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A comparison of regional food systems and food security in rural Mississippi and Italy

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A COMPARISON OF REGIONAL FOOD SYSTEMS AND FOOD SECURITY IN RURAL MISSISSIPPI AND ITALY

by
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ABSTRACT

Food insecurity has strong links to worsened overall health outcomes, specifically, increased prevalence of chronic conditions such as diabetes, cardiovascular diseases, and obesity. Food insecurity in developed nations is primarily characterized by reduced access to nutritionally dense foods. This problem is especially prevalent in the Mississippi (MS) Delta region, where greater than two in five people are food insecure and community health outcomes are among the worst in the nation. Recent literature has placed emphasis on solutions to urban food insecurity, but urban resolutions cannot be fully extrapolated to rural food systems, where insecurity is characterized by a multifactorial lack of access to food markets. Rural southern Italy is socio-economically and geographically similar to rural northwest Mississippi, but has significantly better food security and health outcomes. This research, in an effort to identify potential solutions to the challenges faced by rural communities related to food, compares rural Italian and Mississippi food systems. This study examines the relationships between food producers, processors, and markets to determine from a food systems level how they affect food security. This qualitative study systematically compares regions in Sicily, Sardinia, and Basilicata to rural Northwest MS. Data revealed that the presence of robust supports in the form of agricultural subsidies and formal network creation enables agricultural fluidity, market access, easy information sharing and access. Higher densities of food importers and intermediaries also offer contract flexibility for smaller producers, increasing market access. Rural Italians have developed a social network that involves trading

foods, as well as sharing equipment and labor, enabling widespread access to local food, reducing capital requirements, and circumventing producer constraints. The MS Delta has a similar barter network for securing transportation, which suggests potential for extrapolation to improve food security based mechanisms via Italian norms. This research suggests state and federal-level horticultural capacity building and formalized networking opportunities for small-scale producers at the regional level have significant potential for improving local capacity to mitigate food insecurity and subsequently poor health outcomes among historically marginalized communities.

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Introduction

Food Insecurity and Health

Food insecurity is a longstanding international public health problem (Murthy 2016). At the 1996 World Food Summit, food security was defined as "having physical and economic access to sufficient, safe, nutritious food that meets their dietary needs for an active and healthy life" (World Food Summit 1996). Despite contemporary strides in improving global food security, the 2021 State of Food Security and Nutrition World Report found that 2.37 billion people, or one in three people globally, were moderately or severely food insecure (UN FAO 2021). Food insecurity affects a large global population and is a significant social determinant of health that is strongly associated with worsened health outcomes (Gucciardi et al. 2014).

Research examining the effect food security has on health in the United States and Canada has largely focused on child health outcomes (Gundersen 2015). Studies have associated food insecurity with poorer overall health (Cook et al. 2006), behavioral problems (Andrews and Prell 1999), (McDonald et al. 1994), and worse mental health in children (International Dietary Energy Consultative Group 1995). Studies controlling for other factors have also found that food insecurity is associated with "increased risks of some birth defects, anemia, lower nutrient intakes, cognitive problems, and aggression and anxiety" in children (Gunderson 2015). Food insecure households often have lower quality overall diets, characterized by inadequate micro and macronutrient intake, as well as low fruit and vegetable consumption (Gundersen 2015). Limited access to nutritious

food due to geographic, economic, or social constraints can also result in increased intake of highly-processed, high-calorie, low-nutrient-density foods, which are themselves associated with obesity, and conditions such as hypertension, type-2 diabetes, and cardiovascular diseases (CVDs), positing an indirect risk of worsened health outcomes (Stuff et al. 2004). Indeed, studies have associated food insecurity with a 20% increase in risk for hypertension, and a 2.4 times heightened diabetes risk (Seligman et al. 2007). In some studies, "Diabetes was reported in 10% of individuals with mild, and 16% of individuals with severe, food insecurity" (Seligman et al. 2007). Overall, household food insecurity is associated with significantly worse self-reported health in adults as well as children (Stuff et al. 2004). Reduced access to nutritious food is also associated with an inhibited ability to manage diseases and health conditions, especially those that require controlled diets (Vozoris and Tarasuk 2003). Given the strong association between food insecurity and worsened health outcomes, especially among children, food insecurity should be considered a public health problem and addressed as such.

In the United States, the United States Department of Agriculture (USDA) defines food insecurity as "a household-level economic and social condition of limited or uncertain access to adequate food" (USDA 2006). The USDA reported that 10.2% of households, accounting for nearly fifty million people, were food insecure in 2021 (USDA ERS 2021). Of this population, roughly one-third were described as having "very low food security," meaning one or more household members reported multiple indications of disrupted eating patterns and reduced food intake due to constraints on food access (Coleman-Jensen 2013). However, the prevalence of food insecurity varies widely by

population sociodemographics and geographic region. Nationally, households with children headed by a single woman, those from historically marginalized households, specifically Black and Hispanic households, and households with incomes below 185 percent of the poverty line are more likely to have very low food security. Additionally, households with children are more likely to be food insecure, with approximately 22.5% of households containing children reported as food insecure (Gundersen 2015). Regionally, food security prevalence in the South is significantly higher than the U.S. average, as is the prevalence of the aforementioned risk factors (USDA ERS 2021). Cumulatively, at-risk populations in the South face significant barriers to accessing nutritious food and consequently suffer worsened health outcomes and shortened lifespans. Of the southern states, and the entire nation, Mississippi is the most food insecure (Mendy et al. 2018).

Food insecurity in the Mississippi Delta

The state of Mississippi has the highest prevalence of food insecurity in the United States, reported in 15.3% of households (Mendy et al. 2018). This is three times higher than the U.S. adult average, with more than 2 in 5 (42.9%) of Mississippi adults reported as food insecure (Mendy et al. 2018). Households in Mississippi are also significantly more likely than the rest of the United States to have low or very low food security (Mendy et al. 2018). Alongside food insecurity, Mississippians also face disproportionately higher rates of cardiovascular diseases, diabetes, hypertension, and obesity than the rest of the nation (CDC 2020). CVD, Mississippi's leading cause of death, is 1.4 times more prevalent in the state than it is nationally (CDC 2019). Even controlling for confounding variables, food insecurity and heightened risk of CVDs and

other chronic diseases are geographically correlated in the state, specifically in rural areas (CDC 2019). High disease rates and severe food insecurity are most prevalent in the rural 18-county Mississippi Delta region (Figure 1), where, CVD prevalence is substantially higher than rates in Mississippi and the entire United States (Short et al. 2014). The Mississippi Behavioral Risk Factor Surveillance System (MS BRFSS) found both significant racial disparities in health outcomes and overall high prevalences of chronic diseases in the Delta. This is especially pertinent in relation to the COVID-19 pandemic, as these high-prevalence chronic diseases and social determinants of health have been found to be associated with higher morbidity and mortality in COVID patients (Garg 2020). This contributes to low community health resiliency and subsequently greater vulnerability to public health shocks such as COVID. Consequently, there is a significant public health impetus to address food insecurity and rates of chronic diseases in the Mississippi Delta.

