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ANALYSIS & COMMENTARY

# How Other Countries Use Deprivation Indices—And Why The United States Desperately Needs One

**ABSTRACT Integrating public health and medicine to address social determinants of health is essential to achieving the Triple Aim of lower costs, improved care, and population health. There is intense interest in the United States in using social determinants of health to direct clinical and community health interventions, and to adjust quality measures and payments. The United Kingdom and New Zealand use data representing aspects of material and social deprivation from their censuses or from administrative data sets to construct indices designed to measure socioeconomic variation across communities, assess community needs, inform research, adjust clinical funding, allocate community resources, and determine policy impact. Indices provide these countries with comparable data and serve as a universal language and tool set to define organizing principles for population health. In this article we examine how these countries develop, validate, and operationalize their indices; explore their use in policy; and propose the development of a similar deprivation index for the United States.**

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The 2008 World Health Organization report, *Closing the Gap in a Generation: Health Equity through Action on the Social Determinants of Health*, highlighted that "our children have dramatically different life chances depending on where they were born," and that "health…follow[s] a social gradient."[1] The report laid out an international approach for countries to follow to reduce disparities in social determinants of health. Since its release, social determinants of health have received considerable attention in the United States. Specifically, there is increasing focus on capturing and using data on social determinants of health for clinical, public health, and policy purposes. Several reports from the Institute of Medicine (IOM, now the National Academy of Medicine) have emphasized the importance of social determinants of health to improve public health and primary care integration, advance population health, and guide what data to collect.[2–4] Another IOM report went further, recommending that the Department of Health and Human Services (HHS) "coordinate the development and evaluation and advance the use of *predictive and system-based simulation models to understand the health consequences of underlying determinants of health*" (emphasis added).[5] Most efforts at HHS, both before and after the release of these reports, have focused on data elements rather than how data should be prioritized or organized for use.

Efforts to capture, aggregate, display, and analyze community data in the United States are noteworthy but not sufficient. Sites taking part in the National Neighborhood Indicators Part-

nership have laid the foundations for standardized risk and health outcome measurement.[6] Likewise, tools such as datadiversity.org facilitate looking at a variety of measures and have led to the development of other tools, such as the Child Opportunity Index.[7,8] Unfortunately, this index has not been tested against health outcomes.

Other localities have gone further in linking risk and health outcome measurement. Hennepin County in Minnesota created an integrated data warehouse to track members of a county-sponsored Medicaid accountable care organization, Hennepin Health. The data warehouse combines social service case records, health plan enrollment, demographic, and claims data with encounter-level electronic health record data. Hennepin augments these data by administering an electronic health record–captured psychosocial needs assessment and identifying members with unstable housing.[9] These data augment traditional risk assessment calculators and inform patient-guided care plans.[10] The Public Health Disparity Geocoding Project found that poverty was the best predictor of several health outcomes at the census-tract level in Massachusetts and Rhode Island, and the Index of Concentration at the Extremes captured extremes of poverty and race/ethnicity concentration with an increasing relative risk for three mortality measures within New York Census tracts.[11,12] Gopal Singh and colleagues went further by testing a county-level deprivation index against mortality.[13] While Singh and colleagues' study is important for its use of modeling to construct an index associated with important outcomes, an index that supports clinical, public health, or policy interventions needs data at the subcounty level.

To prepare for the broader use of data on the social determinants of health, the National Committee on Vital and Health Statistics, a statutory advisory body to the HHS secretary, is identifying approaches for improving access to local data. The Office of the Assistant Secretary for Planning and Evaluation at HHS has been charged with developing a plan for using social determinants data to adjust Medicare payments,[14] and there are calls for using social-determinants-of-health adjustments for quality measures more broadly.[15,16] A recent Centers for Medicare and Medicaid Services proposed rule asks whether a measure of "performance of activities for use of standardized processes for screening for social determinants" should be included in the Merit-Based Incentive Payment System, part of a broader Medicare reform law passed in 2015.[17] These federal efforts increase the availability of data on social determinants of health and incentives for addressing population health, but they also raise concerns that policy makers are driving data enumeration and collection without sufficient evidence to guide these activities. Appendix A describes organizational efforts to capture and address social determinants.[18]

The Social Vulnerability Index, developed within the Centers for Disease Control and Prevention (CDC), uses fifteen social factors to identify census tracts most likely to need support from health services following hazardous events.[19] This index has not been evaluated against outcomes to test associations, provide factor weighting, or eliminate collinear variables. For health care, the United States needs an empirical model for organizing and weighting social-determinants-of-health variables to understand how these variables are associated with health outcomes.

