth, Ernst, & Snelling, 2014), these programs do not address sustainable, affordable access once the student leaves school. Other programs focus on connecting low-income populations to farmers markets (Freedman, et al., 2017; Ellsworth et al., 2014), but issues such as location, transportation, infrastructure, and affordability arise. Farmers markets will be further discussed in subsequent sections.

Maryland 2017 public health data indicates roughly 11,600 deaths from heart disease and 1,400 deaths from diabetes, both of which are typically nutrition-related illnesses (CDC, 2018). Specific hunger-related illnesses include iron deficiency, headaches, stomach aches, colds, activity-limiting health impairments, specific nutrient deficiencies, more hospitalizations, and longer inpatient stays (Shepard, Setren, & Cooper, 2011, p. 10). Heart disease and diabetes-related deaths showed consistent growth from 2014-2017, in keeping with warnings that “obesity may soon overtake smoking as the leading preventable cause of death” (Downs et al., 2009, p. 159). The CDC estimates that low food security costs Maryland between \$500 million and \$1 billion per year (Berkowitz, Basu, Gundersen, & Seligman, 2019). Strengthening food networks, both formal and informal, could play a significant role in improving food security in Maryland and reducing the burden on public health care systems.

Youth Education

Education is a powerful, transformative experience that affects an individual's entire life as well as future generations. Struggling with food security threatens children's ability to be successful in their education. While many parents strive to feed their children even if it means going without food for themselves, this does not ensure there is enough food in low food security households for children to consistently have access to the quality and quantity of calories necessary to be successful in school (Coleman-Jensen et al., 2018). In addition to behavioral issues, difficulty focusing, and increased chances of being absent due to illness (Coleman-Jensen et al., 2018), low food security impacts approximately one quarter of households led by adults without a high school diploma (Binder & Berg, 2015). This suggests that low food security affecting performance in school is likely to become (or remain) cyclical and transgenerational. Individuals who do poorly in school are less likely to finish high school or continue their education after earning their diploma, which directly affects their lifetime potential earnings. Low-income populations are more likely to struggle with providing sufficient quality food for their children. By allowing this cycle of inequity to continue, society is condemning people to "the nexus of food insecurity and poor educational performance" (Binder & Berg, 2015, p. 6).

Rural and urban low-income populations face different educational challenges on top of food security struggles. Rural schools struggle with "declining enrollment, high rates of poverty, ... a lack of human capital and adequate transportation" (Robson, Burgoyne-Allen, Squire, Schulz, & Bellwether Education Partners, 2019, p. 4). Other challenges for rural schools orient around districts which use policies better suited for urban areas, limited resources to offer different courses, and "achievement gaps across race and income levels" (Robson et al., 2019, p. 4). Urban schools face their own unique challenges as well. For example, transportation for large numbers of children to and from school, variance in school budgets based on tax revenue for students attending schools in low-income neighborhoods, and finding ways to administer large school districts with diverse abilities and needs without any of the schools falling behind are all challenges for urban school districts (Levin, 2013).

Food security issues may be compounded by the quality of education available to students. Maryland identified issues with “unqualified, and possibly ineffective teachers serv[ing] in the most challenging classrooms in the state” due to issues such as “structural processes directing teacher placement ... [and] difficulties in recruiting for [these schools]” (Maryland State Department of Education, 2018, p. 65). Baltimore City is the primary urban pocket of low-income, low food security populations in Maryland. Its school district data indicates that student achievement rates consistently fall below overall state performance. Given that “Baltimore City Public Schools is the fourth-largest school district in Maryland” this is a problem for the state at large (Alonso, Duke, & English, n.d., para. 1). Food security also affects rural student populations struggling with low incomes and low food security. Low achievement scores may very well be directly associated with low food security. This cyclical, often transgenerational pattern demonstrates the previously discussed pathways from food system processes to health outcomes (Weiler et al., 2015). Strengthening food networks, both formal and informal, could play a significant role in improving educational outcomes in Maryland by reducing the number of people struggling with low food security and its effects.

Economy

As discussed in the public health section previously, food security directly affects the economy through a cycle of intergenerational poverty and social inequities. Low food security leads to poor academic performance, which in turn affects lifetime potential earnings. Low food security reduces or eliminates the ability to build wealth and stability over the course of a lifetime and does not allow for setting aside financial resources to benefit future generations. The monetary costs of low food security nationally are astounding. The Iowa Food Bank Association (n.d.) estimates the following:

- \$130.5 billion due to illness costs linked to hunger and food insecurity
- \$19.2 billion - value of poor educational outcomes and lower lifetime earnings linked to hunger and food insecurity
- \$17.8 billion – charitable contributions to address hunger and food insecurity
- Hunger costs \$542 for every citizen (para. 3).

Some of these food security-related costs are associated with “greater absenteeism, presenteeism, and turnover in the work force” (Iowa Food Bank Association, n.d., para.

4). Focusing more specifically on income, “food insecurity led to a loss of \$19.2 billion in lifetime earnings in 2010” (nationally) (Iowa Food Bank Association, n.d., para. 6). These numbers are significant and emphasize yet again the importance of addressing food security.

Maryland food security-related expenses, known as a “hunger bill”, increased by 44.2% from 2007 to 2010 (Shepard et al., 2011, p. 2). Maryland ranked third nationally for highest increase in that three-year period, and its cost went from \$1.82 billion in 2007 to \$2.62 billion in 2010. Given that low food security rates have continued to increase over the last 10 years since 2010, it is a safe assumption that Maryland’s hunger bill continued to climb as well (Shepard et al., 2011, p. 2). Hunger bills refer to the “combination of lost economic productivity per year, more expensive public education because of the rising costs of poor education outcomes, avoidable health care costs, and the cost of charity to keep families fed” (Shepard et al., 2011, p. 1). The hunger bill concept is important in the food security discussion because it emphasizes how widespread and pervasive the effects of food security truly are. Billions of dollars could be refocused to strategies addressing food security in Maryland. Social networks may help identify where resources would be most effective in addressing this social problem and could support existing strategies to address low food security where they fall short.

Strategies to Address Low Food Security

Given the complexity of the food security issue, it is no surprise that different strategies have emerged to address it. Research specific to the role of informal social networks to address food security is limited and focuses primarily on either the lack of social networks among low food security populations or formal networks among agri-food supply chains (Dhokarh, Himmelgreen, Peng, Segura-Pérez, Hromi-Fiedler, & Pérez-Escamilla, 2009; Jarosz, 2000). Several government programs attempting to address food security exist, but the Supplemental Nutrition Assistance Program (SNAP)³ is perhaps the most well-known program for food-specific benefits. Organizations such as food banks, nonprofits, and churches are well-established in the food security scene, working with individuals to ensure they have enough food from week to week (organizational resources permitting). Farmers markets are associated with bringing fresh

³ Commonly referred to as “food stamps”

produce to areas away from supermarkets. Urban agriculture, or growing food in an urban setting, is slowly becoming legal and increasingly popular in urban areas because it can increase self-sufficiency. Each of these strategies are discussed, followed by a discussion of their failings to address food security.

Supplemental Nutrition Assistance Program (SNAP)

The Supplemental Nutrition Assistance Program (SNAP) program provides nutritional assistance to low-income families in the U.S. by providing monthly supplemental income for food purchases. SNAP is a U.S. Department of Agriculture (USDA) program and originally named as the Food Stamp Program per legislation in 1939. The USDA currently offers several other nutrition assistance programs, but SNAP is by far its largest program. SNAP is arguably the United States' primary policy for addressing low food security. All USDA nutrition assistance programs have the same foundational goals of “increas[ing] food security and reduc[ing] hunger by increasing access to food, a healthful diet, and nutrition education for low-income Americans” (Committee on Examination of the Adequacy of Food Resources and SNAP Allotments et al., 2013, para. 1). The Food Stamp Program was a government response to a market failure as the general population could not afford sufficient nutrition at market prices. The program was designed to incorporate economic surpluses while helping families make ends meet.

The Food Stamp Program required participants to purchase stamps for \$1 to receive an additional stamp worth \$0.50. At its peak, the Food Stamp Program of 1939 served an average of four million people per month. The original program ended due to limited resources and unemployment during World War II. The Food Stamp Program reemerged in the 1960s during the Kennedy and Johnson administrations. At its peak, the second iteration of the Food Stamp Program served approximately 10 million people per month. The 1966 Welfare Reform Act affected the Food Stamp Program as it increased state administrative powers and more restrictively defined eligibility. The 1970s saw another reimagining of the program because many eligible participants could not afford to purchase food coupons and therefore did not benefit from the program. The Food Stamp Act of 1977 eliminated the purchase requirement and increased eligible household participation “by 1.5 million over the previous month” (Committee on Examination of

the Adequacy of Food Resources and SNAP Allotments et al., 2013, para. 8). In 1990, the Food Stamps Program began transitioning to an electronic system and the program was renamed to SNAP. Electronic Benefits Transfer (EBT) went into full effect nationally in 2002 to allow for easier access to benefits and reduce issues of fraud. SNAP currently serves approximately 42 million people per year (Feeding America, 2020).

One of the eligibility requirement standards for SNAP participants is income. Maryland has four tiers of income eligibility including: 1) gross monthly income under 200% of the Federal Poverty Level; 2) gross monthly income under 130% of the Federal Poverty Level; 3) maximum net income under 100% of the Federal Poverty Level, and maximum benefit amount with no income (Department of Human Services, 2019). Benefits decrease in the same order with the lowest benefit available for individuals with no income, likely to encourage employment or avoid dedicating resources to individuals who may be eligible for other programs. SNAP purchases are limited to food items with limitations on what can be purchased determined at the state level. SNAP assistance is distributed via an Electronic Benefits Transfer (EBT) debit card. This card may be used at businesses selling food that meets SNAP requirements but low-income populations with limited access to fresh foods may struggle to afford healthier options. Programs geared toward providing nutrition education and increasing healthy food intake are emerging across the United States. One program demonstrated a 99% reported increase in healthy purchases by SNAP participants (Dannefer, Bryan, Osborne, & Sacks, 2016). Increased demand for locally-sourced products motivates the development of electronic payment infrastructure at farmers markets. This increases the likelihood of vendors at farmers markets accepting electronic SNAP benefits (Bertmann et al., 2012). Farmers markets will be discussed in greater detail in subsequent sections.

While making farmers markets more accessible is a step in the right direction, one study suggests the preferences and needs of SNAP benefit recipients are not considered. Research shows that incorporating SNAP participants in planning and development would have a positive effect on the number of SNAP participants participating in local farmers markets (Ritter, Walkinshaw, Quinn, Ickes, & Johnson, 2019). A study of the Philly Food Bucks program in Philadelphia demonstrated that incentives for SNAP participants can lead to increased farmers market participation in impoverished areas

(Young, Aquilante, Solomon, Colby, Kawinzi, Uy, & Mallya, 2013). Another program focused on nutrition education for low-income children had a 16% increase in children’s knowledge about nutrition (Ellsworth et al., 2014). Significant price variation at the local level in the U.S. raises the issue about whether existing price calculations for SNAP are appropriate (Rogus, 2015). In FY2016, “386,137 households with 737,714 individuals in an average month” received SNAP benefits (FRAC, 2019, p. 1). About 17% of “rural and small town households” and 11% of “households in metro areas” rely on SNAP to be able to acquire quality and nutritious food (see Figure 10) (FRAC, 2018, p. 1).

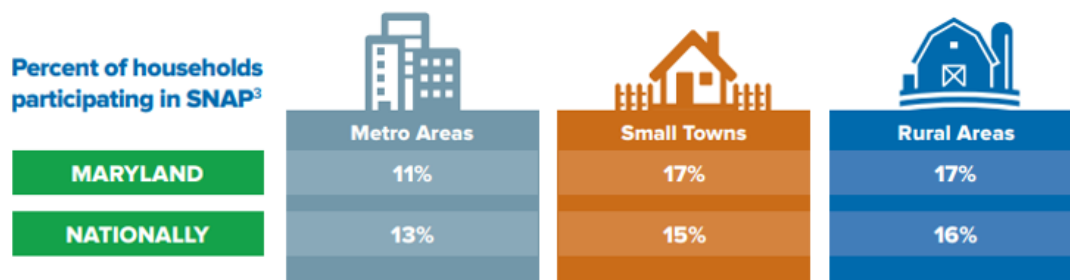


Figure 10: Percent of households participating in SNAP

Source: Food Research & Action Center. (2019). *Maryland Facts: Supplemental Nutrition Assistance Program (SNAP)*.

Food Banks

Food banks, or “community based organizations that collect and distribute donated food free of charge” (Schenck-Fontaine, Gassman-Pines, & Hill, 2017, p. 460), are one example of alternative strategies to addressing food security. Food banks are one element of a much larger hunger relief network that “developed ... to respond to the emergency food needs of poor households beginning as early as the 1980s” (Campbell, 2004, p. 345). There are an estimated 371 food banks in the United States, all contributing to redistributing food to roughly 60,000 “pantries, agencies and programs across the country, which ultimately make the food available to individuals struggling with food insecurity” (Food Bank News, 2020, para. 3). Food banks are different from food pantries in that they redistribute food to local organizations rather than giving food directly to the populations in need.

Maryland has several food banks (e.g., Anne Arundel County Food Bank, Manna Food Center, Food Recovery Network), but perhaps its best-known food bank is the Maryland Food Bank (MFB). MFB has branches in western, central, and southeastern

Maryland, all of which are regions identified as having large vulnerable populations, low-income populations, and low food security. MFB opened its doors in 1979 ahead of the national hunger network trend of the early 1980s and was “the East Coast’s first food bank” (Maryland Food Bank, 2020, para. 1). MFB measures its impact by the lives which benefit from its work, identifying children, working families, seniors, and communities in Maryland as the beneficiaries of its efforts MFB distributes roughly 40 million meals a year, falling short of an estimated 111 million meals that Marylanders need each year (Maryland Food Bank, 2020).

Food banks must make decisions when selecting food distribution locations, and the rural-urban divide is applicable. Food banks cannot survive without resources and donations. Resources and donations are more likely to be given to food banks if they will affect a significant number of people. Rural locations with small populations are unlikely to attract a dedicated food bank, which in turn means that target audiences will have to travel a significant distance to access food bank resources unless there is a nonprofit or religious organization bringing food bank resources to rural Maryland. Urban food banks will have significant access to target populations but may be unwilling to locate in accessible areas. Nonprofits and religious organizations provide the network connections between food banks and target populations to bring food bank resources to the ultimate recipients. A food bank is fundamentally a hub in a network including food pantries, nonprofit organizations, religious organizations, and other entities, all seeking to get food to those who need it. Social networks like these play a key role in feeding communities struggling with food security, but further exploration of networks’ roles outside of formal structures is necessary to understand what informal networks have emerged to fill in the gaps.

Nonprofit and Religious Organizations

Nonprofit organizations (nonprofits) and religious organizations are regularly associated with hunger relief efforts. Nonprofits and religious organizations which play a role in addressing food security typically begin as a direct result of the efforts of “local reformers, activists, community organizers, advocates, or religious congregations” (Eisinger, 2002, p. 115). This means these organizations are driven by people passionate about feeding those who need it. National nonprofits (religious and secular) such as

Feeding America, Bread for the World, the Salvation Army, the Red Cross, and Meals on Wheels have branches in many or all states in the U.S. and partner with smaller, local organizations to maximize resources and impact (Raptim, 2017). Maryland Nonprofits (2020) estimates approximately 32,000 nonprofits are currently operating in Maryland and that 27.9% of Marylanders volunteer with \$5.3 “billion dollars given by Maryland residents to charity annually” (para. 3). While those figures are not specific to nonprofits and religious organizations focusing explicitly on food security, nonprofits and religious organizations are a significant presence in the food security world both nationally and in Maryland. Vulnerable and low-income populations are commonly the target recipients of the work of nonprofit and religious food-focused organizations as they are most likely to struggle with low food security.

Rural and urban nonprofit and religious organizations will face different challenges. Rural organizations have a combination of limited resources and fundraising opportunities for smaller, geographically distanced populations. Urban organizations have high demand but may be serving areas that are less attractive to investors due to crime and/or low potential revenue despite a larger target population. The significance of organizations coming together to maximize the effectiveness of their resources is undeniable when considering the role that social networks play in addressing food security in both rural and urban populations. Informal social networks allow for collaboration and coordination that would be disastrous for organizations working alone with limited resources attempting to have significant impact on the lives of others.

Farmers Markets

Farmers markets help bring fresh produce to areas other than supermarkets. Farmers markets are exactly what they sound like—a market with vendors consisting of farmers directly selling their own products. At face value, farmers markets seem like a great solution for food deserts because they can reduce the distance between low-income and vulnerable populations and quality, affordable food. Farmers markets are seen by many “as a promising public health nutrition intervention, as a political symbol of commitment to local food systems, and as an economic engine to support farmers and community development” (Fang, Bottenheim, Havassy, & Gollust, 2013, p. 39). Markets are a direct producer-consumer relationship that benefits both parties.

Agriculture is the largest industry sector in Maryland and 2017 data shows approximately 2,000,000 acres of farming with 12,400 farming operations (National Agricultural Statistics Center, 2019). Maryland has more than 100 registered farmers markets across the state (Maryland Department of Agriculture, 2020). Despite these numbers, farmers markets have not reached many areas where farmers could sell products to low-income and vulnerable populations. Figure 11 is similar to Figure 5 in that it shows food retail in Maryland, but it also includes farmers markets (orange squares). Note that farmers markets show up in areas close to where supermarkets exist and that farmers markets add little or no additional coverage to areas not already serviced by other food retail.

Rural farmers markets and urban farmers markets face different challenges. Rural farmers markets have smaller populations with greater geographic spreading between them, which translates to lower revenue. Urban farmers markets have larger potential customer populations, but vendors may not want to set up shop in neighborhoods that are high-crime. Rural and urban farmers markets may or may not have the infrastructure available to accept electronic payment, which directly affects whether SNAP participants can use their resources to purchase healthy food. Either way, vulnerable and low-income populations must rely on one another for transportation and shared resources to access healthy, quality food. Social networks improve individual access to resources.

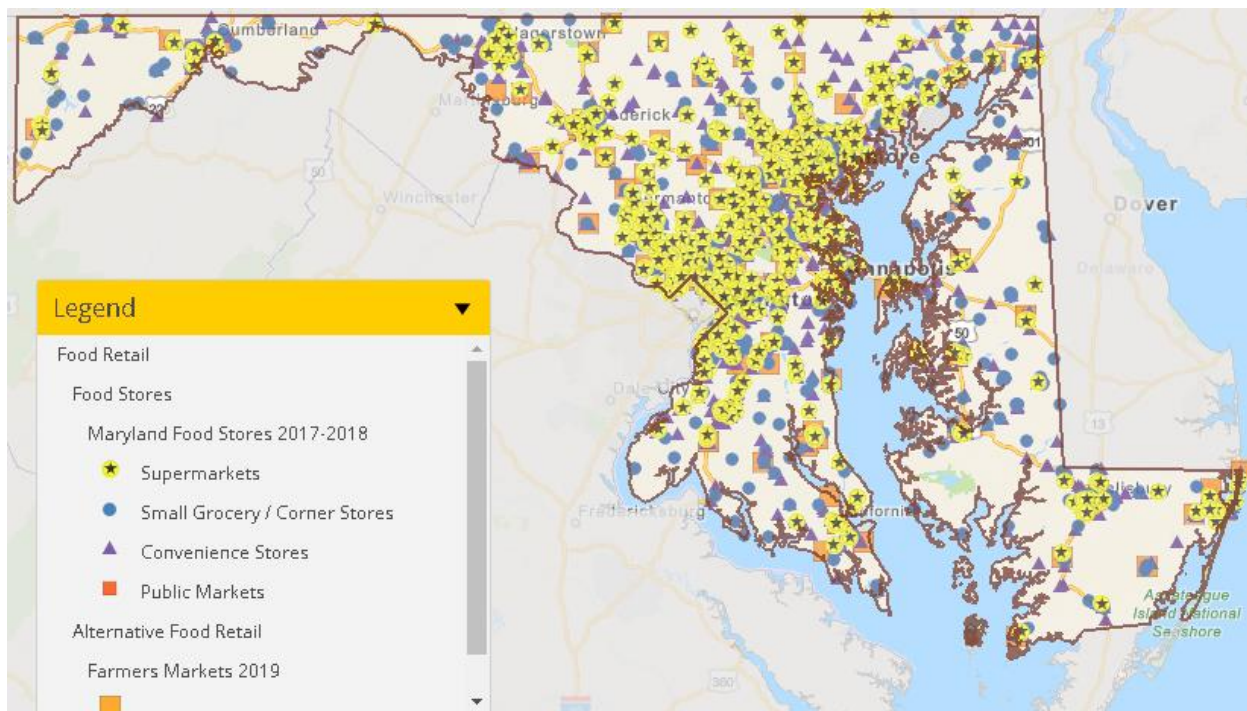


Figure 11: Food retail and alternative food retail in Maryland
Source: Johns Hopkins Center for a Livable Future. (n.d.). Maryland Food System Map.

Urban Agriculture

Cities are beginning to encourage urban agriculture, which refers to growing food in an urban setting. Common examples of urban agriculture include community or shared gardens, gardens on personal property, or gardens on rooftops. Regardless of the manifestation, urban agriculture is an attempt to increase access to fresh produce in an urban environment. Lower-income communities are less likely to have yards or rooftops available for urban farming and therefore are more likely to rely on grocery stores, corner stores, restaurants, and farmers markets for daily food access. Many cities turn to urban agriculture with the hope of producing affordable, high-quality products that will be accessible to low-income citizens, but models typically “are currently incompatible with serving the needs of lower-income communities because their focus is on profit, not on increasing affordability and availability of produce in underserved areas” (Pawlowski, 2018, p. 551).

Some suggest that urban agriculture is a possible solution for addressing these public health challenges related to the effects of low food security (e.g., obesity, malnutrition) because urban agriculture reduces the distance fresh foods must travel to

reach low-income populations (Robles et al., 2016; Ackerman, Conard, Culligan, Plunz, Sutto, & Whittinghill, 2013; Alia et al., 2014), at least in urban settings. The CDC (2020) identifies farmers markets as a key variable in national efforts to curb rising obesity rates in the U.S. Farmers markets increase low-income populations' access to fresh, health foods that may otherwise prove unattainable in urban environments. While farmers markets may be a possible solution, not every area has access to existing markets or suitable areas to start markets. The minority communities with limited sources of income face low food security struggles and farmers markets in those areas “are smaller and provide fewer fresh fruits and vegetables than markets situated in more affluent communities” (Lowery et al., 2016, p. 252).

Urban agriculture may be able to bring healthy food to urban populations, but it simultaneously underscores the social equity challenges of food security given that low-income and vulnerable populations are less likely to have the space and resources necessary. Social networks can play a key role in connecting those with resources to those without to help bridge the gap.

Failings of Discussed Strategies to Address Food Security

Each of the strategies to address food security (e.g., SNAP, food banks, nonprofits and religious organizations, farmers markets, and urban agriculture) have advantages, but they all also struggle with serious flaws. The subsequent sections discuss the failings of each strategy.

Supplemental Nutrition Assistance Program (SNAP)

SNAP is perhaps the strongest of the strategies discussed, but evidence suggests it does not fully meet the needs of its participants and it does not meet the needs of those ineligible to participate. While there are exceptions, some applicants are ineligible if they are not a citizen, if they are a student, or if they make too much or too little money. With 42 million served annually compared to four and ten million per month in previous iterations of the program, there seems to be issues with eligibility preventing access to vital resources. Because “families frequently run out of SNAP benefits before the end of the month ... SNAP benefits ... create[e] a within-month instability in resources for SNAP recipient families” (Schenck-Fontaine et al., 2017, p. 457) that undermines the purpose of the program. While SNAP benefits are not meant to provide for all food

needs, instead providing an economic buffer (Schenck-Fontaine et al., 2017), from the perspective of this study SNAP fails to address food security fully. It will be imperative to understand the informal social networks that have evolved to help low-income and vulnerable populations make ends meet when their SNAP benefits run out too soon. Limited infrastructure for accepting electronic payment (i.e., SNAP electronic benefit transaction cards) and limited access makes it difficult for SNAP recipients to obtain fresh produce.

The limitations of SNAP when it comes to bringing reliable and sustainable access to healthy, quality food to low-income and vulnerable populations emphasizes the importance of understanding how food security issues are addressed. Informal social networks that have evolved to fill gaps in existing food systems may be the answer.

Food Banks, Nonprofit Organizations, and Religious Organizations

While initially addressed separately, it is logical to compare the failings of food banks alongside nonprofit and religious organizations given the tendency for collaboration and partnership between these organizations. Some organizations in each category may work alone, but the majority appear to work in formal networks of resource distribution. There are several weaknesses of these organizations, not the least of which is the short-term nature of their food security work. This emphasis on “short-term hunger alleviation over longer term issues of household income, nutritional quality, food access, or food sourcing” allows for systemic issues to persevere (Campbell, 2004, p. 345). Vulnerable and low-income populations are more likely to turn to social networks first because relying on food charity “can be emotionally stressful and can make people feel stigmatized” (Schenck-Fontaine et al., 2017, p. 478). Finally, food banks, nonprofits and religious organizations may not be meeting the needs of those most severely in need depending on where they choose to open locations. Distance and transportation each play a role in rural and urban food security, so location plays a vital role in the effectiveness and impact of these organizations.

The short-term focus of food banks, nonprofits, and religious organizations begs the question of how low-income and vulnerable populations survive when short-term resources run out. Informal social networks that have evolved to fill gaps in existing food systems may be the answer.

Farmers Markets

Farmers markets bring produce directly to consumers, but there are numerous issues when it comes to relying on farmers markets to address food security. Rural populations are less likely to attract farmers markets because of geographical spread and lower-paying employment opportunities which combine to mean lower profit potential for vendors. Urban populations are less likely to attract farmers markets if they are low-income and in areas of high crime. Rural and urban low-income consumers are more likely to struggle with transportation to and from farmers markets. Limited electronic payment infrastructure in both rural and urban settings may make it impossible for SNAP recipients to use their benefits at farmers markets. Farmers markets tend to be found in areas of higher income and low crime rather than in low-income or vulnerable population areas where their services would be most impactful.

The limitations of farmers markets when it comes to bringing healthy, quality food to low-income and vulnerable populations emphasizes the importance of understanding how food security issues are addressed. Informal social networks that have evolved to fill gaps in existing food systems may be the answer.

Urban Agriculture

Urban agriculture, at face value, may seem like it has the greatest potential to address food security issues for urban populations. Instead, urban agriculture serves to highlight the disparities and discrepancies that exist and ultimately perpetuate food security inequities. Unless local governments and communities invest in urban agriculture in the more impoverished and vulnerable areas in Maryland, urban agriculture will benefit populations other than those it seeks to help (i.e., those who are food secure). Affordable housing in low-income neighborhoods is synonymous with very little space, let alone land or access to rooftop space to grow fresh food. Urban agriculture organizations serving impoverished and vulnerable populations are few and far in between.

The limitations of urban agriculture, particularly its unattainability, when it comes to empowering low-income and vulnerable populations to cut costs and grow their own food emphasize the importance of understanding how these populations overcome food

security challenges. Informal social networks that have evolved to fill gaps in existing food systems may be the answer.

Significance of Failings of Strategies to Address Low Food Security

The failings of these strategies to address low food security matter because social programs, farmers markets, and nonprofits and religious organizations temporarily address food security but do not address underlying issues causing low food security. In the case of urban agriculture, the strategy not only fails to address underlying issues but simultaneously emphasizes systemic disparities. Using these failings to identify where social networks may have evolved to fill gaps could significantly contribute to future food policy. Social networks develop organically and are driven inherently by need; they help individuals and organizations pool resources and maximize impact regardless of whether that impact is survival or increasing reach.

Social equity, or lack thereof, is apparent in the number of people who struggle to feed themselves and their families safely, consistently, and healthily. Maryland has consistent, significant overlap in populations struggling to live healthy, productive lives. Food insecurity is at the nexus between many social problems. Given that nexuses are “a complicated series of connections between different things” (Oxford Learner’s Dictionary, 2020, para. 1), what better way to understand and complement organic solutions than to look at social networks in which individuals and organizations have created their own series of connections to combat low food security? This dissertation will explore and evaluate how social networks supporting access to food (regardless of ability to pay) in Maryland develop formally and informally to provide food to low-income and vulnerable populations.

Conclusion

This dissertation seeks to identify and understand the social networks present in Maryland. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. The strategies discussed in this chapter demonstrate the diverse approaches to addressing food security in Maryland, yet none have made measurable progress addressing the underlying causes of low food security. SNAP benefits support immediate food needs, but only in certain locations and often not in high enough amounts

to get a family through an entire benefits cycle without running out. Food banks, nonprofits, and religious organizations seem to make miracles happen by sourcing donations to ensure maximum impact, yet this approach is a short-term solution to a pervasive problem. Farmers markets and urban agriculture theoretically could help with the quality of nutrition available but may not be in accessible areas or have infrastructure available to accept electronic SNAP benefits. Each strategy focuses on fulfilling an immediate need, yet once an organization's office lights go off and everyone goes home, hunger remains. It is essential to understand how low food security populations work around interconnected social problems to address social inequities for low-income and vulnerable populations in Maryland. Informal social networks that have evolved to fill gaps in existing food systems may be the answer.

THEORETICAL FRAMEWORK

Introduction

The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. This is a challenging task and the theoretical framework, as the backbone of a dissertation, is of utmost importance for ensuring valid and reliable results that can be used to improve social equity. Theoretical frameworks focus a dissertation on key variables specific to the theory and its established strengths and limitations. This dissertation uses social network analysis as its theoretical framework while considering social equity at each step. Social network analysis (SNA) is a research practice blending two sciences: behavioral science and social science (Wasserman & Faust, 2009). SNA emphasizes the importance of relationships between actors and develops models to visualize and analyze existing structures and patterns of behavior. The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. By approaching this research objective with the social network analysis framework, the relationships between actors are a measurable and allow for greater understanding of the role of networks in Maryland's food security dilemma. This chapter explores the reasoning behind the selection of social equity as the primary lens as well the reasoning behind the selection of SNA for this dissertation, the design of this SNA study, and the theoretical foundation of SNA.

Reasoning for Social Equity Lens to Support SNA

Social equity exists as an overarching factor and fundamental principal of food security. This dissertation incorporates a social equity lens to support the social network

analysis framework because food security is an equity problem. Existing research focuses on different areas of equity such as gender (Feeley, 2020; Harris-Fry et al., 2020; Gorrepati, 2016), and race (Nitschke, 2017; Center for Social Inclusion, 2013; Burton et al., 2018) when exploring food security. Additional research exploring the relationship between low food security and equity includes ruralness, income and employment, and vulnerable or marginalized populations (Kirschner, 2016; Harris & Nisbett, 2018; Marguerite Casey Foundation, 2016). Each of these lenses point to the same conclusion: inequity cannot be overlooked when exploring food security issues. Social network analysis in this dissertation begins to address inequities by identifying and exploring the networks that have organically evolved to direct resources to populations whose needs are not met by formal structures.

