

BMJ Open Impact of social determinants of health on cancer care: a survey of community oncologists

Marjorie E Zettler ¹, Bruce A Feinberg,¹ Yolaine Jeune-Smith,¹ Ajeet Gajra^{1,2}

To cite: Zettler ME, Feinberg BA, Jeune-Smith Y, *et al.* Impact of social determinants of health on cancer care: a survey of community oncologists. *BMJ Open* 2021;**11**:e049259. doi:10.1136/bmjopen-2021-049259

► Prepublication history for this paper is available online. To view these files, please visit the journal online (<http://dx.doi.org/10.1136/bmjopen-2021-049259>).

Received 19 January 2021
Accepted 05 September 2021



© Author(s) (or their employer(s)) 2021. Re-use permitted under CC BY-NC. No commercial re-use. See rights and permissions. Published by BMJ.

¹Specialty Solutions, Cardinal Health Inc, Dublin, Ohio, USA

²Department of Medicine, SUNY Upstate Medical University, Syracuse, New York, USA

Correspondence to

Dr Ajeet Gajra;
ajeet.gajra@cardinalhealth.com

ABSTRACT

Objective Cancer survival rates have improved over the past few decades, yet socioeconomic disparities persist. Social determinants of health (SDOH) have consistently been shown to correlate with health outcomes. The objective of this study was to characterise oncologists' perceptions of the impact of SDOH on their patients, and their opinions on how these effects could be remediated.

Design Cross-sectional survey of physicians.

Setting Web-based survey completed prior to live meetings held between February and April 2020.

Participants Oncologists/haematologists from across the USA.

Exposure Clinical practice in a community-based or hospital-based setting.

Main outcome and measure Physician responses regarding how SDOH affected their patients, which factors represented the most significant barriers to optimal health outcomes and how the impact of SDOH could be mitigated through assistance programmes.

Results Of the 165 physicians who completed the survey, 93% agreed that SDOH had a significant impact on their patients' health outcomes. Financial security/lack of insurance and access to transportation were identified most often as the greatest barriers for their patients (83% and 58%, respectively). Eighty-one per cent of physicians indicated that they and their staff had limited time to spend assisting patients with social needs, and 76% reported that assistance programmes were not readily accessible. Government organisations, hospitals, non-profit organisations and commercial payers were selected by 50% or more of oncologists surveyed as who should be responsible for delivering assistance programmes to patients with social needs; 42% indicated that pharmaceutical manufacturers should also be responsible.

Conclusion Our survey found that most oncologists were aware of the impact of SDOH on their patients but were constrained in their time to assist patients with social needs. The physicians in our study identified a need for more accessible assistance programmes and greater involvement from all stakeholders in addressing SDOH to improve health outcomes.

INTRODUCTION

Social determinants of health (SDOH), defined by the WHO as 'the conditions in which people are born, grow, work, live, and age, and the wider set of forces and

Strengths and limitations of this study

- This study exploring the perspectives of oncologists from community practices across the USA on social determinants of health is the first of its kind.
- The participating physicians represented a large sample with broad geographic distribution, but the results may not be generalisable to all oncology practices within the USA.
- The survey relied on the physicians' views of the impact of social determinants of health on their patients; however, the physicians may not have had a complete picture of their patients' circumstances, and views may be subjective.

systems shaping the conditions of daily life', have garnered increased attention in recent years as evidence linking SDOH to health outcomes grows.¹ Although there is no universally accepted consensus on the specific factors comprising SDOH, examples include economic stability (eg, poverty, food insufficiency or housing instability), education, social support, health insurance status, and access to transportation.² Research indicates that clinical care accounts for less than 20% of health outcomes in the USA, with socioeconomic factors, health behaviours and the physical environment contributing greater influence on outcomes.³ These findings provide further evidence that most of what impacts health occurs outside the walls of a clinic or hospital and underscore the need for interventions targeting social and economic conditions to meaningfully improve health outcomes. Although healthcare expenditures in the USA surpass those of other developed nations, healthcare outcomes do not reflect the increased investment.⁴ Payers and healthcare systems have increasingly looked to addressing SDOH as a means to resolve this discrepancy and reduce healthcare costs.^{5,6}