The Robert Graham Center, the policy institute affiliated with the American Academy of Family Physicians, developed the Social Deprivation Index (Exhibit 1), using data on neighborhood social determinants of health, to model health outcomes and health service use and to study the stability of the model across different geographies.[20] The index was modeled on efforts in New Zealand and the United Kingdom, where deprivation indices have been used for more than two decades to allocate health care resources and identify "hot spots"—clusters of high health care utilizers in poor health—and "cold spots"—resource-poor communities with unmet need for health services.[21]

In this article we describe the social deprivation indices developed in New Zealand and the United Kingdom, explore their potential application in the United States, and identify international opportunities to improve the utility of social-determinants-of-health data. Finally, we examine how indices measure social gradients in health outcomes to identify communities with higher or lower levels of deprivation than expected.[22]

## International Deprivation Indices

**NEW ZEALAND INDEX OF DEPRIVATION** The New Zealand Index of Deprivation project began in the mid-1990s to assist with resource allocation in health services.[23] National and regional stakeholders expressed frustration that resource allocation lacked a readily available, theoretically robust, reliable, and validated tool for the measurement of socioeconomic position.[24] In response, the New Zealand Index of Deprivation, a small-area index of socioeconomic deprivation, was created from national census data, and based on international research, with three purposes in mind: resource allocation, commu-

nity advocacy, and research.

The New Zealand Index of Deprivation was built around the idea that deprivation is "a state of observable and demonstrable disadvantage relative to the local community or the wider society or nation."[25(p125)] It can involve both material and social deprivation, where material deprivation involves the goods, services, resources, amenities, physical environment, and location of life, and social deprivation involves the roles, relationships, functions, customs, rights, and responsibilities of membership of society.[25]

The New Zealand Index of Deprivation is used extensively, and its fifth iteration in 2013 combines nine variables from the 2013 census that reflect eight dimensions of socioeconomic deprivation (Exhibit 2). Principal components analysis was used to create the index, which provides a deprivation score for each Meshblock, a small-area geographic unit containing a median of approximately eighty people.[26]

The Ministry of Health uses the index to explore health variation and differentially allocate funds to local health care providers. Local governments use the index maps to visualize the diversity and neediness of local communities as a tool for service planning.[24] An exploratory 2013 New Zealand Index of Deprivation atlas is available.[27] Further details concerning the construction of the index are available elsewhere.[24,28]

The national Population-based Funding Formula for health services uses the New Zealand Index of Deprivation for needs-based resource allocation. New Zealand's health system is largely funded by the national government, but most health care practices are private businesses. The formula is used to distribute the bulk of health funding, aiming to provide each District Health Board with similar relative resources to respond to the needs of its population.[29] The formula covers a range of health services including primary care, hospitalization, community care services, health services for older people, and mental health services.[29]

The formula adjusts the population in each region using the New Zealand Index of Deprivation, ethnicity (Māori, Pacific, or other), and

**EXHIBIT 1**

**US Social Deprivation Index factors and weighting**

| Dimension of deprivation | Description of variables | Component weight |
|---|---|---|
| Single parent | Single-mother household | 0.861 |
| Poor | Population below poverty | 0.828 |
| No car | Rate of no car ownership | 0.760 |
| Education | Less than 12 years' schooling | 0.753 |
| Home ownership | Renter-occupied housing | 0.734 |
| Employment | Nonemployed | 0.704 |
| Crowding | Percent overcrowded | 0.609 |
| Race | Percent black | 0.511 |
| Age | High-need age group | 0.379 |

**SOURCE** Butler DC, Petterson S, Phillips RL, Bazemore AW. Measures of social deprivation that predict health care access and need within a rational area of primary care service delivery (see Note 20 in text).