As a nation, social equity was determined to be a fundamental building block of United States society and government. It is irresponsible and unethical to leave equity out of administration, particularly when it comes to food security. This dissertation, with the backing of extensive social equity and food security literature, treats food security as a social equity problem.

Social Network Analysis and the Research Questions

SNA is at the heart of this dissertation. Each research question was developed based on the core building blocks of the theory. RQ1 launches the study by first asking if there are functional and/or collaborative food access and food information social networks in Maryland. This ties back to SNA theory because it blends *behavioral and social science* to understand the “*real world*” question about how/if populations are overcoming barriers to food security via *social networks*. RQ2 uses the same SNA theory logic but moves beyond RQ1 asking IF the networks exist to asking what role those networks play in food access in Maryland. RQ3 is a fundamental SNA question as it asks about *relation ties*, exploring the structure of the network. Finally, RQ4 is grounded in SNA theory because it looks at elements such as *centrality*, *connectedness*, and *relation ties* to understand if network structure affects a region’s food security rate. Table 9 shows the research questions and their connections to SNA theory.

Table 9: Research questions connection to SNA theory and social equity lens

Research Question	Connection to SNA Theory, Social Equity
Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information <u>social networks</u> in Maryland?	Food access and food information access are key elements of the social equity issue of food security. The existence of food social networks outside of formal networks may suggest the existence of discrepancies and disparities unaddressed by formal solutions. Exploratory “ <i>real world</i> ” <i>question blending behavioral and social science</i> to understand if populations are overcoming barriers to food security via <i>social networks</i>
Research Question 2 (RQ2): What role do <u>social networks</u> play in food access in Maryland?	Exploratory “ <i>real world</i> ” <i>question blending behavioral and social science</i> to understand how populations are overcoming barriers to food security via <i>social networks</i>
Research Question 3 (RQ3): Does the <u>structure</u> of networks vary by region in Maryland?	Regional differences may uncover regional discrepancies and disparities, suggesting the existence of significant inequities. Assess and analyze <i>relation ties</i> to understand the <i>transfer of resources</i> .
Research Question 4 (RQ4): Does <u>network structure</u> vary with regional food security rates?	Regional differences may uncover regional discrepancies and disparities, suggesting the existence of significant inequities. Compares centrality, connectedness, and relation ties to understand if the structure of networks affects a region’s food security rate

Reasoning for Selection of Social Network Analysis

Social networks play a vital role in the survival of rural and urban populations struggling with low food security. People have learned to rely on each other to make ends meet because networks increase chances of survival (but not necessarily chances of populations overcoming hurdles to thrive) (Smith & Meade, 2019, para. 17; Migliore, Schifani, Guccione, & Cembalo, 2014). Understanding these networks and their reach will improve data-informed approaches to allocating resources. Social network analysis (SNA) brings together quantitative and qualitative research techniques. Quantitative analysis cannot fully analyze the structure of networks; qualitative analysis fills in gaps in quantitative analysis and provides a richer understanding of the data and patterns observed. The research questions for this dissertation focus explicitly on the interorganizational and interpersonal interactions between organizations to understand how food and food-related information move throughout Maryland.

Social Network Analysis

Social Network Analysis Theory, once known as sociometry (Granovetter, 1973), is based on the concept of a social network as the unit of analysis. There is growing interest in SNA because of “the appealing focus of social network analysis on *relationships* among social entities, and on the patterns and implications of these relationships” (Wasserman & Faust, 2009, p. 3). SNA and its focus on “relat[ing] micro-level interactions to macro-level patterns” fills a blatant gap in sociological theory (Granovetter, 1973, p. 1360). SNA allows research to move beyond formally established structures to explore what interpersonal and informal interactions are occurring, then evaluate their effects on a system. This shifts the emphasis from individual units to **interactions** between units, putting relationships front and center in understandings of networks (Freeman, 2004; Wasserman & Faust, 2009; Borgatti, et al., 2013). This shift to focusing on relationships to better understand networks is particularly applicable for this food security-focused dissertation because relationships may be driving the evolution of informal social networks serving to address gaps in formal systems.

SNA emphasizes the interdependency of social entities by looking at “relational ties” that create pathways for resources (Wasserman & Faust, 2009); the models developed from SNA research focus on the “network structure environment as providing opportunities for or constraints on individual action” (Wasserman & Faust, 2009, p. 4). A prime example of a network structure creating and providing opportunities is the creation of the internet. The internet created a virtual social network for resource sharing (Watts, 2003). The theoretical underpinnings of SNA orient around the fact that SNA is the “science of the real world—the world of people, friendships, rumors, disease, fads, firms, and financial crises” (Watts, 2003, p. 13). There are two overarching paths in SNA: analyzing “the relationship between *network structure* ... and the corresponding *social structure*”; and treating the network “as a conduit for the propagation of information or the exertion of influence” (Watts, 2003, p. 48). Networks are powerful social tools.

Hungarian author Karinthy wrote about the idea of every individual being connected to one another by no more than six connections (Barabási, 2003; Watts, 2003). The six degrees concept inspired the 1967 Milgram study exploring how many ties were needed to connect a given set of actors without known connections. Milgram’s study

yielded results ranging from two to almost a dozen ties with an average of 5.5 “intermediate persons” – remarkably similar to Karinthy’s “famous ‘six degrees of separation’” (Barabási, 2003, p. 29). SNA of food networks in Maryland will provide greater understanding of how interconnected or distinctly separate organizations really are. People have learned to rely on each other in social networks to make ends meet. This increases chances of bare minimum survival (often by consuming cheap, unhealthy foods) but not chances of populations overcoming health, education, and economic hurdles to truly thrive. SNA can help demystify the innovative networking that has evolved to help people survive.

Fundamental Concepts

SNA theory is based on several fundamental concepts such as actors (entity studied); relational ties (connection between actors); subgroups (“any subset of actors, and all ties among them” [p. 19]); and groups (“collection of all actors on which ties are to be measured” [p. 19]) (Wasserman & Faust, 2009, p. 17-20). Each of these building blocks come together to form a social network, which Wasserman and Faust (2009) define as “a *finite* set or sets of actors and the relation or relations defined on them” (p. 19). Actors in this dissertation could be a farmers market association, an organization of local mothers in a rural or urban population, or food banks, to name a few examples.

Centrality is an SNA measurement used to identify which nodes are **best connected** to other nodes (Borgatti et al., 2013). Nodes with higher centrality (better connected to other nodes) can have greater influence within the network. Degree centrality identifies the nodes with the **most** connections. **Degree centrality** can be measured by counting in-degree and out-degree (to/from) connections to other nodes. In-degree refers to the number of edges going to a node whereas out-degree refers to the number of edges going out from a node, indicating the flow of resources. These two measures can provide valuable information about which direction(s) information and resources flow in a network. **Betweenness centrality** is a measure of node connectedness to other nodes. High betweenness centrality refers to nodes that are highly connected to many other nodes and are frequently on the shortest paths between other pairs of nodes. This is not a structural or hierarchical measurement—betweenness centrality is not about

where an actor is in a network, but rather to whom an actor is connected (Borgatti et al., 2013).

Nodes that are exceptionally well connected to other nodes (have high centrality) are considered hubs, and Barabási (2003) emphasized that “[h]ubs are special. They dominate the structure of all networks in which they are present, making them look like small worlds. Indeed, with links to [many] nodes, hubs create short paths between any two nodes in the system” (p. 64). In other words, nodes which would otherwise be unrelated can have short paths between them thanks to hubs in a network. The importance of this resulting occurrence or increase in connectedness cannot be ignored as these nodes may serve segments of a population that would otherwise be disconnected or unreachable by other organizations. Instead, the short paths between nodes increases access to a greater network of resources. This dissertation explores these connections to understand how networks connect nodes regionally and across the state to increase access to food resources. Finally, connectors are “nodes with an anomalously large number of links ... [which] are present in very diverse complex systems” (Barabási, 2003, p. 56). The high numbers of links help minimize distance between organizations by providing a common connection.

The presence of relational information describing how actors or nodes interact as a “critical and defining feature of a social network” (Barabási, 2003, p. 20). Relational ties are of particular importance because they can play several different roles and serve different purposes. Wasserman and Faust (2009) identify eight types of relation ties:

1. Evaluation of one person by another (for example expressed friendship, liking, or respect);
2. Transfers of material resources (for example business transactions, lending or borrowing things);
3. Association or affiliation (for example jointly attending a social event, or belonging to the same social club);
4. Behavioral interaction (talking together, sending messages);
5. Movement between places or statuses (migration, social or physical mobility);
6. Physical connection (a road, river, or bridge connecting two points);
7. Formal relations (for example authority); and

8. Biological relationship (kinship or descent) (p. 18).

This study focuses on a combination of the second and fourth types of relational tie – behavioral interaction. In this study, the nodes are interacting (e.g., type 4 – talking together) to share food and food information (e.g., type 2 – transferring material resources), and the study will explore how interactions occur throughout the network. Relational ties dictate how communications and resources will flow, so understanding how organizations on opposite “ends” of a network are directly or indirectly connected will play a significant role in understanding the network overall. Analysis of food networks in Maryland will provide greater understanding of how interconnected or distinctly separate organizations really are outside of formal systems. The structure and formal or informal processes and procedures of networks, or network governance, are a key element for a comprehensive understanding of networks.

Social Networks and Network Governance

Network governance, as the name implies, refers to the governance of networks. Diverse definitions of networks and network governance exist in the literature. Definitions vary depending on the lens of researchers and the context of networks being addressed. Jones et al. (1997) use the film industry as an example of a network, noting that “film studios, producers, directors, cinematographers, and a host of other contractors join, disband, and rejoin in varying combinations to make films” (p. 916). Their example of a network provides a flexible and inclusive explanation of networks that enables a richer dialogue around the concept of network governance. Provan & Kenis (2008) use a simpler definition of a network, suggesting that a network is a “group of three or more legally autonomous organizations that work together to achieve not only their own goals but also a collective goal (p. 231). While the definitions vary in their framing, both emphasize that networks are made up of **autonomous** entities working together toward a common goal. In this dissertation, the common goals in explored food-related networks are food security and social equity in Maryland. Understanding how informal and formal food security networks in Maryland govern themselves (or possibly are governed, if that is what is discovered) will provide greater clarity on the role and impact of these networks in addressing food security and social inequity in Maryland.

Networks are unique creations which “typically involve relational communication across actors, rather than communication governed by top-down commands and routines” (Lester & Reckhow, 2013, p. 121). The role of collaboration and reciprocity in terms of exchange of information and/or resources cannot be understated when considering network governance; “networks depend upon a higher level of goal consensus and normative commitment among actors than other forms of organization ... to maintain the reciprocal exchange among actors” (Lester & Reckhow, 2013, p. 121). Simply put, collaboration and reciprocity are vital for network efficacy because networks evolving outside of rules and regulations will not have reinforcing structures requiring behaviors or activities. Network members must work to achieve a common goal (such as addressing food security and social equity challenges in Maryland). An added benefit of networks and network governance over more traditional operations such as a bureaucratic entity is the added flexibility with actors less restricted by or dependent on procedures and protocols. This flexibility may allow for greater innovation to problem-solve. In fact, the network itself may be the direct result of innovation.

The existence of networks outside of formal structures and the resulting network governance patterns have benefits “including enhanced learning, more efficient use of resources, increased capacity to plan for and address complex problems, greater competitiveness, and better services for clients and customers” (Provan & Kenis, 2008, p. 229). These networks may vary depending on the origin of the research. Table 10 summarizes networks across the fields of political science, organizational science/interorganizational theory, and public administration. The type of network(s) identified in Maryland’s food security scene may fall in any of the three categories identified in Table 10, but the researcher anticipates a combination of organizational science/interorganization[al] theory and public administration origins are likely to be present given the focus of the networks explored (e.g., food security, social equity). These two styles focus on different but related activities: 1) “inter-organizational coordination, effective policy/service delivery, integrated policy/services” and 2) “solving societal problems, managing horizontal relations, connecting networks to traditional institutions, deliberation processes” (p. 590). Networks may be brokered (central organization governing) or not brokered (“highly decentralized” and interactive),

participant governed (“governed either collectively by the members themselves, or ... by a single network participant) or externally governed (governed by “a unique network administrative organization”) (Provan & Kenis, 2008, p. 234). Of the possible combinations, participant governance is “the simplest and most common form”; Provan and Kenis (2008) note that the success of network governance, whether through shared governance or with a leading organization, depends on elements such as “trust, size ... goal consensus, and the nature of the task” (p. 237).

Governance is a key element for understanding social networks and can provide insight into how information and resources flow throughout the network. This dissertation uses semi-structured interviews and an SNA survey to explore food security-related networks, including their governance structure, in Maryland. Understanding the types of network governance before launching the data collection will be essential for ensuring a rich understanding of the networks and for guiding the snowball sample development. The nature of informal social networks organically evolving to address a societal need and/or gap in resources and services increases the likelihood that the network will fall within the organizational science/interorganization theory or public administration network governance models (Table 10) (Klijn & Koppenjan, 2012).

Table 10: Types of governance networks in empirical research and their characteristics

	Policy networks	Service delivery and implementation	Managing networks
Main origin	Political science	Organizational science/inter-organization theory	Public administration
Focus	Decision making and effects, closure and power relations on issue and agenda setting	Inter-organizational coordination, effective policy/service delivery, integrated policy/services	Solving societal problems, managing horizontal relations, connecting networks to traditional institutions, deliberation processes
Main research questions	<ul style="list-style-type: none"> - Which actors are involved in decision making (which network exists around the decision?) - What is the nature of the power relations/entrance to the network? - Which are the effects on decision making? 	<ul style="list-style-type: none"> - What does the network around service delivery look like? - How are networks around complex integrated services coordinated? - Which mechanisms are effective and efficient (contracting, partnerships, etc.)? 	<ul style="list-style-type: none"> - How can networks around societal problems be managed? - How should networks be organized and connected to traditional institutions? - How can the variety of content be improved? - How can various value judgments be combined?
History	Started with the pluralist political science research of the 1960s and continues to focus on subsystems, policy communities, and policy networks	Started with the first inter-organizational theorists that focus on inter-organizational coordination and continues to focus on service delivery, contracting, and implementation	Started in the mid-1970s with work on inter-governmental relations and continues with analyses of new forms of management, including their effects and requirements

Source: Klijn & Koppenjan. (2012). Governance network theory: Past, present and future. Policy and Politics, (40)4: 187-206. (p. 590)

One reason why network governance and social network analysis are prominent in the literature is the “shift in governing processes away from formal bureaucratic forms toward ‘network governance’” (Lester & Reckhow, 2013, p. 115). Lester & Reckhow (2013) discuss the interaction of exchange conditions which become embedded in network cultures and in turn become a network’s social mechanisms. Figure 12 provides a process diagram representation of interactions leading to embeddedness and social mechanisms (Jones, Hesterly, & Borgatti, 1997, p. 918). Based on this model, exchange

conditions including demand uncertainty, task complexity, human asset specificity, and frequency develop structural embeddedness, which in turn establishes social mechanisms for a network. Social mechanisms include restricted access, microculture, collective sanctions, and reputation (Jones et al., 1997). The social mechanisms of a network affect how communication and resources flow through the network, which in turn affects which nodes have access to either or both. Understanding these embedded mechanisms may provide insights on how networks operate and ultimately deliver on their goal to feed those struggling with food security. Activities such as political bargaining, hierarchies, and rules of engagement become established over time “like any other governing institution” (Lester & Reckhow, 2013, p. 117).

The existence of social networks outside of formal structures and governing institutions indicates a need that has not been met. Taking that logic a step further, food security-related social networks and their unique governance structures are a key element of social equity in Maryland because their existence suggests food security is not adequately addressed by the programs designed to ensure it.

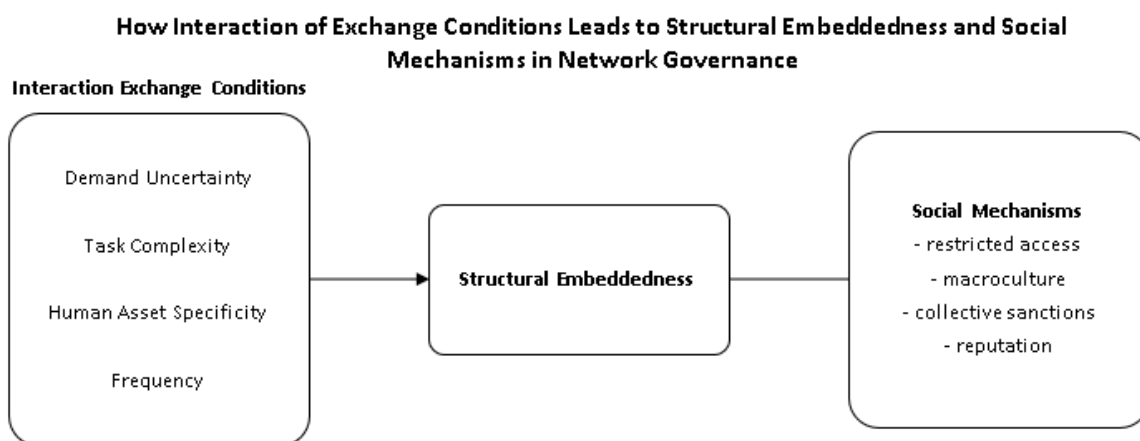


Figure 12: Conditions leading to structural embeddedness and social mechanisms in network governance

Source: Jones, Hesterly, & Borgatti. (1997). A general theory of network governance: Exchange conditions and social mechanisms. Academy of Management Review (22)4: 918.

Regional Equity and Network Governance

Regional equity, which considers disparities in economic development, health and education outcomes, and other factors at a regional level (Organisation for Economic Co-operation and Development, 2016), and its connections to network governance is an

evolving area of focus in research and literature. There is growing support for approaching regional issues with regional governance “as opposed to government ... to achieve the economic, environmental, and equity goals” (Alpert, Gainsborough & Wallis, 2006, p. 144). Regional governance models are cross-sector and interorganizational, “emphasiz[ing] the involvement of public, private, and nonprofit organizations that formal coalitions to modify public policies and agency operations” (Alpert et al., 2006, p. 144). This diverse, horizontal framework for governance is often geared toward addressing equity and specific problems. Regional governance focused on equity problems and “the resulting formal and informal interactions have the potential to increase policy effectiveness at less cost than authority-based structural changes arrived at through formal reorganization” (Schneider, Scholz, Lubell, Mindruta & Edwardsen, 2003, p. 143-144).

There are several forms of regional equity approaches including top-down regionalism, state-led action, civic-led regional planning, community-based planning (spatially focused), and community-based planning (networked social movements) (see Table 11) (Lester & Reckhow, 2013). Each of these forms of regional equity action involve different actors and had different strengths and weaknesses. For example, top-down regionalism involves the federal government and planners/technocrats. This approach in examples studied had strengths including “[c]reation of formal institutional” tools and the use of “Federal dollars [to] act as the carrot to bring stakeholders together”; however, weaknesses were prevalent (Lester & Reckhow, 2013, p. 126). Weaknesses identified included a “[n]arrow spectrum for action with regard to equity issues”, “[d]eclining urban power”, and “[i]ndirect impacts through local government” to name a few. Each of the other forms had different iterations of strengths and weaknesses, leading to the conclusion that “public deliberation does not take place around one fixed ‘table’ around which all relevant stakeholders gather to engage one another” (Lester & Reckhow, 2013, p. 133). Instead, the role of networks becomes significant and prominent in regional equity efforts.

The food security-related social networks in Maryland that this dissertation seeks to uncover and explore may be precisely the types of networks which have the potential to support long-term social equity in the state. Maryland food networks may have

evolved around existing networks or well-known nodes across the state and may include dozens of organizations with different strengths, all coming together to address regional equity through collaboration and pooling of resources. Based on the literature, the networks in Maryland may resemble the “community-based II: networked social movements” form of regional equity action identified by Lester and Reckhow (2013, p. 126). This form of regional equity is characterized by social networks consisting of a variety of organizations seeking to have a direct impact on the target population (in this case, those struggling with food security). Lester and Reckhow (2013) note that this is not truly regional because the laws and policies affecting the network’s efforts are determined at a higher level (e.g., SNAP benefits administered by the State of Maryland), but the efforts and effects at the community level are undeniably important. Community-based, networked social movements such as the work conducted by the Maryland Food Bank to collaborate with other food-related organizations to distribute food resources may have evolved into a bigger network using the same framework. This framework coupled with network governance and regional equity literature may help develop an understanding of the evolution and current configuration/structures of food security- and equity-related social networks in Maryland.

Table 11: Identifying forms of regional equity action

Form	Example	Types of actors involved	Strengths	Weaknesses
Top-down regionalism	- Federal transportation legislation mandated creation of MPOs and regional planning processes for capital budgets. Equity is on the agenda in some regions.	- Federal government - Planners/technocrats	- Creation of formal institutional scale - Federal dollars act as the carrot to bring stakeholders together	- Narrow spectrum for action with regard to equity issues - MPO may be ineffective at reform without vertical power - Declining urban power within the state houses - Difficult to achieve in heterogeneous regions - Indirect impacts through local government
State-led	- Minneapolis' MetroGov - Portland's Urban Growth Boundary - Michigan's Voices for Action networks	- State legislators - State bureaucrats - City/inner-ring suburban - MWC - Planners/technocrats	- Facilitation from higher level officials - May involve direct revenue redistribution based on need	- Declining urban power within the state houses - Difficult to achieve in heterogeneous regions - Indirect impacts through local government
Civic-led regional planning	- Chicago Metropolis 2020 - Leadership Nashville - Jacksonville Community Council	- Business and political elites - Planners - Academics - Foundations - Constituent leaders	- Broad visioning powers - Possibility for boundary spanning - Opportunities to inject equity into regional "epistemic communities"	- "Equity through the back door" - Corporate definition of equity problem
Community-based I: spatially focused	- Community benefits agreements (e.g., Staples Center in Los Angeles) - "Linked" housing development - Quality food access in Detroit	- Local CBOs - Unions - Housing advocacy organizations	- Articulates clear "claim" for redistribution - Links high-profile developments to local needs	- Lower impact - Potentially divisive
Community-based II: networked social movements	- Movement to pass citywide or countywide minimum/living-wage laws	- Local CBOs - National networks of CBOs - Foundations - Unions - Clergy	- Direct impact on population in need	- Not truly regional (most laws are at the urban scale) - May generate business flight

Source: Lester & Reckhow. (2013). Network governance and regional equity: Shared agendas or problematic partners? Planning Theory (12)2: 115-138. (p. 126).

Social Networks and Food Security

As mentioned previously, weak social networks are identified by the USDA ERS as being among the “five characteristics ... most strongly associated with the likelihood of experiencing food insecurity: low levels of education, **weak social networks**, limited social capital, low household income, and being unemployed” (Smith & Meade, 2019, para. 17). The USDA ERS describe social networks as “the respondent’s ability to make new friends” (Smith & Meade, 2019, p. 6). A respondent who has limited ability to form friendships and thereby expand their social network is more likely to experience low food security as well as struggle with economic stability overall. Coupled with less than favorable food environments discussed at length previously, weak social networks can have devastating effects. Food environments affect food security through “factors includ[ing] proximity to food, affordability of food, available food options, services that provide food, marketing and advertising, **social networks**, government policies, cultural norms and market forces” (Center for a Livable Future, 2018, p. 1). Garasky, Morton and Greder (2006) found that strong social networks where households “can count on others for help when it is needed” are “less likely to be food insecure” but interestingly enough did not find a relationship between social networks and acquisition of food (p. 98). Garasky et al. suggest this may be the result of food exchange being normal in community settings rather than “being a specific behavior of food insecure households” (2006, p. 98). Another key takeaway was that “families in poverty often share resources among each other, creating an **informal network** of support” (Garasky et al., 2006, p. 98).

Existing research indicates a strong relationship between social networks and food security. In the last 20 years, research exploring the relationship between social networks and food security was diverse. Hamm and Bellows (2003) explored nutrition educators’ roles in community food security, noting a produce recovery network and a transportation network among numerous other approaches to address community food security. Frongillo, Valois, and Wolf (2003) explored the role of social support in food security challenges among older adults, identifying several occurrences when social interactions helped older adults get through periods of limited or no access to food (e.g., running out of money or food stamps at the end of the month). Pothukuchi (2004) explored the role of community food assessments and planning on improving community food security,

noting that social networks play a key role throughout the assessment, planning, and implementation. Garasky, Morton, and Greder (2006) identified ways that American Midwest families coped with obstacles to sufficient food access, noting that informal support networks played a key role for many families. Christakis and Fowler (2007) looked at the role of social networks in “spreading” obesity over a period of three decades. Timonen and O’Dwyer (2010) evaluated Ireland’s Meals-on-Wheels programs to determine the social objectives and impacts including “providing meals recipients with social contact” (p. 399). Kaschula (2011) studied the role of social networks in HIV/AIDS-affected households in South Africa, noting that social and community networks played a significant role “due to stigma and social exclusion” limiting or altogether preventing access to food resources (p. 1490). Pachucki, Jacques, and Christakis (2011) studied the role of familial and friend social networks on individual food choices. Conrad (2012) discussed the emerging and evolving role of crowdfunding (“the collective efforts of individuals who pool their resources through networking to support efforts initiated by other people or organizations”) (p. 65), noting that food-related initiatives are occasionally funded by crowdfunding.

McMillan and Parlee (2013) explored the role of social networks in the northwest territories of Canada to determine how social interactions affected food security of those relying on others to hunt or harvest. Alia, Freedman, Brandt, and Browne (2014) incorporated the element of federally qualified health center-based farmers’ markets to determine the role of social networks in access not only to food resources but also “social supports related to improved health, economic and community outcomes” (p. 335). Weiler, Hergesheimer, Brisbois, Wittman, Yassi and Spiegel (2014) conducted a meta-narrative mapping exercise to explore the interconnectedness of food sovereignty, food security, and health equity as well as the networks that evolve to help marginalized populations survive. Bissell, Peacock, Holdworth, Powell, Wilcox and Clonan (2018) explored the role of “assumed shared food narratives” in social networks and their impact on food and eating practices (p. 1142). Lavery (2019) shifted focus from adults providing for their families to understanding how children experience and cope with low food security. Rockers, Settle, and Cartmell (2020) focused their research on the social networking, communication, and decision-making of women in agricultural settings. Lin

(2017) considered food security and food sovereignty from a global network perspective to explore impacts on China's food systems and movements.

Each of these studies, while approaching social networks from different angles and lenses, emphasize the role and importance of social networks in food security issues. Even studies which may be described as exploring the negative effects of networks (e.g., Christakis and Fowler's exploration of "spreading" obesity) demonstrates that networks are powerful food security tools regardless of age, gender, family composition, programs, funding sources, rural or urban setting, or nationality. Existing research demonstrates that the relationship between food security and social networks is a well-established research area with ample room for continued expansion. This dissertation seeks to identify and understand the food security-related social networks present in Maryland and to understand the role of those social networks in addressing food security, particularly for vulnerable populations and populations facing barriers (regional or otherwise) to food security including rural food security barriers.

As discussed previously, living in a rural setting is vastly different from urban living in many ways; rural housing, job opportunities, economic stability, education, and food shopping options are drastically different than in urban settings. Limited options for groceries force some rural populations to drive significant distances to get food, relying on a cooler to keep frozen and cold foods safe to eat by the time they get home. Urban residents may benefit from closer proximity to more shopping and grocery options, but may not have access to transportation, be living in a low-income or high crime neighborhood, and may only have access to low-paying employment in their area. Table 8 presented (shown previously) a comparison of rural and urban food security challenges. Garasky et al. (2006) explored rural communities experiences with food environments and relationships, noting that social relationships "are part of the infrastructure that supports rural quality of life" (p. 83). In rural areas where food environments do not meet the needs of households, many "[rely] on **informal support networks**" (p. 83); relationships play a key role in rural life and are essential "support mechanisms" for food security (Garasky et al., 2006, p. 86; Alia et al., 2014).

Social Networks and Social Equity

Social equity and food security come together to form the foundation of this dissertation. The relationship between the two was discussed previously, but the most significant takeaway is that a community's food security rate is an indicator of social equity for that population. Conflicting perspectives exist in food security and equity literature about which equity lens is most appropriate. As noted previously, equity lenses in the literature range from gender and race/ethnicity to ruralness and vulnerable populations. This dissertation does not seek to identify a specific equity lens but rather embraces the consensus that food security is an equity problem. Using the social network analysis framework, this dissertation explores the role of social networks in addressing food security challenges in Maryland.

Social networks develop, often organically, when a need or gap in resources and services (i.e., an inequity) exists. Alia et al. (2014) suggest that social networks “may ... facilitat[e] the acquisition of resources related to health, economic and community outcomes” (p. 342). This facilitation of resources can, in turn, play a role in addressing health disparities which go part and parcel with addressing social inequities and low food security. Networks play a vital role in addressing economic and social inequalities such as “uneven access to jobs, affordable housing, and high-quality education” (Lester & Reckhow, 2013, p. 118). These inequities may be results of formal structures as well as informal ones; Lester and Reckhow (2013) point to the “tractable fault lines of racially and ethnically segregated neighborhoods” (p. 118). Networks are gaining recognition and acceptance as tools to address inequities, as demonstrated by the creation of “eight regional networks for poverty reduction planning” in Michigan in 2008 (p. 128). Other studies focused on the role of networks in addressing inequities through geographically-focused strategies, agricultural interventions, deliberate inclusion of social support systems for gender equity efforts, network governance “to partner across sectors in providing services” (Norman & Major, 2011, p. 234), and the role of “food movements ... to advance[e] an equity agenda” (Burton, Espinoza, Fox & Flores, 2018, p. 1).

Weiler et al. (2014) explored health equity and food systems, noting that social networks can improve the impact and effectiveness of “marginalized place-based social movements” (p. 1087). Harris-Fry, Nur, Shankar, Zanello, Srinivasan, and Kadiyala

(2020) explored the impact of gender equity on food security-related outcomes, noting that agricultural interventions should incorporate access to social support (i.e., networks) to improve effectiveness. Norman and Major (2011) discussed the role of network governance in public administration efforts to “figure[e] out how to do more ... with fewer resources” (p. 234). Burton et al. (2018) explored the role of social movements and social networks in improving food security at the community level. The literature on food security, social networks, and social equity supports the assertion that networks play a key role in addressing low food security and other inequities.

