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GERIATRIC MEDICINE | RESEARCH ARTICLE

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Using a social ecological model to explore upstream and downstream solutions to rural food access for the elderly

Lauri Andress^{1*}

Abstract: A social ecological model is applied to the secondary analysis of qualitative data to study the impact of place on rural food access for older adults in West Virginia. The use of a social-ecological model to review the senior's coded narratives provided a clearer picture of higher impact, upstream levers to address food security for older adults in a rural region. The elderly have restricted access to food in rural West Virginia because of an indirect relationship with place that acts through the social ecological domains of the built environment, macrosocial factors, stressors, the natural environment, and social support. The results of this analysis add to theories on upstream policy sectors that may contribute to food security and the quality of dietary intake for older adults in rural places. As senior populations increase the need for greater understanding of the place-based causal pathways for rural food insecurity and poor nutrition in older adults will become more important for program and policy decisions.

Subjects: Human Geography; Public Health Policy and Practice; Dietetics

Keywords: elderly; food access; nutrition; population health; qualitative; rural; food security; geography



Lauri Andress

ABOUT THE AUTHOR

Lauri Andress has dedicated her career as an instructor, social sciences researcher, and policy analyst to public service where her expertise lies in linking scholarly work with social issues, the public policy process, and community organizing. She is interested in gaps between groups based on socio economic status and the different ways to portray and measure the effects of power on marginalized communities. She utilizes qualitative research skills that integrate ethnographic techniques with content analysis of documents, and data collected from interviews, focus groups, print media and videos. She is currently using a constructivist approach to consider the ways that the media and public discourse shape behaviors and therefore material realities. In West Virginia, she has utilized ethnographic techniques, focus groups, and interviews to explore the food access issues of low income women and the elderly along with the policy discourse for built environment initiatives at the local level.

PUBLIC INTEREST STATEMENT

This paper uses theories from the fields of geography and anthropology on the social construction of place to examine the complex social, economic, and political factors that result in material inequities in food security that can exist between places. As the analysis demonstrates, addressing food access issues may be classified as upstream or downstream approaches. The more traditional responses to food access are downstream efforts addressing physical and emotional wellbeing. To get at root causes of food access solutions should focus on upstream policy issues at the macro, intermediate, and proximate levels.

1. Introduction

Rural places are negatively linked with social and health inequalities characterized by poorer access to resources (Caspi, Sorensen, Subramanian, & Kawachi, 2012; Feng, Glass, Curriero, Stewart, & Schwartz, 2010; Frost et al., 2010). To remain healthy, it is important for older adults to have adequate sources of nutrition (Burns, Bentley, Thornton, & Kavanagh, 2011; Buys & Locher, 2015; Hung, Fu, Lau, & Wong, 2015; Lee & Frongillo, 2001; Sahyoun & Basiotis, 2001; Sharkey, Johnson, & Dean, 2010; Wolfe, Frongillo, & Valois, 2003; Wolfe, Olson, Kendall, & Frongillo, 1996, 1998). The inherent inaccessibility and unavailability of sources of food associated with living in a less dense, rural environment may be strongly associated with the dietary practices of older adults.

In an effort to gain a more complete understanding of the human experience in relation to places more disciplines are borrowing and integrating theories and concepts. Taken together, these discipline specific theories suggest that understanding how rural, older adults negotiate nutritional needs and the material, social, and spatial aspects of place is more effective if ideas from various disciplines are integrated and applied. To explain population health status the field of public health has increasingly integrated theories that unite the concept of “place” as both a geographic and social construct in efforts to understand the body and health status (Galster, 2012; Handy, Boarnet, Ewing, & Killingsworth, 2002; Marmot & Bell, 2009; Putrik et al., 2014; Yen & Syme, 1999). Places—where we live, work and play—are at the forefront of the social determinants of health (SDOH) (Kawachi & Berkman, 2003; Krieger et al., 2003; Larson, Story, & Nelson, 2009).

Within the fields of geography and anthropology numerous theories abound regarding the social construction of place where human experience becomes embodied in material and spatial forms (Low, 1996, 2003). More pointedly, researchers are connecting the social construction of “place” to the complex social, economic, and political factors that result in material inequities that can exist between places (Heynen, Perkins, & Roy, 2006).

The characteristics of a “place” embodied in spatial and material form incorporate the physical environment that includes both the built and natural environment (Northridge, Sclar, & Biswas, 2003). The term “built environment” comes from the field of regional (urban or rural) planning. Elements of the built environment encompass any component in the physical environment that has been made by humans, for example roads, buildings, housing, infrastructure, and parks. The term built environment is used here in reference to all official and unofficial outdoor and indoor spaces that are planned, designed, built or managed by people, and made meaningful through shared, lived experience (Dennis, Gaulocher, Carpiano, & Brown, 2009). In contrast, the natural environment is any part of the physical environment that is not created or modified by humans (Northridge et al., 2003).

