



HEALTH CARE
COST INSTITUTE

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Frequently Asked Questions

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General Questions

How is a metro area defined?

We used Core Based Statistical Areas (CBSAs), as identified by the Office of Management and Budget, to define our metro areas.

How were the sample metro areas chosen? For example, why are there so many data points in areas like Florida but so few in New York?

To be included in the HMI, a CBSA had to have a minimum average of 25,000 member years and 10% coverage of the ESI population within the HCCI data. See the [methodology document](#) for greater detail.

What constitutes an inpatient, outpatient, or professional service?

Inpatient services are rendered to patients who are kept in a health care facility overnight for treatment but not for observation.

Outpatient services are rendered to patients by sections of a hospital that provide medical services not requiring an overnight stay or hospitalization (e.g., emergency room [ER], outpatient surgery, observation room).

Professional services are rendered to patients by a health care professional. Service claims with no valid revenue code are assumed to be professional services (e.g., office and preventative visits, administered drugs).



Price Index Questions

What does “prices” mean?

We define “prices” as the allowed amount paid for a health care service. The allowed amount is the total payment from both the insurer and the patient to a health care provider.

How are “prices” used to compute the “price level”?

Using the prices paid for health care services in each CBSA, we calculate a measure of the average price paid for a representative health care service within each service category. We then calculate the “price level” by comparing this measure to the national average.

For a more comprehensive description of how we calculate the measures used in our report, see [our methodology document](#).

Are differences in prices due to people receiving different services across areas?

When calculating our measure of the average price paid for a representative health care service, we hold the set of services and the amount of each service used constant across areas. In other words, our measure is designed to compare the prices an individual would face for the same basket of health care services in each metro area.

Are differences in prices due to the fact that people may be sicker and therefore requiring more expensive procedures in different areas?

We standardized our sample across areas in several ways to limit the degree to which differences in CBSA populations were influencing the computed price measures. First, we studied the same population in each area: individuals under the age of 65 with employer sponsored insurance, non-individual coverage with one of the following plan types: Health Maintenance Organization, Preferred Provider Organization, Point of Service Plan, or Exclusive Provider Organization. We also standardized the service basket for which we calculated our average price measure across areas (see above). Further, we excluded claims with extreme costs or lengths of stay from our analysis.

Consequently, our analysis compared the prices paid for the same set of services for largely similar populations across areas. That said, it is possible that underlying health



differences of different CBSAs are one among many local factors that affect variation in health care prices.

Are the prices based on where I live or where I receive care?

Prices are based on where patients receive their care.

Health care prices in my metro area were above the national average. Why might this have been the case?

Health care prices are dependent on a number of local factors (e.g., cost of living, demand for health care services, health care provider market structure, health insurer provider market structure, etc.). Our price index is not meant to unpack why prices may be high or low. Subsequent releases will provide more information on commercial health care markets that can help unpack the factors which may be influencing price.

Health care prices in my metro area were below the national average. Does this mean there were low health care prices in my area?

Not necessarily. Comparing a metro to the national average simply tells you how high (or how low) that metro's prices were on the distribution of prices at that time. It could be the case that all prices across all metros were high (or low).

Diving further into our Price Index data, we found that, regardless of their relation to the national average, health care prices were dramatically more expensive in 2016 than in they were in 2012 almost everywhere. While an area might have below average prices in 2016, those prices were on average 16% higher than they were just a few years before. For a more in-depth explanation, check out our Healthy Bytes Healthy Marketplace Index (HMI) [blog post](#).

Price levels and growth rates are often compared in this report. What is the difference between these two measures?

Price levels compare the prices of different CBSAs within one year, in this case 2016. Growth rates compare the price level of the same CBSA over time; most often we report the growth rate between the first and last year of our study (2012 and 2016).



Use Index Questions

What does per-person “use” mean?

We define use as the total number of services used per-person.

How are “use” rates used to compute “use levels”?

Using data on how many services are performed for each type of service in each CBSA, we calculate the use index as a weighted average of per-person use rates across a common set of services. We define the weights based on the share of total spending accounted for by each service in our base year, 2012. For a more complete description see the methodology document.

For a more comprehensive description of how we calculate the measures used in our report, see [our methodology document](#).

How should we interpret the use level of a metro?

Let’s say the overall use level of a metro is 20% above the national median. This means that on average, providers in that metro performed 20% health care services than the providers in the median market.

Is use measured based on a member’s residence or site of care?