**EXHIBIT 2**

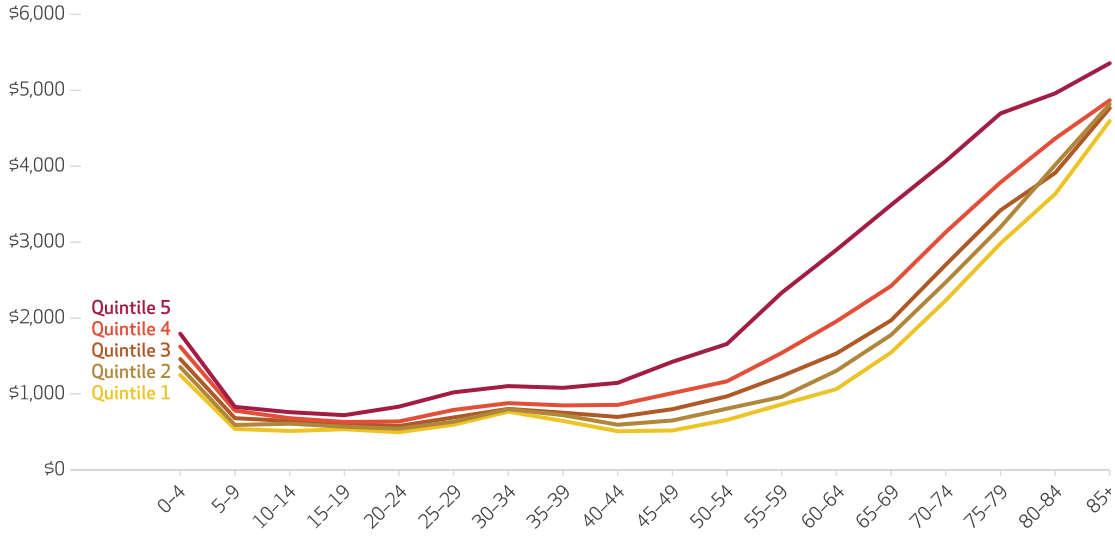
**2013 New Zealand Index of Deprivation element descriptions and weighting**

| Dimension of deprivation | Description of variables | Component weight |
|---|---|---|
| Communication | People under age 65 with no access to the Internet at home | 0.372 |
| Income | People ages 18–64 receiving a means tested benefit | 0.364 |
| Income | Equivalized household income below threshold[a] | 0.356 |
| Employment | People ages 18–64 unemployed | 0.338 |
| Qualifications | People ages 18–64 without high school or postsecondary qualification | 0.332 |
| Owned home | People not living in own home | 0.322 |
| Support | People age under 65 living in a single-parent family | 0.317 |
| Living space | Equivalized households below a bedroom occupancy threshold[a] | 0.303 |
| Transport | People with no access to a car | 0.286 |

**SOURCE** Ministry of Health. Population-based Funding Formula Review: 2015 technical report (see Note 29 in text). [a]Equivalence scales are "measures of the relative incomes needed by different types of families to attain the same material standard of living" See Whiteford P. A family's needs: equivalence scales, poverty, and social security. Canberra: Department of Social Security, Development Division; 1985. Equivalized household income was used for calculating the income variable so that, for example, the standard of living of a household consisting of a single person with an income of $40,000 could be compared to that of a household consisting of two adults and six children with an income of $40,000. Household equivalized poverty thresholds were guided by research and set to include 15 percent of people (see Note 29 in text).

**EXHIBIT 3**

**Cost weights for hospital and community services, by 2013 New Zealand Index of Deprivation quintile**




**SOURCE** Ministry of Health. Population-based Funding Formula Review: 2015 technical report (see Note 29 in text). **NOTE** Cost weights are in New Zealand dollars.

sex; areas with greater deprivation receive more funding.[29] Exhibit 3 provides an example of payment weights for hospital and community services by New Zealand Index of Deprivation quintile. The second use of the New Zealand Index of Deprivation in the formula is in one of three additional adjusters applied to compensate for rurality, immigrants and refugees, and unmet needs. The latter adjustment reduces costly hospital readmissions resulting from unmet need and is based on ethnicity and the New Zealand Index of Deprivation. The amount of funding allocated via the unmet needs factor is calibrated according to calculations of excess "unmet need" in the highest-need sectors of the population.[29]