The impact of SDOH is particularly relevant to patients with cancer, as cancer is one of the costliest diseases to treat (second only

to heart disease).⁷ Patients who reside in zip codes with lower socioeconomic status have lower rates of cancer screening and are more often diagnosed with cancer at a later stage of disease.^{8,9} Furthermore, patients with cancer living in areas of greater deprivation experience a higher incidence of rehospitalisation and mortality.^{10,11} Financial hardship associated with cancer treatment is well documented and disproportionately affects patients with lower educational attainment, lower family income and those who are uninsured.¹² Rising costs of cancer care and therapies, coupled with the prevalence of cancer (in 2020, there are an estimated 18.1 million cancer survivors in the USA, and 1.8 million patients will be diagnosed with cancer this year), put a growing number of cancer patients at risk.^{13,14} As value-based care models shift more accountability to healthcare providers with respect to quality of care, cost containment and improvements in outcomes, awareness of the impact of SDOH on patients has emerged as an essential element of care. For example, as a component of the Oncology Care Model's (OCM) comprehensive, coordinated cancer care, each patient in participating practices must have a documented care plan that includes estimating out-of-pocket costs and addressing health-related social needs.¹⁵ The objective of this study was to gain insight into practising oncologists' views on SDOH and interventions to alleviate negative effects of SDOH. In this paper, we present the results of surveys completed by oncologists regarding their perceptions of the impact of SDOH on their patients and their opinions on potential solutions to mitigate the SDOH burden.

METHODS

Physicians in the Cardinal Health Oncology Provider Extended Network (a community of over 7000 medical oncologists or haematologists, practising in a community-based or hospital-based setting in the USA) were invited to participate in a series of live market research meetings held between February and April 2020. Advanced practice providers and other healthcare professionals were not invited to take part in the meetings. To be eligible for an invitation, physicians must have been actively practising, must have represented different practices with a broad geographic distribution across the USA and could not have participated in another live meeting in the preceding 9 months. All physicians who were invited and agreed to take part in the live meeting completed a premeeting survey. Participants received an honorarium for their participation and were unaware that they would be asked about SDOH at the time they agreed to participation. In the survey, the physicians were asked a series of 10 multiple-choice (single select, modified Likert and multiselect) questions regarding their perceptions of the impact of SDOH on their patients, and their opinions on how the effects of SDOH should be mitigated. Participants submitted their responses via a web-based survey. Responses were summarised using descriptive statistics.

A χ^2 test was performed to compare responses to individual questions among physicians representing practices participating in the OCM versus those from practices not participating in the OCM. No adjustments were made for multiple comparisons. This study was exempt from institutional review board review.

Patient and public involvement

No patients were involved in this study.

RESULTS

A total of 165 physicians were invited to participate and responded to the survey (table 1). The primary medical specialty reported was medical oncology for 33% of respondents, haematology oncology for 65% and other for 2%. The physicians saw a median of 20 patients per day, and the median number of years in practice for the respondents was 18. The regional location of their primary practice was reported as the south for 44% of respondents, the midwest for 21%, the west for 8% and the northeast for 27%. Of the 165 practices represented, 68 (41%) were participating in the OCM value-based care model.

All participants provided answers to all 10 questions. The majority of oncologists surveyed agreed that SDOH, including financial security, food security, social isolation, housing security, addiction, access to transportation and patient health literacy, had a significant impact on their patients' ability to achieve an optimal health outcome (51% selected the response strongly agree; 42% agree; 7% neither agree nor disagree; 1% disagree; 0% strongly disagree). As shown in table 2, most of the participating oncologists said at least half of their patients were negatively impacted by SDOH (4% chose the response all or nearly all; 24% most; 40% about half; 32% few; 0% none).

The SDOH that were the most significant barriers for the patients of the oncologists surveyed are presented in figure 1. Financial security/lack of health insurance was the response selected most often (83%), followed by access to transportation (58%), health literacy (53%), social isolation (43%), housing security (18%), addiction (12%) and food security (7%). Accordingly, the top 2 types of assistance oncologists indicated would have the greatest impact on helping their patients achieve better outcomes were assistance with the cost of medicine (79%) and assistance with transportation to clinic/physician office (57%).

When asked how often they and their staff talked to patients affected by SDOH about how these factors may be interfering with their care, 18% of oncologists surveyed selected 'all the time', while 51% selected 'often', 29% 'occasionally', 2% 'rarely' and 0% 'never' (table 3). The majority of oncologists indicated that they and their staff were constrained in the amount of time they could spend assisting patients with social needs, with 34% responding that they strongly agree, 47% agree, 14% neither agree nor disagree, 5% disagree and 0% strongly disagree.

