Deloitte.

Together makes progress

HEALTH OUTCOMES THROUGH ANALYTICS SERIES

Volume 1: **Literacy and numeracy**

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EXECUTIVE SUMMARY

Executive summary

Literacy, numeracy, and health are interwoven

1. **The county-level average literacy and numeracy across the United States is overwhelmingly low to moderate.** In the context of the current health care environment, improving baseline average literacy and numeracy may have great potential for improving long-term health outcomes.

2. **Numeracy may be especially important and overlooked.** Based on population data, high numeracy is more difficult to acquire and is mentioned less than literacy in the literature. However, our initial findings suggest that numeracy may provide greater visibility into health behaviors and outcomes.

3. **The prevalence of numerically managed chronic conditions in lower-income counties may potentially be reduced** through prioritized resources and efforts on increasing baseline literacy and numeracy. **All income groups could also benefit from improvements.**

4. **Improving literacy and numeracy may also impact health outcomes indirectly** through influence on health behaviors like sleep and physical activity **across all income groups.**

5. **Improved baseline numeracy may influence appropriate health care utilization** to lessen some of the systemic and financial burden and potentially improve provider burnout.

The future state

could depend on collaboration, innovative solutions, and rigorous evaluation as far upstream as possible.

Executive summary

The data says it all

In this volume, you'll find that literacy and numeracy can have important implications for health outcomes.

Literacy and numeracy can be important in managing long-term health outcomes and empowering individuals to own and understand their health

Based on our research, counties with higher literacy and numeracy scores experienced **lower prevalence of chronic conditions, better rates of adequate sleep and physical activity**, and **in some instances lower health care utilization**.

Only 1% of counties had both literacy and numeracy scores classified as high

100% of high numeracy counties are also high literacy, whereas only 11% of high literacy counties are also high numeracy. While numeracy is lesser known, improvement in this skillset may lead to greater impact on health.

310 counties fall in the low income and low numeracy category. This is where we may see the greatest potential impact on health outcomes through research, investment, and resources.

EARLY PREVENTION CAN MATTER

Upstream equal opportunities have the greatest potential for improving disparate long-term health outcomes.

ONE GROUP CANNOT SOLVE THIS ALONE

Stakeholder involvement across industries and within a community setting can be important to developing comprehensive, innovative, relevant solutions.

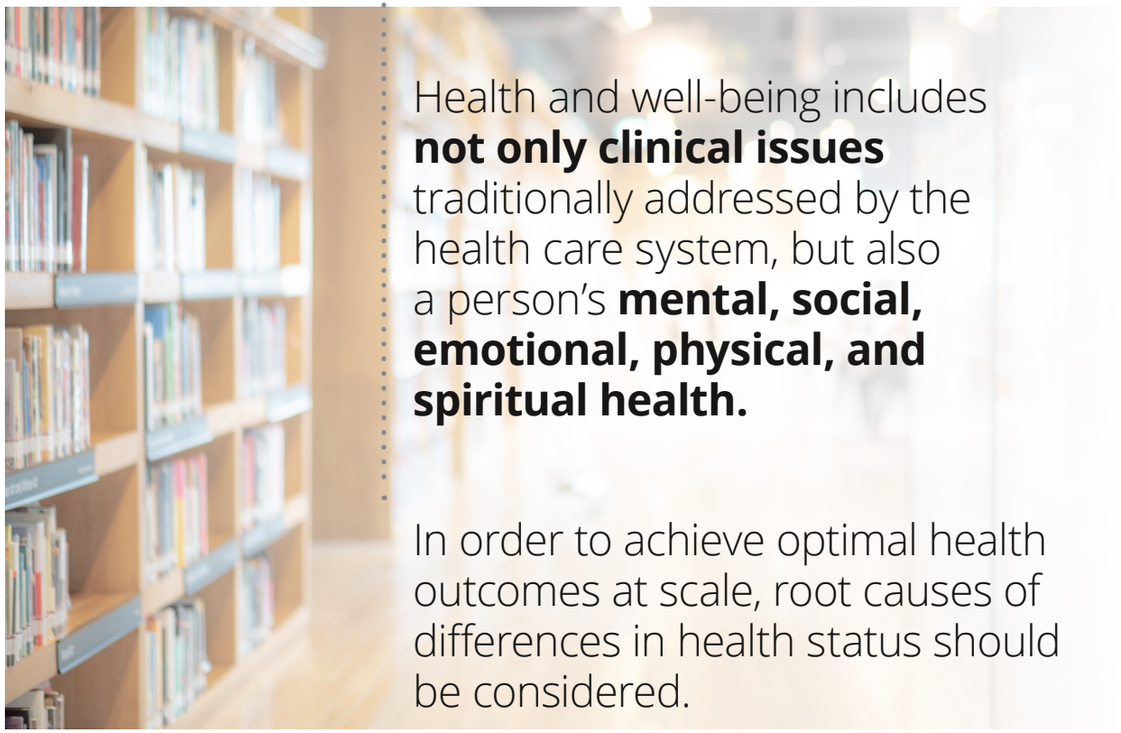
THE ISSUE IS COMPLEX, YET APPROACHABLE

While outcomes are influenced by many overlapping factors, we can detangle the complexity and look for smaller, approachable gaps to inform action that can compound over time into meaningful long-term impact.

Executive summary

"Advancing optimal health outcomes for individuals, families, and communities involves more than access to care"

It is creating opportunities for everyone to fulfill their human potential in all aspects of health and well-being.



Health and well-being includes **not only clinical issues** traditionally addressed by the health care system, but also a person's **mental, social, emotional, physical, and spiritual health.**

In order to achieve optimal health outcomes at scale, root causes of differences in health status should be considered.

Our Health Outcomes through Analytics series aims to empower communities to improve health outcomes through targeted, data-driven interventions.

HEALTH OUTCOMES THROUGH ANALYTICS SERIES OVERVIEW

Series overview

The Deloitte Health Outcomes through Analytics series has three primary goals:

1. **Deepen understanding of drivers of health** by putting real-world numbers behind associations
2. **Clarify and segment analyses** in a way that makes insights and recommendations actionable for community leaders
3. **Share knowledge broadly** with an invitation to complementary and diverse broad range of stakeholders across sectors and industries to develop and take action on solutions together

We hope these insights provoke conversation and catalyze collaborations that ultimately change future outcomes through **innovative solutions and mindsets**.

But this is only a starting point and one small step in improving health outcomes.

Series overview

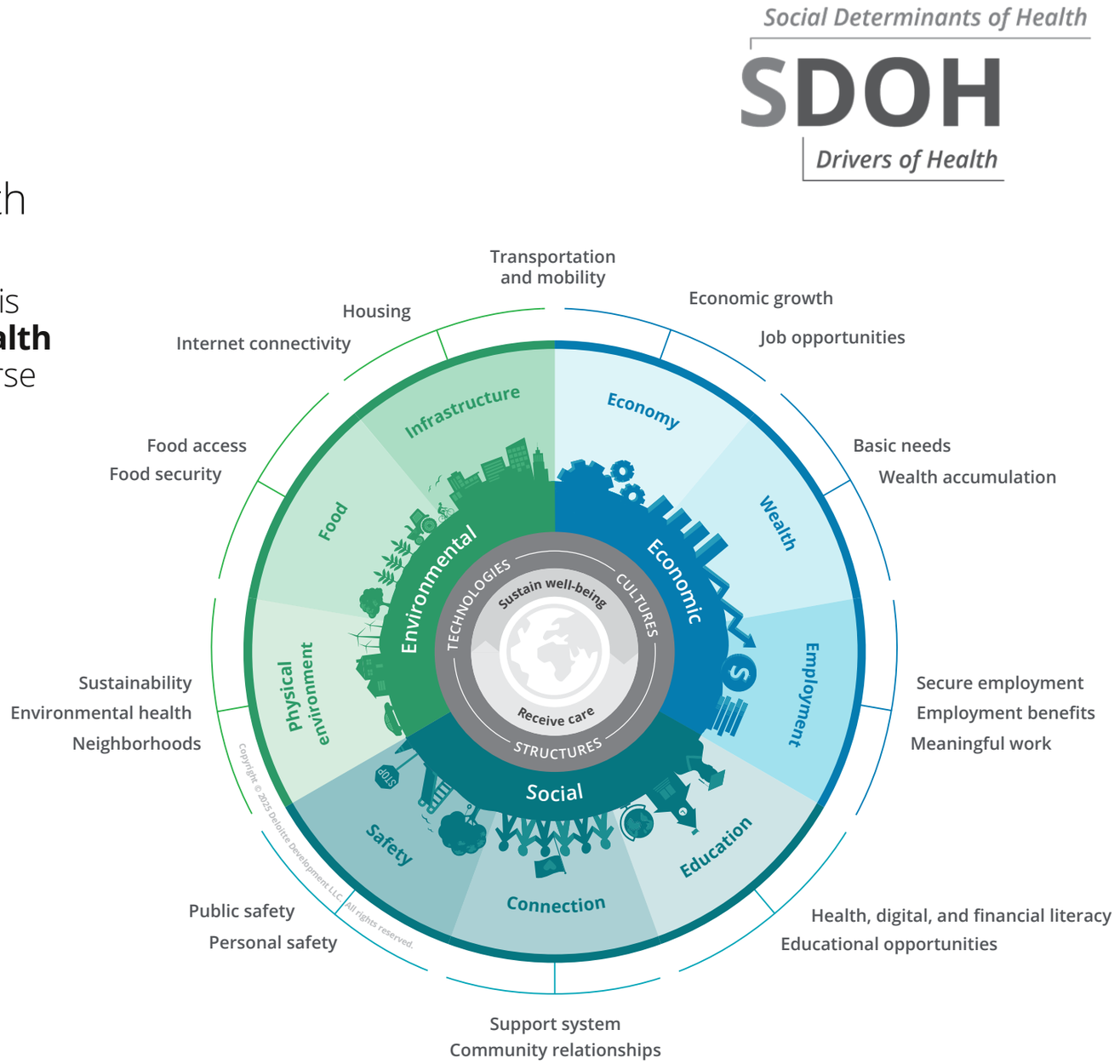
Significant differences in **upstream** drivers of health underlie differences in health outcomes.

The main feature of the Health Outcomes through Analytics series is the sequential exploration of relationships between **drivers of health** and health outcomes through the combination of various and diverse data sets.

DEFINING DRIVERS OF HEALTH

The Drivers of Health, also known as the Social Determinants of Health, are the social, economic, and environmental factors beyond health care that can have an impact on individual and community health, well-being, and outcomes.

- **Economic:** Factors that affect the economy, such as steady employment, interest rates, policies, and governmental activities.
- **Environmental:** Impacts of exposure to pollutants, changes in weather patterns, a lack of nutritious food sources, and unstable or unsafe living conditions.
- **Social:** Obstacles to higher education and job training, lack of connection or relationships, and exposure to intentional violence.

