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From Myth to Reality-

Revolutionizing Healthcare with Augmented Intelligence and Social Determinants of Health

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Dr. David Nace has over 20 years of executive management experience in large healthcare systems, payer health plans, leading healthcare providers and health information technology organizations. Before joining Innovaccer as their Chief Medical Officer, he served as the VP of Population Health at McKesson Corporation, the Chairman of the Board at Patient-Centered Primary Care Collaborative, SVP at the UnitedHealth Group, and VP & Chief Medical Officer at Aetna.

Dr. Nace has been a board member for the Integrated Healthcare Association, a statewide multi-stakeholder leadership group that promotes quality improvement, accountability and affordability of healthcare in California; and the Care Continuum Alliance, based out of Washington, DC. He also served as an advisor to the American Medical Association, National Business Group on Health, World Health Organization, and the International Labor Organization on issues ranging from health promotion and wellness to employer policy and health care financing issues. Dr. Nace earned his medical degree from the University of Pittsburgh.

About the author

Vibhuti Agrawal, PhD

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Dr. Agrawal has been associated with Innovaccer, the leading SF based healthcare data platform company, since 2017. Previously, she has worked as a Fellow with Sealink Capital Partners, as well as an experienced associate at Diamond Advisories, PwC US. She is also currently a member of Population Health Management Journal, the only peer-reviewed journal dedicated to the rapidly evolving field of population health, covering the interplay of health outcomes, social determinants of health, and the policies and interventions that move our systems from acute care to health care. Dr. Agrawal has completed her Ph.D. in Biological Engineering at Massachusetts Institute of Technology (MIT) and her bachelors and masters from Indian Institute of Technology, Delhi (IIT Delhi).

With commentaries from

Innovaccer continues to innovate!! The SVI is a real breakthrough in our ability to link the social determinants of health to health outcomes. It will help us navigate on the long road from volume to value. Remember that in the future, the watchword is " NO OUTCOME, NO INCOME. Innovaccer has embodied this concept today, and is preparing us all for tomorrow.

David B. Nash, MD, MBA
Founding Dean,
Jefferson College of Population Health

Dr. David Nash is the Founding Dean of Jefferson College of Population Health and one of the nation's foremost population health thought leaders. A board-certified internist, Dr. Nash has been named the Dr. Raymond C. and Doris N. Grandon Professor of Health Policy at Thomas Jefferson University, and serves on both the Board of Directors for Humana, Inc. and the Geisinger Commonwealth School of Medicine. As a member of Innovaccer's Strategic Advisory Council, Dr. Nash brings his depth of experience and knowledge regarding the scientific study and implementation of population health management, care coordination, and point of care artificial intelligence.

Innovaccer has a very unique approach of getting all the patient data right in front of doctors. It's not just the claims data, not just the healthcare delivery data, but a lot of the social data as well. The SVI offers new insights to the doctor, and Innovaccer has done a great job of bringing a different perspective to patient care.

Glenn Steele Jr., MD, PhD
Vice Chair, Health Transformation Alliance,
former Geisinger Health System President
and CEO

Dr. Steele is the Vice Chair of the Health Transformation Alliance and former President and CEO of Geisinger Health System. During his 14 year tenure, Geisinger became the exemplar for high quality and well-organized delivery of care with unique degrees of integration between hospital and physicians, use of advanced information technology, and a relentless focus on improvement of care. Dr Steele sits on the Board of Directors for WellCare Health Plans, Ingenious Med, PTC Therapeutics, among others. As a member of Innovaccer's Strategic Advisory Council, Dr Steele helps guide Innovaccer's mission to drive efficiency and value in the U.S. healthcare system.

With commentaries from

Turning population health from philosophy to practice and value based care from a myth to a method will take exactly the kind of mix between technology and science that is demonstrated by the SVI. Innovaccer has become a leader in utilizing augmented intelligence to finally address social determinants of health.

Stephen K. Klasko, MD, MBA
President and CEO, Thomas Jefferson University and Jefferson Health

Dr. Klasko is the President and CEO of Thomas Jefferson University and Jefferson Health. Under his leadership, Jefferson Health grew from three hospitals in 2015 to fourteen hospitals today. His 2017 merger of Thomas Jefferson University with Philadelphia University created a pre-eminent professional university that includes top-20 programs in fashion, design and health professions, coupled with the first design-thinking curriculum in a medical school, conducting the nation's leading research on empathy, an essential component of medicinal practice that is often overlooked in the academic setting. As a disruptive leader in the academic ecosystem, Dr. Klasko brings a unique and valuable point of view to the Innovaccer Strategic Advisory Council.

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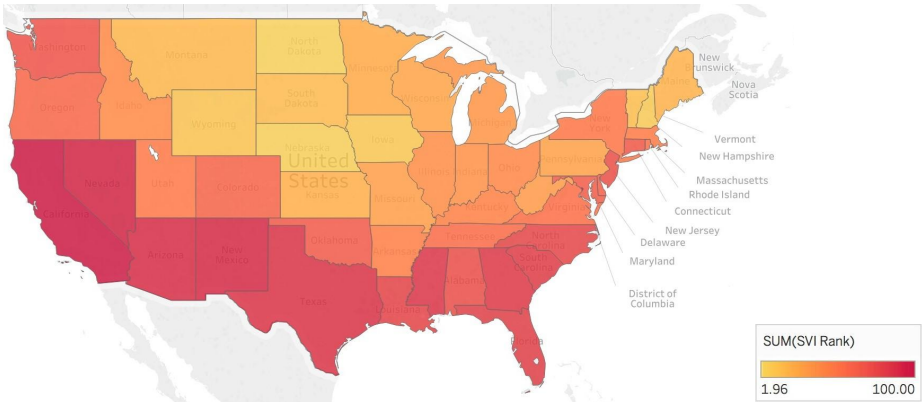
Executive Summary

US clinicians are at a critical juncture, newly responsible for both the quality and value of care and expected to have a deeper understanding of their patients' risk factors. The health impacts of the environment in which patients live affect their health and these health impacts need to be documented and studied properly. According to one study, clinical care accounts for only 20% of the health outcomes of patients, while health behaviors, social and economic factors, and physical environment combined to influence the remaining 80% of health outcomes.[1] The term 'social determinants of health' is used to refer to any non-clinical factor influencing the overall health of the patient.

Social vulnerability index (SVI) is a measure of the population's susceptibility to various social and economic conditions. Leveraging this index, members of the patient's care team can identify improvement areas for every patient and take corrective steps based on these patient-specific vulnerabilities. With Innovaccer's proprietary regression techniques, the vulnerability of regions can be calculated from the US-country level down to the zip code level. Unlike the CDC index, which defined an algorithm to address SVI based on simple summation, Innovaccer has designed a more robust algorithmic model based on multiple regression techniques. The vulnerability index ranking of each state is presented in the following heat map, according to Innovaccer's models. This ranking can be taken further down to a county and zip code level. This progression to a more granular level of analysis will be discussed in the paper.



This whitepaper discusses the importance of social determinants of health, how they affect the processes of care delivery, and how a social vulnerability index can be used to derive critical patient engagement insights and specific actions to be taken on the patient's behalf. Innovaccer's approach to calculating the social vulnerability index is discussed, as well as how appropriate interventions could be ascertained based on the categorization of social insights into seven sub-indices

> Clinical care accounts for only 20% of the health outcomes of patients, while health behaviors, social and economic factors, and physical environment combined to influence the remaining 80% of health outcomes.[1]

A brief introduction to the social determinants of health

Social determinants of health are the conditions in the environments in which people are born, live, learn, work, play, and survive that affect a wide range of health, functioning, and quality-of-life outcomes and risks.