Table 1 Characteristics of survey respondents

Characteristic	Number and % of respondents
Practice setting	
Solo, privately owned community	13 (8)
Small, privately owned community (2–5 physicians)	27 (16)
Medium-sized, privately owned community (6–10 physicians)	17 (10)
Large, privately owned community (>10 physicians)	24 (15)
Community practice, owned by a larger entity (eg, hospital or academic centre)	20 (12)
Community-based hospital	16 (10)
Medical centre or cancer centre	17 (10)
Academic centre or affiliated teaching hospital (defined as having a large teaching system)	30 (18)
Other	1 (1)
Primary medical specialty	
Medical oncology	55 (33)
Haematology oncology	107 (65)
Other	3 (2)
Average number of patients seen per day	
1–5	9 (5)
6–10	4 (2)
11–15	34 (21)
16–20	59 (36)
>20	59 (36)
Years in practice	
1–5	13 (8)
6–10	23 (14)
11–15	31 (19)
16–20	43 (26)
>20	55 (33)
US region	
Northeast	45 (27)
Midwest	34 (21)
South	73 (44)
West	13 (8)
Participation in the oncology care model	
Yes	68 (41)
No	97 (59)

Most oncologists agreed that assistance programmes to help patients with social needs were not readily accessible: 20% chose the response strongly agree, 56% agree, 16% neither agree nor disagree, 7% disagree and 1% strongly disagree. When asked who should have responsibility for delivering assistance programmes to patients, 50%

Table 2 Responses to the question: in your opinion, what portion of your patients are negatively impacted by social determinants?

Response	Number and % of respondents
All or nearly all	7 (4)
Most	40 (24)
About half	66 (40)
Few	52 (32)
None	0 (0)

or more of oncologists surveyed indicated that government organisations, hospitals/cancer centres, non-profit organisations and commercial payers/insurance companies all should be responsible; fewer than half (42%) indicated that responsibility should fall to pharmaceutical manufacturers (figure 2A). Only 2% of surveyed oncologists believed that pharmaceutical companies should not be involved in the social needs of patients; most agreed that manufacturers can play a role in supporting the social needs of patients by offering more copay assistance programmes, patient assistance programmes/free drug programmes or patient education programmes (figure 2B).

To assess the impact of OCM participation, we explored potential differences in the perception of the contributions of SDOH on patient outcomes among oncologists from OCM and non-OCM practices. Only a few differences were noted to be statistically significant: oncologists from non-OCM practices identified food security as a barrier to optimal outcomes more often than those from OCM practices (59% vs 43%, $p=0.04$). Twice as many oncologists from OCM practices identified housing security as a barrier compared with non-OCM participants (25% vs 12% $p=0.04$). A greater proportion of OCM participants favoured that hospitals and cancer centres should play a greater role in patient assistance programmes (59% vs 43% $p<0.05$).

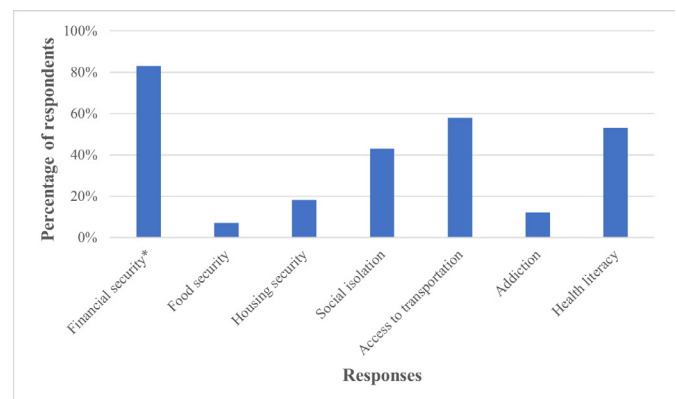


Figure 1 Responses to the question: which social determinants are the most significant barriers for your patients? (Please select your top 3). *Includes lack of health insurance.

Table 3 Responses to the question: among patients affected by social determinants, how often do you or your staff talk to them about how these factors may be interfering with their care?