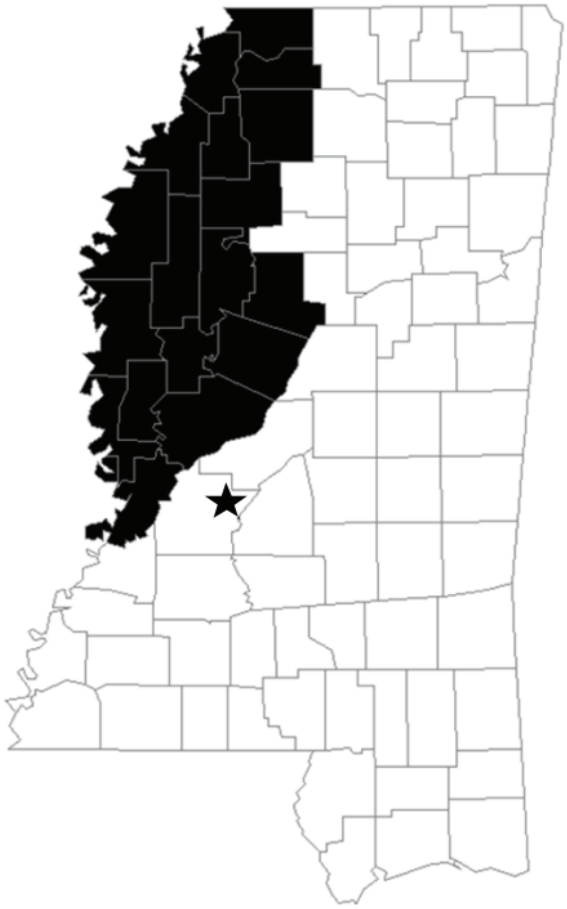


Figure 1: The 18-county Mississippi Delta region, which is composed by Bolivar, Carrol, Coahoma, Desoto, Holmes, Humphreys, Issaquena, Leflore, Panola, Quitman, Sharkey, Sunflower, Tallahatchie, Tate, Tunica, Warren, Washington, and Yazoo counties. (Short et al. 2014)

The long-term role of food insecurity in worsening population health and increasing the vulnerability of communities to community health shocks is acutely felt in the Mississippi Delta region. Poor population health is exacerbated by limited healthcare access and services for preventive care. Addressing food insecurity in the Delta must be

considered a public health priority, and an effort should be made to determine which factors in this region contribute to such severe food insecurity.

Demographically, the Delta region's population is largely constituted by Black citizens, ranging from 53 percent to 76 percent of county populations. These counties are also characterized by high poverty and unemployment rates, averaging 29.61% of the Delta population living under the federal poverty line and county-average unemployment rates as high as 8.8%. (US Census Bureau 2020) The most food-insecure region in the United States is also one of the most impoverished.

This roughly 7,000 square mile region is also overwhelmingly rural. Apart from Desoto County, which includes Memphis suburbs and has a population density of 389.0 people per square mile, the population density in the Delta ranges from 3.2 in Issaquena County to 76.0 people per square mile in Warren County (US Census Bureau 2020). The average population density in the Delta is 54.3 people per square mile, which is significantly lower than the U.S. average of 93.8 (US Census Bureau 2022) This region's land usage is predominantly agricultural, with more than 4 million acres of land designated for agricultural use (Snipes et al. 2005). This represents approximately 6,250 square miles of the 7,000 square mile Delta region, or 89% of land availability. This intensively managed region accounted for "97% of the rice, 81% of the cotton, 79% of the soybean, 67% of the corn, and 88% of the acres of water surface in catfish production" of Mississippi's agricultural production in 2015 (Snipes et al. 2015).

Despite its being one of the most fertile soil regions in the world, with abundant agricultural and horticultural resources, the citizens of the Delta remain widely food insecure with high rates of health conditions associated with nutrition insecurity. This can be partially attributed to a food environment in which agricultural production is primarily dedicated to commodity crops bound for export rather than produce which is locally available, economically viable, and consumable without further processing (Berry 2007). Existing local farmers and small-scale producers have limited access to formal food markets; extremely low population density, high rurality and geographic isolation, uniformly-low income in the region, and limited public transportation infrastructure make direct-to-consumer marketing inefficient, limit economic viability for developing new concrete food markets, and fail to reduce barriers for consumers to physically access fresh produce (Berry 2007). A dearth of social capital and high rurality also pose barriers to the development of alternative or informal food networks, limit novel connections between farmers, food processors, and markets, and contribute to food insecurity in the Delta (Wright Austin 2006).

Italian Food Systems

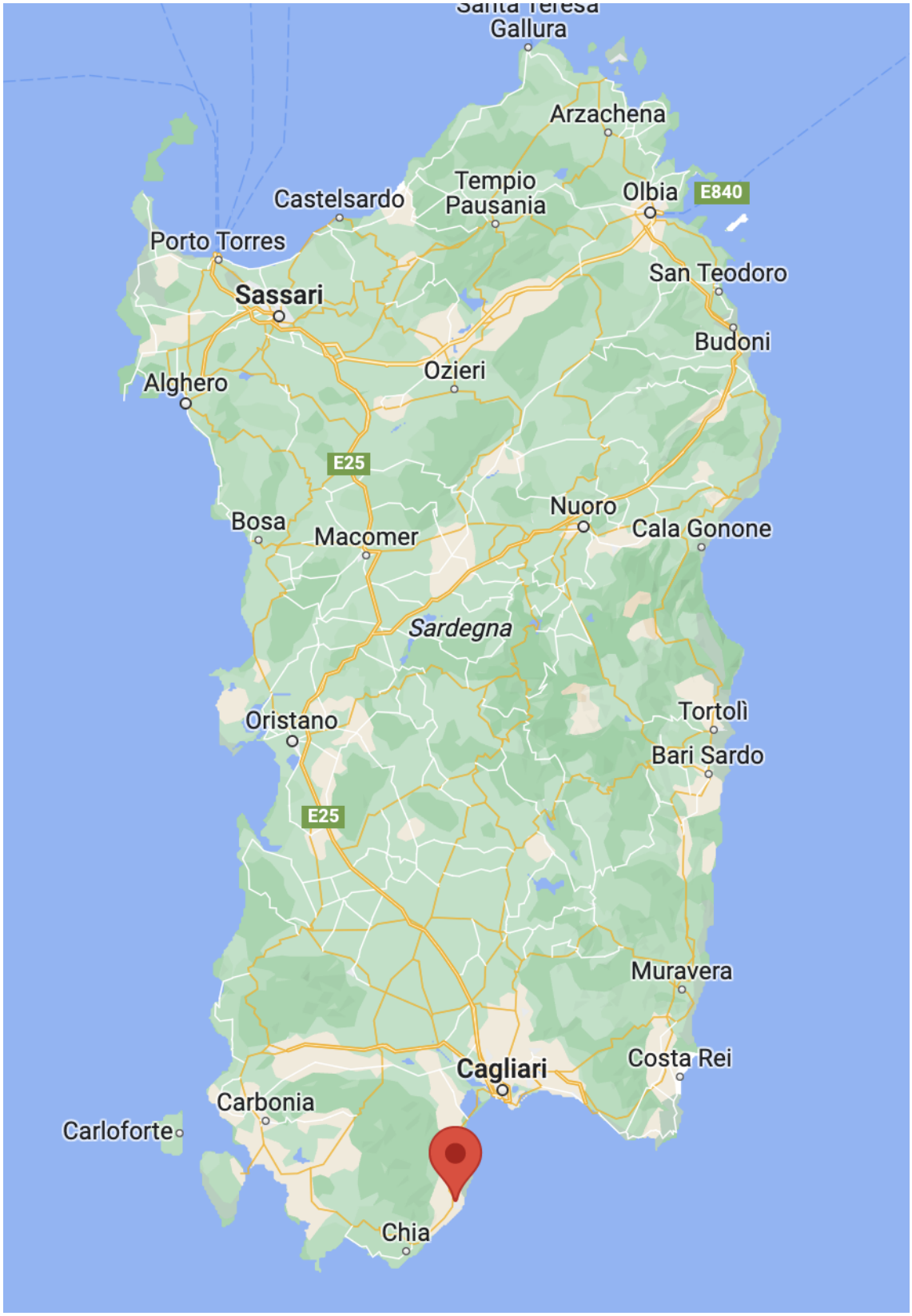
Regions of insular and southern rural Italy share sociodemographic, geographic, and agro-ecologic characteristics with rural northwest Mississippi. Specifically, Sardinia, Sicily, and Basilicata share similar rural sprawls characterized by low population density, high agricultural land use, and high poverty rates. Despite abundant similarities between these regions, Italian counterparts have significantly higher access to affordable and nutritious locally-produced foods and food products, lower rates of chronic diseases, and

higher life expectancies. Given the strongly-researched association between food security and health, a comparison of these food systems and their underlying social factors may provide important insight into how to improve food and nutrition security and consequently health in the Mississippi Delta.

