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The gTC Healthcare Inequality Index

Quantifying the Disparity of Accessibility



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Introduction

Current Healthcare Access

Expanding Role of Government

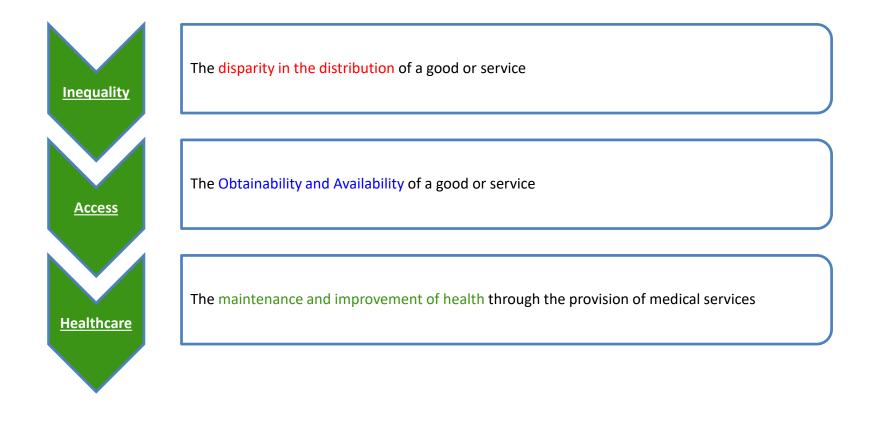
Drivers of Healthcare Inequality

The gTC Healthcare Inequality Index

Conclusion

Annotations

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Patients, Providers, Payers, and the Government interact to form the Healthcare market

- Patients drive the demand of Healthcare and Providers drive the supply
- Payers serve as a facilitator by managing risk and connecting Patients and Providers
- The Government regulates the interactions between Patients, Providers and Payers

Government regulation has expanded into payments

- Medicare and Medicaid have transformed the Government into a Payer
- Regulations such as the ACA, HIPAA, Stark Law, and HITECH have changed the way in which Patients, Providers, and Payers interact, increasing the cost and risk of care and creating barriers to efficient resource allocation
- The increase in regulations has prevented the market from operating efficiently
- The inability for the market to operate efficiently has led to Inequality in the access to Healthcare

The Inequality in access to medical resources can be quantified

- Inequality can be measured by examining the demand (Obtainability) and supply (Availability) of Healthcare
- Patient, Provider, and Payer characteristics can be used to quantify the Obtainability and Availability of Healthcare
- A standardized measurement tool can be created by comparing Obtainability and Availability

The gTC Healthcare Inequality Index ("HII") is a standardized tool that measures Healthcare Inequality

- Healthcare Inequality is driven largely by differences in Availability
- · Population size is a relatively strong predictor of Availability
- The Spread between Obtainability and Availability represents the inefficient allocation of medical resources for a region
- The HII shows that there is an inefficient allocation of medical resources in the United States

The disconnect between stakeholders has manifested itself in the form of Inequality in Healthcare Access. The disparity can be attributed to Government regulations that have catalyzed market inefficiencies.

Questions

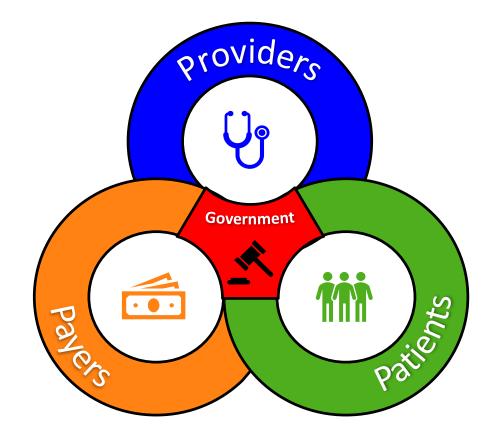
- How do each of the stakeholders in the Health Care system interact and where are the inefficiencies in the interactions?
- Does Healthcare Inequality exist amongst the United States population, and if so, how can it be quantified?
- What are the major drivers of Healthcare Inequality and what factors best predict its existence?

Hypotheses

- Healthcare Inequality exists within the United States and is caused by inefficiencies amongst the stakeholders of the system
- Healthcare Inequality can be quantified by looking at the primary drivers of Inequality within each stakeholder
- Healthcare Inequality is driven by geographic location and population size of an area
- Healthcare Inequality can be predicted by the economic freedom of a location

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Who does it refer to?

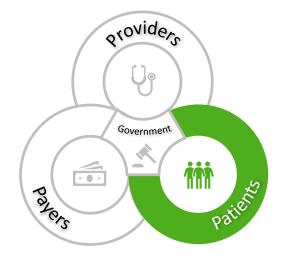
- Individuals and Families
- Employer Groups

What is their role?

Patients serve as the underlying driver for the demand of Healthcare Access as they look to the market to provide goods and services to meet medical needs. Due to the high costs of providing Healthcare services, Patients rely on the Government and Payers to help make Healthcare affordable.

Specific actions:

- Patients visit Providers (physicians and facilities) to receive health care services, incurring costs that must be reimbursed
- Patients provide Payers with monthly premiums in exchange for insurance coverage that helps reimburse costs of treatment
- Patients provide co-payments and other out-of-pocket costs to Providers accompanying the reimbursements made by Payers
- Patients pay taxes to the Government to fund Payer programs and to levy and enforce regulation



Who does it refer to?

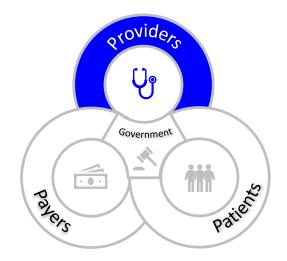
- Physicians
- Healthcare Facilities
- Pharmacies

What is their role?

Providers represent the supply side of health care access. As goods and services become needed, Providers deploy their services in the marketplace in exchange for compensation.

Specific Actions:

- Providers deliver goods and services to Patients who seek medical attention
- Providers send claims to Payers for services rendered, receiving payment for all accepted claims
- Providers receive partial payment from Patients in the form of deductibles and co-payments
- Public Providers also receive subsidy funding from the Government on the caveat of regulatory compliance



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In-Patient vs Out-Patient Care³

In-patient Care generally refers to any medical service that requires admission into a hospital. Service is generalized towards more serious ailments and trauma that require overnight stays.

Out-patient Care is medical service that does not require a prolonged stay at a facility. Example services include check-ups, surgeries, and other same day procedures. Out-patient care tends to be less expensive since it requires less time to administer any sort of service.

It is important to understand the difference between the two types of care as medical billing is processed at different rates depending on the type.

Primary vs Specialty Physicians

Primary Care physicians are doctors grounded in a broad field of medicine. They typically act as a first contact and principal point of continuing care for Patients.⁴ Types include:

- Family Practice, Pediatrician, Internal Medicine
- In some states, Nurse Practitioners and Pharmacists can also provide similar services

Specialty Care physicians are doctors who have received additional education and have been board certified for that specialty - offering more intensive consultation.⁵

Neurologists, Cardiologists, Gynecologists, etc.

Home vs Long Term Care

Home Care is the option for Patients to receive service directly at their residence. This is popular for the elderly and those with disabilities.⁶

Long-Term Care serves those with chronic illnesses and disease. It is often provided in separate facilities such as nursing homes and assisted living centers. It is typically targeted at the elderly.⁷

Pharmacies & Prescriptions

Pharmacies are preparers and sellers of drugs. Drugs are prescribed by physicians and are a tool used in medical treatment. Drugs are produced by biotechnology companies and are approved by the Food and Drug Administration for sale to the public.

Prescriptions are drugs that require a doctor's order for a Patient to use. The substances in drugs are often highly addictive or dangerous if used improperly and thus, are controlled and tracked. Prescriptions are often paid for through a combination of the Patient and Payer.

Physician Practices vs Hospitals⁸

Physician Practices are where multiple physicians provide outpatient services to Patients at the same location. They often consist of both primary care and specialty care physicians and operate independently or as part of a network. They are usually privately funded.

Hospitals are institutions that provide treatment through inpatient services. They often provide emergency care and intensive care and can be funded through both private and public sources and are required to provide emergency medical services regardless of a Patients ability to pay.

Private Facilities vs Health Networks⁸

Private Facilities are physician practices and hospitals that are independently operated. They are often privately funded and for-profit, although many community hospitals are not-for-profit. They are common in rural areas and are not affiliated with larger health networks.

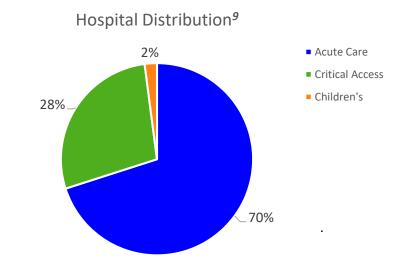
Health Networks are a collection of affiliated physician practices and hospitals. They can be as small as two facilities or as large as 200. They provide large access to specialists and are a systematic way to receive treatment not available at individual facilities. They are more common in urban and suburban areas, although many rural hospitals are part of networks.

Hospital Classifications¹⁰

Acute Care Hospitals are hospitals that usually provide inpatient medical care and related services for surgery, trauma, injuries and other short-term illnesses or conditions and stabilizing care.

Critical Access Hospitals refer to facilities that provide inpatient services in areas that are underserved, often in rural areas that do not have the necessary number of facilities.

Children's Hospitals are specialty hospitals where a majority of Patients are children.



For-Profit Hospitals¹²

- Definition: Hospitals that are registered as traditional profit-making businesses. There are currently 1,034 registered for-profit hospitals in the US¹¹
- Regulatory Differences:
 - They are required to pay applicable income and property taxes as would any other business
 - Have the right to raise capital through their investors and distribute profits
 - Only required to provide stabilizing care to Patients; have the right to refuse addition service

• Services & Trends:

- Usually offer state-of-the-art technologies and services as they have access to outside capital
- Often charge more for the same procedure than not-for-profits
- Typically located in lower-income areas, especially the South
- Recent trend of for-profits purchasing distressed non-profits and converting them to for-profits

Not-For-Profit Hospitals¹²

• **Definition:** Hospitals that are registered as charitable organizations by the IRS. There are currently 2,845 registered not-for-profit hospitals in the US¹¹

• Regulatory Differences:

- These hospitals are exempt from paying all federal, state, and local taxes on income and property
- In return, they must provide "community benefit" and report on their community involvement
- Community benefit is typically measured through the amount of uncompensated services provided

• Services & Trends:

- Typically focused on essential care that may not necessarily be profitable, such as trauma and burn wards
- Tend to be located in higher-income areas that have more insurance coverage
- Are more likely to provide less-profitable solutions such as drug rehab and psychiatric care
- Are required to perform and publish a community need assessment each year

*Government-run hospitals are not considered not-for-profit or for-profit hospitals

Who does it refer to?

