Rural Populations' Sources of Cancer Prevention and Health Promotion Information

Megan E. Leimkuhler, BA [1]

Lindsay Hauser [2]

Noelle Voges [3]

Pamela B. DeGuzman, PhD, MBA, RN, CNL[4]

[1] University of Virginia School of Medicine's Master of Public Health program, Master of Public Health Candidate, Mel7sp@virginia.edu

[2] Director of Outreach and Engagement, School of Medicine Cancer Center Without Walls, University of Virginia, Lh7yn@virginia.edu

[3] Assistant Director of Outreach and Engagement, School of Medicine Cancer Center Without Walls, University of Virginia, Nev6e@virginia.edu

[4] Assistant Professor, School of Nursing, University of Virginia, Prb7y@virginia.edu

Abstract

Purpose: Rural residents are less likely to engage in cancer risk-reduction behaviors than their urban counterparts. Rural cancer disparities may be related to limited access to and comprehension of cancer-related health information. The object of this study was to identify how rural residents access and understand cancer health promotion and prevention information.

Sample: Twenty-seven residents of Central Virginia

Methods: We used a qualitative design with semi-structured interviews and a focus group (n=27) with rural and non-rural residents living in Central Virginia to accomplish the study aim.

Findings: Four themes were identified from the data: 1) non-rural Central Virginia residents seek health information from a variety of electronic sources, 2) rural Central Virginia residents typically seek health care information directly from health care professionals, 3) residents throughout

Central Virginia encounter confusing health care information, and 4) rural residents report incorrect cancer-related information.

Conclusions: Lack of internet access coupled with healthcare shortages may limit the ability of rural residents to contextualize and verify inaccurate health information. Nurses serving a rural population should consider assessing each rural patient's internet access and disseminating printed cancer health promotion materials to rural clients without internet access.

Keywords: rural health; healthcare disparities; access to care; cancer health promotion; health literacy; cancer

Rural Populations' Sources of Cancer Prevention and Health Promotion Information

United States cancer mortality is on the decline; however, similar reductions are not equally shared across geographic areas. Geographic variations in cancer rates are driven in large part by modifiable factors such as smoking and obesity rates. The largest geographic variation in cancer occurrence is for those cancer types that are amendable to prevention, such as lung cancer (Siegel et al., 2020). Engaging in health promotion behaviors (avoiding tobacco products, increasing physical activity) can help prevent cancer (American Cancer Society, 2020a). However, in the U.S., rural residents are more likely to smoke and less likely to maintain normal body weight and meet leisure time physical activity recommendations than their urban counterparts (Matthews et al., 2017).

Cancer health promotion is not only critical to preventing cancer, but also to reduce risk to cancer survivors of recurrent and new cancer (American Cancer Society, 2020b; Ng & Travis, 2008). For those with an existing cancer diagnosis, participation in healthy behaviors can reduce recurrence and improve survival (Spector, 2018). However, the 2.8 million cancer survivors living

in the rural U.S. have lower rates of health promotion behaviors than their urban counterparts (Weaver et al., 2013). This disparity may explain why survivors living in rural areas have higher cancer death rates, often despite lower cancer incidence rates (Henley et al., 2017).