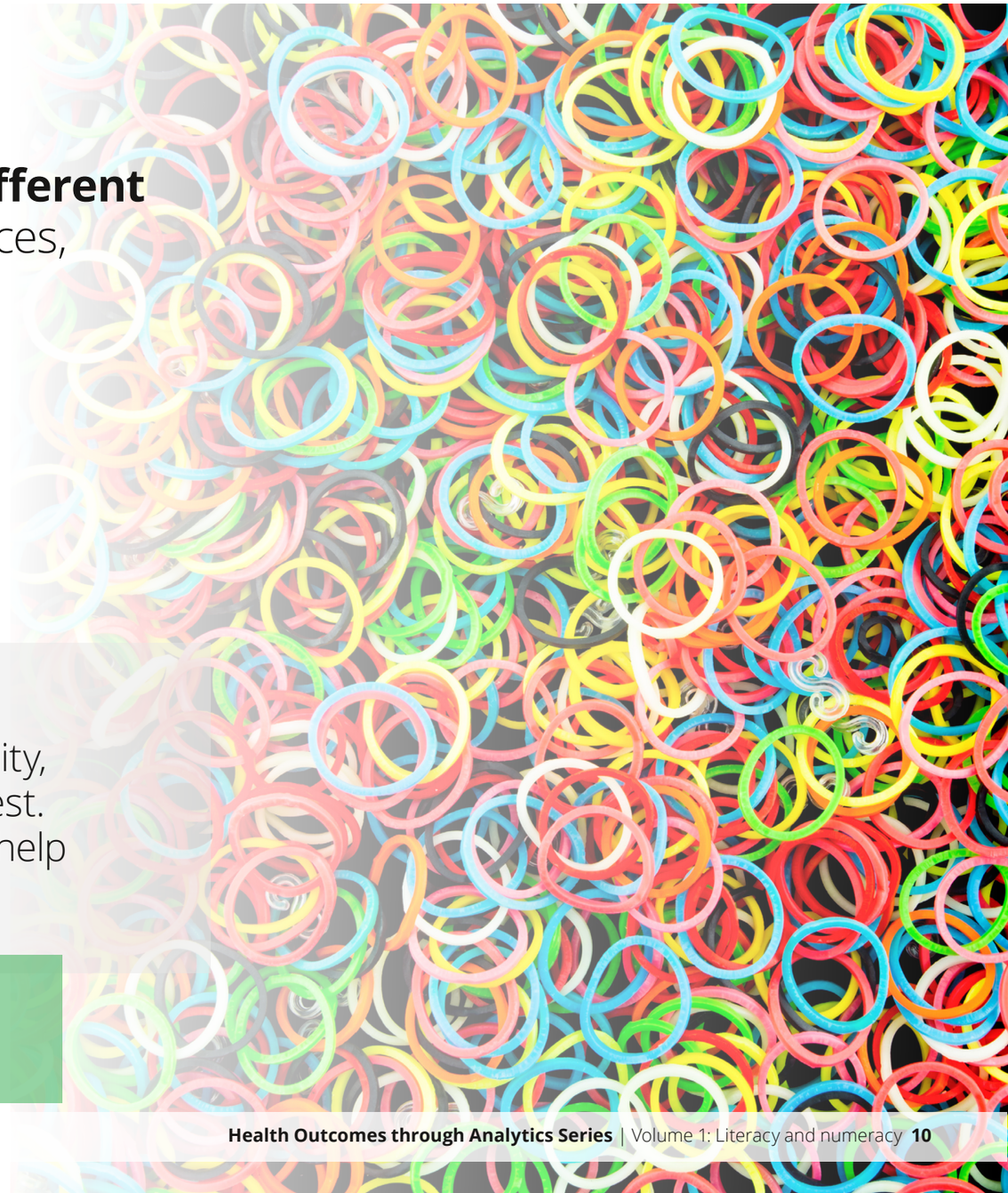


Series overview

There is **inherent complexity within and between the different drivers of health**. In combination with unique lived experiences, these drivers can impact individual health outcomes.

Challenges to building a comprehensive perspective include:

- **Data intricacies;**
- **Intersections across drivers of health; and**
- **Unique lived experiences.**



UNTANGLING COMPLEXITY:

While our population-level analysis cannot determine causality, we ***can*** identify initial trends and formulate hypotheses to test. Additional individual data and direct community insights can help complete a more comprehensive view.

A second phase of this series and research aims **to layer in targeted analyses** and **engage communities** to validate findings and strengthen the evidence base.

Series overview

We can work to **untangle the complexity** by identifying approachable gaps through important questions:

CAN WE QUANTIFY THE FACTORS THAT CONTRIBUTE MOST TO HEALTH?

HOW CAN EFFORTS AND RESOURCES BE PRIORITIZED ACROSS COMMUNITIES AND POPULATIONS?

WHAT ACTIONS LEAD TO AND MAXIMIZE MEASURABLE IMPACT?

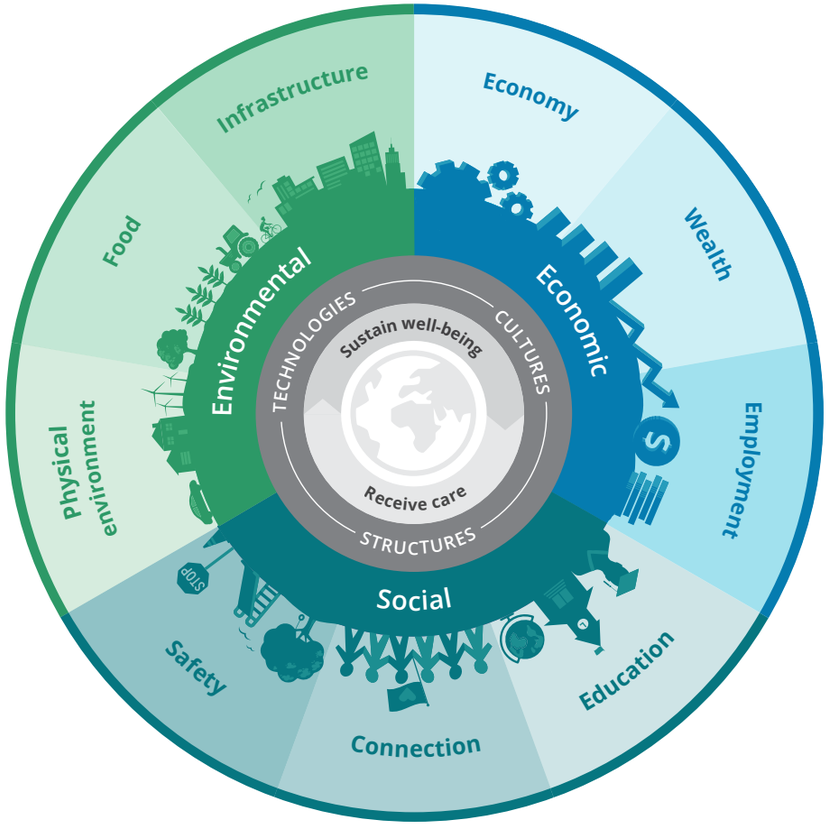
Social Determinants of Health
SDOH
Drivers of Health

Series overview

Data can help us identify these approachable gaps that lead to action and measure impact.

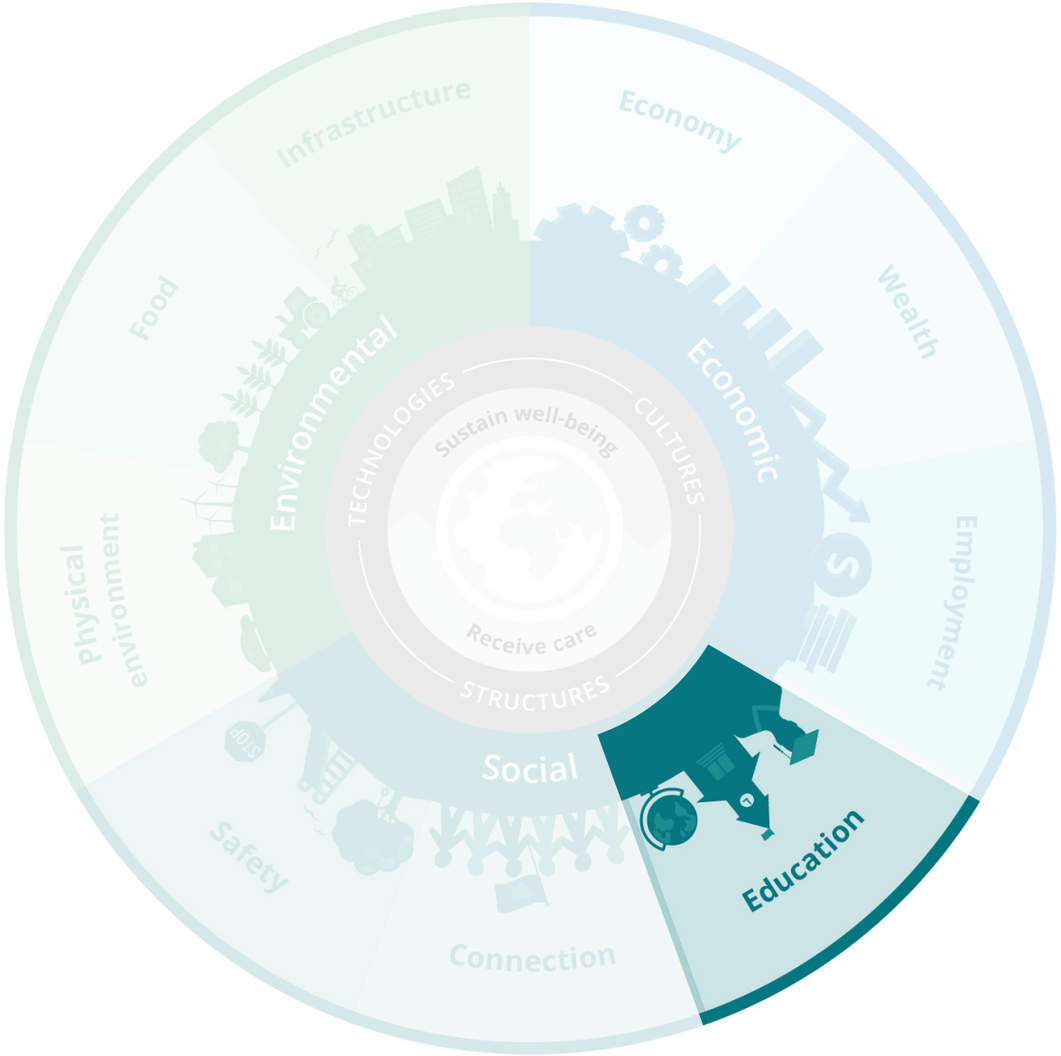
DATA CAN ENABLE US TO:

- **Think differently** about where, when, and how we address health differences.
- **Expose critical gaps and opportunities** to make an impact through a more comprehensive understanding of relationships.
- **Tell stories that reveal unexpected truths** about differences in health status and outcomes.
- **Measure the impact of novel interventions** to extract the most influential drivers.
- **Draw insightful conclusions** about previously unexplored populations and community needs through aggregation and segmentation.



Series overview

Our first volume in the series focuses on **education**—measured through literacy and numeracy—as a driver of health.



LET'S EXPLORE:

Do literacy and numeracy independently matter for health outcomes? At what scale?

How do literacy and numeracy extend outside of formal primary education?

Where in the health care journey can we make the most impact while being holistic? How do we quantify the impact?

Series overview

We aim to **inspire conversation** across settings through compelling research, challenging questions, and ideas **for collaboration and creative problem-solving.**

Each chapter focuses on improving literacy and numeracy in one of the three potential intervention settings:

CHAPTER 1:

Literacy, numeracy, and chronic disease management

FOCUS ON **SCHOOLS:**

- What is the relationship between **childhood education and long-term health outcomes**?
- **How can organizations partner with schools** to improve literacy?
- Where might **early prevention empower young people** to manage future health outcomes?

CHAPTER 2:

Literacy, numeracy, and health behaviors

FOCUS ON **COMMUNITIES AND EMPLOYERS:**

- **What behaviors and health outcomes can community organizations and employers influence** to improve the health of their populations?