- Insurance Companies
- Healthcare Entitlements

What is their role?

Payers serve as an intermediary between Providers and Patients. Due to the high costs and sporadic nature of Healthcare, Patients look to Payers who offer insurance plans to mitigate risks. Payers use their operational scale to negotiate contracts with Providers to help lower the costs for Patients while providing access to a large Patient base.

Specific Actions:

- Payers receive monthly premiums from individuals in exchange for insurance coverage
- Payers pay Providers for treatments rendered to their clients, less deductibles and co-pays
- Payers negotiate with Providers to set reimbursement rates for medical procedures and drugs
- Payers comply with the Government to set their policies and provide plans to those who cannot afford it



Health Maintenance Organization (HMO)¹³

- Enrollee choses a Primary Care Physician ("PCP") who is responsible for referrals to specialists for it to be covered
- A Provider must be within the designated network for care to be covered; emergency treatments are covered regardless



• HMOs tend to have lower premiums, and minimal copayments deductibles due to limited network of coverage

Preferred Provider Organization (PPO)¹³

- Allows for freedom to see a specialist without a referral from a PCP
- In-network Providers require less out of pocket expense, but out-of-network coverage is still provided
- PPOs have higher premiums and out-ofpocket expenses versus HMOs in exchange for the additional flexibility



Exclusive Provider Organization (EPO)¹³

- Covers any specialist within the network and does not require PCP referral to see one
- Do not cover out-of-network Providers unless it is for emergency care
- Premium and out-of-pocket costs tend to be between PPOs and HMOs

Point-Of-Service Plan (POS)¹³

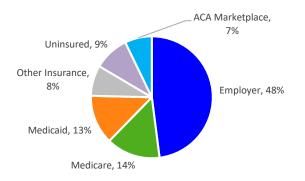
- Sometimes requires enrollee to chose a PCP who must refer individuals to specialists
- Out-network-costs are covered at a higher cost than innetwork
- Services are typically not subject to deductibles and a wide range of benefits are included
- Offers a middle of the road coverage that balances flexibility with costs

Employer Group Plans¹⁴

- Group Plans are insurance policies purchased by employers and are offered to employees as a benefit
- A majority of insured Americans receive their benefits through this method
- Employers typically cover half to the whole premium in these types of plans
- Businesses with less than 50 employees are not required to provide health insurance. Businesses with 50+ employees and have no employees that receive federal subsidies on their coverage are also not required to provide insurance. The rest are required to provide some benefits
- Large businesses must offer health insurance to all full time employees otherwise they are subject to fines

High Deductible Health Plan (HDHP)¹⁶

- HDHP are plans that have relatively low monthly premiums and high deductibles. To purchase a HDHP through a health exchange, an individual must be under the age of 30 or have a hardship waiver
- These plans target low-risk demographics It is common amongst males in their twenties
- The IRS sets the minimum deductible and maximum out-ofpocket expense a HDHP can have
- HDHP Enrollees are allowed to use Health Savings Accounts (HSAs), tax exempt medical saving accounts that can be used to fund uncovered medical expenses. The Government sets a limit on annual contributions to HSAs
- HDHPs are criticized because they incentive individuals to not receive care unless absolutely necessary



Insurance Coverage as of 2016¹⁵

Reimbursement models misalign incentives and disconnect stakeholders from the actual costs of providing care

Fee for Service¹⁷

- Payer reimburses the Provider once an insurance claim is submitted
- Payers often negotiate fixed discount percentages on the claims encouraging Providers to inflate bills to cover costs
- Payers often negotiate fixed reimbursement amounts by procedure, as is the case with Medicare and Medicaid
- Creates a misalignment of incentives as Patients do not cover the costs beyond deductibles and thus Providers can bill excess services and receive higher reimbursements

Capitation¹⁷

- Payers negotiate with Providers (especially health networks) a fixed fee per individual to provide all health services
- As a majority of people in health plans use limited amounts of services, high utilizers are balanced out by low utilizers
- Can incentivize Providers to deliver limited services as payment is not on a utilization basis

Value-Based Reimbursement^{18,19}

- Ties reimbursements of treatment to the factors aimed at measuring the quality of care provided
- Looks at the Providers rates of Hospital-Acquired-Conditions, readmittance, and complications rate to adjust reimbursement rates for services provided
- Medicare and Medicaid have began implementing this to encourage higher qualities of care
- Can incentivize Providers to not report quality metrics as there are financial consequences tied directly to their prevalence

Concierge Care¹⁷

- Provider charges a monthly or annual fee in exchange for direct access and personalized care
- Amenities often include 24-hour physician Availability, expedited appoints, personalized visits, and access to phone consultations
- Fee structure typically is on a periodic retainer fee with supplemental fees for amenities not included in the plan

The Government role in Healthcare is expanding beyond simply serving as a glendonTodd regulator¹



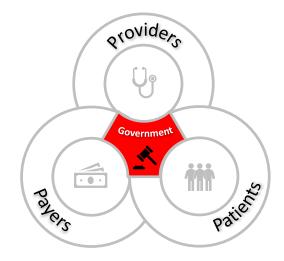
- Federal Government & agencies
- State Governments

What is their role?

The Government serves as the intermediary between Patients, Providers, and Payers. It is responsible for overseeing the system and serves as the facilitator between the three stakeholders. The Governments role has now expanded to include serving as a Provider and Payer through entitlement programs for retirees, low-income individuals, and veterans.

Specific Actions:

- The Government sets and enforces regulations that Providers and Payers must follow
- The Government provides health care to low-income Patients and veterans through its medical facilities
- The Government is the Payer for individuals through its entitlement programs



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What is Medicare?

Medicare is a single-payer, federal insurance program that is offered by the United States Government. It provides health insurance for Americans aged 65 and older and for younger individuals who suffer from certain disabilities. US Medicare is funded by payroll tax, premiums, and surtaxes from beneficiaries.

What were the driving forces behind its creation?

Medicare originated in 1965 when Congress enacted Title XVIII of the Social Security Act to promote the coverage of individuals older than 65. At the time, only 60% of that demographic had health insurance; the elderly paid more than three times the amount for health insurance. This disparity is what ultimately led to the formation of the Medicare system.

The history of Medicare is extensive:

1966 – Medicare spurred the racial integration of thousands of hospital floors and medical practices by making payments to Providers conditional on desegregation

- **1972** Expanded to include benefits for speech, physical, and chiropractic therapy
- 1982 Expanded to include hospice care (on a temporary basis)
- 1984 Hospice care was permanently passed into legislation
- 1997 President Bill Clinton formalized the option of payments to Health Maintenance Organizations (HMOs) Part C
- **2001** Congress extended coverage to younger individuals with amyotrophic lateral sclerosis (ALS)
- 2003 Expanded to include prescription drug coverage under President George W. Bush Part D

Impact & Criticism

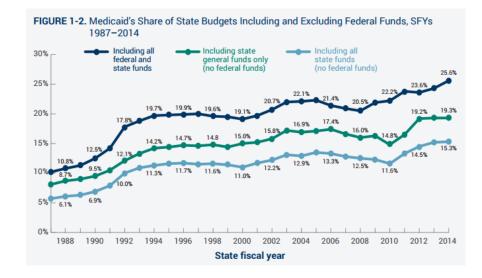
- At the time of its implementation, Medicare offered elderly individuals a lifeline to access affordable Healthcare. Without it they would be stuck digging into life savings, or relying on their children for basic medical necessities which can be costly for the aging population
- Most critics of Medicare are skeptical on the longevity on the program. The rapid increase of the aging population is draining the current system. The average life expectancy in 1965 was 73.8 years. Over the past 50 years, the average life expectancy has risen to 81.56 years forcing the US Government to subsidize an additional 7.76 years of medical expenses for every enrollee

What is Medicaid?

Medicaid is a social health care program offered to families and individuals with limited resources who cannot afford to purchase health care coverage. It currently provides free health insurance to 74 million individuals across the country. It is jointly funded by state and federal Governments - management of the program is done at the state level, where each state determines its own eligibility requirements. Although states are not required to participate in the program, every state has elected to participate since it was established in 1982.

Impact & Criticism

- Medicaid enabled certain demographics that could not previously afford coverage to have access to health care
- Medicaid has led Providers to lower the quality of care they administered²³
- Critics of Medicaid say that the program disincentives it's recipients to pursue upward mobility in society



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The Affordable Care Act increased the Government's involvement in the Healthcare market

What is the ACA?24

Nicknamed Obamacare, the ACA was a legislation passed in March of 2010 aimed at improving the quality and expanding the access to Healthcare while simultaneously lowering the cost to receive coverage. The results have been mixed and controversial, with proponents arguing that it increased the number of individuals insured by 20+ million while opponents argue that costs and taxes associated with its implementation outweigh the benefits.