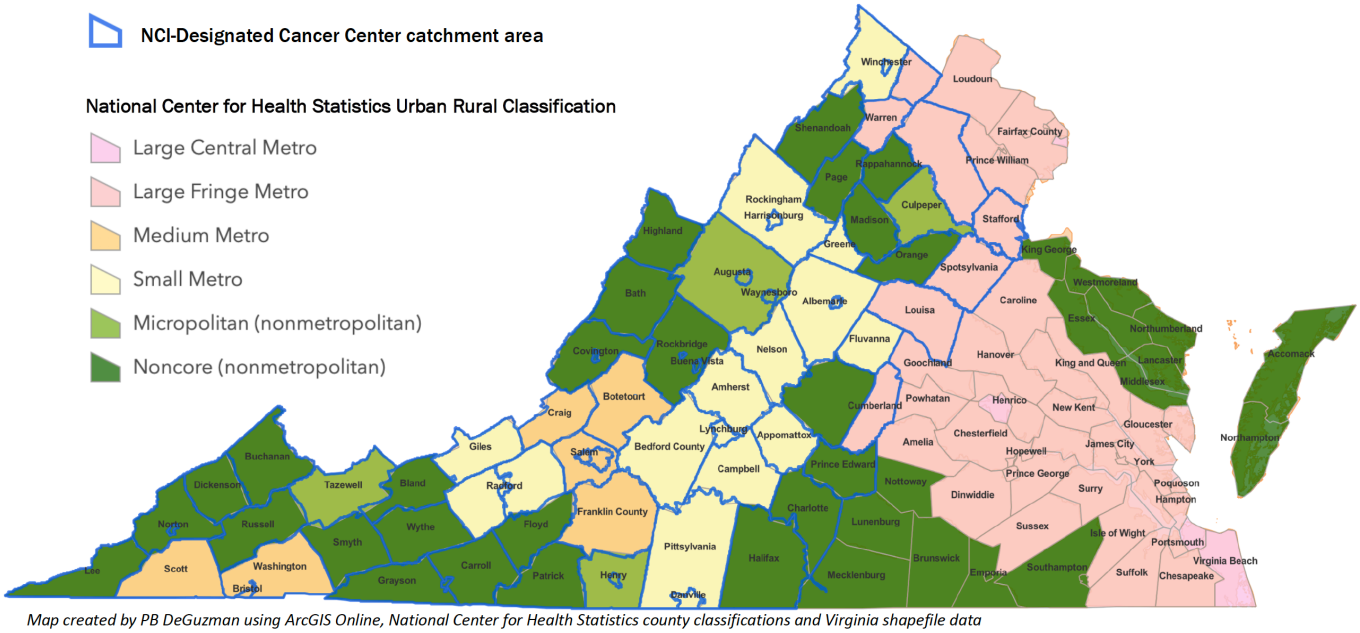
In the rural U.S., access to high quality health care information is impacted by several factors, most notably limited access to health care providers and limitations in health literacy. Rural residents in the U.S. are more likely to access health information directly from care providers (Chen et al., 2019). This difference is related to the *digital divide*, the gap in access to reliable high-speed internet service (Douthit et al., 2015), and is likely a reason why fewer rural residents use e-mail or the internet to connect with their care providers (Greenberg et al., 2018). It is widely accepted that access to high speed, reliable internet is problematic in the rural U.S (Chen et al., 2019; Perrin, 2019; United States Federal Communications Commission, n.d). Although access to internet-based cancer information does not ensure that the user will access reputable sources, certain no-cost sources of free reputable health information such as high-quality evidence-based Cochrane reviews of randomized control trials are only available to those who have access to the internet (Oxman & Paulsen, 2019).

For rural residents who have the connectivity to access evidence-based cancer information online, health literacy poses an additional barrier (Chen et al., 2019; Zahnd et al., 2018). One research study conducted among residents of the Mississippi Delta found a significant correlation between health literacy scores and both healthy eating and consumption of sugary beverages (Zoellner et al., 2011). Among cancer survivors, rural residents report putting in less effort to obtain health care information, fewer concerns regarding the quality, and greater difficulty understanding cancer health information (Katz et al., 2010).

Nurses have a long history of establishing trust in rural communities (Chipp et al., 2011; Reay et al., 2006), and can positively influence the health promotion behaviors of their clientele (Oh et al., 2014; Williams et al., 2014). Nurses can help rural patients reduce risk of poor cancer outcomes by providing them with evidence-based cancer health promotion information. To address gaps in patient knowledge, nurses may benefit from knowing how rural individuals obtain cancer information, what information they are able to obtain, and how they process the information. Thus, the purpose of this research was to identify how rural residents access and understand cancer health promotion and prevention information.

Method

We utilized a qualitative design to address the study purpose. Data was drawn from a community-based needs assessment conducted by the Cancer Center at the University of Virginia Medical Center (UVACC), located in Charlottesville, Virginia.



Map created by PB DeGuzman using ArcGIS Online, National Center for Health Statistics county classifications and Virginia shapefile data

Figure 1: Virginia counties categorized by the Rural-Urban Status Using National Center for Health Statistics' *Rural-Urban classification Scheme for Counties*. Counties with a blue border indicate the service area of one of two National Cancer Institute-designated Cancer Centers in Virginia that serves a largely rural catchment area.

The UVACC is one of two National Cancer Institute (NCI)-Designated Cancer Centers in Virginia. Its catchment area extends from Charlottesville to the northern, western, and southern state borders and is made up of small urban and rural areas. The Figure presents the counties of Virginia classified using the National Center for Health Statistics (NCHS) urban-rural classification scheme (Ingram & Franco, 2014), overlain with the catchment area of the UVACC. The community assessment was conducted in 2017 to better understand the cancer-related needs, barriers to health care access, and need for enhanced cancer-related services and care for residents of Central Virginia as part of a standard from the Commission on Cancer. Assessment participants included those with and without a cancer diagnosis, and those living in an area of the UVACC catchment area, which includes small urban, suburban, and rural areas in Central Virginia. All recruitment, data collection, and human subject protections were overseen and approved by the University of Virginia Institutional Review Board for Social and Behavioral Sciences.