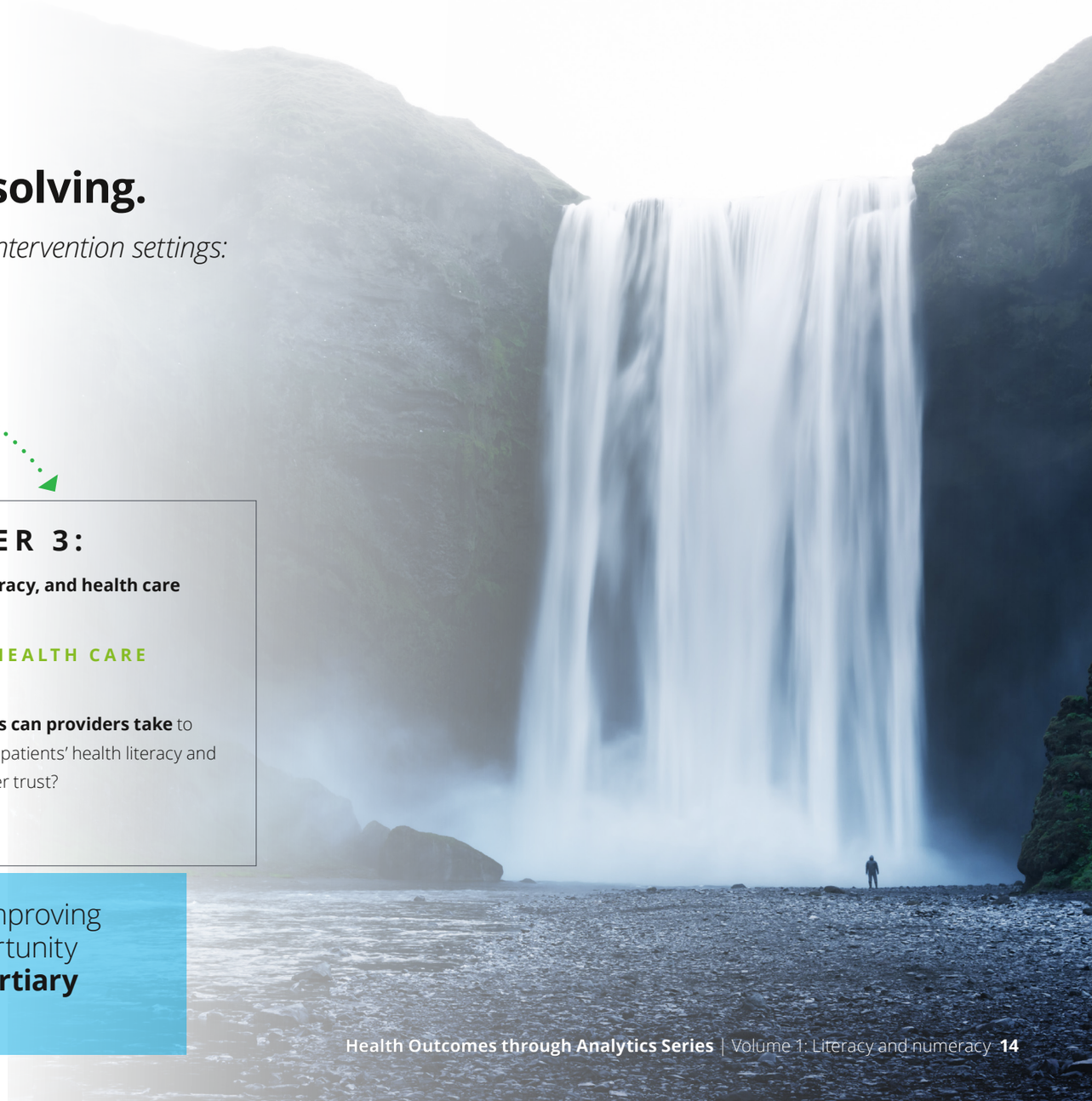
CHAPTER 3:

Literacy, numeracy, and health care utilization

FOCUS ON **HEALTH CARE SETTINGS:**

- **What steps can providers take** to strengthen patients' health literacy and build greater trust?

Early prevention could have the greatest potential for improving outcomes and can afford each individual the best opportunity and agency for health and wellness. **Secondary and tertiary prevention** can help fill the existing gaps.



Chapter 1

Literacy, numeracy, and chronic disease management

In this chaper you'll find...

The **definitions** of literacy and numeracy and why these skill sets may be even more important than ever.

The **current state** of literacy and numeracy across the US.

Findings from population-level data analyses comparing literacy, numeracy, and the prevalence of numerically managed chronic conditions.

A deep dive into the data to identify which cohort may benefit the most from additional resources and effort.

Ideas to consider as we move the conversation forward.

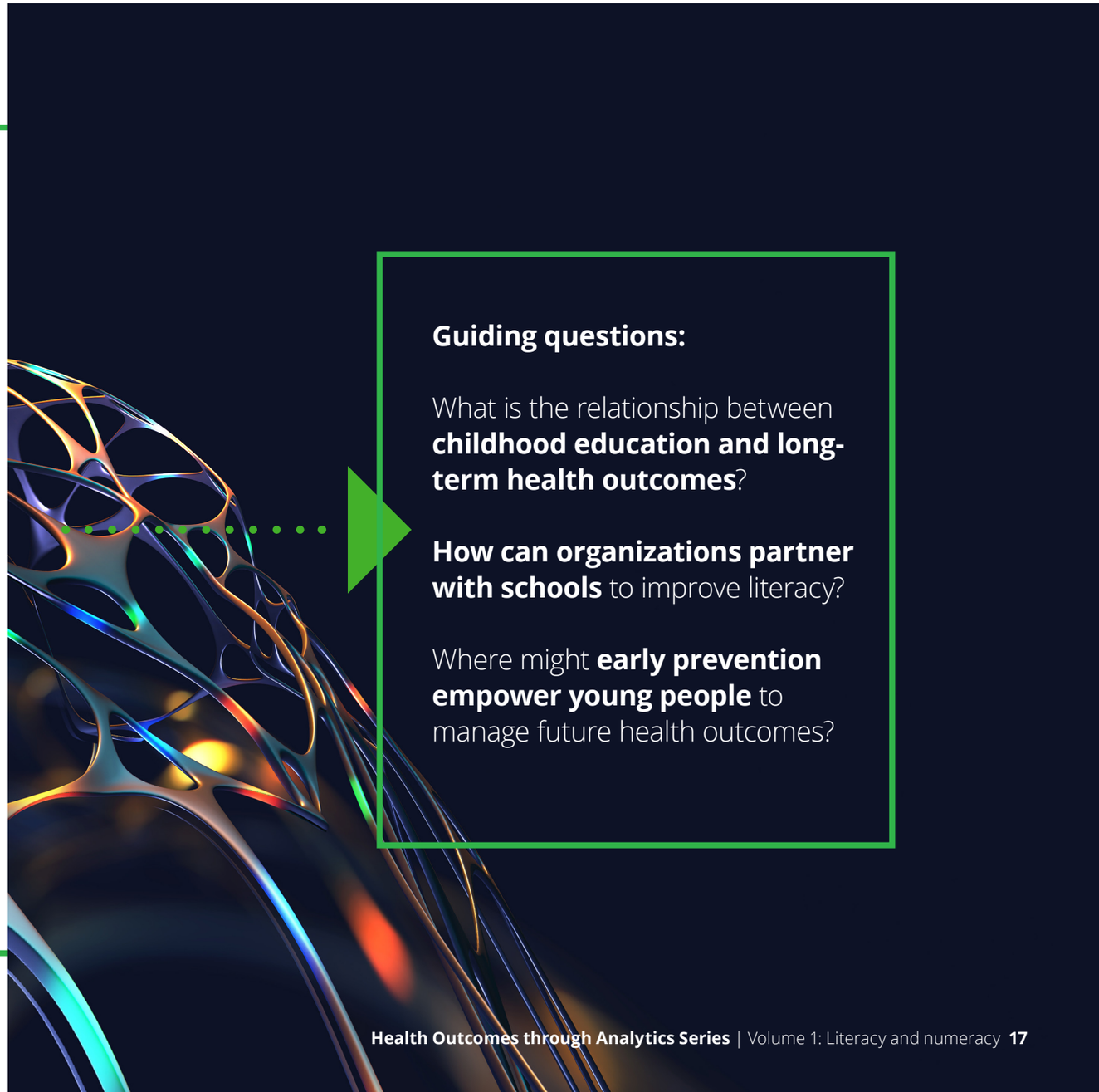
Defining terms

Education

One of the drivers of health typically established early in life, is often measured through assessments for literacy and numeracy.[1]

Literacy:
The ability to understand and engage with written text.

Numeracy:
The ability to understand and apply mathematical information and ideas.



Guiding questions:

What is the relationship between **childhood education and long-term health outcomes**?

How can organizations partner with schools to improve literacy?

Where might **early prevention empower young people** to manage future health outcomes?

Education is foundational

In recent decades, there have been major shifts that potentially impact the **relationship** between literacy, numeracy, and health outcomes.[2]

Two important shifts:

Increase in patients' involvement in their own health journeys and medical decision-making

Vast increase of medical information readily available to the public

These shifts underscore the importance of better understanding the relationship between literacy and health:

Underlying differences may exacerbate different levels of access and outcomes in this new environment.

Literacy and numeracy may be more important than ever to equip individuals with skills necessary to manage their health.

Defining health literacy

"Personal health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others."[3]

—US Department of Health and Human Services

Literacy and numeracy are not about mastering specific content. Rather, they are **skills that can lead to acquiring knowledge** that evolves over time and is self-directed.

State of affairs

How do counties compare across literacy and numeracy skills?

Average literacy and numeracy across total counties in the United States reveal important gaps:

Literacy vs. numeracy		Numeracy: Low	Numeracy: Medium	Numeracy: High	Total counties
Literacy	Low	43	**0**	**0**	**43**
	Medium	326	2,445	0	**2,771**
	High	**0**	293	**35**	**328**
Total counties		**369**	**2,738**	**35**	**3,142**

Note: Numbers in the table above refer to counties included in this analysis.
Definitions of low, medium, and high competency scores can be found in the methodology.

Numeracy is generally the lesser talked about skill yet can be harder to acquire over time. Health and medicine often rely on probabilities to predict outcomes and inform decision-making. Those with lower numeracy may struggle in understanding and contextualizing these probabilities to their personal health journey.[4]

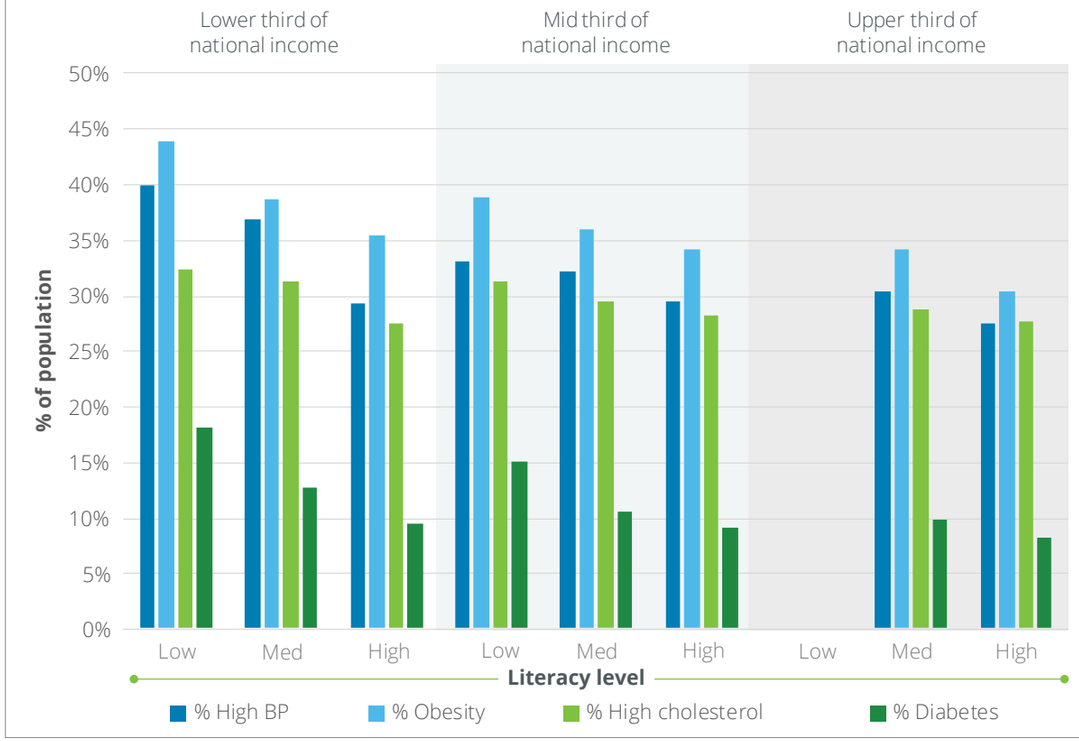
Of the counties analyzed, **0%** had an average low literacy rate and an average high numeracy rate, and vice versa. However, all high numeracy counties are also high literacy, whereas only **11%** (35 of 328) of high literacy counties are also high numeracy, which suggests that numeracy may be more difficult to acquire and may have slightly different outcomes and implications.

Only **1%** (35 of 3,142) of the counties surveyed had both average high literacy and high numeracy scores.