Major policy changes under the ACA:²⁴

- Pre-existing conditions insurance Providers are not allowed to deny coverage or charge a higher rate for individuals with preexisting conditions
- Exchanges marketplaces were established in all 50 states where individuals and small businesses can purchase private insurance plans, typically
- Federal Subsidies households with incomes between 100% and 400% of the poverty line can receive subsidies for insurance plans through a health-insurance exchange
- Individual Mandate individuals who do not purchase an insurance plan or receive one from their employers are now subject to a penalty
- Medicaid Expansion²² an expansion to the eligibility of Medicaid. Following the Supreme Court ruling in NFIB vs. Sebelius, states could not be forced to expand the eligibility and thus not all states have adopted this

Impact & Criticism:²⁶

- Increase in Insurance Access the number of insured individuals has increased by 20+ million since 2010
- Cost Distribution although the costs of Healthcare have dropped for certain groups and risks pools, many low-risk individuals have seen their insurance premiums increase as a result
- Cost Shift although the raw number of individuals with insurance has increased, many of those individuals are unable to use their insurance plans as the deductibles and co-pays may have increased



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Creation & Goal²⁵

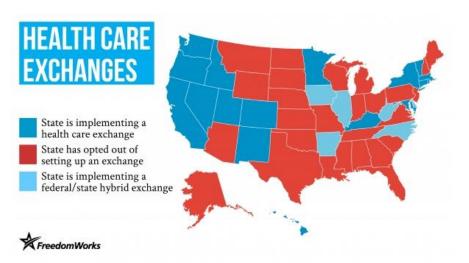
- The Affordable Care Act called for the creation of health care exchanges, online marketplaces where individuals could enroll in compliant plans offered by third parties to help lower the uninsured population
- The exchanges begin enrolling in late 2013 with the plans taking effect in January of 2014
- The plans comply with the individual health mandate, and thus, were marketed as a way to purchase insurance to avoid penalties

Structure²⁵

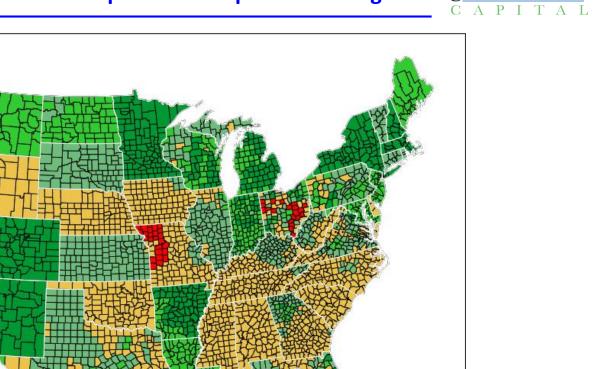
- The exchanges are setup as either fully state-operated, federally-operated, or a hybrid between the two
- The exchanges compile insurance plans from a variety of Providers and sell them to the public, like an Expedia for Healthcare
- The plans are segmented into bronze, silver, gold, platinum, and catastrophic, with plans varying in deductible and premium amounts
- The exchange plans allow individuals who earn 400% percent of the poverty line or lower to receive subsidies in the form of tax credits to increase affordability

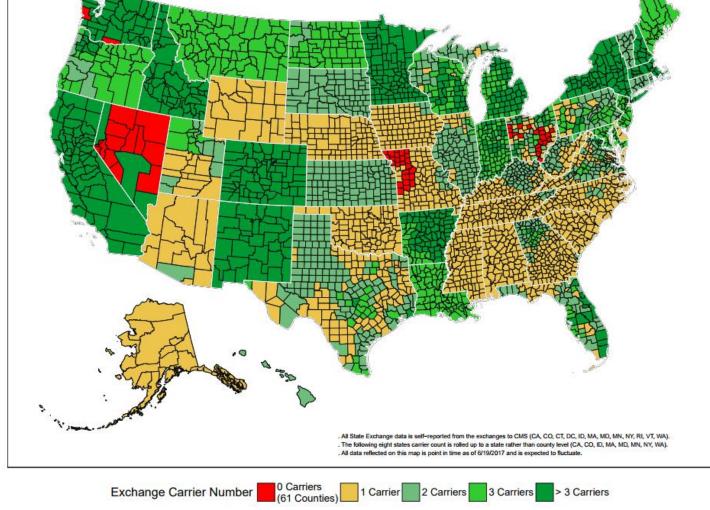
Impact & Criticism²⁷

- Over 12 million people have signed up for health insurance through the exchanges, with 9.6 million from the federal platform and 3.1 million from state exchanges
- Since its implementation, insurance premiums have increased by 74%, largely attributed to the flaws in the design of the exchange and the difficulty for insurers to remain profitable while offering the plans
- Payers have been pulling out of the exchanges, leaving many individuals with little to no option of purchasing a subsidized plan



Very few Payers have been able to remain profitable in public exchanges²⁸





Source: Medicare.gov

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What is the HIPAA?

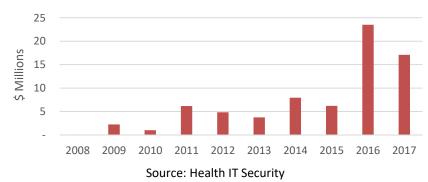
The Health Insurance Portability and Accountability Act of 1996 is legislation that requires data privacy and security provisions for safeguarding medical information. Specifically, this regulation requires covered entities (a health care Provider, health plan Provider, or Healthcare clearing house) and their business associates to maintain reasonable and appropriate administrative, technical, and physical safeguards for protecting electronic Patient health information (ePHI).

Requirements to be HIPAA compliant:

- 1. Ensuring confidentiality; ePHI must not be disclosed or available to unauthorized persons
- 2. Identifying & protecting against reasonably anticipated threats to the security & integrity of ePHI
- 3. Protecting against reasonably anticipated impermissible uses or disclosures of ePHI
- 4. Ensuring confidentiality and HIPAA compliance by the workforce

Impact:

- Increased Accountability Various electronic technologies have now been implemented to control the access to personal health information and audit trails have been established to ensure compliance
- Compliance Fines Covered entities that are not compliant with HIPAA are subject to fines as high as \$250,000 and prison terms of 10 years; HIPAA fines have been significant and have been increasing, with a 2016 aggregate total of \$23,504,800



HIPAA Fines by Year

HITECH incentivized Providers to adopt unachievable goals, increasing Healthcare Costs

The Health Information Technology for Economic and Clinical Health ACT ("HITECH"), passed in 2009 as part of the American Recovery and Reinvestment Act. It was designed to expand HIPAA and to stimulate the adoption of electronic health records ("EHRs"). It attempted to promote change by creating financial incentives for Healthcare Providers to demonstrate meaningful use of EHRs before the law took full regulatory effect.

Major Policy Changes Under the HITECH Act:³¹

- Meaningful Use Promotes the adoption and use of EHRs through use targets and goals. Adopters of the provisions would be given incentive payments through Medicaid
- Breach Notification Covered entities and business associates must notify individuals if their protected health information is breached within 60 days. The Department of Health and Humane Services and local news media must also be notified if the breach exceeds 500 people
- Penalties A four-tier fine system determines the amount of civil penalties that can be levied if an institute is not compliant. The penalties can now also be levied on the individuals in the organization as opposed to just on the entity. A cap of \$1.5 million in civil penalties is placed for each violation
- Transparency Individuals can now request to receive an electronic copy of their health records at the cost of labor for producing it. They also have the right to request information on the treatment provided and the costs of the treatment

Impact & Criticism:^{32,33}

- Increase in Spending Over \$20 Billion in federal dollars have been spent on incentivizing EHR adoption
- EHR Adoption 80% of office-based physicians and 90% of hospitals use EHRs today, although the meaningful use of them remains unclear
- Physician Frustration As many as 60% of physicians claim they would not invest in EHRs if given the choice today due to the high costs and the various functionality issue that arise

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C A P I T A I

The Stark Law has discouraged physicians from owning equity in their facilities

What is the Stark Law?

The Stark Law, passed in parts between 1990 and 1993 is a federal statue that regulates the ethical requirements of Provider referral of Patients. It was designed to prevent Providers from abusing reimbursements from Payers by using kickbacks and to eliminate the financial incentive for Patients to provide unnecessary testing. As a result, physicians are less likely to own medical facilities as they cannot refer Patients.

Major Provisions of the Stark Law:

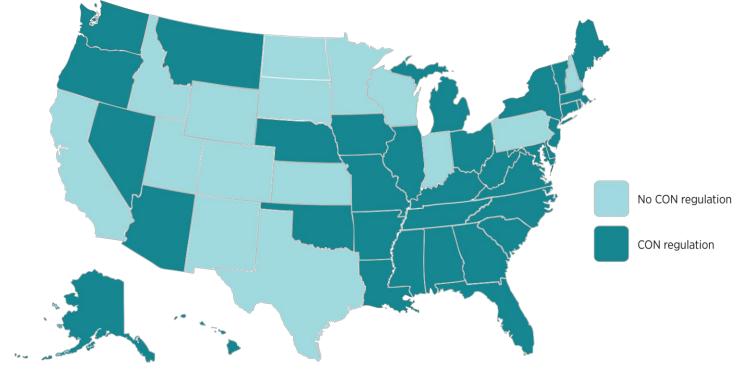
- 1. Prohibits Providers from referring Medicare and Medicaid Patients to facilities in which the physician may have a financial interest or relationship in
- 2. Prevents the Provider entity from presenting claims to Medicare or Medicaid for those referred services
- 3. Establishes specific exceptions to the rules and enables the Secretary of Health and Humane services to grant specific regulatory for financial relationships that do not pose a risk to Patients or Payers
- 4. Places a minimum civil penalty of \$5,500 for each improper claim submitted if prosecuted

Notable Exemptions:

- Does not apply to referrals to in-office ancillary services, rental of office space and equipment, or bona fide employment relationships
- Referrals to publicly traded entities in which the physician owns securities in are exempt

Certificate of Need laws prevent Providers from meeting the needs of Patients, constraining the supply of Healthcare^{34,35}

- Certificate of Need ("CON") is a law stating that the Government must approve any proposed creation of medical facilities. Implemented at the state level in the mid 1900s, the goal of the program was to ensure that facilities providing charitable care would still receive paying Patients to remain operational
- Following the implementations of Medicare and Medicaid, Providers began receiving reimbursements for servicing the poor, negating much of the need for the law
- Today, CON has become a means for larger hospitals to maintain monopolies over areas, as new facilities must be approved before creation
- CON has been repealed in 15 states as of 2017. CON has been shown to cause a shortage in supply of hospital beds and medical equipment