Food security is commonly accepted as a social equity problem in the literature. This dissertation explores addressing the food security social inequity problem in Maryland by exploring how networks have evolved to address low food security, particularly among vulnerable populations facing barriers to stability and self-sufficiency due to those inequities. Food movements, cross-sector collaborations, and social networking-based efforts to address inequities with limited resources all come together to improve lives and feed populations. Whether through region-specific or a statewide network, the organic development and evolution of food security networks in Maryland would logically support the assumption that existing formal structures and programs fail to address inequities.

Food SNA Literature

Existing food-related social network research is targeted and niche. As discussed previously, food security is treated as an equity issue across several distinct lenses including gender equity, racial equity, and inequities for rural and isolated communities, low-income or unemployed populations, and vulnerable or marginalized populations. The breadth and depth of literature tying food security and different categories of social equity provides the basis of this dissertation. Food-specific network analysis commonly focuses on: social networks, interaction patterns, and buying patterns at farmers markets (Ma et al., 2017; Alia et al., 2014); alternative food networks (Brinkley, 2018); food community networks’ social embeddedness of “economic activities and social behavior” (Migliore, Schifani, Guccione, & Cembalo, 2014, p. 549); the effects of social networks on food choices (Pachucki, Jacques, & Christakis, 2011); the role of food retailers in

local food systems (Trivette, 2019); and regional food networks impacts on food system resilience (Duncan, Anderson Brekken, Luri, Fiegener, Sherry, & Liang, 2018).

Ma et al.'s (2017) research on the "food acquisition and shopping habits of residents living in food deserts" is a particularly relevant example of existing food SNA literature for this dissertation. They explored several variables including demographics, transportation access, distance to food sources, and use of other resources (e.g., farmers' markets, food banks or pantries, churches, or social services), concluding that almost half of study participants study relied on social networking for transportation and access to food resources. Alia et al. (2014) suggested that social networks "facilitat[e] the acquisition of resources related to health, economic and community outcomes" (p. 342). The farmers' market became a hub for social interactions and evolving social networks related to food security. Brinkley (2018) used social network analysis to "explore relationships built through an alternative food network" (p. 1), noting that social networks play a significant role in the ultimate effects of alternative food networks. Pachucki et al. (2011) studied the role of familial and friend social networks on individual food choices, noting that social networks likely influence eating behaviors at the individual level. Trivette (2019) explored social networks and food security by looking at the role food retailers play in local food systems and community access to food. Duncan, Anderson Brekken, Lurie, Fiegener, Sherry and Liang (2018) explored the role of regional food networks in strengthening food system resilience, noting that regional food networks have a significant role that can influence policy.

Each of these studies contributes toward understanding the extensive role and impact of networks. The diverse range of studies highlight the potential for network analysis in food security research. Existing research focuses on a variety of units of analysis and lenses; this study takes the relationship between social networks and food security a step further to understand how cross-sector collaborations among organizations with no formal relationships lead to regional and/or statewide networks addressing food security for vulnerable populations struggling with social inequities. This dissertation will expand existing literature on the role of social networks in food security by exploring existing food-related social networks in Maryland working to address social inequities.

Conclusion

The motivation driving this dissertation is the desire to identify and understand the food security-related social networks present in Maryland. This will improve long-term social equity outcomes by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. The use of SNA to understand food systems is a growing trend in research. Studies vary greatly from “network analysis [of] domestic food flows within the USA” (Lin, Dang, & Konar, 2014, para. 1) to using SNA to look at the evolution of networks at the formation and one-year anniversary of a food coalition (Freedman & Bess, 2011). Other studies rely on SNA theory as a tool to measure how complex food systems and networks change over time (Christensen & O’Sullivan, 2016) or to explore how social networks develop their own governance features as they evolve (Dedeurwaerdere, 2017). SNA as a relevant and appropriate theoretical framework for food systems research is an established practice.

SNA is useful as a theoretical framework for this social equity-focused dissertation because exploring how actors, relational ties, subgroups, groups, and hubs interact within the network will provide a deeper understanding of the “real world” approach to overcoming barriers to food security where current formal and governing structures fail. The SNA framework emphasizes that “particular interactions are not of primary concern to social network researchers ... relatively stable patterns of interaction are of most interest” (Borgatti, Everett, & Johnson, 2013, p. 57). The true focus of SNA is on patterns rather than individual, limited interactions that respondents report; understanding patterns of behavior will allow for more comprehensive, relevant, and responsible food policy and resource allocation. Without this careful and deliberate work, systemic and institutionalized social inequities will continue to create and reinforce barriers to food security for low-income and vulnerable populations.

METHODOLOGY

Introduction

The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland. This will improve social equity by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. Theoretical framework and study design are the building blocks of a dissertation, but the methodology used to conduct the study provides the path forward and ensures the project will be manageable, effective, and reliable. Methodology must be carefully designed and followed to ensure that the data collected is both valid and reliable (within the constraints of the theoretical framework), and to ensure that analysis and interpretation are sound. Given the multi-instrument nature of this dissertation, methodology was carefully considered and developed to ensure it fulfilled all expectations for a strong and reliable study. This chapter discusses the methodology of the initial semi-structured interviews, snowball sample survey, SNA survey, and follow-up semi-structured interviews in this study.

This dissertation is a mixed-methods study of Maryland's food access and information social network. This dissertation explored and evaluated how social networks supporting access to food (regardless of ability to pay) in Maryland develop formally and informally to address food security and social equity issues by providing food and related resources to low-income and vulnerable populations. The data collection timeline for this study is presented in Table 12. Data collection, from initial interviews through follow-up interviews, took place over a period of 20 weeks.

Table 12: Data collection timeline

Instrument	Timeline
Initial Interviews	3 weeks
Snowball Survey	6 weeks
Social Network Analysis Survey	6 weeks
Intermediate Analysis (<i>identified follow-up interviewees</i>)	2 weeks
Follow-Up Interviews	3 weeks

The dissertation explored the following research questions:

Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information social networks in Maryland?

Research Question 2 (RQ2): What role do social networks play in food access in Maryland?

Research Question 3 (RQ3): Does the structure of networks vary by region in Maryland?

Research Question 4 (RQ4): Does network structure vary with regional food security rates?

Table 13 demonstrates the connection between each of the four research questions and SNA theory as well as the connection between proposed analyses and SNA theory.

Table 13: Research question analysis connection to SNA theory

Research Question	Connection to SNA Theory	Analysis Connection to SNA Theory
Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information <u>social networks</u> in Maryland?	Exploratory “ <i>real world</i> ” <i>question blending behavioral and social science</i> to understand how/if populations are overcoming barriers to food security via <i>social networks</i>	Quantitative ; structural, composition, and affiliation variables
Research Question 2 (RQ2): What role do <u>social networks</u> play in food access in Maryland?	Exploratory “ <i>real world</i> ” <i>question blending behavioral and social science</i> to understand how/if populations are overcoming barriers to food security via <i>social networks</i>	Qualitative ; TBD based on interviews and survey open-ended responses Quantitative ; structural, composition, and affiliation variables
Research Question 3 (RQ3): Does the <u>structure</u> of networks vary by region in Maryland?	Compares centrality, connectedness, and relation ties by region to understand if network structure varies by region	Qualitative ; TBD based on interviews and survey open-ended responses Quantitative ; structural, composition, and affiliation variables plus centrality, connectedness, and relation ties
Research Question 4 (RQ4): Does <u>network structure</u> vary with regional food security rates?	Compares centrality, connectedness, and relation ties to understand if network structure affects a region’s food security rate	Quantitative ; structural, composition, and affiliation variables plus centrality, connectedness, and relation ties

The subsequent sections explain the four stages of this study including initial semi-structured interviews, the snowball sample survey, the social network analysis (SNA) survey, and follow-up semi-structured interviews.

Initial Semi-Structured Interviews

The first stage of the study consisted of initial semi-structured in-person interviews with staff members at two Maryland Food Bank (MFB) regional offices (Salisbury–Eastern Shore Branch with Regional Director; Hagerstown–Western Branch with Regional Programs Director) to establish relationships with MFB representatives and develop the foundation of the snowball sample. Initial semi-structured interviews were conducted on January 14, 22, and 24, 2020 (Table 14). MFB has an office and warehouse in Baltimore but the researcher was unable to schedule an interview due to Baltimore MFB staff time availability and COVID-19 shutdowns.

Table 14: Initial semi-structured interviews schedule

Interviewee	Organization	Date of Interview
Interviewee 1	Maryland Food Bank – Eastern Shore	January 14, 2020
Interviewee 2	St. Vincent de Paul Food Pantry	January 22, 2020
Interviewee 3	Maryland Food Bank – Western Branch	January 24, 2020
<i>Invitation 4</i>	<i>Maryland Food Bank – Baltimore</i>	-

At the recommendation of the Eastern Shore Branch regional director, and for the sake of additional data collection from a relevant organization to better inform study design, a third interview was conducted with a long-term volunteer at the St. Vincent de Paul Food Pantry in Easton, MD. The three interviews were audio recorded. Participants were asked about their organization, position, work experiences, and organizations they regularly work with for food access and information tasks. Additional questions asked how interviewees would “solve” food security issues in Maryland and about how their perceptions/assumptions about food security or low food security populations may have changed over time. The three initial semi-structured interviews were conducted in person and audio recorded, then manually transcribed (i.e., without transcription software) and qualitatively analyzed to identify concepts and themes to guide the design of the social network analysis survey. It is important to note that these interviews were not the primary source of qualitative data; the SNA survey and follow-up semi-structured interviews provided the majority of qualitative data for this study. Establishing a rapport with each interviewee was a key strategic element of this study because the interviewees were asked to share the electronic snowball and SNA surveys with their networks. Trust in the researcher and in the legitimacy of the study was essential for maximum distribution of the surveys. This approach also helped identify areas of interest that may be relevant in the next stages of the study and ensure the snowball and SNA surveys were appropriately designed to explore food security and social equity issues addressed by social networks.

This study used initial semi-structured interviews rather than a survey because interviews allowed for significantly more in-depth and rich data collection (see Table 15). Interviews allowed for observing social cues indicating that an interviewee may have more to share and therefore prompt for additional information. In this study, questions focused on interviewees’ work experiences, interactions with food recipients, and perceptions of food systems. Interviews also allowed for physical observation of the

interviewees' work environment, which could inspire questions specific to each site. As discussed previously, initial semi-structured interviews were used to guide the rest of the study. The questions asked of interviewees provided an opportunity to gain insight into information, needs, and experiences of difficult-to-reach populations, vulnerable or otherwise, which often go under- or unrepresented in research and policy ("Core indicators", 1990). Semi-structured interview questions were developed based on example questions developed by Cross and Parker (2004). Their questions were designed to "[u]ncover [i]mportant [n]etwork [r]elationships" and were broken into categories of communication, information, problem solving, and innovation (p. 147). Table 16 is adapted from Cross and Parker's (2004, p. 147) original table of example questions.

Table 15: Features of different survey types

Type of data collection	Issues of sensitivity	Interviewer response effects	Data handling errors	Cost of administering	Ability to establish rapport	Ability to maximize elicitation
Face-to-face	High	High	Moderate	High	High	High
Self-administered	Low	Low	Moderate	Moderate	Low	Low
Mail-out	Low	Low	Moderate	Low	Low	Low
Electronic	Low	Low	Low	Low	Low	Low
Phone	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
Group setting	High	Moderate	Moderate	High	Moderate	Moderate

Source: Borgatti, Everett, & Johnson (2013). Analyzing Social Networks.

Table 16: Cross & Parker (2004) questions to uncover important network relationships

Category	Example Questions
Communication	<ol style="list-style-type: none"> How often do you talk with the following people regarding <topic x>? How much do you typically communicate with each person relative to others in the group?
Information	<ol style="list-style-type: none"> How frequently have you acquired information necessary to do your work from this person in the past three months? Please indicate the extent to which each person provides you with information you use to accomplish your work. From whom do you typically seek work-related information? To whom do you typically give work-related information?
Problem solving	<ol style="list-style-type: none"> Whom do you typically turn to for help in thinking through a new or challenging problem at work? How effective is each person in helping you to think through new or challenging problems at work?
Innovation	<ol style="list-style-type: none"> Whom are you likely to turn to in order to discuss a new or innovative idea?

Source: Cross & Parker. (2004). The hidden power of social networks.

These network-focused questions were used as the foundation of semi-structured interview questions early on, before networks had been discovered using SNA, to establish whether the study should continue forward focusing on networks versus something new that may have been more appropriate or applicable.

Questions for the initial semi-structured interviews (see Appendix II: Initial Semi-Structured Interviews – Instrument) were developed based on the concepts and structure of Cross and Parker’s (2004) questions. That design was specifically chosen to emphasize network questions because the goal of the dissertation was to determine if networks were present and subsequently explore them. Asking these questions ensured that a lack of network would be easier to identify early in the study based on responses and allowed for adjusting the focus or methodology of the study if it had been necessary. Questions asked about frequency of communication about food access and security, what kind of information the respondent gave and received, and who they turned to if they need to get something done. Other semi-structured interview questions were geared toward qualitative analysis of individual experiences and perspectives that might inform snowball and SNA surveys. Table 17 ties the initial semi-structured interview questions to Research Questions 1 and 2. The initial semi-structured interview questions were deliberately designed to allow respondents to answer with minimal or no influence from the researcher. Two questions in particular were used to address social equity issues:

1. Tell me about your position.
 - a) What do you see as the strengths of your organization when it comes to addressing food security?
 - b) What could be done differently or better?
 - c) What do you see as the strengths of a network in addressing food security?
2. “If you had unlimited resources, how would you reduce or solve food access and/or food information sharing challenges? What would make your work to address food challenges easier?”

These questions were useful for addressing social equity issues because interviewees consistently demonstrated a clear understanding of the relationship between inequities and low food security. Asking about the strengths and weaknesses of their organizations

for addressing food security allowed interviewees to draw connections between their organizations' work and the issues their target populations face. The second question that was useful for addressing social equity asked how interviewees would "solve" food security, which again encouraged participants to

Table 17: Research questions connection to initial semi-structured interview questions

Research Question	Related Initial Semi-Structured Interview Question(s)
Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information <u>social networks</u> in Maryland?	<ul style="list-style-type: none"> • Do you interact with the other Maryland Food Bank offices? Describe those interactions for me. • Do you have any tips or suggestions for how to connect with the most people possible for this dissertation? What am I missing or overlooking?
Research Question 2 (RQ2): What role do <u>social networks</u> play in food access in Maryland?	<ul style="list-style-type: none"> • Tell me about your position. <ul style="list-style-type: none"> ○ What do you see as the strengths of your organization when it comes to addressing food security? ○ What could be done differently or better? ○ What do you see as the strengths of a network in addressing food security? • Have you experienced anything in the food insecurity world that has changed your perspective? <ul style="list-style-type: none"> ○ Have any of your assumptions changed? ○ What is the most surprising thing you have learned? • "If you want to get something done [for food sharing/access and food information], start with _____. Does a person or organization come to mind? Who? • Who do you turn to for guidance or support? Does it vary by type of issue? • If you had unlimited resources, how would you reduce or solve food access and/or food information sharing challenges? What would make your work to address food challenges easier?

Initial semi-structured interviews were qualitatively analyzed using a coding scheme devised specifically for the data collected. Campbell, Quincy, Osserman and Pederson (2013) argue that "simpler coding schemes are better than complex ones" (p. 308). This logic was applied when developing the coding structure for the initial semi-structured interviews, SNA survey, and follow-up semi-structured interviews. The coding structures for the initial and follow-up semi-structured interviews were developed by reading every transcript three times: first to get a general understanding of the content of the semi-structured interview, again after reviewing all other transcripts to begin identifying themes and concepts addressed in two or more interviews, and a third time using the themes and concepts identified to code the transcripts. The final coding

structure used to qualitatively analyze the initial semi-structured interviews is shown in Table 18. Full analysis is provided in the Results chapter.

The primary objective of the initial semi-structured interviews was to guide the design for the rest of the study by determining if there was evidence of social networks addressing food security and equity issues and to support development of the snowball sample. In this way, the initial semi-structured interviews were successful. Despite being unable to meet with the Maryland Food Bank's Baltimore office due to time constraints of their staff during the early period of the COVID-19 pandemic in the U.S., valuable information indicating network presence plus contact information for organizations was collected from the three interviewees.

Table 18: Coding structure, initial and follow-up semi-structured interviews

Theme/Concept	Description
Networking to accomplish food access mission and objectives	The activities, variety of organizations, variety of food sources, and multiple resources used in a networking capacity to ensure food resources reach target audiences
Barrier: Wraparound services	Barriers faced by support recipients for accessing resources and support services including but not limited to youth programs, housing, utilities, medications, healthcare, and financial literacy resources.
Barrier: Transportation and homebound populations	Barriers faced by support recipients due to limited or no public transportation, limited or no access to personal transportation, or inability to leave home without special assistance.
Barrier: Housing	Barriers faced by support recipients due to lack of stable housing, unsafe living environments, or inability to prepare food in a safe setting.
Barrier: Financial support and resources	Barriers faced by support recipients due to lack of income, loss of employment, unexpected medical bills, emergencies, and other financial challenges.
Barrier: Caring for older relatives, family, children	Similar/related to financial support and resource barriers; barriers faced by support recipients due to increased burden of caring for older relatives, family members, and/or children which may exceed household income.
Barrier: Illegal and prescription drug problems	Barriers faced by support recipients due to drug addictions and related challenges including but not limited to halfway house residents.
Barrier: Limited awareness of resources	Barriers faced by support recipients due to limited or no awareness of resources available in their community or through government programs.
Regional differences	The different challenges faced by support recipients due to rural and urban differences such as economic stability, geographic spreading, limited access to employment opportunities, limited transportation, access to grocery stores, and other variables.
Assumptions and perspectives about clients and/or food security	The assumptions and perspectives held by community members about what someone who needs help from a food bank or pantry “should look like”, how they should behave, what kind of vehicle they should drive, and other assumptions that can affect an individual’s willingness to ask for help.
Funding sources for food security-related organizations	The funding sources that food security-related organizations such as Maryland Food Bank and food pantries rely on to provide services including but not limited to donations (money, food recovery programs), grants, secondary organizations (thrift store associated with organization), and state or federal government funding.
Ideas for “solving” food security problem	The interviewee-identified ideas to “solve” food security as well as the strengths and weaknesses of their organization to address the problem.
Interpersonal experiences with support recipients	The interviewee’s interpersonal experiences interacting with support recipients and/or how that has impacted their work with food security.

Snowball Sample Survey

The second stage of the study consisted of a snowball sample survey designed to develop the sample for the social network analysis (SNA) survey in the third stage. For this study, snowball sampling was used. Snowball sampling is “[a] *nonprobability sampling* method often employed in field research. Each person interviewed may be asked to suggest additional people for interviewing” (Babbi, 1992, p. G7). Borgatti et al.

(2013) recommend snowball sampling processes for “‘natural’ groups” and researcher-defined networks (p. 24). The snowball sampling approach was ideal for this study because it allowed for individuals to identify others within their network in a process that organically documented relationships.

The primary objective of the snowball sampling process was to identify organizations to include in the SNA survey; in this way, the snowball survey was successful. Variables such as COVID-19, challenges anticipating the reach of the network, and the exploratory nature of this dissertation added to the importance of continuing with the SNA survey regardless of the snowball survey response rate. The decision to administer a survey (snowball and SNA survey) to organizations working on food security issues rather than directly surveying populations struggling with low food security was deliberately made based on four key factors: 1) respecting that reliance on others (e.g., friends, family, food banks, nonprofits) for food can be stressful and embarrassing, 2) respecting individuals’ privacy, 3) food recipients’ likely limited awareness of food sources beyond the immediate transactions in which they participate, and 4) low food security tends to affect low-income and vulnerable populations, both of which are less likely to have predictable access to resources such as computer and internet access. The questions asked about social networking by focusing on the network itself to understand how resources flow through formal and informal channels. If the survey were administered to individual actors in these networks, the research questions would require significant modification to reflect individual experiences of food security.

The snowball survey was administered electronically with the Qualtrics survey platform to a database of 208 email addresses including addresses identified by initial interviewees in the first stage. Because the interviewer was unable to meet with the Baltimore City branch of the Maryland Food Bank, a previously developed database of food security-related organizations primarily located in the Baltimore City region was used. This database was developed through extensive web searches and review of public reports. Incorporating the database into the initial sample is a process commonly referred to as “seeding” the sample. Seeding the sample involves using a predeveloped list as the starting point of a snowball sample to increase diversity and representativeness of the sample. An anonymous link was distributed to every email in the sample with a note that

recipients were encouraged to share the link with others to generate the largest possible number of respondents. The survey was open for six weeks. Reminder emails were distributed to respondents who had not completed the survey one week, two weeks, and four weeks after the initial invitation. A thank you email was distributed to all who completed the survey as was an email notifying any who did not complete the survey or did not respond that the survey was closed.

All respondents were asked the following three questions:

- 1) Please include names and email addresses for any individuals or organizations with whom you or your organization partner to address food access and information issues. Include anyone you think of regardless of location or how often/rarely you interact. Also include people you share information with even if they do not send you anything.
- 2) “If you want to get something done for issues related to food access or information, talk to _____.”

When reading that sentence, does a person or organization come to mind?

Please share their **name and email address** in the box below.

- 3) Do you work on food access and information issues as part of an organization or on your own?

If respondents indicated they worked on food access and information issues on their own, the survey automatically skipped questions four through six and directed respondents to the seventh and final question. Those who indicated they worked on food issues as part of an organization were asked the full remaining list of questions. These questions included:

- 4) What is the name of your food access or information organization?
- 5) What is your title at your organization?
- 6) Which best describes your organization’s sector? (Government, nonprofit/not-for-profit, private/contractor, other)
- 7) About how much time do you devote to addressing food sharing, access, or information issues? Please include time spent volunteering, at work, or on any other related activity. (A few hours a month, one or two days a month, several days a month, one or two days a week, three or four days a week, five or more days a week)

The snowball survey sample started with 208 email addresses identified by interviewees and by the researcher. The three initial semi-structured interviewees indicated they would share the snowball survey and SNA survey links with their contact lists, but the researcher has no evidence that this occurred. If the surveys were shared, they could have reached an additional 267 contacts (Western MFB – 133, Eastern Shore MFB – 134) plus an unknown number of contacts reached through the St. Vincent de Paul Food Pantry interviewee. It is also worth noting that there was likely overlap in contact lists between the three interviewees as well as with the researcher's database. Without evidence that the surveys were shared, it is illogical to consider these contact lists as part of the sample size, particularly as the researcher could not include them in follow-up reminder emails. The snowball sample survey received 71 responses. All snowball survey responses identified contacts already included in the snowball sample of 208 email addresses and did not affect the total sample size. There were ten unknown respondents (i.e., respondents who could not be identified because they responded to the anonymous link but did not self-identify or use an email that in the sample) that might be attributable to the survey being forwarded to interviewees' contact lists but are just as likely to be attributable to members of the researcher's sample forwarding the information on to another contact or completing their survey with a different email address.

Table 15 (shown previously) highlights six different approaches to data collection (e.g., face-to-face, self-administered, mail-out, electronic, phone, group setting) and evaluates each approach on several variables including sensitivity, interviewer response effects, data handling errors, cost of administering, ability to establish rapport, and ability to maximize elicitation. Based on the benefits and drawbacks of each approach, this study used electronic data collection to minimize issues of sensitivity, effects of interviewers, data error rates, and costs of administering the instrument. Electronic distribution is particularly fitting for a social network study given that communications like chain emails (i.e., an email forwarded from one individual to a number of individuals on their contact list, who each forward it to individuals on their list and so on) and social media regularly demonstrate how rapidly content spreads through networks. Food security for low-income and vulnerable populations is a complex issue. Learning more about the

informal social networks that fill gaps in formal food system networks will help inform the allocation of resources for maximum impact. Electronic distribution of a survey with primarily close-ended questions to providers is an effective way to explore this topic. SNA allows for both quantitative and qualitative analysis for a richer understanding of how food and food information are shared throughout Maryland.

Social Network Analysis Survey

The third stage of the study consisted of a social network analysis (SNA) survey administered electronically through Qualtrics survey software to 208 email addresses collected through semi-structured interviews, the snowball survey, and the researcher's previous work identifying food security-related organizations. As discussed previously, the researcher's previously developed database was used to supplement the sample because an interview was not achievable with the Baltimore City MFB branch and interviewees did not directly share their contact lists with the researcher during data collection. The previously developed database was also included in anticipation of low response rates due to the COVID-19 pandemic. If the additional database of organizations had not been included in the sample, the SNA survey would have been administered to 15 potential respondents (28 were identified during interviews and snowball survey, but email addresses were only provided for 15).

Questions for the SNA survey were developed based on Cross and Parker's (2004) recommendations for "uncover[ing] important network relationships" (Cross & Parker, 2004, p. 147). Each respondent received a unique link associated with their email address and the link allowed them to complete the survey one time. The SNA survey was designed to identify individuals or organizations who played a key role in the food access and information network, identify any cross-regional communication, and explore whether specific organizations in a region played a significant role in the network(s). SNA survey questions are included in Appendix IV: Social Network Analysis Survey Instrument. Table 19 connects SNA survey questions to Research Questions 3 and 4.

Table 19: Research questions connection to SNA survey questions

Research Question	Related SNA Survey Question(s)
Research Question 3 (RQ3): Does the <u>structure</u> of networks vary by region in Maryland?	<ul style="list-style-type: none"> • “If you want to get something done for issues related to food access or information, talk to ____.” When reading that sentence, do people or organizations come to mind? Please share up to 20 contacts <u>names and email addresses</u> in the box below. • Looking at the Maryland regions below, please indicate the regions where individuals or organizations you have worked with in the last three months are located (including your own region): <ul style="list-style-type: none"> ○ Western Maryland (includes Garrett, Allegany, Washington, and Frederick Counties) ○ Northern Maryland (includes Carroll, Baltimore County, Harford, and Cecil Counties) ○ Baltimore City ○ Southern Maryland (includes Howard, Anne Arundel, Prince George’s, Montgomery, Calvert, Charles, and St. Mary’s Counties) ○ Eastern Maryland (includes Kent, Queen Anne’s, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester Counties) • What do you see as the single biggest need to address food insecurity and hunger in Maryland?
Research Question 4 (RQ4): Does <u>network structure</u> vary with regional food security rates?	<ul style="list-style-type: none"> • RQ4 will be answered using quantitative analysis of SNA principles including centrality, connectedness, and relation ties to understand if network structure affects a region’s food security rate. Looking at the Maryland regions below, please indicate the regions where individuals or organizations you have worked with in the last three months are located (including your own region): <ul style="list-style-type: none"> ○ Western Maryland (includes Garrett, Allegany, Washington, and Frederick Counties) ○ Northern Maryland (includes Carroll, Baltimore County, Harford, and Cecil Counties) ○ Baltimore City ○ Southern Maryland (includes Howard, Anne Arundel, Prince George’s, Montgomery, Calvert, Charles, and St. Mary’s Counties) ○ Eastern Maryland (includes Kent, Queen Anne’s, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester Counties)

Identifying the target population for a study is essential for research design, but it can be exceptionally challenging in the case of SNA studies. Borgatti et al. (2013) explain that “[a]ctors may come and go, may be many in number and hard to enumerate, or it may be difficult even to determine whether a specific actor belongs in a set of actors” (p. 31). In other words, the population may be identified, but it may be inherently fluid. It therefore is necessary to keep this fluidity in mind during design and analysis. The sample population included organizations in Maryland identified by semi-structured interviews, snowball sampling, and the researcher’s previously developed database of organizations likely to be involved in food security-related efforts; overall, the target population included organizations working with food access and information issues in

Maryland. To allow for greater understanding of regional differences during analysis, Maryland was divided into five regions as follows:

- Baltimore City region
- Eastern region (includes Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester Counties)
- Northern region (includes Carroll, Baltimore County, Harford, and Cecil Counties)
- Southern region (includes Howard, Anne Arundel, Prince George's, Montgomery, Calvert, Charles, and St. Mary's counties)
- Western region (includes Garrett, Allegany, Washington, and Frederick Counties)

This regional breakdown allowed for consideration of rural and urban differences, identifying nodes and hubs which have a role in more than one region, and reducing the length of the survey by only asking respondents about regions they identified as relevant to them. By collecting regional data, this study had the flexibility to analyze and draw conclusions at regional and state levels which proved useful based on the data collected.

Study parameters are defined as “the specification of network boundaries, sampling, and the definition of group” (Wasserman & Faust, 2009, p. 20). The nature of a social network study necessitates anticipating ample opportunities to expand beyond the study parameters while committing to focusing on the specifics of the study. Borgatti et al. (2013) explained that “[t]he problem is that no matter whom we choose, we can be sure that many influencers were outside the sample. Notice that the problem is not really the size of the network but rather the nature of the research question” (p. 33). In other words, because the research questions ask about social networks and social interactions, someone will always be left out by omission or commission. For this study, the parameters included organizations in Maryland identified as being involved in food access and information work either by interviewees, snowball sampling, or the researcher's database of food security-related organizations.

The SNA survey was administered within one month of the snowball survey closing. Seventeen respondents opted out, two emails failed, 25 emails bounced (i.e., email addresses were no longer valid, or the invitation emails were blocked by

organizational settings), and 21 emails were included in the sample twice. The final SNA survey population was 191 and distributed across the five regions of Maryland (see Table 20). Table 20 shows the geographical data collected for 72 survey respondents (97.3% of survey responses). Of the 191 invited respondents, 74 surveys were started and 68 were completed. Initiated surveys amounted to a response rate of 38.7% while completed surveys amounted to a 35.6% completion rate (see Table 21). Two emails received by the researcher were requests to opt out; instructions were provided, and their success verified. Two emails were received confirming completion of the survey, to share information about outdated contacts identified in the SNA survey, and/or to request a copy of the contact list. One email was sent as an internal organizational email to another “Jasmine” and was counted as a refusal when the survey was ultimately not completed. The seven additional emails received acknowledged interest in completing the survey but ultimately did not lead to responses.

Table 20: SNA survey responses by Maryland region

Maryland Region					
	Baltimore City	Eastern	Northern	Southern	Western
Responses (n=74)	22	8	10	23	9

Note: geographical data was unavailable for two of the 74 survey respondents. This data reflects 97.3% of responses.

The SNA survey remained open for six weeks. Reminder emails were sent to respondents who had not completed the survey one week, two weeks, and four weeks after the initial invitation. A thank you email was distributed to all who completed the survey. It is important to note that the SNA survey was administered beginning in late March 2020, soon after national movements toward teleworking and emergency operations due to COVID-19. It is impossible to calculate the exact impact but likewise impossible to ignore the probable effects of the pandemic on response rates. Respondents for this study were facing incredible, unprecedented challenges in personal and professional capacities related to food security as well as likely in their personal lives in general.