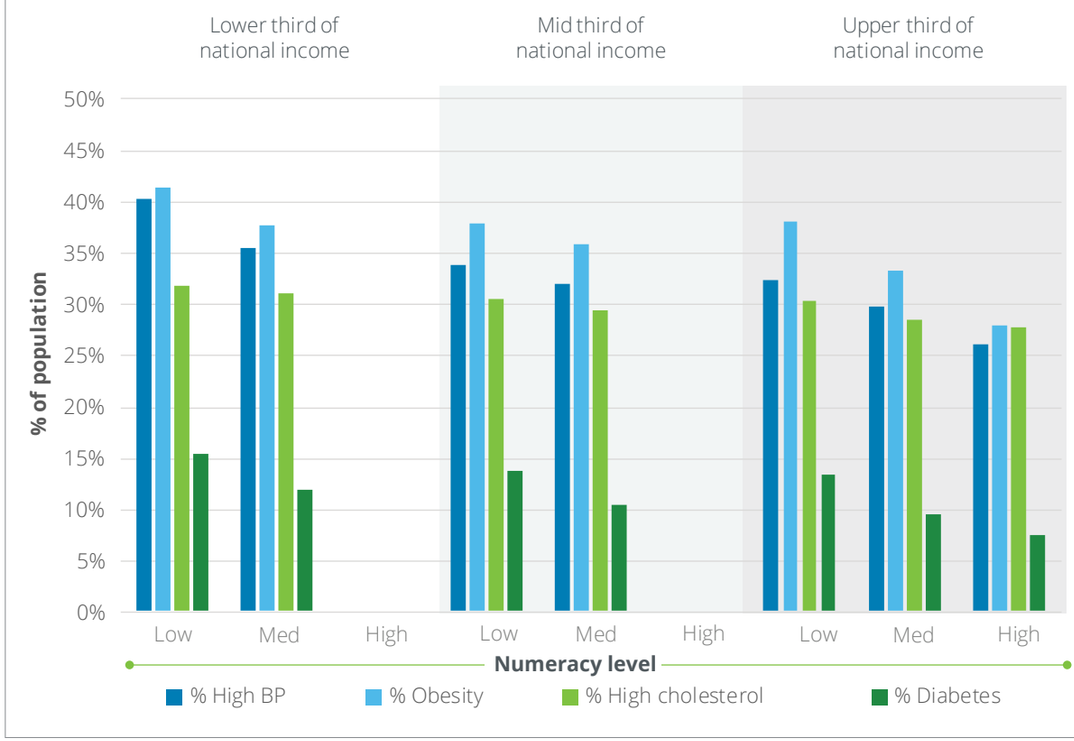
Unpacking the data

Our research uncovered that **counties with lower literacy and numeracy tend to experience higher rates of high cholesterol, diabetes, obesity and high blood pressure**.

County-level literacy and chronic conditions



County-level numeracy and chronic conditions

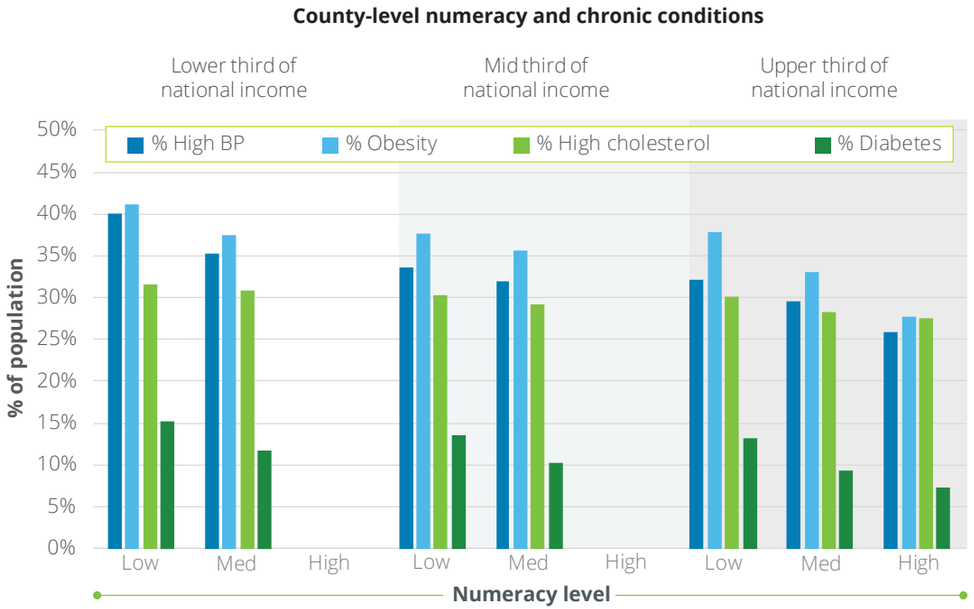


Unpacking the data

Numeracy

THE DATA

The following conditions surveyed require general at-home management and **a strong understanding of numeric values** such as calorie count, blood cholesterol, sugar, and pressure levels for successful management.



HIGHLIGHTS

Numeracy appears to be important for appropriately acting on health information to help manage chronic conditions effectively.

1. Baseline differences in prevalence and numeracy across income groups
The prevalence, though decreasing in all income groups, is overall higher in the lower-income group. Also, the proportion of counties that are low numeracy in the lower-income group (30%) is greater than the proportion of counties that are low numeracy in the higher-income group (1.5%). This points to the potential link between income and numeracy, and it helps to prioritize counties in the lowest-third income and low literacy group for investment, resources, and research.

2. Consistent trends across and within income levels
The negative relationship between numeracy and chronic condition rates exists across the different income groups surveyed. This suggests that while numeracy is related to income, it may also play a role in chronic condition outcomes separate from income (i.e., an improvement in numeracy may lead to an improvement in the prevalence of these conditions in the lower-income group).

3. Prevalence impacted more in lower-income counties
The greatest decrease in chronic condition prevalence upon numeracy increase is in lower-income communities.

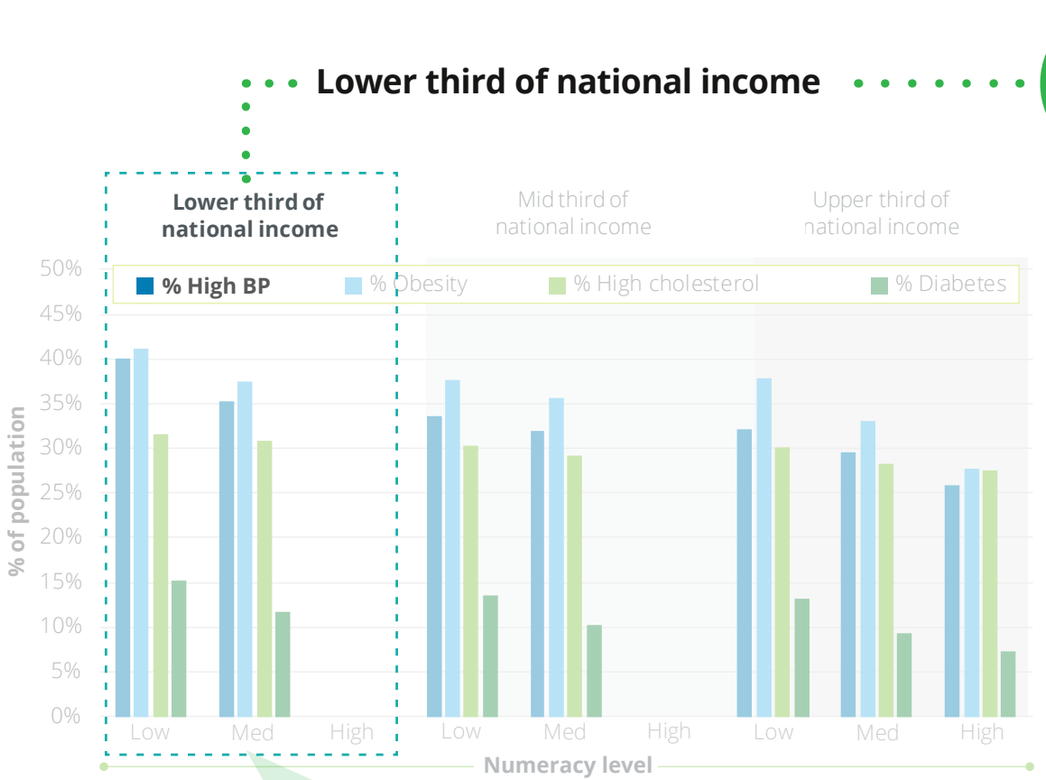
What would impact look like?

The **greatest potential impact on health outcomes may be seen** by investing resources and prioritizing research in the **310 low income and low numeracy countries**.

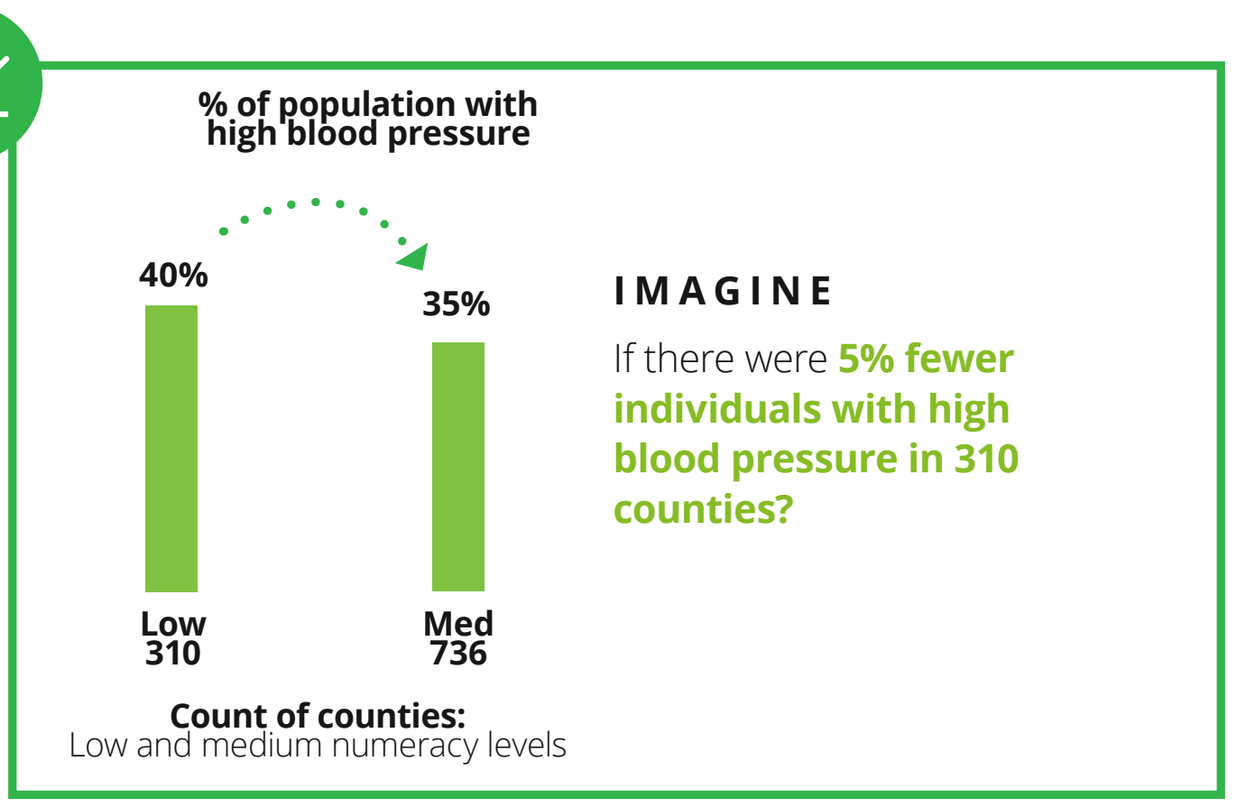
Unpacking the data

These 310 counties highlight an immediate opportunity for prioritizing efforts to help improve population health.

Comparisons across income levels suggest potential greater influences on outcomes by focusing on the lowest-income counties with the lowest numeracy baseline.



The lowest-income counties showed a **5% difference in high blood pressure** between low and medium numeracy counties



IMAGINE

If there were **5% fewer individuals with high blood pressure in 310 counties?**

Unpacking the data

Lower-income counties may experience obstacles to accessing diverse nutritious food options. However, improved numeracy can empower individuals to make healthier selections regardless of circumstance.