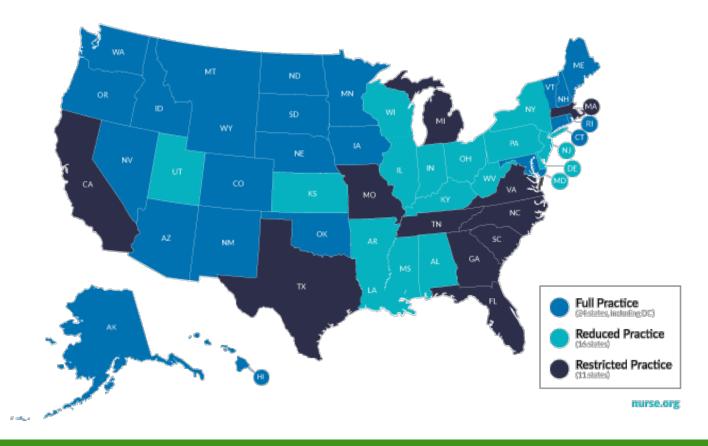
Source: Mercatus

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Medical Licensing Laws limit the supply of Providers³⁶

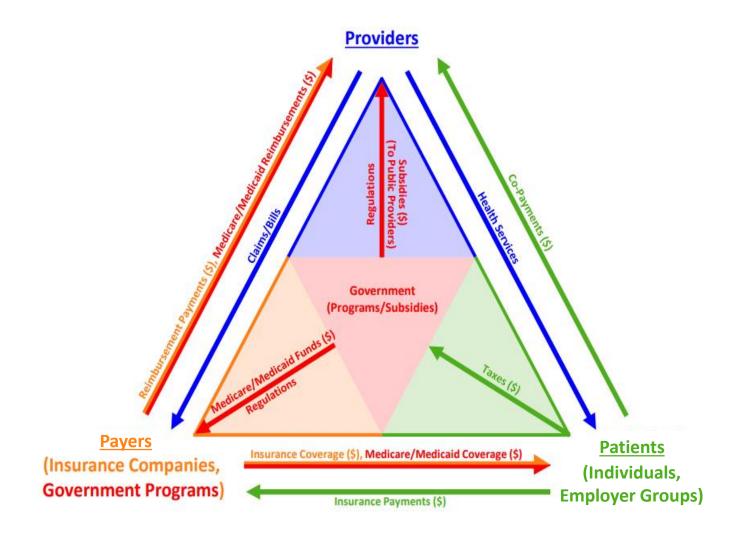
- To gain a license to practice, medical service Providers must attain certain levels of education, pass licensing examinations, and pay fees to governing boards
- States usually have their own licensing requirements, and as a result, medical service Providers are often unable to practice across state lines without going through an extensive licensing process. This **limits the supply of physicians** in areas and serves as a protection of market share as opposed to a true guarantee in quality of care
- Scope of Practice Laws determine whether nurse practitioners and physician assistants can see Patients and prescribe medications without physician supervision. As Medicare reimbursement rates are usually higher for physicians, this can drive the cost of Healthcare in states³⁷



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Source: 2015 gTC Macro Report

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Demographics:

Income: Patients must have the ability to obtain health care by providing payment in exchange for services. Income represents the amount of purchasing power an individual has, and thus captures a Patients ability to utilize medical services when necessary.

Specific Measures:

• Income per capita

Education: Patients must know when and how to use medical services. Due to the complexity of the system, education plays a vital role in the Obtainability of care. Education disparity will capture an individuals ability to navigate the system.

Specific Measures:

• Highest level of education attained

Population: The necessity of Healthcare is dependent on characteristics of the population. Certain factors such as age and gender correlate to higher needs for care and thus more demand. As a result, the population breakdown can contribute to Healthcare Inequality.

Specific Measures:

- Age breakdown of population
- Gender breakdown of population

Physicians:

Physicians are the Provider of medical services to Patients. Patients must have access to a Provider to receive medical services. Physicians are distributed amongst the population, and if the ratio of physicians to population varies from one location to another, Healthcare Inequality will exist.

Specific Measures:

- Primary care physicians to population ratio
- Specialty care physicians to population ratio

Facilities:

For a physician to operate on a Patient, they must have access to specific tools and resources. As a result, medical facilities exist where Patients have access to practicing physicians. If the facilities are not distributed amongst the population equally, Healthcare Inequality will exist as Patients will not be able to receive an equal level Healthcare.

Specific Measures:

- Hospitals to population ratio
- Hospital beds per person

Cost:

Payers manage the Spread of risk amongst a group of Patients. They quantify this risk by charging a specific premium to users of their service. The differences in the premium for an area represent relatively higher or lower risks. The risk of an area can be a source of Inequality as it affects the demand for Healthcare.

Specific Measures:

• Average Annual Premium

Geography:

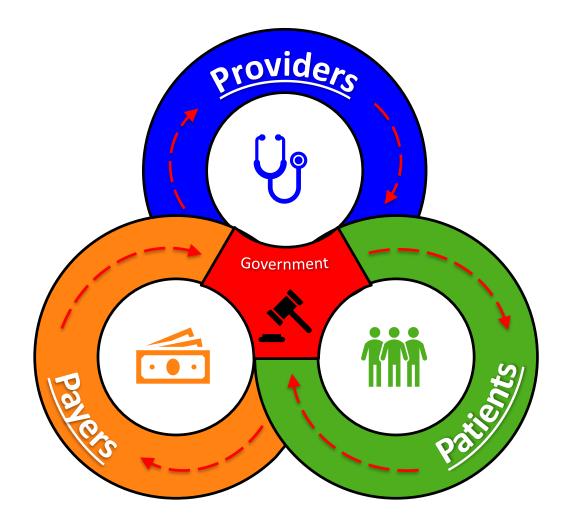
Geography represents the service areas for specific Payers. As Payer regulations vary by location and Payer access is often based on medical service networks, the size and location of the Payer and Patient can serve as another contributor to Healthcare Inequality.

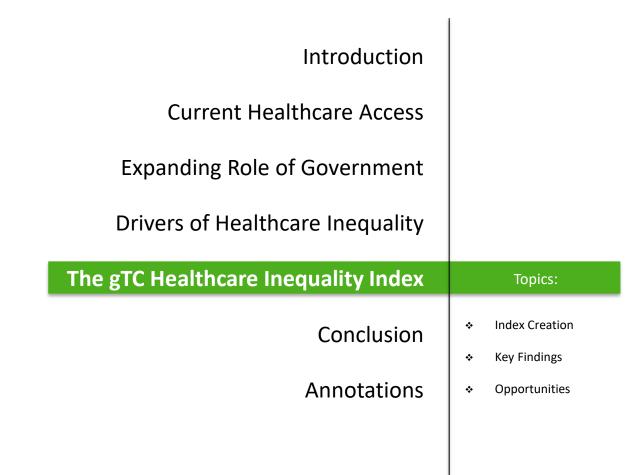
Specific Measures:

• Geographic Size

A standardized measurement of Healthcare Inequality can be created by comparing market drivers







The gTC Healthcare Inequality Index measures the disparity in access of Healthcare

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Inequality in Access of Healthcare

The disparity of distribution in the Obtainability and Availability of medical resources needed for the maintenance and improvement of health

The HII quantifies the Inequality in Access to Healthcare in the USA

Obtainability and Availability combined serve as a proxy for access

Obtainability

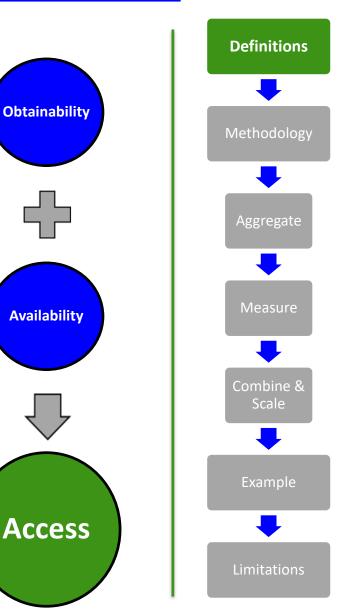
Obtainability represents the inherent capability of an individual to receive Healthcare. With respect to The gTC Healthcare Inequality Index, Obtainability was measured by a series of relative factors and scaled to reflect the <u>Demand</u> within the Healthcare marketplace.

Availability

Availability represents the geographical distribution of Healthcare. With respect to The gTC Healthcare Inequality Index, Availability was measured by a series of relative factors and scaled to reflect the <u>Supply</u> of the Healthcare marketplace.

Access

Access represents the grouped combination of Obtainability and Availability. With respect to The gTC Healthcare Inequality Index, Access reflects the current state of the overarching Inequality that is present relative to the rest of the United States population.





Data was aggregated, measured, combined, and scaled to create the HII

Goals of the HII:

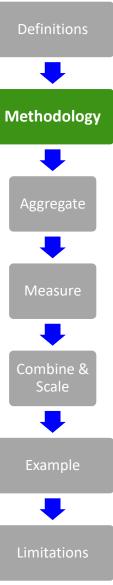
- I. To prove the existence of Healthcare Inequality in the United States
- II. To quantify the degree to which Healthcare Inequality is present among the population
- III. To identify the sources that contribute to an individual location's Healthcare Inequality

Geographic Unit of Measure:

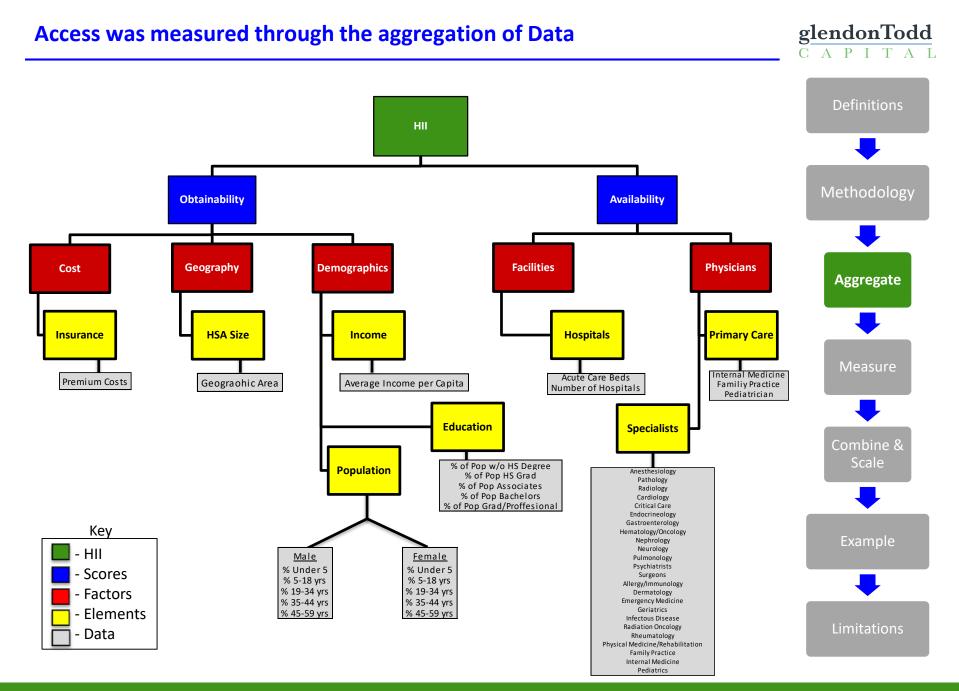
Inequality was measured at the **Hospital Service Area Level** ("HSA"), a collection of zip codes where residents receive most of their hospitalization from hospitals in the area. Every zip code is assigned to a single HSA.