Table 21: Social network analysis survey response and completion rates

Sample Phases	Email Addresses
Initial Sample	208
Opted Out	17
Remaining Sample	191
Responses	
Partial Completion	74
Full Completion	68
Response Rate	38.7%
Completion Rate	35.6%

Given the emphasis on regional analysis for this study, response rates were also calculated by region. They are shown in Table 22.

Table 22: SNA response rate by region

Region	Sample Size	Responses	Response Rate
Baltimore City	59	22	37.3%
Eastern	26	8	30.8%
Northern	24	10	41.7%
Southern	60	23	38.3%
Western	22	9	40.9%
Statewide	191	74 ⁴	38.7%

Reliability and validity are challenged by a low response rate to the SNA survey. SNA surveys have a well-established 70-75% response rate threshold (Borgatti, Carley & Krackhardt, 2006; Kossinets, 2006). In a study of web-based surveys, Archer (2008) identified that the type or purpose of a web-based survey and the timeframe allowed for responding are two variables which most significantly affect response rates (collectively explaining up to “41.4% of the variability in the response rate”) (para. 7). Of the types of surveys evaluated by Archer (2008), (e.g., meeting/conference evaluations, needs assessments, output/impact evaluations, ballots), the SNA survey is most similar to a needs assessment. Archer (2008) identified that needs assessments have the lowest response rates, which may be attributable to “not all of the right people ... identified to respond” resulting in respondents self-screening out of the survey or not being included in the first place. A minimum response rate of 40% was recommended (Archer, 2008). A key takeaway was that a lower response rate does not necessarily undermine the value of data collected, particularly depending on the objectives of the survey. Anseel, Lievens,

⁴ Two responses were of unknown geographic origin (2.7%) and are not reflected in regional totals.

Schollaert, and Choragwicka (2010) found that the type of respondents significantly affected response rates with the highest response rates coming from non-working populations (61.5%) followed by non-managerial respondents (59.6%), consumer respondents (44.1%), top executives (37%), and organizational respondents (35.7%). Anseel et al. (2010) found that web-based surveys had lower response rates than paper surveys. Low response rates significantly increase the likelihood that data is missing from the networks identified by this study, which in turn misrepresents the structure of the networks. As Burt (1987) put it, “missing data are ... a curse to survey network data [because] network analysis is especially sensitive to missing data” (p. 63). The data collected and analyzed is overrepresented due to missing data from non-respondents (Huisman, 2009). In addition to overrepresenting the existing data, the lack of data from non-respondents means that fewer connections were reported which affects network density and centrality measures (Borgatti, Carley & Krackhardt, 2006; Robins et al., 2004).

The SNA survey was both qualitatively and quantitatively analyzed. Qualitative analysis included developing a coding structure for open-ended responses to the question prompt asking how respondents would “solve” food security issues in Maryland. The coding structure is provided in Table 23. When developing the coding structure for the SNA survey, the same logic and process from the initial semi-structured interviews was applied to all open-ended questions: first reading of each response, second reading to identify themes and concepts, and third reading to code the responses based on themes and concepts identified. Full qualitative analysis of the SNA survey is provided in the Results chapter.

Table 23: Coding structure, SNA survey open-ended responses – “solving” food security

Theme/Concept	Description
Transportation	Address barriers faced by support recipients due to limited or no public transportation, limited or no access to personal transportation, or inability to leave home without special assistance.
Access to food	Address food access barriers by improving connection between farmers and people in need, address food deserts, increase reliance on locally sourced foods, and other approaches to increase access to food.
Employment	Address barriers faced by support recipients due to lack of income, loss of employment, and/or limited employment opportunities in their region.
Collaboration	Address food security barriers by increasing collaboration between organizations, within and across communities, and through other collaborative efforts.
Disparities	Address barriers faced by support recipients due to economic, health, regional, and other disparities.

The majority of the data collected with the SNA survey was quantitatively analyzed to evaluate structural, composition, and affiliation variables using Gephi open-source software to evaluate the statistical significance of the data. Gephi (2017) “combines built-in functionalities and flexible architecture to: explore; analyze; spatialize; filter; cluster; manipulate; and export all types of networks” (para. 1). The data was used to analyze various SNA fundamental elements such as degree, in-degree, out-degree, and betweenness centrality distributions. Analysis also considered network structure against low food security rates by network region (e.g., Baltimore City, Eastern, Northern, Southern, Western). This analysis allowed for a better understanding of the overlap between formal and informal food security-related networks.

The objective of the SNA survey was to identify and understand the social networks present in Maryland. The sample population consisted of a cross-sector (i.e., public, nonprofit, private) mixture of managerial and non-managerial respondents across a variety of organizations. The literature on SNA research establishes a minimum recommended threshold response rate of 70-75% (Borgatti, Carley & Krackhardt, 2006; Kossinets, 2006). The literature on web-based surveys suggests that a response rate between 35.7% and 40% is acceptable. While a 70-75% response rate (at a minimum) would have been ideal given that this is not just a web-based survey but an SNA web-based survey, it is worth acknowledging that the web-based methodology may have affected response rates. While acknowledging that the 38.7% response rate is concerning

for reliability and validity concerns, this response rate is also remarkable given the unprecedented and extenuating circumstances related to administering the study during the COVID-19 global pandemic and its resulting unprecedented demand for food resources.

Follow-Up Semi-Structured Interviews

Follow-up semi-structured interviews were conducted with key organizations identified in the SNA survey following the completed network analysis of SNA survey results. Interviewees were identified as hubs and key connections between regions via analysis of survey network data. Follow-up interviews occurred within six months after closing the SNA survey. Participants were asked about: their work with addressing food security; their organization's strengths and weaknesses related to addressing food security; their clientele (low-income, vulnerable, rural or urban, challenges experienced, access to urban agriculture or farmers markets, transportation, and other access challenges); reliance on or experiences with social networks (participants', clients'); experiences that may have changed their perspective; and related questions. Interview questions did not specifically address the COVID-19 environment compared to "normal", but interviewees consistently noted turning heavily to virtual environments to communicate as well as noted a significant increase in demand for food resources. Interviews were conducted over the phone or using the Zoom video communication platform due to COVID-19 safety concerns. Notes were carefully typed during interviews and qualitatively analyzed to identify concepts and themes.

This study used follow-up semi-structured interviews to collect data from key organizations (hubs) rather than using a survey because interviews allowed for significantly more in-depth and rich data collection (see Table 15). Interviews allowed for observing social cues indicating that the interviewee may have more to share and therefore prompt for additional information. Surveys are appropriate for close-ended questions whereas interviews allow for asking more open-ended questions. In this case, questions focused on interviewees' work experiences, interactions with food recipients, and perceptions of food systems. Semi-structured interview questions were developed based on example questions developed by Cross & Parker (2004). Their questions were designed to "[u]ncover [i]mportant [n]etwork [r]elationships" and were broken into

categories of communication, information, problem solving and innovation (p. 147) (see previous Table 16). Table 24 shows the connection between follow-up semi-structured interview questions and Research Questions 1 and 2.

Table 24: Research questions connection to follow-up semi-structured interview questions

Research Question	Related Semi-Structured Interview Question(s)
Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information <u>social networks</u> in Maryland?	Follow-Up Interviews: <ul style="list-style-type: none"> How would you describe the work you do? <ul style="list-style-type: none"> Do you partner with anyone else to get this work done? Do you interact with the Maryland Food Bank? Describe those interactions for me.
Research Question 2 (RQ2): What role do <u>social networks</u> play in food access in Maryland?	Follow-Up Interviews: <ul style="list-style-type: none"> What do you see as the strengths of your organization when it comes to addressing food security? <ul style="list-style-type: none"> What are you most proud of? What could be done differently or better? Tell me about the people you serve. <i>[listen for “client”, “customer”, other – use term]</i> <ul style="list-style-type: none"> Do your <i>[clients, customers, other]</i> have specific traits in common? <ul style="list-style-type: none"> Low-income Vulnerable (difficulty communicating or accessing medical care, help maintaining independence, require constant supervision, or help accessing transportation) Rural or urban <ul style="list-style-type: none"> Have you observed a difference in the challenges they face? (transportation, mobility, access, other) Do your <i>[clients, customers, other]</i> talk about their struggles? <ul style="list-style-type: none"> Do they talk about healthcare? (accessing it, affording it, health issues, other) Do they talk about employment? (getting it, keeping it, losing it, other) Do they talk about SNAP? (getting it, keeping it, losing it, using it, other) Does transportation play a role in food security for the people you serve? Do you know if any of your <i>[clients, customers, other]</i> have tried or have access to urban agriculture? Farmers markets? Are you familiar with the food security challenges in Allegany County, Baltimore City, Dorchester County, or Somerset County? <ul style="list-style-type: none"> These areas have a much higher rate of low food security than the rest of the state. Do you know what may be causing that? <ul style="list-style-type: none"> What is the reputation of the area? Have you heard any stories about those areas? Do you know anyone from any of those areas? Do social networks play a role in your work with food security? <ul style="list-style-type: none"> Your own social networks? <ul style="list-style-type: none"> Other food banks, nonprofits, religious orgs, other? Do you refer clients to services or programs? The social networks of your <i>[clients, customers, other]</i>? <ul style="list-style-type: none"> Family, friends, local organizations, religious affiliations, other? Have you experienced anything in the food security world that has changed your perspective?

Research Question	Related Semi-Structured Interview Question(s)
	<ul style="list-style-type: none"> ○ Have any of your assumptions or beliefs changed? ○ What is the most surprising thing you have learned in your work with food security? ● “If you want to get something done [for food sharing/access and food information], start with _____. ” Does a person or organization come to mind? Who? <ul style="list-style-type: none"> ○ Who do you turn to for guidance or support? Does it vary by type of issue? ○ If you had unlimited resources, how would you reduce or solve food access and food information challenges? ○ What would make your work to address food challenges easier? ● Did an individual or organization inspire you to take your career path? <ul style="list-style-type: none"> ○ Do you remain in contact? ○ Do you exchange tips and information?

Each region was quantitatively analyzed based on results of the SNA survey data to identify the nodes with the most connections to other nodes. Four hubs were identified in the Baltimore City region, one hub was identified in the Northern region, seven hubs were identified in the Southern region, two hubs were identified in the Western region, and two hubs were identified in the Eastern region (see Table 25). These hubs are shown in Figure 13 to demonstrate their connectedness in the larger statewide network. The number of connections used to select hubs varied by region because the number of nodes identified during the SNA survey varied by region. The number of hubs to interview in each region was determined by comparing the total number of organizations in the network, the highest number of connections by organization, the average number of connections, and the number of organizations exceeding the average number of connections. The total number of organizations to interview was also considered against the number of organizations in the network to provide representation across regions.

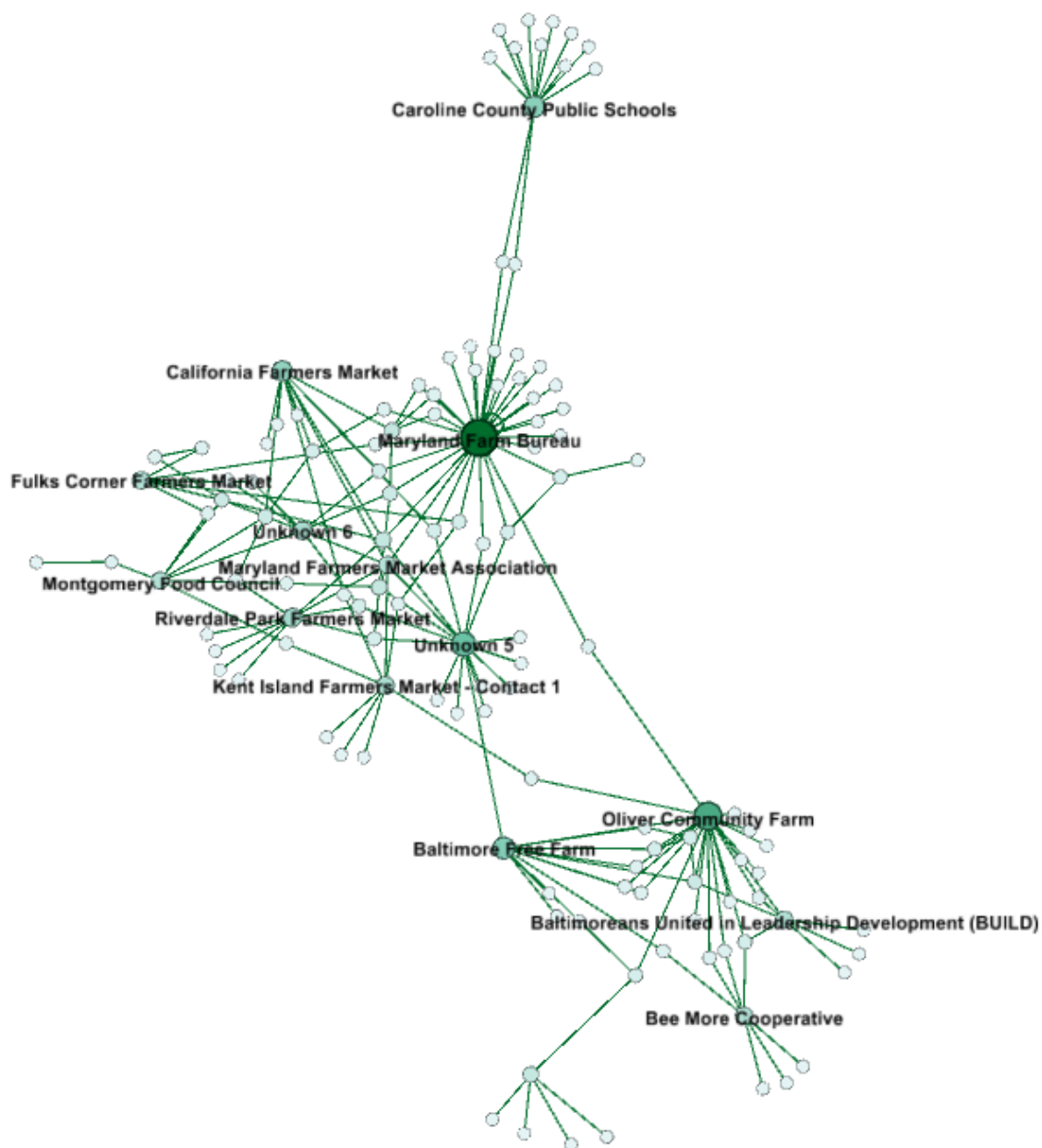


Figure 13: Hubs identified for follow-up semi-structured interviews

Table 25: Regional analysis - organizational connectedness by average and mode connections

Region	Organizations in Network	Highest No. Connections	Average Connections	Mode No. Connections	Organizations above Average	No. Hubs to Interview
Baltimore City	45	21,11,7,7	2.48	1	12	4
Eastern	28	12,8	1.79	1	2	2
Northern	18	7	1.78	1	5	1
Southern	63	18,16,9,9,8	2.78	1	21	5
Western	8	4,3	1.56	1	2	2

Table 26: Follow-up interview hubs by region and number of connections

	Region	Organization	Connections	Interviewee	Date of Interview
1	Baltimore City	Oliver Community Farm	21	Interviewee 12	September 29, 2020
2	Baltimore City	Baltimore Free Farm	11	Invitation 15– no response	N/A
3	Baltimore City	Bee More Cooperative	7	Invitation 14 – no response	N/A
4	Baltimore City	Baltimoreans United in Leadership Development	7	Invitation 16– no response	N/A
5	Eastern	Caroline County Public Schools	12	Interviewee 10	September 24, 2020
6	Eastern	Maryland Farm Bureau	8	Interviewee 8	September 22, 2020
7	Northern	Maryland Farm Bureau	7	Interviewee 8	September 22, 2020
8	Southern	Maryland Farm Bureau	18	Interviewee 8	September 22, 2020
9	Southern	Unknown5	16	N/A	N/A
10	Southern	Riverdale Park Farmers Market	9	Interview 6	September 18, 2020
11	Southern	California (MD) Farmers Market	9	Interviewee 5	September 17, 2020
12	Southern	City of Gaithersburg, Community Services	8	Interviewee 13	September 29, 2020
13	Southern	National Association of Farmers Market Nutrition Programs	7	Interviewee 7	September 21, 2020
14	Southern	Montgomery Food Council	7	Interviewee 11	September 28, 2020
15	Western	Hood College	4	Interviewee 9	September 24, 2020
16	Western	Maryland Farm Bureau	3	Interviewee 8	September 22, 2020

Notes: Interviewees 1-4 were initial semi-structured interviewees and are not included in this table. For Line 7, Unknown5, only unidirectional data was available which prevented identifying the source.

Sixteen organizations were initially identified as hubs during analysis of the SNA data (Table 26). Further analysis identified that one of the sixteen (line 6) was data from Unknown5 which did not provide contact information and that four organizations were actually the same organization with a presence in different regions (lines 5, 7, 14, and 15). This ultimately left 12 organizations identified as hubs for this study. Nine of the 12 requested interviews were successfully conducted. Additional organizations were not identified to replace the three missing interviews because other organizations had significantly fewer connections to other nodes than the nodes they would be replacing for interviews. For example, the Baltimore City region organization with the next highest number of connections after Bee More Cooperative (line 1, Table 26) falling from seven connections to five, which was significantly lower than the most connected hub in the region (21 connections to other nodes). While additional semi-structured interviews with Baltimore City organizations would have increased representation of that region, the organization interviewed was significantly more connected than any other organization in the region's network.

Interviewee 7 was originally identified in the SNA survey as being associated with the Maryland Farmers Market Association (MFMA), but MFMA no longer exists. Interviewee 7 was contacted via email based on their automatic response at their former email address and has moved to a new role at the National Association of Farmers Market Nutrition Programs. Interviewee 7 was asked to base their responses on their former role at the MFMA because of its Maryland-focused efforts rather than incorporating new information from their role at the National Association of Farmers Market Nutrition Programs. Interviewee 9 was identified as a substitute for another individual whose name was associated with Fulks Corner Farmers Market. The initially-invited Interviewee 9 indicated they were not a good contact to discuss food security efforts and forwarded contact information for the individual ultimately interviewed. The follow-up semi-structured interviews were qualitatively analyzed. The coding structure used is shown in Table 18, repeated here for the reader's convenience.

Table 18: Coding structure, initial and follow-up semi-structured interviews (repeat from previous)

Theme/Concept	Description
Networking to accomplish food access mission and objectives	The activities, variety of organizations, variety of food sources, and multiple resources used in a networking capacity to ensure food resources reach target audiences
Barrier: Wraparound services	Barriers faced by support recipients for accessing resources and support services including but not limited to youth programs, housing, utilities, medications, healthcare, and financial literacy resources.
Barrier: Transportation and homebound populations	Barriers faced by support recipients due to limited or no public transportation, limited or no access to personal transportation, or inability to leave home without special assistance.
Barrier: Housing	Barriers faced by support recipients due to lack of stable housing, unsafe living environments, or inability to prepare food in a safe setting.
Barrier: Financial support and resources	Barriers faced by support recipients due to lack of income, loss of employment, unexpected medical bills, emergencies, and other financial challenges.
Barrier: Caring for older relatives, family, children	Similar/related to financial support and resource barriers; barriers faced by support recipients due to increased burden of caring for older relatives, family members, and/or children which may exceed household income.
Barrier: Illegal and prescription drug problems	Barriers faced by support recipients due to drug addictions and related challenges including but not limited to halfway house residents.
Barrier: Limited awareness of resources	Barriers faced by support recipients due to limited or no awareness of resources available in their community or through government programs.
Regional differences	The different challenges faced by support recipients due to rural and urban differences such as economic stability, geographic spreading, limited access to employment opportunities, limited transportation, access to grocery stores, and other variables.
Assumptions and perspectives about clients and/or food security	The assumptions and perspectives held by community members about what someone who needs help from a food bank or pantry “should look like”, how they should behave, what kind of vehicle they should drive, and other assumptions that can affect an individual’s willingness to ask for help.
Funding sources for food security-related organizations	The funding sources that food security-related organizations such as Maryland Food Bank and food pantries rely on to provide services including but not limited to donations (money, food recovery programs), grants, secondary organizations (thrift store associated with organization), and state or federal government funding.
Ideas for “solving” food security problem	The interviewee-identified ideas to “solve” food security as well as the strengths and weaknesses of their organization to address the problem.
Interpersonal experiences with support recipients	The interviewee’s interpersonal experiences interacting with support recipients and/or how that has impacted their work with food security.

Measurement Challenges in Social Network Analysis

Because SNA are field experiments and not true experiments, measurement challenges may arise. Bounding networks in this study was necessary to have a coherent study. Sampling is important and often necessary in social network analysis because “[g]roups have fuzzy boundaries” (Borgatti et al., 2013, p. 34). Sampling allows

researchers to make inferences from the study population about the overall population or network. There are several approaches to sampling ranging from random to systematic, cluster to snowball; snowball sampling was used for this dissertation. Snowball sampling is the process by which an actor or set of actors with known connections (i.e., Maryland Food Bank personnel) are approached first, then asked to name others that they work or collaborate with, and so on (Borgatti et al., 2013, p. 34). Several measurement challenges including accuracy, validity, reliability, and externalities were considered during development of the methodology for this dissertation. Those challenges are discussed and addressed in the Limitations section.

Conclusion

The motivation driving this dissertation is the desire to identify and understand the social networks present in Maryland. This will improve social equity in the long run by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. Understanding the role and impact of social networks on food security and access in Maryland with SNA as the theoretical framework for this dissertation is a deliberate and strategic approach to tackling the complex social issue of food security. The initial semi-structured interviews, snowball survey, SNA survey, and follow-up semi-structured interviews were carefully designed to capture relevant, useful, and accurate information. Participant selection was carefully designed to allow for organic network development with referrals and snowball sampling to mimic how networks evolve. This methodology provided the structure for a strong SNA research project and will help improve understanding of the role that informal and formal social networks play in increasing food access and security. Informal social networks that have evolved to fill gaps in existing food systems may be the answer to addressing food security and social equity issues in Maryland.

RESULTS

Introduction

This dissertation seeks to identify and understand the social networks present in Maryland. This will improve social equity over time by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. Theoretical framework, study design, and methodology are the building blocks of a dissertation, but the results and analysis determine the potential contributions of the study to the literature. Careful attention was paid to each step of framework, design, and methodology to ensure data collected was valid and reliable within the constraints of the theoretical framework. Qualitative analysis is an important element of this dissertation because the social network analysis survey includes open-ended questions to elicit unique, unrestricted responses from respondents. Semi-structured interviews and open-ended survey data is qualitatively analyzed. Open-ended responses were coded to identify themes, unexpected information, and unique responses.

This chapter is organized by research questions and discusses results as well as quantitative and qualitative analysis of data collected through initial interviews, the SNA survey, and the follow-up interviews.

Research Questions

Each research question in this dissertation was carefully grounded in food security and social equity research and designed to identify and explore food security-related social networks in Maryland. The following sections analyze data collected through initial semi-structured interviews, the SNA survey, and follow-up semi-structured interviews. To reiterate, the four research questions guiding this dissertation included:

Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information social networks in Maryland?

Research Question 2 (RQ2): What role do social networks play in food access in Maryland?

Research Question 3 (RQ3): Does the structure of networks vary by region in Maryland?

Research Question 4 (RQ4): Does network structure vary with regional food security rates?

Table 22, which is repeated from the Methodology chapter, is provided for the reader's convenience to reiterate the research questions' connections to SNA theory and to SNA analysis.

Table 22: Research question analysis connection to SNA theory

Research Question	Connection to SNA Theory	Analysis Connection to SNA Theory
Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information <u>social networks</u> in Maryland?	Exploratory “ <i>real world</i> ” <i>question blending behavioral and social science</i> to understand how/if populations are overcoming barriers to food security via <i>social networks</i>	Quantitative ; structural, composition, and affiliation variables
Research Question 2 (RQ2): What role do <u>social networks</u> play in food access in Maryland?	Exploratory “ <i>real world</i> ” <i>question blending behavioral and social science</i> to understand how/if populations are overcoming barriers to food security via <i>social networks</i>	Qualitative ; TBD based on interviews and survey open-ended responses Quantitative ; structural, composition, and affiliation variables
Research Question 3 (RQ3): Does the <u>structure</u> of networks vary by region in Maryland?	Compares centrality, connectedness, and relation ties by region to understand if network structure varies by region	Qualitative ; TBD based on interviews and survey open-ended responses Quantitative ; structural, composition, and affiliation variables plus centrality, connectedness, and relation ties
Research Question 4 (RQ4): Does <u>network structure</u> vary with regional food security rates?	Compares centrality, connectedness, and relation ties to understand if network structure affects a region's food security rate	Quantitative ; structural, composition, and affiliation variables plus centrality, connectedness, and relation ties

Results and Analysis – Research Question 1

Research Question 1 (RQ1): Are there functional and/or collaborative food access and food information social networks in Maryland?

Social networks were identified in five regions (Baltimore City, Eastern, Northern, Southern, Western) through the SNA survey with additional data from initial and follow-up interviews and the snowball sampling process. These regional networks were mapped with Gephi and are represented in Figure 14, Figure 15, Figure 16, Figure 17, and Figure 18. The regional networks were then analyzed to determine if they form a statewide network (represented in Figure 19). Each circle in the map represents an individual or organization (node). The larger the node circle, the more connected the node is in the network. The lines between each node represents a connection (edge) between the two nodes. The arrows on each edge indicate which direction the relationship was reported to flow (i.e., to or from the node, or both). An arrow on one end of the edge (but not the other) indicates that the relationship is unidirectional (i.e., flows one direction). Arrows on both ends of an edge indicates that both nodes identified each other and therefore have a bidirectional relationship. Nodes that are connected to few other nodes and seem separate from the bigger overall network did not identify any ties to other organizations within the bigger network and are therefore represented as a smaller, individual network. The single node that is not connected to any other nodes identified only themselves as an organization with which they collaborate when responding to the SNA survey.

