

Addressing Social Determinants to Improve Patient Care and Promote Health Equity: An American College of Physicians Position Paper

Hilary Daniel, BS; Sue S. Bornstein, MD; and Gregory C. Kane, MD; for the Health and Public Policy Committee of the American College of Physicians*

Social determinants of health are nonmedical factors that can affect a person's overall health and health outcomes. Where a person is born and the social conditions they are born into can affect their risk factors for premature death and their life expectancy. In this position paper, the American College of Physicians acknowledges the role of social determinants in health, examines the complexities associated with them, and offers recom-

mendations on better integration of social determinants into the health care system while highlighting the need to address systemic issues hindering health equity.

Ann Intern Med. 2018;168:577-578. doi:10.7326/M17-2441
For author affiliations, see end of text.

Annals.org

Social determinants of health, which are defined as “the conditions in which people are born, grow, work, live, age, and the wider set of forces and systems shaping the conditions of daily life” (1), are responsible for most health inequalities. Social determinants are primarily rooted in resource allocation and affect factors at the local, national, and global levels (2). Evidence gathered over the past 30 years supports the substantial effect of nonmedical factors on overall physical and mental health. An analysis of studies measuring adult deaths attributable to social factors found that, in 2000, approximately 245 000 deaths were attributable to low education, 176 000 were due to racial segregation, 162 000 were due to low social support, 133 000 were due to individual-level poverty, and 119 000 were due to income inequality (3). The number of annual deaths attributable to low social support was similar to the number from lung cancer ($n = 155\,521$).

The United States, despite ranking among the 10 richest countries in the world per capita, experiences sizable health disparities among its citizens that are rooted in social, economic, and environmental factors. In the United States, place of birth is more strongly associated with life expectancy than race or genetics (4). On average, there is a 15-year difference in life expectancy between the most advantaged and disadvantaged citizens (5). This difference is correlated with geographic characteristics and health behaviors (2) that are influenced by historical and social factors. Population-level inequalities in health care result in \$309 billion in losses to the economy annually and disproportionately affect disadvantaged populations (6). The lack of economic or social mobility can also affect future generations who are born into environments that contribute to negative health outcomes. Research also suggests that investments in interventions to address social determinants of health, such as housing, income support, and care coordination, yield positive outcomes (7).

To address health outcomes associated with social determinants of health, physicians, policymakers, communities, and individuals should understand the role these factors play in individual and community health and strive to implement public policies that reach the largest number of people while targeting the day-to-day needs of individuals in their communities. Tackling these issues will reduce health disparities and promote health equity across the population. Awareness of social determinants of health may not always translate into better health outcomes, but it is an important component of the physician's role as an advocate for patients and a steward of medical care.

METHODS

This policy paper was drafted by the Health and Public Policy Committee of the American College of Physicians (ACP), which is charged with addressing issues that affect the health care of the U.S. public and the practice of internal medicine and its subspecialties. The authors reviewed studies, reports, and surveys on social determinants of health from PubMed, Google Scholar, relevant news articles, policy documents, Web sites, and other sources. Recommendations were based on reviewed literature and input from the ACP's Board of Governors, Board of Regents, Council of Early Career Physicians, Council of Resident/Fellow Members, Council of Student Members, and Council of Subspecialty Societies and a nonmember expert in the field. The policy paper and recommendations were reviewed and approved by the ACP Board of Regents on 19 November 2017. Financial support for the development of this position paper came exclusively from the ACP operating budget.

See also:

Editorial comment 596

* This paper, written by Hilary Daniel, BS; Sue S. Bornstein, MD; and Gregory C. Kane, MD, was developed for the Health and Public Policy Committee of the American College of Physicians. Individuals who served on the Health and Public Policy Committee at the time of its approval and authored this work were Sue S. Bornstein, MD (*Chair*); Gregory C. Kane, MD (*Vice Chair*); Jan K. Carney, MD; Heather E. Gantzer, MD; Tracey L. Henry, MD; Joshua D. Lenchus, DO; Joseph M. Li, MD; Bridget M. McCandless, MD; Beth R. Nalitt, MD; Lavanya Viswanathan, MD; Caleb J. Murphy; Ayeetin M. Azah, MD; and Lianne Marks, MD. Approved by the ACP Board of Regents on 19 November 2017.

POLICY RECOMMENDATIONS

1. The American College of Physicians supports increased efforts to evaluate and implement public policy interventions with the goal of reducing socioeconomic inequalities that have a negative impact on health. Supportive public policies that address downstream environmental, geographical, occupational, educational, and nutritional social determinants of health should be implemented to reduce health disparities and encourage health equity.

2. The American College of Physicians recommends that social determinants of health and the underlying individual, community, and systemic issues related to health inequities be integrated into medical education at all levels. Health care professionals should be knowledgeable about screening and identifying social determinants of health and approaches to treating patients whose health is affected by social determinants throughout their training and medical career.

3. The American College of Physicians supports increased interprofessional communication and collaborative models that encourage a team-based approach to treating patients at risk to be negatively affected by social determinants of health.

4. The American College of Physicians supports the adequate and efficient funding of federal, state, tribal, and local agencies in their efforts to address social determinants of health, including investments in programs and social services shown to reduce health disparities or costs to the health care system and agency collaboration to reduce or eliminate redundancies and maximize potential impact.

5. The American College of Physicians supports increased research into the causes, effects, prevention, and dissemination of information about social determinants of health. A research agenda should include short- and long-term analysis of how social determinants affect health outcomes and increased effort to recruit disadvantaged and underserved populations into large-scale research studies and community-based participatory studies.

6. The American College of Physicians recommends policymakers adopt a "health in all policies" approach and supports the integration of health considerations into community planning decisions through the use of health impact assessments.

7. The American College of Physicians recommends development of best practices for utilizing electronic health record (EHR) systems as a tool to improve individual and population health without adding to the administrative burden on physicians.

8. The American College of Physicians recommends adjusting quality payment models and performance measurement assessments to reflect the increased risk associated with caring for disadvantaged patient populations.

9. The American College of Physicians recommends increased screening and collection of social determinants of health data to aid in health impact assessments and support evidence-driven decision making.

SUMMARY

The ACP believes that understanding and addressing social factors that affect health outcomes is a press-

ing issue for physicians and medical professionals in the communities they serve. In order to reduce negative health outcomes associated with social determinants of health, a comprehensive approach is needed that includes support for public policies aimed at immediate needs and systemic issues, a better understanding of the issue by physicians, improved interpersonal communication, a robust research agenda that incorporates institutional and community involvement, adequate funding for federal and local initiatives, considerations of health in community planning and development, and collection of real-world evidence that can help target interventions toward those who need them most. The ACP puts forth these recommendations to empower stakeholders to advocate for policies aimed at eliminating disparities and establishing health equity among all persons. The **Appendix** (available at Annals.org) contains the full position paper, including the expanded background and policy rationale.

From American College of Physicians, Washington, DC (H.D.); Texas Medical Home Initiative, Austin, Texas (S.S.B.); and Sidney Kimmel Medical College, Thomas Jefferson University, Philadelphia, Pennsylvania (G.C.K.).

Financial Support: Financial support for the development of this position paper comes exclusively from the ACP operating budget.

Disclosures: Disclosures can be viewed at www.acponline.org/authors/icmje/ConflictOfInterestForms.do?msNum=M17-2441.

Requests for Single Reprints: Hilary Daniel, BS, American College of Physicians, 25 Massachusetts Avenue NW, Suite 700, Washington, DC 20001; e-mail, hdaniel@acponline.org.

Current author addresses and author contributions are available at Annals.org.

References

1. World Health Organization. Social determinants of health. 2018. Accessed at www.who.int/social_determinants on 2 November 2017.
2. Commission on Social Determinants of Health. Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health. Geneva: World Health Organization; 2008.
3. Galea S, Tracy M, Hoggatt KJ, Dimaggio C, Karpati A. Estimated deaths attributable to social factors in the United States. *Am J Public Health.* 2011;101:1456-65. [PMID: 21680937] doi:10.2105/AJPH.2010.300086
4. Centers for Disease Control and Prevention. Vital Signs telebriefing on heart disease and stroke deaths. 3 September 2013. Accessed at www.cdc.gov/media/releases/2013/t0903-vs-heart-disease.html on 1 November 2017.
5. Chetty R, Stepner M, Abraham S, et al. The association between income and life expectancy in the United States, 2001-2014. *JAMA.* 2016;315:1750-66. [PMID: 27063997] doi:10.1001/jama.2016.4226
6. Ubrri P, Artiga A. Disparities in health and health care: five key questions. The Henry J. Kaiser Family Foundation. 12 August 2016. Accessed at <http://kff.org/disparities-policy/issue-brief/disparities-in-health-and-health-care-five-key-questions-and-answers> on 8 October 2016.
7. Taylor LA, Tan AX, Coyle CE, et al. Leveraging the social determinants of health: what works? *PLoS One.* 2016;11:e0160217. [PMID: 27532336] doi:10.1371/journal.pone.0160217

Current Author Addresses: Ms. Daniel: American College of Physicians, 25 Massachusetts Avenue NW, Suite 700, Washington, DC 20001.

Dr. Bornstein: 3111 Beverly Drive, Dallas, TX 75205.

Dr. Kane: Department of Medicine, Sidney Kimmel Medical College, Thomas Jefferson University, 1025 Walnut Street, Philadelphia, PA 19107.

Author Contributions: Conception and design: H. Daniel, H.E. Gantzer, T.L. Henry, J.D. Lenchus, L. Viswanathan, A.M. Azah. Analysis and interpretation of the data: H. Daniel, J.K. Carney, H.E. Gantzer, B.R. Nalitt, L. Viswanathan.

Drafting of the article: H. Daniel, G.C. Kane, J.D. Lenchus, B.M. McCandless.

Critical revision of the article for important intellectual content: H. Daniel, G.C. Kane, J.K. Carney, H.E. Gantzer, T.L. Henry, J.D. Lenchus, B.M. McCandless, L. Viswanathan, C.J. Murphy, A.M. Azah.

Final approval of the article: H. Daniel, S.S. Bornstein, G.C. Kane, J.K. Carney, H.E. Gantzer, T.L. Henry, J.D. Lenchus, J.M. Li, B.M. McCandless, B.R. Nalitt, L. Viswanathan, C.J. Murphy, A.M. Azah, L. Marks.

Administrative, technical, or logistic support: H. Daniel, S.S. Bornstein, G.C. Kane.

Collection and assembly of data: H. Daniel, T.L. Henry.