Consider the food selection outcomes of an individual with low numeracy versus an individual with higher numeracy in two different ***hypothetical scenarios:***

IMPLICATIONS

Everyone may make better choices because they can analyze the packaging label, understand the serving size, and apply it to themselves as a result of higher numeracy. This is the case even if at baseline the options may be healthier for those living in higher-income counties.

Low Income County

1. Two residents with **differing levels of numeracy** enter a local gas station

2. Both residents begin exploring aisles for a snack given **a limited selection**

3. The resident with lower numeracy selects a **candy bar**, while the higher numeracy resident selects a **protein bar**

4. The **more numerate** resident can read and interpret the nutritional content, and ends with a **healthier selection**

High Income County

1. Two residents with **differing levels of numeracy** enter a local organic foods market

2. Both residents begin exploring aisles for a snack with **many available healthy options**

3. The resident with lower numeracy selects a **sugary drink**, while the higher numeracy resident selects **Greek yogurt**

4. The **more numerate** resident can read and interpret the nutritional content, and ends with a **healthier selection**

Consider how we can empower young people to ***own*** their health journey

Education is not just the role of educators. **Organizations across the ecosystem should consider collaborating** and can bring an innovative mindset to help affect future health outcomes through early prevention.

How can health care organizations lean in and collaborate with schools? By integrating health literacy topics into core curricula and extracurricular exposure.

How can community partners improve health literacy for families and individuals? Through innovative programming, multigenerational services, and meaningful conversations.

Bringing it all together

Ways to move forward from here

Literacy and numeracy are **skill sets that can lead to acquiring knowledge** that evolves over time and can be self-directed.

By aggregating data at a population level across counties in the United States, we **identify trends across literacy, numeracy, and health outcomes** and across three income buckets.

Lower-income counties may see impacts on chronic condition prevalence the most through improved baseline literacy and numeracy. However, **other income groups may also experience improvements**.

Numeracy may play a greater role in successfully managing chronic conditions that require numerical management.

The role of improving literacy and numeracy education can be a shared responsibility, not just the role of educators. **Collaboration may be essential** to influence early skill set development and ultimately improve long-term health outcomes.

Considerations for action

1 **Develop partnerships:**
To remove obstacles for students and parents, develop partnerships to offer basic health care services through local health providers directly at school.

2 **Collaborate on nutrition:**
Create partnerships to bring farmers markets to schools, and co-organize healthy food preparation workshops during evenings or weekends for the students and families.

3 **Co-develop curricula:**
Co-develop age-appropriate additional lessons during school, created and/or co-taught by local health care providers, on health care access, chronic conditions, at-home disease management, healthy habits, and evidence-based practices.

4 **Engage the community:**
Collaborate to organize health and health care workshops that are aligned with the needs of the community, and add consultations between local health providers and parents on school grounds during evenings or weekends.

The importance of measurement

It is important to measure the ***effect*** of interventions and share which interventions work well and can be scaled and implemented in other communities.

We approached this work with the recognition that differences in outcomes are **complex and multifactorial.** **Individual communities** are best positioned to develop and tailor programs and solutions relevant to their context. **These suggestions are meant to inspire collaboration.**

Chapter 2

Literacy, numeracy, and health behaviors

In this chaper you'll find...

The **definitions** of health behaviors and the connection to health outcomes.

Findings from population-level data analyses comparing literacy, numeracy, and the prevalence of suboptimal health behaviors.

The connection between health behaviors and other life stressors beyond income, and the importance of having resources to address those stressors.

Ideas to consider as the conversation moves forward.

Defining terms

Health behaviors:

Health-related practices that can improve or damage health over time are foundational and prone to change.[5] This chapter focuses on two key health behaviors:

Sleep:

Respondents included in the "low sleep" counts reported fewer than 7 hours of sleep on average during a 24-hour period.

Physical activity:

Respondents included in the "no physical activity" counts reported they had not participated in any physical activities or exercises in the past month.

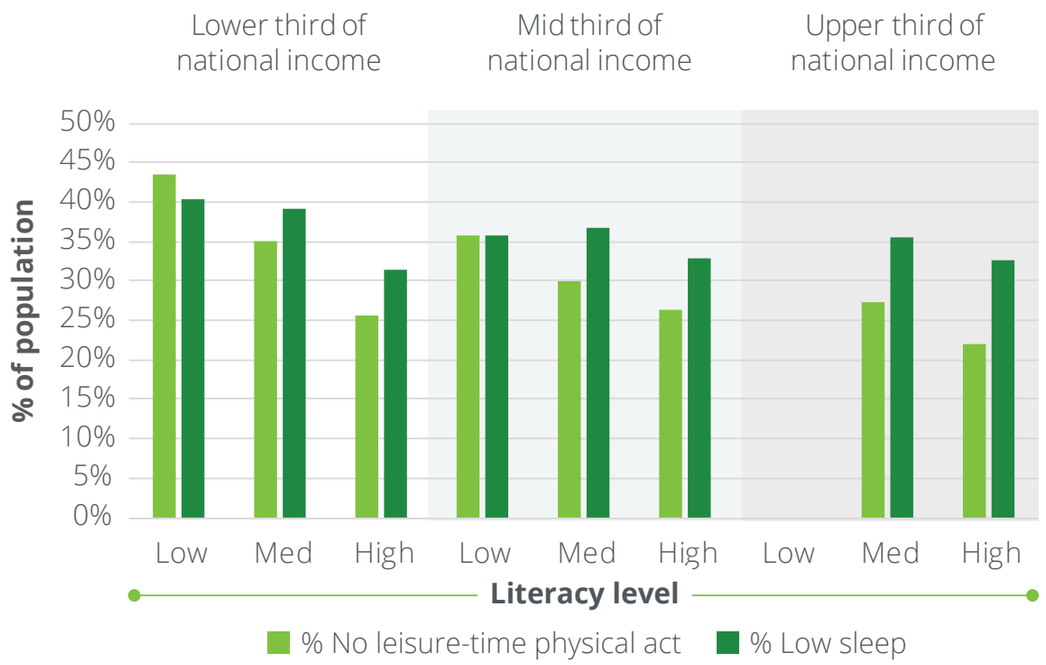
Guiding questions

What behaviors and health outcomes can community organizations and employers influence to help improve the health of their populations?

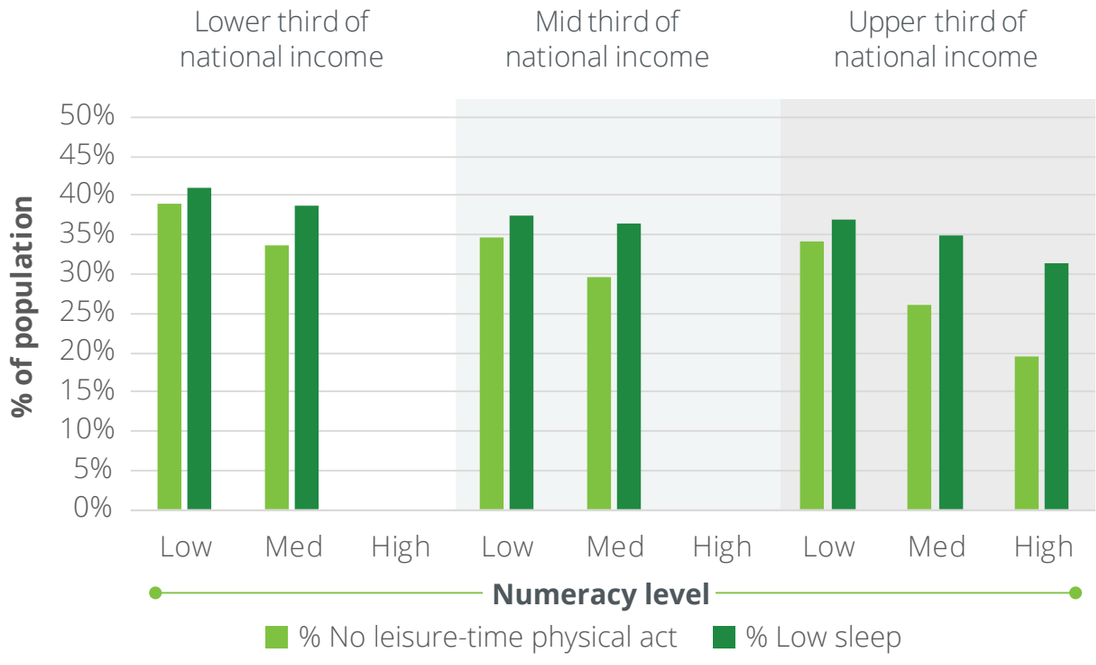
Unpacking the data

Our research uncovered that counties with lower numeracy and literacy **tend to get less sleep and leisurely physical activity in all income groups.**

County-level literacy and chronic conditions



County-level numeracy and chronic conditions

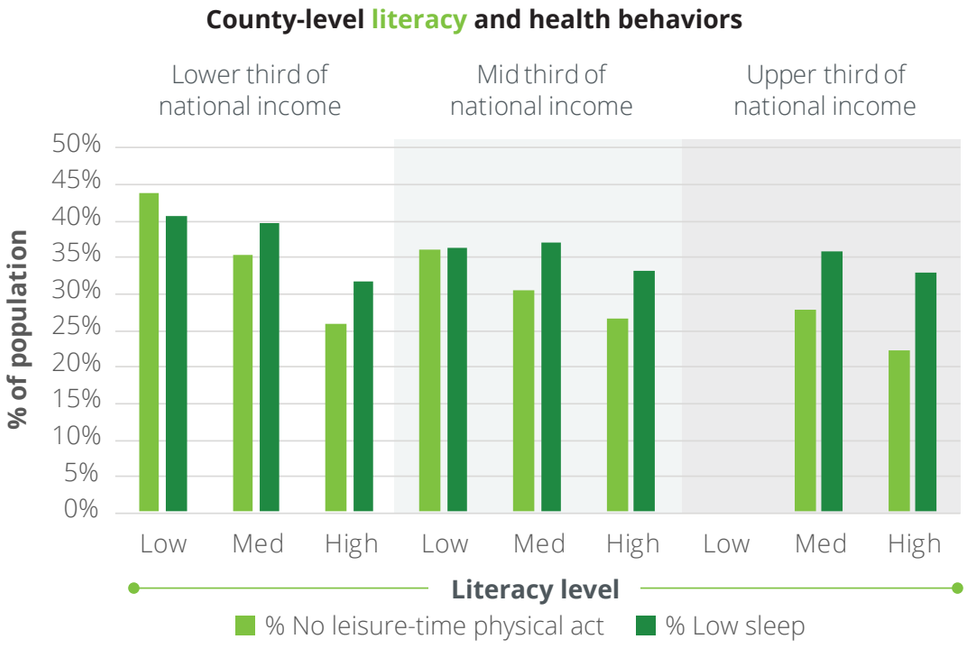


Unpacking the data

Literacy:

THE DATA

Counties with lower literacy levels experience lower rates of sleep and physical activity.



HIGHLIGHTS

Literacy can be an important skill set to empower adults in managing their own health behaviors.

1. Consistent trends across income levels
Literacy appears to be positively associated with county-level sleep and physical activity across all income levels. This suggests that while literacy is related to income, it may also play a role in health behaviors separate from income (i.e., an improvement in literacy may lead to an improvement in sleep and activity).

2. Rates improve most for lower-income counties
Improved literacy rates in lower-income counties shows a greater improvement in sleep and physical activity compared with higher-income counties. Lower-income counties may present the greatest opportunity for impact and intervention.

Defining terms

It may be generally known that getting exercise and sleep is important, but in practice, **life stressors, whether at work—or at home—may prevent the practice of good habits.** Plus **higher income earners do not seem immune** to the stresses.

>50%
of Americans making $100,000 or more may be living paycheck to paycheck[6]

58%
of adults experienced undesired weight gain in 2022[7]

81%
of working parents said a company's childcare benefits were a key criterion when considering a job[8]

72%
of working parents were stressed based on disruptions and uncertainty about school and childcare schedules[9]

Bringing it all together

Ways to move forward from here

Literacy and numeracy can have direct impacts on sleep and physical activity based on population data across counties and across income groups.