Response	Number and % of respondents
All the time	29 (18)
Often	84 (51)
Occasionally	48 (29)
Rarely	4 (2)
Never	0 (0)

DISCUSSION

In this survey of 165 practising oncologists in the USA, 93% agreed that SDOH impacted their patients' ability to achieve optimal health outcomes. Two-thirds of the oncologists in our study estimated that half or more of their

patients were impacted by SDOH, with financial security and access to transportation representing the most significant barriers. Nearly 70% of oncologists reported talking to their patients about how SDOH affected their care often or all the time, although most reported that they and their staff had limited time available to help patients with their social needs. Three quarters of oncologists surveyed thought that assistance programmes were not readily accessible. Most of the respondents indicated that the responsibility for providing assistance to patients with social needs fell to government organisations, hospitals, non-profit organisations and commercial payers, although pharmaceutical companies could provide support through copay assistance, free drug programmes or patient education. We did not find dramatic differences in the perceptions of oncologists from OCM and non-OCM practices.

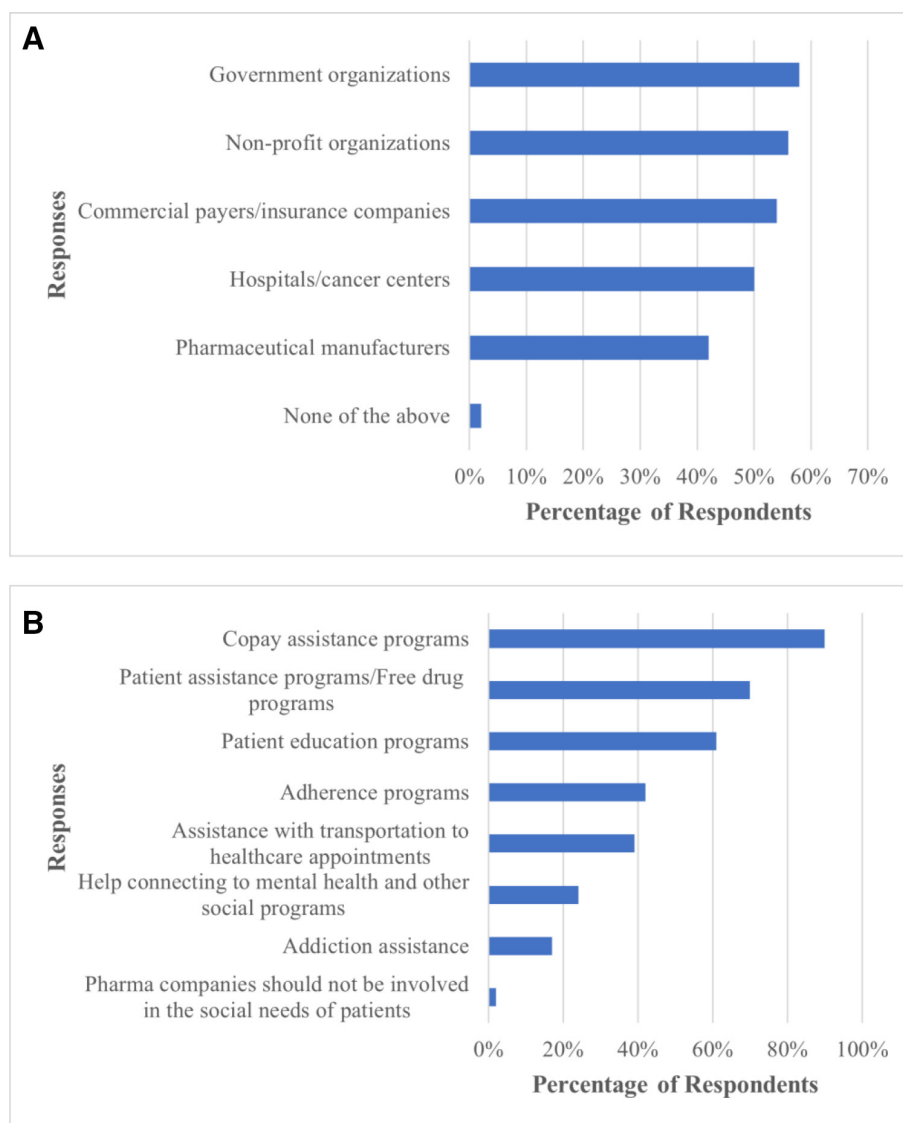


Figure 2 (A) Responses to the question: who should have responsibility for delivering assistance programmes to patients? (Please select all that apply). (B) Responses to the statement: I believe pharmaceutical manufacturers can play a role in supporting the social needs of patients by offering more: (Please select all that apply).