Different aspects of the built environment have been associated with specific health outcomes (Galea, Ahern, Rudenstine, Wallace, & Vlahov, 2005; Jilcott, Moore, Wall-Bassett, Liu, & Saelens, 2011; McGinn, Evenson, Herring, Huston, & Rodriguez, 2007; McGinnis & Robinson, 2013). Built environment research underscores that places and the man made features that make up a space are factors that shape lifestyles and facilitate or impede regular physical activity and healthy eating by citizens (Handy et al., 2002; Schulz & Northridge, 2004).

An example of the link between the built environment and health outcomes focuses on the features of neighborhoods where high residential density, sidewalks, transportation infrastructure and street connectivity are thought to be associated with higher rates of physical activity and lower body-mass index (BMI) among residents (Larson, Story, & Nelson, 2009; Popkin, Duffey, & Gordon-Larsen, 2005; Sallis et al., 2009). Rural residents shop for food in a spatial context marked by lower densities in population and food outlets (Blanchard & Lyson, 2006). Researchers have hypothesized that rural regions have a relationship to fast food consumption, BMI, shopping frequency, and cost and quality of food (Jilcott et al., 2011; Jilcott, Laraia, Evenson, Lowenstein, & Ammerman, 2007; Jilcott Pitts, McGuirt, Carr, Wu, & Keyserling, 2012; Lucan, Gustafson, & Jilcott Pitts, 2012; Seguin, Connor, Nelson, LaCroix, & Eldridge, 2014; Smith & Morton, 2009; West, Weddell, Whetstone, & Jilcott Pitts, 2013).

Research demonstrates that older adults in rural settings experience decreased access to healthy, nutritious food relative to the general population of older adults (Coveney & O'Dwyer, 2009; Quandt, Arcury, McDonald, Bell, & Vitolins, 2001; Seguin et al., 2014). However, contrary to what might be thought, it is not the geographic distance that imposes the challenge but rather the lack of social, infrastructure and welfare systems have a more direct effect on the diets of rural households (Coveney & O'Dwyer, 2009; Garasky, Morton, & Greder, 2006; Sharkey et al., 2010; Wolfe et al., 1996). Accordingly, socio-economic status (SES), transportation, and other coping strategies employed by the elderly to obtain food appear to be important in mediating the direct effects of rural places on food access (Coveney & O'Dwyer, 2009; Liese, Weis, Pluto, Smith, & Lawson, 2007; Smith & Morton, 2009)

This paper reports on the secondary analysis of in-depth interviews collected from an earlier study on rural food access with older adults (Andress & Hallie, 2017). In this case, a social-ecological model adapted from Northridge et al. (2003) was applied to better understand pathways by which material, social, and spatial aspects of a rural place might influence food access and by extension theoretically effect the diet and nutrition of the elderly. In relation to food security, the study examines the respectful accommodation, availability and accessibility of acceptable, affordable, safe foods, and the secure ability to acquire the food in socially acceptable ways (Andress & Fitch, 2016; Kendall & Kennedy, 1998). Food security therefore underscores the importance of the relationship between health and place, when food access is considered.

2. Methods and frameworks

2.1. Use of secondary data

This study was a secondary analysis of data from an earlier study. Methods from the first study may be found in a previously published article (Andress & Hallie, 2017). A twenty-nine minute video titled, "The Elderly and Food Access in Preston County, West Virginia" may be accessed at <https://tinyurl.com/zg5z8mw>. An Institutional Review Board approved the original study and subsequent analysis of data collected between July and October 2015.

Secondary data analysis is considered an efficient way to reexamine previously collected data to generate additional insight and new knowledge (Irwin, 2013). Ethical questions have been raised about the distance between secondary researchers and primary data when the researchers have little experience with the data collection process and groups that provide the data (Irwin, 2013). However, to avoid distance between the researcher and the data, in the case of this study the same researcher analyzed the data from both the first to the second study. Second, the participant-generated data initially collected in the form of photographs and stories is thought to supply a context for secondary data making it easier to comprehend people's lived experiences (Irwin, 2013).

2.2. Use of qualitative data

This secondary analysis also made use of qualitative data from the earlier study. Qualitative research is often used to capture more clearly the link between physical and social characteristics of places and food access (Caspi et al., 2012; Coveney & O'Dwyer, 2009; Garasky et al., 2006; Hansen, Umstadd Meyer, Lenardson, & Hartley, 2015; Jilcott et al., 2011). The benefit of qualitative research in the quest to understand how the built environment impacts health is that it exposes hidden experiences, voices, and views specified as key elements in theories on the social construction of place (Corbin & Strauss, 2008; Heflin, London, & Scott, 2011; Morgan, 2013; Östlund, Kidd, Wengström, & Rowa-Dewar, 2011; Small, 2008). These nuanced, historical, cultural, and dynamic experiences of the groups that inhabit a place are important factors that might not necessarily be picked up with the use of quantitative methodologies alone where it is difficult to identify causal effects, as there will always be the potential for omitted variables and selection bias. (Galster, Jackie, & Malega, 2006; Haynes-Maslow, Parsons, Wheeler, & Leone, 2013; Small, 2008).

