

Rural Health Disparities: Connecting Research and Practice

Brianna Routh

Montana State University

Janie Burney

University of Tennessee

Kimberly Greder

Iowa State University

Mary Jo Katras

University of Minnesota Extension

Kristen Johnson

University of Tennessee

Abstract

Health disparities are prevalent in rural communities across the United States due to compositional factors (socioeconomic status, race/ethnicity, health behaviors) and contextual factors (access to resources). We identify health behaviors and outcome implications for rural families across the multistate USDA Hatch Act–funded projects Rural Family Speak/Rural Families Speak about Health (RFS/RFSH). Project findings cover the cyclical nature of depressive symptoms, factors influencing household nutrition and physical activity behaviors, importance of social supports, and use of health information. We also identify principles for action within the Extension land-grant mission including (1) delivery through mobile formats, (2) incorporating multiple family members, and (3) building on Policy, Systems, and Environment (PSE) approaches both within Extension program areas and across systems levels in the community. Rural health efforts need further adaptation and implementation across diverse communities. Extension can achieve this through professional development and evaluation efforts.

Keywords: rural, health disparities, policy, systems, environment

Rural families experience disparities in health outcomes, which in turn impacts overall community well-being (Singh & Siahpush, 2014). Specifically, disproportionate rates of chronic diseases, acute unintentional injury, and suicide are persistent, with increasingly lower life expectancy in rural communities (Moy et al., 2017; Singh & Siahpush, 2014). Furthermore, rural families have lower average household incomes and experience higher rates of poverty than their urban counterparts (Sparks, 2012). Greater distance to services and resources in rural communities compounds these economic and health disparities (Crowley et al., 2015).

This article highlights findings from two multistate USDA Hatch Act–funded projects, Rural Families Speak (RFS) and Rural Families Speak about Health (RFSH), and outlines potential directions for Cooperative Extension and outreach to help address rural health disparities. RFS (1998–2007) focused on assessing the economic and overall well-being of over 500 rural, low-income families across 17 states in the context of the 1996 welfare reform (Bauer, 2004). Building upon findings from RFS, RFSH (2008–2018) examined the interactions among individual, family, and community factors that affected the health and well-being among over 400 rural, low-income families across 11 states (Mammen & Sano, 2018). Details regarding recruitment, measures, etc. can be found in Bauer (2004) and Mammen and Sano (2018).

Numerous research efforts have suggested or tested health promotion strategies and prevention efforts to reduce health disparities in rural America (Folta et al., 2009; Smith et al., 2008; Vadheim, 2010). Such efforts often focused on specific health conditions and rarely had mechanisms in place for sustainable expansion to other rural communities. As an integral part of the land-grant system, Cooperative Extension (referred to as Extension throughout) has a unique national capacity to understand, act, and address health disparities within rural communities.

Why Focus on Rural United States?

Health disparities have largely been linked to compositional factors (e.g., socioeconomic status, race/ethnicity, health behaviors) and contextual factors (e.g., access to resources). For many rural families, these factors are interconnected and have health implications across the lifespan (Probst et al., 2004; Sparks 2012). Minority and low socioeconomic populations within rural communities experience health disparities at even higher rates, thus, indicating the compounding effect of risk factors (James, 2017). Additionally, compared to their urban counterparts, rural communities have lower rates of leisure time and physical activity, as well as higher rates of smoking, food insecurity, and individuals who are uninsured or participate in Medicare (Singh & Siahpush, 2014; Weinhold & Gurtner, 2014).

Interestingly, there are similarities among health challenges experienced by rural and urban communities including the contextual challenges of distance to resources and affordability

(Katras et al., 2004; Katras, 2003; Phillips & McLeroy, 2004; Singh & Siahpush, 2014). Similar to some urban communities, rural communities often experience lower educational attainment levels, older housing structures, and fewer high-paying, professional job opportunities compared to their suburban counterparts (Sparks, 2012). Compared to urban counties, rural counties are more likely to have food deserts, defined as locations where all county residences live 10 or more miles from a full-service grocery store (Bailey, 2010). Additionally, rural communities experience lower rates of health insurance and health care access associated with fewer primary care physicians or mental health providers per capita, variation in occupations and employment rates, and hospital closures (Sparks, 2012; Kaufman et al., 2016; Weinhold & Gurtner, 2014). Differences in health challenges may be associated with population density, potentially affecting the viability of health-related resources in rural areas compared to their urban and suburban counterparts (Parker, 2011). Contextual factors associated with health disparities shape an individual's ability to enact their desired health behaviors, as well as realistic approaches to promote health within these communities.

Overview of RFS and RFSH

While the RFS and the RFSH projects each had specific aims, both projects included data related to the health and well-being of rural families. Collectively, data from approximately 1,000 rural low-income families across 23 states was examined (Mammen & Sano, 2018). This article focuses on health-related outcomes across both projects. In both projects, in-person interviews were conducted with low-income rural mothers or female primary caregivers to understand contextualized impacts on individual and family health. Across both projects, quantitative data related to general health status, prevalence of health problems, depressive symptomology, health care access, health insurance status, and demographic characteristics (i.e., household make-up, employment, education, financial resources), and qualitative data related to family health challenges were collected. However, in RFSH, qualitative data related to family health behaviors, and family influences on health behaviors, and families' ability to maintain desired food, physical activity, and health care behaviors were also collected. Additionally, quantitative data related to children's general health-related behaviors, family routines, family food and physical activity behaviors, and co-parenting were collected.