Sardinia

Sardinia is one of Italy's least populated regions, with an average population density of 65.9 people per square kilometer, concentrated in the two major coastal cities Sassari and Cagliari, which house 18% of the island's total population (ISTAT 2022a). Much of the island's agriculture is in the provinces of Nuoro and South Sardinia, which have population densities of 35.7 and 51.8 inhabitants per square kilometer, respectively (Urbistat 2022). These densities are dramatically lower outside of municipal centers, to as low as 7.9 in agricultural areas throughout both provinces (Urbistat 2022). Of Sardinia's total land area of 24,113 square kilometers, approximately 14,640 are used for agriculture, representing 60.77% of total land use (ISTAT 2022a). This land use figure represents the majority of available land on the island, as mountainous topography prevents agricultural practices of an appreciable size throughout large stretches of the island. Even in Sardinia's most populated province, Cagliari, which has an average population density of 337.6, rural agricultural areas within it are much more sparsely populated; for instance, the municipality of Pula's population density is 50.6 (ISTAT 2022a). The Pula municipality was chosen as a site of investigation because its rural agricultural area near the major city of Cagliari emulates the Mississippi Delta's relation to Jackson, MS., and Memphis, Tennessee. Pula's agricultural output similarly emulates

the Delta's, characterized by sheep and pork production, vegetables, oats, barley, grains, rice, grapes, olives, and olive oil (ISTAT 2022a). Pula's sheep and pork production are close analogs to MS Delta pork production, and many of Pula's agricultural products, such as wine, myrtle, olive oil, and honey, are destined for processing and export as commodities (ISTAT 2022a). Similarly, in Mississippi, corn, rice, soybeans, and cotton are primarily exported and processed into commodity products. The island is also impoverished, with an unemployment rate of 13.8%, which is higher than the Italian national average, and an average income of 16,540 euros, which is lower than the national average; Sardinia, therefore, economically mirrors Mississippi's relationship with the United States (Bratislava 2022). Despite a sizable export market, high poverty rates, and high rurality, Sardinians are food secure, which is partly resultant of the island's insular economy and food system which has developed to be famine-resilient and efficient (Wang et al. 2022). Data analysis from conducted interviews suggests that an extensive social network, food culture, more abundant small-scale food producers, and widespread sustenance farming enable widespread food access within and beyond market settings (Pes et al. 2015). Part of Sardinia is recognized as a Longevity Blue Zone, hosting a high concentration of centenarians; Sardinia is especially unique in its gender equality in longevity, as females generally possess greater longevity (Pes et al. 2015). Research supports a causal link between dietary factors on the island and Sardinians' longevity, making it an interesting region of comparison to the Delta (Wang et al. 2022) (Buettner and Skemp 2016).



Pula, Sardinia (Apple Maps 2023)

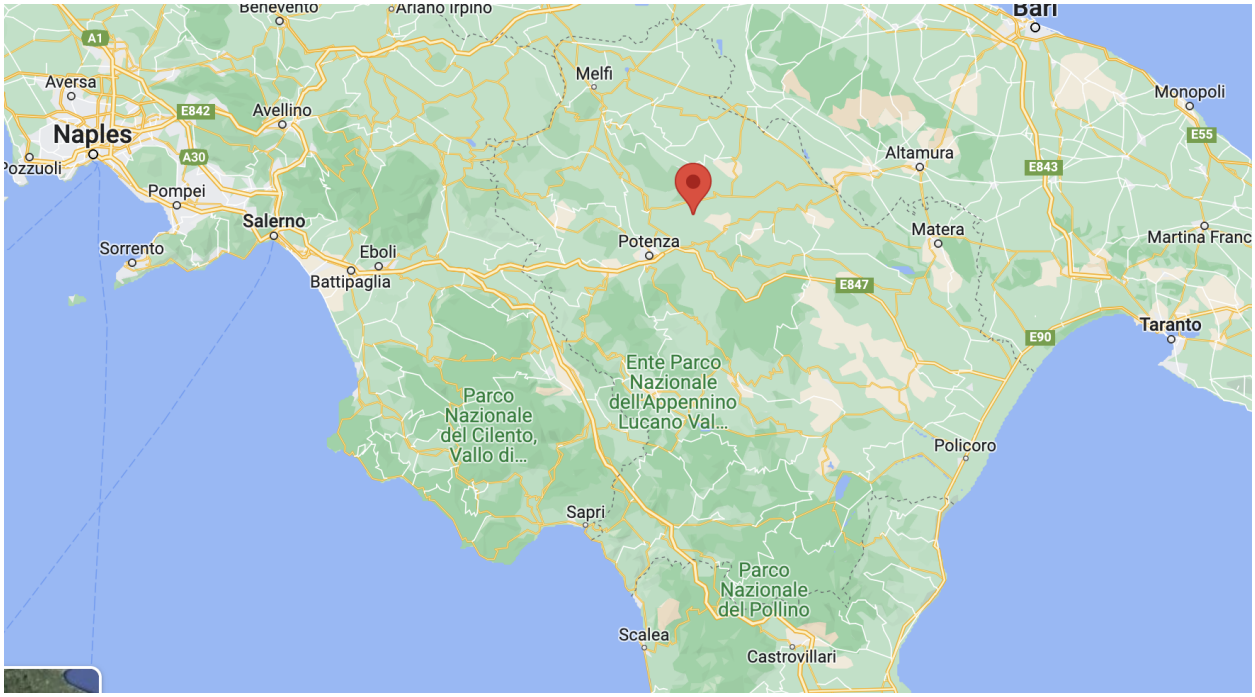
Basilicata

The Basilicata region in southern Italy is one of the nation's poorest, with an average per capita available income of 13,516, an average household income of 26,552 euros, and an unemployment rate of 8.6% as of 2021(ISTAT 2022a). 38% of the population makes less than 10,000 euros annually and 23.4% of households live below Italy's national poverty line (ISTAT 2022a). In the Cancellara municipality in the Potenza province of Basilicata, available per capita income is 13,303, and total consumption per capita is 12,908 (Urbistat 2023). Cancellara has an unemployment rate of 17.2% (Urbistat 2023). The Potenza province as a whole has an average population density of 53.5 inhabitants per square kilometer, while the Cancellara municipality has an average density of 27.4 (Urbistat 2023). The region is also dedicated to agriculture similarly to the MS Delta: "Of the total area, agricultural land covers 50% and forest land 35%... 60% of farm land is used for arable crops. The region's 51,760 farms produce cereals (35%) as well as fruit and vegetable, olive-oil and wine." (Urbistat 2022)**.** Basilicata's agricultural land area is approximately 1,235,527 acres, compared to the approximately 4 million acres utilized by the Mississippi Delta; Basilicata's agricultural output totaled 579.26 million euros in 2016 compared to the Delta's 1.07 billion dollar output in 2002 (ISTAT 2022b; Snipes et al. n.d.). Basilicata as a whole, and Cancellara especially, emulates the ubiquitous agricultural ecology of the Mississippi Delta and many of the sociodemographic factors most common in the Delta region — in both regions, the majority of suitable land is dedicated to agriculture.

Basilicata is the most mountainous region in southern Italy, "with 47% of its area of 9,992 [square kilometers] covered by mountains, whereas 45% is hilly and 8% is made up of plains" (EUROSTAT 2023b). The prevalence of mountainous topography precludes robust infrastructure development and public transit perfusion, contributes to rurality, and precipitates reliance on local food products. This geographic isolation, in conjunction with a lower car-per-capita rate than Mississippi (641 cars per 1000 people in Basilicata compared to 692 cars per 1000 people in Mississippi), serves as an excellent point of comparison for the effects of rurality, limited infrastructure, and limited public transportation options have on food access (Bureau 2021; EUROSTAT 2023b).

Despite the high prevalence of social determinants that are associated with worsened health outcomes and shorter lifespans, life expectancy at birth in Basicilata was 82.4 in 2016, which is well above the 2019 United States average of 78.8 years, and significantly higher than the Mississippi average of 74.4 years, which is the lowest in the nation (CDC 2020; EUROSTAT 2023a). The Delta fares worse than the state as a whole, ranging from a 2019 life expectancy at birth of 70 years in Quitman County to 75 years in Rankin County; it houses 8 counties among the lowest life expectancies in the country (Global Health Data Exchange 2023). While differences in macronutrient consumption between rural Italian and Mississippian populations may be sizable contributors to differential health outcomes, access to adequately nutritious foods is an important mediary. In rural Basilicata, rates of monetary poverty are significantly higher than food insecurity, suggesting the regional food system and social networks in the region

cumulatively provide access to affordable and nutritious food (Marchetti and Secondi 2022).