We measure use based on where a service was performed or, in other words, the metro in which the provider was located.

What factors may relate to high use?

High use may result from a variety of factors relating to both the supply of and demand for health care services. For example, a place may have high use due to underlying population health characteristics, a large number of providers, or aggressive provider practice patterns to name a few.



Can overall use levels reflect the fact that some metros use different services than others?

Yes, across the metros in our study, overall use levels are the result of different use levels within metros across service categories. We also see that metros can have different changes in use levels by service category over time. You can explore these trends and more using the dashboard in our interactive report comparing use levels across metros.

Within a service category, does variation in use levels reflect the fact that some metros use different services than others?

Yes, it is possible that to some extent variation in service category use levels across CBSAs reflects variation in which services CBSAs use. To illustrate this possibility, consider an example where we have two CBSA's A and B. Let's say CBSA A appears to have relatively lower professional service use based on our index compared to CBSA B. Let's say that the same number of total professional services are performed in CBSA's A and B. But, CBSA A uses 100 fewer of a particular service that is heavily weighted when we compute our index and 100 more of a less heavily weighted service than CBSA B. Let's further assume that otherwise CBSA's A and B have identical service use. In this case, CBSA A would have a lower professional use index value than CBSA B even though they use the same number of total professional services. In other words, CBSA A's lower professional use index value is driven by the fact that they use different services than CBSA B.

However, when we look at the data, it appears that across the CBSAs in our sample there is minimal variation in the mix of services within each service category. To see this, we measured the correlations between the proportion of total services accounted for by each sample service in each CBSA in 2016 and the proportion of total services accounted for by each sample service nationally in 2012 (Table 1).

Table 1: Distribution of Correlation Coefficients between the Percent of Total Services Accounted for by Each Sample Service in Each CBSA in 2016 and Nationally for Each Sample Service in 2012

Service Category	Min	5 th Percentile	10 th Percentile	25 th Percentile	Median
Inpatient	0.667	0.723	0.912	0.952	0.971
Outpatient	0.608	0.670	0.702	0.791	0.897
Professional	0.407	0.923	0.936	0.952	0.965



Across our sample, we found strong positive correlations between the proportion of total service use accounted for by each service nationally and in each CBSAs. This indicates that within each service category, CBSAs tend to use each service in relatively similar proportions. In other words, within each service category CBSAs tend to use relatively similar mixes of services.

While a portion of the variation in our use index that we observe may be due to variation in the mix of service CBSAs used, we do not find that there is much of this variation in our sample. This finding provides evidence that within each service category variation in our use index is principally driven by variation in the volume of services performed within metro areas.

Within service categories, can changes in use levels reflect changes in which services metros use over time?

Technically yes, changes in use levels can result from changes in which services a metro uses at any given point in time. For example, let's say a CBSA used 100 of a particular service in 2012 that is weighted heavily when we compute our index. Let's also say that in 2016, this CBSA used none of that same service but a 100 more of a different service that is less heavily weighted when we compute our index. In this case, all else equal, the total number of services used would remain unchanged, but the overall use level would appear to be lower in 2016 than in 2012.

As with our above example, when we look at the data we find that within service categories the mix of services used both nationally and within each CBSA do not change meaningfully over time. In particular, we find that in general the proportion of services accounted for by each particular service remained fairly constant from 2012 to 2016. Below are the correlation coefficients between the percentage of total services accounted for by each sample service nationally in 2012 compared to 2016:

Table 2: Coefficients Correlation Between the Proportion of Total Services Accounted for by Each Sample Service Nationally in 2012 and 2016

Service Category	Correlation Coefficient
Inpatient	0.983
Outpatient	0.939
Professional	0.991



Additionally, we present the distribution of correlation coefficients for the percentages of total services accounted for by each sample service in each CBSA in 2016 and nationally in 2012 above in Table 1. In all cases we find very strong positive correlations. So, while changes in our service category use indices over time may partly reflect changes in which services are being used in a given metro, we do not find evidence that there were substantial changes in which services were used either at the national or the individual CBSA level. This suggests that changes in service category use levels over time primarily reflect changes in the volume of such services used by a particular CBSA.

How correlated were price and use levels?

Across service categories, we observed slight negative correlations between price and use index values. That is areas with higher price levels tended to have lower use levels more so than areas with lower price levels. There was some variation in the correlation between price and use index values across service categories, though, as seen below:

Table 3: Correlation Coefficients between CBSA Price, Use Index Values, 2016

Service Category	2016
Overall	-0.157
Inpatient	-0.130
Outpatient	-0.290
Professional	-0.066



Hospital Concentration Index Questions

What does market concentration mean?