**UNITED KINGDOM INDEX OF MULTIPLE DEPRIVATION** Contemporary research into area-based deprivation in the United Kingdom began following the release of 1966 census data for small areas. Sally Holtermann used eighteen variables from the 1971 census representing housing conditions, unemployment, occupational social class, "special needs" or dependent populations, and housing tenure to explore geographic variations in deprivation.[30] Peter Townsend made the theoretical distinction between poverty and deprivation, the latter of which can include poverty but other forms of material and social disadvantage, too, and extended Holtermann's work using data from the 1981 UK census.[25] Townsend's index used four indicators of deprivation (unemployment, household overcrowding, non–home ownership, and non–car ownership) by Census Ward in England and Wales. Each indicator was selected for its theoretical ability to measure social or material deprivation and was predicated on the availability of 1981 census data.[31] In Scotland, Vera Carstairs and Russell Morris used four variables derived from the 1981 UK census (male unemployment, lack of car ownership, low social class, and household overcrowding) by postcode sector; as in the work of Townsend, the level of deprivation was calculated as the sum of the z-scores of the four variables.[32] Both indices were used to better understand health inequalities, independently in the United Kingdom and Scotland. For example, the Townsend Index demonstrated that the widening inequalities in Britain during the 1970s and 1980s were real and worse than estimated by the Black Report, a seminal study demonstrating wide disparities in health outcomes based on social class in the United Kingdom.[33]

The UK government developed its own Index of Local Conditions in 1991 and the Index of Local Deprivation in 1998. Both indices were produced at three spatial scales based on the 1991 census boundaries: Enumeration District (approximately 101,000 districts with an average of 420 people); Census Ward (approximately 8,620 wards with an average of 5,000 people); and Local Authority District (354 districts in 1998 with an average of 122,000 people). At the Local Authority District scale, the Index of Local Deprivation included twelve indicators, while the Enumeration District and Census Ward scales used five and six indicators, respectively.[34] Concerns about dependence on decennial cen-

sus data, which could become dated, for guiding investments in deprived communities led to enhancements in the electronic collection of data.

In 2000 the English Indices of Multiple Deprivation, built on the Index of Local Deprivation and using new, routinely collected data, incorporated a combination of direct (employment, education, housing, geographic access) and indirect (income, health) measures (Exhibit 4). However, because the population distribution of Census Wards varies immensely within countries, Wales, Northern Ireland, and Scotland have used an "intermediate" geographic scale to measure deprivation. Intermediate geographies (mean of 4,000 people) were aggregations of Output Areas—the smallest UK census areas, containing approximately 300 people each—and were designed to be small enough to reflect neighborhoods while being large enough to be statistically robust. In addition, their populations were designed to be more equally distributed than the existing small area census boundaries (Output Areas or Census Wards). A particular strength of the Indices of Multiple Deprivation is that the domains of deprivation can be used independently or combined as an overall index of multiple deprivation.[35]

The initial allocation of funding for the National Health Service favored wealthier areas, which risked widening health inequalities.[36] The political response was to allocate the health budget according to need. The resulting formula to incorporate population need into allocation decisions considered population distribution, sex, age, and hospital volume, and it introduced weighted capitation. Initially, funding adjustments focused on hospital and resource equity; in the late 1990s, prescriptions and primary care were added to adjustment considerations.[37]

The Index of Local Deprivation and then Indices of Multiple Deprivation informed the government's allocation of health and social resources. For example, between 2008 and 2011, Local Authorities were eligible to receive a share of £1.5 billion based on their ranking in three deprivation domains.[38] The National Health Service also used the English Indices of Multiple Deprivation (2004, 2007) as part of its weighted capitation funding modeling, allocating £85 million to primary care trusts and deprivation-weighted bonuses to physicians.[39]

Two separate studies found that the 2000 Indices of Multiple Deprivation were more effective for reaching the poor and reducing inequalities than were previously used methods, and that the use of the indices in a weighted capitation formula was associated with a significant reduction in absolute inequalities between the least and most deprived communities for causes amenable to health care.[40,41] A tool for exploring the 2015 Indices of Multiple Deprivation is available online.[42]

The United Kingdom continues to wrestle with how to simplify payment formulas to improve transparency without losing specificity for targeting inequality. Some researchers also argue for greater local resource decision-making flexibility regarding funding clinical versus community services, and for configuring and integrating health services to improve health outcomes.[37]