Participant Recruitment

To ensure a broad sample of participants, a venue-based recruitment strategy was utilized. We screened, recruited, consented, and interviewed participants at several clinic waiting areas, public libraries and public health clinics in surrounding rural counties, and at a nationally accredited senior center located in a suburban county. To meet inclusion criteria, participants had to identify themselves as residing in Virginia and being at least 18 years of age or older.

Data Collection

We utilized semi-structured interviews to determine respondents' experience with cancer health promotion and prevention. Qualitative studies that utilize semi-structured interviews are typically guided by a list of topics to cover, rather than a predetermined, unchangeable series of specific questions to ask (Polit & Beck, 2012). Because our participants included both those with

and without a history of cancer, and the topics included cancer-related prevention and health promotion behaviors, the interview guide was structured differently for those with a previous cancer diagnosis (i.e., cancer survivors). For participants who had never had a cancer diagnosis (i.e., community members), topics focused on health promotion activities, including exercising regularly, quitting smoking, reducing alcohol intake, and eating a healthy diet. Participants were also asked about their access to health care information and resources. Cancer survivors were asked to speak about their knowledge of health maintenance behaviors as a cancer survivor, what actions they were currently taking to maintain their health post-treatment completion, and where they sought information about how to stay healthy. All interviews were conducted individually either in-person or over the phone, except for one in-person focus group of all cancer survivors (using the cancer survivor interview guide) conducted at the suburban senior center. Demographic information was collected from each participant, including sex, age, county of residence, and low-income status, which is a pervasive driver of health literacy inequalities (Cutilli et al., 2018; Michou et al., 2019; Sudore et al., 2006; Tang et al., 2019). Income status was dichotomized as yes or no based on the participant's answer to the question "do you ever have difficulty meeting the basic financial needs of your household (rent, electricity, etc.)".

Data Analysis

The focus group and interviews were audio recorded and transcribed verbatim. Analysis was conducted according to Sandelowski's descriptive content approach. Transcripts were analyzed by the research team using a line-by-line approach (Sandelowski, 2000). Dedoose, a cross-platform application for analyzing qualitative and mixed methods research with text, was used to conduct inductive open coding to generate and organize codes and themes within the interview text data

(Dedoose Version 8.3.5, 2020). To reduce bias, two researchers (M.E.L. and P.B.D.) worked in tandem, discussing and each code and theme designation, until consensus was reached.

For the purpose of comparative analysis between rural and urban areas, we used the NCHS urban rural classification scheme (Ingram & Franco, 2014). Rural and urban status were classified accounting for the unique geography of the Cancer Center location with a small city surrounded by rural areas. Although all areas in the immediate region are classified as either rural or small urban, we considered the small urban and immediately surrounding areas of Charlottesville and Albemarle county as "urban" and those outside of a 45-minute radius as rural, unless they lived in an area classified by NCHS as urban or medium metropolitan.

Results

We collected data from 27 participants. Participant details are in the Table.

Table 1

Participant Characteristics (n = 27)

Characteristic	N (%)
Interview Type	
One-on-one	21 (77.8%)
Focus group	6 (22.2%)
Cancer Status	
Cancer survivor	16 (59.3%)
Community member	11 (40.7%)
Residence Type	
Rural resident	11 (40.7%)
Non-rural resident	16 (59.3%)
Sex	
Female	19 (70.4%)
Male	7 (25.9%)
Missing data	1 (03.7%)
Socioeconomic Status	
Not low-income	14 (51.9%)
Low-income	12 (44.4%)
Age	
65 or Younger	15 (55.6%)
Over 65	12 (44.4.5)

Overall, our sample represented both rural and non-rural areas of Central Virginia, with ages ranging from 21 to 88. Eleven of the interviewees were residents who had never received a cancer diagnosis, while 16 were cancer survivors. Respondents were split roughly equally between those who self-identified themselves as low-income and those who did not.

