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April 17, 2014 Webinar
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Slide 1: Thanks so much for tuning in for today's webinar. I will be sharing selected portions of my research that I conducted at the University of Missouri-Columbia. I will not be going too in-depth with every aspect of the research, especially the analysis, but have included a number of slides for reference purposes and can answer questions following the presentation. I have three main objectives for this webinar. First, by the end of the webinar, I want you to 1) Understand the importance of moving towards working together to establish ways to measure community food security in the United States; 2) Know where to access relevant data for appropriate geographic areas and how to pair them with localized data, if that is your desire; and 3) Consider how this method could be used in your work to best inform intervention strategies, in terms of policy or practice, in diverse communities.

Slide 2:

Population increases, loss of arable land, climate change, and the dependence on non-renewable energy inputs threatens our global food system. Global food and energy demands are at an all time high. This has contributed to rising food prices which impacts vulnerable, low-income populations the most. Increased need means strains on community resources. People may have limited food choices which often results in poor diets. Childhood food insecurity impacts cognitive and emotional development which can impact educational attainment. Food insecure adults have higher rates of depression, anxiety, social isolation and low self-esteem often brought on by the challenge of having enough food to last the month. Chronic diet-related diseases such as diabetes and high blood pressure are common in food insecure households. Communities experiencing high levels of food insecurity may have an impaired work force which impacts community viability. People working in a variety of settings from the micro to macro level have the skills to intervene and work with communities to consider long-term sustainable solutions to respond to the growing needs.

Slide 3:

As many of you know, household or individual food security is measured by the United States Department of Agriculture (USDA) through an annual valid and reliable survey. There are various forms of the survey, and each year, as part of the December Current Population Survey, state food security is reported using three year's of data. The USDA method uses four levels of food security. Low and very low level food security means there are reported dietary changes and indications of missed meals, lower quality diet, or reduced food intake.

Food insecurity is highest among people living below the poverty line. Nationally, the most vulnerable populations include single-parent households, African American households, and Hispanic households. Rates have been increasing since 2006, with the highest increase in the very low food insecurity category.

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In Missouri, very low food security has increased by 20% since 2003 and 23.4% of households with children are food insecure.

Research has shown that childhood food insecurity impacts cognitive and emotional development which can impact educational attainment. Food insecure adults have higher rates of depression and anxiety, often brought on by the challenge of having enough food to last the month. Adults also report social isolation and low self-esteem. Chronic diet-related diseases such as diabetes and high blood pressure are common in food insecure households. Communities experiencing high levels of food insecurity may have an impaired work force which impacts community viability.

Since data is not available at the county-level, researchers have developed county-level estimation models based on significant state-level predictors like poverty and race that research has been shown to be strongly related to food insecurity. This includes estimates often reported through Feeding America's "Map the Meal Gap," lead by Dr. Gunderson, as well as estimation models from Oregon State University and the University of Missouri.

The research I conducted is based on community food security which addresses health, social, economic, and environmental justice issues within the food system. This is used widely by multi-disciplinary university researchers and community agencies. At this time, however, no real measurement exists for community food security. For the purposes of my study, which was conducted in the state of Missouri, counties act as surrogates for community, although the methodology can be applied and modified for different geographic boundaries.

Slide 4: When I began my research, a review of literature looking at ways to measure community food security revealed several major categories to consider, each with different indicators, depending on the 1) availability of data, 2) level of data, i.e., state, county, city, 3) funding and time available. Much work around the US has been done to look at ways to quantify as well as map issues like food access, food availability, and different aspects of food systems. We'll be spending a lot more time on which categories and indicators I used, but I wanted to show the key areas which served as a starting point for my own work. If you want a detailed summary of the literature, these categories, sub-indicators, and location of data, please email me and I can provide those for you after the presentation.

Slide 5: This is an adapted chart from Mark Winne, Hugh Joseph, and Andy Fisher's comparison of traditional anti-hunger models. These models traditionally work to treat the problem. So, if food is needed, provide food (like emergency food programs). If food and nutrition is needed for health purposes, like in the case of WIC, provide food and nutrition education. These are not two models running parallel, as they work well to meet emergency needs while taking into consideration ways to provide long-term sustainable solutions. This chart shows how community food security moves towards thinking about public health issues, policy and

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planning to support strategies to create healthier communities, ways in which academics and community partners and business people can work together to tackle issues together, and how community food security really moves us in the direction of thinking about food in terms of economic development viability for people and communities, jobs, farmland preservation, different scales of farm viability, healthy people, environmental stewardship, and the social resources and vitality available in a community.