Within a market, concentration is a measure describing the distribution of market share amongst competing firms. A highly concentrated market means that a small number of firms hold a large majority of the market share; and vice versa for an unconcentrated market. Therefore, a highly concentrated market is considered to be a less competitive market.

In the context of this report, a highly concentrated market means that a smaller number of hospital systems account for a larger share of inpatient admissions from residents in a given metro area. While markets with lower concentration can be interpreted as the admissions of patients from a given area are more evenly distributed across a higher number of hospital systems.

Are market concentration and competition the same thing?

No. Competition is the act of more than one firm vying for a share of a given market against one another. Measuring the concentration of a market is a common way to measure how competitive that market is. A highly concentrated market typically signifies low competition and vice versa.

What is Herfindahl-Hirschman Index (HHI)? What does it measure?

The Herfindahl-Hirschman Index (HHI) is a frequently used method of measuring concentration in a market. It is calculated, in this report, by squaring the share of all admissions for residents in a metro area that occurred at a given hospital system, for each hospital system in which those residents received care. Those resulting squares are then summed together to give a number between 0 and 1. That number represents the inpatient hospital system HHI for the market. A HHI of 0 means that the market is perfectly competitive, while a market with a HHI of 1 can be interpreted as a monopoly.

What is meant by the term “market” in the report?

We defined a market as all hospital systems at which patients residing in a particular metro area received care – regardless of whether the hospital system was located in the same metro as the patient. It is important to note that we use the term “market” primarily for notational simplicity. The goal of our report is not to analyze product markets for antitrust purposes.



Why choose CBSAs as the geographic market rather than alternative market geographic definition (e.g., Hospital Referral Region, Hospital Service Area, Commuting Zone)? How does this impact your analysis?

The goal of this report is to publicly produce a measure of hospital market concentration at the most local geographic level possible. We found that the CBSA (commonly referred to in our reports as a “metro area”) was the most disaggregated geographic unit that still allowed for the reporting of a substantial number of areas across the country, while maintaining our minimum data thickness requirements.

As stated both above and explicitly in the report, this geographic market definition does not and is not intended to represent a product market for antitrust analysis.

A limitation of choosing CBSAs is that, in many cases, they may be too large to precisely represent a geographic market. As a result, using metro areas to define hospital markets may potentially understate the actual level of concentration experienced by patients in some areas. For example, in larger, more densely-populated metros, the CBSA boundaries might encapsulate multiple areas that could be considered a hospital market. As a result, it is not surprising that many of the larger metro areas (such as New York City, NY and Philadelphia, PA) appear to have some of the least concentrated hospital markets according to our HHI measure. It is possible that, by construction, our HHI measure may understate the true level of concentration in these markets.



Given your market geographic definition - Core-Based Statistical Area - how would constructing HHIs differently impact the analysis?

Using our market definition - a CBSA or “metro area” - we compute what is referred to as a “patient-flow” based HHI measure. That is, we consider a hospital market to be all hospital systems at which individuals from a given CBSA are admitted. We then compute our HHI measure as the sum of squared hospital system market shares. That is, we compute the sum of squared hospital system shares of total admissions for individuals from each metro area in each year in our sample.

Even given our geographic market definition, there are many other ways we could have computed HHIs. For instance, we could have computed a “geographic location” HHI where we defined the hospital market as all hospital systems physically located within our geographic market (metro area). Alternatively, similar to [Kessler and McClellan \(2000\)](#), one could compute hospital-specific HHI values and take the weighted average for all hospitals in a given locality (“Hospital-Based HHI”).

In order to see how our measure compared to these alternative calculations, we computed a “geographic location” HHI and a “hospital-based” HHI using our sample data.

Overall, the distributions of our patient flow and geographic location HHIs were similar. Both tended to report HHIs with higher absolute values than our hospital-based HHI measures.