Four themes were identified from the data: 1) non-rural Central Virginia residents seek health information from electronic sources, 2) rural Central Virginia residents primarily seek health care information directly from health care professionals, 3) residents throughout Central Virginia encounter confusing cancer health information, and 4) rural residents report incorrect cancer-related information. Of note, we did not discern any unique themes from those who self-reported as low-income; however, we have identified which quotes are from low-income individuals in the following thematic exemplars.

Non-Rural Virginians Seek Health Information from a Variety of Electronic Sources

Residents of non-rural counties in Central Virginia frequently reported seeking health advice and information predominantly from electronic sources, such as television programming or web-based resources. A 71-year-old cancer survivor from a non-rural county reported primarily seeking health information through internet-based searches and forums such as Club Red, a local membership-based online community for preventing heart disease: "So, you know, I get information from, as I said, Club Red [and] from different blogs on the internet." An 82-year-old female community member from a non-rural county also reported that she utilized Club Red for health promotion information. A low-income 35-year-old female community member from a non-rural county reported using Facebook to connect with organized walking groups within the community: "That's always a great place to find some support." She reported using the online community to meet up with walking groups at a local high school track in the evenings, at no cost

to her. Several non-rural community members and cancer survivors reported using the internet, and two members specifically mentioned Dr. Oz as a source of health information. An 82-year-old female cancer survivor from a non-rural county reported frequent use of online print materials, including newspapers and magazines:

> Well, I use the internet quite a lot… the Washington Post and health periodicals that come out, like Harvard and other teaching hospitals, you know, that are directed… to women's health. So… I really get a lot of information on that.

She also described participating in an online support group for survivors of a rare cancer that she discovered through the Washington Post: "It has just been wonderful. And these people are all over the world 'cause it's so rare. There's only about a hundred people in the support group."

Rural Virginians Seek Health Care Information Directly from Health Care Professionals

Study participants from rural counties predominantly reported seeking cancer-related health information directly from a health care provider. A 69-year-old female cancer survivor from a rural county reported that her family did not use the internet to look up information on how to maintain her health after cancer treatment, instead seeking information directly from her physician: "We haven't looked up anything on the internet, 'cause you know… we can ask [my doctor] when we come [to the clinic], if there is anything we need... he's really good." Another rural cancer survivor, a 49-year-old male, discussed his difficulty accessing information after treatment and his reliance on medical professionals rather than health care websites on the internet. "Where would I get information? I have to ask the doctors or somebody." When asked if he used the internet for advice on how to take care of his health needs, he said "not really…I go to the medical websites…most of the hospitals have a website." When asked about what resources she would seek for improving her health, a rural 44-year-old female community member said that she would "probably start with

the doctor." Similarly, a low-income rural female community member noted that her husband sought out "a nutrition clinic" at the area NCI-designated hospital.

A rural 79-year-old female community member whose husband is a cancer survivor reported that they sought post-treatment health promotion information from a specialty clinic close to their home.

> We live about seven miles from [the community hospital-based clinic, and] …they have an ostomy nurse that we can contact that is very knowledgeable. They have a meeting every couple of months for ostomy patients in the area. And she's available on the phone for information if you want to call her or if you got any questions or anything.

Residents Throughout Central Virginia Encounter Confusing Cancer Health Information

All participants, from both rural and non-rural areas described several sources of confusion about cancer-related health promotion information. One source of confusion was related to the volume of information available. A rural 65-year-old female community member reported, "well there's a lot of stuff, I mean just in the health magazines, magazines themselves, you know, for healthy eating that's out there." Two separate community members from non-rural counties conflated sources for heart health with those aimed at cancer health. When asked specifically about sources of cancer-related health promotion information, they both cited *Club Red* as an internet-based source. However, Club Red is a Medical Center-affiliated organization dedicated to promoting heart healthy lives by preventing and controlling heart disease, not the prevention of cancer (Jump, 2007). Another participant reported the frustration of trying to synthesize what seemed like conflicting information about how to maintain cancer-related health. A 66-year-old female cancer survivor, also from a rural county, stated:

> Well, it's 'you should definitely eat this' and then a month later, maybe not, you know… or something like drinking coffee. It's helpful to have two cups of coffee today, but it's harmful two weeks later, type thing. That's what sometimes gets frustrating…

Cancer survivors also experienced confusion about the different places they could seek reputable information about health maintenance. Despite living in the same county as an NCI-designated cancer center, multiple cancer survivors did not know where to seek cancer-related health information after completing treatment.