How food insecurity has been framed, defined, and measured has influenced the approaches, interventions, and policies. The question kept nagging me that if we have this utopian definition of community food security, but there is no way to measure it yet, how can we determine the most effective and efficient intervention strategies to address the problem? How can we move away from only relying on short-term solutions, such as SNAP/Food Stamps that are currently being threatened to consider ways to invest in communities and people to create long-term strategies to ensure that the needs of all people are being met, while keeping in mind the environmental threats.

Slide 6: This study uses a social-ecological systems framework that includes social development and sustainable development. The underlying value is social equity. Social development is a process of planned social change that incorporates economic development while promoting population health and sustainability. The sustainable development model addresses the importance of providing a safe food supply in communities, while maintaining balanced ecosystems.

Slide 7: Since much previous research and county-level estimation models have used socio-demographic predictors like poverty level and unemployment, my study was conducted to extend the knowledge of food security at a county-level to include food environment indicators. This includes exploring how access to food stores, availability of various food stores, affordability, availability and use of public food assistance programs like the Supplemental Nutrition Assistance Program (SNAP), or Food Stamps, private food assistance like obtaining food from a food pantry, and local food production and distribution relate to food insecurity.

Slide 8: Since most food security research has been conducted in urban areas, and Missouri is largely rural, I wanted to identify the most important components in the food system that impact food security at the county level in rural areas. I also wanted to look at risk factors and protective factors related to food security and identify differences in community food security factors between rural and urban areas.

Slide 9: My sample include all 114 Missouri counties and St. Louis City. Using the Office of Management and Budget designations, 81 counties were labeled as nonmetropolitan, or rural, and 34 were labeled as metropolitan, or urban. Missouri

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is an interesting place to conduct community food security research because of the wide variety of agricultural landscapes.

Slide 10: It was really important for me to consider a methodology that was not only robust and comprehensive, but one in which could serve as a starting point for localized work to answer localized questions around community food security. It was also important to consider the plethora of data sources that any person with an Internet connection could access. Much of what I include is free data. Many people may want to consider localized issues that are important to their community. I am sure many of you are familiar with Community Food Assessment processes in which core issues are defined by the people in that particular community. For example, I did not include anything about wages, even though clearly wages of people working in the fields, in processing, in distribution, in waste management, and in food services, is an important aspect of economic and social justice aspects of community food security. People interested in very specific environmental aspects of community food security may want to include more measures related to issues like water usage or leakage of pollutants in the food system. It is up to the community to decide their focus, which can be added in to this model. Lastly, some data is not available at very localized levels, like neighborhoods, but really, either using estimation techniques or doing on-the-ground work, you can get much of the same information. The idea here is that this is a starting point.

Slide 11: I used several data sources in this study and will go through each of them for your consideration. Much of this data is updated annually, while some of it had to be gleaned or sought by government agencies.

Slide 12: Various Census data files can be accessed by anyone, though I will say there is a learning curve in terms of the types of information you are seeking. You will want to consider whether to use the 3-year estimates, five-year estimates, or one-year estimates. This is largely dependent upon considerations of population levels in your area and the accuracy of your data. For example, I conducted this research a few years after the 2008 economic crash and housing crisis, so I had to consider the years of my data.

Slide 13: Housing is an important consideration for communities. Affordable housing is usually defined as not costing more than 30% of a household's income (sometimes people include utilities, sometimes they do not). There has been some research pointing to a direct relationship between high percentages of households paying more than 30% (and especially more than 50%) for housing and how this has impacted food budgets. If you think about specialized populations, beyond people who are low income, such as seniors who are on a fixed income, housing costs may become more of an issue as incomes decline and food needs may have changed due to health issues.

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Slide 14: Poverty and Unemployment are important indicators of food insecurity. You can obtain monthly unemployment figures, which again you must consider what questions you are trying to address and which figures make sense for your own study.

Slide 15: This is a reference link for those who are interested in the data obtained from the USDA Food Environment Atlas, which at the time of this study, was very new. It is loaded with great information and links to data.

Slide 16: Since the Ver Ploeg, et al's 2009 report to Congress, discussions of food deserts and food access have dominated the literature, as financing has been attached to areas identified as having low access to food stores. Data is available related to access to transportation, percentage of low income people, and distance to food stores (which varies depending on whether an area is urban or rural). Of course, since that time, discussion has ensued about access. Issues like public transportation or safety or routes people take or whether people are leaving from home to access food have all come up in critiques.

Slide 17: When we talk about availability, we are usually talking about the availability of different types of food stores. Different research, including some I conducted for a different project, as well as local community food assessments, point to differences in the availability of food at different food stores, especially as it relates to "healthy food" (such as lean meats, low-fat dairy, whole grains, fresh produce), and the differences in affordability of food at different stores. This often looks different between rural and urban areas.