Between 2001 and 2007 the Department of Communities and Local Government allocated £2.9 billion to ninety-one Neighborhood Renewal Funds and £2 billion to New Deal for Commu-

**EXHIBIT 4**

**English Index of Multiple Deprivation element descriptions and weighting**

| Dimension of deprivation | Description of variables | Component weight |
|---|---|---|
| Income deprivation | Includes both people who are out of work and people who are working but have low earnings (and who satisfy the respective means tests) | 22.5% |
| Employment deprivation | Proportion of the working-age population in an area involuntarily excluded from the labor market | 22.5% |
| Education, skills and training deprivation | Lack of attainment and skills in the local population | 13.5% |
| Health deprivation and disability | Premature death and the impairment of quality of life through poor physical or mental health | 13.5% |
| Crime | Risk of personal and material victimization at the local level | 9.3% |
| Barriers to housing and services | Physical and financial accessibility of housing and local services<br>People under age 65 living in a single-parent family (geographic and affordability barriers) | 9.3% |
| Living environment deprivation | Quality of housing, air quality, road traffic accidents | 9.3% |

**SOURCE** Smith T, Noble M, Noble S, Wright G, McLennan D, Plunkett E. The English Indices of Deprivation 2015: technical report. London: Department for Communities and Local Government; 2015.

nities areas using the Indices of Multiple Deprivation. Both programs aim to reduce social and economic inequalities through community partnership and regeneration. By 2007 there was evidence of health improvements among the most deprived areas, including a reduction in cardiovascular mortality disparities.[43]

## A Social Deprivation Index In The United States

**LEARNING FROM PEERS** As the United States considers how to use social determinants of health to reduce health disparities and allocate resources for health care, it can look to the experience of peer nations. These case studies suggest that the United States should start with social-determinants-of-health indices based on ecological data, enabling rapid data acquisition and use, while reducing the marginal costs for health practices. Using ecological data, in which at least one observation is measured at the population level, is more efficient than collecting data from individuals.

The Social Deprivation Index developed by the Robert Graham Center is one US index similar to indices in the United Kingdom and New Zealand that has been tested for use. The CDC's Social Vulnerability Index is a laudable demonstration and may be another good option with empirical testing and weighting. Appendix B compares the dimensions included across deprivation indices.[18] We believe that the Office of the Assistant Secretary for Planning and Evaluation is the HHS agency best positioned to lead such an effort.

**SHARED INTERNATIONAL EXPLORATION** Concerns in the United States about using ecological data provide an opportunity for collaboration among researchers, policy makers, and health systems both domestically and internationally. Federally qualified health centers and clinical systems such as Hennepin Health, which routinely collect data on social determinants of health data at the individual level, are natural laboratories for studying individual versus neighborhood measurement of these determinants. International research collaborations can also aid in understanding how index elements and weightings are associated with outcomes.

There is a shared opportunity to learn more about clinical applications of indices to individuals and populations, including growing interest in the United States for creating Community Vital Signs, which communicate patient-level risk for bad health outcomes.[44] Clinics in the United States have used social-determinants-of-health data within a geospatial mapping environment to better understand whom they serve and understand community characteristics.[21,45] Policy makers and researchers also share a need to better understand which policy applications may reduce disparities. Justifying and improving social determinants of health–derived policies would benefit from research and evaluation of applications and interventions.

**Policy makers and researchers share a need to better understand which policy applications may reduce disparities.**

## Discussion

**POSITIVE AND NEGATIVE DEVIANTS** Deprivation indices that have been tested against health outcomes not only illuminate health inequalities but also highlight communities whose health outcomes are better or worse than would be predicted by their levels of deprivation. A collective opportunity exists to evaluate and learn from outlier communities: those that appear to be more resilient (better-than-predicted health outcomes) or more affected by social determinants of health than others are.[46,47] Identifying how resilient communities overcome deprivation can provide a blueprint for similar communities to potentially replicate.