Across the broader medical community, the recognition of the importance of identifying patients at risk for poor outcomes due to SDOH is reflected in the issuance of policy statements related to screening by professional societies such as the American Academy of Family Physicians, the American Academy of Pediatrics and the American College of Obstetricians and Gynecologists.^{16–18} Similarly, the American Cancer Society has published a framework for addressing SDOH, which includes recommendations for screening, to further cancer health equity.¹⁹ In addition, the Centers for Medicare & Medicaid Services' (CMS) Accountable Health Community model implements screening for health-related social needs among Medicare and Medicaid beneficiaries receiving healthcare at participating sites.²⁰ However, despite these recommendations, how often screening for SDOH occurs in clinical practice has not been well described. A study of 739 hospitals and 2190 physician practices in the USA found that only 24.4% of hospitals and 15.6% of physician practices screened patients for the five specific social needs outlined in the CMS Accountable Health Communities Model (food insecurity, housing instability, utility needs, transportation needs, and interpersonal violence). For those that did not screen for any of the five, the most common barriers cited were lack of time and financial resources.²¹

To alleviate the burden of screening, several strategies have been undertaken to better capture SDOH within electronic health records (EHRs). The American Medical Association in collaboration with UnitedHealthcare is working to create 23 new International Classification of Disease (ICD)-10 codes related to SDOH, including access to nutritious food, adequate and safe housing, available transportation, financial ability to pay for medications and utilities, and caregiver needs.²² The use of artificial intelligence (AI) also figures prominently into efforts to improve identification of SDOH for patients: natural language processing of the unstructured notes in EHRs has been shown to identify greater prevalence of tobacco use, alcohol abuse, drug abuse, depression, housing instability, fall risk and poor social support than could be identified through administrative data.²³ Health systems such as Mount Sinai have adopted AI solutions to pull data from unstructured notes to help identify patients at risk.²⁴ Other health systems are using AI technology that integrates clinical factors from the EHR with socioeconomic factors to flag patients at risk for readmission.^{25 26} Decision models incorporating clinical EHR data and community-level SDOH data have demonstrated the ability to predict the need for social service referrals.²⁷ Applied machine learning using SDOH data alone has also been shown to accurately predict emergency department visits or hospital admissions.²⁸ Finally, in a recent pilot study, an AI decision tool that incorporated SDOH helped patients with cancer receive timely palliative care by identifying those who were at risk for short-term mortality.²⁹

The physicians in our study viewed the responsibility for assisting patients with social needs as belonging to

government organisations, non-profit organisations, pharmaceutical companies, hospitals and commercial payers. In the past decade, these entities have made important strides towards mitigating the impact of SDOH on clinical outcomes through policy changes, commitments for community programmes and initiatives to support individual patients that go beyond screening. The Affordable Care Act, enacted in 2010, requires tax-exempt hospitals to conduct community health needs assessments every 3 years and to create an implementation strategy to improve health at the community level.³⁰ Some states have also established waivers that allow Medicaid dollars to pay for interventions to support social needs of patients.³¹ Non-profits such as the Leukemia & Lymphoma Society provide copay assistance, travel assistance, education and community support to patients,³² and foundations such as the Robert Wood Johnson Foundation provide grants for programmes to address food and housing insecurity, among other SDOH.³³ Patient assistance programmes provided by pharmaceutical companies,³⁴ as well as patient support and adherence programmes, copay and prior authorisation support provided through hub services, are important resources for patients and providers. In addition, recent years have seen significant funding initiatives by hospitals, health systems and payers to address SDOH. From 2017 to 2019, direct financial investments in programmes addressing SDOH in the USA are estimated at \$2.5 billion, involving 57 health systems and 917 hospitals across the USA.³⁵ The majority of the funds were focused on housing initiatives, followed by employment, education, food security, social and community context and transportation.³⁵ Commercial payers such as Anthem, Kaiser Permanente and United Healthcare have also invested millions into affordable housing solutions, and Humana introduced their Bold Goal strategy to address food insecurity, loneliness and social isolation, and transportation barriers, recognising that the investment is likely to result in lower healthcare costs.^{36–39} There is evidence to support investment in social needs leading to better health outcomes: one study found that US states with a higher ratio of social to health spending (calculated as the sum of social service spending and public health spending divided by the sum of Medicare spending and Medicaid spending) had significantly better subsequent health outcomes across multiple health measures (including mortality rates for lung cancer).⁴⁰