Table 3: Distributions of Differently Computed HHI Measures (2016)

	Patient Flow HHI	Geographic Location HHI	Hospital-Based HHI
Summary Statistic:			
Mean	0.3341	0.4047	0.2703
Standard Deviation	0.1395	0.1710	0.067
5 th Percentile	0.1365	0.1543	0.1545
10 th Percentile	0.1697	0.1905	0.1798
25 th Percentile	0.2452	0.2989	0.2301
50 th Percentile	0.3193	0.3785	0.2715
75 th Percentile	0.4064	0.5116	0.3068
90 th Percentile	0.5182	0.6119	0.3547
95 th Percentile	0.6394	0.7149	0.3842



While the hospital-based HHI tended to report HHIs that are closer to zero (less concentrated) than our other two measures, all three measures ranked metro areas' hospital market concentration similarly.

Table 4: Correlations Among Differently Computed HHI Measures

	Patient Flow HHI					
	2012	2013	2014	2015	2016	Pooled
Geographic Location HHI	0.92	0.92	0.93	0.92	0.92	0.92
Hospital-Based HHI	0.85	0.85	0.79	0.71	0.76	0.79

All measures were very highly correlated. While there appears to be some variation within years, over time all pairwise correlation coefficients were above 0.7 (and significant positive correlations at conventional levels) in each year. In other words, areas that had relatively (un)concentrated hospital markets as measured by our patient flow” HHI, in a given year, tended to have relatively (un)concentrated hospital markets as measured by the other two HHI measures computed.

The goal of this report is to publicly produce a measure of inpatient hospital market competition that allows readers to compare metro areas across the country and over time. Due to this objective, we feel the selected method for computing HHI in this report is qualitatively similar to other alternative computation methods, despite the potential limitations. Further, we felt that the “patient flow” method presented the most straightforward way to compute HHIs. Lastly, as discussed in greater detail [here](#), the patient flow method of HHI is more robust to potentially mis-specifying geographic boundaries for markets (a potential concern with our choice of CBSAs as geographic markets - discussed above).

Methods Note: Our discussion of these methods draws heavily from the work John Graves and co-author(s); for a more complete discussion of these methods for computing HHIs, their similarities/differences, and more see this [working paper](#).

Our Hospital-Based HHI Measure is computed as follows: For each hospital h to which an individual from CBSA g is admitted, we compute a hospital-specific HHI. We use our measure of patient flow HHI for each metro area we observe in our data (including ones for which we do not report), and we compute the weighted average of all the patient flow HHIs of each CBSAs g' from which an individual comes to be admitted at hospital h . Here, weights are determined as the share of total admissions to hospital h in year t from each CBSA g' . We then take the weighted average of the hospital-specific HHI for all hospitals h' to which individuals from CBSA g are admitted. Here we weight hospital-specific HHIs by the share of individuals from CBSA g admitted to each hospital h . We refer to this this weighted average as our hospital-based HHI for the given market



Given the choice of market definition and HHI computation method, how would using an alternative market size definition or data source to compute HHI affect your analysis?

Given our choice of geographic market (CBSA) and that we computed a patient flow HHI, we used HCCI data on inpatient hospital admissions to determine market shares. A potential concern with using HCCI data is that it is a convenience sample which may not be representative. That is, the hospitals to which commercially insured individuals are admitted in the HCCI data may be biased by factors such as insurer networks, negotiated discounts, or other such factors. For instance, we may observe market shares that overstate some hospital systems' true market share and therefore overstate that hospital market's level of concentration. Similarly, using admissions as a measure of market size, rather than a capacity-based measure such as the number of hospital beds, may result in observing a concentration measure that is biased by factors such as hospital quality that result in patients disproportionately being admitted to particular hospitals relative to their size.

To see how our measure of hospital concentration would change depending on our method for defining market size, we used alternative data sources (AHA data on admissions or beds rather than HCCI data on admissions) to calculate comparable HHI measures. Because the AHA data is aggregated at the hospital level, we used the geographic location method when computing these HHI values. For ease of comparison, we also report our geographic location HHI using HCCI data on inpatient admissions.

Below are summary statistics of the distribution of HHI values computed using the different methods and data sources in 2016. These comparisons in other years or pooled over time produced qualitatively similar results. As we can see, each HHI measure has a relatively similar. As expected, among the geographic location HHIs, the measure computed using data on HCCI admissions resulted in an HHI distribution shifted slightly to the right of the HHI measures computed using AHA data. However, the patient flow HHI measure computed using HCCI data on admissions had a very similar distribution to both measures computed with AHA data.