According to the World Health Organization, the social determinants of health can be defined as “the conditions in which people are born, grow, work, live, and age and the wider set of forces and systems shaping the conditions of daily life." These forces and systems include economic policies and systems, development agendas, social norms and policies, and political systems. These conditions can be very different for various population subgroups and can lead to disparities in health outcomes.[2]

Factors such as social isolation can increase the risk of falling ill; for example, they increase risk of heart disease by 29% and stroke by 32%.[3] Lower education rates are also related to high levels of smoking and shorter life expectancy.[4] There are multiple instances which demonstrate how social factors have a significant impact on the health of the population.

Understanding the value behind social elements in US healthcare

Success in the value-based care environment cannot be achieved based solely on clinical insights. According to one study, clinical care accounts for only 20% of the health outcomes of patients, while health behaviors, social and economic factors, and physical environment combined add up to influence the remaining 80% of the health outcomes.[1] Healthy People 2020, a science-based, 10-year national objective for improving the health of all Americans, highlights the importance of addressing the social determinants of health by “Creating social and physical environments that promote good health for all” as one of their four overarching goals for the decade.[5]”

Social determinants matter because they can affect the health of the population residing in a particular region for better or for worse. Trying to improve population health armed with only clinical data and not the non-clinical factors, is like investing in a project which cannot generate positive returns. Although multiple pieces of research demonstrate that social determinants may substantially contribute to a person’s health status and well-being, the major problem is one of the resources: how to address these complex challenges and who is the best-positioned stakeholder to do so in a clinical environment.

> At least 25 cents on every dollar spent on healthcare is spent on the treatment of diseases that result from potentially changeable behavior.[6]

CDC's Social Vulnerability Index

In order to understand and classify the population and the social factors associated with their living conditions, we need to segregate US regions based on multiple factors. According to the Centers for Disease Control and Prevention, social vulnerability refers to the resilience of communities when confronted by external stresses on human health- stresses such as natural or human-caused disasters or disease outbreaks.

The Agency for Toxic Substances and Disease Registry (ATSDR) Geospatial Research, Analysis & Services Program (GRASP) created databases to help emergency response planners and public health officials identify and map communities that will most likely need support before, during, and after a hazardous event. This data can also be utilized to derive insights on social determinants for patients.

The CDC's SVI uses U.S. Census data to determine the social vulnerability of every census tract. Census tracts are subdivisions of counties for which the census collects statistical data. The SVI ranks each tract on 15 social factors, including poverty, lack of vehicle access, and crowded housing, grouping them into four related categories or themes. Maps of the four categories are shown in the figure below. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking.[7]

Social vulnerability index (SVI) is a measure of the population's susceptibility to various social and economic conditions. Based on this Index, we can point out specific problem areas that require extra focus in order to improve population health outcomes. The CDC has defined an algorithm to estimate SVI for every census-tract in the US, however, this algorithm is based on a simple summation of the percentile ranks for all SDOHs, which results in an over-estimation of social vulnerability in cases of high positive correlation between multiple SDOHs.

In order to improve on the limitations of the CDC model, Innovaccer has developed proprietary algorithms to cater to the social determinants. Addressing the limitation of the CDC's algorithm by adding more social determinant dimensions, we have developed a comprehensive and robust method for computing SVI.

This methodology uses 58 SDOH elements related to the following categories:

1

Socio-economic index

The socioeconomic index refers to the social and economic stability of the population residing in the area. This score provides the vulnerability of the region to provide a stable social and economic standard to its residents. This includes the population which is below the poverty line or the civilians, above the age of 16, who are unemployed, among others. Such people are at a higher risk of falling ill.

2

Household Composition/ Disability

This index provides the vulnerability residing in a region in terms of the living status and their average age. The effect of social elements varies with the age of the person at a very large scale. It also includes the vulnerability on parameters such as non-institutionalized population with disability.

3

Minority Status/ Language

This index provides the vulnerability of the region in terms of the minority population residing in the region and the existing language barrier. Most of the time, the minority community that speaks a different language has to face language barrier difficulties which affect their overall living standards and, ultimately, their health.

4

Housing and Transportation

This index provides the vulnerability of the region in terms of the availability of proper housing and transportation facility. Areas with poor housing facilities or improper access to efficient transportation, or sometimes both face complications availing proper medical care, leading to poor health outcomes. Factors such as persons residing in institutionalized group quarters, or the housing units receiving SNAP benefits, or the households with no vehicle are included in this category.

5

Lifestyle

The lifestyle of the people in a region affects their overall health outcomes. Factors such as high smoking or drinking rates and late working hours, among others, lead to an unhealthy lifestyle which affects the health outcomes of the population.

6

Access to Healthcare

This index provides the vulnerability of the region in terms of access to health care facilities among the population residing in that region. This access availability could be hindered by many reasons, including unavailability of care facilities in the first place or improper transportation facilities, among

7 Food Security

This index provides the vulnerability of the region in terms of providing good quality food to its residents. In most of the areas, the people have limited access to good quality food which affects their overall health. Factors such as population count beyond 1 mile or half a mile away from the supermarket are included in this region.

Unlike the CDC which has only considered the first 4 categories and all their correlated information, we have considered uncorrelated information from them and built a tool to analyze social-risks across different zip code codes in the US for 7 themes as specified above. Leveraging this tool, providers can not only identify the most vulnerable regions, but also understand why these regions are more vulnerable, define corrective steps to address these vulnerabilities, and have a better estimate of the risk profile of their patients.

Calculation of SVI score for any county

Social Vulnerability Index (SVI) consists of complex factors that need to be calculated very carefully considering every single one that affects the population health. We have performed an extensive literature survey on the existing models of calculating social vulnerability such as the CDC's model to understand the scope of previous work done in the field. The four-step guide which was used to compute the SVI for any zip code or census tract in a county is as follows:

Identifying the sub-indices contributing to the SVI score

The initial step is to define the sub-indices contributing to the SVI. The survey should be streamlined with the existing information regarding the county or the zip code. A team-based approach is required to make an exhaustive list of factors influencing each of the sub-indices.

Collecting data from the available public sources

The next step is the collection of data. The data required to compute SVI needs to be mined from publically-available data dumps and reports to gather data for different social factors. Data sources to be explored include health.data.gov, CDC, Food Research Atlas Data, Google Maps, and the Community Health Assessment Report, among others.

Analyzing the data to compute the SVI score with a data-driven approach

The collected data needs to be processed. Data collected is analyzed, cleaned, and standardized to identify the contribution of individual variables to the overall SVI score of the county or region. Once the data is analyzed, the SVI score is computed using multiple data-driven modeling approaches.

> Innovaccer classified over 55 social determinants in 7 different categories.

These approaches are:

- Simple Summation
- Principal Component Analysis
- Partial Least Squares Regression

Validating the authenticity of the computed score

After the computation of the overall SVI score, it is checked for its authenticity and validation. All the algorithms are validated using actual health data from the Community Health Assessment of different counties.