APPENDIX: EXPANDED BACKGROUND AND RATIONALE

Social determinants of health have been described as nonmedical factors that influence health (8), including income and social status; education; physical environment, including safe drinking water and clean air; healthy workplaces; safe housing; communities and roads; employment and working conditions; social support networks; and access to health services. These factors may have short- or long-term effects on health outcomes and are associated with negative health outcomes. For example, living in dilapidated housing with ongoing exposure to harmful pollutants is likely to result in poorer health (9), whereas access to stable housing with minimal environmental risks in a low-crime area is likely to reduce the chance of negative health outcomes. Categories and examples of social determinants of health are shown in the Appendix Table (10).

Socioeconomic Status

The primary nonmedical factor affecting health is socioeconomic status. Socioeconomic status may be assessed by wealth (either individual wealth or family income), education (higher education is associated with better economic outcomes), or occupation (which provides financial benefits as well as benefits from expanded social networks) (11), although Americans primarily associate income or wealth with socioeconomic status. Income inequality in the United States continues to grow: The top 1% of earners make 3 times what they did in the 1980s, whereas the bottom 50% earn the same average income they did in 1980 (12). Not only is the income gap widening, the percentage of persons

earning more than their parents has been decreasing. Members of the millennial generation, generally classified as persons born between 1981 and 1997, have only a 50% chance of earning more than their parents (12). Socioeconomic status is also linked to racial and ethnic disparities, and certain racial or ethnic groups are disproportionately represented in lower socioeconomic groups. An estimated 38% of the excess mortality among African American adults versus white non-Latino adults is related to income (13).

In 2016, 14% of the U.S. population had a household income below the federal poverty threshold. Whether someone meets this threshold is calculated on the basis of total income before taxes, including earnings, Social Security benefits, and public assistance (14). However, the percentage of Americans living in poverty is not evenly distributed, nor does it take into consideration those who have incomes above the poverty threshold but live in poverty areas (census tracts with a poverty rate >20%) (15). The most recent data show that the number of persons living in poverty areas increased from 49.5 million in 2000 to 77.4 million during 2008 to 2012. African Americans in both metropolitan and nonmetropolitan areas have the highest poverty rates (23% and 33%, respectively). In addition, U.S. Census Bureau statistics from 2015 show that 19.4 million persons reported living in deep poverty, defined as a household income less than 50% of the 2015 poverty threshold (16). The poverty rate has fluctuated over the years; it reached a low of 11.1% in 1973 and has typically been between 11% and 15% since then.

Neighborhoods with concentrated poverty often lack grocery stores with fresh food, adequate public transportation, access to public spaces, adequate employment prospects, and access to health care services; often have underfunded schools; and often are situated near environmental hazards. Low-income persons are disproportionately affected by major weather events; an analysis of those still in need of housing assistance after being displaced by Hurricane Sandy in 2012 showed that marginalized persons still faced obstacles, such as long-term housing solutions, meeting the basic needs of their families, and financial burdens (17). Low-income persons may be particularly vulnerable to extreme weather events due to poor housing conditions and economic instability that makes it difficult to prepare or plan for natural disasters (18).

Education and employment status affect socioeconomic status and economic mobility and health. Research indicates that children from households and communities with low socioeconomic status may be negatively affected by underresourced schools, hindering academic progress and resulting in higher risk for dropping out of school (19). Lower educational attainment is associated with lower wages and higher levels of unemployment. The unemployment rate among per-

sons who have not completed high school is more than 50% (20).

Housing

Shelter and protection from the elements are considered basic physiologic needs of humans. Housing protects persons from environmental harm but may also contribute to poorer health outcomes if the dwelling is unsafe, substandard, or dilapidated. Unsafe or dilapidated housing is associated with exposure to lead and asthma triggers (dust, mold, moisture, and rodents); injuries; and mental health stressors, such as violence and social isolation (21). In addition, overcrowded living conditions can contribute to the spread of airborne disease, such as respiratory infections or pneumonia, and proximity to environmental hazards can increase risk.

As part of the Healthy People 2020 initiative, data are collected on primary objectives, including economic stability, education, social and community context, and housing and built environment. Data show that the proportion of households earning less than 200% of the federal poverty level and spending more than 30% of income on housing increased steadily from 65.1% in 2007 to 69.5% in 2011 (22). Approximately 12 million renters or homeowners spend more than 50% of their annual income on housing. Families or individuals who spend more than 30% of their income on housing are considered to be "cost-burdened" and may have difficulties affording necessities, such as food, transportation, and medical care. They also are at higher risk for eviction and possible homelessness (23). The U.S. Department of Health and Human Services (24) defines a homeless person as:

... an individual who lacks housing (without regard to whether the individual is a member of a family), including an individual whose primary residence during the night is a supervised public or private facility (e.g., shelters) that provides temporary living accommodations, and an individual who is a resident in transitional housing. A homeless person is an individual without permanent housing who may live on the streets; stay in a shelter, mission, single room occupancy facility, abandoned building or vehicle; or in any other unstable or non-permanent situation.

The U.S. Department of Housing and Urban Development uses a narrower definition of homelessness for its programs (25).

The homeless population is at increased risk for mental health problems and certain diseases and poses challenges for policymakers. Approximately 60% of homeless persons have had mental health problems, as many as 80% have marked decline in cognitive function, the prevalence of tuberculosis is at least 46 times

higher in the homeless population than the general population, and the prevalence of hepatitis C is 4-fold higher than in the general population (26). Models such as supportive housing or Housing First have shown that providing basic housing integrated with optional social and/or health services may improve health outcomes. For example, the Bud Clark Commons is a housing initiative in Portland, Oregon, that uses harm reduction and Housing First models for the most vulnerable applicants. Since 2011, the Bud Clark Commons has housed more than 200 residents, and more than 80% have remained in permanent housing (27).

Transportation

Transportation in the United States is primarily motorized, and the reliance on motorized vehicles and motorized transportation increases potential for fatal injury, as well as air pollution, accidents, and physical inactivity, which lead to other health problems (28). The reliance on motorized transportation may also disproportionately affect the aging population because they may have limited driving ability. A 2010 study found that the costs of medical care and lost productivity associated with motor vehicle crashes were approximately \$99 billion in 2005 (29). Lack of transportation options also creates barriers to health care access, leading to missed appointments, missed or delayed medication use, delayed care, or poorer management of chronic conditions. A review of 61 studies found lack of transportation to be a major obstacle to health care access, particularly for low-income, uninsured, or underinsured persons (30). Neighborhoods with lower socioeconomic status may have longer wait times for emergency response vehicles than neighborhoods with higher socioeconomic status (31). Living and attending school in proximity to high-traffic areas can affect a person's health. In cities, poverty corridors often match highway geography, contributing to excess exposure among the poorest and most vulnerable residents (32, 33). In particular, exposure to automobile exhaust can play a critical role in poor asthma control, asthma exacerbations, and acute care visits among children (34). These effects are not limited to children; data on symptoms among U.S. veterans have shown that proximity to roadways is associated with increased wheezing in patients with chronic obstructive pulmonary disease (35).

Low-income persons and persons of color are more likely to rely on "active transportation" (walking, bicycling, or public transit) to get to work or other activities than those in other income brackets. Persons who earn less than \$10 000 per year have the highest rates of walking or biking to work, and walking is the primary means of getting to work in large cities in all U.S. regions (36). Although these persons are more likely to walk or bike, they do so in dangerous conditions. Pedestrian fatality rates are twice as high in low-

income neighborhoods compared with higher-income neighborhoods, and bicycling fatality rates among Hispanic/Latino persons and African Americans are 23% and 30% higher, respectively, than among white non-Latino persons (37). Low-income communities also have poorer infrastructure for walking or biking, such as sidewalks; street lighting; marked crosswalks; or traffic calming features, such as traffic islands or traffic circles.

Food and Agriculture

Access to a healthy and adequate supply of food is necessary to living a healthy and productive life. Approximately 11% of households in the United States (25.8 million adults and 12.4 million children) are considered food-insecure. Food insecurity is a broad concept that includes the physical feeling of hunger and anxiety about access to food. It may result in unhealthy food-related behaviors, such as skipping meals or consuming low-cost but calorie-dense foods that are highly processed and have little nutritional value. Food insecurity is also strongly related to poverty; approximately 33% of households with incomes less than 130% of the poverty level are food-insecure (38).

Current efforts suggest that promotion of healthy eating can be successful, but these efforts are affected by social class, social networks, race and ethnicity, and neighborhood (39). One hurdle to improving diet is access to fresh produce and nutritious food. Approximately 23.5 million persons live in "food deserts," and about half of these are low-income persons (40). Food deserts are areas in which at least 500 people and/or 33% of the census tract's population reside more than 1 mile from a supermarket or large grocery store (≥ 10 miles in rural populations) (41). A total of 2.3 million persons live in rural food deserts. Better access to supermarkets is associated with reduced risk for obesity, and other studies have found that neighborhood environment, including proximity to grocery stores, may be a determinant of body mass index (37). Data from the U.S. Department of Agriculture also show that adults in counties with a larger number of food deserts have rates of diabetes that are 5 percentage points higher than those in counties with a low number of food deserts (38).

The "Digital Divide"

The digital divide is the gap between those who have access to technology or the Internet and those who do not, typically on the basis of higher versus lower socioeconomic status (42). Thirteen percent of U.S. adults do not use the Internet; of these, 19% do not use it because of cost barriers related to Internet service or computer ownership (43). In addition, demographic variables, such as age, education, community (rural, urban, or suburban), or income, may contribute to nonadoption of technology (41). The American Medical Informatics Association has stated that it "believe[s] that access to broadband is, or will soon become, a

social determinant of health" (44). Lacking access to reliable and affordable Internet or mobile service limits not only a person's ability to utilize technology for health-related purposes but also their ability to access other important services, such as emergency assistance or employment opportunities. Lack of Internet or computer access at home also puts students at an educational disadvantage, referred to as the "homework gap." Approximately 5 million households with school-aged children do not have high-speed Internet access at home, with a disproportionate share being low-income African American or Hispanic/Latino households, and low-income households are 4 times more likely than middle- or high-income households to lack broadband access (45).

There is an increased emphasis on integrating technology into medical care, and lack of reliable Internet access can hinder a person's ability to access medical portals or electronic health records (EHRs). Thirty-nine percent of rural areas lack reliable access to broadband technologies (46), hampering the ability of physicians to utilize technology to improve access to care and limiting the use of EHRs. Lack of Internet service can also stifle health literacy and prevent patients from utilizing mobile health technologies, such as applications that support healthy behaviors. A 2012 survey showed that 21% of uninsured persons do not use the Internet, those who are likely to lack health insurance are also likely to not be online, and 59% of uninsured persons did not report seeking health information online (42). In addition, there is an association between health literacy (the ability to understand basic health care information and use it to make health care decisions) and Internet access and use (47).