Process:

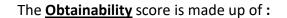
- 1. Data Aggregation Determined which databases were useful in contributing to Healthcare Inequality (Sources used: Dartmouth Atlas³⁸, Medicare.gov³⁹, US Census⁴⁰, Kaiser Family Foundation⁴¹)
- 2. Measurement Scored each data point based on its relative Inequality against the population mean
- 3. Combined & Scaled Averaged data points until Final Scores were reached and scaled results to create the index



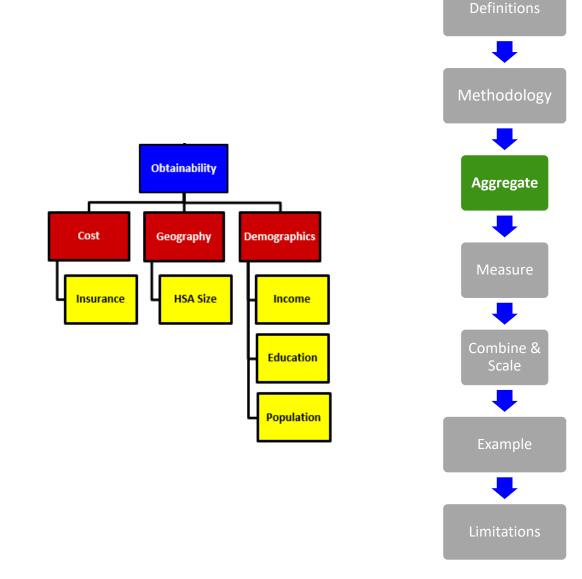




Obtainability represents the demand side of Healthcare access



- 1. Costs -
 - Insurance
- 2. Geography -
 - HSA Size
- 3. Demographics -
 - Income
 - Education
 - Population



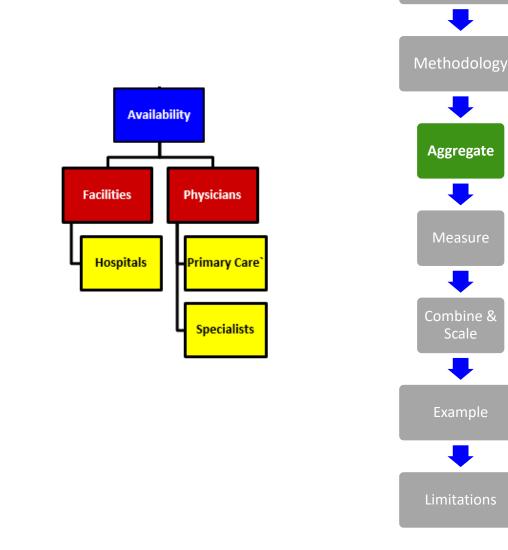
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Definitions

The Availability score is made up of :

- 1. Facility Distribution -
 - Hospitals per Capita
- 2. Physician Distribution -
 - Primary care physicians per capita
 - Specialists per capita



Inequality in Obtainability was measured against absolute standard deviation

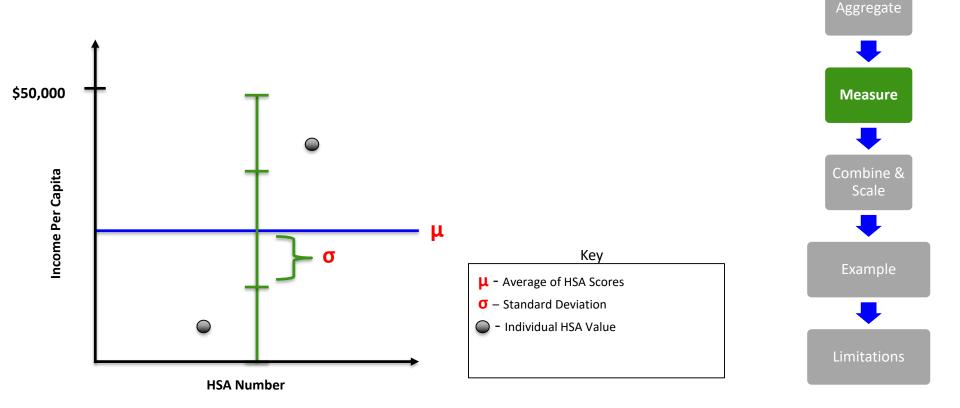
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Definitions

Methodology

System:

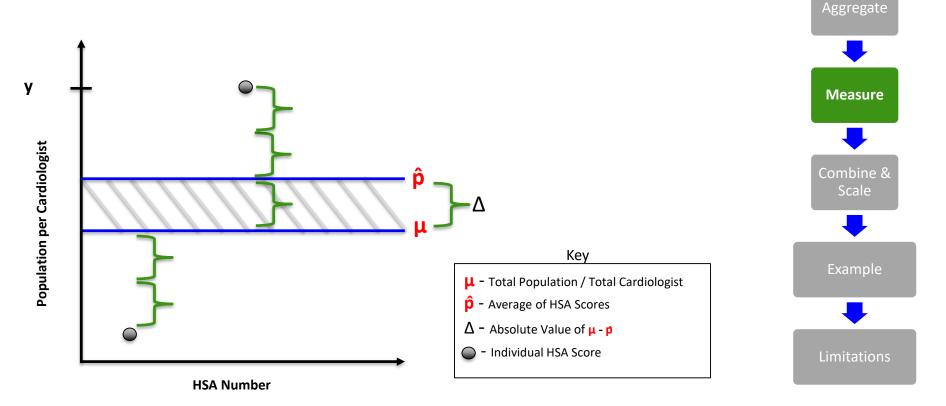
- $\boldsymbol{\mu}$ represents the population-weighted average of the HSA scores for data
- σ represents the standard deviation of the data set
- Individual HSAs were compared to μ to determine the magnitude of Inequality
- Each standard deviation away from μ served as a measure of absolute Inequality
- Standard deviation is the optimal measure to use as it does not overvalue inherent population inequalities; it measures absolute differences in area







- µ represents perfect distribution of resources amongst HSAs (ideal state)
- p represents the average of the HSA scores for data (actual state)
- Δ represents the Spread between μ and \hat{p}
- Data was compared to μ and measured against Δ the output was standardized through data sets
- The spread will take into account the skew of the distribution, which standard deviation does not capture



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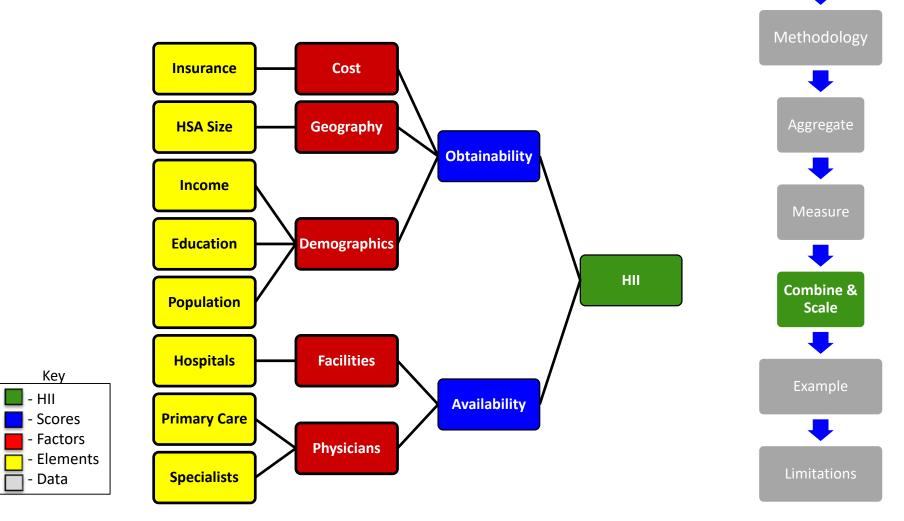
<u>C</u> <u>A</u> <u>P</u> <u>I</u> <u>T</u> <u>A</u> <u>I</u>

Definitions

Methodology

Each tier was averaged to calculate the Obtainability and Availability Scores

- Obtainability was calculated as the average of the Cost Factor, Geography Factor, and Demographic Factor
- Availability was calculated as the average of the Physicians Factor and Facilities Factor
- The Obtainability and Affordability scores were scaled and plotted to represent the HII



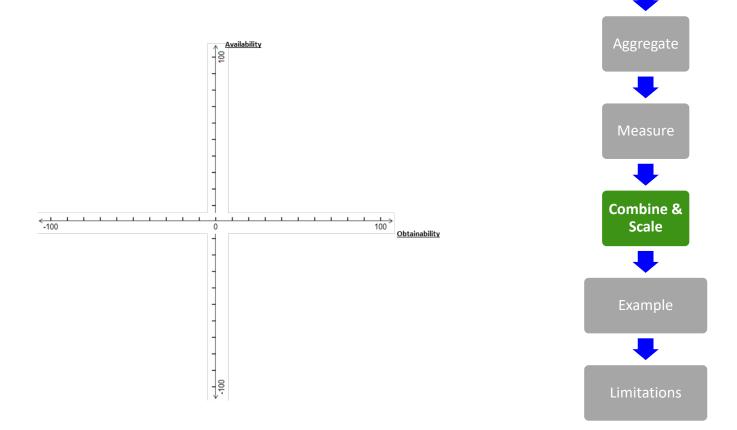
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Definitions