To understand the scope of rural health outcomes from these two diverse, multistate efforts, co-authors conducted a search for all scholarship discussing health outcomes from data collected throughout the RFS and RFSH projects. Scholarship included journal manuscripts, poster presentations, dissertations, and project basebooks, with 27 total products reviewed. Key health behaviors and health outcomes findings were grouped into contextual categories aligning with the socio-ecological model (Bronfenbrenner, 1977) within rural communities. Additional articles were reviewed for supporting or contradicting evidence in rural communities as well as to

understand how Extension outreach might be able to further support the health of rural communities into the future.

Health Behavior and Outcome Findings

Findings across both projects suggest that health behaviors and outcomes are situated within the complex framework of the socio-ecological model (Bronfenbrenner, 1977). Analysis identified supports and challenges to health behaviors and outcomes at the individual, family, and community contexts, as well as intersectionality across contexts.

Individual Context

Multiple analyses from RFS/RFSH data found that individuals often faced multiple health risk factors. One RFS research article found these rural mothers had multiple cancer-related risk factors, including that 36% were smokers, 39% reported low physical activity levels, and 45% were obese (BMI over 30), with 35% having two or more risk factors (Noonan, 2016). Another analysis from RFSH mothers found increasing maternal depressive symptoms were associated with increasing maternal BMI (Routh, Doudna, et al., 2015).

A common strategy for addressing individual health risk factors is direct individual health education. However, RFS/RFSH findings suggest that low-income, rural mothers may have challenges with understanding, or even receiving, health messages (Mammen et al., 2018). At times, health professionals' use of medical terms (particularly for immigrant mothers) were predominant barriers to understanding health information (Reina et al., 2012; Routh, Greder, et al., 2015). Mothers may turn to trusted social networks or search online to find more understandable information related their own or their child's health (Routh, Greder, et al., 2015). These findings support literature suggesting that adults may increasingly seek health information via technology (Baker et al., 2003; Fox, 2011).

Family and Household Context

Family relationships and household-level factors were associated with behaviors and outcomes across both projects. Reported food and physical activity behaviors in RFSH households were associated with maternal depressive symptoms (Hyjer Dyk et al., 2015). Half of all RFS families (50.5%) reported food insecurity in 1998, and 39.7% of RFSH families reported low or very low food security in 2011 within their homes (Sano et al., 2018). In addition, living with a family member with depressive symptoms may hinder the ability to work outside of the home as family members may need to request time off work to care for family members with depressive symptoms (Sano et al., 2008). Researchers suggest that depression is also potentially bi-directionally linked to household food insecurity (Routh et al., 2016); in fact, having just one

family member with depressive symptoms may reduce the likelihood of a household becoming food secure (Huddleston-Casas et al., 2009). Similarly, though, findings indicated that social support, or presence of positive relationships, may decrease the likelihood of maternal depressive symptoms (Garrison et al., 2004).

Community Context

In line with previous research in rural communities, RFS/RFSH research found similar challenges associated with health behaviors and outcomes in community settings. Utilization of healthcare services depended not only on the emotional and cognitive processes of mothers (Simmons et al., 2008), but also accessible transportation and geographic distance to affordable options (Downey & Greder, 2014; Sano et al., 2011). Similarly, findings indicated that health problems may hinder a mother's ability to obtain education and work, resulting in being uninsured and in economic hardship (Berry et al., 2008). Having a job was associated with having fewer depressive symptoms and fewer health problems, while having, or perceiving to have, a challenging financial situation was associated with a higher likelihood of depressive symptoms (Sano & Richards, 2011). For some of these rural women, transportation was also a barrier impacting women's weight, eating patterns, and ability to engage in physical activity (Bove & Olson, 2006; Hyjer Dyk et al., 2015). Formal and informal supports also indicated associations with food security for RFS families. While federal food assistance programs were not significantly associated with household food insecurity, participation in the "food stamps" program (currently Supplemental Nutrition Assistance Program, or SNAP) was associated with decreased risk of hunger, and interpersonal relationships, such as church membership and getting together with friends, were protective against food insecurity (Swanson et al., 2008). Additionally, the rural environment was not always a barrier, as some rural residents discussed the presence of nature trails, safe communities, and local supports providing opportunities for fulfilling desired health behaviors (Izenstark et al., 2016).