Racial and Ethnic Health Disparities

The ACP's policy on racial and ethnic health disparities acknowledges that addressing social determinants of health is a key component to increasing health equity among racial and ethnic populations (48). Social determinants can exacerbate health care disparities among racial or ethnic groups. Socioeconomic status, race, and ethnicity are connected in a complex, multidimensional way and may affect a person's health independently or in combination (49). For example, Latina women have a higher incidence rate of cervical cancer and have higher mortality rates than non-Latina/Hispanic women (3.0 vs. 2.1 deaths per 100 000 women) (50). Latina women are also more likely to lack health insurance than white non-Latina women, which affects access to care (51). American Indian and Alaska Native adults are more likely to have stroke than white non-Latino or African American adults in the same age range (52). However, those who do have stroke may not receive the necessary care in a timely manner. The Indian Health Service's operating budget is not large enough to cover

all eligible services, and a Government Accountability Office report found that “these gaps in services sometimes delay diagnoses and treatments, which can exacerbate the severity of a patient’s condition and necessitate more intensive treatment” (53).

Another example is the difference in incidence and death rates between African American women and white non-Latina women. African Americans have the highest cancer burden of any racial or ethnic group for all types of cancer, and African American women are more likely to die of breast cancer despite having a lower incidence rate than white non-Latina women (54). African American women are also more likely to be diagnosed at later disease stages and have lower survival rates for breast cancer than any other racial or ethnic group (55). A review of the social determinants associated with this mortality disparity found that it was tied to social, economic, and cultural disparities, as well as genetic and biological factors (56). Research has also shown that aggressive breast cancer tumors are more common in younger African American and Latina women living in areas with low socioeconomic status (57).

Racism or ethnic discrimination—systems in society, including internalized, interpersonal, or systemic practices, that cause unavoidable and unfair inequalities in power, resources, or capacities and opportunities across racial or ethnic groups and manifest through beliefs, stereotypes, prejudices, or discrimination—can also result in poorer health outcomes, including poorer mental health (such as depression [58]) and physical health. A meta-analysis of studies that focused on the relationship between racism and health also found that ethnicity is a factor in how discrimination is associated with certain negative health outcomes. For example, there are stronger negative mental health associations for Asian Americans and Hispanic/Latino persons than African Americans (59).

Federal and Local Initiatives Related to Social Determinants

The federal government has implemented or established several initiatives that incorporate social determinants of health into the action plan or may have a broader effect on social determinants. The Healthy People 2020 initiative includes measuring and monitoring of social determinants of health and disparities. Four indicators (15.4%) have met or exceeded targets, and 10 (38.5%) are improving. Moreover, fewer adults are smoking cigarettes, fewer children are exposed to secondhand smoke, more adults are meeting physical activity targets, and fewer adolescents are using alcohol or illicit drugs (60). Executive Order 12898 established the Federal Interagency Working Group on Environmental Justice, which directed all federal agencies to identify and address cases where their programs, policies, and activities had disproportionately adverse

health effects on low-income and disadvantaged communities. In addition, the Centers for Medicare & Medicaid Services will award grants to local jurisdictions that implement accountable health community models in their communities in an effort to improve health outcomes and reduce health costs by addressing social determinants of health, such as food insecurity, inadequate transportation, and unstable housing. The 3-track model seeks to bring awareness of community services, assistance in navigating available services, and alignment of community need with available services (61). Programs like the Older Americans Act provide social services that encourage independence for aging Americans. The Older Americans Act contains critical support, including the Meals on Wheels program, legal services, and transportation services. Approximately 10% of older persons have incomes below the poverty threshold (62), and although this is an improvement over previous decades, these social services remain vital for members of this population.

States and local communities also attempt to identify and mitigate potentially negative effects of social determinants by implementing programs that foster community partnerships with public and private entities. These initiatives show the importance of community-level participation. Examples include efforts in New Jersey to address high-utilizing or high-cost patients through coordinated efforts to identify such patients, provide appropriate resources, and reduce barriers to care (63, 64); a state program in Vermont (65); medical-legal partnerships (66); and partnerships between the medical community and businesses, such as the Fruit and Vegetable Prescription Program, which works with hospitals, community health centers, food hubs, farms, and retail outlets to “prescribe” fruits and vegetables for low-income individuals and families (67). It is important to note that programs that are successful or show positive benefit in some communities may not be as successful in others.

The Complexities of Social Determinants of Health

Determinants of health involve varying levels of social, biological, and behavioral interplay and pose unique obstacles for policymakers. A recent example is the water crisis in Flint, Michigan. Flint is a predominantly African American city, and 41% of residents live below the federal poverty level (68). In 2014, the state of Michigan authorized switching the source of tap water for the approximately 99 000 residents of Flint from the Detroit Water and Sewerage Department to the Flint River. The Flint Water Treatment Plant did not use corrosion control, resulting in increased lead contamination in the water supply. After several parents and community health care workers heard about elevated levels of lead and noticed health problems affecting citizens after the switch, testing concluded that blood

lead levels had increased among children in the city (69). Lead ingestion can be serious, and the effects of lead poisoning are sometimes irreversible (70).

Flint had experienced eroding infrastructure and reduced infrastructure investments after many manufacturing jobs left the area, increasing potential exposure to hazardous conditions (71). Flint is also a food desert, with only 1 major grocery store in the city. Residents reported being unable to afford bottled water, and those who did attempt to purchase it found that it was often sold out. Nutrition and access to healthy food also affect health issues associated with lead exposure. When children are deficient in certain vitamins and minerals, such as iron, calcium, and vitamin C, lead absorption increases (72). These factors resulted in the residents of Flint being particularly vulnerable to increased exposure to and ingestion of lead.

Positions and Recommendations

1. The American College of Physicians supports increased efforts to evaluate and implement public policy interventions with the goal of reducing socioeconomic inequalities that have a negative impact on health. Supportive public policies that address downstream environmental, geographical, occupational, educational, and nutritional social determinants of health should be implemented to reduce health disparities and encourage health equity.

Socioeconomic status has far-reaching influence on nearly all areas of physical and mental health. All races and ethnicities with low socioeconomic status are at a disadvantage, and persons who are born into lower socioeconomic status are more likely than those in higher brackets to have cardiovascular disease, mental illness, poor quality of life, and premature death (73). A study also showed that lower socioeconomic position in childhood is associated with higher risk for death from certain causes in adulthood (74). In a separate study spanning 4 decades, researchers found that lead exposure in childhood affected cognitive function and socioeconomic status at age 38 years, greatly influencing social mobility (75).

People are more likely to have better health outcomes if they have the resources to obtain a good education, stable housing, safe environments, and health care coverage (76). However, years of racial and ethnic discrimination, segregation, and inequality have resulted in a legacy of disadvantaged groups more likely to reside in neighborhoods that lack access to nutritious food, quality housing, good jobs, or properly funded schools (77). Poverty is still one of the strongest predictors of premature death; an analysis of data that spanned 7 countries and included 1.7 million persons found that adults with low socioeconomic status were nearly 1.5 times more likely to die before age 85 years than those with higher socioeconomic status. In addition,

the reduced life expectancy in those with low socioeconomic status was approximately the same as the reduction associated with inactivity (78). Strengthening economic development for disadvantaged persons and communities and supporting economic mobility are likely to meaningfully improve the physical health and overall wellness of people throughout generations. An observational study showed that a reduction in neighborhood-level segregation was associated with a decrease in systolic blood pressure (79).

The effects of socioeconomic status on nearly all aspects of society indicate that no single policy or set of policies can eliminate health disparities (80). Because the health effects of socioeconomic status are felt the most by persons living in poverty, income modifications for low-income persons are likely to have direct positive health effects. In one test program, persons were guaranteed a minimum income with tax reductions associated with additional earned income. An assessment of the effect of this program on low-income families found that providing additional income to expectant mothers was associated with higher-birthweight infants, which researchers suggested was related to improved nutrition (81). Another successful intervention provided housing vouchers to low-income families, giving them more options in where to live (82) and potentially improving access to grocery stores, reliable transportation options, and schools. Finally, a simulation showed that increasing the minimum wage to \$15 per hour could have averted 2800 to 5500 premature deaths, primarily among low-income persons (83).

Addressing inequalities related to socioeconomic status will have the most meaningful effect on individual, community, and intergenerational health and social mobility. The effect of socioeconomic status on health is far-reaching and variable, and exploring nonmedical interventions to address the effect of social determinants of health will vary in efficacy (84). However, there is also a pressing need for public policy interventions that address the day-to-day needs of persons with negative health outcomes related to social determinants.

In an analysis of the relationship between public policy and social determinants of health, the authors stated that public policy is influenced by political, social, and economic environments to determine a dominant health model. If the model prioritizes biology of disease and individual risk factors, public policy is more likely to focus on treating illness and managing risk to the detriment of broader population health (85). Although reducing individual risk for disease is important, public policies that aim to eliminate or reduce unhealthy conditions or promote initiatives that support individual or community health are vital to overcoming the health inequities that can be associated with social determinants of health.

It is also important to remember that simply increasing access to certain services, such as grocery stores, may not have meaningful effects without additional supportive policies that can influence individual behavior and choice. For example, in 2003, Pennsylvania adopted the Fresh Food Financing Initiative, a state-wide program aimed at opening new grocery stores in underserved areas. Six months after implementation of the program, few residents had adopted the newly built stores as their main store, and there was no discernible change in daily fruit and vegetable intake or body mass index, suggesting that merely opening the stores was not enough to change long-term habits (86). The authors noted that in the future, partnerships with local health departments and initiatives that support affordability and availability could increase the chance that residents would adapt their behaviors. Other supportive public policies that may affect health include taxes on sugar-sweetened beverages (87); authorizing and encouraging farmers' markets, community-assisted agriculture, and direct-marketing farmers to facilitate the use of Supplemental Nutrition Assistance Program benefits at those locations (88); and Housing First and permanent supportive housing programs (89).

2. The American College of Physicians recommends that social determinants of health and the underlying individual, community, and systemic issues related to health inequities be integrated into medical education at all levels. Health care professionals should be knowledgeable about screening and identifying social determinants of health and approaches to treating patients whose health is affected by social determinants throughout their training and medical career.

The health care system is shifting toward putting a premium on the quality of care provided as opposed to the number of services provided. With a system that pays for quality and outcomes, physicians must consider the underlying factors that affect a patient's physical health and continued wellness. An increased focus on wellness and prevention presents an opportunity to improve overall population health. One challenge for physicians is the need to develop a broader understanding of how social or environmental determinants may affect a patient's ability to adhere to a care plan. A patient with diabetes who lives in substandard housing, recently lost their job, or lives in a food desert will face greater challenges in managing their illness than a patient who is not facing these obstacles. However, it might not be readily apparent to a physician that a patient living in substandard housing may have trouble keeping their insulin refrigerated due to poor wiring and spotty electricity or that a patient living in a food desert might also lack reliable transportation options to get to a grocery store with nutritious food.