**LIMITATIONS OF INDICES** While deprivation indices hold great promise, several caveats merit future research. First, researchers and policy makers may disagree over the criteria required to judge the validity of indices, particularly when each performs differently depending on the selected test of validity. This means that decisions cannot be completely driven by evidence and will require researchers and policy makers to continuously evaluate and modify them. Second, the configuration of administrative boundaries and scale at which analyses are conducted can significantly affect results and interpretations. Users must be mindful of the modifiable areal unit problem, which observes that aggregated values vary depending on how underlying area bound-

aries are drawn, and thus optimize their data and geographical boundaries in a way that mitigates these errors.[48] Relatedly, small-area census geographies are susceptible to boundary changes over time, which can be mitigated through data harmonization techniques.[49] Third, there is debate over whether it is appropriate to apply area-level measures of deprivation to individuals. Using current indices as proxies for individual characteristics risks ecological fallacy, where false conclusions are made about individuals based on group data. In New Zealand, researchers found weak correlation between small-area and individual deprivation indices: Nondeprived individuals lived in communities with poor index scores, and vice versa.[50] However, New Zealand researchers have found that the likelihood and magnitude of the error decreases with smaller geographic units.

## Conclusion

The United States lacks a nationally agreed-upon strategic approach for reducing health disparities and for bringing social determinants of health into efforts to do so. It lags behind other countries and behind innovative communities within its borders in addressing the health impact of social inequities through clinical and policy interventions, including adjusting resource allocation according to need. Collectively, these experiences construct a compelling case for developing and building consensus around a deprivation index for the United States derived from ecological data. The Robert Graham Center's Social Deprivation Index offers one option on which to build. The Social Vulnerability Index offers a platform of small-area data managed by the CDC that appears ripe for development into a weighted index. The Office of the Assistant Secretary for Planning and Evaluation, which is responsible for developing a plan for using social determinants data to adjust health care payments, should have a vested interest in developing a reliable index. New Zealand and the United Kingdom offer decades of experience in the use of such indices. The United States could learn from the evidence of health outcome improvements in those countries as it pursues both financial savings and better health for all. ■

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**Appendix A:** Government & Other Organizations with Roles in social determinants of health Policy

| | **Organization's contribution to social determinants** | **Current activities related to social determinants** | **Potential future role** | **Social determi-nants of health data collection** | **Social determinants of health measure creation** | **Interventions that address social determinants of health** | **Payment** |
|---|---|---|---|---|---|---|---|
| **States** | Virginia and Connecticut have independently developed indices that capture deprivation. | Health Opportunities Index (Virginia)<br>Health Equity Index (Connecticut) | Collection and dissemination of public health data<br><br>Funders of social determinants of health projects | x | x | x | |
| **National Academy of Medicine** | Identified domains that should be included in electronic health records and described opportunities for linking electronic health record data with public health organizations.<br><br>Created a framework for integrating public health and primary care | Domains proposed included race / ethnicity, education, financial resource strain, stress, depression, physical activity tobacco use, alcohol use, social connections, exposure to violence, and neighborhood and community characteristics | Curation of best practices<br><br>Synthesis of current evidence | x | x | x | |

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| **National Quality Forum** | Endorses clinical but not population health measures | Its population health framework discusses the process of selecting appropriate measures but does not endorse a set of measures.<br><br>Its Measure Applications Partnership vets specific measures within federal programs. It highlighted a need for more population health measures but did not comment on specific ones. | Measurement creation and validation around population health | x | x | | |
| **Centers for Disease Control and Prevention (CDC)** | Programs to address social determinants<br>Tools for putting social determinants into action<br>Sources for data on social determinants | Has a repository of social determinants of data and does less to curate that list or push forward measures | Creation of a minimum data set, which could be used by providers and payers | x | | x | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **National Association of Community Health Centers** | Creation of a patient completed social determinants of health tool (PRAPARE - Procotol for responding to and assessing patient assets, risks, and experiences) | PRAPARE's tool includes questions about migrant status, family structure, housing situation, education, insurance, income, unmet needs, social isolation, legal issues, transportation, refugee status, and safety. | Testing and standardizing assessment of patient social needs<br><br>Creation of interventions that address social determinants of health | x | | x | |
| **National Committee on Vital Statistics administered by CDC)** | The committee assists and advises on health data, statistics, privacy, national health information policy, and strategy. | Population Health subcommittee developing a set of "core" measurement domains that encompass metrics that help describe population health outcomes and well-being of communities | Creation of a minimum data set, which could inform delivery and payment adjustment | x | | | |
| **Health IT Policy Committee (Office of the National Coordinator)** | Stage 3 Meaningful Use aimed to improve health outcomes and asked electronic health records to collect social information and connect practices to registries | Stage 3 Meaningful Use asks for collection of occupation and industry codes, sexual orientation, and gender identity. Electronic health records also need to report to population and public health registries. | Provide guidance around integrating public health and electronic health records, detail electronic health record data collection capacity requirements | x | x | | |