2.3. Food access dimensions and data

In this article the secondary data analysis used only the coded transcripts from the original study broken into quote segments that were as small as possible while still retaining meaning (Miles & Huberman, 1994; Tesch, 1990). These quote segments were coded in the earlier study using the five dimensions of food access (Table 1). (1) availability defined as the adequacy of the supply of healthy food (e.g. presence of certain types of restaurants near people’s homes, or the number of places to buy produce; (2) accessibility signifying the geographic location of the food supply and ease of getting to that location; (3) affordability representing food prices and people’s perceptions of worth relative to food cost; (4) acceptability which is defined as an individual’s attitude regarding the attributes of their local food environment and whether or not the given supply of products meets their personal standards; and (5) accommodation representing how well local food sources accept and adapt to local residents’ needs (i.e. store hours, parking, or types of payment accepted (Andress & Fitch, 2016; Caspi et al., 2012).

2.4. The social ecological model

The dimensions of food access were analyzed against the social ecological model adapted from Northridge et al. (2003) to determine the potential pathways by which the dimensions of food access could shape food security and by extension theoretically dietary practices. The use of the social ecological framework (Figure 1) is meant to demonstrate: (1) the spatial, material, and social pathways by which the coded food access narratives might move back and forth across the social ecological model shaping dietary practices and health and wellbeing; and (2) why moving upstream away from health is the best way to improve population health.

Public health research has used a social-ecological model to integrate the numerous, multi-level individual, social, and environmental correlates influencing health-related outcomes (Stokols, 1992). The approach demonstrates the role of exogenous factors in shaping health by either supporting or discouraging health-promoting behaviors and eventually health outcomes (Sallis, Bauman, & Pratt, 1998).

In Figure 1 between, the first and fourth columns the model depicts the features of a place that serve as pathways which interact in a dynamic, rarely linear, sometimes simultaneous fashion to impact population health outcomes (Northridge et al., 2003). Column I, on the far left, describes the various pathways by which social, political, and economic processes interact with the features and characteristics of a place to impact population well-being and health as displayed in column IV (Northridge et al., 2003; Schulz & Northridge, 2004). In column I, labeled the macro level, there are three domains (natural environment, macrosocial factors, and inequalities). The model suggests that macro- social processes and structures in the first column are established in the domains below that lay out societal order, rules about ownership, control of resources, and the differential distribution of income and resources between groups and individuals that give rise to inequities (Martikainen,