Physicians can be important advocates in the effort to reduce potential negative health outcomes associated with social determinants of health. In one survey, 85% of primary care physicians or pediatricians believed that unmet social needs led to poor health outcomes; however, 4 of 5 were not confident in their ability to meet the social needs of their patients (90). As trusted members of society, physicians have the potential to effect meaningful policy changes. Dr. Mona Hanna-Attisha, a pediatrician in Flint, Michigan, heard about elevated lead levels in the water and residents' concerns about water quality after the switch to the new water source. She knew that the hospital where she worked routinely tested young children for lead exposure, and she conducted comparisons of blood lead levels using test results from before and after the switch. She found that the percentage of children in Flint with lead poisoning doubled—or, in some neighborhoods, tripled—and that this correlated with where lead levels were highest. She presented her findings during a press conference, forcing the issue into the spotlight and forcing public officials to acknowledge the ongoing lead exposure (91).

Early and ongoing education about health disparities and negative health outcomes associated with social determinants of health can help physicians to better identify these factors and effectively treat patients with them. The Health Scholars Program, a 9-month program based at the community health center Puentes de Salud in Philadelphia, Pennsylvania, piloted a course in which medical students were taught by volunteer medical and public health faculty and completed a project that required them to develop, implement, and evaluate an intervention to address a community-defined need. Participants reported high levels of overall satisfaction with the program and indicated that it increased their desire to serve vulnerable communities, although the degree to which they followed through with tangible outcomes is unknown (92). Other researchers have developed frameworks for educating health professionals on social determinants of health. The National Academies of Sciences, Engineering, and Medicine (NASEM) Committee on Educating Health Professionals to Address the Social Determinants of Health proposed a framework consisting of 9 components centered around 3 concepts (transformative learning, dynamic partnerships, and lifelong learning) (93).

Efforts to improve health equity have been made that emphasize screening, education, and actionable initiatives in graduate medical education programs. The Accreditation Council for Graduate Medical Education incorporated reducing health disparities into its Clinical Learning Environment Review program. The program performs site visits to accredited institutions that sponsor residency programs and assesses and

provides feedback in 6 focus areas (94). Under the focus area of health care quality, the pathway "Resident/fellow and faculty member education on reducing health care disparities" prioritizes education on identifying and reducing health care disparities for the patient population seen at their institution as well as training in cultural competency (94). Although there is some consideration of health equity and social determinants in the academic setting, more robust integration should be considered as stakeholders develop a better understanding of how these issues factor into direct clinical care of patients, including incorporating social determinants of health into undergraduate medical education and continuing medical education in addition to medical school, residency, and fellowship programs.

3. *The American College of Physicians supports increased interprofessional communication and collaborative models that encourage a team-based approach to treating patients at risk to be negatively affected by social determinants of health.*

Health professionals across disciplines, including medicine, social work, and public health, play key roles in helping to reduce negative health outcomes related to social determinants. Good primary care experiences, including accessibility and continuity of care, are associated with better self-reported health and can reduce the adverse association between income inequality and general health (95).

Clinical care is critical to overall health; however, medical care comes into play primarily at the onset of illness, whereas outside influences affecting health are constant. In 2012, NASEM released the report "Primary Care and Public Health: Exploring Integration to Improve Population Health," which acknowledged that investments in the health care system had done little to reduce the cost of care and that more needed to be done to reduce costs and improve care (96). The patient-centered medical home (PCMH) model aims to deliver coordinated and cost-effective care and provides an opportunity for collaboration and communication between members of the care team about social determinants of health. For example, collocation of community-based resources within the PCMH can also address issues of transportation and communication (97). The ACP supports the joint principles of PCMHs and is encouraged by their potential to support broader public health goals. Strengthening the components of the PCMH that address social determinants of health for individual patients, such as social service assistance or directing patients to appropriate community resources, helps to address individual needs of patients. Further collaboration is also needed to improve access to specialty services for disadvantaged patients in a way that promotes continuation of care and reduces confusion for the patient. Providing specialty care services to underserved populations

can also result in savings, as shown by reduced costs after the expansion of allergy services to Medicaid beneficiaries in Florida (98).

Effective collaboration requires ongoing communication and education. Communication is arguably the most important consideration in interventions to change individual behaviors that may be influenced by social determinants. One must consider how the message is communicated, who is delivering it, and how the individual or community might respond (99). Collaborative health care teams that utilize the unique skills of each team member and follow the principles in the ACP position paper "Principles Supporting Dynamic Clinical Care Teams" (100) are positioned to effectively communicate and disseminate information to patients. Strengthening communication among team members also ensures that everyone involved in the patient's care is engaged about roles and responsibilities and is acting in the patient's best interests.

4. *The American College of Physicians supports the adequate and efficient funding of federal, state, tribal, and local agencies in their efforts to address social determinants of health, including investments in programs and social services shown to reduce health disparities or costs to the health care system and agency collaboration to reduce or eliminate redundancies and maximize potential impact.*

Although the U.S. health system is the most expensive in the world, it does not perform better than those of other industrialized countries. This is partially a result of a small share of health expenditures (9%) being directed toward prevention and low levels of investment in social services (101). Compared with other countries in the Organisation for Economic Co-operation and Development (OECD), the United States invests relatively small amounts in social services that may address social determinants of health. On average, OECD nations spend \$2 on social services for every dollar spent on health care, whereas the United States spends 55 cents per dollar (102). Evidence suggests that increased social services can help to mitigate health disparities (103). In addition, research funding has been primarily targeted toward specific diseases or risk factors for certain diseases, focusing many available research dollars on a "clinical, individual approach to disease" (104).

Investments in social services are associated with cost savings, and funding for social services that have been shown to reduce costs and improve health should be included in health care funding packages at the state and federal levels. An analysis of peer-reviewed literature on investments in social services or integrated models of health care and social services found that 32 studies reported significant positive effects, and many reported decreased health care costs and improved outcomes in housing, nutrition, income support, and

care coordination (7). An analysis of states between 2000 and 2009 found that those with higher ratios of social services spending to medical spending had better health outcomes (93), and residents of states with the lowest ratios had higher rates of myocardial infarction, lung cancer, and mental illness. Investments in social services suggest a reduction in overall health care costs insofar as they relate to chronic illness or the need for medical intervention, such as hospitalization. A study of state-level social services spending determined that a 20% change in the median ratio of social services spending to health spending could reduce the percentage of adults with obesity by 0.33%, or 85 000 adults. Obese adults are estimated to incur \$2700 more in annual health care costs than nonobese adults (93).

Because prioritizing funding for programs can be challenging in an uncertain budget environment, cross-agency collaboration is needed to ensure that resources are being used effectively and efficiently. The Federal Interagency Health Equity Team facilitates activities among agencies, including the Departments of Health, Agriculture, Commerce, Justice, Education, Defense, Veterans Affairs, Housing and Urban Development, Labor, and Transportation; the Consumer Product Safety Commission; and the Environmental Protection Agency, to increase the efficiency and effectiveness of policies and programs at all levels. Office of Lead Hazard Control and Healthy Homes grants provide local governments with funds to research and implement effective ways to reduce hazards associated with exposure to lead-based paint and other poor housing conditions, such as mold, pesticides, vermin, and air quality, that are often found in low-income housing (105). A housing-based approach to reducing lead exposure in children was associated with reductions in blood lead levels during 1970 to 1990, in addition to improved screening efforts (106).

Despite attempts to encourage collaboration and reduce overlap, large cuts to federal funding for programs intended to address environmental or safety risk have been proposed. For example, proposed cuts to the Environmental Protection Agency in the fiscal year 2018 budget could result in the elimination of 2 programs aimed at reducing risk for lead exposure (107), and a \$300 million reduction in funds to the Indian Health Service has been proposed. Funding for block grant programs, such as Temporary Assistance for Needy Families, the Substance Abuse Prevention and Treatment Block Grant program, and job training block grants, has decreased by an average of 27% over the past 17 years (108). It is increasingly important that programs not only are working efficiently but are funded appropriately to reach the people they are intended to serve.

5. *The American College of Physicians supports increased research into the causes, effects, prevention,*

and dissemination of information about social determinants of health. A research agenda should include short- and long-term analysis of how social determinants affect health outcomes and increased effort to recruit disadvantaged and underserved populations into large-scale research studies and community-based participatory studies.

Underlying the challenge of reducing negative health outcomes associated with social determinants of health is determining how to translate research into actionable public policies or interventions and the effectiveness of interventions or efforts. Low socioeconomic status is known to be associated with an increased likelihood of poor health, but understanding influences that keep people in that position or effective strategies for social and economic mobility given a person's unique circumstances are lacking. Improving population health necessitates identifying the social and behavioral processes that will help in the development of interventions (109).

Given that there are often areas of overlap in the study of social determinants of health, research is being focused on multistakeholder collaboration and partnerships. In 2010, the National Institutes of Health (NIH) announced the transition of the National Center on Minority Health and Health Disparities to the National Institute on Minority Health and Health Disparities (NIMHD) and signaled a commitment to reducing health disparities. The NIMHD then released a framework for how NIH institutes and centers can work together to achieve their primary goals (110). The plan involves research, including comparative effectiveness research and research on social determinants of health, behavioral and social sciences, and genetics and biological factors; research capacity building through research infrastructure enhancements, workforce diversity, and informatics capacity; community outreach, information dissemination, and public health education; and the integration of all of these objectives.

Including disadvantaged populations and communities in clinical research can ensure that the results reflect the diversity of the U.S. population. Community-based participatory models engage community members as well as researchers and health care professionals in the area to identify and address social determinants of health and encourage healthy behaviors in the community. These studies help conceptualize social determinants of health and how they affect individual behavior (such as poor diet or limited exercise) as well as the broader community. The Office of Behavioral and Social Sciences Research, in partnership with the NIH, developed funding opportunities to stimulate community-based participatory research, particularly in underserved communities (100). Such research can help identify factors that need to be considered beyond individual behavior and challenges to achieving sustained improvements.