> *[When undergoing cancer treatment] I had my consult with the surgeon and his team, [and] they went over everything that was focused on their surgery but in terms of me afterwards, when I leave that office … I had no idea that there were resources available. It's not evident that there are resources available… I didn't know there was a resource center until I saw it in the newsletter from the Senior Center.*

Rural Residents Report Incorrect Cancer-Related Information

Multiple participants from rural areas of Central Virginia reported cancer-related health information that was either factually incorrect or incorrectly synthesized. When asked about dietary habits that help prevent cancer, a rural 59-year-old cancer survivor reported that "this girl told me that cancer survives on sugar." In response to the same question, a rural female participant stated that she heard "some people say that eating a lot of gluten can cause cancer." Though she stated that she was "not sure how true that is," she noted that she had "heard that said a few times." When asked about the relationship between alcohol and cancer, a 44-year-old female rural community member conflated liver cancer with cirrhosis of the liver, stating that liver cancer could be contracted "from your diet, what you eat… you don't have to drink anything."

Discussion

Our interviews with Central Virginia community members and cancer survivors illustrate how rural residents in our region obtain and process cancer-related health information. The results suggest how rural and urban populations can differ in sources and interpretation of cancer-related health promotion information. Both rural and urban residents reported difficulty synthesizing information from different sources; however, these groups differed in how they obtained and validated the information. Electronic media was reported as a main cancer-related health information source for our non-rural participants. This is not surprising given that the most reported source of health information in the United States is the internet (Swoboda et al., 2018). In a few cases, non-rural participants reported using online sources such as those from medical talk shows and a national newspaper. Only about half of advice offered on televised medical shows are supported by evidence (Korownyk et al., 2014); health professionals have similarly mixed opinions about the benefit of newspapers as sources of cancer-related health information, which likely reflects inconsistent quality of content (McCaw et al., 2014). While information gleaned may not be entirely evidence-based, there may be some benefits. For example, the participant who reported seeking information from a national newspaper health section was looking for information about a rare cancer, and the information led her to join a support group for that specific group. In light of a potentially mixed benefit, nurses should inquire about which electronic sources patients use, and provide an evidence-based context to the information found.

Although some of our rural participants also reported using the internet, most described that they would seek cancer-related health information directly from care providers. This difference is perhaps not surprising, given that 660,000 homes and businesses across Virginia lack broadband internet access, which reflects the state of limited broadband access across rural America

("Commonwealth Connect," 2019; LaRose et al., 2007). Despite their reported reliance on health care professionals for cancer-related information, several rural residents reported incorrect or incorrectly synthesized information about how to prevent cancer, and when they did, health care providers were not cited as the source. In fact, sources of misinformation were described vaguely, such as information they had "heard." This finding is perhaps not surprising given both the lack of access to both the internet and to health professionals. While inaccurate health information is found broadly across the internet and use of it certainly does not shield users from finding wrong information (Green et al., 2020), the internet also contains many free primary and synthesized sources of evidence (Oxman & Paulsen, 2019). Rural residents also have less access to confirm or contextualize misinformation because there are significant shortages of primary care providers in rural areas of the U.S. compared with urban areas, and rural residents are more likely to delay medical visits due to distress or fear (Graves et al., 2016; Stephen et al., 2013). Thus, we hypothesize that when rural residents receive imprecise or poorly understood information, they are left to synthesize this information on their own, and that when internet access is lacking, rural populations are even more reliant on health promotion education from a health care professional.

Implications for Rural Nurses

As the role of nurses continue to expand in the U.S., there is an opportunity to impact rural health disparities (Owens, 2018). Our research suggests that nurses with a rural clientele should prioritize using clear, factual, appropriately-leveled materials to educate patients about health behaviors that prevent cancer. As part of a health literacy assessment, nurses should consider inquiring about the internet access of their patients, with the understanding that it may limit the availability of clear and appropriate health promotion materials. For those clients with internet access, nurses can discuss which electronic sources patients are using, and if necessary, redirect

them toward evidence-based online sources. For lower literacy populations, it is well accepted that materials should be written at a 6th grade or lower reading level and include illustrations to maximize effectiveness (Safeer & Keenan, 2005). As such, evidence-based reviews may not be appropriately leveled for many patients. The American Cancer Society website (www.cancer.org) contains health information written in plain language (Merriman et al., 2002). Nurses may need to ensure that patients can search and navigate to the appropriate materials. For those patients with limited access to broadband internet, rural nurses should prioritize distribution of appropriate-level printed (i.e., non-electronic) materials. For certain cancers, practitioners can request free printed cancer-related health information materials from the Centers for Disease Control and Prevention, and can print health prevention materials from the American Cancer Society's website. To supplement these resources, nurses may consider identifying regional cancer centers that serve their geographic areas to develop partnerships in public health education. These centers may have access to additional printed materials that can help maintain the health of those within their service area. Care providers and staff of regional cancer centers serving rural communities are also likely to be knowledgeable about the local rural culture, which can vary considerably geographically (Morgan & Reel, 2003). Ultimately improvements in rural electronic communications infrastructure, specifically enhanced broadband internet access to rural areas, would also improve health care providers' ability to deliver sufficient, easily digestible information to patients.