Intersectionality Context

Across individual, family, and community contexts, the intersectionality between the rural experience and the experience identifying as a member of another often-underserved group was associated with RFS/RFSH outcomes. Findings indicate that rural African American, Native American, Latino Immigrant, and LGBTQ+ individuals and families experienced disparate health behaviors and outcomes (Greder et al., 2009; Greder et al., 2012; Sano et al., 2011; Mendez et al., 2016; Cancel-Tirado et al., 2018). For example, household food and physical activity behaviors were significantly associated with identification as a Latina immigrant (Routh, 2018). Mother's identification as a Latina immigrant was also a modifier indicating more adults in the home was associated with fewer healthy household behaviors (Routh, 2018). A case study of a lesbian mother found that while she was able to find some support for financial or parenting

stresses, but using these supports often meant enduring devaluation or discrimination surrounding her sexual identity (Mendez et al., 2016). Disparities are also reflected in access or utilization of health care resources as Latino, African American, and Native American parents and/or children were less likely to report having health insurance compared to their non-Latino, White counterparts (Sano & Richards, 2011).

Extension as a Resource for Reducing Rural Health Disparities

Although there are many programs working to address health disparities nationally, few have implemented more programs embedded in rural communities than Extension. As the outreach arm for land-grant institutions across the nation, Extension is uniquely positioned to develop and deliver research-informed, trusted resources and education that address the needs at all socio-ecological levels including individuals, families, and communities. The National Framework for Health and Wellness outlined by the Extension Health Task Force identifies how Extension nationally serves the mission to “increase the number of Americans who are healthy at every stage of life” (Braun et al., 2014). This framework aligns with the U.S. Department of Health and Human Services’ National Prevention Strategy Action Plan (National Prevention Council, 2011), incorporating Extension priority areas, the social-ecological model, and co-creating with community partners. As stated by Meyer et al. (2018), “Catalyzing and supporting innovation is a historic purpose and ongoing mission of Extension.”

Integrating RFS/RFSH findings across socio-ecological systems and areas of Extension programming can improve the health of rural communities. The section below outlines strategies informed by RFS/RFSH findings and specific examples of Extension’s current innovative work.

Individual Context: Technology

As rural families face challenges in accessing health resources, Extension direct education remains critical. In addition to the traditional, in-person delivery, RFSH findings suggest that technology provides opportunities to reach mothers through email or mobile messaging (Mammen et al., 2018). These findings are supported by a Montana State University Extension needs assessment that found approximately half of current and future Extension participants were interested in traditional, in-person delivery, while electronic newsletters, online courses, and short how-to videos followed closely behind (Routh et al., 2020). By exploring and developing options for delivery via technology, Extension could reach current and new participants in meaningful ways with research-informed health information. Further building the expertise within Extension in technology delivery, including online courses, text messages, videos, and/or mobile apps, may be particularly important in light of public health crises such as COVID-19. Examples of current Extension technology efforts include the following:

- A text messaging program to engage parents in their children's school nutrition education with behavioral nudges (Grutzmacher et al., 2017). The program has shown success in increasing fruit and vegetable intake of parents and children in Maryland.
- A text messaging campaign to improve health insurance knowledge, confidence, and behaviors among millennials developed through a process of design thinking and concept mapping by an Extension Health Insurance Literacy Action Team (Kiss et al., 2018).
- A program incorporating video, Facebook, and collaboration with local college students to develop and deliver diabetes education on preparing healthy foods for a young adult audience (Thomas & Donaldson, 2018).

Household Context: Multiple Family Members

To promote increased social and family support for health behaviors, Extension programming could encourage multiple family members to participate together. While many programs integrate strategies for addressing the family, fewer engage multiple family members directly in programming efforts. While family-based health prevention programs are widely suggested and occasionally attempted, they are often limited in scope, focusing on a particular parent and/or child (Kitzmann & Beech, 2011). Programs traditionally tailored to individual behavior change could consider incorporating multiple family members to support greater potential individual and family-level change. Current examples include the following:

- Abriendo Caminos—Clearing the Path to Hispanic Health is a healthy lifestyle curriculum designed for low-income, low-literature Hispanic families. Together, adults and youth engage in a series of workshops focused on healthy dietary behavior patterns and basic knowledge of nutrition, physical activity, and the organization of collective/shared family mealtimes (Hammons et al., 2013).
- GGrandS (Grandfamily Resilience and Sustainability) is a family life education program designed to respond to the increasing number of grandparents raising grandchildren. One of the objectives is to fortify family relationships and connect the family to community resources (Forthun et al., 2018).
- Military family camps: In partnership with the Department of Defense, U.S. Department of Agriculture, and 4-H youth development, multiple states are engaging in military family camps to promote strengthening of resiliency through facilitated teamwork and family cohesion (Ferrari, 2015).

Community Context: Policy, Systems, and Environmental Approaches

RFS/RFSH findings emphasize the importance of community organizational and policy context associated with health behaviors and outcomes. Policy, Systems, and Environmental (PSE)

approaches can create a community context that makes it easier for families to choose a healthy lifestyle in places where they work, live, and play (Bunnell, 2012). Funding agencies and national guidance specifically request the inclusion of PSE approaches from Extension to work across multiple systems levels in addressing health disparities (U.S. Department of Agriculture). While these PSE approaches are often complex, research indicates health behaviors and outcomes are complex and potentially cyclical in nature. Interdisciplinary collaborations provide PSE opportunities to address gaps in plans and to identify potential challenges, available resources, and community-driven solutions (Giles-Corti et al., 2015). Specifically, Extension has an opportunity to be an example for cross-disciplinary efforts addressing health disparities by interweaving multiple disciplines and areas of expertise from 4-H youth development, agriculture and natural resources, community and economic development, family and consumer sciences, and other university programs. Examples include the following:

- A youth farm stand program designed to integrate youth through 4-H, nutrition education, and the agricultural community by providing new markets for produce while also supporting community development through economic and food-related resources (Strieter & Hughes, 2009).
- The 4-Health program, which integrated parents of rural 4-H participants in nutrition, physical activity, and healthy parenting education and behavior change. This program capitalized on youth development and FCS expertise to develop a parent-informed obesity prevention curriculum (Benke et al., 2013).
- A USDA Rural Health and Safety Education grant that brings together family development, community leadership and civic engagement, health and nutrition, and a college of pharmacy to address the opioid crisis in rural counties. (Garbow et al., 2019).

Intersectionality Context: Expanded Collaboration

RFS and RFSH also highlight the importance of considering intersectionality within rural experiences while developing or implementing Extension efforts. In many communities, Extension has capacity to contribute these various areas of expertise, but it may be more impactful to also serve our communities as “change agents.” Extension “change agents” may formally or informally bring together key stakeholders, facilitate conversations, and co-create with community partners towards unifying strategic action. This requires establishing communication, relationships, and shared goals to jointly understand, develop, and support initiatives with community stakeholders that can speak to intersectional experiences (Giles-Corti et al., 2015). By engaging community stakeholders directly in the decision-making process, there will be increased buy-in, recognition of current community resources and supports, broader reach, and ultimately, more potential for shared understanding and impactful, sustained health behavior change. Specifically, agents, educators, and specialists may serve on councils, facilitate community advisory boards, engage in research driven by community stakeholders, train

community volunteers to serve as a local resource, promote PSE efforts, and support the voices that may often go unheard in order to be “change agents” for healthy communities. Examples include the following:

- Food policy councils with cross-sector participation are providing an opportunity for Extension professionals from a variety of areas to serve as “change agents,” facilitating community engagement and collaboration to meet community health needs (Fitzgerald & Morgan, 2014).
- Obesity prevention programs funded through the Centers for Disease Control and Prevention such as “Community Coalitions for Change” have transformed parks, schools, and grocery stores to promote healthy options for rural communities (Wallace et al., 2019).
- The National 4-H Council and Robert Wood Johnson Foundation are partnering with 15 university Extension systems across 45 communities to support communities in fostering and sustaining a culture of health through volunteer training, youth engagement, PSE efforts, and cultivation of diverse coalitions (Parisi 2018; Well Connected Communities, n.d.).

What is needed to achieve these strategies?

By incorporating additional technology, multiple family members, PSE, and expanded collaboration efforts as suggested by RFS/RFSH findings, Extension could decrease rural health disparities and support rural health. While the examples presented suggest that these efforts are already underway across the country, the continued existence of rural health disparities suggests there is much room for increased reach and impact. Further, it is important to recognize how changing needs and public health crises inform and drive Extension’s work. Extension systems must be prepared to work hand-in-hand with communities to respond to the needs and opportunities of their communities (Meyer et. al, 2018) in innovative and impactful ways, but also also to respond to critical community needs such as the opioid epidemic and COVID-19 pandemic, which are uniquely impacting rural communities. In order to successfully implement these strategies and ensure that Extension professionals feel confident in their ability to serve as “change agents” (Morton, 2002), Extension professionals should engage in continuous professional development such as

- An online professional training program that is multi-disciplinary and brings together a nutrition educator, a 4-H youth development educator, and a community partner to expand thinking and work efforts from individual behavior change to an ecological approach to address obesity (Stark et al., 2017).
- An online program to help Extension staff to understand and integrate PSE interventions with their traditional direct education strategies focused on health promotion (Dybestter et al., 2017E).

- The mentoring program SpeedS, which was used to build partnerships between Extension and non-Extension researchers to facilitate research dissemination to state communities (Eschbach, 2018).

As the almost two decades of research has shown, a “one size fits all” approach is not the solution. Extension needs to continue to work with communities to co-create community health education and resources that are tailored to both the unique and diverse needs of rural communities. It is important to remember that rural populations are not homogeneous in factors potentially contributing to health disparities, and neither are rural communities providing the same context for families across the country. Alternatively, Extension can have great impacts when collaborating across states, regions, and the national Extension system to build capacity and understand best practices. Thus, emphasis should be placed on sharing our rural successes, co-developing adaptable rural programming and PSE efforts, and exploring how we can increase impact in rural communities in innovative and collaborative ways.