At the level of the individual oncology practice, one strategy broadly employed to address the social needs of patients has been the addition of a navigator to the care team. Nurse, social worker or counsellor navigators perform tasks such as making arrangements for patient services or peer support groups, referring patients to resources and assisting patients with low health literacy.⁴¹ Providing patient navigation is another component of the OCM value-based care model,¹⁵ an important point to note as 41% of the physicians in our study represented practices participating in the OCM. By reducing barriers



to care and bridging gaps for patients with cancer who have social needs, patient navigation has been shown to improve outcomes and increase patient satisfaction.⁴² In addition, the creation of a financial navigator role at some oncology practices, to help patients with copay assistance applications, free drug options and other resources to cover expenses during their care, has proven successful in reducing patient out-of-pocket costs.⁴³

Limitations of this study include its descriptive nature and its reliance on physicians' estimates of the impact of SDOH on their patients and the amount of time spent by staff in assisting patients. We did not have access to any patient or practice data to support these estimates. Additionally, while the physicians in our study represented practices with broad geographic distribution across the USA, we have no information on the communities where the practices are located or the representation of patients within the practices. Finally, our sample did not include radiation or surgical oncologists, which may limit the generalisability of our results.

CONCLUSIONS

To our knowledge, this is the first peer-reviewed publication to date to assess oncologists' perceptions of the impact of SDOH on their patients and their thoughts about how SDOH could be addressed. We found that while awareness of SDOH was high (nearly all oncologists surveyed agreed that SDOH influences their patients' health outcomes), most oncologists did not have the time or resources to assist their patients with social needs and did not consider assistance programmes to be readily accessible. Recognition of the negative consequences of SDOH burden is important, but physicians in our study lacked adequate means to resolve the issues. Borrowing from the concept of a cancer 'groundshot', the most effective solutions may be the simplest.⁴⁴ For the most immediate impact on cancer morbidity and mortality, we believe that what is needed more urgently than expensive new technology or therapeutics that may only provide modest benefits to a small proportion of cancer patients is to ensure that all patients with cancer are equipped with the basic necessities of life: housing and food security, access to care and affordable treatment. While straightforward in concept, the challenge of addressing SDOH to promote health equity and improve health outcomes is a complex, long-term endeavour. The incorporation of patient navigators into the care team for some oncology practices has shown that interventions targeting patients' social needs can be effective, but larger scale interventions at the community and national level will ultimately be needed to effect meaningful change. Collaborative action by professional organisations such as the American Society of Clinical Oncology, the Oncology Nursing Association and the Association of Oncology Social Work may be one avenue to drive this change. It remains to be seen if efforts underway to improve screening to identify patients at risk for poor outcomes due to SDOH burden,

and increased investment by hospitals, health systems and payers in initiatives targeting SDOH, will translate into improved outcomes for patients with cancer.

Contributors AG and BAF designed the study. YJ-S analysed the data. MEZ, AG and BAF interpreted the results. MEZ drafted the manuscript. All authors critically reviewed and approved the manuscript.

Funding The authors have not declared a specific grant for this research from any funding agency in the public, commercial or not-for-profit sectors.

Competing interests All support for the present manuscript including provision of study materials and article processing charges was provided by Cardinal Health. All authors are employees of Cardinal Health and may own stock in Cardinal Health.

Patient and public involvement Patients and/or the public were not involved in the design, or conduct, or reporting, or dissemination plans of this research.

Patient consent for publication Not applicable.

Ethics approval The data used in this study did not include any identifiers that met the standard for ethics board review.

Provenance and peer review Not commissioned; externally peer reviewed.

Data availability statement Data are available on reasonable request.

Open access This is an open access article distributed in accordance with the Creative Commons Attribution Non Commercial (CC BY-NC 4.0) license, which permits others to distribute, remix, adapt, build upon this work non-commercially, and license their derivative works on different terms, provided the original work is properly cited, appropriate credit is given, any changes made indicated, and the use is non-commercial. See: <http://creativecommons.org/licenses/by-nc/4.0/>.