Limitations

Our study was qualitative and thus findings are not generalizable. We recruited a sample from across Central Virginia, that was intended to represent a diverse background of residents, while venue-based recruitment enabled us to have incorporate a large proportion of cancer survivors and those living in rural areas; however, results should not be interpreted as

representative of the Central Virginia population or other areas of the United States. Rather, these results are intended to inform practice and promote research to reduce rural disparities in cancer outcomes.

Conclusion

Rural cancer-related health disparities may be related to limited access to accurate and appropriately-leveled health promotion information. Nurses serving rural populations may improve the health knowledge of their clientele by intentionally disseminating appropriately-leveled print-based information, and inquiring about access to certain internet-based resources. Partnering with regional cancer centers whose service area extends to the nurse practice area may be warranted and should be considered to improve access to appropriate cancer health promotion materials.

References

American Cancer Society. (2020a). *ACS Guidelines on Nutrition and Physical Activity for Cancer Prevention*. https://www.cancer.org/healthy/eat-healthy-get-active/acs-guidelines-nutrition-physical-activity-cancer-prevention.html

American Cancer Society. (2020b). *Second cancers*. https://www.cancer.org/treatment/treatments-and-side-effects/physical-side-effects/second-cancers-in-adults.html

Chen, X., Orom, H., Hay, J. L., Waters, E. A., Schofield, E., Li, Y., & Kiviniemi, M. T. (2019). Differences in rural and urban health information access and use. *The Journal of Rural Health*, *35*(3), 405–417. https://www.doi.org/10.1111/jrh.12335

Chipp, C., Dewane, S., Brems, C., Johnson, M. E., Warner, T. D., & Roberts, L. W. (2011). "If only someone had told me ...": Lessons From rural providers. *Journal of Rural Health*, *27*(1), 122–130. https://doi.org/10.1111/j.1748-0361.2010.00314.x

Commonwealth connect. *(2019). Governor Northam's plan to connect Virginia*. https://rga.lis.virginia.gov/Published/2019/RD109/PDF

Cutilli, C. C., Simko, L. C., Colbert, A. M., & Bennett, I. M. (2018). Health literacy, health disparities, and sources of health information in U.S. older adults. *Orthopaedic Nursing*, *37*(1), 54–65. https://www.doi.org/10.1097/NOR.0000000000000418

Dedoose Version 8.0.35. (2020). Los Angeles, CA: SocioCultural Research Consultants, LLC www.dedoose.com

Douthit, N., Kiv, S., Dwolatzky, T., & Biswas, S. (2015). Exposing some important barriers to health care access in the rural USA. *Public Health*, *129*(6), 611–620. https://doi.org/10.1016/j.puhe.2015.04.001

Graves, J. A., Mishra, P., Dittus, R. S., Parikh, R., Perloff, J., & Buerhaus, P. I. (2016). Role of geography and nurse practitioner scope-of-practice in efforts to expand primary care. *Med Care*, *54*(1), 81–89. https://doi.org/10.1097/MLR.0000000000000454

Green, L. W., Brownson, R. C., & Fielding, J. E. (2020). Introduction: Fake news, science, and the growing multiplicity and duplicity of information sources. *Annual Review of Public Health*, *41*, v–vii. https://doi.org/10.1146/annurev-pu-41-012720-100001

Greenberg, A. J., Haney, D., Blake, K. D., Moser, R. P., & Hesse, B. W. (2018). Differences in access to and use of electronic personal health information between rural and urban residents in the United States. *Journal of Rural Health*, *34*, 30–38. https://doi.org/10.1111/jrh.12228

Henley, S. J., Anderson, R. N., Thomas, C. C., Massetti, G. M., Peaker, B., & Richardson, L. C. (2017). Invasive cancer incidence, 2004-2013, and deaths, 2006-2015, in nonmetropolitan and metropolitan counties - United States. *MMWR Surveillance Summaries*, *66*(14), 1–13. https://doi.org/10.15585/mmwr.ss6614a1