Figure 14: Baltimore City social network map

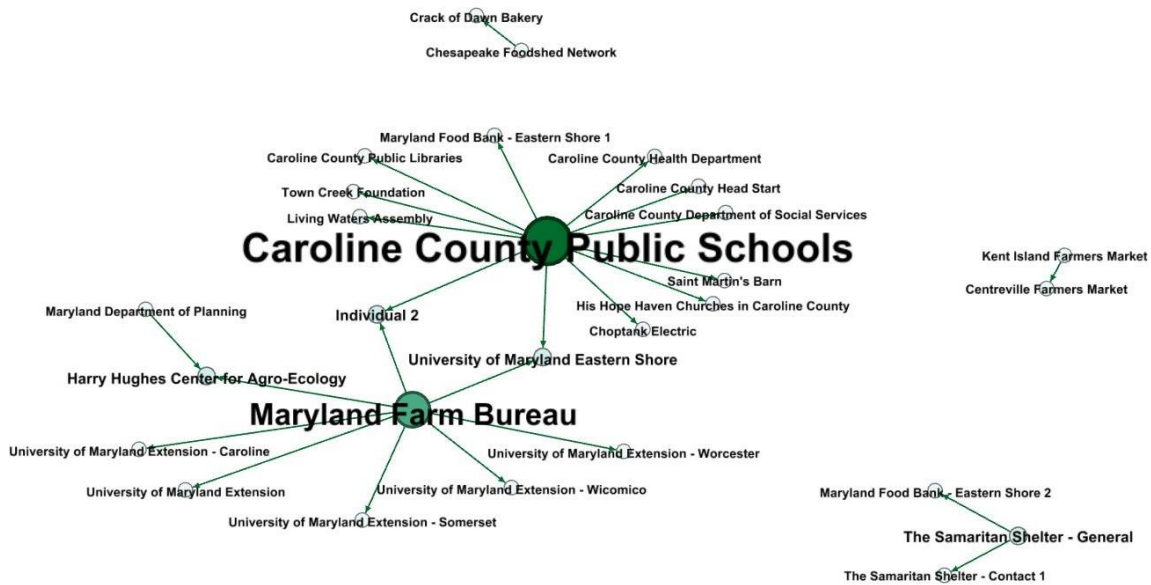


Figure 15: Eastern region social network map

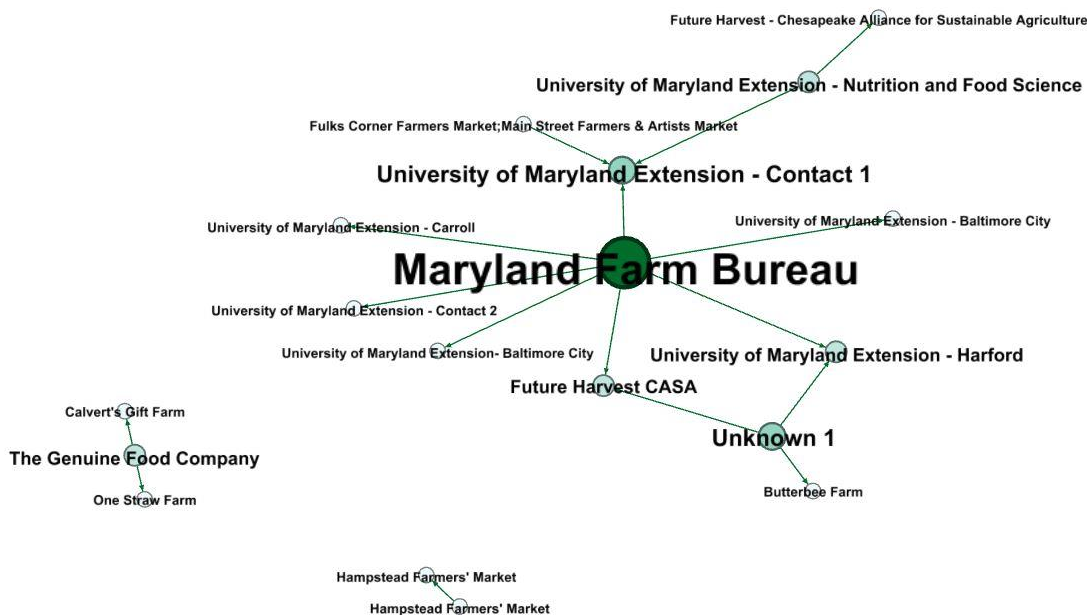


Figure 16: Northern region social network map

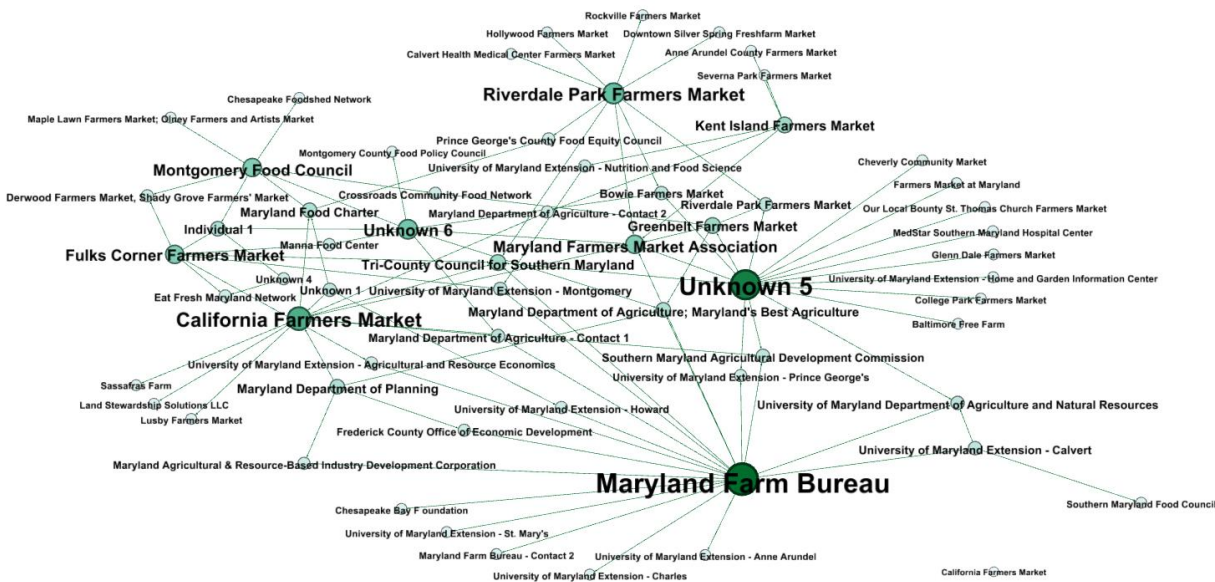


Figure 17: Southern region social network map

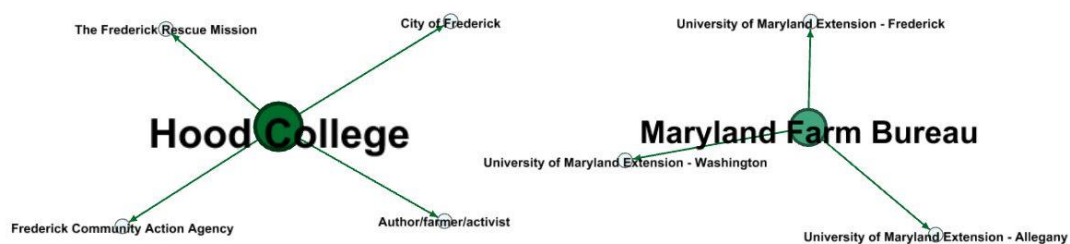


Figure 18: Western region social network map

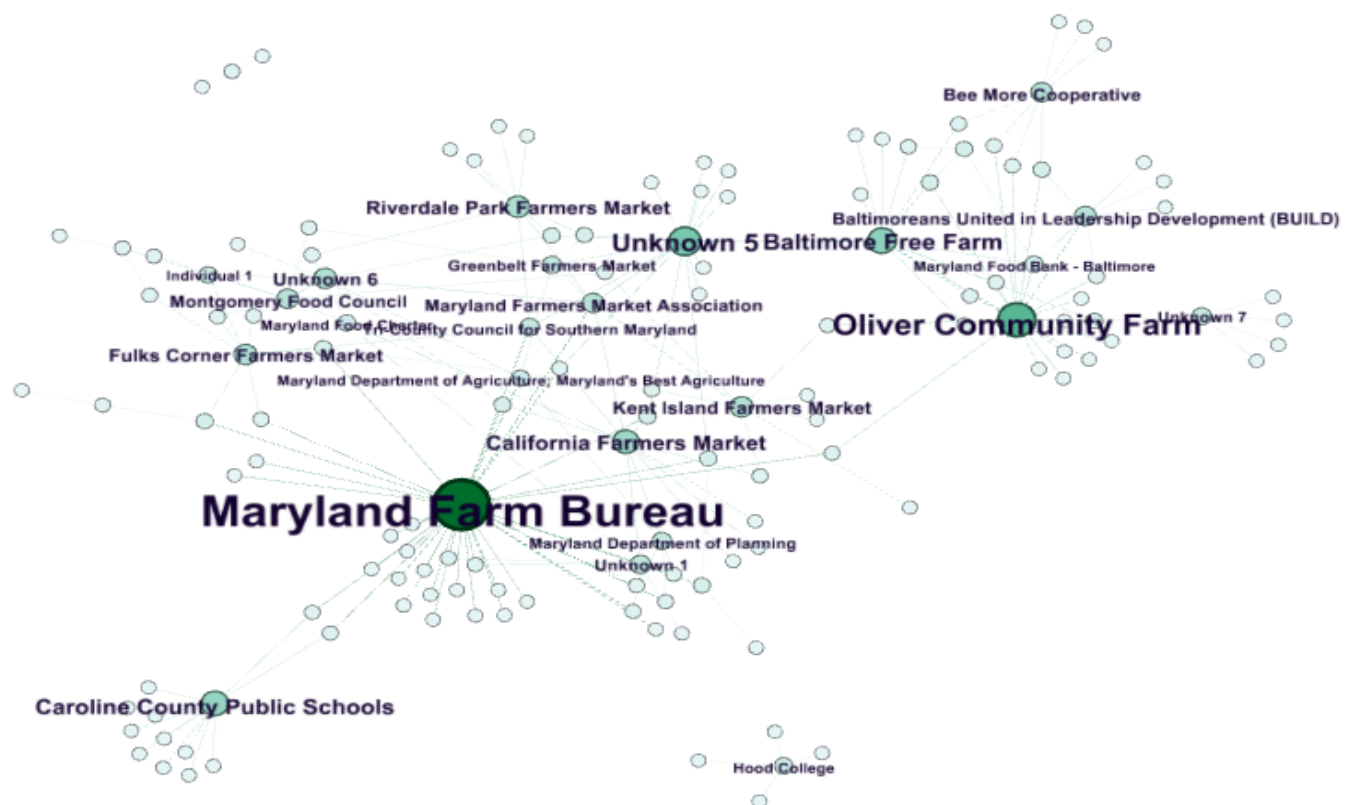


Figure 19: Statewide social network map

Networks were identified in all five regions. When analyzed from a statewide perspective, there are two networks: one which includes the vast majority of nodes, and an isolated network from the Western region. When considering each network at the regional level, the Baltimore City, Eastern, Northern and Southern networks are structurally larger and presumably more functional than the Western network given higher numbers of nodes and edges. The Western network is noticeably smaller and consists of two separate networks of four and five nodes. The distance and isolation factors of the Western network are apparent when considering the data from a statewide perspective; one of the two Western networks connects back to the statewide network and one does not.

Several variables were quantitatively analyzed using Gephi software including structural, composition, and affiliation variables. As discussed previously, structural variables refer to “measure [of] ties of a specific kind between pairs of actors” (Wasserman & Faust, 2009, p. 29). Structural analysis focused on the number organizations (nodes) identified in each regional network and in the statewide network overall. Composition variables are the “measurements of actor attributes ... and are defined at the level of individual actors” such as geographic location (Wasserman & Faust, 2009, p. 29). Affiliation variables combine two sets “to define an affiliation variable for each” of the events (Wasserman & Faust, 2009, p. 30). Regional networks were categorized as simple or complex based on the average degree of distribution and average path length. Networks with an average degree of distribution above 1.000 and an average path length greater than 1.000 were identified as complex. Networks with an average degree of distribution below 1.000 and an average path length of 1.000 or lower were identified as simple. Table 27 provides an overview of the results of analyzing these network variables.

Table 27: Analysis of structural, composition, and affiliation variables

Network	No. Nodes	Avg. Degree of Distribution	Average Path Length	Network Complexity
Baltimore City	45	1.333	1.389	Complex
Eastern	28	0.893	1.000	Simple
Northern	18	0.889	1.000	Simple
Southern	63	1.508	1.500	Complex
Western	8	0.778	1.000	Simple
Statewide	120 ⁵	1.370	1.470	Complex

To evaluate the impact of seeding the SNA survey sample with the previously developed database of food-related organizations, SNA survey data was analyzed using only organizations identified through interviews and snowball survey responses. As discussed previously, contact information was provided for 15 organizations. Figure 20 represents the statewide network based on interview and snowball samples with all edges reported in SNA response data. Figure 21 represents the statewide network based on interview and snowball samples with only edges directly related to the sample. These two figures emphasize the impact that seeding the SNA survey sample had on collecting significantly more data than would have been possible if the sample had included only the 15 organizations identified.

⁵ Because some nodes were documented in more than one regional network, summing the nodes from each region would yield a falsely high total. There were 120 unique nodes identified.



Figure 20: Statewide network, interview and snowball sample only, all recorded edges from full SNA response data

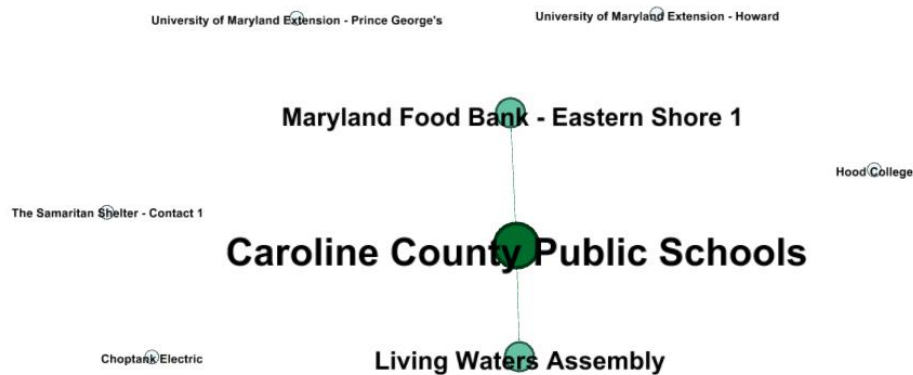


Figure 21: Statewide network, interview and snowball sample only - sample edges only

Research Question 1 can be answered simply: yes, functional and/or collaborative networks exist in Maryland. More importantly, this study identified the existence of five regional networks with varying levels of complexity which together form a complex, functional network at the statewide level (with the notable exception of an isolated, small network in the Western region). Regional networks connect to each other through statewide connections through key hubs.

Results and Analysis – Research Question 2

Research Question 2 (RQ2): What role do social networks play in food access in Maryland?

The role of social networks in food access in Maryland was significant according to survey respondents and interviewees. Respondents and interviewees were asked to identify organizations with whom/which they worked to address food security challenges in Maryland. The resulting regional networks identified (see Figures 13-17) indicated simple and complex networks across the state culminating into a complex statewide network (see Figure 19).

Initial Semi-Structured Interviews

The initial semi-structured interviews served two key purposes: identifying other organizations to add to the sample and informing the open-ended question or questions to include in the SNA survey. The initial semi-structured interview guide (see Appendix II: Initial Semi-Structured Interviews – Instrument) included questions about the interviewee’s organization, primary work activities/internal and external interactions, observations and personal growth as it related to food security, key network contacts, and how the interviewee would address or “solve” food security issues if they had unlimited resources. These questions were designed based on Cross and Parker’s (2004) interview guide design and customized to collect data which would help answer the research questions. Several concepts and themes emerged across the three initial interviews (see Table 18 – repeated on next page for reader’s convenience) and guided development of the SNA survey. The concepts, themes, and specific examples provided by interviewees were also used to inform the follow-up semi-structured interviews and ensure that questions were designed to collect rich qualitative data to provide a well-developed understanding of food security challenges in Maryland. The subsequent section provides expanded and detailed data from the initial semi-structured interviews. Semi-structured interviews were conducted with two Maryland Food Bank staff members (Eastern Shore branch, Western branch) and with a representative of the St. Vincent de Paul Food Pantry. Interviews were conducted in person, audio records, and manually transcribed.

Table 17: Coding structure, initial and follow-up semi-structured interviews (previous)

Theme/ Concept	Description	Responses
Networking to accomplish food access mission and objectives	The activities, variety of organizations, variety of food sources, and multiple resources used in a networking capacity to ensure food resources reach target audiences	3
Barrier: Wraparound services	Barriers faced by support recipients for accessing resources and support services including but not limited to youth programs, housing, utilities, medications, healthcare, and financial literacy resources.	3
Barrier: Transportation and homebound populations	Barriers faced by support recipients due to limited or no public transportation, limited or no access to personal transportation, or inability to leave home without special assistance.	3
Barrier: Housing	Barriers faced by support recipients due to lack of stable housing, unsafe living environments, or inability to prepare food in a safe setting.	2
Barrier: Financial support and resources	Barriers faced by support recipients due to lack of income, loss of employment, unexpected medical bills, emergencies, and other financial challenges.	3
Barrier: Caring for older relatives, family, children	Similar/related to financial support and resource barriers; barriers faced by support recipients due to increased burden of caring for older relatives, family members, and/or children which may exceed household income.	3
Barrier: Illegal and prescription drug problems	Barriers faced by support recipients due to drug addictions and related challenges including but not limited to halfway house residents.	2
Barrier: Limited awareness of resources	Barriers faced by support recipients due to limited or no awareness of resources available in their community or through government programs.	1
Regional differences	The different challenges faced by support recipients due to rural and urban differences such as economic stability, geographic spreading, limited access to employment opportunities, limited transportation, access to grocery stores, and other variables.	2
Assumptions and perspectives about clients and/or food security	The assumptions and perspectives held by community members about what someone who needs help from a food bank or pantry “should look like”, how they should behave, what kind of vehicle they should drive, and other assumptions that can affect an individual’s willingness to ask for help.	2
Funding sources for food security-related organizations	The funding sources that food security-related organizations such as Maryland Food Bank and food pantries rely on to provide services including but not limited to donations (money, food recovery programs), grants, secondary organizations (thrift store associated with organization), and state or federal government funding.	3
Ideas for “solving” food security problem	The interviewee-identified ideas to “solve” food security as well as the strengths and weaknesses of their organization to address the problem.	3
Interpersonal experiences with support recipients	The interviewee’s interpersonal experiences interacting with support recipients and/or how that has impacted their work with food security.	3

Common concepts and themes about barriers to food security and social equity emerged during the initial semi-structured interviews, and several were discussed by all three interviewees including: the importance and role of networking in accomplishing their food security-related objectives; food security barriers due to limited access to wraparound services; barriers due to limited or no access to public or personal transportation; barriers due to lack of income, loss of employment, unexpected medical bills, emergencies, and other financial challenges; food security barriers due to increased burden of caring for older relatives, family members, and/or children which may exceed household income; and the challenges food security-related organizations face in securing sufficient funding from donations, grants, secondary organizations, and state or federal government funding. Each of these barriers suggests regional inequities and disparities are highly visible and observable. When discussing the importance and role of networking, interviewees made comments such as: employing “a network relations manager who is basically managing our partners” (Interviewee 1; also mentioned by Interviewee 3), “we have 30 network partners” (Interviewee 3) and identifying several partners within their networks (all three interviewees). There was consistent emphasis on the importance of pooling resources with network partners to accomplish food access work. Themes or concepts identified by at least two interviewees included: food security barriers created by homelessness and/or unstable/unsafe home environments; food security barriers created by addiction to illegal or prescription drugs or related challenges; region-specific challenges (i.e., rural and urban differences) such as geographic spreading, limited employment opportunities, and limited access to grocery stores (see previous comment from Interviewee 3 about populations traveling 45 minutes to the nearest grocery store); and food security barriers created by assumptions and perspectives held by community members about what someone who needs help from a food bank or pantry “should look like” (Interviewee 1). Interviewee 3 specifically mentioned that individuals in their area seemed to struggle with limited awareness of available resources, which was later reinforced by the fact that so few nodes were identified in the Western region (and were divided into two smaller, unconnected networks).

Transportation was identified as a barrier to food access by all three interviewees. Examples included limited or no public transit options, the distance to food (i.e., grocery stores),

and geographic spreading, particularly in rural areas. Interviewee 1 mentioned “go[ing] into a community that a lot of individuals probably don’t have transportation to get where they really need to go” to help populations access food and also identified having to factor in transportation costs within their organization to help make those trips possible. Interviewee 2 discussed working with homebound populations “who, first of all, do not drive... they can’t get to anything without special needs. Whether it’s the bus coming to pick them up, or trams, or whether they have drivers that come pick them up.” Interviewee 3 said they would “beef up the transportation infrastructure. I think that’s a huge barrier to folks getting the resources they need,” emphasizing that “[e]verything is really spread out in Western Maryland. What you find out is, especially as you go up into the mountains, head northeast, go to Smithburg, or to Garrett, Allegany, to the west... there is no grocery store for 45 minutes.”

The importance of and need for wraparound services to ensure food security lasts longer than the immediate food provided at a food bank was also mentioned by the three interviewees. Interviewees noted that services needed to be developed to address more than just food security. Interviewee 2 shared that St. Vincent de Paul “put[s] [people] up in a hotel just to get them off the street for a while. Or help with housing, help with electricity, help with their basic needs. Medical needs. And that helps them somewhat.” Interviewee 1 concurred, noting that “Food is what we are, that is our business. But the clients that are accessing our partner accounts are needing more than that. So, they tend to need these other wraparound social support services to help meet their need.” Interviewee 3 noted that when a paper mill in the area shut down and thousands of jobs were lost, their organization explored providing “[n]ot only food, but also some wraparound services like information on skills training, assistance with utilities, and housing. We don’t do all of that stuff, our forte is food, but just connecting with organizations that do that kind of work and bringing them into the fold and coming together for these resource fairs.”

Limited resources were a primary concern for all three interviewees. Given the nature of the organizations, it is logical that resources would be limited with break-even profit margins and reliance on donations that can be unpredictable in quantity, quality, and type. Interviewee 1 discussed the importance of grants and attempting to secure state funding has been for the

success of their organization. Interviewee 2 emphasized the importance of donations and revenue from the associated thrift store for the organization's capacity and continued ability to serve others. Interviewee 3 discussed the importance of donations, noting that "sporadic donations" come in but otherwise they rely on the central Baltimore branch of the Maryland Food Bank to pass along resources.

Access to food was identified by two interviewees as a key challenge leading to low food security. Grocery stores closing was of particular concern for the western Maryland Food Bank branch interviewee because one grocery store closing may increase the minimum distance traveled to a grocery store to as many as 30 miles. This is problematic in Western Maryland where home-bound or transportation-limited individuals and families lose the ability to obtain food within a reasonable distance. Cost of transportation becomes a new barrier as a result. Addiction (i.e., illegal and prescription drug use/abuse) was mentioned as a challenge to food security in both the western Maryland Food Bank and St. Vincent de Paul interviews. Employment and economic stability were mentioned in two interviews, particularly as they related to western Maryland's economic reliance on seasonal tourism and fewer businesses with employment opportunities in both western and eastern Maryland. Lack of income, loss of employment, and related financial challenges were mentioned by all three interviewees, but perhaps the most poignant comment was from Interviewee 1: "they are individuals like you and I who are just one emergency from having nothing. One loss of a job, one loss of their vehicle that supports the household. Those are the individuals we're seeing. Those are the ones falling through the gaps because they make just a little too much to qualify for any type of benefit. Those are the individuals that typically are having to access our emergency feeding programs." Inequities and regional disparities and the effects they have on lives were consistently addressed throughout the three initial interviews.

Food waste was mentioned and emphasized by Interviewee 3 as an example of systemic issues with food supply and distribution. An example given was of several thousand pounds of a dairy product being donated because a single board in the pallet they were shipped on was broken (disregarding the pristine condition of the food product. Another example provided by Interviewee 3 was the donation of 11,000 pounds of broccoli "because someone ordered too

much.” These two examples highlight a significant issue that is likely occurring elsewhere where perfectly safe food products would otherwise go to waste if they had not had a food bank available in the area to accept the food as a donation. Given the significant presence of food insecurity in Maryland, particularly in Allegany, Baltimore City, Dorchester, and Somerset Counties, this waste should raise alarm. Food waste drives up food costs, which directly affects food insecure populations, and thousands of pounds of dairy products and 11,000 pounds of broccoli could go a long way to feeding food insecure populations; it would likely be shocking to learn how often this food waste happens.

The three initial semi-structured interviewees were asked about their interactions with Maryland Food Bank in general. Interviewees 1 and 3 were both employees of the organization and indicated daily, regular communication. According to Interviewee 3, the organization uses Microsoft Teams as a “digital whiteboard” to share ideas, notes, and keep strategic conversations going. Maryland Food Bank utilizes an online ordering system that its partners use to place orders based on what food or donations are available at the time of the order. Interviewee 2 was not an employee of the Maryland Food Bank and indicated that their organization orders food products through the Maryland Food Bank online system as well as maintains a regular channel of communication for any issues or special needs that may arise.

When asked about ways to improve operations, Interviewee 1 emphasized several opportunities to improve including: strengthening network capacity, developing partnerships with social service/wraparound services organizations, increased incorporation of data-based decision-making to address food security, and education and advocacy. Interviewee 2 discussed the potential to receive a refrigerated truck from a grant that would enhance the process, make delivery safer for volunteers, and increase the organization’s ability to deliver food to those who need it most. Interviewee 3 identified a need for additional personnel, to develop guidelines for partner relationship management and cultivation, and to increase communication with partners.

When asked about the characteristics of the populations served, Interviewee 1 emphasized that their primary audience is made of up people “who are just one emergency from having nothing. One loss of a job, one loss of their vehicle that supports the household”. Interviewee 2 indicated that their primary audience includes most halfway house residents in

their area, individuals experiencing homelessness, home-bound individuals, families with children, and Hispanics. Interviewee 3 noted that their primary audience was those who are transportation-limited, battle with addiction, or are unemployed.

The majority of issues identified by interviewees connect directly back to social inequities. Food security is an equity problem, but how it manifests regionally appears to vary. Barriers such as limited access to wraparound services, limited transportation, limited access to housing, limited access to financial support and resources, caring for others in excess of household income, illegal and prescription drug problems, limited awareness of resources, and regional differences such as economic stability, geographic spreading, employment opportunities, and other factors compound on each other to effectively limit a population's ability to survive (not to mention preventing populations from thriving). As evidenced by the four counties with the highest rates of food insecurity, disproportionate poverty and the cyclical effects of food insecurity have long-term, often trans-generational effects. The barriers identified by interviewees highlight that food security is part of a bigger issue and must be addressed. Equity and food security affects all aspects of life.

The three interviewees were asked about how their perceptions around food security and related issues may have changed since they began their work with food security. Interviewee 1 discussed their experiences with individuals who self-identified as former or current recipients after a presentation donating and giving back to the organization because it made a difference in their lives. Interviewee 1 emphasized that many recipients want to give back even when they do not have much themselves. Interviewee 2 shared that they had negative perceptions about the people who relied on food pantries (e.g., lazy, do not want to get a job) but that over time it became apparent that recipients typically have had a crisis and need help to get them through a difficult time. Interviewee 3 mentioned the biggest perception change they had experienced was realizing how much greater the need is than the general population seems to realize. Interviewee 3 emphasized that federal programs for nutrition and other kinds of assistance do not meet the needs of everyone who needs help overcoming barriers.

The final question that initial interviewees were asked was how they would "solve" food security issues if they had unlimited resources. Interviewee 1 discussed adding a kitchen to

connect with community members, teach cooking skills, and help with education on how to prepare different food items. Interviewee 1 also mentioned increasing partnerships to source local produce, which they suggested would stimulate the local economy while providing healthful foods to recipients. Interviewee 2 highlighted that several issues such as reducing homelessness and increasing nutrition education for children would need to be addressed simultaneously before food security could be addressed. Interviewee 3 discussed the importance of strengthening public transportation infrastructure as well as to educate the community on resources that exist for assistance with food, utilities, and other needs. Interviewee 3 also suggested that financial literacy courses would help with longer-term stability.

Research question 2 asked about the role that networks play in addressing food security and social equity issues in Maryland. The initial semi-structured interviews provided ample data and examples of how networks of organizations (i.e., the Maryland Food Bank and its partners) are pooling resources and working together across Maryland to provide food when existing formal structures failed to meet the need of low food security populations. Interviewees identified opportunities for networks to drastically improve lives by incorporating organizations with different focus areas such as healthcare, public benefits, housing, utilities, and social services in general to help the target population achieve overall stability.

SNA Survey Open-Ended Responses

The SNA survey included question #9, an open-ended/unaided question which asked respondents: “What do you see as the single biggest need to address food insecurity and hunger in Maryland?” Approximately one fourth of respondents answered the question. The two most common categories mentioned by survey respondents included transportation and access issues followed closely by employment issues and the need for greater collaboration. Their responses are summarized in Table 28 below.

Table 28: SNA survey open-ended responses by category

Category of Response	Number of Responses
Transportation: Create/improve delivery and distribution system to reduce farmer losses/food waste (4); Consumer access to transportation (4)	8
Access: Create/improve direct connection between farmers and people in need (1); lower costs for low-income households (4); food deserts (1); locally sourced foods (2)	8
Employment: increase wages, increase number of jobs	7
Collaboration: Build/strengthen communities (1), collaboration between organizations (2); communication and collaboration for policy discussions (1); build infrastructure and startup/maintenance funding (1); increased corporate support (1)	6
Education: Increase education about nutrition and sourcing (2)	2
Disparities: Address and account for structural racism and other disparities (1)	1

SNA open-ended survey responses to the question prompt about the single biggest need to address low food security and hunger provided ample data. Eight respondents discussed transportation as one of the biggest challenges. Four responses specifically suggested that creating and/or improving a delivery and distribution to reduce farmers' losses and food waste would be a significantly important action. Four other respondents focused on increasing overall access to transportation through development of public transit and related activities. Another key focus area was access. One respondent suggested that Maryland needs to create and improve the direct connections between farmers and people in need while four respondents focused on providing food at lower costs to low-income households. One respondent discussed the importance of addressing and remedying food deserts and two respondents suggested that there should be greater emphasis on locally-sourced foods.

Employment was discussed by seven respondents as essential for addressing low food security and hunger in Maryland. Employment-related suggestions focused on increasing wages ("livable wage") and increasing access to employment opportunities. Collaboration was mentioned by six respondents. One respondent focused on the importance of building and strengthening communities, two respondents discussed the importance of facilitating and supporting collaboration between organizations, and one respondent discussed increasing communication and collaboration for more effective and mutually beneficial policy discussions. One respondent suggested focusing on building up infrastructure and funding startup/maintenance funds for communities, and another respondent suggested that there should

be increased corporate support of communities. Education was identified by two respondents as an important focus area for addressing food security and hunger issues in Maryland. Both respondents suggested there is a need for increased education about nutrition and where food comes from. One respondent identified that disparities must be addressed to solve food security and hunger issues, noting that communities and/or the state must address and account for structural racism and other disparities.

Research question 2 asked about the role of social networks in addressing food security and social equity issues in Maryland. While the SNA survey open-ended (unaided) questions did not specifically address networks in the prompt, respondents identified several examples that could and may already be addressed by networks including access, collaboration, and disparities (e.g., social equity). Initial interviews and SNA open-ended responses indicated a consensus that transportation, access, employment, and regional disparities were key issues in the bigger food security problem. The importance of networks was emphasized in both initial interviews and survey responses. Answers were expected to differ given the shift in lens from interviewees working with the Maryland Food Bank to individual organizations participating in a larger network; however, there was a remarkable level of consistency across the two instruments and qualitative data. For the bigger equity picture, the consistency of identified inequities and barriers to food security across the state emphasizes that equity issues must be addressed to improve food security rates in Maryland.

Follow-Up Semi-Structured Interviews

Follow-up interview participants were identified using Gephi social network analysis software to analyze SNA survey responses and identify which organizations were notably more connected than others within regional networks (see Table 29). Interviewees were selected based on the highest number of connections (edges) for each region. Fifteen interviewees (hubs) were initially identified for follow-up interviews.

Table 29: Follow-up semi-structured interview participants identified as hubs by SNA

Region	Name	Organization	Connections
Baltimore City	Invitation 14	Bee More Cooperative	7
Baltimore City	Invitation 15	Baltimore Free Farm	12
Baltimore City	Interviewee 12	Oliver Community Farm	19
Baltimore City	Invitation 16	Baltimoreans United in Leadership Development (BUILD)	7
Northern	Interviewee 8*	Maryland Farm Bureau	7
Southern	Unknown5	Unknown organization	16
Southern	Interviewee 8*	Maryland Farm Bureau	18
Southern	Interviewee 6	Riverdale Park Farmers Market	9
Southern	Interviewee 5	California (MD) Farmers Market	10
Southern	Interviewee 7	National Association of Farmers Market Nutrition Programs	7
Southern	Interviewee 13	City of Gaithersburg, Community Services	7
Southern	Interviewee 11	Montgomery Food Council	7
Western	Interviewee 9	Hood College	4
Western	Interviewee 8*	Maryland Farm Bureau	3
Eastern	Interviewee 8*	Maryland Farm Bureau	8
Eastern	Interviewee 10	Caroline County Public Schools	12

*Interviewee 8 and/or the Maryland Farm Bureau was identified as a hub in the Northern, Southern, Western, and Eastern regions of Maryland.

The initial list of fifteen interviewees was reduced to twelve for two reasons. One respondent to the SNA survey was an anonymous respondent in the southern Maryland region who completed the survey with a forwarded link, but no contact information was available; this is unfortunate as it resulted in a lost opportunity to connect with the second-most connected hub in the network. Four of the identified regional hubs were the same organization (with a presence in multiple regions), so only one interview was appropriate. Figure 19 (shown previously) provides a visual representation of the statewide food security social network developed using SNA survey responses.

Ultimately, nine of the 12 follow-up semi-structured interviews were completed due to lack of responses from three interviewees to interview invitations. Additional interviews were not scheduled because the hubs identified were the most connected nodes in each network; the next-most connected nodes had significantly fewer edges. The respondents' answers to questions

about food security and their work in the field are summarized in Table 30 and expanded upon in greater detail in subsequent sections.