Improvements in sleep and physical activity may have an impact on other facets of life outside general well-being; Improved habits may indirectly affect workplace effectiveness, productivity, and community engagement.

Implementing and evaluating interventions in community and employment settings may be an appropriate approach to **meet people where they're at** currently and provide education and resources that are directly applicable.

Considerations for action

1 **Develop partnerships:**
Develop partnerships between employer-sponsored health care plans and health care systems, with incentive structures to encourage and help track healthy habits. Consider bringing health care services such as wellness visits and annual vaccines to the employer setting.

2 **Offer incentives:**
Employers can offer wellness benefits to supplement traditional health insurance. These could include flexible time and space within the workday for physical activities, rest, and well-being, as well as the financial incentive to do so.

3 **Co-develop curricula:**
Involve community organizations and subject leaders in the design and expansion of these programs to help build trust and encourage participation. Build toward a wellness culture that encourages participation and usage of programs and benefits.

4 **Engage the community:**
Local communities and governments can develop activities and programs in shared spaces (e.g., parks and community centers) that engage families and connect people across industries.

The importance of measurement

It is important to measure the ***effect*** of interventions and share which interventions work well and can be scaled and implemented in other communities.

We approached this work with the recognition that differences in outcomes are **complex and multifactorial. Individual communities** are well positioned to develop and tailor programs and solutions relevant to their context. **These suggestions are meant to inspire collaboration.**

Chapter 3

Literacy, numeracy, and health care utilization

In this chaper you'll find...

The **definitions** of health care utilization metrics.

An exploration of mixed evidence in prior literature connecting literacy to healthcare utilization indicates further exploration is needed.

Findings from population-level data analyses comparing literacy, numeracy, and health care utilization patterns across income levels.

Ideas to consider as we move the conversation forward.

Defining terms

Health behaviors:

Health care utilization refers to services used to address health concerns across patient populations:[10]

Outpatient visits:

Respondents who reported visiting an outpatient health care facility in 2019 and the corresponding volume of visits.

Emergency department (ED) visits:

Respondents who reported visiting a hospital emergency department in 2019 and the corresponding volume.

Inpatient days:

Respondents who reported staying overnight at a hospital or other inpatient care facility in 2019 and the corresponding number of days for each instance.

Guiding questions

What behaviors and health outcomes can community organizations and employers influence to help improve the health of their populations?

Prior evidence leaves us wondering

Global findings show mixed results:

Some prior literature, conducted mainly in other countries, suggests that lower literacy may lead to inappropriate or excess utilization.[11]

Other research focused on specialty care (e.g., cancer care) has found opposite trends, where increased literacy has resulted in increased utilization.[12]

There is more nuance and context to uncover in our own health care ecosystem.

The US health care system is unique:

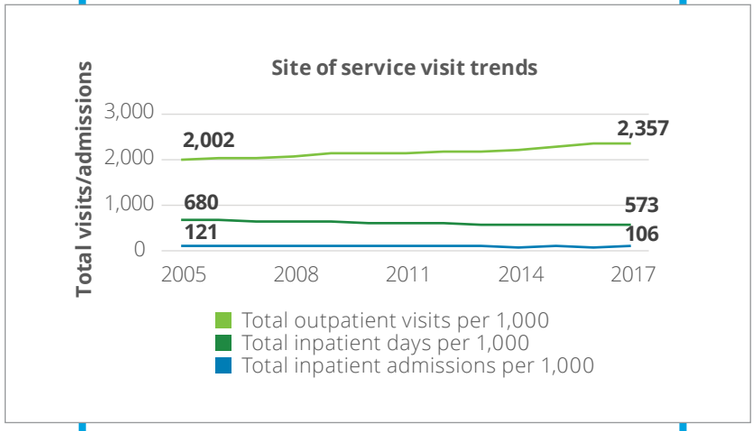
The United States has a unique health care system. Therefore, US-specific research is needed to identify whether global behaviors hold true within the system we operate in.

The cost of health care has increased significantly in the United States, constituting 17.8% of GDP in 2021.[13]

Growing costs may not be sustainable to meet the needs of the US population.

Growing shifts cannot continue infinitely:

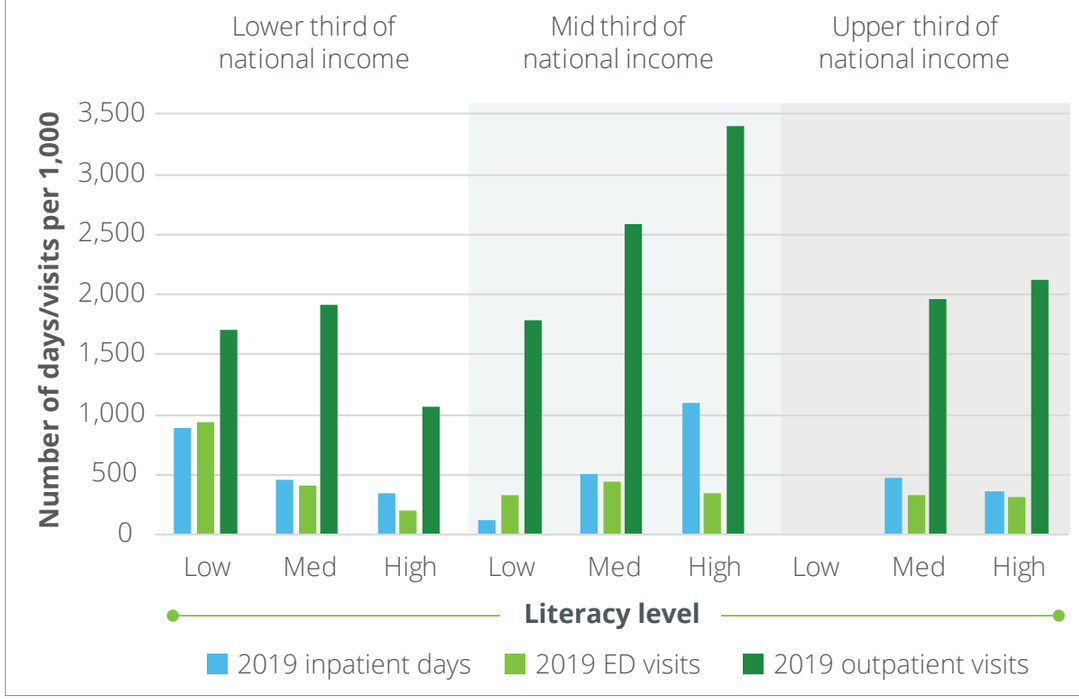
While we have seen promising shifts away from acute (inpatient) care and growing outpatient care, these trends cannot increase infinitely without, potentially, great financial cost and a further overburdened system.



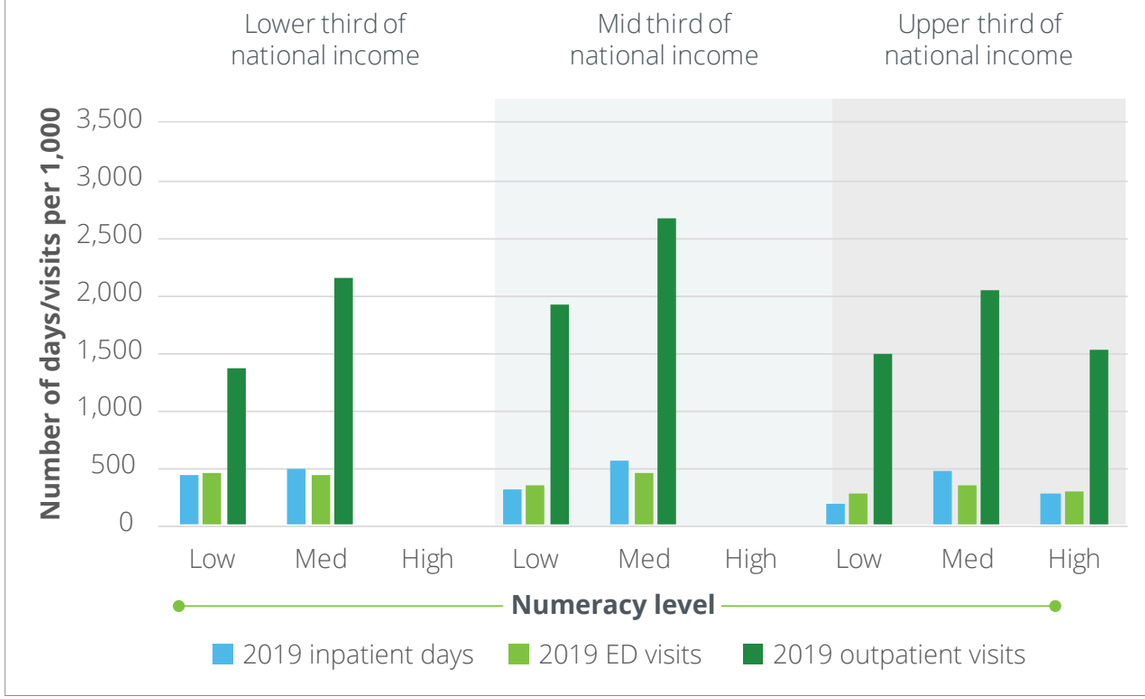
Unpacking the data

Our findings on literacy reflect some of the prior ambiguity. However, the **relationship between numeracy and health care utilization seems to be more consistent**. Moreover, there may be a numeracy threshold (from medium to high) that helps to avoid inappropriate utilization.

County-level literacy and health care access



County-level numeracy and health care access



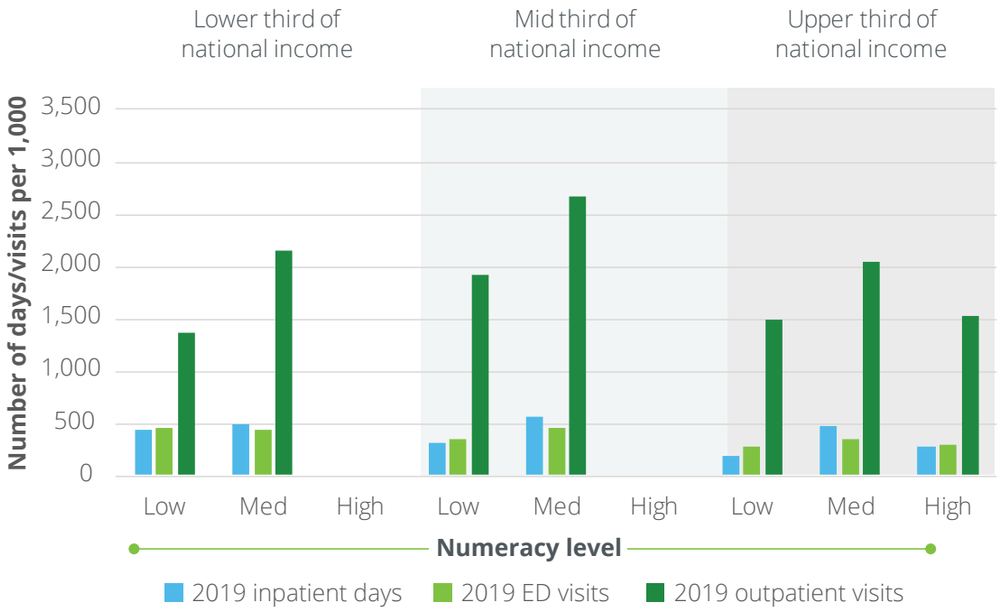
Unpacking the data

Numeracy:

THE DATA

At a population level, average high numeracy may lead to more judicious health care utilization across all sites of service.

County-level numeracy and health care access



HIGHLIGHTS

Numeracy appears important for interpreting and appropriately acting on personal health information which may inform site-of-service decisions.

1. Numeracy inferences may be stronger than literacy

Numeracy levels, stratified into income groups, show more consistent patterns of association to health care utilization trends compared to literacy. Additionally, numeracy appears to be more strongly connected to income as all high numeracy counties are in the upper third of income. This creates a somewhat natural, controlled environment that holds stable other factors associated with income, such as quality and availability of services. As a result, numeracy may be a better indicator of health care utilization.