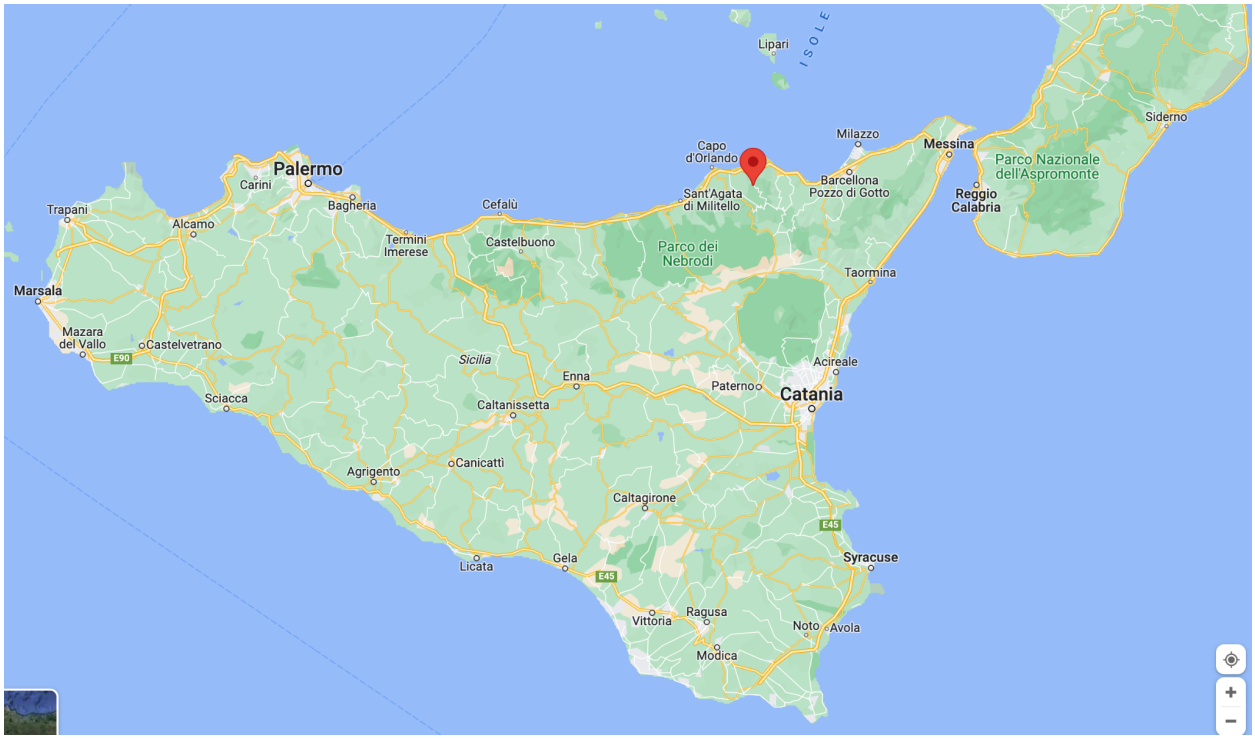


Cancellara, Province of Potenza, Region of Basilicata (Apple Maps 2023)

Sicily

Sicily is another impoverished region of Italy with high food security. 17.7% of households live under the Italian poverty line, with a 15% unemployment rate, which is one of the highest in Europe (EUROSTAT 2023b; ISTAT 2022b). Sicily is more densely populated than the Delta region, averaging 185.9 people per square kilometer, but this is biased by four large coastal cities which house nearly 2 million people (ISTAT 2022b). In central Sicily, the population density is significantly lower. For example, the agricultural commune of Sant'Angelo di Brolo in the Messina province has a population density of 39.1 people per square kilometer (ISTAT 2022b). Sicily is unique in that

monthly household food expenditure is approximately 200 euros, which is the lowest monthly expenditure on food in all of Italy and among the lowest in Europe (Marchetti and Secondi 2022). This low expenditure is partially due to large, non-market social networks between food producers, processors, and consumers that enable the cheap purchase of or bartering of a variety of food products. The island primarily produces grains, citrus fruits, tomatoes, legumes, olives and olive oil, almonds, grapes, cheese, and wine (Kokotsakis 2021). "In 2005, the region exported 294 million euro in agricultural products against imports of only 144 million euro. Agriculture… is characterized by small-scale farming (50.2% of plots in use are less than one hectare)," which serves as an interesting point of comparison with the Delta, suggesting small-scale farming operations can maintain sizable export volumes while simultaneously bolstering food security by enabling community consumption of affordable local produce (Regione Sicilia 2022).



Sant'Angelo di Brolo, Sicily (Apple Maps 2023)

Rural Basilicata, Sicily, and Sardinia share key sociodemographic, geographic, and agroecological characteristics with the Mississippi Delta, but have comparably higher food and nutrition security and significantly better population health outcomes. Given the abundant existing similarities between the Delta and rural southern and insular Italy, a comparative study was undertaken between these two regional food systems to understand Italian best practices that could be extrapolated with cultural pertinence and region-specificity to improve food and nutrition security and subsequently health outcomes in the Mississippi Delta.

Methods

Case Development

U.S Census data was collected from the 18 counties constituting the Mississippi Delta. Population density, agricultural output, agro-geography, poverty, unemployment rates, food insecurity, life expectancy, and overall health outcomes were analyzed. A list of rural Italian regions was then compiled and the same data were collected from Italy's *Istituto Nazionale di Statistica* (ISTAT) and compared to data from the MS Delta. The islands of Sardinia and Sicily and the Basilicata region were identified as suitable analogs to the MS Delta, with similar population densities, poverty and unemployment rates, rurality, and dominant agricultural land usage.

Municipality and Region	Average Population Density (people/mile^2)	Average Poverty Rate	Unemployment Rate (1)	Percent food insecure	Average Life Expectancy in 2019	Percent agricultural la use
MS Delta	54.3	29.8%	3.5%	42.9%	74.4	89%
Sant'Angelo di Brolo, Sicily	101.269	17.7%	14.5%	6.25% *	81.8	63% *
Pula, Sardinia	131.054	13.9% *	13.8%	8%*	82.6 *	60.77% *
Cancellara, Basilicata	70.966	23.4%	17.2	5.8%*	82.4 *	50%, 35% forested *

Table 1: Collation of economic, agricultural, and health data in Mississippi and Italy

(1) Differential measurement standards employed between US Census and ISTAT data collection

* Regional or provincial average used rather than municipal average if municipal data was unavailable

Interviews

An interview protocol, recruitment script, and series of questions were then devised and submitted to the University of Mississippi's (UM) Institutional Review Board for interview protocol approval. All necessary documentation was then completed and approved by the UM IRB. The Italian National Committee for Bioethics was contacted for information regarding documentation and approval for interviews; no official committee approval was required. The following questions were used in interviews.

1. How are you involved in Mississippi's food system?
    a. For how long?

    b. In what capacity
    c. How has your role evolved?
2. What does a successful regional food system look like to you?
3. Why do you think that it is important to produce food in this manner (locally / regionally / organically)?
4. If you were to build a regional food system in the Delta / Northern Mississippi, what questions would you need to be answered?
5. What are your future goals for production, engagement within our regional food system, and enterprise?
6. What barriers are preventing you from reaching these goals?
7. How have you observed the Mississippi food system improve during your time working in it?
8. What factors outside your realm of control (food processing/production/consumption/consumer desire/market availability) affect your ability to produce/market food in this manner?
9. Which players have been important in increasing your capacity to function in this food system?
10. How has your market changed in the past 10 years?
11. Did you have initial difficulty market building, understanding/obtaining financing, or navigating regulations?
12. What role do you see your work in our food system, and food systems in general playing in population health, and individual health and wellbeing?
13. Do you consider yourself successful in your role?