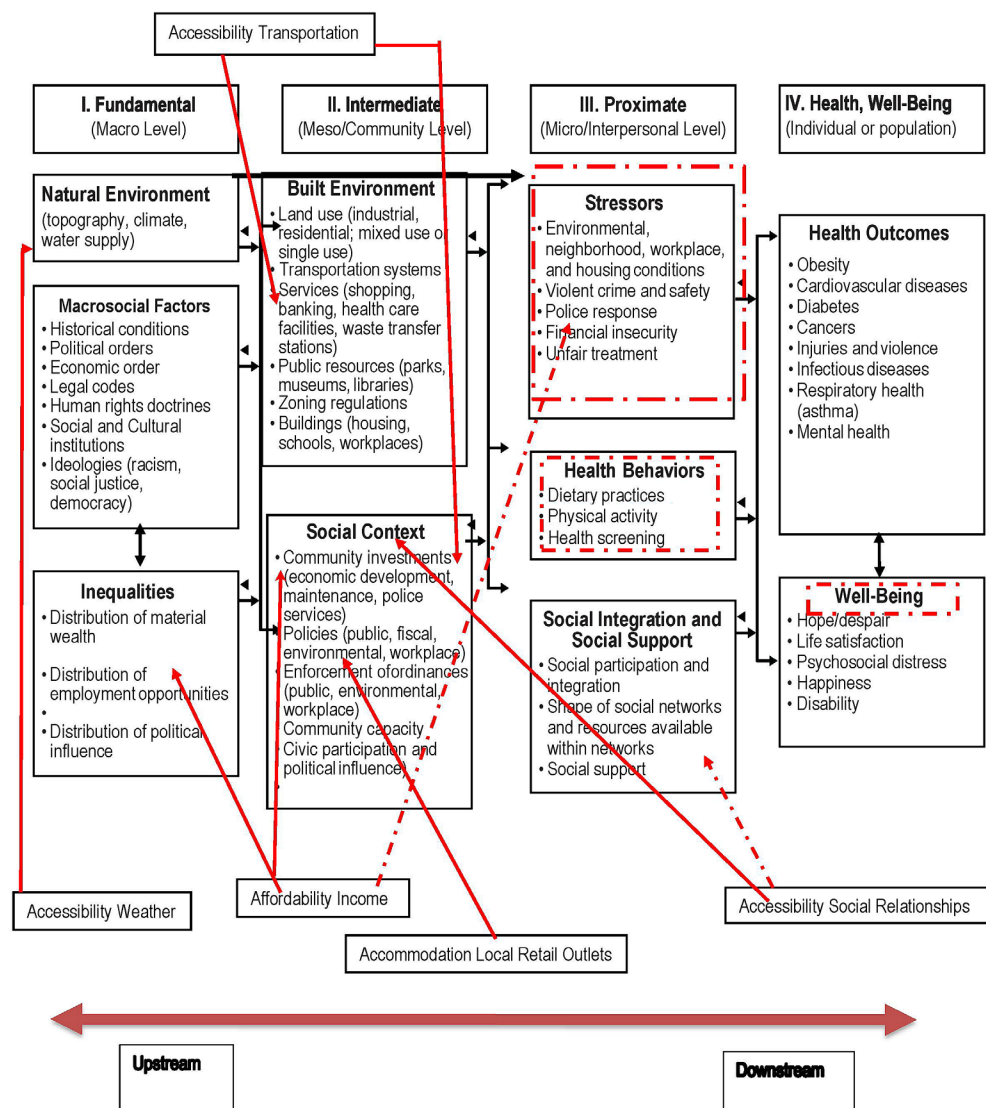
Table 1. Dimensions of food access

Dimensions of Food Access	Definitions
Availability Are there sources for food?	The adequacy of the supply of healthy food (e.g. presence of certain types of restaurants near people’s homes, or the number of places to buy produce)
Accessibility (2nd) Can the elderly get to or make use of the food that is available?	The geographic location of the food supply and ease of getting to that location
Affordability (2nd) Are the elderly able to pay for the food that is available?	Food prices and people’s perceptions of worth relative to food cost
Accommodation (2nd) Do food sources respond to the needs of the elderly?	How well local food sources accept and adapt to local residents’ needs (i.e. store hours or types of payment accepted)
Acceptability (2nd) Does the food available meet the standards of the elderly?	An individual’s attitude regarding the attributes of their local food environment and whether or not the given supply of products meets their personal standards

Bartley, & Lahelma, 2002; Northridge et al., 2003). Two of the domains in column I influence one another where historical conditions, ideologies, legal codes, and institutions have historically played leading roles in creating spatial concentrations of poverty and wealth based on social status, e.g. race/ethnicity, sexuality, religion, gender. In this model, the factors upstream in column I (excluding in the natural environment) are thought to affect population health by influencing access to multiple resources listed in column two that are necessary to maintain health (Schulz & Northridge, 2004).

The meso level, presented in column two, has two domains including built environment and social context (Figure 1). It is thought that the fundamental factors in column I (policies, institutional rules, historical context, ideologies) have differential impacts thus establishing (within the domain of inequalities) the haves and the have-nots or regions that have more wealth, influence, and resources and regions that have fewer resources, power, and wealth. The upshot of this is that the built environment and social context domains at the meso level are designed, and shaped by the resources available or unavailable to regions that have received their influence and resources based upon the macrosocial factors at the fundamental level (Martikainen et al., 2002; Northridge et al., 2003; Schulz & Northridge, 2004).

Figure 1. Social ecological model with dimensions of food access.



It is also significant that the domains at the intermediate level (Column two) may be used to influence both columns to the right and left, i.e. influence the factors at the fundamental level and likewise shape the proximate factors (Column III). For example, living wage policies emanate from the box labeled social context because this policy has the potential to impact other intermediate-level factors such as access to public resources, community investment, and the quality of education available to community residents. (Schulz & Northridge, 2004). These intermediate-level factors (Column II) would be expected in turn to influence more proximate factors (Column III) associated with health and well-being, such as stressors (e.g. through reducing financial insecurity), health behaviors (e.g. through making more nutritious foods affordable), and social integration and social support (e.g. through making it possible to work fewer hours or fewer jobs to make ends meet, and thereby spending more time with friends and family). Finally, in the long term, living wage policies may influence more fundamental factors (Column I) such as economic inequalities by redistributing wealth from employers to workers (Fairris, Runsten, Briones, & Goodheart, 2015; Reich, Hall, & Jacobs, 2005).

Moving from the intermediate factors at the meso level to the proximate factors at the micro level (Column III), the model enters the familiar sphere of individual behavior where most of public health has operated in the twentieth century (Andress, 2006). The proximate factors at the micro level influencing health and well-being are represented by three domains: health behaviors, stressors (including violent crime, financial insecurity, and environmental toxins) and social integration/support (including the shape of social networks and the resources available within networks). It is thought that factors in column two at the meso level can facilitate or pose as barriers to improvements in the domains of stressors, health behaviors and social integration/support (Northridge et al., 2003; Schulz & Northridge, 2004).

Attention should be paid to the arrows which are meant to propose a dynamic and interactive structure (Northridge et al., 2003). The two-sided arrows hypothesize that domains may both interact and influence each other. The domains of stressors and social integration use the arrows to recognize the influence of those domains on one another plus individual behavior (Northridge et al., 2003). However, under this model, while health behaviors are shaped by stressors and social integration/support, a mechanism in the opposite direction is not thought to exist, i.e. health behaviors do not affect stressors or social support/integration.

2.5. Moving upstream away from health is the best way to achieve health

The other points worth emphasizing with respect to the social ecological model are how it can help demonstrate the production of health in the United States (Avendano & Kawachi, 2014). While the model may be read from left to right it is worth noting that the aim for public health practitioners is to solve population health problems by moving from downstream starting at column IV back to the left of the model towards fundamental factors in column one (Avendano & Kawachi, 2014; Dorfman & Wallack, 2007; McKinlay & Marceau, 2000). This is referred to as going upstream. The proximate factors in column III nearest to health in column IV are thought to operate at an interpersonal level taking account of individual behavior or differences in health care, all of which are downstream to the far right of the model (Figure 1) (Avendano & Kawachi, 2014).