References

- Bailey, J. (2010). Rural grocery stores: Importance and challenges. Center for Rural Affairs Rural Research and Analysis Program. <https://alliancetoendhunger.org/wp-content/uploads/2018/03/rural-grocery-stores.pdf>
- Baker, L., Wagner, T. H., Singer, S., & Bundorf, M. K. (2003). Use of the Internet and e-mail for health care information: results from a national survey. *Journal of American Medical Association* 289(18), 2400–2406. <https://doi.org/10.1001/jama.289.18.2400>
- Bauer, J. W. (2004). Basebook Report: Low income rural families: Tracking their well-being and functioning in the context of welfare reform. North Central Region, Multi State Project NC223. <https://portal.nifa.usda.gov/web/crisprojectpages/0198368-rural-low-income-families-tracking-their-well-being-and-function-in-an-era-of-welfare-reform.html>
- Benke, C., Bailey, S., Martz, J., Paul, L., Lynch, W., & Eldridge, G. (2013). Developing a parent-centered obesity prevention program for 4-H families: Implications for extension family programming.” *Journal of Extension*, 51(3). <http://www.joe.org/joe/2013june/a8.php>
- Berry, A., Katras, M. B., Sano, Y., Lee, J., & Bauer, J. W. (2008). Job volatility of rural, low-income mothers: A mixed methods approach. *Journal of Family and Economic Issues*, 29(1), 5–22. <https://doi.org/10.1007/s10834-007-9096-1>

Bove, C. F., & Olson, C. (2006). Obesity in low-income rural women: Qualitative insights about physical activity and eating patterns. *Women and Health, 44*(1), 57–78.

https://doi.org/10.1300/J013v44n01_04

Braun, B., Bruns K., Cronk, L., Fox, L. K., Koukel, S., Le Menestrel, S., Lord. L. M., Reeves, C., Rennekamp, R., Rice, C., Rodgers, M., Samuel, J., Vail, A., & Warren, T. (2017).

Cooperative Extension's national framework for health and wellness.

<https://nifa.usda.gov/resource/national-framework-health-and-wellness>

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*(7), 513.

Bunnell, R., O'Neil, D., Soler, R., Payne, R., Giles, W.H., Collins, J., Bauer, U., & Communities Putting Prevention to Work Program Group. (2012). Fifty communities putting prevention to work: accelerating chronic disease prevention through policy, systems and environmental change. *Journal of Community Health, 37*(5), 1081–1090. <https://doi.org/10.1007/s10900-012-9542-3>

Burney, J., & Haughton, B. (2002). EFNEP: a nutrition education program that demonstrates cost-benefit. *Journal of the American Dietetic Association, 102*(1), 39–45.

[https://doi.org/10.1016/S0002-8223\(02\)90014-3](https://doi.org/10.1016/S0002-8223(02)90014-3)

Burney, J., Routh, B., Greder, K., & Greer, B. (2015). *Associations between maternal depression and family eating and physical activity behaviors* [Poster Presentation]. National Council on Family Relations, Vancouver, BC.

Cancel-Tirado, D. I., Feeney, S. L., Washburn, I. J., Greder, K. A., & Sano, Y. (2018). Health, well-being, and health care access in rural communities: comparing Latino and non-Latino white low-income families. *Family and Community Health, 41*(2), 73–

82. <https://doi.org/10.1097/FCH.000000000000193>

Crowley, M., Lichter, D. T., & Turner, R. N. (2015). Diverging fortunes? Economic well-being of Latinos and African Americans in new rural destinations. *Social Science Research (51)*, 77–

92. <https://doi.org/10.1016/j.ssresearch.2014.11.007>

Dybsetter, A., Purdue, L., Bohen, L., & Heim, S. (2017). *Systems Approaches for Healthy Communities. Pilot Program Evaluation Snapshot*, University of Minnesota Extension.

Downey, J., & Greder, K. (2014). Depressive symptomology among rural low-income Latina and non-Latina white mothers. In L. B. Sampson (Ed.), *Family and Health: Evolving Needs, Responsibilities, and Experiences*. <https://doi.org/10.1108/S1530-35352014000008B017>

Eschbach, C., Carter, E., Newkirk, C., Tiret, H., Millet, M., Cronk, L., & Dwyer, J. (2018). Using speed meetings to connect extension experts with university health researchers. *Journal of Extension*, 56(4), 4IAW3. <https://www.joe.org/joe/2018august/iw3.php>

Fitzgerald, N., & Morgan, K. (2014). A food policy council guide for extension professionals. *Journal of Extension*, 52(2), 2FEA6. <https://www.joe.org/joe/2014april/a6.php>

Ferrari, T. M. (2015). Considerations for creating successful camps for military families. *Journal of Extension*, 53(5). <https://www.joe.org/joe/2015october/iw6.php>

Folta, S. C., Lichtenstein, A. H., Seguin, R. A., Goldberg, J. P., Kuder, J. F., & Nelson, M. E. (2009). The StrongWomen–Healthy Hearts program: Reducing cardiovascular disease risk factors in rural sedentary, overweight, and obese midlife and older women. *American Journal of Public Health*, 99(7), 1271–1277. <https://ajph.aphapublications.org/doi/10.2105/AJPH.2008.145581>

Forthun, L. F., Fogarty, K., Rudd, S., Bartolomeo, S., & Mighty, P. D. (2018). Providing family education for grandparent caregivers: Lessons from the GGrandS Program. *Journal of Extension*, 56(2). https://www.joe.org/joe/2018april/pdf/JOE_v56_2rb3.pdf

Fox, S. (2011). The social life of health information, 2011. Pew Internet and American Life Project. Washington, DC. <https://www.pewresearch.org/internet/2011/05/12/the-social-life-of-health-information-2011/>

Garbow, J., Michels, B., Beaulieu, S., Katras, M. J, Palombi, L., Becher, E., & Rothstein, R. (2019). Community Driven Solutions in Addressing the Opioid Crisis in Rural Minnesota [Poster Presentation]. National Health Outreach Conference. May 1-3, Fort Worth, Texas.