6. *The American College of Physicians recommends policymakers adopt a "health in all policies" approach and supports the integration of health considerations into community planning decisions through the use of health impact assessments:*

"Health in all policies" (HiAP) works to integrate health considerations into government-implemented policies, such as transportation, infrastructure, or urban planning (111). The concept behind the HiAP model is to anticipate and prevent triggers of negative social determinants. For example, when building low-income housing in a community, the local planning commission may consider the location relative to public transportation, primary care or health care facilities, schools, and safety. In 2011, NASEM recommended that the HiAP approach be adopted at the federal, state, and local levels (112). In 2010, the United States moved to incorporate the HiAP concept into federal agencies through the Patient Protection and Affordable Care Act. The Affordable Care Act established the National Prevention Council, which is chaired by the Surgeon General and whose mission is to develop and implement cross-sector strategies to promote health and disease prevention. The council includes 20 federal departments, agencies, and offices (113). In 2012, the National Prevention Council targeted 3 areas to accelerate progress: increasing tobacco-free environments; increasing access to affordable, healthy food; and identifying opportunities for prevention. The council's 2014 status report noted that progress had been made on all fronts. In July 2014, more than 22 000 schools in the United States became eligible to serve healthy breakfasts and lunches to low-income students, on the basis of data collected from such programs as the Supplemental Nutrition Assistance Program and Temporary Assistance for Needy Families instead of paper applications. This was estimated to help as many as 9 million children (114).

The HiAP model is also effective at the state level. California established the Health in All Policies Task Force in 2010, comprising 22 agency members and guided by 6 goals (115). Since its creation, the task force has developed an action plan on active transportation; established a partnership among the Departments of Education, Food and Agriculture, and Public Health called the "California Office of Farm to Fork"; successfully piloted a community-supported agriculture program; and integrated health criteria into state food purchasing contracts (116). The Seattle/King County Health Department in Washington also worked to integrate health considerations into area planning. Through this approach, it has altered the budget of the Department of Natural Resources and Parks to enable walking trails to be built in low-income communities, reduced the number of students expelled from school through a collaboration between the criminal justice and education departments, and included health-based metrics in city and

county land use and transportation plans (117). Other cities that have implemented HiAP include Boston, Massachusetts; Washington, DC; and Nashville, Tennessee.

Health impact assessments have aided in the implementation of HiAP. They bring together scientific data, health experts, and public input to identify the potential effect of new laws, regulations, or programs on health (118). Health impact assessments:

... [look] at health from a broad perspective that considers social, economic, and environmental influences; [bring] community members, business interests and other stakeholders together, which can help build consensus; [acknowledge] the trade-offs of choices under consideration and [offer] decision makers comprehensive information and practical recommendations to maximize health gains and minimize adverse effects; [put] health concerns in the context of other important factors when making a decision; and [consider] whether certain impacts may affect vulnerable groups of people in different ways.

Health impact assessments are important to inform policymakers of the potential positive and negative effects of policies or programs. The American Public Health Association has extensive resources to assist local and state governments in incorporating health impact assessments into their decision making (119).

7. *The American College of Physicians recommends development of best practices for utilizing electronic health record (EHR) systems as a tool to improve individual and population health without adding to the administrative burden on physicians.*

Electronic health records have the potential to be a beneficial tool in facilitating data aggregation and thus integration of social determinants and population health into the broader health care system. Potential uses of incorporation of social determinants into EHRs include identifying individual risk factors, identifying the need for referrals to appropriate public health or social services agencies, increasing shared decision making between patients and physicians, expanding the capacity of health systems to tailor services to their population's needs, and supporting research (120). Several logistical reasons have been identified for why collection and use of data on social determinants of health have not been more prominent, including lack of knowledge and consensus, resource differences between social services and health care organizations, lack of multisector collaboration, and difficulties with current technology systems (121).

The International Classification of Diseases, 10th Revision, includes Z Codes (Z00 to Z99) (122) that could better chart health conditions in EHRs. Codes Z55 to

Z65 relate to social or economic issues, including problems related to education and literacy (Z55), problems related to employment and unemployment (Z56), and problems related to housing and economic circumstances (Z59) (112). This type of data can be used to improve panel management and expand the definition of quality improvement to include such things as food access intervention, staffing for team-based care, and adjustment of clinician panel sizes (123). Translation of the information will differ between individual and population health because each has different goals.

In 2014, the NASEM Committee on the Recommended Social and Behavioral Domains and Measures for Electronic Health Records identified 12 social determinants to be included in EHRs as part of meaningful use stage 3 and issued recommendations on standardizing collection of measures of these social determinants. Several behavioral and social domains are currently collected: tobacco use; alcohol use; race/ethnicity; and residential address, which is geocoded. The NASEM recommended new domains to be collected on the basis of evidence of their usefulness if they are included in the EHR: education level; financial strain; stress; depression; physical activity; social isolation; intimate partner violence; and neighborhood median household income, which would be obtained using the residential address (120).

The Protocol for Responding to and Assessing Patients' Assets, Risks, and Experiences (PRAPARE) tool is a national-level effort to collect data on social determinants. PRAPARE incorporates core measures not included in the NASEM recommendations, including housing status and stability, employment, language, and migrant or seasonal farm work, as well as optional measures of incarceration history, refugee status, and general safety (124). The NASEM committee also indicated the need for regular evaluation of metrics to ensure that the goal of using these systems to reduce health disparities and improve health outcomes is still being met (125).

When developing best practices for use of EHRs as a tool to improve health, stakeholders must consider how to optimize benefits without adding to a physician's administrative burden, such as by limiting the number of domains and adding new ones only after evidence supports their inclusion.

8. *The American College of Physicians recommends adjusting quality payment models and performance measurement assessments to reflect the increased risk associated with caring for disadvantaged patient populations.*

There is interest in how to incorporate social determinants of health into risk adjustment models and how they may affect performance outcomes (126). A 2013 review of literature on social factors potentially affecting risk for hospital readmission for community-acquired pneumonia or

heart failure found a wide range of factors that could affect outcomes (127). Research also indicates that safety net hospitals are more vulnerable to higher penalties under hospital readmission pay-for-performance measures, and inclusion of patient- and community-level characteristics reduced variance in risk-standardized readmission rates (128). Despite the association between readmission rates and areas that primarily serve disadvantaged populations, questions remain about the most appropriate ways to incorporate social determinants into performance measurement.

Initiatives have been instituted to assess the scope of impact that social determinants of health have on hospital readmissions, given data showing an association between the two. These models and demonstrations offer guidance on appropriate ways to capture and adjust for social determinants of health. The National Quality Forum recommended and has undertaken a project focused on assessing how and to what degree socioeconomic factors affect outcome measures (129). Focus on Hospitals became the first Web site to report hospital readmission data adjusted for sociodemographic status (130). The Centers for Medicare & Medicaid Services has also undertaken efforts to consider social determinants of health in hospital readmissions, including identifying ways to connect patients with appropriate community resources (131) and adding a risk adjustment to the Medicare Advantage Star Rating program for differences in dual-eligibility status and disability among beneficiaries.

9. *The American College of Physicians recommends increased screening and collection of social determinants of health data to aid in health impact assessments and support evidence-driven decision making.*

Among policy discussions is the role that can be played in identifying and screening for social determinants of health in the clinical setting by physicians and other medical professionals whose roles are to diagnose and treat disease. Research shows that screening rates for health-related social problems are low despite the effectiveness of such screening in identifying health-related needs associated with social determinants of health. In a survey of 205 families visiting a pediatric clinic for a well-child visit, 82% reported 1 or more health-related social problems, but 33% reported no screening for them. In addition, 70% identified at least 1 need for a referral, but 49% reported an unmet referral need (132). Screening for even 1 health-related social problem may result in identification of other problems. The use of a Web-based screening tool focused on identifying food insecurity found that food insecurity was also associated with problems with health care access, education, housing, and income insecurity (133).

Screening supports collection of population- and individual-level information needed to identify social

determinants of health broadly within communities and among individuals. However, improving patient care through screening and data collection should not add undue burden on the physician or practice, and other avenues for collecting this type of data at the state and local levels should be explored. The Patient Centered Assessment Method tested a way to incorporate screening for social factors into the primary care setting by screening for health and well-being, social factors, and health literacy. A study of the tool in Scotland found that although it did not have immediate positive or negative effects on patient satisfaction, it did increase the number of onward referrals and referrals to non-medical services (134).

Screening need not occur at every clinical encounter, and physician practices should be allowed to tailor their screening methods in a way that is appropriate to their practice and the patient population they treat. This is another area where collaboration among physicians, social workers, care coordinators, nurse practitioners, and others could support screening and data collection without adding burden. Potential collaborators will need to address who will screen and collect data and how the data will be used and disseminated (120).

Outside the clinical setting, those at the local and state levels should also play a key role in supporting screening and data collection through surveys, polls, or questionnaires. The Nashville Area Metropolitan Planning Organization (MPO) used data from 6 health-related questions included in the Middle Tennessee Household Travel Survey; additional households completed an expanded questionnaire. All who completed a questionnaire kept a travel diary and wore a GPS device for 4 days. The MPO used the data to determine 4 demographic characteristics correlated with poor health, including being impoverished, being unemployed, being older than 65 years, and not owning a car. As a result, the MPO was able to prioritize transportation projects in areas that it deemed "health priority areas" using a points system (135).

A key component of screening is understanding the complex social and economic dynamics that are involved in assessing these issues and not painting with broad strokes. Screening for social determinants in the clinical setting can be difficult because of a fundamental difference between social determinants and clinical care. A recent commentary noted, "Screening for any condition in isolation without the capacity to ensure referral and linkage to appropriate treatment is ineffective and, arguably, unethical" (136). The article also offered recommendations for screening protocol, including integrating screening with referral and linkage to community-based resources, taking a comprehensive systems approach to screening, building and utilizing the strength of families and communities, and not limiting screening practices on the basis of apparent social status

(125). These are important factors in efficiently and effectively reaching patients and directing funds that target individual and broad-scale behaviors.