D

The Obtainability and Availability scores were scaled using a regression

- The established scores were normalized to a -100 to 100 point scale
- This was done by running a regression and finding the best-fit trendline that models the data
- The two outside points were used to create a function that will map each score to its final value
- This process was done individually for both the Obtainability and Availability scores



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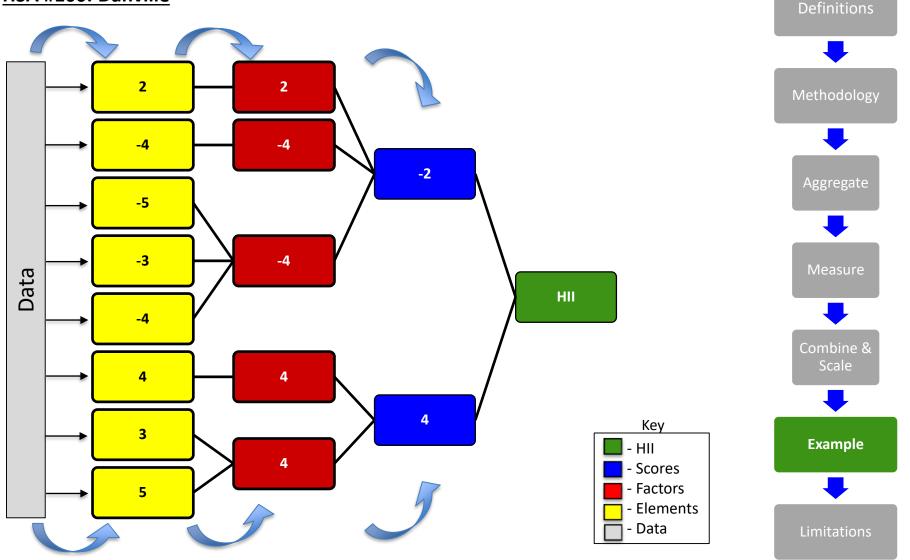
Definitions

Methodology

A comprehensive example illustrates how the HII was calculated



HSA #100: Danville



Relative to the population the example HSA is low in Obtainability and high in Availability

glendonTodd D Definitions Aggregate Measure Combine & Scale

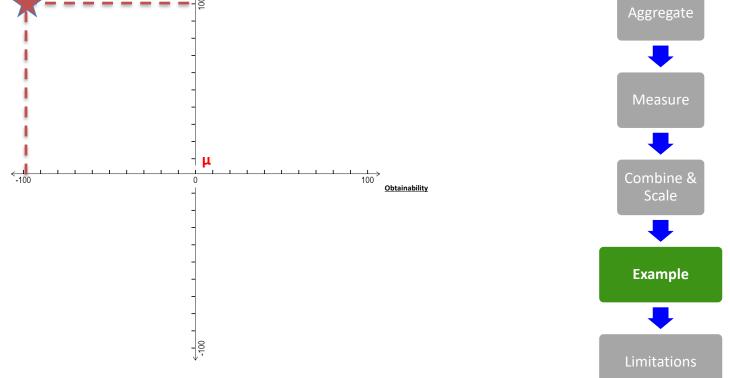
	HSA #	City	Obtainability	Availability
\mathbf{X}	100	Danville	-2	4
X	200	Stanford	2	4
X	300	Marlin	-2	-4
\mathbf{X}	400	Newport	2	-4

Danville has an Obtainability score of -2 and an Availability Score of 4

• The raw scores scale to index values of <u>-100</u> and <u>100</u>, respectively

Availability

• These implied scores indicate that this HSA has better than average Obtainability and Availability

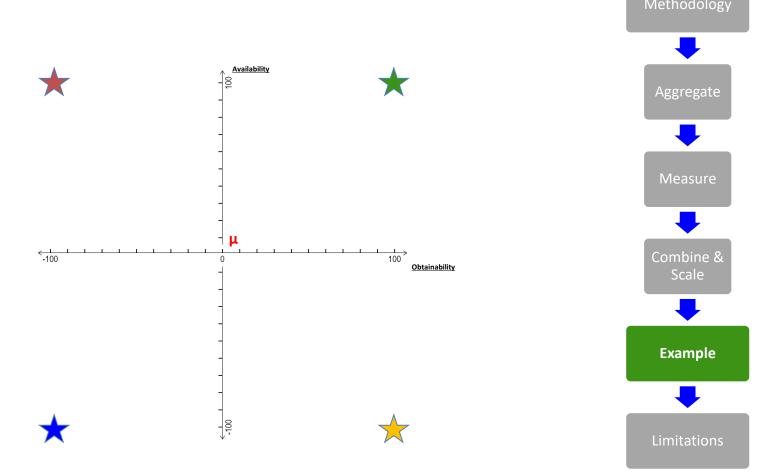


Plotting scores relative to each other exemplifies the power of scaling in the example

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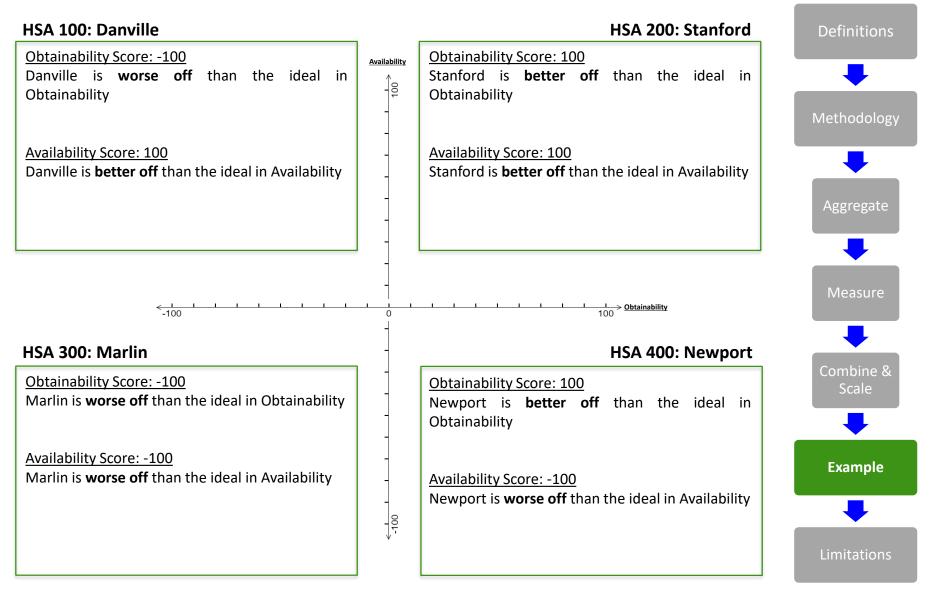
Definitions

	HSA #	City	Obtainability	Availability
X	100	Danville	-2	4
X	200	Stanford	2	4
X	300	Marlin	-2	-4
\mathbf{X}	400	Newport	2	-4



Plotting the HII on a scaled graph allows for easier comparison between HSAs

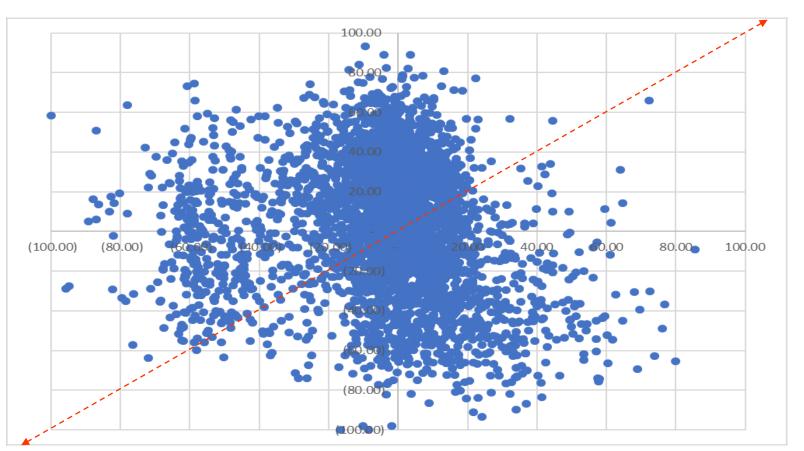
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gTC's HII is limited by the data available for the index and the assumptions it makes

- Healthcare is determined by a complex set of characteristics and thus Healthcare Access can only be measured indirectly through influencers
- Data is not always available at HSA level. Data available only at the state level was assumed to be uniform across each state while it is likely there is variation amongst HSAs
- Databases are not constantly updated and thus the Index creates a picture of Healthcare inequality that is timelagged by a few years
- Facilities should also capture complementary resources such as pharmacies and diagnostic imaging centers. As data was not available at the local level, this information could not be included
- Only 5400 of the 5800 registered hospitals could be accounted for in the calculation, meaning there is some error in the Hospital Element
- The complexities of the medical system require an understanding of how the system works and requires technical literacy. This was assumed to be captured by the Educational Attainment and the age of the population as it cannot be measured directly
- Due to the disconnect between Physician expenses and what is paid for medical expenses, Patient costs cannot be measured directly. This was approximated using the cost of insurance premium

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Availability (y)

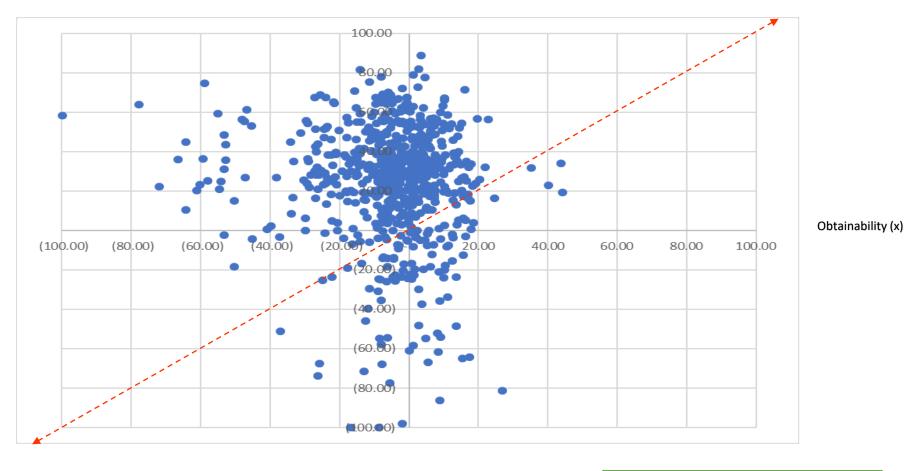
n = 3436 HSAs

Obtainability (x)