Slide 18: Places like the CDC whose focus is on health, have pointed to areas where fast food restaurants outnumber food stores, pointing to concerns about access to healthy foods.

Slide 19: You can get information about usage of various food assistance programs from the USDA Food Environment Atlas, though to get better data, it is best to access your state, county, or city programs.

Slide 20: Some of the data on these food assistance are limited, and you can only get state-level data.

Slide 21: Sources like the Food Research and Action Center (FRAC) may be helpful in accessing more timely analyses of eligibility vs. participation for different food programs.

Slide 22: I was part of a team that regularly produces the Missouri Hunger Atlas and has relationships with all of the foodbanks in the state. So data about the amount of food distributed through their pantry network and through their adult and child

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care centers was available through those relationships. Additionally, annual data concerning participation rates in different programs was available.

Slide 23: As a reference, this is a page from the Missouri Hunger Atlas. More can be found on the link from the previous slide.

Slide 24: It is always a challenge obtaining information about ag production, beyond the large subsidized agri-businesses. There are different ways to obtain this data, including considerations about direct farm sales, point of sales, actually conducting a statewide survey of farmers,

Slide 25: or looking at types of food grown (keeping in mind the complex food system and that it is hard to track where food grown ends up)

Slide 26: But important to community food security are markets like CSAs and farmers markets that consider economic, social, cultural, and health aspects of community food security. Much of this data may be gleaned from sources in your own communities.

Slide 27: During my time at Missouri, I also worked with the Center for Applied Research and Environmental Systems that had a Community Issues Management system and many GIS experts.

Slide 28: When you can, check out this amazing resource. It is a web-based collaborative network that has lots and lots of data, and starter maps, for those interested in spatial analyses. They have worked with many groups and agencies across the country around a variety of food issues, especially related to childhood obesity.

Slide 29: As mentioned before, my study used counties for communities. You would want to consider the appropriate level for the questions being asked and the uniqueness of your community. Other food system variables may be considered as well.

Slide 30: This exploratory study had several steps. The first was to estimate the county-level food insecurity rates which are labeled as food uncertainty so as not to confuse with the USDA food security measurement. Next, a Principal Component Analysis was used to reduce the data into components. Then, the components scores from the PCA were regressed onto the county-level food uncertainty variable. They were used in a regression model to estimate a new variable, community food uncertainty. Last, sub-analyses were conducted to analyze significant differences between groups.

Slide 31: Since county-level food insecurity rates are not available, a validated model estimation technique developed by researchers from MU's Interdisciplinary Center

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for Food Security was used to estimate county level food uncertainty. Nine state level socio-demographic predictors were regressed onto food insecurity rates for every US state and the District of Columbia.

The state-level coefficients were used as multipliers with the county-level data for each of the 9 sociodemographic predictor variables. This allows us to then obtain an estimate of the percentage of households who are food uncertain in each county in the state. The range of food uncertainty is 9.18% in Platte County to 24.28% in Pemiscot County.

Slide 32: This table shows the means, standard deviations, and ranges for the county-level data for the 9 socio-demographic predictors and the estimation of county food uncertainty. Please note that the asterisks signify significant differences between the rural and urban sub-samples. The range of food uncertainty is 9.18% in Platte County to 24.28% in Pemiscot County.

Slide 33: Using a method established by Lopez and Tchumtchoua in 2005, a Principal Components Analysis, or PCA, was used to reduce the food environment data. Strict criteria were used to determine which components to retain.

Slide 34: The next three slides show the 6 extracted components, the indicators, loading levels, and the percent variance explained in descending order. Components loaded between 3 and 5 indicators. The first component includes food programs, such as the amount of food distributed by emergency food programs and the number of Community Supported Agriculture Program sites and explains 28.14% of variance. The second component relates to transportation and distance to food stores and explains 15.16% of variance.

Slide 35: Component 3 relates to agricultural production, while Component 4 explains 8.73% of variance and includes indicators related to WIC, SNAP, and housing affordability.

Slide 36: Direct Farm Sales, which are those sales sold directly to the final consumer are captured in Component 5. Component 6 addresses the availability of farmers markets and SNAP-authorized stores, as well as the percentage of households paying more than 30% for their mortgage, indicating housing unaffordability.

Slide 37: The extracted component scores were then regressed onto the modeled county level food uncertainty estimation from Step 1 to identify the most important food environment predictors of food insecurity. The model includes the 6 component scores and explains 58.7% of variance. Four out of 6 components were significant. Availability and affordability contributed the most, followed by program usage, access, and agricultural production.