Data Collection

Data were collected from May to December 2022. An initial list of potential interview candidates including rural Mississippi small-scale farmers, producers, food processors, market owners, and food system academics and advocates was created. This list was stratified to maximize representation of the Delta's regional food system, from production to consumption. Potential candidates were contacted via email using the following recruitment script: “Hello, my name is Matthew Knerr. I am a student at the University of Mississippi. I am conducting research on food systems and their effect on food security in

Mississippi, and I am inviting you to participate as a potential contributor to the program. *Participation in this research includes participating in a 30-60 minute interview. Your total time commitment will be between approximately 1-1.5 hours. If you have any questions or would like to participate in the research, I can be reached at…"* Interviews were then arranged and conducted virtually or in person, depending on the preferences of the interviewee. Following initial interviews, snowball sampling and stakeholder group recruiting yielded new interviewees. A total of eight interviews were conducted with players involved in the Mississippi food system, each lasting approximately an hour. Interviews were recorded and uploaded to a secure Box folder, where personal and identifying information were anonymized. Interviews were then transcribed using the Trint platform.

An analogous list of Italian food producers, processors, and market owners in rural Sicily, Sardinia, and Basilicata was created through an internet search. An effort was made to contact Italian food system players who were involved in food production analogous to Mississippian production, including cereal grains, products like olive oil, honey, and wine grapes bound for future processing and/or export, sheep production, and local vegetable production. Initial candidates were contacted through the World Wide Opportunities on Organic Farms (WWOOF) platform. The author then conducted on-site interviews with initial food producers, living on-site for between two and four weeks per candidate, between May and August 2022. Following initial interviews, snowball sampling was conducted to trace food from production through processing and marketing, to consumption. Interviews were conducted to determine the relationships and networks

between food producers, processors, marketers, and players in rural Italy to determine how these networks and other factors increased market access, reduced marketing barriers, and increased food availability. A translator was recruited to facilitate interviews with interviewees who spoke only Italian. Six formal interviews were conducted, recorded, anonymized, and transcribed using Trint, while ten informal interviews were conducted at local farms, food processing facilities, and markets in Pula, Sant'Angelo di Brolo, Cancellara, and Potenza, in which key phrases and quotes were recorded into a notebook and later transcribed into a Word document. Snowball sampling was conducted to stratify the aspects of production, processing, and marketing analyzed in the study.

Data Analysis

Transcribed interviews were translated from Italian to English using Trint (Trint 2022) translation services and revised and verified by a member of the research team to ensure proper translation. Transcripts were then qualitatively analyzed using thematic coding, as outlined in (Cafer et al. 2022) as well as through axial and open coding analysis outlined in (Cafer et al. 2021). Key recurrent themes were collated into Table 3. Pseudonyms were created to ensure respondents remained anonymous.

Results

Across Site Themes	**Theme w/** *Axial Codes*	**Open Codes**
Market	**Market Access** *Geography*	Rural areas deprioritized in marketing Difficult in selling direct-to-consumer

	Access to institutional markets *Access to contracts* *Lack of markets in the Delta* *Lack of resources to reach market* *Limited support from existing markets* *Necessity of multiple markets* **Accessing markets with cost-effective local produce sales** *Limited markets offer governmental benefits* *Cannot provide competitive pricing for local produce* *Cannot pay competitive rates to producers*	Larger markets and institutions unwilling to contact small producers – certain scale required to access large markets Extremely sparse market density in rural MS Lack of transportation and refrigeration options to reach markets Forced to choose between farming and market days Targeted marketing Moving to e-commerce Transition to CSA Farmer's markets only reach portions of communities Importance of market-owner partnerships and support Nutrition voucher programs, SNAP benefits, dollar matching, and similar programs
	Branding *Region-specific products and cultivars* *Producers maintain brand control*	Producers differentiate based on region and specific crop cultivars Producers form own brand identity Producers often market own products

	Natural and organic agriculture	Strong local preference for organic foods, without pesticides.
	Market Access *Importers and intermediates flexibility* *Catering to agritourism* *Availability of fairs and markets*	Regular contracts with organic markets On-site markets to cater to wealthy agritourists Connections formed at product-specific markets and fairs
	Widespread access to a variety of markets	Importers and intermediates offer flexible contracts and terms Strong word-of-mouth advertising Regional markets accessible via intermediaries Local organic shops offer flexible terms Abundance of municipal farmer's markets Able to market in morning and farm in afternoon
Capital Access	**Unwilling to pursue private loans** *Fear of losing ownership and autonomy*	Reluctance to pursue private loans Retaining ownership and/or authority is valued
	Unable to pursue private loans	Not qualified for preferred private capital loans
	Government aid and grants inaccessible *Government fund disbursement mechanisms biased*	Reported difficulty accessing government grants Available funding sometimes has non-application based disbursement Funding appears geared

	No capacity for grant applications	toward large-scale producers Unconnected farmers felt unable to apply for state aid Labor shortage heightens lack of grant application capacity Extension services limited in capacity building and grant writing assistance
	NONE	
Government Role	**Regulations** *Sentiment that regulations are geared towards large-scale agriculture* **Financial Support** *Limited long-term or large-scale funding* *Sentiment of biased grant distribution* **Social Support** *Lack of connections between roles in food system* **Technical Support** *Extension services offered excellent technical support*	Difficult and expensive regulations for small producers and processors Lack of subsidies Limited role in connecting players to one another Non-application based federal funding distribution in MS Lack of oversight in state funding distribution
	Financial support *EU Development Goal Subsidies* *Specific Grants* **Governmental Assistance** *Knowledge resources*	Abundant grants and subsidies for small-scale and organic farmers Grants for specific productions techniques and regions Grants to assist incoming players Government assistance in

		finding and applying for grants and navigating subsidies Straightforward aid application process
	Network creation	Formal databases of food system players made available
Competition	**Competition from bulk producers** *Commodity crop land usage* *Pricing from bulk productio*n	Local production cannot match price Commodity crops subsidized Production land share dominated by commodity crops in the Delta Thin margins to be price-competitive, high transportation and storage prices Recent and slow transition to product and cultivar differentiation
	Consumer Preferences and Constraints *Consumer education* *Cost-oriented purchases*	Reduced preference for organic or quality vs higher price Lack of cultural food education Acknowledged preference for easy-to-cook foods
	Brand Differentiation *Niche markets* *Differentiated products and cultivars* *Customer loyalty*	Niche products and cultivars allow for easy differentiation between producers Preference towards locality drives consumer choices Non-market and long-term customers have high loyalty Local and organic market access facilitate product

	Competition from bulk producers	differentiation and branding Competition from non-EU countries with cheap labor and intensive agricultural practices
Producer Constraints	**Barriers to steady production** *Network and market reliability* *Labor constraints*	Aging farmers Insufficient labor, especially during harvest Decline in workforce Difficulty producing steadily year-round Cooperative model necessary for reliable production for markets Difficulty finding farmers practicing same values to collaborate with Producers note large seasonal fluctuation in demand
	Barriers to expansion *Limited available land* *Regulatory barriers* *Financial barriers* *Labor constraints* *Chemical Drift*	Steep barriers such as equipment or facility purchases prevent expansion Initial difficulty building connections; may want to focus solely on production Difficult and expensive to purchase new land Limited social networks necessitate equipment purchase and rentals, limit sharing Organic farmers report crop loss from neighboring chemical drift Repeated sentiment of difficulty navigating regulations
	Labor constraints	Labor shortage crisis

	Agricultural constraints *Aging permaculture* *Non-GMO and organic practices limit yields*	Labor prices alone are higher than bulk product final prices Aging farmers Lack of specialized labor Labor-intensive traditional harvesting practices Circumvented through social network Reduced input requirements Reduced residual labor Aging permaculture reduces yields
Learning	**Social Resources** *Multi-generational family farm* *Knowledge resources from proximal neighbors* *Unconnected farmers face difficulties* *Knowledge resources helpful only in specific domains* **Institutional resources** *Governmental resources: extension*	Adequate access to knowledge resources among connected farmers Difficult for new farmers to access social knowledge resources Difficulties navigating grant applications and regulations Limited learning from outside teaching organizations Difficulty navigating business aspects of farming Social resources often don't address these aspects of production Extension provided excellent technical assistance for production-related