53

Obtainability equals Availability

HSAs with populations below 10,000 tend to have an Availability that exceeds the Obtainability



Availability (y)

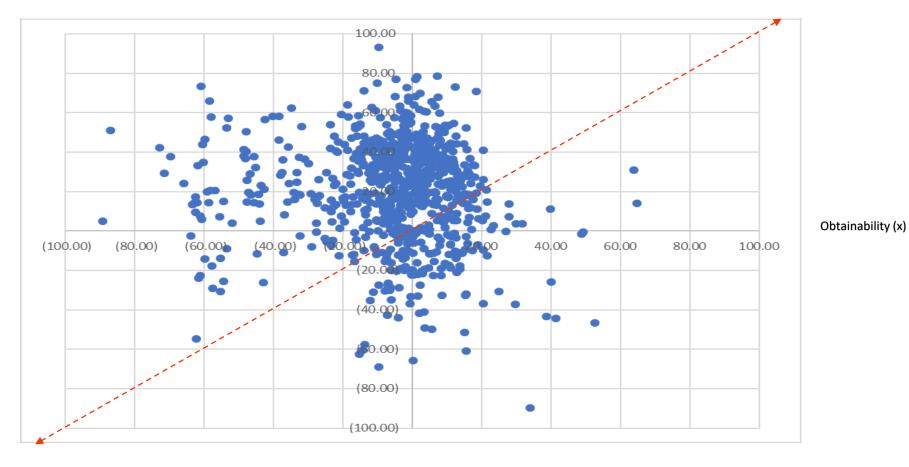
n = 681 HSAs

Obtainability equals Availability

Key Findings: Populations between 10,000 – 25,000

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HSAs with populations of 10,000 – 25,000 tend to have an Availability that exceeds the Obtainability



Availability (y)

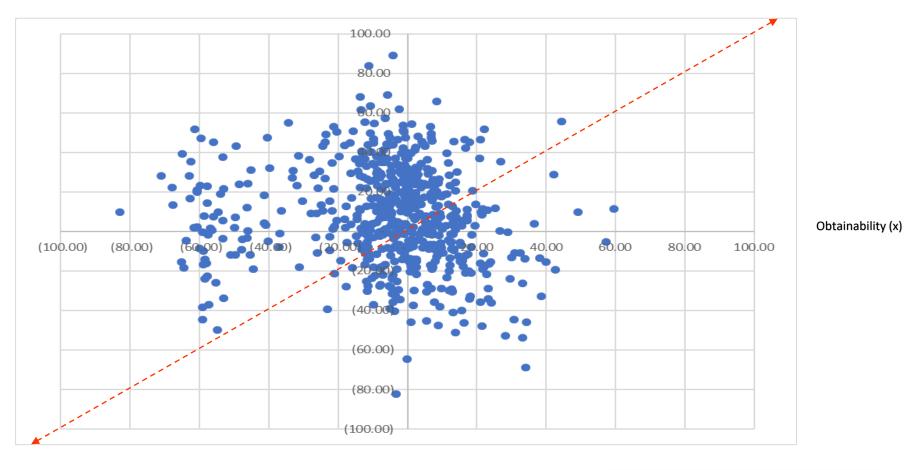
n = 797 HSAs

Obtainability equals Availability

Key Findings: Populations between 25,001 – 50,000

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HSAs with populations of 25,001 – 50,000 are concentrated around average Availability and Obtainability



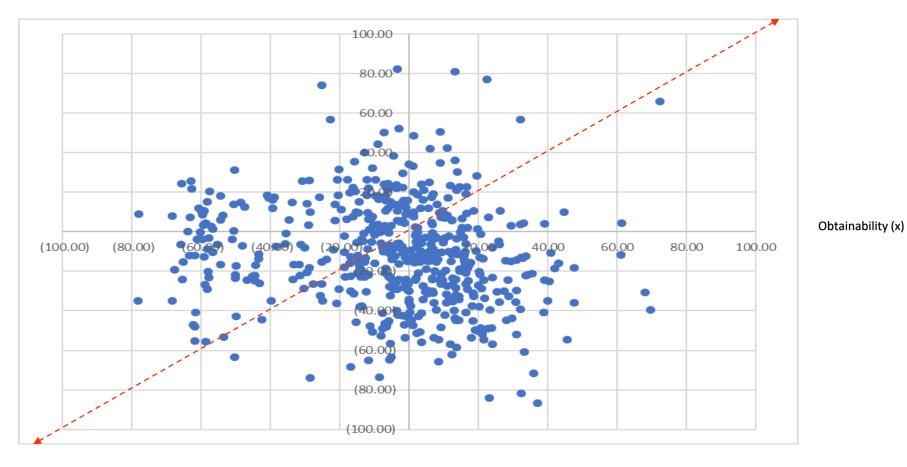
Availability (y)

n = 628 HSAs

Obtainability equals Availability

Key Findings: Populations between 50,001 – 100,000

HSAs with populations of 50,001 – 100,000 are concentrated around average Availability and Obtainability



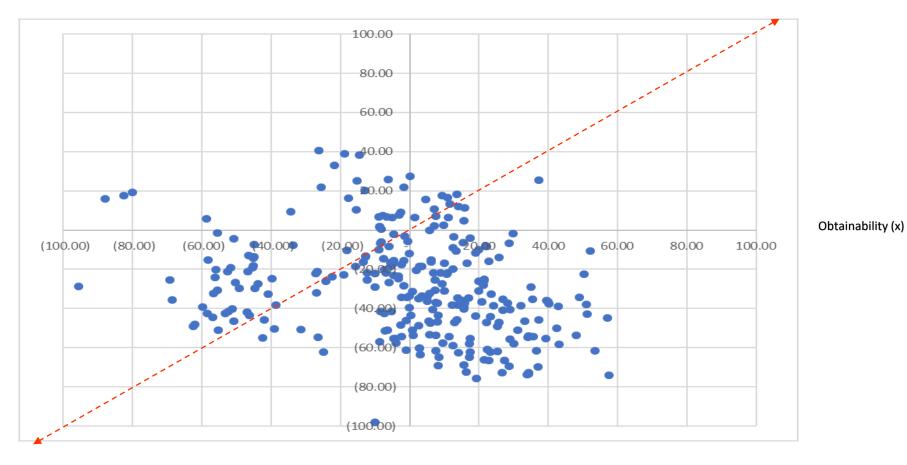
Availability (y)

n = 535 HSAs

Obtainability equals Availability

Key Findings: Populations between 100,001 – 150,000

HSAs with populations of 100,001 - 250,000 tend to have an Obtainability that exceeds the Availability



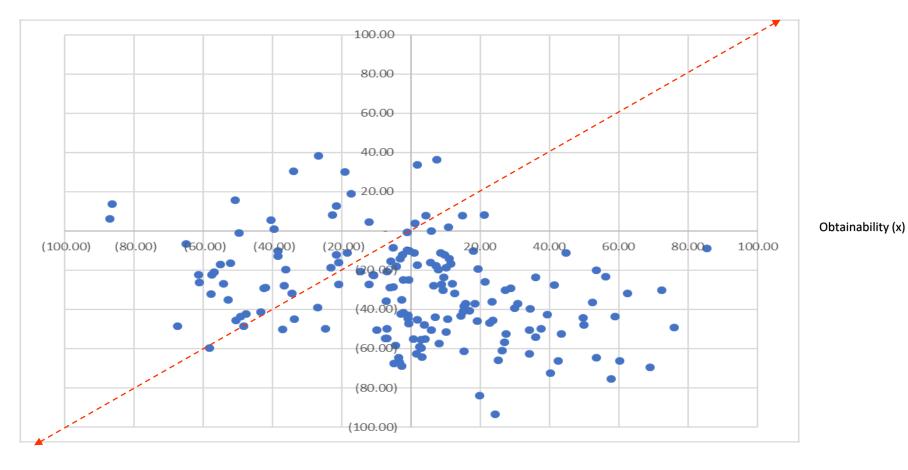
Availability (y)

n = 274 HSAs

Obtainability equals Availability

Key Findings: Populations between 150,001 – 200,000

HSAs with populations of 150,001 - 200,000 tend to have an Obtainability that exceeds the Availability



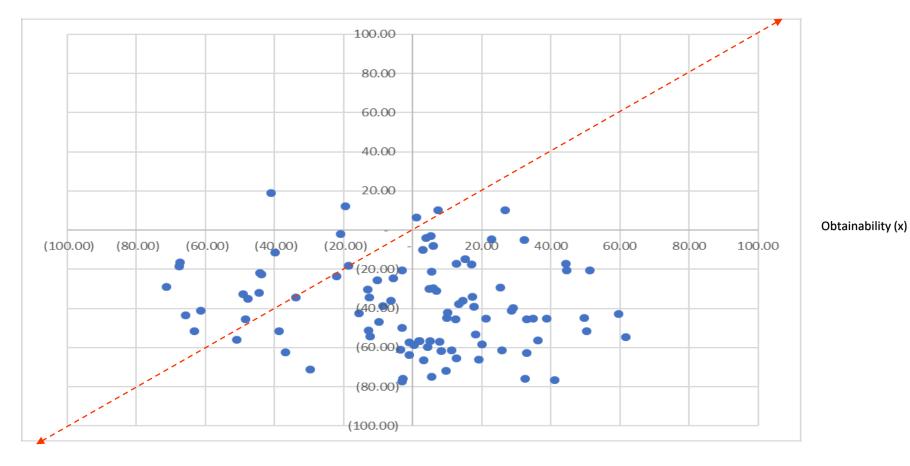
Availability (y)

n = 169 HSAs

Obtainability equals Availability

Key Findings: Populations between 200,001 – 250,000

HSAs with populations of 200,001 – 250,000 tend to have an Obtainability that exceeds the Availability