Table 5: Distribution of HHI Measures Constructed with Different Measures of Market Size, Data Sources (2016)

HHI Method:	Patient Flow	Geographic Location	Geographic Location	Geographic Location
Data Source:	HCCI Data	HCCI Data	AHA Data	AHA Data
Measure of Market Size:	Inpatient Admissions (ESI)	Inpatient Admissions (ESI)	Inpatient Admissions (All)	Total Beds (All)
Summary Statistic:				
Mean	0.3341	0.4047	0.3367	0.3202
Standard Deviation	0.1395	0.1710	0.1499	0.1381
5 th Percentile	0.1365	0.1543	0.0989	0.1012
10 th Percentile	0.1697	0.1905	0.1492	0.1404
25 th Percentile	0.2452	0.2989	0.2378	0.2281
50 th Percentile	0.3193	0.3785	0.3179	0.3074
75 th Percentile	0.4064	0.5116	0.4482	0.4220
90 th Percentile	0.5182	0.6119	0.5078	0.5026
95 th Percentile	0.6394	0.7149	0.5690	0.5244

In addition to all of the HHI measures having similar distributions, they were also highly correlated. This was true both within each year and pooled over time. In other words, whether comparing across CBSAs or over time, HHIs computed using each of the different methods or data sources discussed above would rank metro area hospital market concentration levels similarly. In other words, they would provide similar relative comparisons of metro area hospital market concentration. Combining this with the previous finding that the distribution of each HHI measures are similar, each HHI measure would also provide a similar absolute comparison of metro area hospital market concentration.



Table 6: Correlations Among HHI Measures Constructed with Different Measures of Market Size (Data Sources)

			HHI Method: Data Source: Measure of Market Size:		Patient Flow HCCI Data Inpatient Admissions (ESI)			
			2012	2013	2014	2015	2016	All
HHI Method:	Data Source:	Measure of Mkt. Size:						
Geographic Location	HCCI Data	Inpatient Admissions (ESI)	0.92	0.92	0.93	0.92	0.92	0.92
Geographic Location	AHA Data	Inpatient Admissions (All)	0.73	0.71	0.72	0.71	0.70	0.71
Geographic Location	AHA Data	Total Beds (All)	0.75	0.73	0.73	0.72	0.72	0.73

While HHI measures based on HCCI admission data and AHA beds data have similar distributions and are highly correlated both across CBSAs and over time, it is important to note that changes in each HHI measure may be driven by different factors. The HHI measure based on HCCI admission data can be related to factors such as network structure and hospital quality, among many others. As a result, changes in HHI may be related to these factors, which potentially confounds a comparison between changes in our HHI measure and changes in measures of prices, such as our price index.

What is patient flow?

Due to our defining the market as all residents who live in a given metro area, patients that travel outside of their resident metro area to receive inpatient care are included in the calculation of the resident market HHI. To show both how prevalent as well as where patients traveled outside their resident metro for care, we calculated the share of total inpatient admissions from residents in a given metro area that occurred at hospital systems located in all other metros. These shares for each resident metro area are considered its “patient flows”.

The patient flow shares for all resident (member) metro areas are publicly available to [download](#). All provider-based metro areas that received less than 10 admissions from the given resident metro area, as well as admissions to providers in unidentifiable rural areas were summed together and categorized as “Other”.



Do your HHI measures take rural hospitals into account?

Identifiable rural areas were included in the analysis, however as discussed, the markets studied were defined by patients who lived in the 112 sample metro areas. As such, rural areas infrequently factored in to our HHI calculations, as it was uncommon for patients that lived in a metro area to have sought out inpatient care at rural provider.

What is considered a substantial change in HHI?

A merger that causes an increase in HHI of 0.0200 is sufficiently large enough to warrant further investigation within at least moderately concentrated markets and above per Department of Justice and Federal Trade Commission Horizontal Merger Guidelines. While our analysis is not intended to be interpreted as antitrust analysis, this standard provides some context to what may be considered a large change in HHI.

Reference:

“Horizontal Merger Guidelines: 5.3 Market Concentration,” The United States Department of Justice, last modified August 19, 2010,

<https://www.justice.gov/atr/horizontal-merger-guidelines-08192010#5c>

How could a metro area that experienced merger activity see a decrease in concentration?

As we describe above, we computed a patient flow HHI using HCCI data on inpatient hospital admissions. Where patients are admitted in the HCCI data can be biased by factors such as insurer networks, patient preferences, or many other factors that are both related and un-related to hospital market structure. Decreases in our HHI measures in metro areas where we identified a hospital merger could reflect changes in said factors, such as quality improvements in a hospital system attracting a larger share of patients, that were unrelated to changes in hospital market structure due to mergers.