Located further to the left or upstream in the model, other factors that may shape population health are socioeconomic inequities or impacts from the built and natural environment (Avendano & Kawachi, 2014). While all of these factors contribute to poor health in the US it has been established that they do not all contribute equally (Avendano & Kawachi, 2014). Further, analysis of proximal factors downstream to the right of the model (Figure 1) indicates that proximal features fail to account sufficiently for the ways that health is produced and, concomitantly, cannot with singular emphasis alone, improve health (Avendano & Kawachi, 2014; Lieberman, Golden, & Earp, 2013). For example, a public health strategy might aim to help groups manage the anxiety from living in high crime, under resourced communities. However, along with that strategy, the public health intervention could also recommend and support community investments to redevelop a region in order to

secure larger, more permanent relief from the factors causing stress for the elderly i.e. support a community development organization and/or work with policymakers to come up with incentives to help draw developers and businesses to the area. It should be noted that this strategy, if successful, attracts new investments and different groups that can disrupt a place culturally, economically, and socially. The upshot of this kind of investment in a region is sometimes gentrification and displacement of the original group out of the community, in this case the elderly (Andress, 2017).

Moving back to the left in the model or upstream- means that solutions to poor health are getting as close as possible to the source or the causes of the causes (Braveman & Gottlieb, 2014) (Figure 1). The column labeled “fundamental” on the far left of the model operates at the macro level and symbolizes: (a) the root causes of poor health; (b) the biggest levers that may be manipulated to address the problem; and (c) the most effective preventive interventions available when the society is culturally, ideologically and politically aligned to act (Andress, 2017).

In fact, it may be said that, based on the best available evidence, each domain in the model represents policy decisions that, subject to a region’s political values, and ideology, possess the greatest potential to facilitate gains and/or losses in population health outcomes (Northridge et al., 2003). In other words, how (and whether) a region’s decision makers decide to address economic development, affordable housing, or land use could shape food access which in turn impacts population health (Davies & Sherriff, 2014).

3. Results

3.1. Participant demographics

The study started with 26 participants. All twenty-four of the remaining participants were white women apart from two males that later dropped out of the project. Self-reported data indicated a mean age of 72 years ranging from 59 to 85. Except for two participants with a college degree, the remainder of the women had some college or a high school degree. The majority of the women lived at or below poverty level, while three were middle income at an income greater or equal to \$2,500 per month. Most of the participants had at least one chronic health problem such as diabetes, heart disease or arthritis. Apart from three participants, everyone reported a physical impairment that limited mobility.

3.2. Dimensions of food access and the social ecological model

Results from an earlier analysis of the data demonstrated that the older adults in the study did not experience all five of the dimensions of food access within a rural place to the same degree or even as the dimensions were defined. The greatest distress to food security was not the dimension of availability or even accessibility when defined as closeness or convenience, (Andress & Hallie, 2017). Availability was not an issue due to practices of gardening, food pantries, and the presence of farmer’s markets and large and small retail outlets. The attitude of the older adults regarding attributes of their local food system highlighted dissatisfaction with products that came in quantities that were too large for their household and thus had to be frozen or given up to avoid waste and spoilage (Andress & Hallie, 2017). Further, the dimension of acceptability for the seniors also included disappointment with the quality of fruits and vegetables in comparison to what they could grow if able to garden.

This secondary study focused on the dimensions of food accessibility redefined, plus accommodation, and affordability while excluding availability and acceptability (Table 1). The reasons for the focus on only three of the five dimensions is because: (1) the senior’s problems with the dimension of acceptability could be subsumed under the dimension of accommodation where a food system accepts and adapts to resident’s needs; (2) the problems with affordability were expressed with great frequency and fervor; and (3) the issues of the rural, older adults expanded the dimension of accessibility to include physical limitations, financial restraints, transportation options, social relationships, and nonresponsive systems that were barriers to attaining the satisfactory food they perceived

to be available (Andress & Hallie, 2017; Wolfe et al., 2003). For these reasons, this secondary study focused on the dimensions of food accessibility redefined, plus accommodation, and affordability while excluding availability and acceptability (Table 1).

3.2.1. Accessibility

Accessible food in a rural region according to the photo narrative constructed by these older adults meant being able to utilize the food sources that were available (Andress & Hallie, 2017). Many seniors had problems with accessibility defined as (1) weather; (2) social relationships; (3) physical mobility; and (4) transportation, i.e. a functioning vehicle, public transportation; safe roads. Table 2 provides another view of the food access dimensions laid out in relation to the social ecological columns and domains. In the case of the dimension of accessibility the senior's issues fall under all four columns and more specifically the domains of natural environment, built environment, social integration/support, and well-being.

3.2.2. Accommodation

Data coded under the food access dimension of accommodation illustrated instances when a local provider, organization, or retail outlet responded to the needs of the older adults. Seniors described negative and positive experiences, practices, and common customs that highlighted a relationship between place, their food access needs, and retailer accommodations to meet those needs. The dimension of accommodation is located at the intermediate level or column II under the domain of the social context (Table 2).