Garrison, M. E. B., Marks, L., Lawrence, F., & Braun, B. (2004.) Religious beliefs, faith community involvement and depression: A study of rural, low-income mothers. *Women and Health*, 40(3), 51–62. https://doi.org/10.1300/J013v40n03_04

Giles-Corti, B., Sallis, J. F., Sugiyama, S., Frank, L. D., Lowe, M., & Owen, N. (2015). Translating active living research into policy and practice: One important pathway to chronic disease prevention. *Journal of Public Health Policy*, 36(2), 231–243. <https://doi.org/10.1057/jphp.2014.53>

Greder, K., de Slowing F. R., & Doudna, K. (2012). Latina immigrant mothers: Negotiating new food environments to preserve cultural food practices and healthy child eating. *Family and Consumer Sciences Research Journal*, 41(2), 145–160. <https://doi.org/10.1111/fcsr.12004>

Greder, K., Sano, Y., Cook, C. C., Garasky, S., Ortiz, L., & Ontai, L. (2009). Exploring relationships between transnationalism and housing and health risks of rural Latino immigrant families. *Family and Consumer Sciences Research Journal*, 38(2), 186–207. <https://doi.org/10.1111/j.1552-3934.2009.00020.x>

Grutzmacher, S. K., Duru, E. B., Speirs, K. E., Worthington, L., Munger, A. L., & Lachenmayr, L. A. (2017). Using text messages to engage low-income parents in school-based nutrition education. *Journal of Hunger and Environmental Nutrition*, 13(3), 1–5. <https://doi.org/10.1080/19320248.2017.1364196>

Hammons, A. J., Wiley, A. R., Fiese, B. H., & Teran-Garcia, M. (2013). Six-week Latino family prevention pilot program effectively promotes healthy behaviors and reduces obesogenic behaviors. *Journal of Nutrition Education and Behavior*, 45(6), 745–750. <https://doi.org/10.1016/j.jneb.2013.01.023>

Huddleston-Casas, C., Charnigo, R., & Simmons, L. A. (2009). Food insecurity and maternal depression in rural, low-income families: A longitudinal investigation. *Public Health Nutrition*, 12(8), 1133. <https://doi.org/10.1017/S1368980008003650>

Hyjer Dyk, P., Routh, B., Katras, M. J., Mammen, S., & de Davila, S. A. (2015). *Barriers and enablers to good health experiences by low-income rural mothers* [Poster]. National Council on Family Relations, Vancouver, BC.

Izenstark, D., Oswald, R. F., Holman, E. G., Mendez, S. N., & Greder, K. (2016). Rural, low-income mothers' use of family-based nature activities to promote family health. *Journal of Leisure Research*, 48(2), 134-155. <https://doi.org/10.18666/jlr-2016-v48-i2-6409>

James, C. V., Moonesinghe, R., Wilson-Frederick, S. M., Hall, J. E., Penman-Aguilar, A., & Bouye, K. (2017). Racial/ethnic health disparities among rural adults—United States, 2012–2015. *MMWR Surveillance Summaries*, 66(23), 1. <https://doi.org/10.15585/mmwr.ss6623a1>

Kitzmann, K. M., & Beech, B. M. (2011). Family-based interventions for pediatric obesity: Methodological and conceptual challenges from family psychology. *Couple and Family Psychology*, 1(S), 45–62. <https://doi.org/10.1037/2160-4096.1.S.45>

Katras, M. J. (2003). *The Private Safety Net: How Rural Low-Income Families Access and Use Resources to Make Ends Meet in the Era of Welfare Reform*. [Doctoral dissertation, University of Minnesota]. <https://elibrary.ru/item.asp?id=5919314>

Katras, M. J., Zuiker, V., & Bauer, J.W. (2004). Private safety net: Childcare resources from the perspective of rural low-income families. *Family Relations*, 53(1), 201–209. <https://doi.org/10.1111/j.0022-2445.2004.00010.x>

Kaufman, B. G., Thomas, S. R., Randolph, R. K., Perry, J. R., Thompson, K. W., Holmes, G. M., & Pink, G. H. (2016). The rising rate of rural hospital closures. *The Journal of Rural Health*, 32(1), 35–43. <https://doi.org/10.1111/jrh.12128>

Kiss, E., Katras, M. J., Koonce, J., Martin, K., Wise, D., Mielitz, K., & Brown, V. (2018). Advancing methodology: From concept mapping to mobile messaging campaign. *Journal of Human Sciences and Extension*, 6(2), 57–70. <https://www.jhseonline.com/article/view/719>

Mammen, S., & Sano, Y. (2018). Rural, low-income families and their well-being: Findings from 20 years of research. *Family Science Review*, 22(1), 1–8.