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Slide 38: This is a comparison of the two methods of measurement, the first just based on sociodemographic predictors of household food insecurity, and the second adding in the aforementioned community-level variables. The legend is hard to read, but black represents the highest percentages of household or community food insecurity, followed by brown, orange, turquoise, and yellow.

Slide 39: This study is useful to policymakers or practitioners who are interested in designing ways to improve community food security. Independent samples t-tests were conducted between the 10 counties with the highest percentage of community food uncertainty and the 10 counties with the lowest percentage of community food uncertainty. Various risk factors were identified in the high community food uncertain counties. Policymakers and practitioners may also want to take a look at protective factors in a county that may decrease the percentage of community food uncertain households. This table presents each component and selected significant indicators in descending order, so if possible, it would make sense to start at the top when planning interventions as those were found to have the greatest impact on food insecurity. Transportation limitations and distance to food store was a major risk factor, while housing affordability protected communities. Counties with low percentages of community food uncertainty distributed more food and had more CSA programs. Agricultural areas were more likely to be community food uncertain. A person working in this field may develop strategies to increase affordable housing stock, pilot a CSA program, work with city planners on improving public transportation, or work with food pantries to develop partnerships with food stores, producers, and donors to increase their supply of food for distribution.

Slide 40: Another contribution of this study is the emphasis on rural areas. In Missouri, 9 out of 10 of the most community food uncertain counties are rural. The one urban community is St. Louis City. Independent samples t-tests were used to look at the differences between rural and urban communities. Again, this table presents the components in descending order of their contribution to community food security. Rural communities had a higher percentage of people paying more than 30% for housing, had higher transportation limitations, and traveled farther to purchase food. Urban areas had less grocery stores per capita, more WIC redemptions, more CSA's, and distributed more emergency food.

Slide 41: As an example of how someone might use this study in their own community, let's revisit where we started. The first map is the estimated percentage of households in each county that are considered food uncertain using the 9 socio-demographic indicators in the county-level estimation model. Although it is hard to see, the map is divided into quintiles. The black areas represent the highest percentages, followed by brown, orange, blue and yellow. On the right is the estimated percentage of households in each county that are considered community food uncertain using the estimated county food uncertainty as the dependent variable and the 6 weighted component scores as independent variables. This new estimation improves on the first model by including food environment indicators.

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One reason it is useful to compare the two is to determine if there are communities that are significantly different when food environment indicators are included. One such county is Ozark County, which was estimated to have around 15% food uncertainty, which was ranked towards the upper middle of all Missouri Counties. However, when food environment indicators were included, the percentage increased to over 20% and it is ranked as the 4th highest community food uncertain county. The components and indicators can then be explored to target interventions or policy changes.

Slide 42: A person working in Ozark County may look at the selected indicators that significantly differed from the mean for all Missouri counties and for all rural counties. Again, the table is presented in descending order of the contribution to food security. It is evident that housing affordability is a major risk factor for Ozark County. Transportation and distance to stores is problematic, and there is only 1 WIC-authorized store. Another major area of concern is the pounds of food distributed per capita, which is well below the average. Although Ozark County is not an agricultural area due to its geography, CSA distribution sites from nearby counties for meat, produce, or dairy may be piloted as one example of a way to improve access to healthy foods since there are no sites at this time.

Slide 43: At this time, this is the only known method for measuring community food uncertainty. It is a practical method for professionals since it allows a way to conceptualize systems components that can be targeted for manipulation through interventions. The findings are useful for teams from several disciplines as they provide evidence for appropriate areas to intervene that impact community food security. This is especially useful for grant applications that target public health.

Slide 44: My study had a few limitations. For one, counties were used as surrogates for communities in one state and findings may not be generalizable. Since I used secondary data, I was limited by the time frame in which some of the data was collected. Also, the agriculture data was not available for St. Louis City and for some variables was combined with St. Louis County. The study is also based on a modeled dependent variable rather than an absolute measure of county-level food security. I was not able to include health or environmental variables that would reflect those aspects of the Hamm and Bellows Community Food Security definition.

Slide 45: This is a working model showing a complex number of issues that need to be addressed when moving towards measuring community food security.

Slide 46: In the future, I would like to build on the current model by including county-level data from different states or conducting this research at a different geographic level, such as a city or a town. I am interested in collecting primary data at a more localized level, especially related to agricultural production, and the prices and types of food available at various food stores. I plan to compare this model with one using data from a time period prior to the economic recession. I am

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considering which health and environmental variables to consider. I may use more advanced techniques such as Hierarchical Linear Modeling or Structural Equation Modeling. Since emergency food programs and public food assistance programs are being strained, considering the impacts of higher eligibility and usage will be important in the future.