3.2.3. Affordability

The data demonstrated that while all of the older adults found value in fresh fruits and vegetables and a variety of food recommended for health reasons, they also found the prices to be unaffordable (Andress & Hallie, 2017). In other words, the dimension of food affordability was mediated by income. All the seniors expressed the sense that something of value—fresh, healthy food—was unattainable. The least well-off seniors typically ran out of food each month because subsidized benefits did not last from pay period to pay period. Alternatively, seniors with higher fixed incomes also found their resources to be a limiting factor requiring tradeoffs between buying the better brand at a higher price versus a less expensive alternative. The seniors described feelings of depression, anxiety and constant vigilance before, during, and after spending money to buy food. In Table 2, the issue of affordability mediated by income is displayed under column I and the domain of inequalities.

4. Discussion

The discussion is divided into three sections. The first part summarizes key points about the social ecological model that aid in the analysis of up and down stream features of the dimensions of food access for rural older adults. A discussion on the social ecological model and downstream aspects of rural food access follows. The last section of the discussion considers upstream properties of the dimensions of food access within the social ecological model.

4.1. Summary key parts social ecological model

The following ideas are paramount in this secondary analysis of qualitative data using the social ecological model (Figure 1) to classify the ways that a rural place influences food access for older adults:

- (1) All of the columns and domains within columns are interactive and have the potential to influence or be influenced by one another based on the decisions made by a community and policymakers around policies, regulations, programs, customs, and practices (Schulz & Northridge, 2004). For example, if arrangements and processes around the macrosocial factors can produce inequalities, the model assumes that actions and policy decisions within the macrosocial and intermediate columns can undo the inequalities.

Table 2. Dimensions of food access for older adults based on social ecological levels and domains

Levels	Fundamental (Macro level)				Intermediate Meso/Community level		Proximate micro/Interpersonal level			Health, well-being (Individual or population)		
	Domains		Macrosocial factors	Inequalities	Domains		Stressors	Health behaviors	Social integration/Support	Health outcomes	Domains	
Dimension	Natural environment	Accessibility Weather			Built environment	Accessibility Transportation					Well being	
Dimension					Accessability Transportation				Stressors	Health behaviors	Social integration/Support	Health outcomes
Dimension				Affordability Income							Accessibility Social Relationships	Accessibility Disability

- (2) The best way to address population health involves moving upstream, away from health (in the last column) towards columns I or II to identify the causes of the causes that determine population health (Martikainen et al., 2002; Northridge et al., 2003).
- (3) The downstream domains in columns III and IV represent factors that influence features of the individual's body and behavior in the form of physical, mental, and social processes.
- (4) The upstream column at the macrosocial level is thought to undergo change incrementally over time based on a slow buildup of forces that over time might erode or alter economic order, cultural values/beliefs or entrenched organizations and systems.
- (5) The upstream domains of macrosocial factors and inequalities represent the characteristics of a place that give rise to the social and economic processes that set up equitable and/or inequitable groups and places. The macrosocial factors play a leading role in creating, mitigating, or preventing spatial concentrations of inequalities in wealth, political influence, and employment and educational opportunities (Schulz & Northridge, 2004).

4.2. Downstream features

A downstream approach to address the rural food access problems identified by the older adults would begin with columns III and IV and the domains with broken lines around them (Figure 1). A downstream approach may or may not acknowledge a relationship with upstream factors but in either case, the upshot is that the approach will not alleviate or mitigate upstream factors. Except for social integration and support (Column III), downstream approaches within the domains of columns III and IV typically focus on the internal landscape of the body absent the features of a place and other relevant characteristics that make up that place. The social integration/support domain is considered downstream because, while it works on a larger scale than at the individual level and does not focus on the body, it also does not: (1) involve systemic change; (2) require that the approach take account of external factors such as policies and regulations or the built environment; or (3) focuses on informal, social ties and relationships that may shift, weaken, or strengthen based on voluntary action (Golden, McLeroy, Green, Earp, & Lieberman, 2015; Lieberman et al., 2013).

Disassociated from the features of a place, food insecurity solutions tend to be downstream responses that address stress and impaired health behaviors (Column III) which leads to diminished well-being and health (Column IV) (Wolfe et al., 2003). In comparison food insecurity tied to an analysis of rural places might look upstream at the built environment and transportation funding and infrastructure (Column II) instead of simply fixing the body or dissatisfaction with quality of life within the domains of health outcomes and well-being (Figure 1).

To summarize, rural food access problems of the older adults could be handled downstream as stressors, harmful dietary practices, and/or distressed well-being (Figure 1, Columns III and IV). However, that approach does not address the causes of the causes or the origins of the senior's food access problems. Further, the downstream approach is a slow, individual level response to problems that may continue to perpetuate across the population of rural seniors because of failure to address the root causes (Braveman & Gottlieb, 2014; Dorfman & Wallack, 2007).