ORCID ID

Marjorie E Zettler <http://orcid.org/0000-0003-4332-0066>

REFERENCES

- World Health Organization. About social determinants of health, 2020. Available: https://www.who.int/social_determinants/sdh_definition/en/
- United States Department of Health and Human Services, Office of Disease Prevention and Health Promotion. Social determinants of health, 2020. Available: <https://www.healthypeople.gov/2020/topics-objectives/topic/social-determinants-of-health>
- Hood CM, Gennuso KP, Swain GR, et al. County health rankings: relationships between determinant factors and health outcomes. *Am J Prev Med* 2016;50:129–35.
- Organisation for Economic Co-operation and Development. OECD health statistics, 2020. Available: <https://www.oecd.org/health/health-data.htm>
- Modern Healthcare. In Depth: Payers can't control costs without social determinants of health model, 2018. Available: <https://www.modernhealthcare.com/article/20180825/NEWS/180829956/in-depth-payers-can-t-control-costs-without-social-determinants-of-health-model>
- Modern Healthcare. In depth: hospitals tackling social determinants are setting the course for the industry, 2018. Available: <https://www.modernhealthcare.com/article/20180825/NEWS/180809949/in-depth-hospitals-tackling-social-determinants-are-setting-the-course-for-the-industry>
- Soni A. Top five most costly conditions among adults age 18 and older, 2012: estimates for the U.S. Civilian Noninstitutionalized Adult Population. Statistical Brief #471 2015.
- Kurani SS, McCoy RG, Lampman MA, et al. Association of neighborhood measures of social determinants of health with breast, cervical, and colorectal cancer screening rates in the US Midwest. *JAMA Netw Open* 2020;3:e200618.
- Roche LM, Niu X, Stroup AM, et al. Disparities in female breast cancer stage at diagnosis in New Jersey: a spatial-temporal analysis. *J Public Health Manag Pract* 2017;23:477–86.
- Whitney RL, Bell JF, Tancredi DJ, et al. Hospitalization rates and predictors of rehospitalization among individuals with advanced cancer in the year after diagnosis. *JCO* 2017;35:3610–7.
- Gaubatz ME, Bukatko AR, Simpson MC, et al. Racial and socioeconomic disparities associated with 90-day mortality among patients with head and neck cancer in the United States. *Oral Oncol* 2019;89:95–101.