Table 30: Follow-up semi-structured interviews, solving food security by category

Category of Response⁶
<p>Population served</p> <ul style="list-style-type: none"> • I5: “predominantly Navy people”; vulnerable populations not visible or may not exist; significant transportation challenges with limited public transit • I6: Spanish-speaking immigrants; single-parent homes; has heard anecdotal examples of racism related to employment challenges; heavy presence of SNAP recipients; significant vulnerable populations; significant transportation challenges • I7: multiple jobs and/or multiple children; vulnerable population struggling with waiting in line and reauthorizing every six months for benefits (“add more burden to people already struggling”); significant transportation challenges • I9: recipients reside in food deserts; low-income areas in urban environments • I10: significant Hispanic population; significant Haitian population; significant language barriers; significant transportation challenges; high unemployment rate • I11: significant language barriers (“need to incorporate Korean, Spanish, and others”); significant transportation challenges • I12: predominantly elderly, low-income, and African-American • I13: 40% Latino; high presence of vulnerable individuals; low-income; single-parent immigrant families; senior citizens; significant transportation challenges
<p>Food security in Allegany County, Baltimore City, Dorchester County, and Somerset County</p> <ul style="list-style-type: none"> • I5: Allegany County: geographically isolated, lacking economic engine; Dorchester/Somerset Counties: isolated, predominantly minority, socioeconomically disadvantaged; Baltimore City: economic hardships, changing industry, “crumbled” economy • I6: Dorchester/Somerset Counties: high food production but mostly high volume and exported; Allegany County: industrial and mountainous, closed factories eliminated jobs; Baltimore City: “always best of times, worst of times – all the time” • I7: Allegany County: fewer employment opportunities, geographic spread, limited resources invested in small towns, aggregation of all food providers/work locations, small grocery stores closed increase distance to travel for food • I8: Allegany County: transportation and food storage challenges, financial/socioeconomic class issues, limited access to WIC/SNAP and other benefits • I10: [all]: “Poverty is the problem”, “lack of job skill, lack of job opportunities, limited transportation, poor economic growth, low income tax base, addiction, abuse, etc.” Issues “closing the SNAP gap”, higher cost of living than most U.S. counties but significant

⁶ Interviewees not included in a category refused to answer the question and/or indicated they did not have sufficient information to answer.

number of residents living below standard, significant disparities with data disaggregated

- I12: Baltimore City: recently closed a major grocery store in the neighborhood and created a food desert, significant transportation challenges; Allegany/Dorchester/Somerset Counties: “they might be growing a lot, but the food isn’t staying there”
- I13: Allegany/Dorchester/Somerset Counties: less populated, fewer resources, fewer opportunities to network, greater geographic spread

Role of social networks

- I5: small-scale market farms rely heavily on social media; word of mouth strongest form of advertising; heavy reliance on social networks
- I6: networks essential – “must interact with and know your neighbors (who are your customers) to know if your efforts are effective, meet them where they need you”; “people not exposed to those struggling with food security, immigrants, etc. are ‘missing something’”
- I7: “most effective way to get anything done is to have strong social networks to reach people, find people, work together on goals”
- I8: interviewee’s entire position involves networking with producers, organizations, and governments across Maryland and in a national advocacy capacity
- I9: “I’m proud of our partnerships! We have fostered great relationships within the community and each partner is so supportive of the FFSN”, “I turn to our network partners or my colleagues [for guidance]”⁷
- I10: “Absolutely we could not do it without one another. Sharing resources, volunteers, etc.” refers clients to other programs/services “all the time”
- I12: organizes events/recruits volunteers, partners with local organizations⁷
- I13: “Absolutely. We’re sit in the middle of a county. If it wasn’t for the collaborations with our congregations, apartment complexes, nonprofits, schools ... it’s one of our priorities to collaborate and keep those collaborations going. We don’t do anything by ourselves. I don’t see how anyone could operate without it. Can’t afford to waste taxpayer money, donations, whatever, by not collaborating and wasting resources/not streamlining.”

Changed perspectives

- I6: “cared from a distance” about food security before, now understands the value “of being there for our neighbors and our fellow citizens – won’t be able to have full employment, good jobs, profits, etc. without it”
- I9: “During the pandemic the number of food taken directly from the gardens increased. People were coming to the gardens and harvesting the food before our gardeners could get to it and provide it to our distribution partners. Although I don’t think it surprised me, it was just a sad situation to observe. So long as the produce went where it was needed most, that’s all that mattered”

⁷ Note: I9 and I12 said networks played minimal/no role in their efforts, then provided examples of networks and network activities. Possibly first time they had been asked to think about their work in the context of networking.

- I10: “people don’t think it’s in their community ... it is alive and well unfortunately”
- I11: has observed a shift in the food security community lens from discussing mapping and access (physical) to thinking about cultural capital and what kind of food people actually want
- I12: was unaware of food security prior to joining their current organization
- I13: “When I went to school, I think my school was pretty progressive as far as teaching new social workers that you have to address individual needs, start where the person is, but you also have to work with systems, change, advocacy... I think all the jobs that I have had have supported that. The government ones are trickier because you have to advocate in different ways... the folks that we serve or work with need to be part of that movement and advocacy. We can’t just be in our offices planning and identifying needs without the people around the table that are experiencing the needs.”

Solving food security

- I6: provided list: 1) understand the needs of those struggling, 2) ensure all food security programs have connections to places where people gather, and 3) ensure food security programs are adequately serving communities they are part of
- I7: “I would break down silos between the different areas/programs – between the hunger community & the agricultural community, between different federal benefits and state/local benefits programs, etc.”
- I8: “The pandemic exposed the issues of overall supply chain and the logistics of moving food in the United States. We learned that we consolidated too much and lacked the redundancy we need”, “build redundancy and incentivize/localize with local/smaller businesses when big supply chain goes down. Also increase awareness around food and meal preparation, food education for unprocessed food – no more HomeEc is problem”
- I9: “I would like to provide more opportunities to get the community more involved in all aspects of food security, starting with opportunities to learn how to garden, learn self-reliance skills, nutrition and revise a local food movement that bring us together in a meaningful way”
- I10: “I would build a food innovation center to create jobs, a healthy food chain supply year round, train youth and adults for job skills, teach people how to grow food themselves, how to cook, mobile farmers markets for the food desert areas, food processing plants, economic development for the region”
- I11: better data on barriers to access/security; resources to share more drilldown specific community-level data, perceptions data, etc. to work with food assistance providers and shape programs; increase program outreach and communication about food assistance resources available (especially multi-language); hire team of food assistance resource navigators with cultural competencies; address supply chain issues to get the right food at the right organization at the right time
- I12: education (starting young, teach kids about healthy food and produce, generational training to make long-term change); access

(make it easier for parents to nurture kids' interest by going to local grocery store and helping them apply lessons learned in school at the grocery store)

- I13: “If we’re gonna help people, if you don’t address food security for them and their kids—not only is that immoral and unacceptable—you have to address those basic needs before you can move on (employment, housing, health, mental health, school success)” ... “I would expand the new Gaithersburg Cares hub – pull in dream model Financial Impairment Center – model out of Cities for Financial Education Bloomberg project – neighborhood based food sites that also include empowerment services and how to sign up for food stamps and how to cook nutritionally and economically. It includes education and other opportunities for people. I think I would expand that and put the extra money into hiring people to do the delivery ... People can get jobs, more people to do delivery. And I’d used the money to buy more cultural food – like, we’re getting it, but money would definitely help. Hire more people that would be outreach workers from different cultural groups and languages – on the streets door knocking. Basic outreach – bring that model back”

Population Served

According to interviewees, populations served varied by the interviewees' locations and by their role within the food security community. Low-income populations were mentioned directly or indirectly by every interviewee. Vulnerable populations were mentioned directly by three interviewees and indirectly by seven interviewees. Language barriers were mentioned by four interviewees. Transportation challenges were mentioned by six of the nine interviewees. Challenges related to SNAP, WIC, and other benefits were mentioned by two interviewees. Food deserts were mentioned by two interviewees. Two interviewees mentioned high populations of senior citizens. Racism and related employment challenges was mentioned by one interviewee.

Interviewee 5 was unaware of the presence of vulnerable populations in their area (Southern region). Their county is in the second-highest level (out of four, four being the highest) of deprivation (see Figure 8), which raises questions about visibility of the population, transportation effects on population ability to access, and individual perceptions. It is important to note that while the county is in the second-highest category for level of deprivation, it is not considered to be a county struggling with low food security. Interviewee 6 (Southern region) specifically mentioned a significant number of Spanish-speaking clients, which is supported by the county having a Hispanic population of approximately 17.9%. Interviewee 10 (Eastern region) mentioned high representation of Hispanic and Haitian populations, which is supported by the county's 7.0% Hispanic population. Interviewee 11 (Southern region) indicated a significant need for Korean, Spanish, and other language supports, which is supported by the county's 14.6% Asian and 19.3% Hispanic population. Interviewee 13 (Southern region) stated the county population was 40% Hispanic, but this may have been a verbal/recall error.

Food Security in Allegany County, Baltimore City, Dorchester County, and Somerset County

When asked about awareness and potential causes of the higher rates of food security challenges in Allegany County, Baltimore City, Dorchester County and Somerset County, interviewees provided relatively similar responses. For Allegany County, Dorchester County, and Somerset County, geographic isolation, including distances between grocery stores and food storage challenges, was identified by four of the

interviewees. Limited economic activity and employment opportunities were mentioned by five interviewees. Two interviewees noted that there are high levels of food production in the three counties but the food “isn’t staying there” (suggesting it is shipped to other parts of the state or out of state). Access to SNAP, WIC, and other benefits was identified by one interviewee while another noted issues with “closing the SNAP gap”, or the difference between the number of eligible participants and the number of people actually enrolled in SNAP benefits. One interviewee mentioned that poverty, limited job skill training, and drug addiction may be affecting these areas.

Baltimore City was a difficult topic for several interviewees and most shied away from direct answers. One interviewee summarized Baltimore City’s situation by identifying economic hardships, changing industries, and a “crumbled” economy. Another interviewee described the city as “always best of times, worst of times – all the time”. Interviewee 12 represented a Baltimore-based organization and mentioned a specific local grocery store closing permanently, which in turn created a food desert in a predominantly elderly, low-income African American neighborhood.

Role of Social Networks

Whether directly or indirectly (see Significance of Follow-Up Interview), eight of the nine interviewees strongly agreed that networks played a significant role in their work with food security. Descriptions of the role of networks and social networking included: “most effective way to get anything done”; “absolutely we could not do it without [network partners] ... I don’t see how anyone could operate without it”; “must interact with and know your neighbors ... to know if your efforts are effective”; and “absolutely we could not do it without one another”. Less direct examples of reliance on social networks included social media for advertising and coordinating efforts as well as organizing events, recruiting volunteers, and partnering with local organizations. Interviewee 8 noted that their position is almost exclusively focused on networking with producers, organizations, and government entities across Maryland and in a national capacity.

Changed Perspectives

Responses about changed perspectives related to the food security world varied. Five of the nine interviewees indicated any change in perspective, and each provided a

different perspective. Interviewee 6 mentioned formerly “car[ing] from a distance” but now understanding the value of food security for all. Interviewee 9 noted that the COVID-19 pandemic highlighted the need in the community, sharing that “people were coming to the gardens and harvesting the food before our gardeners could get to it and provide it to our distribution partners... so long as the produce went where it was needed most, that’s all that mattered”. Interviewee 10 did not necessarily indicate a change in their own perspective but noted that others incorrectly “don’t think it’s in their community”. Interviewee 11 also focused on a bigger picture lens rather than their own perspectives, mentioning a shift in the food security community lens from discussing mapping and access (physical) to thinking about cultural capital and what kind of food people want. Interviewee 12 was unaware of food security prior to joining their current organization. Interviewee 13 mentioned their change in perspective came with experience working with government organizations and how the type of organization affects how food security issues can be addressed.

Solving Food Security

The ideas to solve food security challenges (with unlimited resources, based on the prompt) yielded diverse answers. Interviewee 6 provided a three-step plan including: 1) understand the needs of those struggling, 2) ensure all food security programs have connections to places where people gather, and 3) ensure food security programs are adequately serving communities they are part of. Interviewee 7 discussed breaking down silos between the hunger community and the agricultural community as well as between federal and state/local benefit programs. Interviewee 8 focused on how “the pandemic exposed the issues of overall supply chain and the logistics of moving food in the United States.” They identified that over-consolidation and limited redundancy resulted in empty shelves and food shortages when COVID-19 struck the U.S. Based on this, Interviewee 8 suggested building redundancy and incentivizing local food production and supply chains. Interviewee 9 discussed providing additional opportunities to education communities about gardening, nutrition, and self-reliance. Interviewee 10 focused on creating jobs through a food innovation center, developing a year-round healthy food supply, providing job training for youth and adults, nutrition and food preparation

training, mobile farmers markets for food deserts, food processing plants, and general economic development.

A unique focus presented by Interviewee 11 was to focus on better data on barriers to access and food security to inform policy and decision-making. Interviewee 11 emphasized the role that better data would play in community-level work, program outreach, and communication about resources available. Interviewee 11 also suggested hiring food assistance resource navigators with cultural competencies as well as addressing supply chain issues to get the right food to the right organization at the right time. Interviewee 12 focused on education related to healthy food and produce alongside increased access to healthy food to empower families to nurture children's interests for transgenerational impacts. Interviewee 13 approached food security from a more holistic perspective, noting that "you have to address those basic needs before you can move on (employment, housing, health, mental health, school success)". Interviewee 13 also discussed expanding existing programs and incorporating financial education centers, neighborhood-based food sites with empowerment services, benefits resources, and nutritional/economical food preparation classes.

Significance of Follow-Up Interviews Data

There were several key takeaways from the follow-up semi-structured interviews. First, the interviewees themselves represented a variety of backgrounds and likely reasons for connectedness. Some were better able to answer questions about their work as it related to food security than others. To demonstrate the diversity of interviewees, Interviewee 5 was well connected and provided a predominantly private sector lens geared toward sales while Interviewee 8 was a super hub identified across four of the five regional networks (Northern, Southern, Eastern, and Western) and provided a lens geared toward farmers' and producers' roles, needs, and capabilities related to addressing food security in the state. Interviewee 13 was exceptionally well connected within their region and was cognizant and deliberate with food security decision-making and strategy. Interviewee 12 indicated they "fell into" the work and had a limited awareness of bigger-picture food security. The majority of interviewees were able to discuss their work in terms of networks, but Interviewee 6 in particular used terms including "organic", "social network", and "network management" that indicated networking was a regular, active,

and deliberate part of their professional work. Interviewee 9 and Interviewee 12 did not personally associate their work to network activities but provided networking examples throughout their responses, suggesting that this may be an issue of terminology rather than a lack of networking. Research question 2 asked about the role of networks in addressing food security and social equity challenges in Maryland. Follow-up interview data expanded upon the data already collected during initial semi-structured interviews and the SNA survey to provide a richer understanding of how networks affect these issues.

Results and Analysis – Research Question 3

Research Question 3 (RQ3): Does the structure of networks vary by region in Maryland?

As discussed previously, the network structure varies by region in Maryland. Regional networks were identified in Baltimore City, Eastern, Northern, Southern, and Western Maryland regions (see previous Table 27). The Western region network is the smallest and simplest regional network with one hub reaching four other connections and a second hub connecting two other entities. In other words, there were two small networks identified in the Western region which were not connected to each other. Northern and Eastern regional networks are more complex with major hubs connecting to several other nodes as well as smaller two-to-three organization networks not connected to the larger network. Southern and Baltimore City regional networks are extensive, complex, and well connected (see Figures 14-19). The subsequent data and analysis provide the number of nodes and edges, network densities, maximum distances between nodes, and average distances between nodes for each regional network as well as for the statewide network (see Table 31 below).

Table 31: Overall network metrics by regional network

	Baltimore City	Eastern	Northern	Southern	Western	Statewide
Nodes	45	28	18	63	8	148
Edges	60	25	16	95	7	200
Density	0.030	0.033	0.052	0.024	0.097	0.018
Maximum Distance	3	1	1	4	1	9
Average Distance	1.389	1.000	1.000	1.500	1.000	4.083

The size of each regional network varied. The Southern region had the highest number of nodes (63) while the Western region had the fewest nodes (8). A higher number of nodes compared to edges indicates the presence of isolates, or nodes which are not connected to other nodes. Density in a social network map refers to how interconnected nodes are to each other. Density values range between zero and one (0.000 and 1.000). A larger density figure indicates a higher level of connectedness between nodes. The Northern and Western regional networks had the highest network density, followed by the Eastern and Baltimore City networks. The Southern and Statewide networks had the lowest network density. Nodes connected to two or more other nodes may play a more significant role and cause more disruption if they are lost from the network. None of the regional networks have a large density value. The greatest density rating was 0.097, which means that 10% of possible connections were reported. This suggests that organizations are not collaborating. This low density value is likely a direct result of the noted low response rate of 38.7% to the SNA survey. Based on the data collected, networks may be connected but are less active or robust on paper than they may be in the real world.

The maximum distance in social network analysis refers to the diameter of a network and measures the maximum number of “connections along the shortest path between two nodes” (Wachhaus, 2020, p. 68). Average distance, alternatively, looks at the average number of connections along the shortest path between two nodes. The Eastern, Northern, and Western regional networks had a maximum distance of one (1.00) compared to the statewide network with a maximum distance of five. This means that all nodes in the Eastern, Northern, and Western regional networks are within one connection of each other whereas nodes in the statewide network may be as separated as five connections. Average distance logically reflects this data with higher average distances mirroring the networks with higher maximum distances.

One thing that becomes apparent upon close inspection of each regional network is that edges in regional networks do not connect to other regional networks. This suggests that the statewide network may be centralized rather than a collection of independent but connected regional networks. In other words, regional networks would be completely separate from each other if not for a few specific nodes connecting them to

the centralized statewide network. A series of “what-if” scenarios were conducted to explore the potential impact of losing hubs in the statewide network. By definition, hubs are highly connected to other nodes and play a key role in relationships that indirectly connect less connected nodes to the greater network. Four hubs are particularly prominent and pull the majority of nodes together to form the larger, centralized network: Caroline County Public Schools (CCPS), Unknown 5, Oliver Community Farm, and the Maryland Farm Bureau. If CCPS is removed from the network, the statewide network separates into three separate networks with 11 organizations completely isolated from all others (Figure 22). If Unknown5 is removed from the network, two separate networks are created with seven isolated nodes (Figure 23). If Oliver Community Farm is removed, two separate networks are created with seven isolated nodes (Figure 24). If the Maryland Farm Bureau—the most significant hub in the statewide network with a presence in multiple regional networks—is removed from the network, three separate networks are created with all University of Maryland Extension county branches isolated (Figure 25). If the University of Maryland Extension county branches were treated as a single entity rather individually by county branches, the organization would undoubtedly become a significant hub in the statewide and regional networks. The relationship between the Maryland Farm Bureau and University of Maryland Extension branches and the impact of that relationship may be worth future exploration.

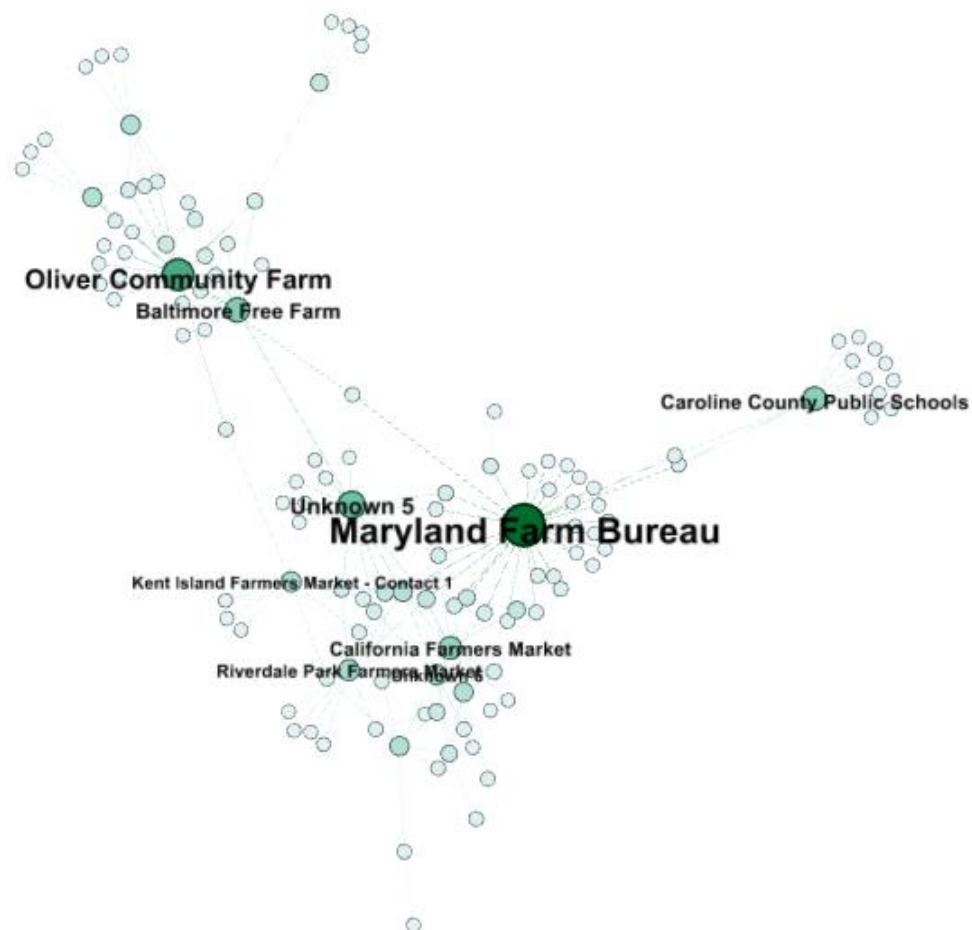


Figure 19: Statewide social network map (repeated from previous)