Further analysis of the zip code level effect on the social determinants of health

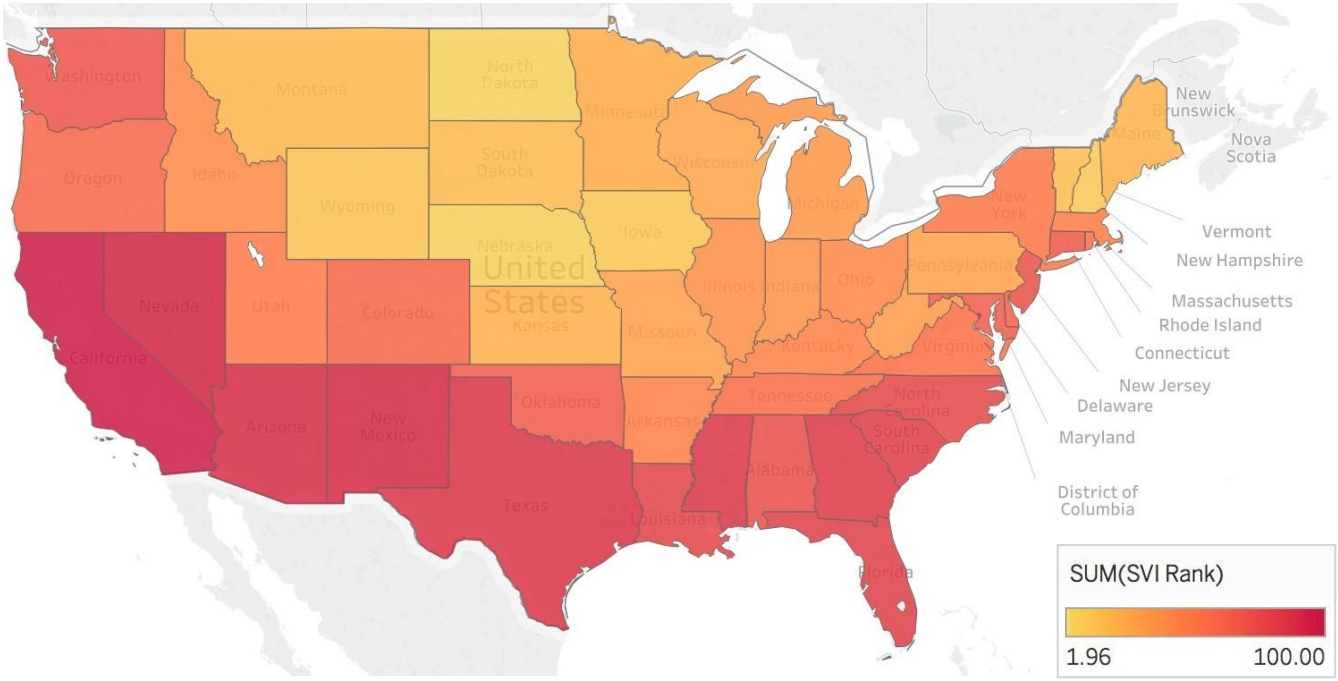
The social elements do not just impact the macro-level, but their effect can be substantial and variable across multiple zip codes in a single county. Although obvious that a person's socioeconomic circumstances impact his/her health, there are other social factors that impact the outcomes of care.

Sample analysis to understand the effect of SDOH data

In order to understand the micro-level impact of social determinants, we need to analyze it in sequential order, from an entire US-nation level impact to a zip code level impact. Based on non-clinical data collected from sources such as Centers for Disease Control and Prevention (CDC), Agency for Toxic Substances and Disease Registry (ATSDR), Geospatial Research, Analysis, and Services Program, Social Vulnerability Index 2014, US Department of Agriculture and Food Research, Atlas Data 2015, Google Maps, Health Data NY, and CMS Prescription Data, we calculate the comprehensive overall SVI score from multiple data sources by using regression techniques.

State-level SVI score impacting the nation

By applying multiple regression techniques, we calculate the overall SVI score for every state. Based on this score, we can identify the performance of every state on an overarching level. However, at this stage, we still would not have enough data and insights on the specific social elements to plan proper interventions. In order to generate actionable social insights, we need to drill down further to a county-level.



Based on similar regression techniques, we can identify the top and the lowest performing counties in every state. The following table indicates the county performance relative to SDOH for each state:

The top and lowest performing counties in each state relative to SDOH

Sr. No.	State	Top Performing County	Lowest Performing County
1	Alabama	Cleburne	Greene
2	Alaska	Kenai Peninsula	Bethel
3	Arizona	Yavapai	Le Flore
4	Arkansas	Cleburne	Phillips
5	California	Sierra	Kings
6	Colorado	Mineral	Costilla
7	Connecticut	Litchfield	Hartford

Sr. No.	State	Top Performing County	Lowest Performing County
8	Delaware	Sussex	New Castle
9	District of Columbia	zip code 20027	zip code 20019
10	Florida	Citrus	Hendry
11	Georgia	White	Clayton
12	Hawaii	Kauai	Maui
13	Idaho	Bear Lake	Clark
14	Illinois	Jasper	Cook
15	Indiana	Tipton	Lake
16	Iowa	Lucas	Polk
17	Kansas	Ellis	Wyandotte
18	Kentucky	Lyon	Jefferson
19	Louisiana	Cameron	Orleans
20	Maine	Lincoln	Androscoggin
21	Maryland	Garrett	Baltimore City
22	Massachusetts	Barnstable	Suffolk
23	Michigan	Macomb	Wayne
24	Minnesota	Wilkin	Mahnomen
25	Mississippi	Itawamba	Holmes
26	Missouri	Atchison	St. Louis City
27	Montana	Beaverhead	Big Horn
28	Nebraska	McPherson	Thurston
29	Nevada	Douglas	Clark
30	New Hampshire	Sullivan	Strafford
31	New Jersey	Hunterdon	Hudson
32	New Mexico	Quay	Dona Ana
33	New York	Hamilton	Bronx
34	North Carolina	Transylvania	Pasquotank
35	North Dakota	Billings	Sioux
36	Ohio	Shelby	Cuyahoga
37	Oklahoma	Ellis	Oklahoma
38	Oregon	Wheeler	Multnomah
39	Pennsylvania	Sullivan	Philadelphia
40	Rhode Island	Washington	Providence