- 12 Han X, Zhao J, Zheng Z, *et al*. Medical financial hardship intensity and financial sacrifice associated with cancer in the United States. *Cancer Epidemiol Biomarkers Prev* 2020;29:308–17.
- 13 National Cancer Institute. Cancer prevalence and cost of care projections, 2020. Available: <https://costprojections.cancer.gov/>
- 14 National Cancer Institute. Surveillance, epidemiology, and end results (SEER) program, 2020. Available: <https://seer.cancer.gov/stafacts/html/common.html>
- 15 Centers for Medicare & Medicaid Services. Oncology care model: key drivers and change package, 2020. Available: <https://innovation.cms.gov/files/x/ocm-keydrivers-changepkg.pdf>
- 16 American Academy of family physicians. Social determinants of health policy, 2020. Available: <https://www.aafp.org/about/policies/all/social-determinants.html>
- 17 COUNCIL ON COMMUNITY PEDIATRICS. Poverty and child health in the United States. *Pediatrics* 2016;137:e20160339.
- 18 Committee on Health Care for Underserved Women. ACOG Committee opinion no. 729: importance of social determinants of health and cultural awareness in the delivery of reproductive health care. *Obstet Gynecol* 2018;131:e43–8.
- 19 Alcaraz KI, Wiedt TL, Daniels EC, *et al*. Understanding and addressing social determinants to advance cancer health equity in the United States: a blueprint for practice, research, and policy. *CA A Cancer J Clin* 2020;70:31–46.
- 20 Centers for Medicare & Medicaid Services. Accountable health community model, 2020. Available: <https://innovation.cms.gov/innovation-models/ahcm>
- 21 Frazee TK, Brewster AL, Lewis VA, *et al*. Prevalence of screening for food insecurity, housing instability, utility needs, transportation needs, and interpersonal violence by US physician practices and hospitals. *JAMA Netw Open* 2019;2:e1911514.
- 22 American Medical Association press release. New ICD-10 codes will help physicians tackle social barriers to care, 2019. Available: <https://www.ama-assn.org/practice-management/digital/new-icd-10-codes-will-help-physicians-tackle-social-barriers-care>
- 23 Navathe AS, Zhong F, Lei VJ, *et al*. Hospital readmission and social risk factors identified from physician notes. *Health Serv Res* 2018;53:1110–36.
- 24 Healthcare IT News. How Mount Sinai is using AI to unlock social determinant data in the EHR, 2019. Available: <https://www.healthcareitnews.com/news/how-mount-sinai-using-ai-unlock-social-determinant-data-ehr>
- 25 Northwell Health press release. Northwell to use Jvion's AI software to address patient readmissions, 2019. Available: <https://www.northwell.edu/news/northwell-to-use-jvion-s-ai-software-to-address-patient-readmissions>
- 26 Novant Health press release. Novant health launches program with prescriptive analytics leader Jvion, 2020. Available: <https://www.novanthealth.org/home/about-us/newsroom/press-releases/newsid33987/2419/novant-health-launches-program-with-prescriptive-analytics-leader-jvion.aspx>
- 27 Kasthurirathne SN, Vest JR, Menachemi N, *et al*. Assessing the capacity of social determinants of health data to augment predictive models identifying patients in need of wraparound social services. *J Am Med Inform Assoc* 2018;25:47–53.
- 28 Chen S, Bergman D, Miller K, *et al*. Using applied machine learning to predict healthcare utilization based on socioeconomic determinants of care. *Am J Manag Care* 2020;26:26–31.
- 29 Gajra A, Zettler ME, Miller KA, *et al*. Impact of augmented intelligence on utilization of palliative care services in a real-world oncology setting. *JCO Oncol Pract* 2021;OP.21.00179 doi:10.1200/OP.21.00179
- 30 IRS. Requirements for 501(c)(3) hospitals under the affordable care act – section 501(r), 2020. Available: <https://www.irs.gov/charities-non-profits/charitable-organizations/requirements-for-501c3-hospitals-under-the-affordable-care-act-section-501r>
- 31 Alderwick H, Hood-Ronick CM, Gottlieb LM. Medicaid investments to address social needs in Oregon and California. *Health Aff* 2019;38:774–81.
- 32 Leukemia & Lymphoma Society. The Leukemia & Lymphoma Society website, 2020. Available: www.lls.org
- 33 No authors listed. Funding to improve social determinants of health. *Health Aff* 2019;38:1589–90.
- 34 Yezefski T, Schwemm A, Lentz M, *et al*. Patient assistance programs: a valuable, yet imperfect, way to ease the financial toxicity of cancer care. *Semin Hematol* 2018;55:185–8.
- 35 Horwitz LI, Chang C, Arcilla HN, *et al*. Quantifying health systems' investment in social determinants of health, by sector, 2017-19. *Health Aff* 2020;39:192–8.
- 36 Anthem Blue Cross press release. Anthem blue cross takes action amid pandemic to address California housing crisis, 2020. Available: <https://www.bcbs.com/press-releases/anthem-blue-cross-takes-action-amid-pandemic-address-california-housing-crisis>
- 37 Kaiser Permanente press release. Announcing \$200M impact investment to address housing crisis, 2018. Available: <https://about.kaiserpermanente.org/community-health/news/kaiser-permanente-announces-200-million-impact-investment-partne>
- 38 United Healthcare press release. UnitedHealthcare's Investments in Affordable Housing to Help People Achieve Better Health Surpass \$400 Million, 2019. Available: <https://www.unitedhealthgroup.com/newsroom/2019/2019-03-26-uhc-affordable-housing-path-metro-villas.html>
- 39 Humana. 2020 BOLD goal progress report, 2020. Available: <https://populationhealth.humana.com/2020-bold-goal-progress-report/>
- 40 Bradley EH, Canavan M, Rogan E, *et al*. Variation in health outcomes: the role of spending on social services, public health, and health care, 2000-09. *Health Aff* 2016;35:760–8.
- 41 Wells KJ, Valverde P, Ustjanuskas AE, *et al*. What are patient navigators doing, for whom, and where? a national survey evaluating the types of services provided by patient navigators. *Patient Educ Couns* 2018;101:285–94.
- 42 Kline RM, Rocque GB, Rohan EA, *et al*. Patient navigation in cancer: the business case to support clinical needs. *J Oncol Pract* 2019;15:585–90.
- 43 Monak M, Bell K, Whitt A. Development of a financial navigation program to ease the burden of financial toxicity. *JCO* 2019;37:6565.
- 44 Gyawali B, Sullivan R, Booth CM. Cancer groundshot: going global before going to the moon. *Lancet Oncol* 2018;19:288–90.