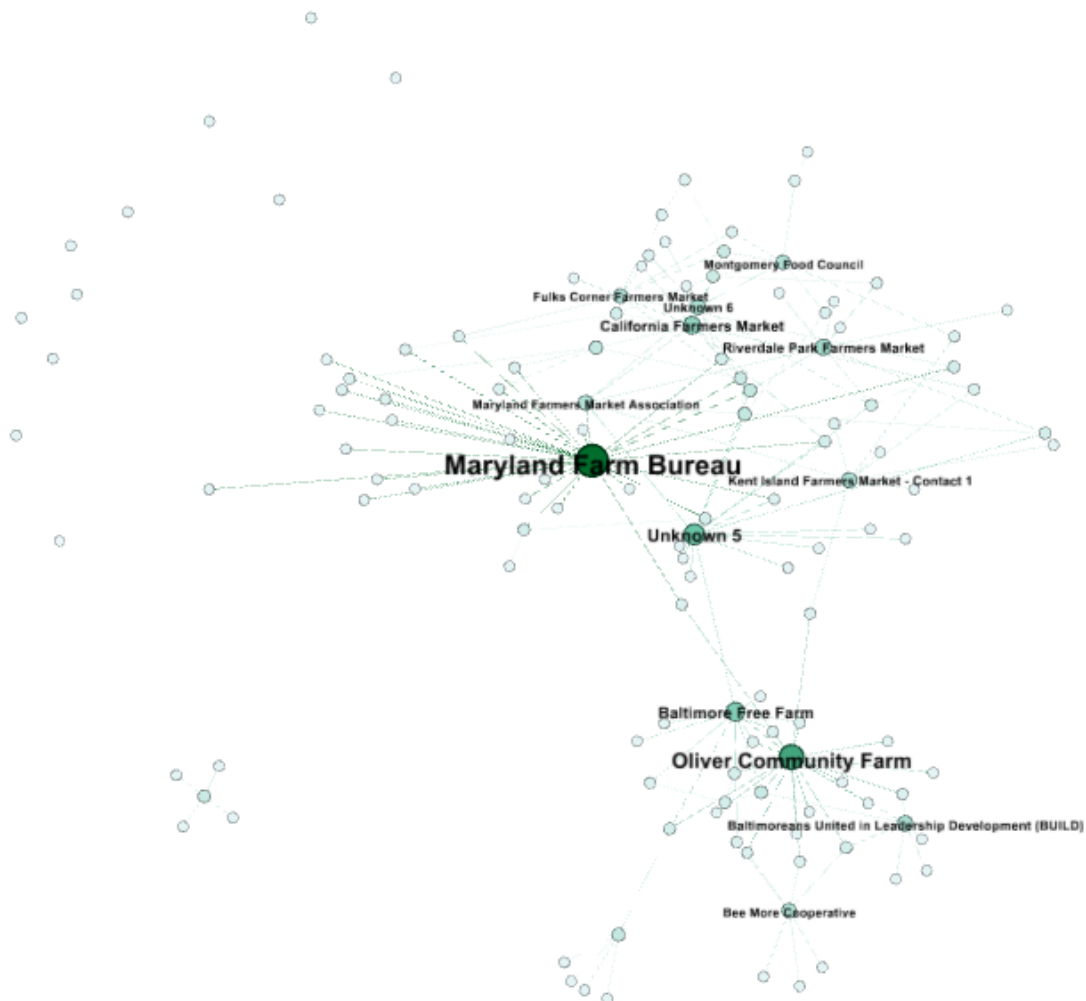


Figure 22: Statewide network, no Caroline County Public Schools

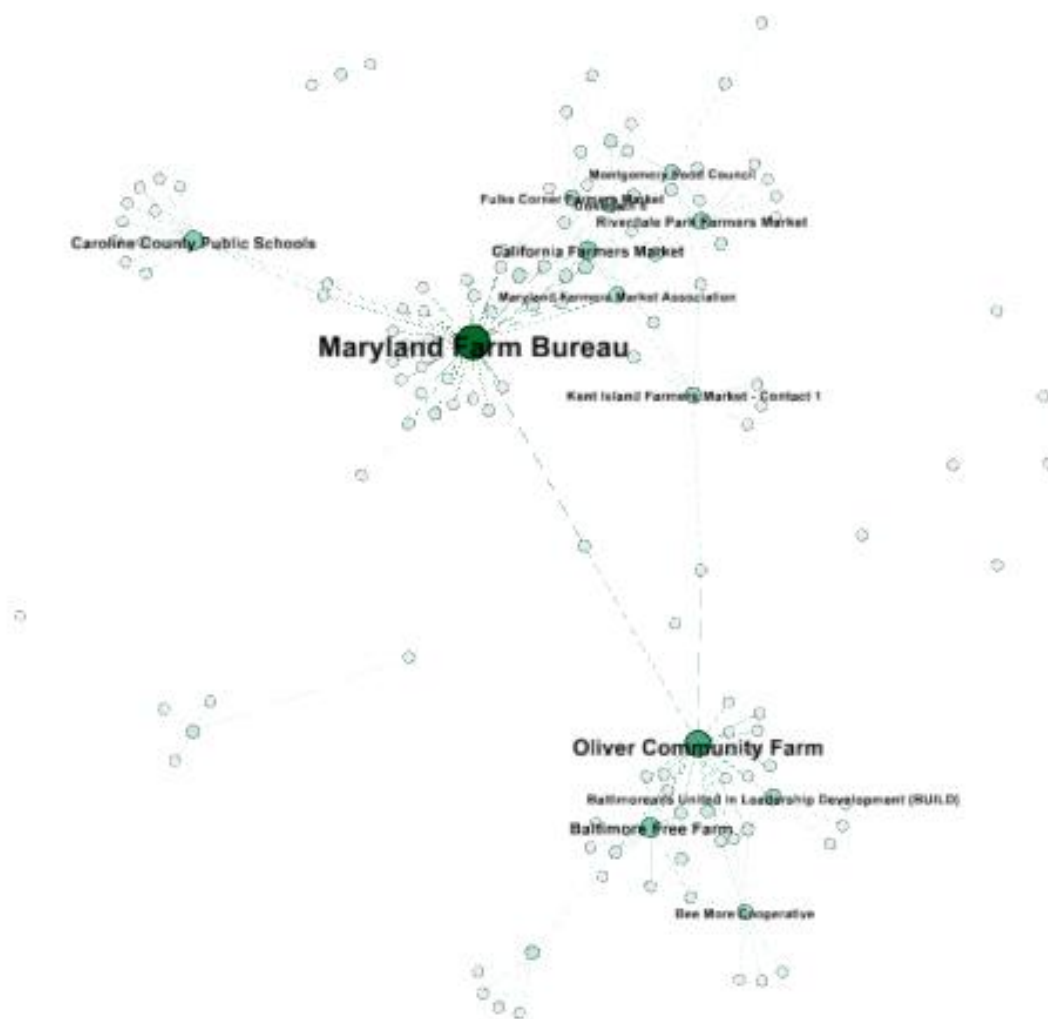


Figure 23: Statewide network, no Unknown 5

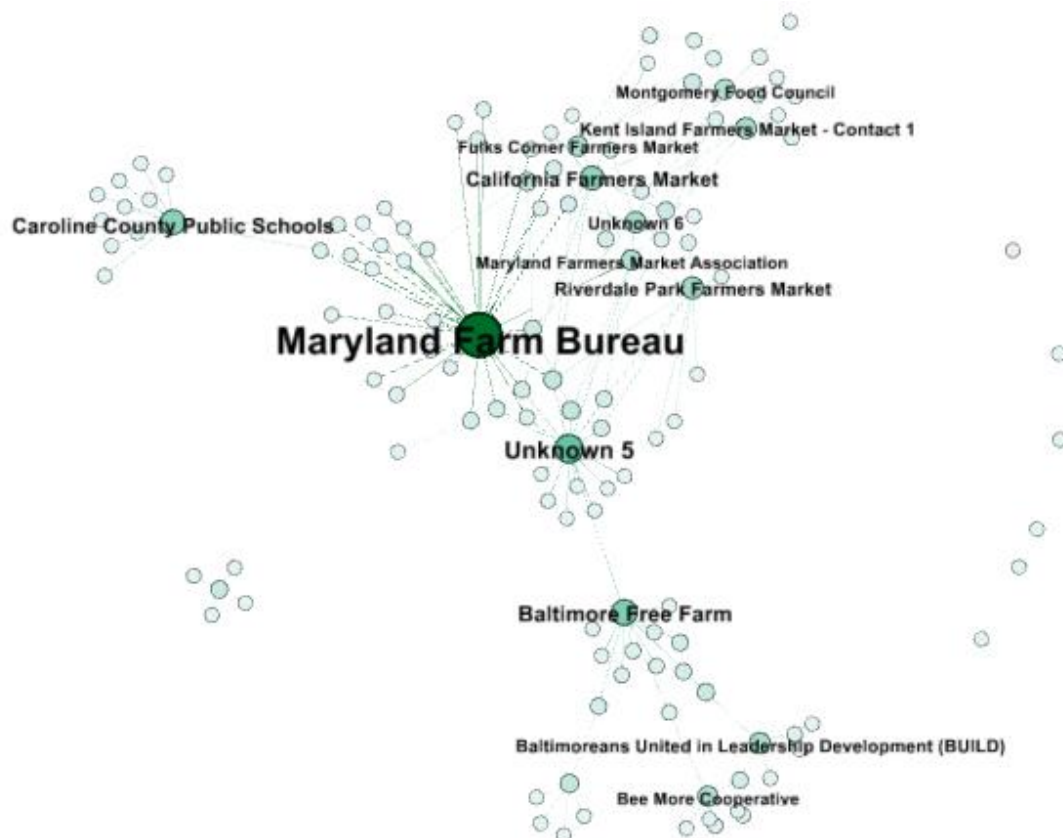


Figure 24: Statewide network, no Oliver Community Farm

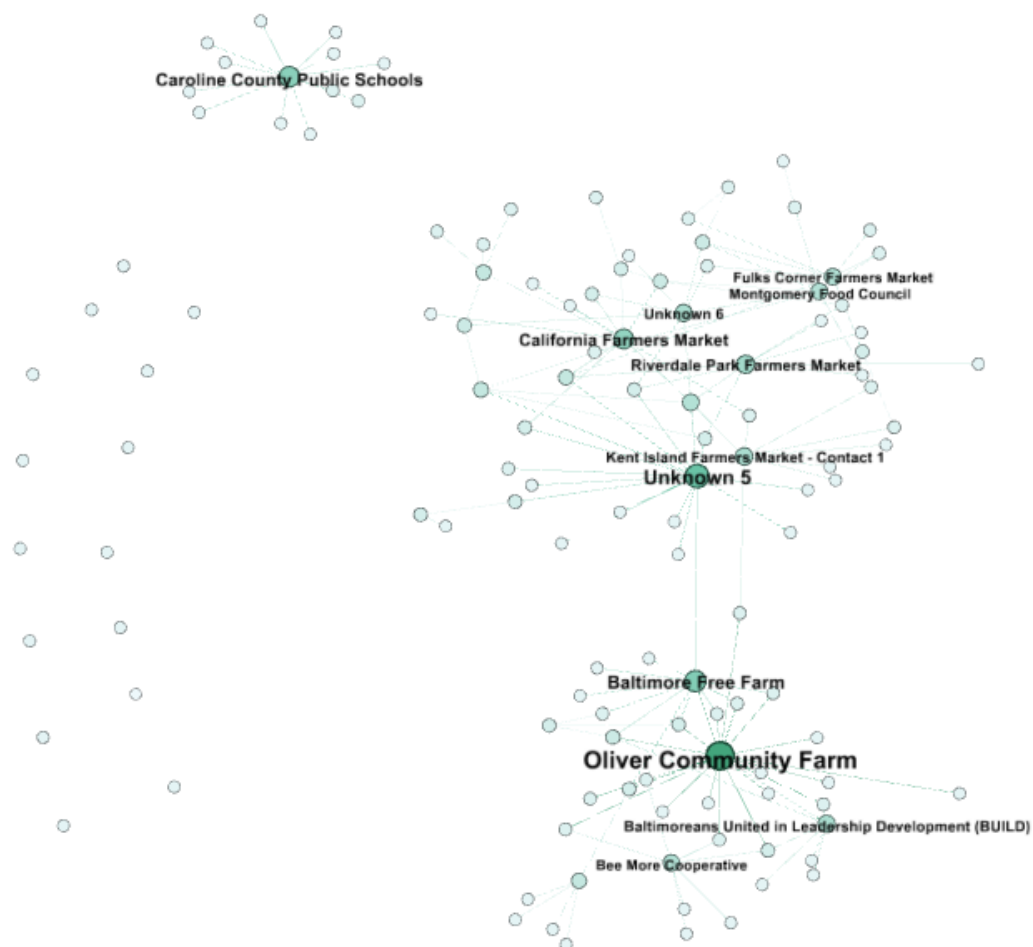


Figure 25: Statewide network, no Maryland Farm Bureau

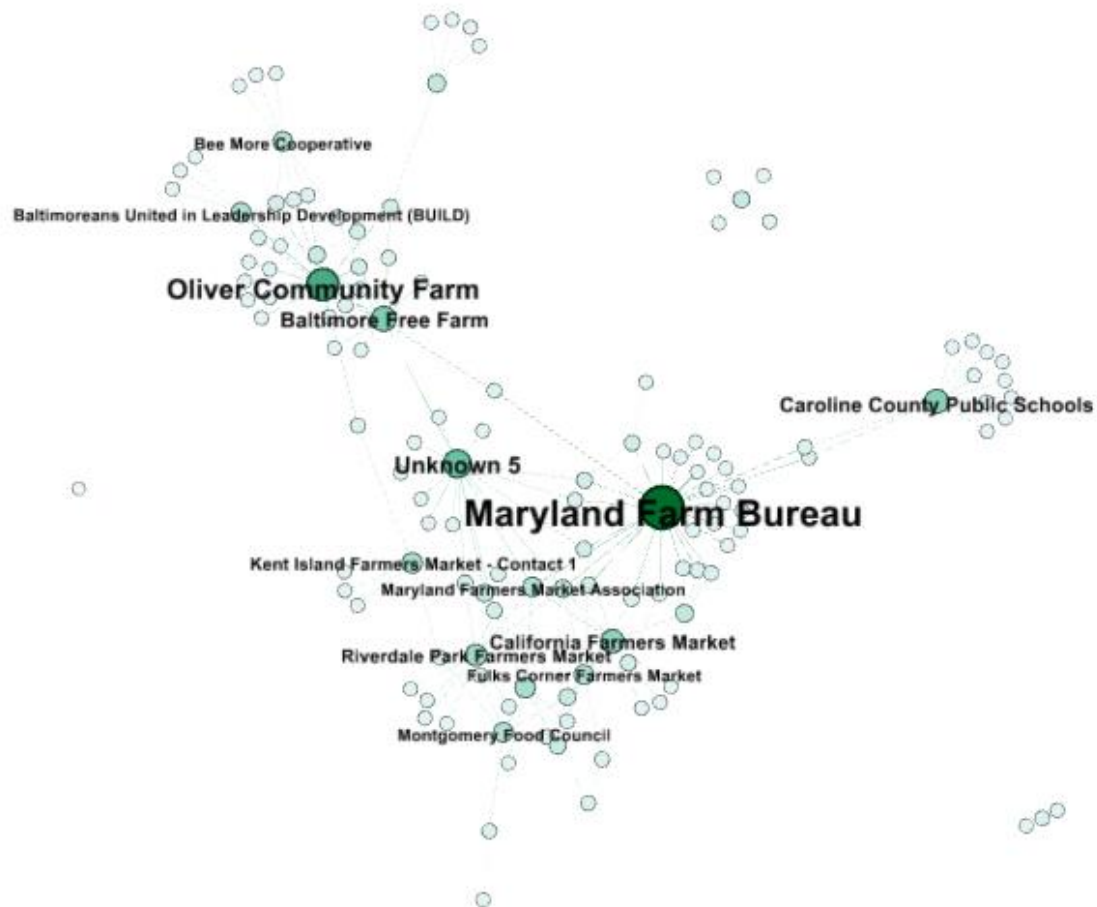


Figure 26: Statewide network, no Maryland Department of Agriculture

Three additional intriguing observations were made. First, there are University of Maryland Extension (UME) branches for each county in Maryland. While each by itself is not particularly well connected, they are present throughout the entire statewide network. Without them, the entire network would be substantially less connected. Figure 27 shows the statewide network (left) versus the statewide network without University of Maryland Extension county branches (right). While Maryland Farm Bureau is still clearly a hub, several nodes are isolated by the removal of University of Maryland Extension offices. Network density increases from 0.010 to 0.024, but the average distance between nodes increases from 1.473 to 4.223 indicating a significant increase in the number of nodes resources must pass through to reach all nodes. Second, the Maryland Department of Agriculture (MDA), while having fewer branches, serves a similar function as it

connects other less-connected nodes to the greater statewide network. Losing either UME or MDA decreases the connectedness of many nodes and increases the maximum and average distances between nodes in the network. Table 32 shows the network statistics for each “what if” scenario (i.e., removing Maryland Farm Bureau, Caroline County Public Schools, Unknown 5, Oliver Community Farm, University of Maryland Extension, Maryland Department of Agriculture). Losing any of the six hubs nearly doubles the maximum distance between nodes (from five in the existing statewide network to nine). The average distance between nodes increases (resulting in a decrease in betweenness centrality) most when CCPS, MDA, and UME hubs are removed from the network, suggesting that these three hubs play a key role in overall network cohesiveness. This is an important observation for understanding the role and structure of networks because the assumption that hubs play the most significant role may be misleading; it may in fact be organizations with several smaller sub-nodes connecting other less-connected nodes that make the biggest difference. Practically speaking, this indicates that the value of smaller nodes should not be overlooked and it is important to understand which nodes provide key connections in networks.



Figure 27: Full statewide network (left) vs. network without University of Maryland Extension county branches (right)

Table 32: "What If" scenario network statistics

	Statewide	"What If" Scenario Network Statistics					
		No Caroline County Public Schools	No Unknown 5	No Oliver Comm. Farm	No MD Food Bank	No MD Dept. of Agriculture	No University of MD Extension
Figure	19	23	24	25	26	27	28
Nodes	120	134	134	134	134	132	109
Edges	188	173	169	163	154	175	154
Density	0.010	0.019	0.019	0.018	0.017	0.020	0.024
Maximum Distance	5	9	9	9	9	9	9
Average Distance	1.473	3.856	1.261	1.216	1.149	4.128	4.223

The third observation made was that there are two networks completely isolated from the statewide network: one of the two Western networks (centering around Hood College as a hub with four connected nodes) and a small, separate Eastern shore network consisting of two contacts at The Samaritan Shelter and MFB-Eastern Shore. The Western network centering around Hood College represents five unique organizations coming together to form a network in the highly rural, geographically spread/isolated Western region. This small network includes the Frederick Rescue Mission, Frederick Community Action Agency, City of Frederick, and an author/farmer/activist (individual). If any one of these nodes made even a single connection to the other small network identified in the Western region or to another node in the statewide network, it would become integrated into the statewide network structure. The Eastern stand-alone "network", which would be more accurately described as a relationship between two organizations, could connect to any of the other nodes in the Eastern region network and become integrated into the statewide network structure. It is worth noting that this was the only reported relationship from any survey respondents with the MFB-Eastern Shore branch.

The design of this study deliberately began with the Maryland Food Bank (MFB) for initial semi-structured interviews and developing the snowball sample because MFB has branches across the state, an established history of serving the entire state and of absorbing other food banks, and because of its overall ability to deliver food to low-income and vulnerable populations. The findings of this study conflicted with those

assumptions and raised questions about MFB's role in food security in Maryland. First, assuming that MFB interviewees did in fact share the snowball and SNA survey with their networks of food-related organizations, the fact that only ten unknown responses were collected during this study (responses which could be attributed to the researcher's sample forwarding the email on just as easily as they could be attributed to MFB contacts) challenges whether the MFB connections form connected networks or are better described as contact lists. Another surprising finding was that few respondents indicated any kind of relationship with MFB. The Baltimore branch had four connections to other nodes, the Eastern Shore branch had one connection to another node, and the Western branch was not identified by any SNA survey respondents.

Research question 3 asked if network structure varies by region. In addition to varying by size, each network varied by density, maximum distance between nodes in a network, and the average distance between nodes in the network. In short, yes, network structure varies by region in Maryland.

Results and Analysis – Research Question 4

Research Question 4 (RQ4): Does network structure vary with regional food security rates?

Regional network data was used to analyze various SNA fundamental elements such as degree, in-degree, out-degree, and betweenness centrality distribution (see Research Question 3 analysis). To answer RQ4, analysis considered network structure against low food security rates in the network region (Table 33). Regions were determined based on geographic proximity of counties and based on the regional groups used by the Maryland Food Bank. The Maryland Food Bank groupings alone could not be used because the organization does not serve Prince George's or Montgomery Counties, both of which are served by another organization. Three of the five regions (Baltimore City, Eastern, and Western) included one or more of the four counties identified with substantially higher food security rates. The Northern and Southern regions did not – all counties in those regions were at or below the statewide average food security rate of approximately 11%. To reiterate, regional networks were categorized as simple or complex based on the average degree of distribution and average path length (see Table 33). Networks with an average degree of distribution above 1.000

and an average path length greater than 1.000 were identified as complex. Networks with an average degree of distribution below 1.000 and an average path length of 1.000 were identified as simple.

Table 33: Regional network structure analysis

Region	Rural/ Urban	Population ⁸	Food Security Rate	Network Description
Baltimore City	(1) Urban	Total: 619,000 Average: 619,000	Range: 18.0% Average: 18.0%	Complex
Eastern Kent, Queen Anne's, Talbot, Caroline, Dorchester , Wicomico, Somerset , Worcester Counties	(8) Rural	Total: 349,000 Average: 44,000	Range: 8.0–16.6% Average: 12.0%	Simple
Northern Carroll, Baltimore County, Harford, Cecil Counties	(2) Rural (2) Urban	Total: 1,347,000 Average: 337,000	Range: 8.1–11.0% Average: 11.6%	Simple
Southern Howard, Anne Arundel, Prince George's, Montgomery, Calvert, Charles, St. Mary's Counties	(4) Rural (3) Urban	Total: 3,039,000 Average: 434,000	Range: 7.4–10.3% Average: 9.7%	Complex
Western (Garrett, Allegany , Washington, Frederick Counties)	(4) Rural	Total: 495,000 Average: 124,000	Range: 8.9–15.1% Average: 12.3%	Simple

Baltimore City is a population center and treated individually as its own region. Baltimore City had a highly complex network with a food insecurity rate of 18.0%, much higher than the statewide average of approximately 11%. The Eastern region has a somewhat complex network with food security rates ranging from 8.0% to 16.6% (average of 12.0%). Both the average low food security rate and the upper limit of the range are higher than the statewide average. The Northern region has a somewhat complex network with food security rates ranging from 8.1% to 11.0% (average of 11.6%). Both the average low food security rate and the upper limit of the range are equal to or higher than the statewide average. The Southern region had a complex network with food security rates ranging from 7.4% to 10.3% (average of 9.7%). Both the average low food security rate and the upper limit of the range are lower than the statewide average. The Western region has a simple network with food security rates ranging from 8.9% to 15.1% (average of 12.3%). Both the average low food security rate and the upper limit of

⁸ Rounded to the nearest thousand.

the range are higher than the statewide average. Due to the sample size for this study, there is insufficient data to statistically analyze the relationship between network structure and food security.

Conclusion

This dissertation sought to identify and understand the social networks present in Maryland. This will improve food security and social equity long-term by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. Understanding the role and impact of social networks on food security and access in Maryland with SNA as the theoretical framework for this dissertation is a deliberate and strategic approach to tackling the complex social issue of food security. Careful attention was paid to each step of framework, design, and methodology to ensure data collected was valid and reliable within the constraints of the theoretical framework. This chapter discussed the results and analysis of data collected. Research Questions 1, 2, and 3 were successfully answered. Research Question 4 had relevant data but an insufficient sample size to statistically analyze the relationship between network structure and regional food security rate. Informal social networks that have evolved to fill gaps in existing food systems may be the answer to addressing food security and social equity issues in Maryland.

DISCUSSION

Introduction

This dissertation identified and explored the food security social networks present in Maryland. This could improve social equity over time by informing and enabling increased affordable and sustainable access to healthy food and food security for low-income populations in Maryland. Understanding the role and impact of social networks on food security and access in Maryland with SNA as the theoretical framework for this dissertation was a deliberate and strategic approach to tackling the complex social issue of food security. In previous chapters, the literature review of this dissertation explored social equity, food security, negative effects of low food security, and strategies to address the problem. The theoretical framework provided grounding in Social Network Analysis with consideration for the social equity elements of food security. Methodology was carefully structured to maximize validity and reliability within the constraints of the theoretical framework and in keeping with the literature despite the COVID-19 pandemic. This study developed research questions based in the literature to identify and understand the food security social networks present in Maryland. Data was collected in phases with different instruments to ensure well-rounded data for mixed methods analysis. This chapter provided a summary of results and conclusions followed by a discussion of limitations and recommendations for future research.

Summary of Results

Qualitative analyses were conducted using data collected via initial and follow-up semi-structured interviews as well as open-ended data from the SNA survey. Transportation was identified throughout data collection as a significant barrier to food access and security. Geographic spreading in rural areas and limited transit options in both rural and urban areas were identified as contributing to transportation and access

challenges. Other challenges identified included limited availability of wraparound services, limited resources of organizations addressing food security, limited access to grocery stores, drug abuse, economic instability, un- or underemployment, housing/homelessness, regional disparities/inequities, and food waste. Another common thread throughout data collection was the challenges faced by populations struggling with food security. Most of the challenges identified were directly related to inequities; limited access to transportation, wraparound services, resources, grocery stores, and so forth are all directly related to regional and social disparities disproportionately affecting vulnerable populations. Interviewee 1 emphasized that their primary audience is made of up people “who are just one emergency from having nothing. One loss of a job, one loss of their vehicle that supports the household”. Others noted the food security challenges of low-income, minority, and/or vulnerable populations, often coupled with and compounded by language and cultural barriers. Eight of the nine follow-up semi-structured interview participants strongly agreed that networks played a significant role in their work with food security.

Quantitative analyses were conducted to evaluate the structure of the networks identified and to answer the research questions. Social networks were identified and mapped for each of the five Maryland regions as well as a statewide network. Quantitative analysis of the structure of networks identified variance by region. Three of the five regions (Baltimore City, Eastern, and Western) included one or more of the four counties in Maryland identified with substantially larger populations struggling with low food security due to food insecurity rates exceeding the statewide average of approximately 11%. Each region’s food insecurity rate was higher than the statewide average, but the sample size of this study was insufficient for statistical analysis of the relationship between network structure and food security rate.

Answering the Research Questions

The research questions were answered as follows:

Research Question 1

Research Question 1 was: Are there functional and/or collaborative food access and food information **social networks** in Maryland?

Social networks were identified in all five regions (Northern, Southern, Eastern, Western, Baltimore City). These social networks were connected to one another to form a relatively centralized statewide network. Some smaller collections of nodes are disconnected from the bigger network (e.g., isolated to their region). Regional networks were connected through the statewide network, but not directly to each other. Identifying a statewide network is important because this suggests nodes across the state may have or could be connected to statewide resources rather than being limited to regional resources. Also, the regional networks which are simple and less connected to the statewide network (e.g., Western, Eastern) are serving regions with greater inequities and disparities. The regional networks arguably represent and reflect the very inequities they seek to address.

Research Question 2

Research Question 2 was: What role do social networks play in food access in Maryland?

The role of social networks in food access in Maryland was significant according to survey respondents and interviewees. Respondents and interviewees were asked to identify organizations with which they worked to address food security challenges in Maryland. The resulting networks identified indicated networks across the state culminating into a complex and extensive informal statewide network. Eight out of nine interviewees indicated that social networks play a vital role in their food security efforts. Interviewees described social networking as the “most effective way to get anything done” (Interviewee 7), noting they “don’t see how anyone could operate without it. Can’t afford to waste taxpayer money, donations, whatever, by not collaborating” (Interviewee 13).

An unexpected finding was the limited reported influence or role of the Maryland Food Bank in the food network(s). This could be due to low response rates and missing data, but it is worth noting that organizations identified by Maryland Food Bank partners, particularly in the Western region, did not reciprocate the reported importance of their interactions or collaboration. Another finding was the importance of nodes which were not necessarily hubs in regional or statewide networks (e.g., Maryland Farm Bureau, Caroline County Public Schools, University of Maryland Extension county branches, Unknown 5, Oliver Community Farm, Maryland Department of Agriculture). The loss of

nodes which initially seemed less influential had significant effects on overall network structure (see previously shown Table 32). Qualitative data indicates that the role of networks is vital for food security efforts in Maryland, yet quantitative data indicates that regional disparities are reflected in network structures. As discussed previously, regional networks represent and reflect the very inequities they seek to address.

Research Question 3

Research Question 3 was: Does the structure of networks vary by region in Maryland?

Network structure substantively varies by region in Maryland (see previously shown Table 31). The Western region network is the smallest and simplest regional network with one hub connecting four other nodes and a second hub connecting two other nodes. One network connects to the statewide network through an edge while the other remains isolated. The Northern and Eastern regional networks are complex with major hubs connecting to several other connections as well as smaller two-to-three organization networks. Southern and Baltimore City regional networks are extensive, complex, and well connected. Quantitatively, the structure of networks varies by region in Maryland. Existing inequities and regional disparities may be greatly influencing the development of regional social networks.

Research Question 4

Research Question 4 was: Does network structure vary with regional food security rates?

Various fundamental SNA elements such as the number of nodes and edges, network density, maximum distance and average distance were analyzed. Three of the five regions (Baltimore City, Eastern, and Western) included one or more of the four counties identified with substantially higher food security rates (Allegany County, Baltimore City, Dorchester County, and Somerset County). The Northern and Southern region networks did not. While average food security rates varied by region and network structures varied by region, there was an insufficient sample size to statistically analyze the relationship between network structure and food security rate; however, several observations can be made, each with equity implications.

The three regions which included the four high food insecurity counties also had the highest overall mortality rates and highest deprivation rates in the state. The four counties with the highest food insecurity rates had the greatest gaps between ALICE survival budgets and median household incomes as well as above average rates of individual in poverty, unemployment, and percent of the population receiving Food Supplement Program benefits. The relationship between food security and equity has been discussed at length in this dissertation and is emphasized by each of these factors. The corresponding regional networks for the four identified counties followed a concerning observed pattern (though not statistically tested). Allegany County falls in the Western region, which had the fewest reported nodes in the network, several of which are completely isolated from the statewide network. Baltimore City, while benefitting from a complex and large network, has even greater need based on the factors discussed previously magnified by a population 85 times as large as the next largest of the four counties. These needs are likely still largely unmet as greater need requires more resources to resolve. Dorchester County and Somerset County both fell within the Eastern region network, yet county-level inequities mean that counties that are within miles of each other have vastly different experiences. Somerset County's inequities and disparities are demonstrated by an astounding 61.8% of its population receiving Food Supplement Program benefits. The Eastern region network was unique compared to the other regional networks because its primary hub was the Caroline County Public Schools node, a node which would not necessarily be associated with food security efforts and does not directly serve Dorchester or Somerset Counties. Similar to Allegany County and the Western region network, the Eastern region network has several smaller sets of nodes connected to one or two others that are largely isolated from other networks. While the Eastern region network may indirectly serve Dorchester and Somerset Counties, their higher food insecurity rates coupled with regional inequities and disparities highlight that vulnerable populations are not benefitting.

Implications of Research Questions and Findings

The implications of this study's findings are extensive and essential for the future of food security in Maryland. Implications are explained in the following sections.

Implications of Research Question 1

The existence of formal and informal food security social networks which have organically evolved to address gaps in food systems for low-income and vulnerable populations in Maryland has been confirmed. The networks identified were serendipitous; while there may have been marginal overlap with Maryland Food Bank contact lists, the existence of these networks without deliberate or guided formation is significant and has unique implications for food security and social equity in Maryland. It was noted previously that SNAP is arguably the United States' primary policy for addressing low food security; the existence of the regional and statewide networks addressing food security indicates a significant gap in existing programs and processes designed to meet the needs of low-income and vulnerable Maryland residents. SNAP is arguably the most extensive program focused on addressing food insecurity in the United States. The SNAP gap (i.e., difference between number of people eligible to enroll and actual number of participants) was identified in SNA open-ended responses as one example of SNAP failing to address food security. Other strategies to address food security discussed in the Problem Statement included food banks, nonprofit and religious organizations, farmers markets, and urban agriculture. Each has significant flaws and fails to address food security with any real long-term impact (if they actually addressed the needs of truly food insecure populations). The failings and resulting gap in existing programs and processes created a void now filled with social networks seeking to address this severe equity problem.

Identifying five serendipitous regional networks with sufficient overlap to allow for a centralized statewide network is significant, and the existence of these networks is consistent with the literature on food security and social equity. While regional networks are connected to one another through the greater statewide network, they rarely connect to each other directly. Analysis identified that the loss of nodes such as Caroline County Public Schools, Maryland Farm Bureau, University of Maryland Extension county branches, Unknown 5, Maryland Department of Agriculture, or Oliver Community Farm significantly impacted the average distance between nodes. As discussed previously, food security and social equity literature emphasize the importance of social networks in individual and population food security. The USDA ERS goes so far as to identify weak

social networks as one of the top five factors affecting food security (Smith & Meade, 2019). Relationships may be driving the evolution of informal social networks serving to address gaps in formal systems. Literature on the role of networks in addressing food security and social inequities supports the findings around food security barriers identified by survey respondents and interviewees including limited access to wraparound services, limited access to public or personal transportation, lack of income, loss of employment, increased burden from caring for others in excess of household income, and the challenges of funding food security-related organizations. Findings indicate that role of networking in accomplishing food security-related objectives and addressing inequities and disparities is significant.

The implications of identifying regional and statewide networks in Maryland can be interpreted positively or negatively. On the one hand, their existence indicates gaps in existing programs and processes which mean some of the most vulnerable populations in Maryland, struggling with significant inequities and disparities, continue to be underserved and hungry. On the other hand, the existence of regional and statewide networks indicates effort on the part of roughly two hundred organizations coming together of their own volition to address food insecurity. The simple, limited networks (e.g., the Western and Northern regional networks) and networks which serve a greater area but fail to serve the most food insecure populations (e.g., Dorchester and Somerset Counties in the Southern region) emphasize the importance of networks on the ground addressing immediate needs rather than solely relying on a statewide or centralized network. These networks represent an untapped resource for identifying new models, reaching heretofore un- or underserved low-income and vulnerable populations, identifying opportunities for further networking/collaboration, and using data to better inform policy and decision-making related to food security and social equity.

Implications of Research Question 2

The reported role of social networks in food access in Maryland is significant. Social networks are identified by the USDA ERS as being among the “five characteristics ... most strongly associated with the likelihood of experiencing food insecurity: low levels of education, **weak social networks**, limited social capital, low household income, and being unemployed” (emphasis added) (Smith & Meade, 2019, para. 17). Human

beings are social creatures and rely on one another through social networks to overcome any gaps in resources and to survive. The fact that food access networks also rely on their connections to maximize impact and effectiveness is unsurprising. Perhaps the most significant implication from Research Question 2 is that organically evolving social networks demonstrate the importance of avoiding silo behaviors and of collaborating with other entities to maximize impact and effectiveness. The existence and evolution of these social networks, particularly at the regional level, also demonstrates the impact that regional inequities and disparities have on vulnerable populations. This implication is especially relevant for modifying existing programs and processes as well as for planning any new efforts to address food security. The documented reliance on food security-related networks emphasizes the pressing, life-threatening need for deliberately incorporating disparities and social equity into the discussion of how best to address food security in Maryland.

Contrasting the findings of Research Question 2 from normative and positive perspectives helps contextualize their implications. From a normative perspective (e.g., how things “ought to be”), the U.S. is founded on the belief that all people are equal and have “unalienable Rights, that among these are Life, Liberty and the pursuit of Happiness” (National Archives, 2020, para. 2). Based on this fundamental belief, inequities and disparities should be resolved and preventative measures in place to ensure they do not reoccur. Individuals and families should have consistent, safe access to a sufficient quantity and quality of culturally-appropriate food. Food insecurity should not be a transgenerational, cyclical burden borne by those unfortunate enough to live in areas plagued by inequities and disparities. From a positive perspective (e.g., how things actually are), equity is rarely considered in program and policy development discussions resulting in inequities and disparities which affect the most vulnerable populations more focused on survival than on fighting for equity in a policy arena. The reality of having enough individuals and families struggling with food insecurity to warrant regional and statewide networks to fill in the gaps left by existing programs and policies is a moral and ethical emergency.

Implications of Research Question 3

Network structure varied by region in Maryland across all indicators. This is likely due in part to limited resources, smaller populations, and geographic spreading in rural areas compared to urban areas with significantly higher populations and clusters of organizations better situated to collaborate. Demographic data (e.g., race/ethnicity, gender, age) presented in the Introduction chapter suggest that areas with the most concerning low food security rates vary across indicators and should not be treated identically. ALICE survival and stability budgets provided another indicator that localized inequities—particularly in Allegany County, Baltimore City, Dorchester County and Somerset County, which have the highest rates of food insecurity—may be more severe than expected when looking at statewide data. Each of these the four counties was in noticeably worse shape than statewide averages on indicators including median household income, ALICE survival budgets (2 adults, 2 children), percent of individuals in poverty, unemployment rate, and percent of population receiving Food Supplement Program benefits. These struggling counties fell within the Western, Baltimore City, and Eastern regional networks. The Western network was noticeably limited and simple with two hubs in two small networks; this may be attributable to regional demographics including low population density and geographic spreading noted by interviewees. The Baltimore City network was an extensive, complex network but the loss of one or two key hubs has the potential to leave dozens of nodes cut off; this may be attributable to regional demographics including higher population density and struggles with transportation and food deserts noted by interviewees and survey respondents. The Eastern regional network had two notably well-connected hubs and losing the largest node would leave ten nodes cut off from the network; this may be attributable to the regional demographics including geographic spreading noted by interviewees.

Two scenarios were run to evaluate the impact of including the predeveloped database of food-related organizations in the SNA survey sample. These two scenarios looked at what the network would look like if only the 15 organizations identified through interview and snowball survey data were included compared to 1) all edges from the entire sample used in the SNA survey and 2) edges only directly identified by the 15 organizations directly. Unsurprisingly, both scenarios proved that seeding the SNA

survey sample with almost 200 additional organizations allowed for significantly more data to be collected about the networks. Of the 15 organizations identified, only a handful participated in the survey; this begs the question of whether they are actually well connected or active in the food access social network.

A series of “what-if” scenarios were conducted to explore the potential impact of losing hubs in the statewide network. If Caroline County Public Schools is removed from the network, the statewide network separates into three separate networks with 11 organizations completely isolated from all others. If Unknown5 is removed from the network, two separate networks are created with seven isolated nodes. If Oliver Community Farm is removed, two separate networks are created with seven isolated nodes. If the Maryland Farm Bureau—the most significant hub in the state and present in four out of five regions—is removed from the network, three separate networks are created with all University of Maryland Extension (UME) county branches isolated.

UME county nodes and Maryland Department of Agriculture (MDA) nodes connect other less-connected nodes to the statewide network. Losing either UME or MDA would increase maximum and average distances between nodes in the network. This is an important observation for understanding the role and structure of networks because the assumption that hubs play the most significant role may be misleading; it may in fact be organizations with several smaller sub-nodes connecting other less-connected nodes that make the biggest difference.