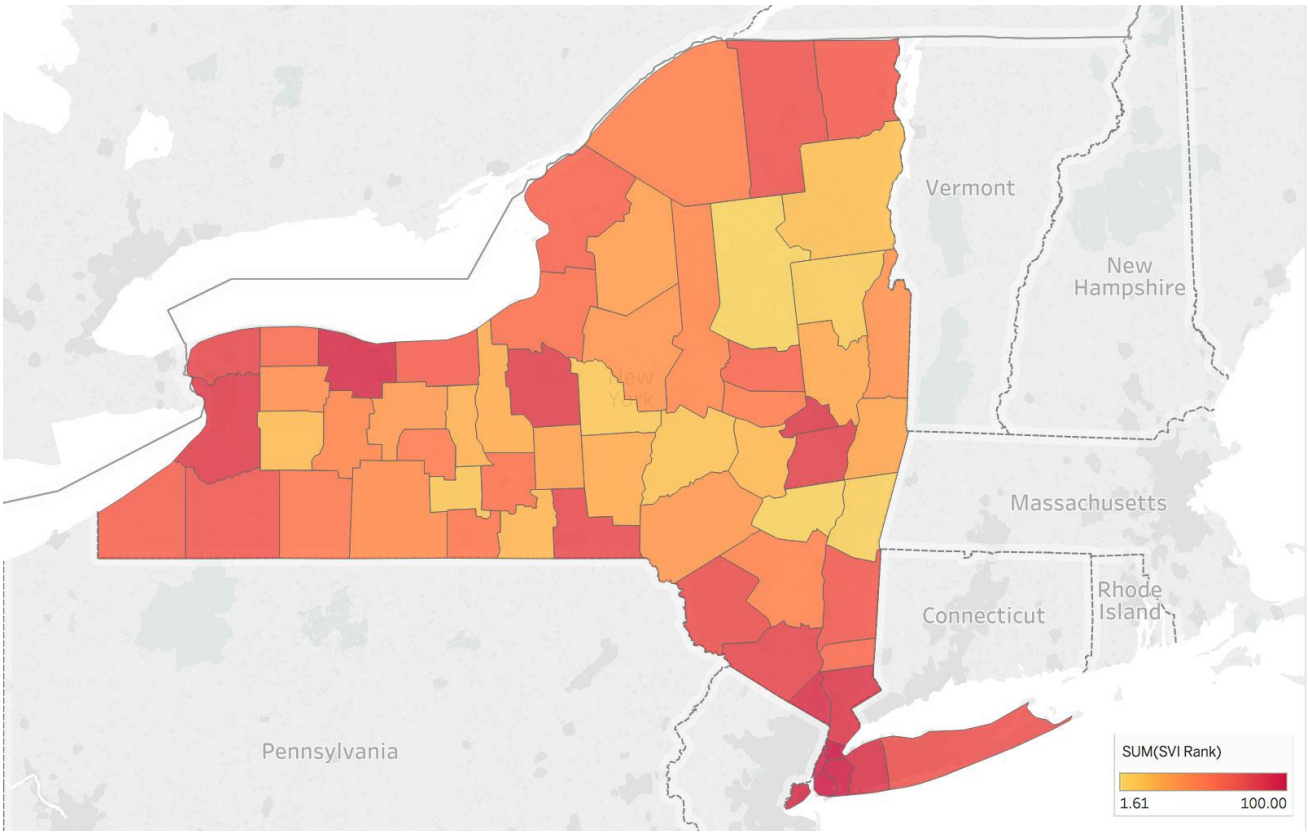
Sr. No.	State	Top Performing County	Lowest Performing County
41	South Carolina	Oconee	Allendale
42	South Dakota	Hand	Todd
43	Tennessee	Pickett	Shelby
44	Texas	Llano	El Paso
45	Utah	Daggett	Salt Lake
46	Vermont	Bennington	Chittenden
47	Virginia	Highland	Manassas Park
48	Washington	Lincoln	Yakima
49	West Virginia	Pendleton	Cabell
50	Wisconsin	Oneida	Menominee
51	Wyoming	Albany	Sweetwater

To get an in-depth understanding of a state's performance, we can study the effect of social elements on the state of New York and its counties.

> Based on Innovaccer's research on the social determinants, the state of North Dakota and Hawaii turned out to be the least and the most vulnerable states respectively.

County-level SVI score impacting the state of New York

Following a similar pattern of the SVI analysis, the performance of every county in the state of New York can be calculated. The performance of every county accounts for the overall performance of the state. At this stage, we can drill down from state-level analysis to county-level analysis, which would provide a much clearer picture and explanation for the effects of social elements on the residents of the state.



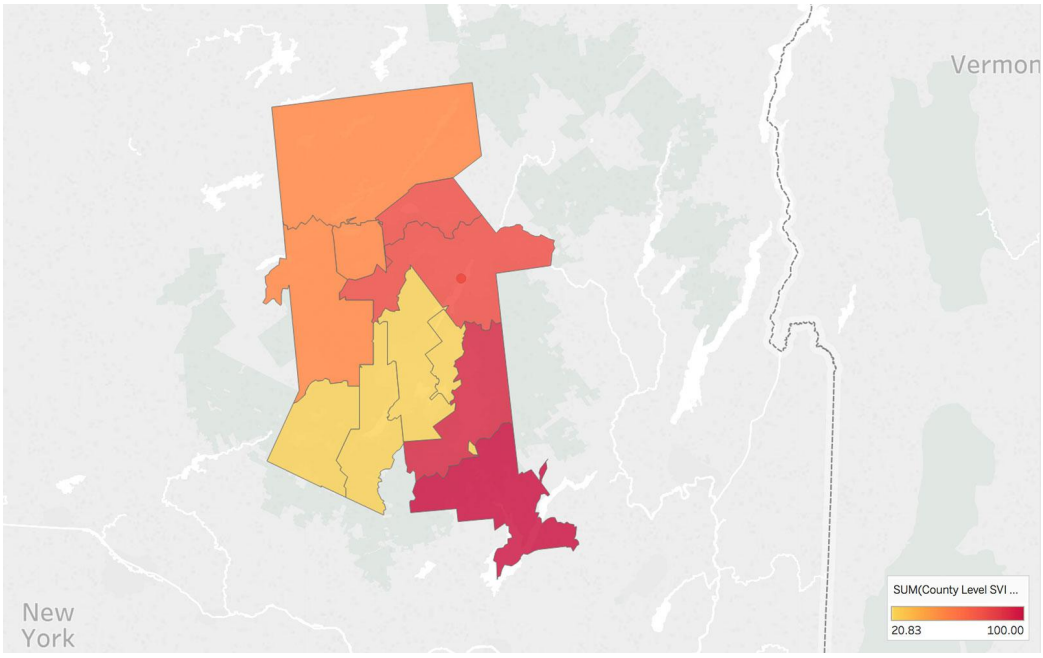
Based on the above analysis of the counties in the state of New York, the top and lowest performing counties are Hamilton and Bronx respectively. However, in order to derive actionable insights based on the performance of these counties, we need to drill down still further to a zip code level.

> Factors such as social isolation can increase the risk of falling ill; for example, they increase risk of heart disease by 29% and stroke by 32%.

Zip code level analysis of the top and lowest performing counties in the state of New York

Once again, similar regression techniques can be applied to identify the SVI score of every zip code in the chosen counties.

The zip code level analysis of the best performing county is:



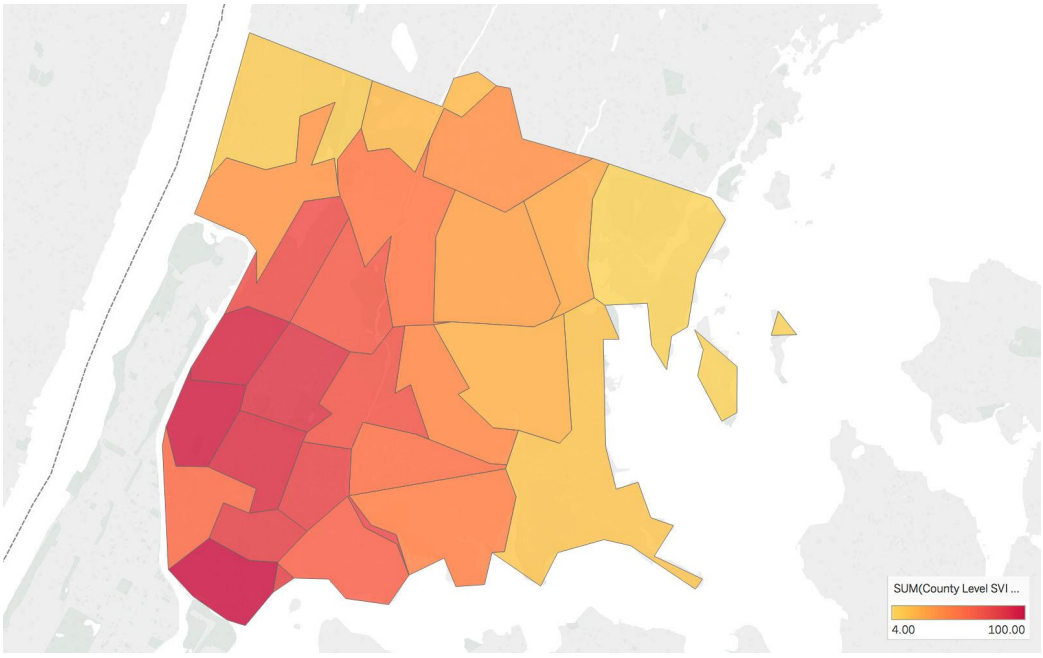
Hamilton County

Zip code-level performance of Hamilton county

Top performing zip code- 13353

Lowest performing zip code- 12134

The zip code level analysis of the worst performing county is:



Bronx County

Zip code-level performance of Bronx county

Top performing zip code- 10464

Lowest performing zip code- 10454

> The effects of social determinants drill down from a country level to a zip code level.

Based on the result obtained above, it can be concluded that every zip code has a different performance associated with their regional social elements affecting the area. The overall performance of the county is affected by the performance of each zip code.

There could be high performing and low performing zip code regions in every county and to obtain a better understanding of all seven categories, we need to analyze the performance of every zip code on all seven of the categories.

Insights on the performance of the sample zip code

In order to gain a better perspective on the performance of the regions contributing to the overall performance of the counties in the state, we need to analyze the effects of social elements or social determinants on the seven categories.

The performance of the above-identified zip code regions, on every category, can be tabulated as follows* :

County-level SVI percentile score on 7 sub-indices of the above identified zip codes

SVI Sub-Indices	Top performing county in New York state		Lowest performing county in New York state	
	Top performing zip code (13353)	Top performing zip code (12134)	Top performing zip code (10464)	Top performing zip code (10454)
Socio-economic index	45.83	91.67	4.00	96.00
Household Composition/ Disability	45.83	100.00	4.00	100.00
Minority Status/ Language	20.83	91.67	4.00	96.00
Housing and Transportation	20.83	100.00	4.00	76.00
Lifestyle	45.83	100.00	60.00	32.00
Access to Healthcare	70.83	100.00	92.00	72.00
Food Security	29.17	100.00	4.00	38.00

**SVI percentile score denotes 100 being the most vulnerable in terms of the associated index*

Based on the insights obtained from the table, it can be clearly stated that the performance of every zip code is unique, irrespective of its associated county, and also varies based on the SVI performance sub-indices.

A similar analysis is performed on all zip codes in the United States and an overall SVI score is calculated using Innovaccer's proprietary regression techniques. This analysis perfectly correlates with nationally available data.

Preventive actions to influence the effects of social determinants

Every social determinant affects the region in its own way and corresponding preventive actions need to be taken in order to overcome the adverse health outcomes of the citizens of that region. For instance, the community resources and data needs to be integrated in the care coordination processes to take proper interventions. When providers are able to completely understand the effects of non-clinical factors, they can provide much better care to their patients.

The analysis of social determinants can be applied for multiple use cases such as:

Increasing the efficiency of the care coordination team

Typically, one care manager (aka care coordinator) is responsible for managing approximately 1,000 to 1,500 lives. Upon considering the exact condition of the patient and upon careful examination, most patients can be divided into multiple categorizations, such as cohorts with existing care gaps, rising risk, high utilizers, and more. Because of the reality of limited resources, it is impossible for the care manager to focus on all lives equally. The SDOH data and SVI will add another lens of prioritization and risk and will allow the care manager to refine their focus further on patients who have a poor SVI then drill down further to understand the specific factors leading to the SVI score.

The role of behavioral health, social workers and health coaches

Behavioral health professionals and social workers are now being paired with care managers as critical members of the patient-centered care team. Non-clinical health coaches can also help reduce clinical burden and enhance patient engagement. By use of the SVI insights, these critical members of the team can be assigned to the highest risk patients where their energies will have the greatest impact. In addition, using the individual SVI scores across different categories (transportation, housing, food accessibility, and many more), a social worker can assign and link appropriate community resources to the patient.

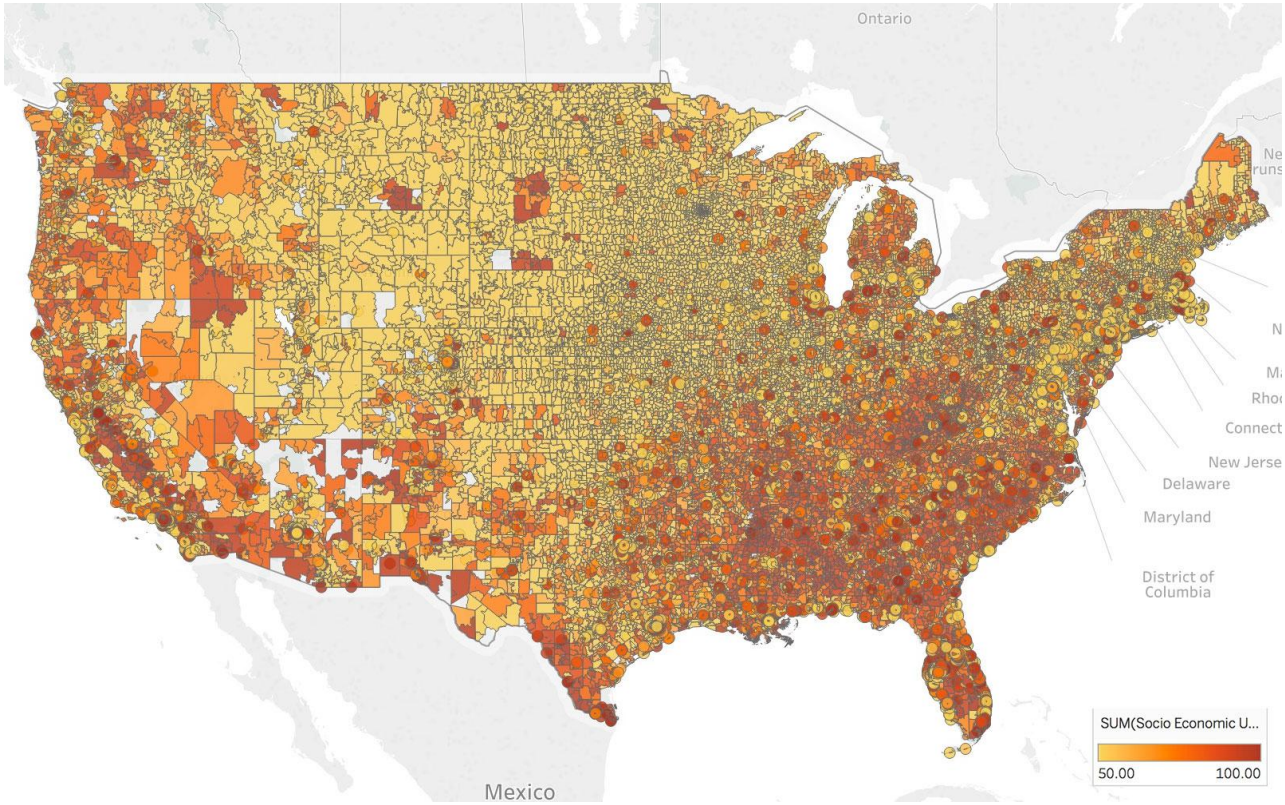
Better partnerships with community resources and social improvement funding agencies

Armed with information from the robust SVI analysis, government, commercial payers and large health systems can partner more effectively with community resources as well as with social improvement funding agencies to target specific areas of need in patient populations. This also leads to improved social scores at the community and regional areas and geographic improvements in the overall cost of care.