	Non-governmental resources	inquiries Multiple invested university-affiliated programs and advocates involved in farmer education and networking Cited need for expanding these entities Non-governmental resources filling niche of connecting producers
	Social Resources *High availability of local mentors* *Cultural disposition to teaching and learning*	Abundance of multi-generational farmers and processors Strong cultural teaching predisposition Intrinsically social production roles Established networking and marketing schemes facilitate learning and mutual assistance Low technological and regulatory barriers aid knowledge sharing
	Institutional Resources *High availability of governmental resources to facilitate social connections* *Limited known direct extension services*	Multiple accessible databases to find peers based on size, products, production style, and proximity Little knowledge or usage of government extension services

Table 3: Axial and thematic coding analysis from interviews

Role of Respondents in MS and Italian Food Systems

Respondents' Role in Food System	**Number of Respondents in formal interviews**	**Total number of respondents including**

		key informant interviews
Mississippi Farmer	2	2
Italian Farmer	1	2
Mississippi Processor	1	1
Italian Processor	0	1
Mississippi Marketer	1	1
Italian Marketer	1	1
Multiple roles in MS	2	2
Multiple roles in Italy	4	6
Academic or institutional player in MS	3	3
Academic or institutional player in Italy	0	0

Table 4: Interviewee food system roles

Throughout the snowball interviewing process, a higher percentage of Italian respondents stated they were involved in multiple roles in the food system (i.e. a farmer who also processed and/or marketed their produce) than in Mississippi. One feasible explanation for this phenomenon is the nature of Italian marketing, which largely relies on word-of-mouth advertising and a long-term, loyal local customer base (Key Informant Interview, Marco, 06/23/2022). Italian food producers also cited valuing having control over processing and branding, while Mississippi food processors and marketers reported that producers were more interested in or fully preoccupied with food production alone.

In both Mississippi and Italy, food producers reported having access through established social networks and connections to experienced nearby producers that can provide advice and knowledge related to farming and food production practices. (Key Informant Interviews, John, 11/15/2022; Sofia, 07/14/2023). A key difference is that Mississippi players had difficulty initially establishing relationships with entrenched producers, and existing relationships often involved only knowledge sharing, while Italian social networks also enabled labor and equipment sharing. Food producers in both locations also reported using easily-accessible online resources such as YouTube to learn about production techniques and pest management: "You really just have to just to learn on your own, [farming] has to be something that you really want to do. I consider myself to be a YouTube farmer because I'm learning a lot of my own farming practices from other farmers on YouTube" (Key Informant Interviews, John, 11/15/2022)**.**

Theme One: Markets

"They can't find markets. You know, there are farmer's markets, but most people don't go to farmer's markets… You know, and the number of grocery stores, there aren't very many grocery stores in the Delta" (Key Informant Interview, Jessica, 11/14/2023).

Small-scale horticulturists in the Mississippi Delta reported difficulty in finding and accessing markets. A glaring contributing factor is the low density of concrete food markets throughout the Delta. However, even existing markets, which tend to be regional or national brands, are difficult for small-scale growers to access because they often cannot meet the scale and reliability of production required for contracts, and many

markets without close relationships with producers will not extend contract flexibility. Similarly, there is an abundance of institutional markets such as schools, hospitals, and jails that do not contract smaller growers because of hurdles associated with production reliability and the logistics of balancing multiple small contracts. Farmers who manage to secure market access also face logistical and financial hurdles related to food refrigeration, storage, and transportation.

Circumventions to the lack of brick-and-mortar markets include mobile food trucks, E-commerce, forming relationships with chefs and restaurants, transitioning to community-supported agriculture (CSA) models, and prioritizing regional farmer's markets. The low buying power and population density of the Delta have made mobile food truck operations unprofitable (Key informant interview, John, 11/15/2022). Consequently, food producers have limited outreach and marketing efforts in rural Mississippi. E-commerce has recently emerged as an effective way to directly reach consumers. "We've really grown our e-commerce and developed our website, a lot of their subscription boxes, all the different products that we offer. We use FedEx shipping services, a really kind of innovative packaging to be able to ship straight to people's houses and [keep it] frozen" (Key informant interview, Doug, 9/28/2023). Key informants in the Delta alluded to unique connections to organic markets that offer purchase flexibility and also more directly support developing producers' efforts to increase food production and consistency, such as by altering their retail models to increase profits on bulk nonlocal items to reduce the costs of local produce. Interviews

conveyed these relationships as the exception rather than the norm, and alluded that a successful food system ought to be built upon market relationships such as these.

A distinct difference between market access in Mississippi and Italy is the flexibility offered to Italian producers by processors, intermediates, importers, and markets. Interviewed Italian farmers indicated they had autonomy in deciding their level of involvement with branding and marketing: some preferred to focus solely on production and sold raw produce bulk to intermediaries, while other farmers created their own brands, oversaw their food processing, and sold their own value-added products. Italian producers were able to prioritize branding and delving into niche markets and food products because they were not preoccupied with seeking contracts. Flexible contracts with local and organic markets as well as intermediaries who contracted multiple growers to fulfill large-scale contracts with larger markets made this possible. This often involved producing niche food cultivars and locale-specific food products and marketing them in this manner. Cumulatively, Italian markets and intermediaries adapted to producers, while Mississippi producers felt that they had to cater to strict market standards. Italian producers also had greater access to local farmer's markets; key informants averaged selling produce at five farmer's markets and did not cite fuel or transportation costs as prohibitive, which is a common barrier in the Delta. Sardinian and Sicilian farmer's markets relied on year-long vendor contracts, and were organized regionally so that neighboring towns had their markets on different days, allowing farmers to sell at multiple locations. Rural Italy had a high density of farmer's markets than rural Mississippi. Sardinian key informants said that farmer's markets were much more

profitable than supermarket contracts. Italian key informants also stated that they could sell at markets in the mornings, and farm in the afternoons, while Mississippi respondents reported having to dedicate entire days to market if they opted to, heightening already precipitous labor constraints; Italian farmer's market access did not heighten producer constraints.

Another key difference noted is that virtually all Italian food producers and processors rely on word-of-mouth advertising for a significant portion of their networking. (Key Informant interviews, Nona, 07/28/23 and Felippe, 7/28/23). Interestingly, word-of-mouth advertising increased not only access to customers, but offered routes for food system players occupying different roles to connect with one another.

Theme two: Government Role

"So here he was talking about funding and trying to apply for certain grants through the Mississippi Agriculture Department. And they're not listed on the website. Pretty much because they hand-pick who the money goes to. There's no way to apply because they already have someone in mind, and they give the money that's passed down to them from the federal government. They just give it to who they're already in contact with. They don't give anybody else the chance to apply for that money" (Key Informant Interview, Jessica, 11/14/2023).

"I think that the only way to make this stuff more accessible to lower-income [people] is through subsidies, through, you know, SNAP and food benefits and schools, institutions

and places sort of having, like maybe even grocery stores got like tax credits to purchase locally can, you know, sell my product for like a slightly higher comparable price. The difference is made up in some type of incentive program just to kind of scale the local agriculture" (Key Informant Interview, Doug, 09/28/2023).

Two commonly reported themes amongst players involved in Mississippi's food system are frustration with strict and expensive governmental regulations, specifically for small-scale processing and marketing, and a sentiment that governmental funding is distributed inequitably, favoring larger producers. Meat processing regulations were reported to be especially disfavorable toward medium and small-scale processors (Key Informant Interview, Doug, 09/28/2023). Moreso, respondents felt that it was difficult to traverse regulations and that governmental entities like the USDA were unresponsive in assisting in navigating regulations. "We've had to learn a hell of a lot about our federally inspected meat processing and animal slaughtering, which is also an enormous, a challenging business, all kinds of separate enterprises" (Key Informant Interview, Doug, 09/28/2023). The burden was left up to individuals to research and understand them. In some cases, memberships in cooperatives or national associations provided assistance in navigating regulations (Key Informant Interview, Doug, 09/28/2023). Small-scale players also vocalized that government financial assistance is limited and distributed inequitably (Key informant interviews, Jessica, John, and Brittany, 11/18/2023). This burden was felt especially acutely by new producers, and beyond receiving aid for operations, Mississippi respondents felt that government subsidization is necessary for local producers to sell

produce at prices comparable to large-scale agricultural operations (Key informant interviews Doug and John).