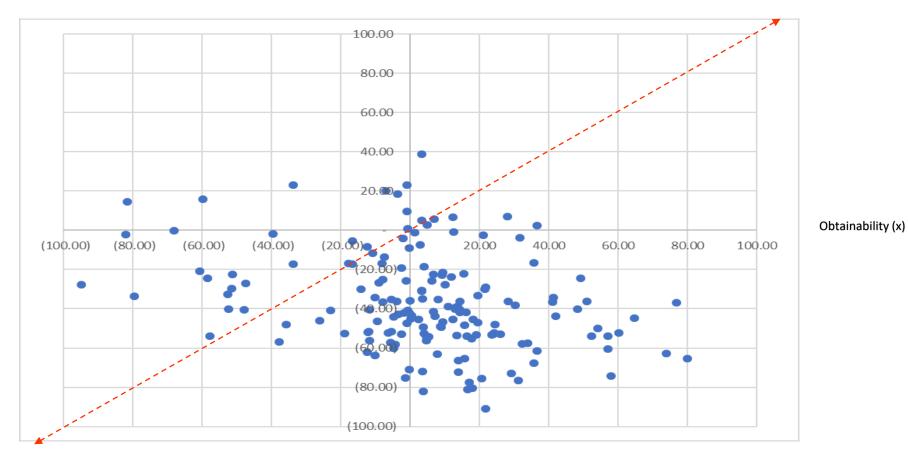
Availability (y)

n = 97 HSAs

Obtainability equals Availability

Key Findings: Populations between 250,001 – 500,000

HSAs with populations of 250,001 - 500,000 tend to have an Obtainability that exceeds the Availability



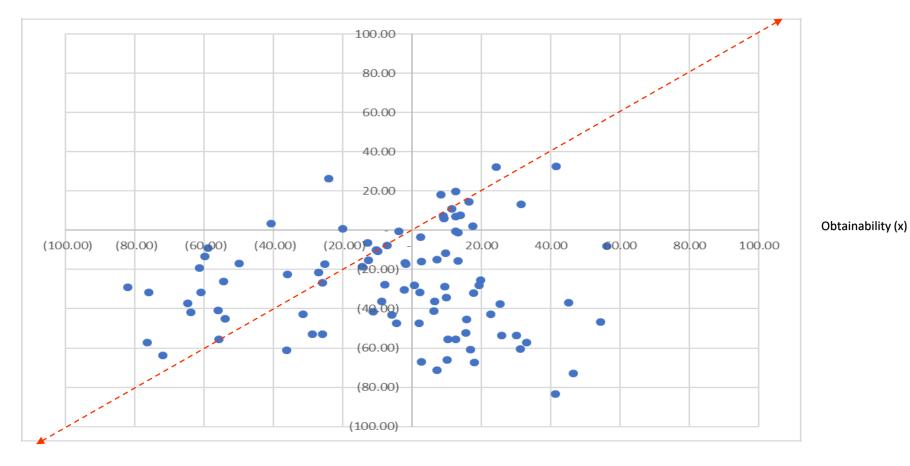
Availability (y)

n = 165 HSAs

Obtainability equals Availability

Key Findings: Populations greater than 500,000

HSAs with populations of 200,001 - 250,000 tend to have an Obtainability that exceeds the Availability



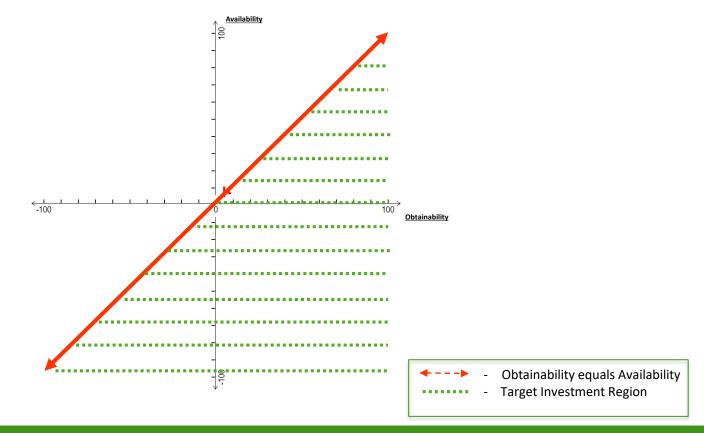
Availability (y)

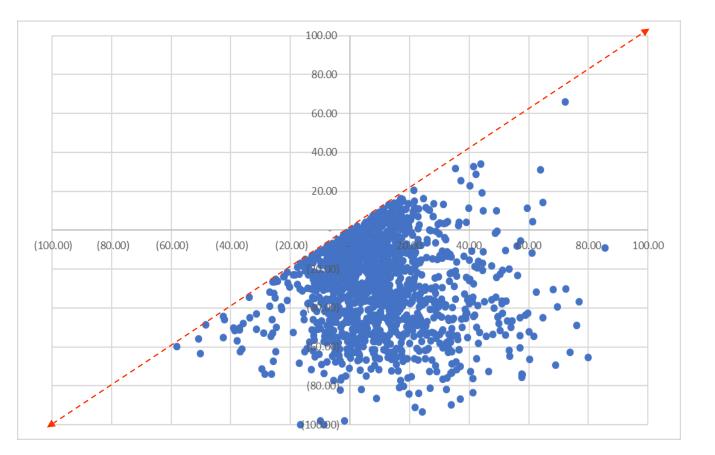
n = 90 HSAs

Obtainability equals Availability

Investment opportunities arise in locations where the Obtainability exceeds the Availability

- Obtainability represents a populations inherent ability to acquire health care. As the score is based on the characteristics of the population, capital investments do not have the ability to change an area's Obtainability score
- Availability represents the medical resources that are present in an area. Capital investments can change the medical resources available, and thus can directly impact the Availability score
- Investments should target areas that have an Obtainability Score exceeding the Availability score to maximize impact. This implies that the demand for the services exceeds the supply available





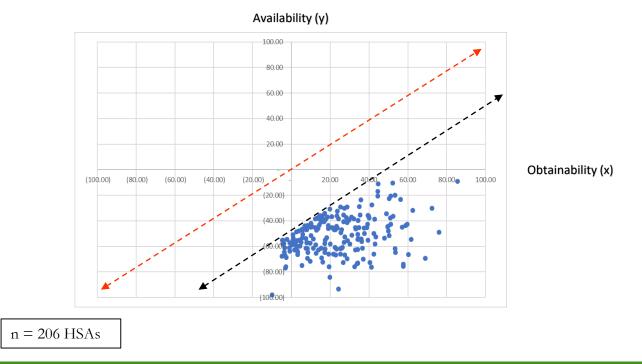
Availability (y)

Obtainability (x)

- HSA

Population and Spread serve as the differentiating factors when sourcing investments

- Investments in locations that have the same Spread should have an equal contribution to reducing Healthcare Inequality, ceteris paribus
- Areas differ in population, and thus, similar investments could have different impacts on the Spread for HSAs as Scores are normalized by population
- Targeting areas that have larger populations ensures that the investment will not increase the Availability beyond the Obtainability. The trade-off between impact and population size should be considered
- Investments should be in areas that have a population between 100,000 250,000. These areas are more likely to have sufficient market sizes to guarantee both financial and impactful returns
- Target HSAs are locations that have a Spread (A-O) below -50. This criteria was used to ensure that targeted areas had a significant need for additional medical resources



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Expanding Role of Government

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Conclusions

- The Obtainability Scores and Availability Scores for all HSAs have a standard deviation of 34.13 and 44.54 respectively. If Healthcare Inequality did not exist, the standard deviations would be zero
- As the standard deviation of Availability Scores is greater than the standard deviation for Obtainability Scores, there is relatively more Inequality present in Availability
- Population size does not predict the Obtainability of Healthcare well. The correlation between the Obtainability Score of an HSA and the Population is -.16
- Population serves as a weak predictor of Availability. The correlation between the Availability Score of an HSA and the Population is -.319

The HII quantifies the inefficiencies in Healthcare resource allocation

- As Obtainability and Availability represent the demand and supply of Healthcare respectively, for resource allocation to be efficient, the two must be equal. Thus, the Spread (A-O) quantifies the inefficiency in resource allocation
- The average Spread between the Obtainability Score and the Availability Score is 36.58, proving resource allocation is unequal and inefficient
- The correlation between the Frazier Institute's Economic Freedom Index of North America⁴² and a state's HII Spread (O-A) is -.2. This implies **Economic Freedom is a weak predictor of Healthcare Inequality**
- The disconnect between Obtainability and Availability implies that there are non-market forces acting on Healthcare.

Regulations are the likely causes of inefficiency

- The ACA expanded the Obtainability of Healthcare by making Payers more accessible on average. It did not, however, change the Availability, and thus, a Spread between the two exists
- Regulations such as HIPAA, HITECH, the Stark Law have introduced new costs to Healthcare, decreasing margins and negatively affecting the incentive for Providers to expand. This would manifest itself in more disparity in Availability scores
- Certificate of Need laws increase the difficulty of opening new facilities, manifesting itself through the disparity in resource distribution

Reforming the Government's role in controlling the development of medical facilities will help improve the efficiency of the Healthcare market and allow for proper resource allocation

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Annotations: Works Cited

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At glendonTodd Capital, we approach private equity a bit differently. We believe firmly that operational insights and understanding are key to genuinely understanding the risk profile and the opportunity of any given investment. For this reason, glendonTodd Capital LLC only invests in companies where at least one of the of glendonTodd has operated a company. With this thesis, we provide more than just capital by allowing the management teams of our investments to draw on our experience, leadership, values and insight as resources management can use to accelerate the growth of the company. Leadership, values and insight are key attributes of the value we seek to add to distinguish ourselves from other sources of capital.

We also believe strongly in focusing on those companies with attractive growth stories. Our investment thesis informs our hold periods and our co-investment partners. We do not hold investments based on an arbitrary three to five year time line, but rather hold companies based on our view of their value proposition in the marketplace. As importantly, we always seek to surround ourselves with value added lenders and co-investors, along with management teams of the highest integrity.

We are focused on the business services sector and on the Healthcare industry. With each principal having over years of experience in their respective industry, we seek to serve stakeholders with the sum of our capabilities to advance our collective interests.

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