2. Utilization trends change as numeracy increases

While the initial trend is greater total utilization from low to medium numeracy counties, there is a decrease in utilization in all utilization from medium to high numeracy. On a population scale, there seems to be an inflection in trend when moving into the high-numeracy range, which might signal more judicious utilization. However, this could also be influenced by other interacting and confounding factors, thus warranting additional analyses on the individual level.

Bringing it all together

Ways to move forward from here

Literacy and numeracy both matter when it comes to making personal health care decisions. However, numeracy appears to be better correlated to utilization. And high numeracy may potentially help individuals utilize all services, even outpatient services, more judiciously and with greater autonomy over their health and wellness.

Providers have an opportunity to empower patients through help in interpreting and applying often numerically based evidence to their unique care management and health journeys.

There is more to explore in the context of site-of-service decisions based on inconsistent trends and complexities related to underlying conditions.

With the ever-increasing cost of **health care services, provider burnout**, and **resource shortages,** there may be a threshold of utilization that borders on excess or inappropriate use, which is worth exploring through continued rigorous research.[14]

Implications for action

1 **Inpatient, emergency, and acute care discharge planning:**

The discharge process from emergency room visits and prolonged inpatient stays may leave patients uncertain about next steps. Opportunities exist for discharge planning educators to meet with patients and share tailored, lliteracy- and numeracy-level appropriate information and discuss actionable plans for home management. Community pharmacies may also have an important role in health education, planning, and navigation.

Examples of topics to discuss may include prescriptive levels of care for upcoming symptoms, the likelihood of experiencing them, and planning actions to address barriers or concerns with access, safety, and well-being.

2 **Proactive surveying of patient challenges and uncertainties:**

Outpatient facilities, such as primary care centers and community health organizations, can identify and monitor information captured during visits that relates to drivers of health. As an example, nurses could collect upfront information from patients during their first prenatal visits about language comprehension, transportation challenges, or food insecurity risks.

Natural language processing could be used to look for trends and build better structures for partnering with patients to minimize challenges earlier in **their health journeys**.

The importance of measurement

It is important to measure the ***effect*** of interventions and share which interventions work well and can be scaled and implemented in other communities.

We approached this work with the recognition that differences in outcomes are **complex and multifactorial. Individual communities** are best positioned to develop and tailor programs and solutions relevant to their context. **These suggestions are meant to inspire collaboration.**

Conclusion

Literacy, numeracy, and health outcomes are interwoven

Key learnings

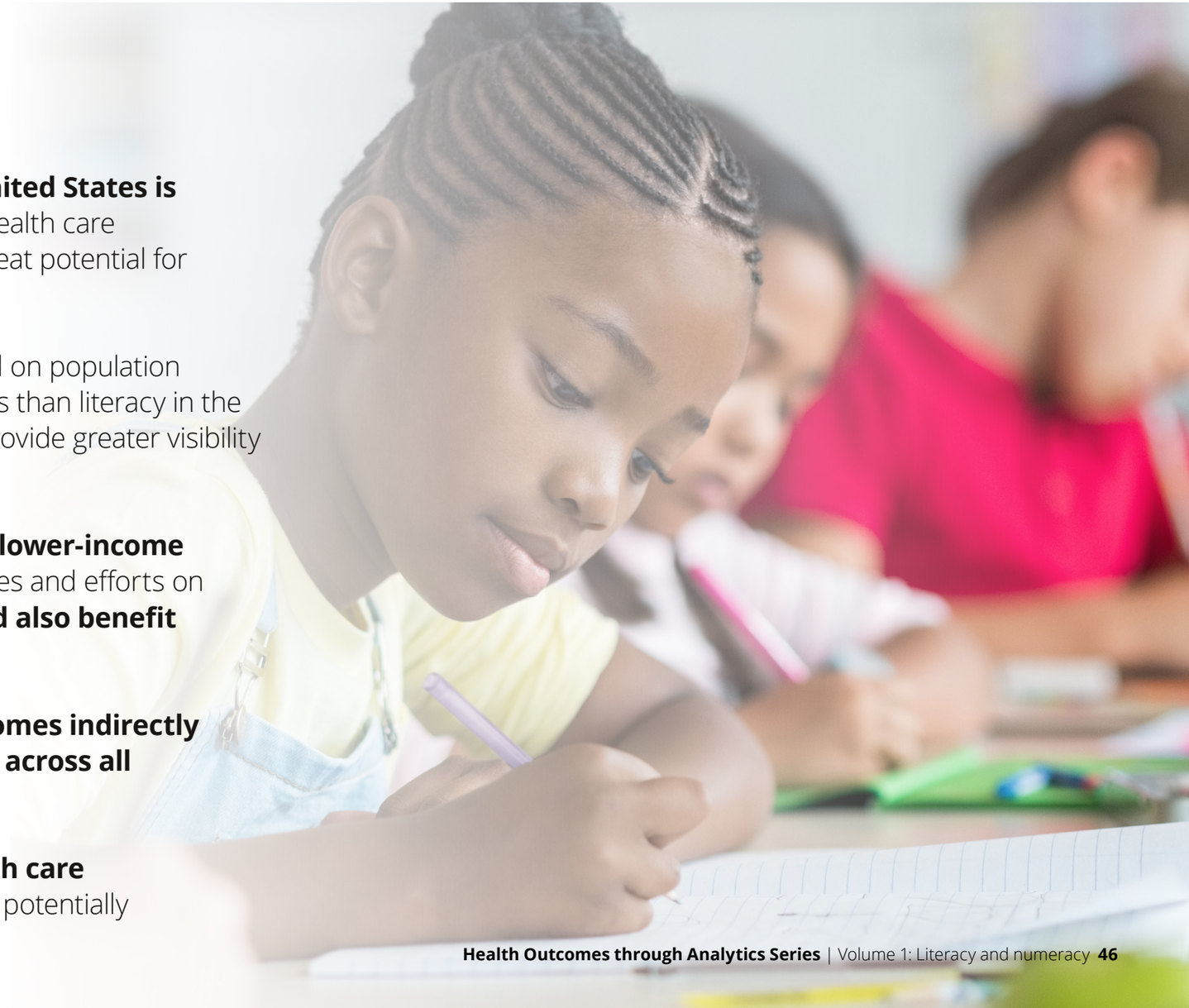
1. **The county-level average literacy and numeracy across the United States is overwhelmingly low to moderate**. In the context of the current health care environment, improving baseline literacy and numeracy may have great potential for improving long-term outcomes.

2. **Numeracy may be especially important and overlooked.** Based on population data, high numeracy is more difficult to acquire and is mentioned less than literacy in the literature. However, our initial findings suggest that numeracy may provide greater visibility into health behaviors and outcomes.

3. **The prevalence of numerically managed chronic conditions in lower-income counties may potentially be reduced** through prioritized resources and efforts on increasing baseline literacy and numeracy. **All income groups could also benefit from improvements.**

4. **Improving literacy and numeracy may also affect health outcomes indirectly** through influence on health behaviors like sleep and physical activity **across all income groups.**

5. **Improved baseline numeracy may influence appropriate health care utilization** to lessen some of the systemic and financial burden and potentially improve provider burnout.



Learnings in context

Literacy and numeracy are ***skills to acquire knowledge***, not specific content knowledge, and the main distinction from medium to high in either category is the ability to ***apply information.*** This switch in skill set may critically influence behaviors and outcomes.

There seems to be 1) a deluge of health information—much of it based on probabilities—and 2) more patient involvement in medical decision-making.

Additionally, individuals may collect health information from a variety of sources, from communities to social media. The population should be equipped with skills to ***identify and discern accurate and relevant information*** when they need it.

Ultimately, the system should be more ***efficient, accessible, and approachable*** for people to own their health journeys and improve health outcomes.

Chapter 1

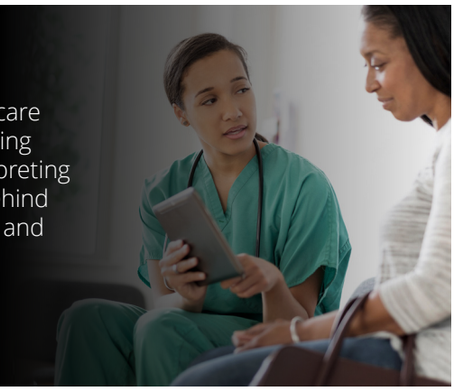
Literacy and numeracy are components of education that are established early in life. Developing collaborative and community-based programs to support everyone in achieving their full potential from the beginning provides the opportunity for greatest impact.

Chapter 2

While good habits might be generally known, daily stressors can influence habits. And higher earners do not seem to be immune, so employers and community partners should dedicate space and resources for the practice of good health habits.

Chapter 3

Numeracy may be a better correlate of health care utilization. Incorporating patient education during discharges or office visits that focuses on interpreting and applying the probabilities and numbers behind individuals' conditions may lead to more active and informed engagement.



Moving forward together

The main goals of our Health Outcomes through Analytics series are to deepen our knowledge on drivers of health, detangle and segment analyses, and share knowledge broadly in order to **inspire conversation and catalyze collaborations that ultimately address root causes.**

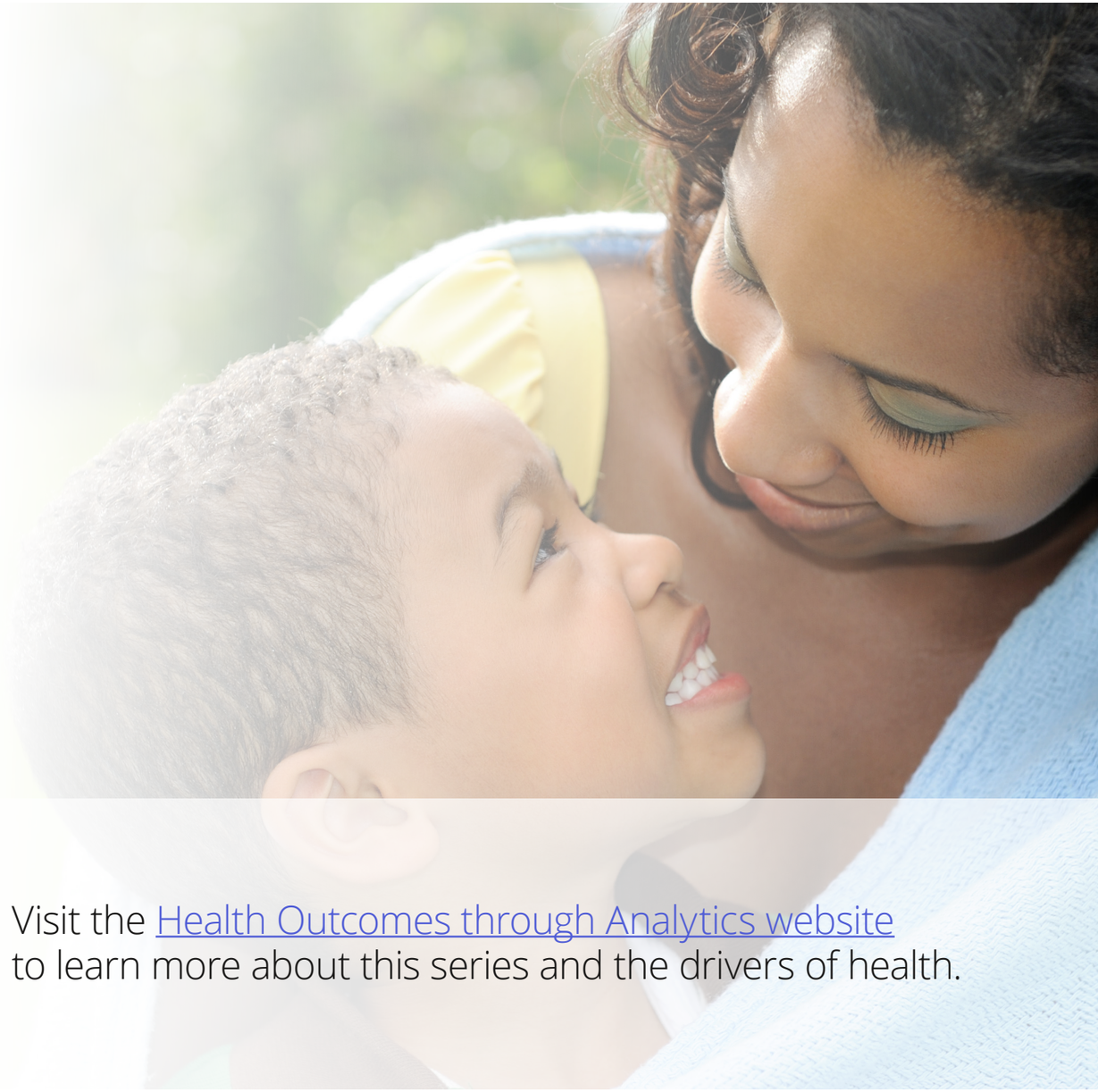
We also recognize that real-world **health care issues tend to be highly nuanced, complex, and multifactorial**. Thus, we need additional real-world research to keep building the evidence base, and this series is just the first step.