Performance across the nation based on multiple SVI parameters

Based on the available social determinants of health data, the county level performance of the United States can be ascertained through the following heat maps. A more comprehensive and more granular zip code level analysis can be accessed through Innovaccer's proprietary tool, SDOH Portal 2.0.

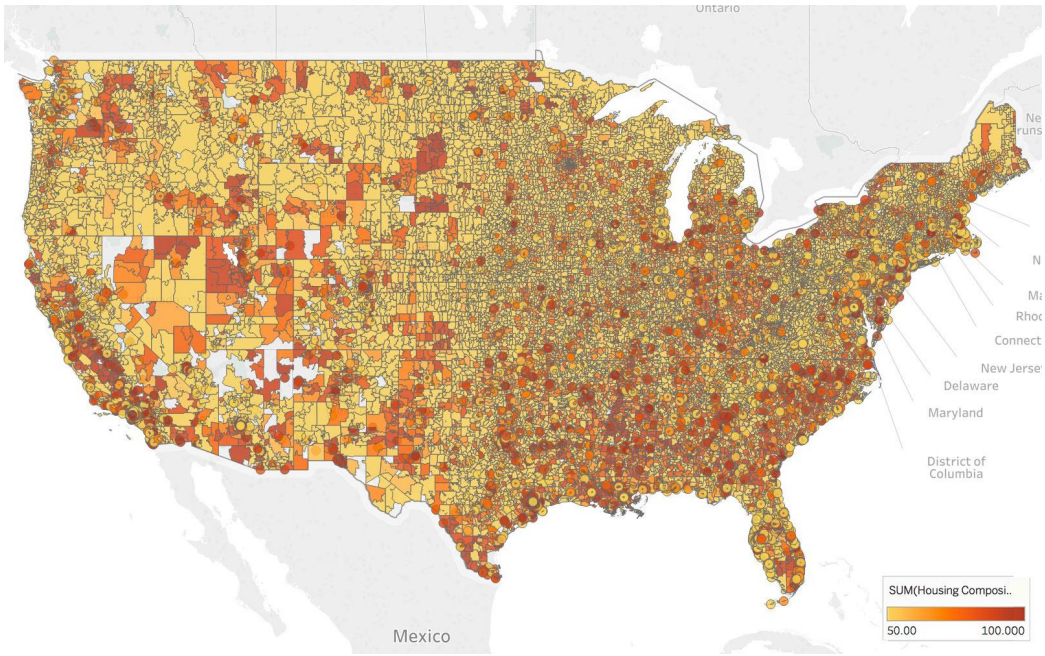
Socio-economic index



US-level Performance:

- Top Performing County: McPherson, Nebraska
- Lowest Performing County: Le Flore, Oklahoma

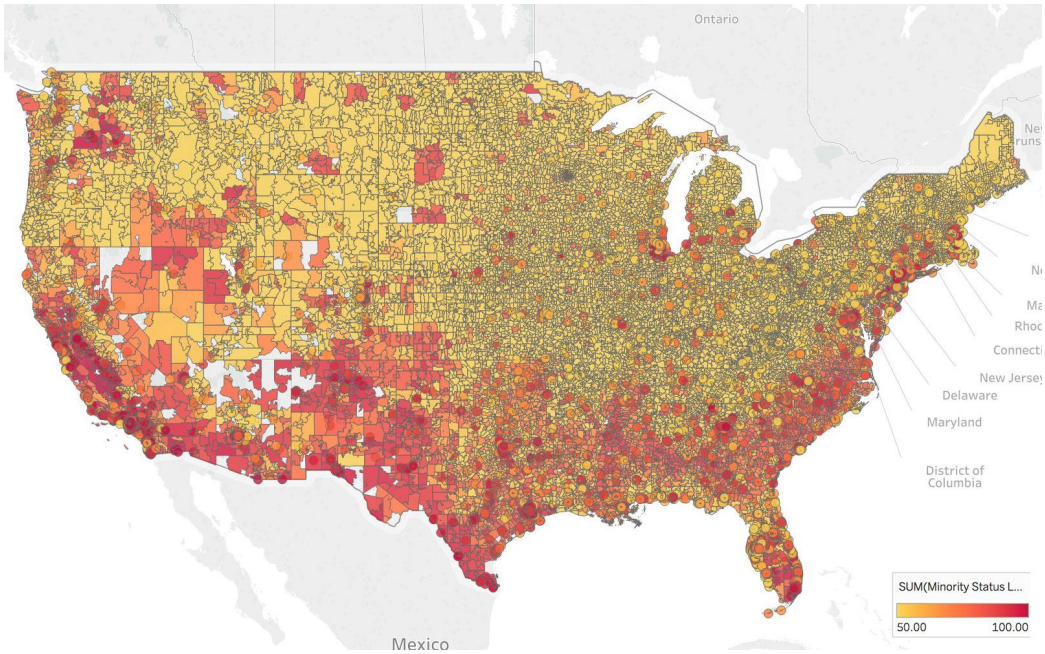
Household Composition/Disability



US-level Performance:

- Top Performing County: Mineral, Colorado
- Lowest Performing County: Todd, South Dakota

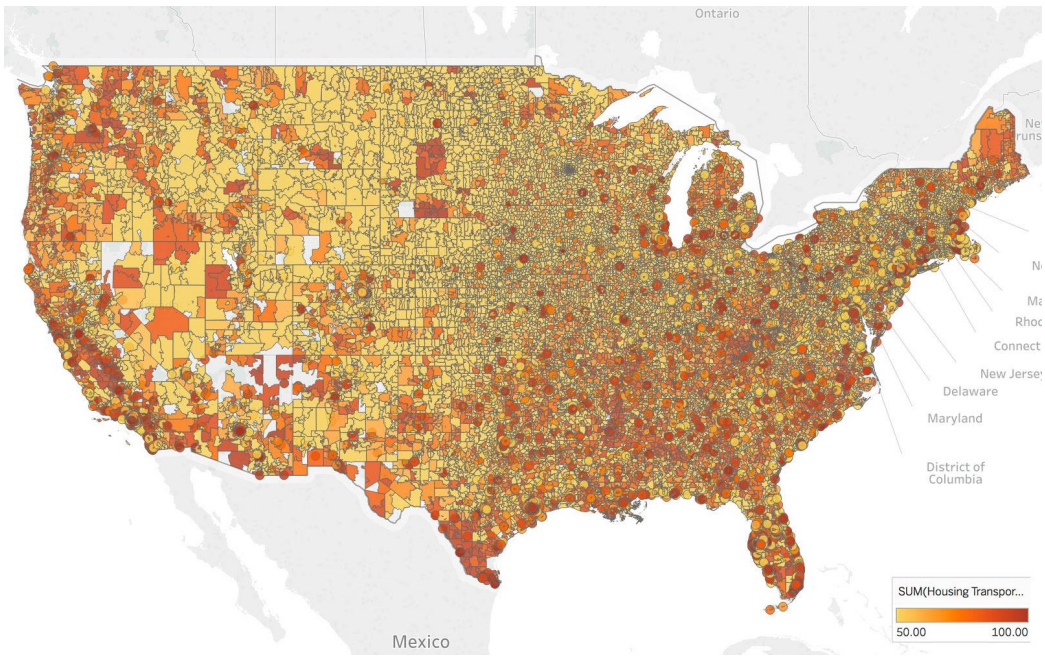
Minority Status/Language



US-level Performance:

- Top Performing County: Leslie, Kentucky
- Lowest Performing County: Bronx, New York

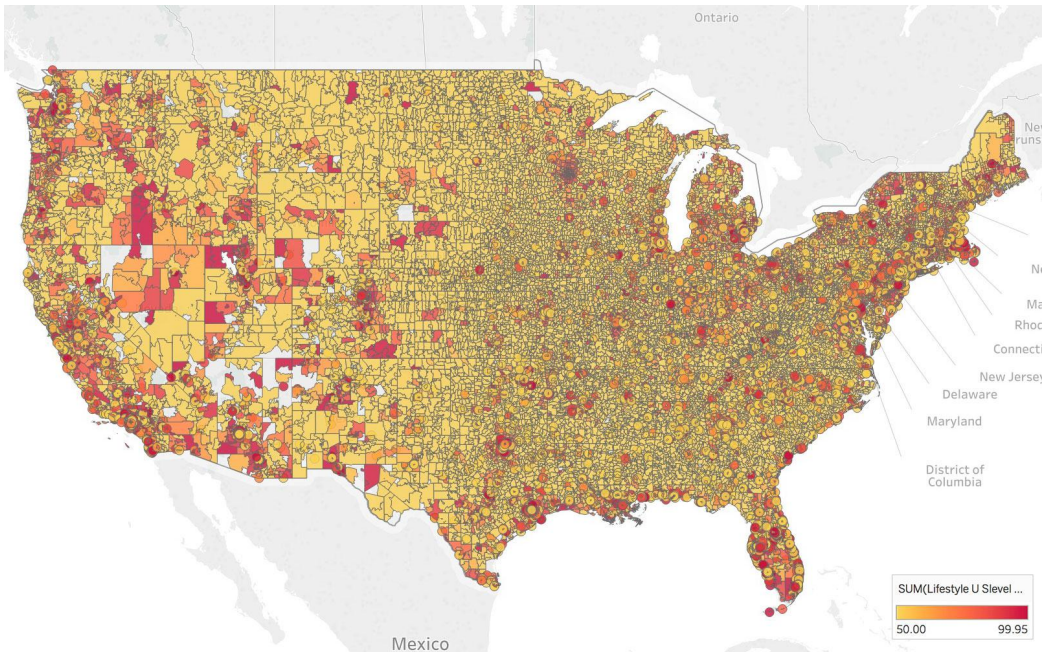
Housing and Transportation



US-level Performance:

- Top Performing County: Daggett, Utah
- Lowest Performing County: Bethel, Alaska

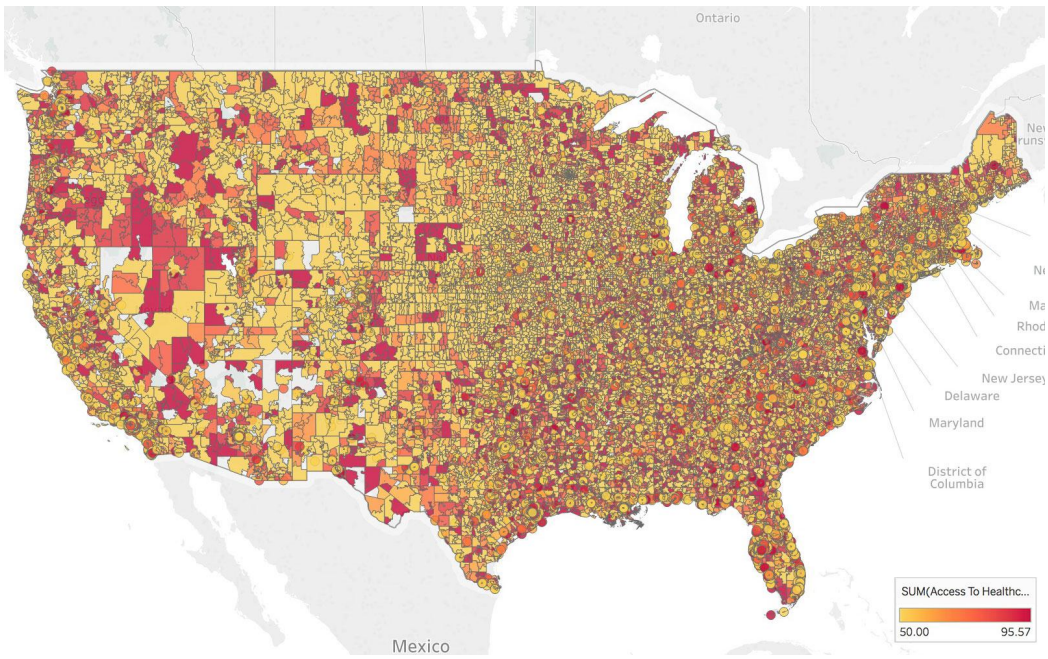
Lifestyle



US-level Performance:

- Top Performing County: Macomb, Michigan
- Lowest Performing County: Yukon-Koyukuk, Alaska

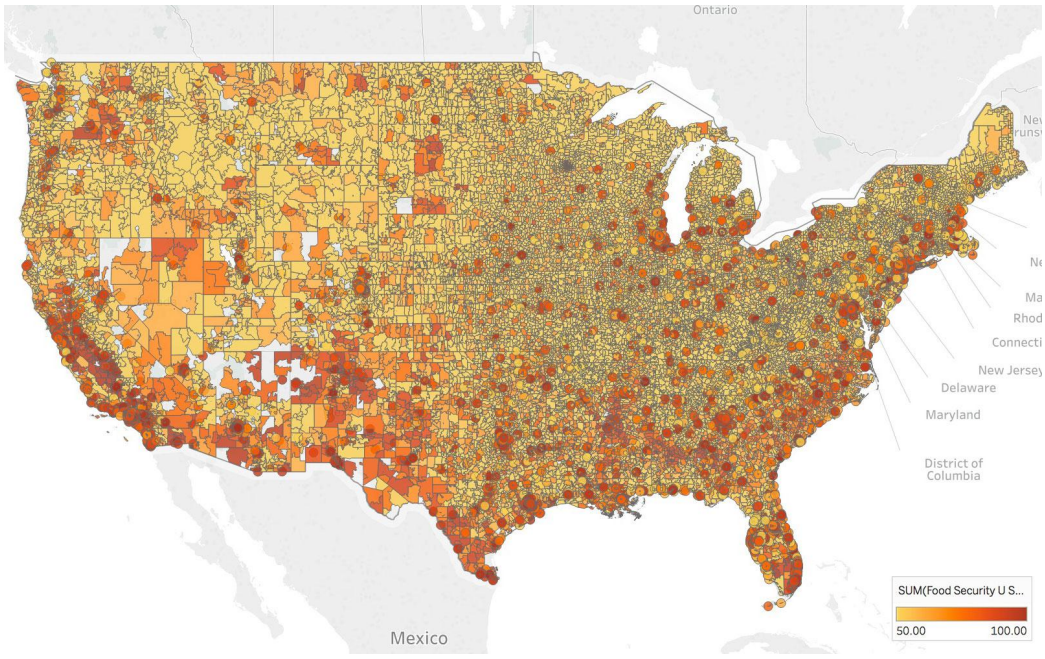
Access to Healthcare



US-level Performance:

- Top Performing County: Macomb, Michigan
- Lowest Performing County: Pepin, Wisconsin

Food Security



US-level Performance:

- Top Performing County: Warren, Indiana
- Lowest Performing County: Bethel, Alaska

Moving forward with the SVI to deliver insights at the individual patient level

The performance of every county is calculated by using the Principal Component Analysis method. This next step is to identify the overall vulnerability score by using the Partial Least Square Regression method. When the effects of different SDOH elements is calculated based on specific health outcomes such as ED admissions and in-patient visits for the Medicaid population, the results could pinpoint vulnerabilities on specific parameters. This would result in a better understanding of the performance of the counties on every measure.

We need to move beyond the generic population-level understanding to an individual, specific understanding of the social determinants of health. The ideology to be incorporated includes bringing insights from the zip code level data together with patient-specific SDOH data to derive granular insights on the patients' social condition. Once those insights are available, we can combine with the risk analysis done using clinical and claims data to obtain a much more comprehensive picture of the patient and the elements that are most likely to affect the patient's health. With such crucial insights in hand, providers and healthcare organizations can better drive interventions, successful outcomes and cost-effective care delivery.

SDOH Case Study: Engaging patients for value-based outcomes at Mercy Health Network:

Mercy Health Network (MHN) identified the need for a more robust framework to impact the overall health status of its 310,000 patients. In order to accomplish this goal, they needed to have a multidimensional understanding of the patients in urgent need of interventions. Most importantly, they needed to identify the patients that would return to the hospital because of non-clinical reasons, and an appropriate mechanism to link them to community resources once identified.

In order to achieve this, Mercy Health Network engaged patients in the collection of social data. This collection created a rich data layer which required an advanced unified data platform for analysis. Based on the socio-economic data, Mercy Health Network was able to more accurately assess patient risk, and drive multiple care coordination strategies linking patients with community resources.

> With data-driven strategies, Mercy Health Network drove up their total cumulative returns by 280%.

Key aspects of these strategies include:

Event-based strategizing

Mercy Health Network utilizes an advanced unified data platform that allows them to leverage every dataset at their disposal. They set about implementing an event-based strategy using Admission-Discharge-Transfer (ADT) data and the Emergency Department utilization records. They managed to establish connectivity among more than 35 hospitals through ADT connections as well as their state health information exchange. The method includes the use of “strategy” triggers to populate the daily schedules or work queues of clinical Health Coaches (aka Care Managers).

Closing gaps in care

The next step was leveraging the integrated data to generate insights. First, the network generated single patient profiles based on numerous data sources, and using advanced analytics, they were able to identify high-risk patients or patients with chronic conditions. Then, the care teams carried out outreach/ engagement activities via the system Health Coaches. The network stressed greater emphasis on annual wellness exams, as well as provider engagement and incentive alignment as methods to drive transformation.

Improved communication

To keep their network patient-centered, they deployed ‘virtual-handoffs’. These eliminated the use of emails or calls to patients, as everything could be communicated by tasking the team member on the acute side of the delivery system. With better analysis of patient activities, ‘Social Media’ like timelines were included so every care team member is able to track patient activity.

Community engagement

With the help of network data analysis, MHN was able to identify high-cost SNFs, network leakages, and other cost drivers. This was critical to driving network cost down and ensuring quality care. Ultimately, care teams now have are ‘Virtual Rolodex’ of hundreds of geo-tagged community resources and an ability to track linked community resources at the patient level.

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> SDOH data is multidimensional and must be incorporated into clinical and other datasets to provide an accurate view of patient risk.

A unified healthcare data platform is required to analyze the social determinants of health data

Understanding the impact of social determinants is one of the revolutionary ways healthcare is changing. But the SDOH data is multidimensional and must be incorporated into clinical and other datasets to provide an accurate view of patient risk. A unified healthcare data platform can incorporate multiple data sources to deliver clean, structured sets and can easily expand as the amount and types of data increase. Different entities can use foundational analytics to better understand their networks, identify gaps in care, study the state of population health, and learn about the growth opportunities in their regions.

Innovaccer's healthcare data platform has been purpose-built for enabling a true connection across multiple data sets including the social determinants data. With its 200+ automatic connectors to widely used healthcare data systems and applications, InData enables rapid data ingestion and integration for a high-performance orchestration layer. The healthcare data platform pieces together disparate data sources into unique, longitudinal Patient-360 records which are exchanged via industry-governed standards. InData ensures that providers don't make decisions based on an incomplete view of the patient, but instead reaches beyond the EHR clinical data and provides the care team with multidimensional insights into patients' living conditions and how other behavioral factors impact their overall health status.

Along with InData, the following modules are built on Innovaccer's healthcare data platform:

- **InCare:**

  Smart, AI-assisted care management solution, with PCMH level care delivery, hardcoded into the workflow. InCare streamlines the care management process enabling systems to scale care management programs at lower costs, and with higher quality.

- **InGraph:**

  State-of-the-art analytics and reporting solution with over 800+ measures to track network performance and outcomes, customizable measures and dashboards accessible across the network, and automated reporting on quality measures.

- **InNote:**

  A smart, lightweight physician's digital assistant that surfaces critical system and population health insights derived from multiple data sources, at the point of care. Using InNote, insights such as care gaps, dropped codes, process measures and referrals information can be shared with the clinician - without their having to leave the EHR experience.

- **InConnect:**

  An automated analytics-driven patient engagement solution to scale patient outreach workflow, and bring patients closer to the care team.

Conclusion

Though providers have recognized that social factors significantly influence their patients' health, they are often unaware of their patients' social vulnerabilities and are unable to accept responsibility for managing these issues or providing support to their patients outside of the clinical realm. There are multiple factors impacting the successful integration of non-clinical interventions into clinical practice, including lack of data insights, administrative burden, payment models, and lack of experience with addressing the non-medical determinants.

Success in the value-based models will compel healthcare systems to pay more attention to the social factors that influence patients' health. The strategies to deal with this area of patient support must reduce the burden on providers and engage other stakeholders to contribute to a better patient outcome. In order to completely address SDOH data, collaboration among different healthcare stakeholders is also required. Many stakeholders, including providers, employers, payers, public health officials, and community policymakers play a role in attempting to improve the non-medical conditions that significantly affect health.

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About Innovaccer

Innovaccer Inc. is a leading healthcare data platform company focused on delivering more efficient and effective healthcare by combining pioneering analytics with transparent, and accurate data. Innovaccer's aim is to simplify complex data from all points of care, streamline the information, and help organizations realize strategic goals based on key insights and predictions from their data. Its products have been deployed across more than 500 locations with over 10,000 providers leveraging it at institutions, governmental organizations, and several corporate enterprises such as Mercy ACO, StratiFi Health, UniNet Healthcare Network, Catalyst Health Network, and Osler Health Network. Innovaccer is based in San Francisco with offices around the United States and Asia.

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