Mammen, S., Sano, Y., Braun, B., & Fost Maring, E. (2018). Shaping core health messages: Rural, low-income mothers speak through participatory action research. *Health Communication*, 34(10), 1141–1149. <https://doi.org/10.1080/10410236.2018.1465792>

Mendez, S. N., Holman, E. G., Oswald, R. F., & Izenstark, D. (2016). Minority stress in the context of rural economic hardship: One lesbian mother's story. *Journal of GLBT Family Studies*, 12(5), 491–511. <https://www.tandfonline.com/doi/full/10.1080/1550428X.2015.1099493>

Meyer, R. L., Meyer, N. J., & Katras, M. J. (2018). Taking the leap: Leap: exploring a theory of program innovation. *Journal of Extension*, 56(5). <https://www.joe.org/joe/2018september/a4.php>

Morton, L. (2002). Building local knowledge for developing health policy through key informant interviews. *Journal of Extension*, 40(1), 1FEA7. <http://www.joe.org/joe/2002february/a7.php>

Moy, E., Garcia, M. C., Bastian, B., Rossen, L. M., Ingram, Faul, M., Greta, M., Massetti, G., Thomas, C. C., Hong, Y., & Iademarco, M. F. (2017). Leading causes of death in nonmetropolitan and metropolitan areas-United States, 1999–2014. *Morbidity and Mortality Weekly Report*, 66(1), 1–8. <https://doi.org/10.15585/mmwr.ss6601a1>

National Prevention Council. (2011). *National Prevention Strategy: America's Plan For Better Health and Wellness*. Washington, DC: U.S. Department of Health and Human Services, Office of the Surgeon General.

Noonan, D., Dardas, L., Bice-Wigington, T., Sloane, R., Benjamin, R., Choi, S. E., & Simmons, L. A. (2016). Understanding multiple behavioral risk factors for cancer in rural women. *Public Health Nursing, 33*(6), 519–528. <https://doi.org/10.1111/phn.12282>

Parker, T. (2011). USDA Economic Research Service-Urban Influence Codes. <https://www.ers.usda.gov/data-products/>

Parker, T., & Ghelfi, L. M. (2004). Using the 2003 urban influence codes to understand rural America. *Amber Waves*. <https://www.ers.usda.gov/amber-waves/2004/april/using-the-2003-urban-influence-codes-to-understand-rural-america/>

Parisi, M. A., Northcutt, J. K., McKendry, J. K., Sherrill, J. E., Westbrook, W., Dye, C., & Snow, J. Z. (2018). Extension: The backbone organization in statewide population health management. *Journal of Extension, 56*(2). <https://joe.org/joe/2018april/iw1.php>

Paulozzi, L. J., & Xongli, X. (2008). Recent changes in drug poisoning mortality in the United States by urban-rural status and by drug type. *Pharmacoepidemiology and Drug Safety, 17*(10), 997–1005. <https://doi.org/10.1002/pds.1626>

Phillips, C. D., & McLeroy, K. R. (2004). Health in rural America: Remembering the importance of place. *American Journal of Public Health, 94*(10), 1661–1663. <https://doi.org/10.2105/AJPH.94.10.1661>

Probst, J. C., Moore, C. G., Glover, S. H., & Samuels, M. E. (2004). Person and place: The compounding effects of race/ethnicity and rurality on health. *American Journal of Public Health, 94*(10), 1695–1703. <https://doi.org/10.2105/AJPH.94.10.1695>

Reina, A., Greder, K., Slowing, F., & Sano, Y. (2012). *Mothers informing messages to improve rural Latino family health* [Poster]. National Council on Family Relations Conference, Phoenix, AR.

Remley, D., Buys, D., Cronk, L., Duffy, V., Garden-Robinson, J., Horowitz, M., McGee, B., Nelson, C., Reicks, M., & Warren, T. (2018). The role of Cooperative Extension in chronic disease prevention and management: Perspectives from professionals in the field. *Journal of Human Sciences and Extension, 6*(2), 15–25. <https://www.jhseonline.com/article/view/716>

Routh, B. (2018). Family systems associations with obesogenic behaviors among rural Latino and White families [Doctoral dissertation, Iowa State University].

<https://lib.dr.iastate.edu/etd/16451/>

Routh, B., Doudna, K., & Greder, K. Maternal depression and BMI among rural low-income Latina immigrant mothers [Presentation]. National Council on Family Relations, Vancouver, BC.

Routh, B., Greder, K., Katras, M. J., Sano, Y., and Alveraz de Davila, S. (2015). *Rural Low-Income Mothers Using the Internet for Health Information* [Presentation]. Multicultural Health Conference, Philadelphia, PA.

Routh, B., Greder, K., Lohman, B., & Neppl, T. (2016). *Associations between mental health and obesity*. National Council on Family Relations Report.

Routh, B., Grocke, M., & Ashe, C. (2020). *Montana State University Extension 2019 Health and Nutrition Statewide Needs Assessment*. Montana State University Extension.

https://msuextension.org/wellness/needs_assessment

Sano, Y., Dolan, E., Richards, L., Bauer, J., & Braun, B. (2008). Employment patterns, family resources, and perception: Examining depressive symptoms among rural low-income mothers. *Journal of Rural Community Psychology*, E11(1).