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| **Health and Human Services, Assistant Secretary for Planning and Evaluation** | In its advisory role, the Assistant Secretary for Planning and Evaluation will be developing social determinants of health payment adjustment recommendations | Payment adjustment using social determinants of health | Provide a model for incorporating social determinants of health into payment | | | | x |
| **Centers for Medicare and Medicaid Services** | Accountable health communities<br><br>Comprehensive primary care payment model that includes functions to meet social needs | The accountable health communities promote clinical-community collaboration<br><br>CMS adjusts Medicare payment based on input costs, such as physician wages and rent but does not adjust payments to account for differences in sociodemographic factors. | Creation of a geographic adjustment of payment | | | | x |

**Appendix B.** Comparison of Deprivation Indices Dimensions

| Country | Geographic unit | Dimension of deprivation | Description of variable |
|---|---|---|---|
| New Zealand New Zealand Deprivation Index* | Meshblock (~100 people) | Communication | No access to the internet at home |
| | | Income | Receiving a means tested benefit<br>Living in equivalized[6] households with income below an income threshold |
| | | Employment | Unemployed |
| | | Education | No high school degree |
| | | Housing | Not living in own home<br>Living in equivalized[6] households below a bedroom occupancy threshold |
| | | Household | Single parent family |
| | | Transportation | No access to a car |

| | | | |
|---|---|---|---|
| United Kingdom Indices of Multiple Deprivation** | Neighborhoods (~1500 people) | Income | Receiving income support |
| | | Employment | Receiving unemployment support |
| | | Education, Skills, and Training | Meeting specific educational milestones |
| | | | English proficiency |
| | | Health Deprivation and Disability | Years of potential life lost |
| | | | Disability |
| | | | Morbidity |
| | | | Mood and anxiety prevalence |
| | | Crime | Violence |
| | | | Bulgary |
| | | | Theft |
| | | | Criminal damage |
| | | Barriers to Housing and Services | Distance to post office, primary school, supermarket, and general practice |
| | | | Crowding |
| | | | Homelessness |
| | | | Housing affordability |
| | | Housing and Neighborhood | Housing in poor condition |
| | | | Houses without central heating |
| | | | Air quality indicator |
| | | | Road traffic accidents indicator |

| | | | |
|---|---|---|---|
| United States Social Vulnerability Index[¥] | Census tract (mean ~4000 people) | Income | Below poverty<br>Income |
| | | Employment | Unemployed |
| | | Education | No high school diploma |
| | | Demographics | Aged 65 or older |
| | | | Aged 17 or younger |
| | | | Older than age 5 with a disability |
| | | Household | Single parent |
| | | Demographics | Minority |
| | | | Speaks English "Less than Well" |
| | | Housing | Multi-unit structures |
| | | | Mobile homes |
| | | | Crowding |
| | | | Group quarters |
| | | Transportation | No vehicle |
| United States social deprivation index[§] | Primary care service area (mean ~40,000 people; median ~15,000) | Income | Below poverty |
| | | Employment | Unemployed |
| | | Household | Single parent family |
| | | Demographics | Black |
| | | | High Need Age Group: Under 5, Female aged 15-44 |
| | | Education | Less than 12 years of schooling |
| | | Transportation | No car |
| | | Housing | Renter occupied |
| | | | Crowding |

Sources:
*New Zealand Deprivation Index; New Zealand Ministry of Health. *Population-Based Funding Formula Review: 2015 Technical Report*.; 2016. http://www.health.govt.nz/publication/population-based-funding-formula-review-2015-technical-report. Accessed May 26, 2016.
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Notes: Variables in the "Description of variable" column are summaries and not comprehensive
Equivalization is a method used to control for household composition.