Web-Only References

8. Braveman P, Egerter S, Williams DR. The social determinants of health: coming of age. *Annu Rev Public Health*. 2011;32:381-98. [PMID: 21091195] doi:10.1146/annurev-publhealth-031210-101218
9. Crowley RA; Health and Public Policy Committee of the American College of Physicians. Climate change and health: a position paper of the American College of Physicians. *Ann Intern Med*. 2016;164:608-10. [PMID: 27089232] doi:10.7326/M15-2766
10. Heiman HJ, Artiga S. Beyond health care: the role of social determinants in promoting health and health equity. The Henry J. Kaiser Family Foundation. 4 November 2015. Accessed at www.kff.org/disparities-policy/issue-brief/beyond-health-care-the-role-of-social-determinants-in-promoting-health-and-health-equity on 11 September 2017.
11. American Psychological Association. Measuring socioeconomic status and subjective social status. 2018. Accessed at www.apa.org/pi/ses/resources/class/measuring-status.aspx on 11 May 2017.
12. Chetty R, Grusky D, Hell M, Hendren N, Manduca R, Narang J. The Fading American Dream: Trends in Absolute Income Mobility Since 1940. Working Paper no. 22910. Cambridge, MA: National Bureau of Economic Research; December 2016. doi:10.3386/w22910
13. Braveman PA, Cubbin C, Egerter S, Chideya S, Marchi KS, Metzler M, et al. Socioeconomic status in health research: one size does not fit all. *JAMA*. 2005;294:2879-88. [PMID: 16352796]
14. U.S. Census Bureau. How the Census Bureau measures poverty. Updated 11 August 2017. Accessed at www.census.gov/topics/income-poverty/poverty/guidance/poverty-measures.html on 3 November 2017.
15. Bishaw A. Changes in areas with concentrated poverty: 2000-2010. American Community Survey reports. United States Census Bureau. June 2014. Accessed at www.census.gov/content/dam/Census/library/publications/2014/acs/acs-27.pdf on 10 May 2017.
16. UC Davis Center for Poverty Research. What is the current poverty rate in the United States? Updated 18 December 2017. Accessed at <https://poverty.ucdavis.edu/faq/what-current-poverty-rate-united-states> on 3 November 2017.
17. Internal Displacement Monitoring Centre. Global estimates 2015: people displaced by disasters. 2015. Accessed at www.internal-displacement.org/assets/library/Media/201507-globalEstimates-2015/20150713-global-estimates-2015-en-v1.pdf on 12 September 2017.
18. Ross T. A Disaster in the Making: Addressing the Vulnerability of Low-Income Communities to Extreme Weather. Washington, DC: Center for American Progress; August 2013.
19. American Psychological Association. Education and socioeconomic status. 2018. Accessed at www.apa.org/pi/ses/resources/publications/education.aspx on 1 November 2017.
20. National Center for Education Statistics. Employment and unemployment rates by educational attainment. Updated April 2017. Accessed at https://nces.ed.gov/programs/coe/indicator_cbc.asp on 1 November 2017.
21. Hood E. Dwelling disparities: how poor housing leads to poor health. *Environ Health Perspect*. 2005;113:A310-7. [PMID: 15866753]
22. Healthy People 2020. SDOH-4.1.2. Proportion of households earning less than 200% of the poverty threshold that spend more than 30% of income on housing. Accessed at www.healthypeople.gov/2020/data-search/Search-the-Data#objid=5254 on 9 May 2017.
23. U.S. Department of Housing and Urban Development. Affordable housing. 2017. Accessed at https://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing on 8 May 2017.
24. National Health Care for the Homeless Council. What is the official definition of homelessness? 2017. Accessed at www.nhchc.org/faq/official-definition-homelessness on 10 May 2017.

25. **National Alliance to End Homelessness.** Changes in the HUD definition of "homeless." 18 January 2012. Accessed at www.endhomelessness.org/library/entry/changes-in-the-hud-definition-of-homeless on 10 May 2017.
26. **The Commonwealth Fund.** In Focus: Using Housing to Improve Health and Reduce the Costs of Caring for the Homeless. November 2014. Accessed at www.commonwealthfund.org/publications/newsletters/quality-matters/2014/october-november/in-focus on 8 October 2016.
27. **Center for Outcomes Research & Education.** Integrating Housing and Health: A Health-Focused Evaluation of the Apartments at Bud Clark Commons. Portland, OR: Center for Outcomes Research & Education. Accessed at http://media.oregonlive.com/portland_impact/other/Verified%20BCC%20report%20with%20appendix.pdf on 13 February 2018.
28. **Robert Wood Johnson Foundation.** How does transportation impact health? Issue Brief. October 2012. Accessed at www.rwjf.org/content/dam/farm/reports/issue_briefs/2012/rwjf402311 on 5 May 2017.
29. **Centers for Disease Control and Prevention.** Physical activity for everyone: the benefits of physical activity. Updated 4 June 2015. Accessed at www.cdc.gov/physicalactivity/everyone/health/index.html on 27 November 2017.
30. **Syed ST, Gerber BS, Sharp LK.** Traveling towards disease: transportation barriers to health care access. *J Community Health.* 2013; 38:976-93. [PMID: 23543372] doi:10.1007/s10900-013-9681-1
31. **Govindarajan A, Schull M.** Effect of socioeconomic status on out-of-hospital transport delays of patients with chest pain. *Ann Emerg Med.* 2003;41:481-90. [PMID: 12658247]
32. **Houston D, Wu P, Ong P, Winer A.** Structural disparities of urban traffic in Southern California: implications for vehicle related air pollution exposure in minority and high-poverty neighborhoods. *J Urban Aff.* 2004;26:565-92. doi:10.1111/j.0735-2166.2004.00215
33. **Brunekreef B, Janssen NA, de Hartog J, Harssema H, Knape M, van Vliet P.** Air pollution from truck traffic and lung function in children living near motorways. *Epidemiology.* 1997;8:298-303. [PMID: 9115026]
34. **O'Connor GT, Neas L, Vaughn B, Kattan M, Mitchell H, Crain EF, et al.** Acute respiratory health effects of air pollution on children with asthma in US inner cities. *J Allergy Clin Immunol.* 2008;121:1133-9. [PMID: 18405952] doi:10.1016/j.jaci.2008.02.020
35. **Garshick E, Laden F, Hart JE, Caron A.** Residence near a major road and respiratory symptoms in U.S. veterans. *Epidemiology.* 2003;14:728-36. [PMID: 14569190]
36. **McKenzie B.** Modes less traveled—bicycling and walking to work in the United States: 2008–2012. American Community Survey Reports. Washington, DC: United States Census Bureau; May 2014.
37. **Safe Routes to School National Partnership.** Fighting for equitable transportation: why it matters. American Public Health Association. 2015. Accessed at www.apha.org/~media/files/pdf/topics/environment/built_environment/srtsnp_equitytransp_factsheet2015.ashx on 4 May 2017.
38. **Seligman HK.** Food Insecurity and Diabetes Prevention and Control in California. Accessed at https://cvp.ucsf.edu/images/seligman_food.pdf on 8 October 2016.
39. **Viswanath K, Bond K.** Social determinants and nutrition: reflections on the role of communication. *J Nutr Educ Behav.* 2007;39:S20-4. [PMID: 17336801]
40. Food access and its relationship to diet and health outcomes. In: U.S. Department of Agriculture. Access to Affordable and Nutritious Food: Measuring and Understanding Food Deserts and Their Consequences. Washington, DC: U.S. Department of Agriculture; June 2009:51-60. Accessed at www.ers.usda.gov/webdocs/publications/42711/12716_ap036_1_.pdf?v=41055 on 13 February 2018.
41. **U.S. Department of Agriculture.** Definition of a food desert. Accessed at www.ers.usda.gov/data-products/food-access-research-atlas/documentation#definitions on 13 February 2018.
42. **Stanford University.** Digital Divide. 2017. Accessed at <https://cs.stanford.edu/people/eroberts/cs181/projects/digital-divide/start.html> on 1 August 2017.
43. **Anderson M, Perrin A.** 13% of Americans don't use the internet. Who are they? Pew Research Center. 7 September 2016. Accessed at www.pewresearch.org/fact-tank/2016/09/07/some-americans-dont-use-the-internet-who-are-they on 25 July 2017.
44. **Pai A.** Letter regarding request for comment—actions to accelerate adoption and accessibility of broadband-enabled health care solutions and advanced technologies (GN docket no. 16-46, FCC 17-46). 24 May 2017. Accessed at www.amia.org/sites/default/files/AMIA-Response-to-FCC-Notice-on-Accelerating-Broadband-Health-Tech-Availability.pdf on 25 July 2017.
45. **Horrigan JB.** The numbers behind the broadband "homework gap." Pew Research Center. 20 April 2015. Accessed at www.pewresearch.org/fact-tank/2015/04/20/the-numbers-behind-the-broadband-homework-gap on 25 July 2017.
46. **Federal Communications Commission.** 2016 broadband progress report. 28 January 2016. Accessed at https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-6A1.pdf on 2 November 2017.
47. **Estacio JB, Whittle R, Protheroe J.** The digital divide: examining socio-demographic factors associated with health literacy, access and use of internet to seek health information. *J Health Psychol.* 2017;1359105317695429. [PMID: 28810415] doi:10.1177/1359105317695429
48. **American College of Physicians.** Racial and Ethnic Disparities in Health Care, Updated 2010. Philadelphia: American College of Physicians; 2010.
49. **Williams DR, Priest N, Anderson NB.** Understanding associations among race, socioeconomic status, and health: patterns and prospects. *Health Psychol.* 2016;35:407-11. [PMID: 27018733] doi:10.1037/hea0000242
50. **Mann L, Foley KL, Tanner AE, Sun CJ, Rhodes SD.** Increasing cervical cancer screening among US Hispanics/Latinas: a qualitative systematic review. *J Cancer Educ.* 2015;30:374-87. [PMID: 25154515] doi:10.1007/s13187-014-0716-9
51. **American Cancer Society Cancer Action Network.** Cervical cancer incidence rates remain higher in Hispanic/Latina women. 2017. Accessed at www.acscan.org/sites/default/files/FINAL%20-%20Hispanic%20Latinas%20and%20Cervical%20Cancer%2005.09.17.pdf on 5 November 2017.
52. **Zhang Y, Galloway JM, Welty TK, Wiebers DO, Whisnant JP, Devereux RB, et al.** Incidence and risk factors for stroke in American Indians: the Strong Heart Study. *Circulation.* 2008;118:1577-84. [PMID: 18809797] doi:10.1161/CIRCULATIONAHA.108.772285
53. **United States Government Accountability Office.** Progress on many high-risk areas, while substantial efforts needed on others. GAO-17-317. February 2017. Accessed at www.gao.gov/assets/690/682765.pdf on 30 October 2017.
54. **National Cancer Institute.** Cancer health disparities. Updated 11 March 2008. Accessed at www.cancer.gov/about-nci/organization/crhd/cancer-health-disparities-fact-sheet#r3 on 12 September 2017.
55. **DeSantis CE, Fedewa SA, Goding Sauer A, Kramer JL, Smith RA, Jemal A.** Breast cancer statistics, 2015: convergence of incidence rates between black and white women. *CA Cancer J Clin.* 2016;66:31-42. [PMID: 26513636] doi:10.3322/caac.21320
56. **Gerend MA, Pai M.** Social determinants of black-white disparities in breast cancer mortality: a review. *Cancer Epidemiol Biomarkers Prev.* 2008;17:2913-23. [PMID: 18990731] doi:10.1158/1055-9965.EPI-07-0633
57. **Carey LA, Perou CM, Livasy CA, Dressler LG, Cowan D, Conway K, et al.** Race, breast cancer subtypes, and survival in the Carolina Breast Cancer Study. *JAMA.* 2006;295:2492-502. [PMID: 16757721]
58. **Noh S, Kaspar V.** Perceived discrimination and depression: moderating effects of coping, acculturation, and ethnic support. *Am J Public Health.* 2003;93:232-8. [PMID: 12554575]
59. **Paradies Y, Ben J, Denson N, Elias A, Priest N, Pieterse A, et al.** Racism as a determinant of health: a systematic review and meta-analysis. *PLoS One.* 2015;10:e0138511. [PMID: 26398658] doi:10.1371/journal.pone.0138511
60. **U.S. Department of Health and Human Services.** Healthy People 2020 leading health indicators: progress update. March 2014. Ac-

cessed at www.healthypeople.gov/sites/default/files/LHI-Progress-Report-ExecSum_0.pdf on 12 October 2016.