<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.486.7639&rep=rep1&type=pdf>

Sano, Y., Garasky, S., Greder, K., Cook, C. C., & Browder, D. E. (2010). Understanding food insecurity among Latino immigrant families in rural America. *Journal of Family and Economic Issues*, 32(1), 111–123. <https://link.springer.com/article/10.1007/s10834-010-9219-y>

Sano, Y., Katras, M. J., Lee, J., Bauer, J., & Berry, A. (2010). Working towards sustained employment: A closer look on intermittent employment of rural low-income families. *Families in Society: The Journal for Contemporary Social Service*, 91(4), 342–349.

<https://doi.org/10.1606/1044-3894.4039>

Sano, Y., Mammen, S., & Oliver, B. (2018). Food insecurity among rural, low-income families. *Family Science Review*, 22(1), 26–37.

Sano, Y., & Richards, L. N. (2011). Physical health, food security, and economic well-being: The rural perspective. In J. W. Bauer & E. M. Dolan (Eds.), *Rural Families and Work: Context and Problems* (pp. 77–98). Springer, New York, NY.

Sano, Y., Richards, L., & Lee, J. (2011). Invisible barriers to employment: Mental and behavioral health problems that hinder self-sufficiency.” In J. W. Bauer & E. M. Dolan (Eds.), *Rural Families and Work: Contexts and Problems* (pp. 99–116). Springer, New York, NY.

Simmons, L. A., Anderson, E. A., & Braun, B. (2008). Health needs and health care utilization among rural, low-income women. *Women and Health*, 47(4), 53–69.
<https://doi.org/10.1080/03630240802100317>

Singh, G. K., & Siahpush, M. (2014). Widening rural–urban disparities in life expectancy, US, 1969–2009. *American Journal of Preventive Medicine*, 46(2), e19–e29.
<https://doi.org/10.1016/j.amepre.2013.10.017>

Smith, K. B., Humphreys, J. S., & Wilson, M. G. A. W. (2008). Addressing the health disadvantage of rural populations: how does epidemiological evidence inform rural health policies and research? *Australian Journal of Rural Health*, 16(2), 56–66.
<https://doi.org/10.1111/j.1440-1584.2008.00953.x>

Sparks, P. (2012) Rural health disparities. In L. J. Kulcsar & K. J. Curtis (Eds.), *International Handbook of Rural Demography* (pp. 255–271). Springer, New York, NY.

Stark, C. M., Devine, C. M., & Dollahite, J. S. (2017). Characteristics associated with the application of an ecological approach to preventing childhood obesity. *Public Health Nutrition*, 20(1), 174–182. <https://doi.org/10.1017/S1368980016001798>

Strieter, L. A., & Hughes, L. J. (2009). “The Youth Farmstand: A model program for workforce preparedness, lifeskills education, and economic development. *Journal of Extension*. 47(4), 4IAW2. <https://www.joe.org/joe/2009august/iw2.php>

Swanson, J. A., Olson, C. M., Miller, E. O., & Lawrence, F. C. (2008). Rural mothers’ use of formal programs and informal social supports to meet family food needs: A mixed methods study. *Journal of Family and Economic Issues*, 29(4), 674–690. <https://doi.org/10.1007/s10834-008-9127-6>

Thomas, J. B., & Donaldson, J. (2014). “Sugar Free with Justin T.: Diabetes education through community partnerships. *Journal of Extension*, 52(6). <https://joe.org/joe/2014december/iw6.php>

United States Department of Agriculture. (n.d.) *Policy, systems, and environmental change*. <https://snaped.fns.usda.gov/snap-ed-works/policy-systems-and-environmental-change>

Vadheim, L. M., Brewer, K. A., Kassner, D. R., Vanderwood, K. K., Hall, T. O., Butcher, M. K., Helgerson, S. D., & Harwell, T. S. (2010). Effectiveness of a lifestyle intervention program

among persons at high risk for cardiovascular disease and diabetes in a rural community. *The Journal of Rural Health*, 26(3), 266–272. <https://doi.org/10.1111/j.1748-0361.2010.00288.x>

Wallace, H. S., Franck, K. L., & Sweet, C. L. (2019). Community Coalitions for Change and the policy, systems, and environmental model: A community based participatory approach to addressing obesity in rural Tennessee. Centers for Disease Control Program Evaluation Brief 16. https://www.cdc.gov/pcd/issues/2019/18_0678.htm.

Well Connected Communities. (n.d.) *About well connected communities*.

<https://wellconnectedcommunities.extension.org/about/>

Weinhold, I., & Gurtner, S. (2014). Understanding shortages of sufficient health care in rural areas. *Health Policy*, 118(2), 201–214. <https://doi.org/10.1016/j.healthpol.2014.07.018>

U.S. Department of Agriculture. (n.d.). *FY 2021 Supplemental Nutrition Assistance Program Education Plan Guidance*. SNAP-Ed Connection. <https://snaped.fns.usda.gov/program-administration/guidance-and-templates>