4.3. Upstream features

In this section, the data are considered in light of upstream approaches that might be undertaken to address rural food access issues of the senior population. In general, using the best available evidence to guide movement away from health back upstream in the social ecological model can lead to the most effective policy based solutions aimed at the causes of the causes (Braveman & Gottlieb, 2014; Northridge et al., 2003). The pathways and factors that establish the dietary practices of the seniors are depicted with greater accuracy when the portrayal is grounded in the idea that health behaviors are socially conditioned (Golden et al., 2015; Lieberman et al., 2013). This means that circumstances, conditions, or features external to the individual's body (Columns I and II) exert influence on the body's emotional and physical responses and thus health and well-being located downstream (Figure 1).

In the social ecological model columns I and II represent two kinds of place-based approaches to improving population health. First, within the macro-level in column I within the domains of macrosocial factors and inequalities are listed higher order place-based factors that facilitate or bar access to power, resources, autonomy, and equity for groups (Lieberman et al., 2013). In contrast, the domains in column II comprise place-based factors that—for the most part—exist at the local level. Further, the domains of the built environment and social context are established by the factors in column I. Last, the factors in the column II domains target a health issue more directly or at a higher level of association than factors in column I (Lieberman et al., 2013). For example, environmental and workplace policies may address worksite wellness programs and the use of tobacco (Schulz & Northridge, 2004). Zoning, land use, and economic development investments are associated with obesity, diabetes and dietary practices through an indirect association with access to fresh food based on the type of grocery stores and restaurants allowed or encouraged to locate in a region (Azuma, Gilliland, Vallianatos, & Gottlieb, 2010).

Finally, theoretically, it is worth noting that communities with more conservative cultural, political, and ideological values might find it a struggle to push further upstream moving from columns III or IV to column I (Lundell, Niederdeppe, & Clarke, 2013; Niederdeppe, Bigman, Gonzales, & Gollust, 2013; Niederdeppe, Bu, Borah, Kindig, & Robert, 2008; Niederdeppe, Roh, Shapiro, & Kim, 2013; Niederdeppe, Shapiro, & Porticella, 2011). The reluctance to move towards fundamental issues in columns II and I are reflected in public and political decision-making about taxes, the role of government, the distribution of resources, civil and human rights, and equity.

The dimensions of food access from the rural, older adults formulated as upstream issues in Figure 1 are represented by the solid lines within the social ecological model. It has already been stated that most of these food access issues could be treated as stressors in a downstream approach. For example, affordability defined as income may be addressed in three different ways representing upstream and downstream approaches. First, affordability is displayed in the model with a dotted line leading downstream to financial insecurity within the domain of stressors (Figure 1). At the same time, affordability as income has a solid line leading to distribution of material wealth upstream within the domain of inequalities.

An argument may be made that an upstream approach to the problems with affordability based on income at a macro level would acknowledge that to achieve good nutrition requires money. Accordingly, income problems in the United States require an aggressive effort at the macro level to address the distribution of material wealth at best or (at a minimum) the income support programs for older adults (Ferrie, Shipley, Marmot, Stansfeld, & Smith, 1998; Hajat, Kaufman, Rose, Siddiqi, & Thomas, 2011; Marmot, 2013; Marmot & Bell, 2009; Marmot, Bloomer, & Goldblatt, 2013).

Similarly, the food access dimension of affordability as income could be addressed upstream within column II in the domain of social context with an economic development approach that offers tax incentives to business enterprises that provide high quality, discounted fruits, vegetables, and other food to the elderly (Hajat & Purnell, 2017).

There is one large lever that may be used to craft upstream solutions for the remaining food access dimensions of accommodation and accessibility (Figure 1). This mechanism, aside from public policy, is possibly one of the most promising approaches in the United States to improve health and social inequities upstream before they become downstream health issues (Zuckerman, 2013). This twenty-first century approach, located under the domain of social context, could provide financing for place-based initiatives related to economic development and infrastructure or built environment investments.

With new federal guidelines and emphasis on prevention of reoccurring illness and high mortality rates in low wealth groups, tax exempt healthcare systems are in a furious race to rethink how they invest health system endowments and community benefits funds in upstream, preventive initiatives (Young, Chou, Alexander, Lee, & Raver, 2013; Zuckerman, 2013). The big idea to finance upstream initiatives in

column II requires that hospitals take up a role as an anchor institution and supply much needed financing to build the infrastructure needed for healthy communities. An anchor institution is committed to intentionally applying an institution's long-term, place-based economic power and human capital in partnership with a community to mutually benefit the long-term well-being of both (Zuckerman, 2013).

The dimension of food accessibility as transportation is placed upstream under column II and within the domain of built environment. It has been established that the built environment shapes health indirectly by facilitating the ability to get to needed resources (Handy et al., 2002; Hansen et al., 2015; Northridge et al., 2003). The difficulties with transportation that impede food access and dietary intake include no personal vehicle or public transportation system, an inoperable or unreliable vehicle, and little or no resources for the maintenance and operation of a vehicle. An example of an upstream approach under the built environment and social context domains (Figure 1) might include increasing tax revenues that support a regional public transportation system. Alternatively, the public transportation system could be financed through a public-private partnership model to address a funding gap in a publicly funded system. In this example, a local authority or a central-government agency enters into a contract with a private supplier for the delivery of a service. The private entity, based on negotiations, might take responsibility for building infrastructure, financing the investment, and then managing and maintaining this service (Iossa & Martimort, 2015).