This stands in stark contrast to the Italian government and the European Union's (EU) role in supporting small-scale, local food production and processing practices throughout rural Italy. Key informant interviews illuminated abundant EU grants related to sustainable farming practices and made available specifically to small-scale farmers (Key Informant, Nona, 07/29/2023). Respondents reported that EU grants were made easily accessible, and provided subsidies based upon land usage and production volume. A small grower in rural Basilicata received $40,000 annually to produce grain and seeds, while a small processor received a large grant to purchase their initial equipment (Key informant interviews, Nona and Felippe). Funding was provided through the EU's Common Agricultural Policy (Development 2023). Adequate grants and subsidies are directed toward small-scale producers and made more directly accessible to them, rather than placing mediating governmental bodies in charge of disbursement.

Beyond supportive financial assistance, the Italian government compiles and regularly updates compendiums of farmers and food processors, and makes this information available so that food system players can connect with one another based on proximity, products, production style, and size (Nona). Resources such as this were used by more than one Italian respondent to source raw products for processing and selling (Key informants Felippe, Cindy). Italian respondents cited no difficulties navigating regulations.

Theme three: Producer Constraints

“You know, I didn't have enough farmers in the area to provide food, I mean, produce for that market” (Key Informant Interview, John, 09/28/2023).

“Finding other farmers to work with is really hard. It's hard because, you know, there’s not very many farmers that farm the way I farm. Because I you know, I'm a sustainable farmer or I'm not certified organic, but I use organic principles” (Key Informant Interview, John, 11/15/2023).

“They can't find anyone to help them work. And it's an aging population in farm work. So most of the farmers that are in the Mississippi Delta are in their sixties and older. There are a few younger farmers, but not enough to take over the older farms. So that's one issue, is that they're just older. There's a decline in workforce. They can't find anybody to do the hard labor like harvesting. That's the most labor intensive part of farming and for produce, because there aren't machines that do that work for you” (Key Informant Interview, Jessica, 11/14/2023).

A large constraint cited by both Italian and Mississippian producers is limited labor, especially during harvest. In both regions, farmers characterized themselves and proximal farmers as aging, and cited difficulties in finding and affording workers during harvest season. In rural Sicily, producers cited a severe shortage of workers and consequently high rates for available workers (Marco, 06/23/22). Farmers from both regions also cited

high costs for labor as a constraint (Marco and John). Italian farmers were differentially influenced by this problem based on the amount of permaculture employed as well as the extent to which their harvests could be mechanized (Nona). Italian producers circumvented labor constraints by relying on social networks and staggering harvest times so that groups of farmers could collectively help one another with their harvests (Marco, Nona). A Mississippian respondent reported having started an analogous network in the Delta in which a small group of Delta farmers similarly assist one another with harvests, but this practice is limited in Mississippi, potentially due to a dearth of social capital (John).

Mississippi food processors and producers with contractual sales also reported difficulty in managing producer networks to reliably meet production quotas. This problem was influenced by producers' desire to associate with and sell with producers that share production techniques and values, like farming organically, minimizing pesticide use, or raising cattle above regulatory requirements (John, Doug). Mississippi respondents also felt significantly more limited in production capacity due to difficulty accessing capital to purchase equipment and facilities. Land and capital constraints also limited production expansion for MS producers and processors (John and Doug). MS farmers in cooperatives or labor agreements had interest in expanding their farm size, but were financially or geographically limited. Increasingly, large-scale farming operations are dominating MS Delta farmland and displacing medium and small-scale farmers (Doug, Jessica, Brittany). As the Delta region is predicted to transition to large-scale produce

farming due to climate change, this transition toward large-scale farms is forecasted to hasten (Brittany).

Theme four: Competition

"[The] European system imports from Morocco, Algeria and other countries like Portugal and Spain, they import oranges for a low price. And of course [consumers] prefer to buy cheaper…They import for maybe $.20 per kilo. And then if [we] have to [harvest] them, you have to pay and the cost to you is maybe $0.50 per kilo just to [harvest]" (Key Informant Interview, Marco, 06/23/2022).

"But I mean the problem is the food is too cheap and trying to make my stuff match commodity stuff is, the only way to sell it that cheap is to just replicate that their model, which I mean I would never be able to do that… I don't want to become the thing that inspired me to do it differently" (Key Informant Interview, Doug, 09/28/2023).

Local producers and processors in both regions cited difficulties competing against bulk production operations as well as the impossibility of matching prices. In Mississippi, small-scale players tended to adopt organic, organic-adjacent, or minimal chemical approaches which added further competitive hurdles (John). Italian producers had to compete with non-EU large-scale producers that utilized cheap labor and high mechanization to lower prices. Labor costs in rural Sicily were often twice the cost of bulk-produced food after packaging and import (Marco). Respondents countered this

with targeted marketing and branding that emphasized organic production and locality (Doug). Italians were more successful because of a higher concentration of specialty, local, and organic markets, a strong cultural preference towards locally-produced food, established customer loyalty, high product differentiation, and word-of-mouth advertising (Felippe, Cindy, Nona). Interestingly, all concerns of competition cited by Italian respondents were directed to non-EU bulk producers, rather than local or regional producers.

Theme five: Capital Access

"Access to capital is always challenging and there's options there. But we've been pretty reticent to go to the private capital market because we want to maintain control and ownership of what we're doing because it's our generational family land" (Key Informant Interview, Doug, 09/28/2023).

Mississippi producers, processors, and markets cited access to capital as a significant barrier to developing in the roles, increasing production, and positively contributing to local food systems in the Delta (Doug, John, Chicory). Specifically, a lack of governmental grants, subsidies, and loans was cited as a barrier to safe development. Food processors who required expensive equipment and large facilities to meet regulatory requirements had special concerns about funding operational expansions, or even initially entering the field (Doug). Private loans were unappealing to established food systems players due to unfavorable lending conditions and fear of losing ownership and authority of their operations (Doug, John, Jeff). New food system players, especially producers, felt

that private loans were inaccessible (John). Academic respondents cited inequity in governmental grant distribution that biases larger-scale and established farmers in Mississippi, who tend to produce commodity crops rather than horticultural ones (Jessica, Brittany).

Italian food system players circumvented these problems in two key ways. First, the use of social networks and regular inter-player communications facilitated bartering networks that included exchanging raw and processed food products, labor, knowledge, and equipment. Many of these relationships are the result of inter-generational, well-established barter networks that have yielded formal arrangements on a host of agricultural tasks (Nona, Cindy, Marco). Cited arrangements included providing raw milk for processed cheese, allowing others' sheep to graze on harvested land in exchange for labor, mutual harvest labor agreements, trading produce for labor, lending equipment for labor and/or produce, processing food products for a portion of the final product, exchange of specialized services (orange tree pruning, tractor repair, beehive maintenance) for produce, and a variety of sharecropping arrangements. An abundance of longstanding agricultural arrangements did not preclude newcomers from joining existing social networks; new food producers and processors felt they had abundant knowledge and social resources, reporting that longstanding farmers made initial social outreach efforts (Felippe, Cindy). Many of these arrangements were initially formed to avoid paying for labor, processing, or having to purchase equipment.

Second, Italian producers and processors were able to access and apply for EU

agricultural and development grants that funded equipment and inputs for new operations, and subsidized existing operations (Felippe, Nona). Respondents cited no difficulty in finding, applying for, and maintaining EU grants. Cumulatively, EU subsidization of small-scale farmers minimized barriers to entering local food production and processing, and significantly aided local food system players.

Theme six: Learning

"I really enjoy talking to small meat plants because we share the same challenges and resources" (Doug).

Connected (often multigeneration) players in Mississippi reported having adequate social access to knowledge resources related to farming and processing techniques, either from proximal producers or local and regional agricultural associations (Doug). New players without established social networks struggle to access these resources. Regional, racial, and socioeconomic conflicts may all negatively contribute to the ability of new producers and processors to integrate into established agricultural social networks. Italian respondents did not report this, citing examples of new producers and processors easily integrating into local social networks in Sicily and Basilicata (Felippe and Marco), often with outreach from existing food system players.