Furthermore, **each community is generally best positioned to develop and tailor programs and solutions relevant to their context.** Going as far upstream as possible should catalyze the greatest impact. However, an important mindset is starting somewhere, grounded in data, community engagement, and a commitment to identifying and taking action on approachable gaps within the complexity.

With some advanced planning, **evidence can be generated using existing sources**—any individual and organization can begin collecting information and measuring outcomes with openly available tools, resources, and collaborations.

Finally, the **criticality of measurement and evaluation cannot be overemphasized.** A better future relies on shared knowledge.

We look forward to engaging, sharing data and insights, and building solutions.



Visit the Health Outcomes through Analytics website to learn more about this series and the drivers of health.

Empowered with this knowledge, there is both a responsibility and an opportunity.

Continue the conversation with us.

Authors and outreach

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Data and methodology

LITERACY AND NUMERACY

Source: This analysis utilized the National Center for Education Statistics' (NCES) Program for the International Assessment of Adult Competencies (PIAAC) results. PIAAC provides county-level survey-based data on literacy and numeracy proficiency of adults in all US counties and the District of Columbia. Surveys were conducted on three occasions between 2011 and 2017.

Literacy: In the context of this analysis, literacy is used as a proxy measure for health literacy, a link also highlighted in previous literature on this topic. While the survey is not necessarily focused on health or health literacy, through this unique style of assessing for life skills, the PIAAC's definition of literacy (i.e., the basic cognitive and workplace skills for in-dividuals to participate and prosper) is quite similar to that of the US Department of Health and Human Services' definition of health literacy:

> *Health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others.*[15]

Numeracy: The numerical understanding of personal, absolute, and relative risk is important to being able to make medical decisions; therefore, numeracy is used as an independent variable from literacy. Results of studies are often presented as data, charts, and figures. Reading medical literature generally requires some application of numerical knowledge and the ability to interpret numbers and data. Thus, this analysis utilizes the results for the assessment of numeracy.

Variable definition: A county is defined as having low proficiency if the average PIAAC score is below 226 (out of 500), medium proficiency for scores of 226–275, and high proficiency above 275. These cutoffs correspond to the three levels used on the *PIAAC Skills Map*. Also, for additional context in interpreting the main results, please refer to the PIAAC website for a detailed breakdown of skills assessed.

INCOME

Household median income is sourced from the County Health Rankings, which, in turn, sources the data from the 2020 Small Area Income and Poverty Estimates. After sorting all US counties by this variable, we divided the counties into thirds. Upper third of national income is defined here as the top third of US counties with respect to income. Lower third of national income is the bottom third of US counties with respect to income. The mid third of national income is the middle third. Upper third of national income is defined as the top third of US counties with respect to median income.

Data and methodology

NUMERICALLY MANAGED CONDITIONS AND HEALTH RISK BEHAVIORS

Data on numerically managed conditions and health risk behaviors was sourced from *PLACES*, a collaboration between the Centers for Disease Control and Prevention (CDC), the Robert Wood Johnson Foundation, and the CDC Foundation. PLACES provides health data for small areas across the country. Data sources used to generate these model-based estimates include Behavioral Risk Factor Surveillance System (BRFSS) 2019 or 2018 data, Census Bureau 2019 or 2018 county population estimate data, and American Community Survey (ACS) 2015–2019 or 2014–2018 estimates.

High cholesterol, high blood pressure, diabetes, obesity, sleep, and physical activity are all presented as the proportion of the population aged 18 and older that self-report having the condition in the county.

HEALTH CARE UTILIZATION

Data on health care utilization (inpatient, outpatient, and ED) representing the year 2019 was sourced from the Health resources & services administration (HRSA) area health resources files (AHRF). The AHRF is a compilation of more than 50 data sets, and the utilization data comes from the AHA Annual Survey of Hospitals published in the *AHA Guide to the Health Care Field*.

Inpatient days, emergency department visits, and outpatient visits, are all presented per 1,000 population in the county.

The longitudinal Site of Service Visit Trends data (page 39) is sourced directly from the American Health Association 2019 Trends in the overall health care market report supplementary data.

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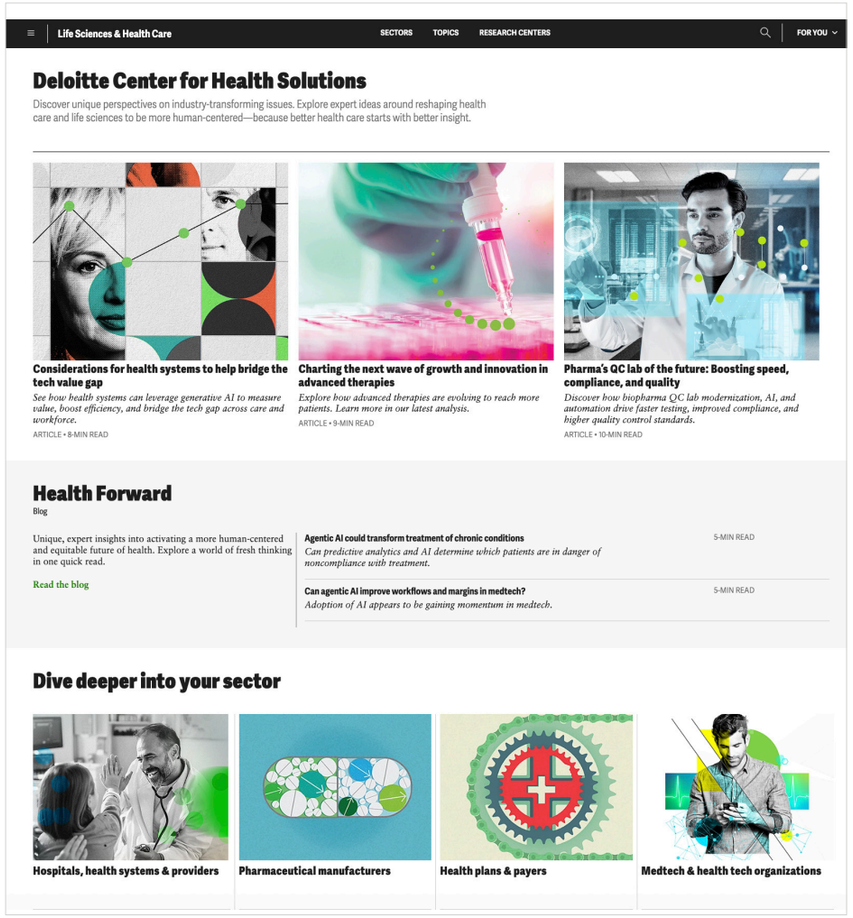

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Join the conversation

Looking to talk more about the drivers of health or how your organization can help further health access? We'd love to learn how we can help you work toward optimal health outcomes. Let's talk and make a meaningful difference.

Endnotes

1. US Department of Education, National Center for Education Statistics, Program for the International Assessment of Adult Competencies (PIAAC), US PIAAC 2017, US PIAAC 2012/2014.
2. Valerie F. Reyna et al., "How numeracy influences risk comprehension and medical decision making," *Psychological Bulletin* 135, no. 6 (2009): pp. 943–73; Chenxi Liu et al., "What is the meaning of health literacy? A systematic review and qualitative synthesis," *Family Medicine and Community Health 8*, no. 2 (2020): p. e000351; Alice M. Noblin, Thomas T. H. Wan, and Myron Fottler, "The impact of health literacy on a patient's decision to adopt a personal health record," *Perspectives in Health Information Management 9* (2012): pp. 1–13; Danielle M. Muscat et al., "Health literacy and shared decision-making: Exploring the relationship to enable meaningful patient engagement in healthcare," *Journal of General Internal Medicine* 36, no. 2 (2021): pp. 521–24; Sasha A. Fleary and Patrece Joseph, "Adolescents' health literacy and decision-making: Qualitative study," *American Journal of Health Behavior* 44, no. 4 (2020): pp. 392–408.
3. US Department of Health and Human Services Office of Disease Prevention and Health Promotion, "Health literacy in healthy people 2030," accessed September 2025. https://odphp.health.gov/healthypeople/priority-areas/health-literacy-healthy-people-2030
4. Reyna et al., "How numeracy influences risk comprehension and medical decision making"; Russell L. Rothman et al., "Perspective: The role of numeracy in health care," *Journal of Health Communication* 13, no. 6 (2008): pp. 583–95; Lisanne Heilmann, "Health and numeracy: The role of numeracy skills in health satisfaction and health-related behaviour," *ZDM* 52, no. 3 (2020): pp. 407–18.
5. Osamu Itani et al., "Short sleep duration and health outcomes: A systematic review, meta-analysis, and meta-regression," *Sleep Medicine* 32 (2017): pp. 246–56; Faith S. Luyster et al., "Sleep: A health imperative," *Sleep* 35, no. 6 (2012): pp. 727–34; Pawel Posadzki et al., "Exercise/physical activity and health outcomes: An overview of Cochrane systematic reviews," *BMC Public Health* 20, no. 1 (2020): p. 1724; William L. Haskell, Steven N. Blair, and James O. Hill, "Physical activity: Health outcomes and importance for public health policy," *Preventive Medicine* 49, no. 4 (2009): pp. 280–82.
6. Megan Leonhardt, "More than half of Americans raking in $100,000 or more are living paycheck to paycheck," *Fortune*, January 30, 2023.
7. American Psychological Association (APA), "Stress in America 2022: Concerned for the future, beset by inflation," press release, October 2022.
8. Tracy Brower, "Working parents are in crisis: New data and the 5 best responses," *Forbes*, June 5, 2022.
9. APA, "Stress in America 2022: Concerned for the future, beset by inflation."
10. US Department of Health and Human Services (HHS), Health Resources and Services Administration (HRSA), Bureau of Health Workforce (BHW) National Center for Health Workforce Analysis (NCHWA), User documentation for the County Area Health Resources File (AHRF) 2021–2022 release, accessed April 14, 2023.
11. Yi Zhang, Zhongliang Zhou, and Yafei Si, "When more is less: What explains the overuse of health care services in China?," *Social Science & Medicine* 232(C) (2019): pp. 17–24; Jessica Vandenbosch et al., "Health literacy and the use of healthcare services in Belgium," *Journal of Epidemiology and Community Health* 70, no. 10 (2016): pp. 1032–38; Sabine Ackermann Rau, Sibel Sakarya, and Thomas Abel, "When to see a doctor for common health problems: Distribution patterns of functional health literacy across migrant populations in Switzerland," *International Journal of Public Health* 59, no. 6 (2014): pp. 967–74.
12. Madeline C. Rutan et al., "The relationship between health literacy and nonrecommended cancer screening," *American Journal of Preventive Medicine* 60, no. 2 (2021): pp. e69–e72.
13. Anne B. Martin et al., "National health care spending in 2021: Decline in federal spending outweighs greater use of health care," *Health Affairs* 42, no. 1 (2022).
14. Ibid; Tait D. Shanafelt et al., "Changes in burnout and satisfaction with work-life integration in physicians and the general US working population between 2011 and 2017," *Mayo Clinic Proceedings* 94, no. 9 (2019): pp. 1681–94; American Association of Colleges of Nursing, "Fact sheet: Nursing shortage," last updated October 2022.
15. Darren A. Dewalt et al., "Literacy and health outcomes: A systematic review of the literature," Journal of *General Internal Medicine* 19, no. 12 (2004): pp. 1228–39.

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Together makes progress

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