61. **Centers for Medicare & Medicaid Services.** Accountable health communities model. Accessed at <https://innovation.cms.gov/initiatives/AHCM> on 12 October 2016.

62. **Federal Interagency Forum on Aging-Related Statistics.** Older Americans 2016: Key Indicators of Well-Being. Washington, DC: US Gov Pr Office; August 2016. Accessed at <https://agingstats.gov/docs/LatestReport/Older-Americans-2016-Key-Indicators-of-WellBeing.pdf> on 10 September 2017.

63. **Westfall JM.** Cold-spotting: linking primary care and public health to create communities of solution. *J Am Board Fam Med.* 2013;26:239-40. [PMID: 23657689] doi:10.3122/jabfm.2013.03.130094

64. **Gawande A.** The hot spotters. *The New Yorker.* 24 January 2011. Accessed at www.newyorker.com/magazine/2011/01/24/the-hot-spotters on 5 October 2016.

65. **Department of Vermont Health Access.** Vermont Chronic Care Initiative. Accessed at <http://dvha.vermont.gov/for-providers/vermont-chronic-care-initiative-vcci> on 12 September 2017.

66. **National Center for Medical-Legal Partnership.** Helping families keep their heat and lights on. 1 October 2017. Accessed at <http://medical-legalpartnership.org/utility-story> on 7 February 2018.

67. **Wholesome Wave.** Fruit and Vegetable Prescription Program. FVRx fact sheet. Accessed at www.wholesomewavegeorgia.org/food-rx on 13 February 2018.

68. **U.S. Census Bureau.** Quick facts: Flint City, Michigan. Accessed at www.census.gov/quickfacts/table/PST045215/2629000,00 on 8 October 2016.

69. **Kennedy C, Yard E, Dignam T, Buchanan S, Condon S, Brown MJ, et al.** Blood lead levels among children aged <6 years—Flint, Michigan, 2013–2016. *MMWR Morb Mortal Wkly Rep.* 2016;65:650-4. [PMID: 27359350] doi:10.15585/mmwr.mm6525e1

70. **Mayo Clinic.** Lead poisoning. 2016. Accessed at www.mayoclinic.org/diseases-conditions/lead-poisoning/basics/definition/con-20035487 on 8 October 2016.

71. **Ross T, Solomon D.** Lessons from Flint: the case for investing in the building blocks of communities of color. *Center for American Progress.* 3 March 2016. Accessed at <https://cdn.americanprogress.org/wp-content/uploads/2016/03/02102155/CommunitiesofColorFlint.pdf> on 4 May 2017.

72. **U.S. Environmental Protection Agency.** Learn about lead: lower your chances of exposure to lead. Updated 26 May 2017. Accessed at www.epa.gov/lead/learn-about-lead#lower on 4 May 2017.

73. **Cheng JK.** Confronting the social determinants of health—obesity, neglect, and inequity. *N Engl J Med.* 2012;367:1976-7. [PMID: 23171094] doi:10.1056/NEJMp1209420

74. **Galobardes B, Davey Smith G, Jeffreys M, McCarron P.** Childhood socioeconomic circumstances predict specific causes of death in adulthood: the Glasgow student cohort study. *J Epidemiol Community Health.* 2006;60:527-9. [PMID: 16698985]

75. **Reuben A, Caspi A, Belsky DW, Broadbent J, Harrington H, Sugden K, et al.** Association of childhood blood lead levels with cognitive function and socioeconomic status at age 38 years and with IQ change and socioeconomic mobility between childhood and adulthood. *JAMA.* 2017;317:1244-51. [PMID: 28350927] doi:10.1001/jama.2017.1712

76. **Woolhandler S, Himmelstein DU.** The relationship of health insurance and mortality: is lack of insurance deadly? *Ann Intern Med.* 2017;167:424-31. [PMID: 28655034] doi:10.7326/M17-1403

77. **Robert Wood Johnson Foundation.** Overcoming Obstacles to Health: Report from the Robert Wood Johnson Foundation to the Commission to Build a Healthier America. Princeton: Robert Wood Johnson Foundation; February 2008. Accessed at www.rwjf.org/content/dam/farm/reports/reports/2008/rwjf22441 on 11 May 2017.

78. **Stringhini S, Carmeli C, Jokela M, Avendaño M, Muennig P, Guida F, et al; LIFEPAATH consortium.** Socioeconomic status and the 25 × 25 risk factors as determinants of premature mortality: a multi-cohort study and meta-analysis of 1.7 million men and women.

Lancet. 2017;389:1229-37. [PMID: 28159391] doi:10.1016/S0140-6736(16)32380-7

79. **Kershaw KN, Robinson WR, Gordon-Larsen P, Hicken MT, Goff DC Jr, Carnethon MR, et al.** Association of changes in neighborhood-level racial residential segregation with changes in blood pressure among black adults: the CARDIA study. *JAMA Intern Med.* 2017;177:996-1002. [PMID: 28505341] doi:10.1001/jamainternmed.2017.1226

80. **Adler NE, Newman K.** Socioeconomic disparities in health: pathways and policies. *Health Aff (Millwood).* 2002;21:60-76. [PMID: 11900187]

81. **Williams DR, Costa MV, Odunlami AO, Mohammed SA.** Moving upstream: how interventions that address the social determinants of health can improve health and reduce disparities. *J Public Health Manag Pract.* 2008;14 Suppl:S8-17. [PMID: 18843244] doi:10.1097/01.PHH.0000338382.36695.42

82. **Task Force on Community Preventive Services.** Recommendations to promote healthy social environments. *Am J Prev Med.* 2003;24:21-4. [PMID: 12668195]

83. **Tsao TY, Konty KJ, Van Wye G, Barbot O, Hadler JL, Linos N, et al.** Estimating potential reductions in premature mortality in New York City from raising the minimum wage to \$15. *Am J Public Health.* 2016;106:1036-41. [PMID: 27077350] doi:10.2105/AJPH.2016.303188

84. **Williams DR, Costa MV, Odunlami AO, Mohammed SA.** Moving upstream: how interventions that address the social determinants of health can improve health and reduce disparities. *J Public Health Manag Pract.* 2008;14 Suppl:S8-17. [PMID: 18843244] doi:10.1097/01.PHH.0000338382.36695.42

85. **Shi L, Tsai J, Kao S.** Public health, social determinants of health, and public policy. *Journal of Medical Sciences.* 2009;29:43-59.

86. **Cummins S, Flint E, Matthews SA.** New neighborhood grocery store increased awareness of food access but did not alter dietary habits or obesity. *Health Aff (Millwood).* 2014;33:283-91. [PMID: 24493772] doi:10.1377/hlthaff.2013.0512

87. **Gortmaker SL, Long MW, Ward ZJ, Giles CM, Barrett JL, Resch SC, et al.** Brief: cost effectiveness of a sugar-sweetened beverage excise tax in Philadelphia, PA. (Prepared by the CHOICES Project at the Harvard T.H. Chan School of Public Health.) Accessed at http://choicesproject.org/wp-content/uploads/2016/11/BRIEF_Cost-Effectiveness-of-a-Sugar-Sweetened-and-Diet-Beverage-Excise-Tax-in-Philadelphia-PA.pdf on 13 February 2018.

88. **Cotter EW, Teixeira C, Bontrager A, Horton K, Soriano D.** Low-income adults' perceptions of farmers' markets and community-supported agriculture programmes. *Public Health Nutr.* 2017;20:1452-1460. [PMID: 28202100] doi:10.1017/S1368980017000088

89. **Community of Hope.** Permanent supportive housing. 2016. Accessed at www.communityofhopedc.org/housing/permanent-supportive-housing on 11 May 2017.

90. **Robert Wood Johnson Foundation.** Health care's blind side. 1 December 2011. Accessed at www.rwjf.org/en/library/research/2011/12/health-care-s-blind-side.html on 12 September 2017.

91. **Gupta S, Tinker B, Hume T.** 'Our mouths were ajar': Doctor's fight to expose Flint's water crisis. Updated 22 January 2016. Accessed at www.cnn.com/2016/01/21/health/flint-water-mona-hanna-attish/index.html on 6 February 2018.