The food access domain of accommodation was expressed in the form of stories about unresponsive retail outlets that failed to adjust to the income restraints and physical disabilities of the older adults. Unaccommodating retail outlets were placed in column II at the intermediate level under the domain of social context (Figure 1). An example of an upstream approach would encourage retail outlets to be more attentive to their elderly customers through the provision of incentives. An example would be for an institution, e.g. the local government or a state program for seniors, to subsidize a portion of the marketing expenses if a retail outlet provides and promotes special services for elderly customers. Placed in column II under the domain of social context, broadly this approach would provide investments to fund partnerships with public and private organizations to accommodate the needs of older adults (Figure 1).

For problems with access to food based on social relationships two approaches are considered. The downstream domain of social integration/ support in column III is implicated by a broken line as an approach to address food accessibility based on social relationships (Figure 1). This tactic to address the inability to get to sources of food depends on social networks and the kindness of family, friends and voluntary organizations. However, based on the data, most older adults do not find consistent, reliable arrangements to get to food sources when using a social network (Andress & Hallie, 2017). Voluntary networks often result in unreliable food delivery or inconsistent rides to sources of food as family members live far away, neighbors have their own schedules and volunteers give up or move onto the next cause. Accordingly, an upstream approach to get at root causes of food inaccessibility based on social relations might be found in column II within the domain of social context (Figure 1). Several approaches could be merged including the use of community civic capacity to structure and finance a long-term, consistent arrangement to get food to the elderly or help the elderly get to the sources of food.

Finally, where weather is a problem that shapes access to food for rural, older adults the domain of the natural environment is identified as part of the pathway for the problem (Figure 1). In the social ecological model there is a double arrow between the built and natural environment domains meaning they interact and influence one another (Northridge et al., 2003; Schulz & Northridge, 2004). It should also be noted that the built environment domain is connected to the domain of social context (Northridge et al., 2003). Potential solutions and decisions that might address the effects of weather on food access may be found within both domains of the built environment and social context. To provide food year round an upstream approach might take the form of economic development investments and incentives to build and or fund creative arrangements through food enterprises joining the farming community with local distribution hubs (Berti & Mulligan, 2016; Freudenberg, Silver, Hirsch, & Cohen, 2016) (Figure 1).

4.3.1. Limitations

The study has several limitations. The sample was not racially diverse, consisted solely of one gender, and focused on one narrow geographic location. All of these when taken together limit the generalizability of the findings to a rather small rural region. This limitation may be addressed in future studies by conducting focus groups with more diverse, seniors in other rural parts of the United States. Another challenge in this qualitative study is a limitation imposed by advances in the field of public health knowledge. Understanding the scale and mechanisms that drive the causal relationships between upstream and downstream factors is still in its infancy. Studies demonstrate that both behavioral and structural interventions are required in most cases to improve population health (Lieberman et al., 2013). However, the right combination of downstream, individual behavior strategies and structural, upstream approaches is unclear.

Researcher subjectivity is a limitation in qualitative research. In the original data analysis to mitigate researcher subjectivity and ensure trustworthiness of the coding and data analysis using the five dimensions of food access, the results were presented in a community exhibition and debriefing session at a local art center (Krefting, 1991). To lessen researcher subjectivity even more the process of bracketing may be employed in future studies where the researcher engages in the self-reflective process of recognizing and setting aside (bracketing but not abandoning) their a priori knowledge and assumptions (Tufford & Newman, 2012). Bracketing methods include recording and challenging reactions to the data using reflexive journaling, writing memos, and/or recorded discussions with another researcher (Tufford & Newman, 2012).

5. Conclusion

Secondary data analysis incorporated the use of a social ecological model to examine qualitative data on the impact of place on food access and dietary intake for the elderly in a rural region. Qualitative data is especially helpful in uncovering the hidden voices, historical knowledge, and information from groups and provides a deeper view of the perceptions of the participants bringing sharper clarity to the social construction of place (Denzin & Lincoln, 2009).

The complex web of factors shaping food access for rural seniors was illustrated within a social ecological model where the elderly have restricted access to food in rural West Virginia because of an indirect relationship with place that acts through the social ecological domains of the built environment, macrosocial factors, stressors, the natural environment, and social support. Despite creating some clarity about association between place and health using the social ecological model, questions remain about how best to confirm causality and the relationship between place, food access, and nutrition for rural seniors. Further, questions remain as to whether the food access issues for urban seniors would also be classified along the same pathways as those presented for rural seniors in this research. A promising outcome of this work is that it contributes to theoretical work on upstream policy sectors that may contribute to food security for older adults in rural places. Rather than simply examining whether communities matter for population health, this research sheds light on how population characteristics interact with and are shaped by the social and material construction of places. As senior populations increase the need for greater understanding of the place-based, causal pathways for rural food insecurity and poor nutrition in older adults will become more important for program and policy decisions.

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