Discussion

Rural Mississippi and southern rural Italy face many similar hurdles to sustaining local food systems, especially related to production volume. An aging population of farmers, an extreme labor shortage, high costs of labor, and capital-intensive farming practices are all concerns that must be navigated. Beyond operating in a governmental atmosphere predisposed to subsidization, Italian food system players create and rely on social networks to overcome labor shortages, solicit specialized labor, and avoid having to rent or purchase equipment.

It was initially hypothesized that access to knowledge resources would be a significant issue for Mississippi food producers and processors, especially for new operators. Collected data suggests that this is not the case. While intra and inter-role networking was cited as a difficulty for new food system players, government extension offices offered technical services and support that ameliorated this deficit, suggesting that the current extension configuration is effective in supporting rural food system players. MS respondents cited that social networks, membership in cooperatives or trade associations, technology such as YouTube, and extension services cumulatively sourced sufficient answers to technical questions and problems. Interestingly, Italian respondents did not cite associating with Italian agricultural extension services, and many were not sure if Italian counterparts even existed (Marco, Felippe), suggesting a potential area in which rural Italy could benefit from examining Mississippi extension service operations. Despite effective extension services, MS respondents overwhelmingly cited difficulties navigating agricultural regulations, suggesting an avenue for improvement.

Both regions studied have very low population densities that make traditional marketing schemes, and even concrete markets, unviable. Italian farmers had the resources to create their own full-time food markets, but opted not to because the population they served did not supply sufficient demand. Instead, they sought flexible market options, such as local farmer's markets in the region; contracts with organic shops, intermediaries, and supermarkets; and on-site sales through word-of-mouth agreements. Groups of producers and processors also had well-established, multi-player bartering arrangements to provide sustenance foods to one another. A key difference between Italy and rural Mississippi was the flexibility of contract and market options presented to Italian producers, which can be partially attributed to the social nature of such contracts in Italy. An important caveat is that there are simply more markets in rural Italy than in rural MS. Local organic markets did not require long-term contracts with producers, and instead opted to buy produce as farmers offered it, often changing sold in the market weekly. Supermarkets also offered shorter-term contracts without strict production requirements, enabling deals with multiple small-scale producers. One of the most marked distinctions between the regions is the role of intermediaries in rural Italy. Purchasers belonging to cooperatives, regional associations, or simply regional businesses have established connections with a huge net of small-scale producers and maintain regular contact with them throughout harvest seasons to purchase harvested crops and sell them in bulk to regional and national markets. In this way, intermediaries offer small producers flexible access to regional and national markets without concerted effort from the producers. These relationships relied almost exclusively on word-of-mouth connections, with buying arrangements made on the phone. Such relationships, especially amongst regional intermediaries and buying

associations, allowed local producers to provide fresh food to an entire region without having to manage their own storage and transportation logistics; Italian producers would call local markets and intermediaries prior to a harvest and arrange a sale immediately following harvest. Market intermediaries, and flexible market options more generally, are the exception rather than the norm in Mississippi.

Supportive social systems do not exist pervasively in Mississippi. An academic informant involved in the Delta food system cited an instance in which one farmer needed an expensive pea sheller to process his own peas to make a profit after factoring in transportation, and had been struggling to source one for an extended period of time, instead relying on a third-party producer and reducing his profit margin to virtually zero. His neighboring farmer owned three pea shellers that had not been used in a significant period of time. It was not until the academic informant connected the two that a deal could be made. Contrarily, a grain farmer in Basilicata required an attachment to his tractor for a specific task, was able to locate one after two phone calls with neighboring farmers, and arranged a deal in which he would provide labor in exchange for using the tractor attachment, within an afternoon. Cumulatively, Italian food system players utilize social networks to overcome production constraints, minimize capital requirements, manage market connections, and even source their own food.

A dearth of social capital, which may be tied to regional, racial, and socioeconomic differences amongst Mississippi producers and processors, leads to limited social network development and utilization, especially for new food system players. The

cultural and historical context of farming two generations post Jim-Crow era Mississippi likely contribute to this social environment, and must be considered in making recommendations based on observed Italian best practices.

Cumulatively, Italian food system players were better connected to both other players occupying the same role (i.e. two producers) and between roles (i.e. a producer and a processor). Much of this can be attributed to Italian food and social cultures and intergenerational involvement in the food system, but the Italian government has also played a significant role in facilitating these connections. The government compiles a contact list of Italian producers, processors, and markets, organizes by region, production technique, and food products, and makes provides the compendium to food system players. Respondents cited using this list to source bulk products for processing, and to connect with regional processors (Felippe, Nona). Collectively, Italian players utilized social networks to overcome production constraints, minimize capital inputs, improve agricultural techniques, and access novel markets, partners, and customers, all of which were cited as difficulties by Mississippi respondents. Based on this comparison, facilitating social network formation and promoting the utilization of networks, particularly for equipment sharing and labor assistance, would benefit Mississippi food system players. Increasing the government's role in connecting players occupying different roles in Mississippi's food system is one recommended avenue to do so. The Italian government's method of compiling and sharing contact information compendiums would be a simple place to start; collecting further information such as involvement in

organic production, production scale, types of production, and location could facilitate more pragmatic use of this information.

There is also a need to improve the connections between Mississippi food producers. There were numerous provided anecdotes, such as with the pea sheller, that indicate how improved collaboration between producers could ameliorate many of the most-cited hardships in rural Mississippi, especially related to production constraints. In this case, non-governmental entities such as non-profit organizations or even universities with established regional knowledge stand as a powerful tool to connect food system players to one another. There is a need to increase their role in the Mississippi Delta food system.

Similarly, more accessible technical assistance for small-scale players interested in applying for government grants would greatly improve capital access in the Delta. Support in capacity building and grant writing could help overcome difficulties in governmental grant application processes, which can favor large-scale producers, businesses, and institutions. There are instances of such programs, such as the Environmental Protection Agency's (EPA) Environmental Justice Thriving Communities Technical Assistance Centers (EJ TCTAC) program. This program funds the establishment of nationwide technical assistance centers that support communities in navigating federal grant applications related to environmental justice. These technical assistance programs are specifically geared towards "providing technical assistance, training, and related support to communities with environmental justice concerns and their partners. The new technical assistance centers will provide training, assistance, and

capacity building on writing grant proposals, navigating federal systems such as Grants.gov and SAM.gov, and effectively managing grant funding. These centers will also provide guidance on community engagement, meeting facilitation, and translation and interpretation services for limited English-speaking participants" (US EPA 2022). The United States Department of Transportation has a similar program, called the Thriving Communities Program, that similarly aims to fund groups that provide capacity building and support for disadvantaged communities to become competitive in applying for federal aid for infrastructure projects (US DOT 2023). Within the agricultural sector, the USDA hosts the Rural Partners Network (RPN), which aims to improve the ability of rural communities to apply for federal funding (Rural Partners Network 2023). While such technical assistance programs exist, more specific programs should be developed for small-scale business owners. As Mississippi respondents stated that extension services were inadequate resources for fielding questions related to production and processing regulations, a consolidated government outreach role in assisting small-scale operators to navigate regulations could also improve production.

Conclusion

The association between food insecurity and worsened health outcomes has been well documented in the international literature. The Mississippi Delta has the highest rate of food insecurity in the United States, is one of the most impoverished, and observes high rates of chronic diseases that burden community health resources and increase vulnerability to health shocks, such as the Covid-19 pandemic. Regions in rural and insular Italy share pertinent characteristics, such as agro-ecology and sociodemographics,

with rural northwestern Mississippi yet have significantly higher food security and lower rates of chronic diseases. A comparison between rural Italy and Mississippi yielded culturally-pertinent suggestions to improve food security in the Delta. A greater governmental role in creating or funding systems that build capacity and provide technical assistance for small producers to apply to state and federal funding would reduce production constraints related to throttled access to capital. Nonprofits and well-connected institutions have been successful in connecting food producers to one another and instigating initiatives like mutual labor assistance and equipment sharing; an increased presence in the Delta would especially benefit new and developing producers. There is also a need to improve contract and market flexibility for small-producers, especially in markets that offer benefits such as SNAP.

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