92. **O'Brien MJ, Garland JM, Murphy KM, Shuman SJ, Whitaker RC, Larson SC.** Training medical students in the social determinants of health: the Health Scholars Program at Puentes de Salud. *Adv Med Educ Pract.* 2014;5:307-14. [PMID: 25278787] doi:10.2147/AMEP.S67480

93. **National Academies of Sciences, Engineering, and Medicine; Institute of Medicine; Board on Global Health; Committee on Educating Health Professionals to Address the Social Determinants of Health.** A Framework for Educating Health Professionals to Address the Social Determinants of Health. Washington, DC: National Academies Pr; 2016. doi:10.17226/21923

94. **Accreditation Council for Graduate Medical Education.** CLER Pathways to Excellence: Expectations for an Optimal Clinical Learning Environment to Achieve Safe and High Quality Patient Care. Chi-

- cago: Accreditation Council for Graduate Medical Education; 2014. Accessed at www.acgme.org/Portals/0/PDFs/CLER/CLER_Brochure.pdf on 10 May 2017.
95. Shi L, Starfield B, Politzer R, Regan J. Primary care, self-rated health, and reductions in social disparities in health. *Health Serv Res.* 2002;37:529-50. [PMID: 12132594]
 96. **Institute of Medicine.** Primary Care and Public Health: Exploring Integration to Improve Population Health. Washington, DC: National Academy of Sciences; March 2012. Accessed at www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2012/Primary-Care-and-Public-Health/Primary%20Care%20and%20Public%20Health_Revised%20RB_FINAL.pdf on 5 May 2017.
 97. Garg A, Jack B, Zuckerman B. Addressing the social determinants of health within the patient-centered medical home: lessons from pediatrics. *JAMA.* 2013;309:2001-2. [PMID: 23619825] doi:10.1001/jama.2013.1471
 98. Hankin CS, Cox L, Bronstone A, Wang Z. Allergy immunotherapy: reduced health care costs in adults and children with allergic rhinitis. *J Allergy Clin Immunol.* 2013;131:1084-91. [PMID: 23375206] doi:10.1016/j.jaci.2012.12.662
 99. Rimal RN, Lapinski MK. Why health communication is important in public health [Editorial]. *Bull World Health Organ.* 2009;87:247. [PMID: 19551226]
 100. Doherty RB, Crowley RA; **Health and Public Policy Committee of the American College of Physicians.** Principles supporting dynamic clinical care teams: an American College of Physicians position paper. *Ann Intern Med.* 2013;159:620-6. [PMID: 24042251] doi:10.7326/0003-4819-159-9-201311050-00710
 101. Miller G, Roehrig C, Hughes-Cromwick P, Turner A. What is currently spent on prevention as compared to treatment? In: Faust H, Menzel P, eds. *Prevention vs. Treatment: What's the Right Balance?* New York: Oxford Univ Pr; 2011:37-55.
 102. Bradley EH, Canavan M, Rogan E, Talbert-Slagle K, Ndumele C, Taylor L, et al. Variation in health outcomes: the role of spending on social services, public health, and health care, 2000–09. *Health Aff (Millwood).* 2016;35:760-8. [PMID: 27140980] doi:10.1377/hlthaff.2015.0814
 103. Avendano M, Kawachi I. Why do Americans have shorter life expectancy and worse health than do people in other high-income countries? *Annu Rev Public Health.* 2014;35:307-25. [PMID: 24422560] doi:10.1146/annurev-publhealth-032013-182411
 104. Syme SL. Social determinants of health: the community as an empowered partner. *Prev Chronic Dis.* 2004;1:A02. [PMID: 15634364]
 105. **U.S. Department of Housing and Urban Development.** Healthy homes and lead hazard control. Accessed at <http://portal.hud.gov/hudportal/HUD?src=/hudprograms/hhlhc> on 12 October 2016.
 106. **Centers for Disease Control and Prevention.** Preventing Lead Exposure in Young Children: A Housing-Based Approach to Primary Prevention of Lead Poisoning. Atlanta: Centers for Disease Control and Prevention; October 2004. Accessed at www.cdc.gov/nceh/lead/publications/primarypreventiondocument.pdf on 1 November 2017.
 107. Bloom DA. FY 2018 President's Budget: Major Policy and Final Reserve Decisions [Memorandum]. 21 March 2017. Accessed at www.washingtonpost.com/apps/g/page/politics/epas-spending-cut-plan/2188/?tid=a_inl on 11 May 2017.
 108. Reich D, Shapiro I, Cho C, Kogan R. Block-granting low-income programs leads to large funding declines over time, history shows. *Center on Budget and Policy Priorities.* 22 February 2017. Accessed at www.cbpp.org/research/federal-budget/block-granting-low-income-programs-leads-to-large-funding-declines-over-time on 6 November 2017.
 109. Boyce CA, Olster DH. Strengthening the public research agenda for social determinants of health. *Am J Prev Med.* 2011;40:S86-8. [PMID: 21146786] doi:10.1016/j.amepre.2010.10.006
 110. **U.S. Department of Health and Human Services; National Institutes of Health.** NIH health disparities strategic plan and budget fiscal years 2009–2013. Accessed at www.nimhd.nih.gov/docs/2009-2013nih_health_disparities_strategic_plan_and_budget.pdf on 11 May 2017.
 111. Bauman AE, King L, Nutbeam D. Rethinking the evaluation and measurement of health in all policies. *Health Promot Int.* 2014;29 Suppl 1:i143-51. [PMID: 25217351] doi:10.1093/heapro/dau049
 112. **Institute of Medicine.** For the Public's Health: Revitalizing Law and Policy to Meet New Challenges. Washington, DC: National Academy of Sciences; June 2011. Accessed at www.nationalacademies.org/hmd/~/media/Files/Report%20Files/2011/For-the-Publics-Health-Revitalizing-Law-and-Policy-to-Meet-New-Challenges/For%20the%20Publics%20Health%202011%20Report%20Brief.pdf on 8 October 2016.
 113. **U.S. Department of Health and Human Services.** National Prevention Council. Accessed at www.surgeongeneral.gov/priorities/prevention/about on 8 October 2016.
 114. **National Prevention Council.** National Prevention, Health Promotion, and Public Health Council Annual Status Report 2014. Washington, DC: U.S. Department of Health and Human Services; July 2014. Accessed at www.surgeongeneral.gov/priorities/prevention/2014-npc-status-report.pdf on 11 May 2017.
 115. **California Department of Public Health.** Health in All Policies (HIAP). Accessed at www.cdph.ca.gov/Programs/OHE/Pages/HIAP.aspx# on 11 May 2017.
 116. **California Health in All Policies Task Force.** California's Health in All Policies Task Force fact sheet. Accessed at www.co.merced.ca.us/DocumentCenter/View/11972 on 13 February 2018.
 117. Wernham A, Teutsch SM. Health in all policies for big cities. *J Public Health Manag Pract.* 2015;21 Suppl 1:S56-65. [PMID: 25423058] doi:10.1097/PHH.0000000000000130
 118. **The Pew Charitable Trusts.** Health Impact Project: about health impact assessment. Accessed at www.pewtrusts.org/en/projects/health-impact-project/health-impact-assessment on 9 October 2016.
 119. Rudolph L, Caplan J, Ben-Moshe K, Dillon L. *Health in All Policies: A Guide for State and Local Governments.* Oakland: Public Health Institute; 2013.
 120. Adler NE, Stead WW. Patients in context—EHR capture of social and behavioral determinants of health. *N Engl J Med.* 2015;372:698-701. [PMID: 25693009] doi:10.1056/NEJMp1413945
 121. **Robert Wood Johnson Foundation.** Using social determinants of health data to improve health care and health: a learning report. 2 May 2016. Accessed at <https://healthleadsusa.org/wp-content/uploads/2016/06/RWJF-SDOH-Learning-Report.pdf> on 27 November 2017.
 122. **Centers for Disease Control and Prevention.** ICD-10-CM official guidelines for coding and reporting FY2016. 2016. Accessed at www.cdc.gov/nchs/data/icd/10cmguidelines_2016_final.pdf on 11 May 2017.
 123. Gottlieb L, Tobey R, Cantor J, Hessler D, Adler NE. Integrating social and medical data to improve population health: opportunities and barriers. *Health Aff (Millwood).* 2016;35:2116-23. [PMID: 27834254]
 124. **National Association of Community Health Centers.** PRAPARE. Accessed at www.nachc.org/research-and-data/prapare on 11 May 2017.
 125. **Institute of Medicine.** Capturing Social and Behavioral Domains and Measures in Electronic Health Records: Phase 2. Washington, DC: National Academies Pr; 2014.
 126. Nuckols TK. With the Merit-Based Incentive Payment System, pay for performance is now national policy. *Ann Intern Med.* 2017;166:368-9. [PMID: 28114662] doi:10.7326/M16-2947
 127. Calvillo-King L, Arnold D, Eubank KJ, Lo M, Yunyongying P, Stieglitz H, et al. Impact of social factors on risk of readmission or mortality in pneumonia and heart failure: systematic review. *J Gen Intern Med.* 2013;28:269-82. [PMID: 23054925] doi:10.1007/s11606-012-2235-x
 128. Nagasaki EM, Reidhead M, Waterman B, Dunagan WC. Adding socioeconomic data to hospital readmissions calculations may produce more useful results. *Health Aff (Millwood).* 2014;33:786-91. [PMID: 24799575] doi:10.1377/hlthaff.2013.1148

129. **National Quality Forum.** Risk Adjustment for Socioeconomic or Other Sociodemographic Factors. Technical Report. Washington, DC: National Quality Forum; 2014.
130. **Focus on Hospitals.** Risk-adjustment methodology for readmissions. Accessed at <http://focusonhospitals.com/risk-adjustment-methodology-for-readmissions> on 1 August 2017.
131. **Betancourt JR, Tan-McGrory A, Kenst KS.** Guide to Preventing Readmissions among Racially and Ethnically Diverse Medicare Beneficiaries. (Prepared by Disparities Solutions Center, Mongan Institute for Health Policy at Massachusetts General Hospital.) Baltimore: Centers for Medicare & Medicaid Services Office of Minority Health; September 2015.
132. **Fleegler EW, Lieu TA, Wise PH, Muret-Wagstaff S.** Families' health-related social problems and missed referral opportunities. *Pediatrics.* 2007;119:e1332-41. [PMID: 17545363]
133. **Baer TE, Scherer EA, Fleegler EW, Hassan A.** Food insecurity and the burden of health-related social problems in an urban youth population. *J Adolesc Health.* 2015;57:601-7. [PMID: 26592328] doi:10.1016/j.jadohealth.2015.08.013
134. **Pratt R, Hibberd C, Cameron IM, Maxwell M.** The Patient Centered Assessment Method (PCAM): integrating the social dimensions of health into primary care. *J Comorb.* 2015;5:110-9. [PMID: 29090159] doi:10.15256/joc.2015.5.35
135. **Transportation for America.** Case study: Nashville, TN. Prioritizing public health benefits through better project evaluation. 2016. Accessed at <http://t4america.org/wp-content/uploads/2016/09/Nashville-Case-Study.pdf> on 11 May 2017.
136. **Garg A, Boynton-Jarrett R, Dworkin PH.** Avoiding the unintended consequences of screening for social determinants of health. *JAMA.* 2016;316:813-4. [PMID: 27367226] doi:10.1001/jama.2016.9282

Appendix Table. Social Determinants of Health and Health Outcomes*

Social determinants of health

- Economic stability
 - Employment
 - Income
 - Expenses
 - Debt
 - Medical bills
 - Support
- Neighborhood and physical environment
 - Housing
 - Transportation
 - Safety
 - Parks
 - Playgrounds
 - Walkability
- Education
 - Literacy
 - Language
 - Early childhood education
 - Vocational training
 - Higher education
- Food
 - Hunger
 - Access to healthy options
- Community and social context
 - Social integration
 - Support systems
 - Community engagement
 - Discrimination
- Health care system
 - Health coverage
 - Provider availability
 - Provider linguistic and cultural competency
 - Quality of care

Health outcomes

- Mortality
- Morbidity
- Life expectancy
- Health care expenditures
- Health status
- Functional limitations

* Adapted from Heiman and Artiga (10).