Ingram, D. D., & Franco, S. J. (2014). NCHS Urban – Rural classification scheme for counties. In *Vital and Health statistics. Series 2, Data Evaluation and Methods Research*. http://europepmc.org/abstract/MED/22783637

Jump, P. (2007). U.VA. launches 'Club Red," an online support community. *UVAToday*. https://news.virginia.edu/content/uva-health-system-launches-club-red-online-support-community

Katz, M. L., Reiter, P. L., Corbin, S., de Moor, J. S., Paskett, E. D., & Shapiro, C. L. (2010). Are rural Ohio Appalachia cancer survivors needs different than urban cancer survivors? *Journal of Cancer Survivorship*, *4*(2), 140–148. https://doi.org/10.1007/s11764-010-0115-0

Korownyk, C., Kolber, M. R., McCormack, J., Lam, V., Overbo, K., Cotton, C., Finley, C., Turgeon, R. D., Garrison, S., Lindblad, A. J., Banh, H. L., Campbell-Scherer, D., Vandermeer, B., & Allan, G. M. (2014). Televised medical talk shows - What they recommend and the evidence to support their recommendations: A prospective observational study. *BMJ*, *349*. https://doi.org/10.1136/bmj.g7346

LaRose, R., Gregg, J. L., Strover, S., Straubhaar, J., & Carpenter, S. (2007). Closing the rural broadband gap: Promoting adoption of the Internet in rural America. *Telecommunications Policy*, *31*(6–7), 359–373. https://doi.org/10.1016/j.telpol.2007.04.004

Matthews, K. A., Croft, J. B., Liu, Y., Lu, H., Kanny, D., Wheaton, A. G., Cunningham, T. J., Khan, L. K., Caraballo, R. S., Holt, J. B., Eke, P. I., & Giles, W. H. (2017). Health-related behaviors by urban-rural county classification — United States, 2013. *MMWR Surveillance Summaries*, *66*(5), 1–8. https://doi.org/10.15585/mmwr.ss6605a1

McCaw, B. A., McGlade, K. J., & McElnay, J. C. (2014). Online health information - What the newspapers tell their readers: A systematic content analysis. *BMC Public Health*, *14*(1), 1–

9. https://doi.org/10.1186/1471-2458-14-1316

Merriman, B., Ades, T., & Seffrin, J. R. (2002). Health literacy in the information age: Communicating cancer information to patients and families*: A Cancer Journal for Clinicians*, *52*(3), 130–133. https://doi.org/10.3322/canjclin.52.3.130

Michou, M., Panagiotakos, D. B., Lionis, C., & Costarelli, V. (2019). Socioeconomic inequalities in relation to health and nutrition literacy in Greece. *International Journal of Food Sciences and Nutrition*, *70*(8), 1007–1013. https://www.doi.org/10.1080/09637486.2019.1593951

Morgan, L. L., & Reel, S. J. (2003). Developing cultural competence in rural nursing. *Online Journal of Rural Nursing and Health Care*, *3*(1), 28–37. https://doi.org/10.14574/ojrnhc.v3i1.246

Ng, A. K., & Travis, L. B. (2008). Subsequent malignant neoplasms in cancer survivors. *Cancer Journal*, *14*(6), 429–434. https://doi.org/10.1097/PPO.0b013e31818d8779

Oh, E. G., Yoo, J. Y., Lee, J. E., Hyun, S. S., Ko, I. S., & Chu, S. H. (2014). Effects of a three-month therapeutic lifestyle modification program to improve bone health in postmenopausal Korean women in a rural community: A randomized controlled trial. *Research in Nursing and Health*, *37*(4), 292–301. https://doi.org/10.1002/nur.21608

Owens, R. A. (2018). Transition Experiences of New Rural Nurse Practitioners. *Journal for Nurse Practitioners*, *14*(8), 605–612. https://doi.org/10.1016/j.nurpra.2018.05.009

Oxman, A. D., & Paulsen, E. J. (2019). Who can you trust? A review of free online sources of "trustworthy" information about treatment effects for patients and the public. *BMC Medical Informatics and Decision Making*, *19*(1). https://doi.org/10.1186/s12911-019-0772-5

Perrin, A. (2019). Digital gap between rural and nonrural America persists. *Pew Research Center*. https://www.pewresearch.org/fact-tank/2019/05/31/digital-gap-between-rural-and-

nonrural-america-persists/

Polit, D. F., & Beck, C. T. (2012). *Nursing Research: Generating and Assessing Evidence for Nursing Practice*. Wolters Kluwer Health/Lippincott Williams & Wilkins.