There are two networks completely isolated from the statewide network: one of the two Western networks and a small Eastern shore network consisting of two contacts at The Samaritan Shelter and MFB-Eastern Shore. The Western network centering around Hood College represents five unique organizations coming together to form a network in the highly rural, geographically spread/isolated Western region. If any one of these nodes made even a single connection to the other networks identified in their region or to another node in the statewide network, the two separate networks would become integrated into the statewide network structure.

Study design focused on the Maryland Food Bank (MFB) for initial semi-structured interviews and developing the snowball sample. MFB has a statewide presence and the infrastructure to connect low-income and vulnerable populations with food. This

study's findings raised questions about MFB's role in Maryland food security. Assuming MFB interviewees shared the snowball and SNA surveys with their networks of food-related organizations, there were only ten unknown responses. This challenges whether MFB connections form networks or are better described as contact lists. Few respondents indicated any kind of relationship with MFB. The Baltimore branch had four connections to other nodes, the Eastern Shore branch had one connection to another node, and the Western branch was not identified by any SNA survey respondents. All of this suggests that MFB may be less connected or structurally suitable for network efforts to address food security and social inequities than initially believed.

The variances in network structure have substantial implications for food policy and programmatic planning. There is significant need for greater consideration of the different realities (e.g., inequities and disparities) faced throughout the state; factors such as regional unemployment rates, median household income, and cost of living vary greatly from county to county, but these details are often overlooked or unaccounted for in food security policies. In addition to these factors, network governance is likely to vary by regional network which increases the complexity of the statewide network identified. Any future collaborations between informal networks and formal structures would need to account for these differences when exploring opportunities to pool resources and complement each other's efforts.

Food access networks will continue to expand and grow as long as low-income and vulnerable populations continue to experience a gap in food systems, but there is an obvious danger in relying solely on these networks to address the food system gaps. Despite having the highest rates of food insecurity in the state, Allegany, Baltimore City, Dorchester, and Somerset Counties' needs do not reflect a significant difference in network structure in the way one would hope. Instead of an increased presence of highly connected nodes working together to address food security issues in the area, there are fewer and less connected nodes. The simplicity and limited nature of these networks like reflect the overall disparities of each area by highlighting the lack of resources in those areas. This emphasizes that food policy and programmatic seriously fails at the regional level. Social networks addressing food security and food access demonstrate a need but work within the constraints of the environment in which their target populations exist;

failing to address inequities and disparities in those regions is the equivalent of putting a bandage on a bullet wound. Food social networks identified in this study have an immediate impact but cannot provide long-term solutions within the current environment.

Implications of Research Question 4

Food security rate varied by region and network structure varied by region, but the final sample size of this study was insufficient for statistical analysis of this relationship. Despite the lack of statistical analysis of the relationship, the variance in food security rates and network structures suggest underlying inequities and disparities at the regional level. The literature suggests that there are population pockets in Maryland which struggle with disparities across all indicators. Food security is undeniably a social equity problem. As mentioned previously, the three regions with the four highest food insecurity counties also have the highest overall mortality and deprivation rates in Maryland as well as the most significant gaps between ALICE survival budgets, median household incomes, and rates of poverty, unemployment, and percent of the population receiving Food Supplement Program benefits.

Though not statistically tested, there is a concerning observable pattern between regional networks and food security rates for the four most insecure parts of the state. The Western region includes Allegany County and has the smallest and noticeably simple network which includes two small groupings of nodes (separate from each other). One of the two groupings of nodes is completely isolated from the state network and the other is one lost connection away from being completely isolated. Baltimore City is different from the other three high food insecurity areas given its urban status and significantly larger population. Baltimore City's network is complex and large yet needs are still largely unmet likely because larger populations create a higher demand for food access and require greater resources. Dorchester and Somerset Counties are perhaps the most noteworthy when considering food security rates and network structure. Both are included in the Eastern region, which had a simple but diverse network including nodes such as Caroline County Public Schools and six University of Maryland Extension county branches. The network is well integrated into the statewide network, yet county-level inequities mean that counties that are within miles of each other have vastly

different experiences. Somerset County's inequities and disparities are demonstrated by an astounding 61.8% of its population receiving Food Supplement Program benefits. The Eastern region network was unique compared to the other regional networks because its primary hub was the Caroline County Public Schools node, a node which would not necessarily be associated with food security efforts and does not directly serve Dorchester or Somerset Counties. While the Eastern region network may indirectly serve Dorchester and Somerset Counties, their higher food insecurity rates coupled with regional inequities and disparities highlight that vulnerable populations are not benefitting.

Overall, the observed patterns between food security rates and regional network structure have serious and significant implications for programmatic and policy decisions. Each of the four counties with the highest food insecurity rates in the state also have the least connected and simplest networks. This is likely due to regional inequities and disparities limiting the resources available in those areas. Similar to Interviewee 1's statement that their target population is "just one emergency from having nothing", these regional networks are one lost connection away from being isolated from statewide resources.

Identifying these networks was the first step in a much bigger moral and ethical obligation in the state: using this information to address food security and social inequities by informing policies to increase affordable and sustainable access to healthy food and food security for low-income populations. The ultimate goal of food security studies such as this dissertation is to identify solutions which would ultimately eliminate the gaps for low-income and vulnerable populations and ensure high food security for all. Based on the findings of this study, the role of networks is apparent and significant for addressing food security in Maryland. This organic development of support and access systems without deliberate formation or government intervention suggest that breaking from traditional approaches, learning from the organic evolution and governance of networks, and addressing food security and social inequity issues by meeting people where they are would be logical next steps.

Limitations

Because SNA studies are field experiments rather than true experiments, measurement challenges can arise. Bounding networks (i.e., limiting organizations to

food-related organizations in Maryland, unless specifically identified by a respondent) was necessary to have a coherent study but limited the full potential (and potentially endless) networks which could have been identified. Sampling was necessary because network boundaries are “fuzzy” and this study focused solely on food access in Maryland (Borgatti et al., 2013, p. 34). Snowball sampling was identified as an appropriate method for developing the network but has known limitations. In essence, studying a network inherently requires setting boundaries which inevitably affect the network. Accuracy is important, but in SNA the true focus is on patterns rather than individual, limited interactions. Construct validity was essential for this study and was satisfied because questions about social networks measured the relevant network variables. Reliability is a challenge with SNA research because SNA measures a social network at a given time and networks can change, which fails the test-retest model.

The most significant limitation of this study is the low response rate to the SNA survey (38.7%). The COVID-19 global pandemic was beginning to take hold in the United States during the launching of data collection and created a significant externality for this study. The global pandemic drastically affected daily life both within and outside the home, so networks were most likely affected. Data collection was launched in January 2020 with initial semi-structured interviews. The SNA survey was launched in March 2020 around the time when much of the United States had begun enforcing stay-at-home orders and organizations were switching to remote work for non-essential workers. Several invited participants responded directly or incorporated comments into their survey and/or interview responses to share that they were overwhelmed with food security work due to the pandemic. The unprecedented global pandemic and shutting down of economies will likely be studied for decades to come but is specifically relevant for this study because it undoubtedly affected response rates. The researcher decided to proceed with the study despite the pandemic for three reasons: 1) the timeline of the pandemic was unknowable; 2) it was impossible to predict what the network would like after the pandemic compared to beforehand (and illogical to assume it would return to “normal” afterward); and 3) data collected during a highly activated period for the network as demand/need skyrocketed provided a unique opportunity for research.

Measurement Challenges in Social Network Analysis

Several measurement challenges were considered during the design and implementation of this study. They included accuracy, validity, reliability, and externalities. Each is explained and addressed in subsequent sections.

Accuracy

A measurement challenge is accuracy, or how close the measurement is to the actual value. While it is important to consider the effects of relying on respondent recall or thorough responses, “particular interactions are not of primary concern to social network researchers ... relatively stable patterns of interaction are of most interest” (Borgatti, Everett, & Johnson, 2013, p. 57). In other words, accuracy is important, but in SNA the true focus is on patterns rather than individual, limited interactions that respondents may or may not remember. In this study, respondents to the SNA survey were asked to identify individuals or organizations with whom they had worked on food-related issues from a list. They were also able to enter any actors not included on the list in open-ended questions at the beginning and end of the survey.

Validity and Reliability

Validity, or measuring what is meant to be measured, can be challenging in research if a study is not carefully designed. While this may seem apparent at first, issues of construct validity “aris[e] when measures of concepts [do not] behave as expected in theoretical predictions” (Borgatti et al., 2013, p. 58). Another measure often discussed alongside validity is reliability. Reliability is based on the idea that a “test-retest model can be used and yield the same result. This is an inappropriate assumption in social network analysis because networks are influenced by several variables that can and most likely will change over time” (Borgatti et al., 2013, p. 58). In this study, construct validity was satisfied if questions about social networks measured the network variables they addressed. As discussed previously, reliability is challenging in SNA research because networks evolve over time. Low response rates have “implications for missing data and the reliability of network data”, specifically identifying issues with “accuracy of measurement declin[ing] predictably as a function of the amount of error introduced” (De Brún and McAuliffe, 2018, p. 7). Snowball sampling is specifically identified as a strong approach to SNA because “such approaches can be of great value in accessing ‘hidden’

or hard to reach populations” (De Brún & McAuliffe, 2018, p. 7). Costenbader and Valente (2003) suggest that “individuals who typically are missed or refuse to participate ... are individuals who are on the periphery and have fewer connections to the rest of the social network” (p. 301). While a low response rate undeniably affects the reliability and validity of the study, it is worth noting that the literature suggests that those who opt out or are missed are more likely to be less connected which in turn suggests that those who participate are more likely to be highly connected (i.e., hubs) and may play a more significant role in the network.

Reliability and validity are challenged in this dissertation by a low response rate to the SNA survey. SNA surveys have a well-established 70-75% response rate threshold (Borgatti, Carley & Krackhardt, 2006; Kossinets, 2006). Research focusing specifically on web-based surveys (the SNA survey in this dissertation was a web-based survey), albeit not specifically SNA-related, suggest that a response rate of 35.7 – 40.0% is reasonable (Fan, 2008; Archer, 2008). Given that this is an SNA study, a minimum response rate of 70-75% would have been ideal but it is worth acknowledging that the web-based administration of the survey may have affected response rates. While the Northern and Western regions had slightly higher response rates than the overall SNA survey response rate of 38.7% (41.7% and 40.9%, respectively), response rates were concerningly low by region as well as statewide. The 38.7% response rate is concerning for reliability and validity of this study, but it is also remarkable to have received that high a response rate given the unprecedented and extenuating circumstances related to administering the study during the early stages (in the United States) of the COVID-19 pandemic and its resulting unprecedented demand for food resources (Morello, 2020). The COVID-19 pandemic led to economic shutdowns and nationwide job losses which in turn created an unprecedented demand for food resources. Given that this study focused on networks providing food resources to fill in gaps in existing structures, the target population of this study was directly affected by the pandemic and it is reasonable to assume that this drastically affected response rates.

Externalities and Other Measurement Challenges

There are measurement challenges and potential errors that occur beyond the design of a study. These include externalities, omission errors, commission errors,

edge/node attribution errors, data collection and retrospective errors, and errors related to data management, formatting, aggregation, and other data processes. Externalities refer to variables that are outside of the study which can influence the study in some way (Watts, 2003). As discussed previously, a significant externality during this study was the COVID-19 pandemic. The global pandemic drastically affected daily life both within and outside the home, so the effects were highly likely to affect how networks and the individuals and organizations within them behaved. This could have affected not only response rates but also network composition if organizations were unable to continue operating. While the researcher considered waiting until after the pandemic, this idea was rejected for three reasons: 1) the timeline of the pandemic was unknowable; 2) it was impossible to predict what the network would like after the pandemic compared to beforehand (and illogical to assume it would return to “normal” afterward); and 3) data collected during a highly activated period for the network as demand/need skyrocketed provided a unique opportunity for research.

Omission and commission errors are specific to SNA in that they look at how edges and nodes that are or are not included in a network affect the network. Omission errors refer to “missing edges and nodes can have huge impacts on errors in network variables, particularly for some centrality measures. Such missing data can make networks appear to be more disconnected than they really are or make other nodes and edges in the network” seem to be more central and influential than they actually are (Borgatti et al., 2013, p. 37-38). Omission errors in this study may have affected the data due to low response rates and the standard challenges of relying on snowball sampling. Another omission error that may apply in this study is the potential for survey respondents to experience survey fatigue due to the design of the regional network questions. The survey was deliberately designed to break up the information and only show lists of individuals/organizations if a respondent indicated activity in the relevant region(s), but the lists were long and may have been overwhelming regardless. If these errors did occur, the potential impact on the study would be that fewer connections were indicated which affects the observed network structure.

Commission errors, on the other hand, are nodes and edges that are included erroneously. Commission errors “can affect the ultimate determination of node-level

measures and the identification of key nodes” (Borgatti et al., 2013, p. 38). Edge/node attribution errors occur when something is mistakenly attributed to “either an edge or node incorrectly” (Borgatti et al., 2013, p. 38). A potential commission error in this study is respondents selecting the wrong information due to name confusion or the web-based survey platform. While possible, this is less likely to have occurred because it requires a respondent actively selecting an organization. Organizations not selected by any survey respondents were omitted in the network maps and data to ensure that only those identified as connected were reflected. If nodes were mistakenly identified, they were unlikely to have been mistakenly selected by more than one respondent and therefore would only have a single edge reflected in the network. This minimizes the impact on the study.

Data-related errors overall refer to how data is collected and managed. Data collection and retrospective errors address the potential for individual memory to affect behavior reporting, “particularly having to do with social interactions of a temporally discrete nature” (Borgatti et al., 2013, p. 38). Data management/data entry, data fusion/aggregation, errors in secondary sources and data mining, and formatting errors are all examples of ways that data can be erroneous due to a variety of decisions, mistakes, or other sources (Borgatti et al., 2013, p. 39-40). Data collection and retrospective errors may have occurred in this study due to survey respondent errors. These issues may also have occurred due to errors on the part of the researcher, but several checks and balances were employed throughout the study by the researcher to minimize any data management/entry and fusion/aggregation errors including but not limited to keeping multiple copies of data and databases to ensure a “backup” was always available, saving a new version every time changes were made to any documents or databases, and running calculations in multiple iterations to ensure identical results were occurring at each phase.

Conclusion

Human beings are inherently social creatures. As a society, we are familiar and comfortable with the idea of friends and family helping each other. Professionally, we are familiar and comfortable with role of networking events and the importance of connecting with the “right” people to achieve our goals. It is intuitive that this societal

reliance on networking inevitably leads to networks of people or organizations with common goals, like the networks identified in this study. To quickly recapture the key findings of this dissertation: 1) social networks actively working to address food security and social inequities in Maryland were identified in all five regions and formed a statewide network; 2) the role and importance of networks in addressing food security and social inequities was supported by qualitative and quantitative data; 3) network structure varied by region in Maryland; and 4) the variance in regional food security rates and network structures suggests a concerning pattern between underlying inequities and disparities at the regional level and network structure. These networks represent an untapped resource for identifying new models, reaching un- or underserved low-income and vulnerable populations, and using data to better inform food security policy and decision-making. There is need for greater consideration of the different realities faced throughout the state; disparities are often overlooked in one-size-fits-all policies. The goal of food security studies such as this dissertation is to identify solutions which would ultimately eliminate the gaps in formal food systems, ensuring food security and social equity for all. The role of networks is apparent and significant in Maryland but limited by the very inequities networks seek to address. Any future collaborations between informal networks and formal structures would need to account for these differences.

Identifying these networks was the first step in a much bigger moral and ethical obligation of public administrators; we must incorporate data and learn from existing real-world solutions to develop equity-informed policies and programs. Organically evolving networks like those identified in this study are not a silver bullet for correcting food security and social inequities; they do, however, represent an opportunity to break from traditional approaches that are failing. This study fills a gap in the literature on food security by identifying an alternative strategy to addressing food insecurity and social inequities in Maryland; administrators must learn from and collaborate with networks to identify best practices and develop complementary programs and policies.

One of the key lessons learned from this research is that attempting to replace, recreate and/or operate programs separately from existing network structures is more likely to waste valuable resources and undermine the networks than improve food security and equity in Maryland; lives will continue to be severely impacted while hungry

people caught in transgenerational cycles hope for a food secure future. An essential focus of these efforts must be to increase use of data- and equity-informed decision-making to ensure resources are specifically being directed to address disparities and inequities. This applies to both organizations in networks and to policymakers. Network organizations have an opportunity to connect with each other, potentially statewide given the centralized network structure identified, to collaborate and complement each other's efforts. The findings of this study suggest that regional networks, particularly in the Eastern and Western regions, would benefit from increased resources and support to address the inequities and disparities their structure so clearly reflects. Any large-scale changes will take time; in the interim, Maryland food access organizations should explore opportunities to network their way into more resources and identify symbiotic partnerships to expand the impact of the life-saving food security and social equity work they are already doing in Maryland.

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APPENDIX I: SEMI-STRUCTURED INTERVIEWS – CONSENT FORM

CONSENT FORM FOR PARTICIPATION IN AN INTERVIEW DISCUSSION

Whom to Contact about this study:

Principal Investigator:	<u>Jasmine Greene, MPA</u>
Faculty Sponsor:	<u>Dr. Aaron Wachhaus</u>
Department:	<u>College of Public Affairs, University of Baltimore</u>
Telephone Number:	<u>410-837-5359</u>

Summary

You are invited to participate in an interview focused on the movement and sharing of food and food information by a researcher at the University of Baltimore College of Public Affairs. The topics to be discussed will explore your professional and personal experiences with how food is grown or sourced; how food moves around or through Maryland; and how food-related information is shared. The discussion will last approximately one hour.

Your participation in the interview is completely voluntary. There is no risk to you for participating. The interview will be audio recorded. The audio recording will be used by the researcher to develop a sample for distributing a survey and writing a report in support of the researcher's dissertation and a publication. You will not be identified in any of the products of this project and the audio recordings will be kept by the researcher until they finish writing their report.

Additional Information

If you agree, you will participate in an interview. The discussion will be audio recorded to accurately capture what is said so the researcher can write their report. You may choose how much or how little you want to share during the interview. You may also choose to terminate the discussion at any time. Participating in this interview will not benefit you directly, but it will help the researcher learn more about how food and food information move throughout Maryland which will be shared through the researcher's report.

The information you share if you participate in this interview will be kept completely confidential as allowed by the law. Only the researcher and the sponsoring faculty member (Dr. Aaron Wachhaus, awachhaus@ubalt.edu) will be able to listen to or view the recordings.

If you have any questions about this study, please contact Jasmine Greene via email at jgreene@ubalt.edu or by phone at [REDACTED]. If you have questions about your rights as a research participant, please contact Stefanie Dwyer, Institutional Review Board Administrator, University of Baltimore at 410-837-4057 or irb@ubalt.edu.

Your signature below says

1. You are at least 18 years of age.
2. You agree to participate in the discussion (interview.)
3. You agree to be audio recorded during the discussion (interview.)

You will be given a copy of this form to keep, whether you agree to participate or not. The second signed consent form will be kept by the researcher.

I have read the consent form and all my questions about the study have been answered. I understand that the interview will be audio recorded. I agree to participate in this study.

Participant:

Witness:

Print name:

Print Name:

Signature:

Signature:

Date: _____

Date: _____

APPENDIX II: INITIAL SEMI-STRUCTURED INTERVIEWS – INSTRUMENT

SOCIAL NETWORK ANALYSIS OF FOOD INFORMATION AND ACCESS IN MARYLAND

SEMI-STRUCTURED INITIAL INTERVIEW INSTRUMENT (PRE-SNA SURVEY)

This interview guide is intended to provide interviewees and their leadership with a sense of the scope of the interview for a social network analysis of Maryland's food access and information sharing network. Interviews is a conducted and audio recorded by doctoral candidate Jasmine Greene from the University of Baltimore. In addition to responding to these questions, interviewees were given the opportunity to share any additional information they deem relevant to the project. Participants will also be asked to provide contact information for individuals and/or organizations discussed during the interview.

A. ORGANIZATION OR DEPARTMENT ACTIVITIES AND PRIORITIES

1. Do you interact with the other two Maryland Food Bank offices? Describe those interactions for me.
 - a. Frequency
 - b. Direction of communication
 - c. Content

B. YOUR POSITION

2. Tell me about your position.
 - a. How long have you been at the Maryland Food Bank?
 - b. What is the best part about your job?
 - c. What do you see as the strengths of your organization when it comes to addressing food insecurity?
 - d. What could be done differently or better?

C. OBSERVATIONS AND LEARNING

3. Have you experienced anything in the food insecurity world that has changed your perspective?
4. Have any of your assumptions changed?
5. What is the most surprising thing you have learned?

D. NETWORK CONTACTS – SNA CONTENT

1. "If you want to get something done [for food sharing/access and food information], start with _____. " Does a person or organization come to mind? Who?
2. Who do you turn to for guidance or support? Does it vary by type of issue?

E. ADDITIONAL RESEARCH QUESTIONS

3. Are there any questions or topics I could include in the survey that would be useful to Maryland Food Bank?

F. FINAL QUESTIONS

4. If you had unlimited resources, how would you reduce or solve food access and/or food information sharing challenges? What would make your work to address food challenges easier?
5. Did an individual or organization inspire you to take your career path?
 - a. Do you remain in contact?
6. Do you have any tips or suggestions for how to connect with the most people possible for this dissertation? What am I missing or overlooking?

Thank you for taking the time to discuss food information and access in Maryland. You and anyone you identified will receive a brief survey in the next few weeks asking for information about food access and information in Maryland. Please feel free to send any additional email addresses you think of or to forward the survey link.

Contact Jasmine Greene at jgreene@ubalt.edu or [REDACTED] if you have any questions or concerns after today's interview.

APPENDIX III: SNOWBALL SURVEY INSTRUMENT

Social Network Analysis of Food Access and Information in Maryland - Snowball Survey

Survey Flow

Block: Survey Introduction (1 Question)
 Standard: Identifying Contacts for Sample (1 Question)
 Standard: Identify a Key Contact (1 Question)
 Standard: Demographic Information (4 Questions)
 Standard: Individual/Organizational Activities (1 Question)

Page Break

Start of Block: Survey Introduction

Q1 This study explores how food and food information is shared throughout Maryland. The researcher is conducting a social network analysis to map the network of organizations collaborating on these issues. You or your organization has been identified by the Maryland Food Bank as working to address food access and information sharing.

You are invited to be a part of this analysis by completing a short survey about the individuals and organizations you work with to address food issues. The survey data will be used to identify the organizations in your area working to address food challenges and assess the strength of the relationships among the organizations in your area.

Individuals and organizations you identify will be invited to participate in the survey as well. Your participation in the survey is completely voluntary. The names of the individuals and organizations identified in this survey may be included in the social network report produced through this research.

End of Block: Survey Introduction

Start of Block: Identifying Contacts for Sample

Q2

Please include names and email addresses for any individuals or organizations with whom you or your organization partner to address food access and information issues. Include anyone you think of regardless of location or how often/rarely you interact. Also include people you share information with even if they do not send you anything.

Enter one name and email address per line by hitting "Enter" at the end of each line.

End of Block: Identifying Contacts for Sample

Start of Block: Identify a Key Contact

Q3 “If you want to get something done for issues related to food access or information, talk to _____.” When reading that sentence, does a person or organization come to mind? Please share their **name and email address** in the box below.

End of Block: Identify a Key Contact

Start of Block: Demographic Information

Q4 Do you work on food access and information issues as part of an organization or on your own?

- ☐ As part of an organization (1)
- ☐ On my own/as an individual (2)
- ☐ Other (please explain) (3) _____

Skip To: End of Block If Do you work on food access and information issues as part of an organization or on your own? = On my own/as an individual

Q5 What is the name of your food access or information organization?

Q6 What is your title at your organization?

Q7 Which best describes your organization's sector?

- ☐ Government (1)
- ☐ Nonprofit/not-for-profit (2)
- ☐ Private/contractor (3)
- ☐ Other (please explain) (4) _____

End of Block: Demographic Information

Start of Block: Individual/Organizational Activities

Q8 About how much time do you devote to addressing food sharing, access, or information issues? Please include time spent volunteering, at work, or on any other related activity.

- ☐ A few hours a [month](#) (1)
- ☐ One or two days a [month](#) (2)
- ☐ Several days a [month](#) (3)
- ☐ One or two days a [week](#) (4)
- ☐ Three or four days a [week](#) (5)
- ☐ Five or more days a [week](#) (6)

End of Block: Individual/Organizational Activities

APPENDIX IV: SOCIAL NETWORK ANALYSIS SURVEY INSTRUMENT

Social Network Analysis of Food Access and Information in Maryland - SNA Survey

Start of Block: Default Question Block

Q1 This study explores how food and food information is shared throughout Maryland. The researcher is conducting a social network analysis the map the network of organizations collaborating on these issues. You or your organization has been identified by the Maryland Food Bank, individuals or organizations in Maryland, or through public resources as an individual or organization working to address food access and information sharing. You are invited to be a part of this study by completing a brief survey about the individuals and organizations you work with to address food issues. The survey data will be used to develop a social network map of food and food information sharing in Maryland. Your participation in the survey is completely voluntary. The names of organizations identified in this survey may be included in the report produced through this research, but individuals will not be identified. Your responses will be anonymous and confidential.

End of Block: Default Question Block

Start of Block: Demographic Information

Q2 "If you want to get something done for issues related to food access or information, talk to _____." When reading that sentence, do people or organizations come to mind? Please share up to 20 contacts' names and email addresses in the box below. Press "Enter" after each contact to move to a new line.

End of Block: Demographic Information

Start of Block: Network Contacts

Q3 Looking at the Maryland regions below, please indicate the regions where individuals or organizations you have worked with in the last three months are located (including your own region):

- ☐ Western Maryland (Includes Garret, Allegany, Washington and Frederick Counties) (1)
- ☐ Northern Maryland (Includes Carroll, Baltimore County, Harford, and Cecil Counties) (2)
- ☐ Baltimore City (3)
- ☐ Southern Maryland (Includes Howard, Anne Arundel, Prince George's, Montgomery, Calvert, Charles and St. Mary's) (4)
- ☐ Eastern Maryland (Includes Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester Counties) (5)

Respondents are asked to indicate regions (indicated below). The survey logic is structured to show a list of individuals or organizations for each region the respondent selects as separate questions with a “select all that apply”:

Display This Question:

If Looking at the Maryland regions below, please indicate the regions where individuals or organizat... = Northern Maryland (Includes Carroll, Baltimore County, Harford, and Cecil Counties)

Q5 For Northern Maryland, please select ALL individuals or organizations you have communicated with regarding food issues:

Display This Question:

If Looking at the Maryland regions below, please indicate the regions where individuals or organizat... = Baltimore City

Q6 For Baltimore City, please select ALL individuals or organizations you have communicated with regarding food issues:

Display This Question:

If Looking at the Maryland regions below, please indicate the regions where individuals or organizat... = Southern Maryland (Includes Howard, Anne Arundel, Prince George's, Montgomery, Calvert, Charles and St. Mary's

Q7 For Southern Maryland, please select ALL individuals or organizations you have communicated with regarding food issues:

Display This Question:

If Looking at the Maryland regions below, please indicate the regions where individuals or organizat... = Eastern Maryland (Includes Kent, Queen Anne's, Talbot, Caroline, Dorchester, Wicomico, Somerset, and Worcester Counties)

Q8 For Eastern Maryland, please select ALL individuals or organizations you have communicated with regarding food issues:

Q9 What do you see as the single biggest need to address food insecurity and hunger in Maryland?

Q10 Thank you for your time and your responses. This study explores how food and food information is shared throughout Maryland. The researcher is conducting a social network analysis to map the network of organizations collaborating on these issues. The names of organizations identified in this survey may be included in the report produced through this research, but individuals will not be identified. Your responses will be anonymous and confidential.

If you have any questions about this study or the survey, please contact Jasmine Greene at jgreene@ubalt.edu or [REDACTED]

End of Block: Network Contacts

APPENDIX V: FOLLOW-UP SEMI-STRUCTURED INTERVIEWS

SOCIAL NETWORK ANALYSIS OF FOOD INFORMATION AND ACCESS IN
MARYLAND FOLLOW-UP SEMI-STRUCTURED INTERVIEW INSTRUMENT
(POST-SNA SURVEY)

1. Tell me about your position.

- a. How long have you been at [organization]?
- b. What is the best part about your job?
- c. How would you describe the work you do?
 - i. Do you partner with anyone else to get this work done?
 - ii. Do you interact with the Maryland Food Bank? Describe those interactions for me.
- d. What do you see as the strengths of your organization when it comes to addressing food security?
 - i. What are you most proud of?
 - ii. What could be done differently or better?

2. Tell me about the people you serve. *[listen for “client”, “customer”, other – use term]*

- a. Do your *[clients, customers, other]* have specific traits in common?
 - i. Low-income
 - ii. Vulnerable (difficulty communicating or accessing medical care, help maintaining independence, require constant supervision, or help accessing transportation)
 - iii. Rural or urban
 - 1. Have you observed a difference in the challenges they face? (transportation, mobility, access, other)
- b. Do your *[clients, customers, other]* talk about their struggles?
 - i. Do they talk about healthcare? (accessing it, affording it, health issues, other)
 - ii. Do they talk about employment? (getting it, keeping it, losing it, other)
 - iii. Do they talk about SNAP? (getting it, keeping it, losing it, using it, other)
 - iv. Does transportation play a role in food security for the people you serve?
- c. Do you know if any of your *[clients, customers, other]* have tried or have access to urban agriculture? Farmers markets?

3. Are you familiar with the food security challenges in Allegany County, Baltimore City, Dorchester County, or Somerset County?

- a. These areas have a much higher rate of low food security than the rest of the state. Do you know what may be causing that?
 - i. What is the reputation of the area?
 - ii. Have you heard any stories about those areas?
 - iii. Do you know anyone from any of those areas?
- 4. **Do social networks play a role in your work with food security?**
 - a. Your own social networks?
 - i. Other food banks, nonprofits, religious orgs, other?
 - ii. Do you refer clients to services or programs?
 - b. The social networks of your *[clients, customers, other]*?
 - i. Family, friends, local organizations, or religious affiliations, other?
- 5. **Have you experienced anything in the food security world that has changed your perspective?**
 - a. Have any of your assumptions or beliefs changed?
 - b. What is the most surprising thing you have learned in your work with food security?
- 6. **“If you want to get something done [for food sharing/access and food information], start with _____.” Does a person or organization come to mind? Who?**
- 7. **Who do you turn to for guidance or support? Does it vary by type of issue?**
- 8. **If you had unlimited resources, how would you reduce or solve food access and/or food information sharing challenges? What would make your work to address food challenges easier?**
- 9. **Did an individual or organization inspire you to take your career path?**
 - a. Do you remain in contact?
 - b. Do you exchange tips and information?