Reay, T., Patterson, E. M., Halma, L., & Steed, W. B. (2006). Introducing a nurse practitioner: experiences in a rural Alberta family practice clinic. *Canadian Journal of Rural Medicine*, *11*(2), 101–107. https://pubmed.ncbi.nlm.nih.gov/16630436/

Safeer, R. S., & Keenan, J. (2005). Health literacy: the gap between physicians and patients. *Am Fam Physician*, *72*(3), 463–468. https://pubmed.ncbi.nlm.nih.gov/16100861/

Sandelowski, M. (2000). Whatever happened to qualitative description? *Research in Nursing & Health*, *23*(4), 334–340. https://www.doi.org/10.1002/1098-240x(200008)23:4<334::aid-nur9>3.0.co;2-g

Siegel, R. L., Miller, K. D., & Jemal, A. (2020). Cancer statistics, 2020. *CA: A Cancer Journal for Clinicians*. https://doi.org/10.3322/caac.21590

Spector, D. (2018). Optimizing Cancer Survivors' Health: The Role of Lifestyle Behaviors. *Journal for Nurse Practitioners*, *14*(4), 323-329. https://doi.org/10.1016/j.nurpra.2017.12.007

Stephen, M. P., Robert, L. P. J., Andrew, W. B., & Gerald, T. K. (2013). Unequal distribution of the U.S. primary care workforce. *American Family Physician*, *87*(11). https://www.aafp.org/afp/2013/0601/od1.html

Sudore, R. L., Mehta, K. M., Simonsick, E. M., Harris, T. B., Newman, A. B., Satterfield, S., Rosano, C., Rooks, R. N., Rubin, S. M., & Ayonayon, H. N. (2006). Limited literacy in older people and disparities in health and healthcare access. *Journal of the American Geriatrics Society*, *54*(5), 770–776. https://www.doi.org/10.1111/j.1532-5415.2006.00691.x

Swoboda, C. M., Van Hulle, J. M., McAlearney, A. S., & Huerta, T. R. (2018). Odds of talking to healthcare providers as the initial source of healthcare information: Updated cross-sectional results from the Health Information National Trends Survey (HINTS). *BMC Family Practice*, *19*(1), 1–9. https://doi.org/10.1186/s12875-018-0805-7

Tang, C., Wu, X., Chen, X., Pan, B., & Yang, X. (2019). Examining income-related inequality in health literacy and health-information seeking among urban population in China. *BMC Public Health*, *19*(1). https://doi.org/10.1186/s12889-019-6538-2

United States Federal Communications Commission. (n.d.). *Connect2HealthFCC - Mapping Broadband Health in America 2017*. https://www.fcc.gov/reports-research/maps/connect2health/#ll=37.926868,-78.447876&z=8&t=broadband&bbm=fixed_access&dmf=none&zlt=county

Weaver, K. E., Palmer, N., Lu, L., Case, L. D., & Geiger, A. M. (2013). Rural–urban differences in health behaviors and implications for health status among US cancer survivors. *Cancer Causes & Control*, *24*(8), 1481–1490. https://doi.org/10.1007/s10552-013-0225-x

Williams, I. C., Utz, S. W., Hinton, I., Yan, G., Jones, R., & Reid, K. (2014). Enhancing Diabetes Self-care Among Rural African Americans With Diabetes: Results of a Two-year Culturally Tailored Intervention. *The Diabetes Educator*, *40*(2), 231–239. https://doi.org/10.1177/0145721713520570

Zahnd, W. E., James, A. S., Jenkins, W. D., Izadi, S. R., Fogleman, A. J., Steward, D. E., Colditz, G. A., & Brard, L. (2018). Rural-Urban differences in cancer incidence and trends in the United States. *Cancer Epidemiology Biomarkers and Prevention*, *27*(11), 1265–1274. https://doi.org/10.1158/1055-9965.EPI-17-0430

Zoellner, J., You, W., Connell, C., Smith-Ray, R. L., Allen, K., Tucker, K. L., Davy, B. M., &

Estabrooks, P. (2011). Health literacy is associated with healthy eating index scores and sugar-sweetened beverage intake: Findings from the rural Lower Mississippi Delta. *Journal of the American Dietetic Association*, *111*(7), 1012–1020. https://doi.org/10.1016/j.jada.2011.04.010