

# HEALTHCARE AUDIT METRICS: A HISTORICAL APPROACH TO DETERMINING AN “ACCEPTABLE STATISTICAL PRECISION” LEVEL

## Introduction

One of FTI Consulting’s statistical experts, who was involved in an arbitration matter on behalf of a large commercial payor, was asked to testify on the concept of an “acceptable statistical precision” in regard to estimating New York Medicaid overpayments during routine audits. He said that the concept of “acceptable statistical precision” could not be answered by the study of statistics – and that today, we know that it cannot even be answered by historic New York Medicaid audits.

The following questions came directly from the arbitration panel during the expert’s cross examination and were used to try to pin down the expert on what he thought were “typical” and “reliable” levels of precision in these types of healthcare audits.

- “What’s the highest/lowest precision level you’ve achieved in a sample that you’ve designed?”
- “Are they [precision levels] typically less than 20 percent?”
- “Is it your opinion that achieving an 80 percent precision in estimating an overpayment from an audit provides a reliable estimate of an overpayment? ...Assume that everything about the sampling and extrapolation was done correctly, it was random, it was executed perfectly.”

These questions implied that there is some threshold that renders an overpayment point estimate unreliable based *solely* on the

precision level. Further, these questions implied that this threshold is somewhere below 100 percent.

Putting the issue of “reliability” aside, one could potentially assess what is “commonly accepted” by looking at historical precision levels from the New York’s Office of the Medicaid Inspector General’s (“OMIG”) (or any other government agency’s) audits. While OMIG publishes their audit reports online, one cannot conduct a detailed analysis of historical precision levels as the information had never been contained in one clean, structured dataset – until now.

### BACKGROUND

OMIG routinely employs statistical sampling to assess whether healthcare providers receive higher reimbursements from the State of New York due to mistakes made in claims processing or the provision of medically unnecessary services. For each NY OMIG audit, information is reported on the statistical sampling process, the alleged overpayment calculation and determination and the extrapolated overpayment results.

FTI Consulting’s Applied Statistical Data Sciences team constructed a first-of-its-kind dataset consisting of Medicaid audit review metrics for providers in the State of New York. This dataset created by FTI Consulting contains information from hundreds of NY OMIG audits regarding sample sizes, extrapolated overpayments with associated confidence levels and various statistics regarding the sample and population from which the sample of claims was drawn.

## HOW FTI CONSULTING COLLECTED THE DATA

OMIG publishes summaries of their audits of healthcare providers on their website. The findings of each audit are reported in an audit summary, which can be viewed and downloaded as a PDF. While each audit summary can be easily viewed, the set of available audit reports is voluminous and would require several hours to download.

The first step in the data collection process involved parsing the HTML code of OMIG's website to identify all available PDF hyperlinks on the "Final Audit Reports" page. Next, a Python script downloaded all available audit reports and saved them to a directory. This second step was not trivial as OMIG blocks users that "ping" its website too frequently at regular intervals, like a dedicated denial-of-service ("DDoS") attack, which also uses a scraping script. An actual attack would ping a website so frequently that its servers would be overwhelmed, and they would not be able to respond to genuine users anymore. This is why users have to enter a "CAPTCHA" code on particular sites – to prove that "I am not a robot."

To overcome the obstacle of being perceived as an attacker and getting blocked from the OMIG website, we set the program to download the PDFs at very short, but random intervals. Fortunately, OMIG did not resort to blocking our Internet Protocol ("IP") address, otherwise we would have resorted to using a virtual private network service to hop IP addresses every time our IP was blocked. It is important to note that while all this sounds potentially nefarious, the whole exercise was within the law as we were only scraping public information. Use of these techniques for a DDoS attack or to get information that one does not have access to can have detrimental consequences.

As of June 2017, FTI Consulting downloaded 8,706 audit reports dating back to 2010. As of today, audit reports are only available for two years from the date of issue, so one cannot replicate the results we have at the same scale today. It is unknown whether the OMIG changed its website standard as a result of FTI Consulting's actions in 2017.

With the available audit reports downloaded, FTI Consulting was particularly interested in the statistical results pertaining to the sampling methodology and extrapolation of overpayments. See the example below.<sup>1</sup>

### SAMPLE RESULTS AND ESTIMATES

Universe Size	40,465
Sample Size	200
Sample Book Value	\$20,251.49
Sample Overpayments	\$1,172.90
Net Financial Error Rate	6%
Mean Dollars in Error	\$5.8645
Standard Deviation	24.51
Point Estimate of Total Dollars	237,307
Confidence Level	90%
Lower Confidence Limit	\$121,200

FTI Consulting used Python programs to analyze the available audit reports dating back to February 1, 2010. We parsed the data in each PDF and searched for key terms, such as "Lower Confidence Limit" and "Point Estimate," to identify whether the statistics of interest were available within the report.

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<sup>1</sup> New York State, Department of Health, Office of The Medicaid Inspector General. Review of Medical and Health Research Association of New York, Inc. Claims for Diagnostic and Treatment Center Services Paid from January 1, 2005 - December 31, 2006. Final Audit Report, Audit Number: 08-1010.

While there were many OMIG audits, only a very small percentage of the audit reports contained these statistics – 305 out of the 8,706 audit reports.

We then scraped the relevant information, assembled it into a database and reviewed it for accuracy.

### WHAT FTI CONSULTING FOUND

Key summary statistics from the 305 NY OMIG audit reports from February 2010 through June 2017 are reported directly below. These summary statistics reveal a high level of variability in these New York OMIG precision levels and do not allow for any definitive conclusions on what might be considered an “acceptable level” of precision.

	# of (non-missing) Observations	Mean	Min	25th Percentile	50th Percentile	75th Percentile	Max
Sample Size	305	142	50	100	100	200	1,168
Population Size	303	69,168	100	4,086	19,948	64,047	4,257,554
% of Population Sampled	303	5.1%	0.0047%	0.2%	0.6%	2.9%	100.0%
Extrapolated Overpayment	305	\$935,061	\$4,309	\$92,923	\$233,749	\$580,701	\$92,058,110
Lower Confidence Limit	305	\$602,277	\$347	\$29,292	\$92,431	\$309,955	\$66,190,140
Error Rate	82	17.4%	3.84%	6.4%	9.7%	22.3%	71.4%
Precision <sup>2</sup>	304	51.5%	3.4%	32.5%	52.0%	69.8%	99.7%

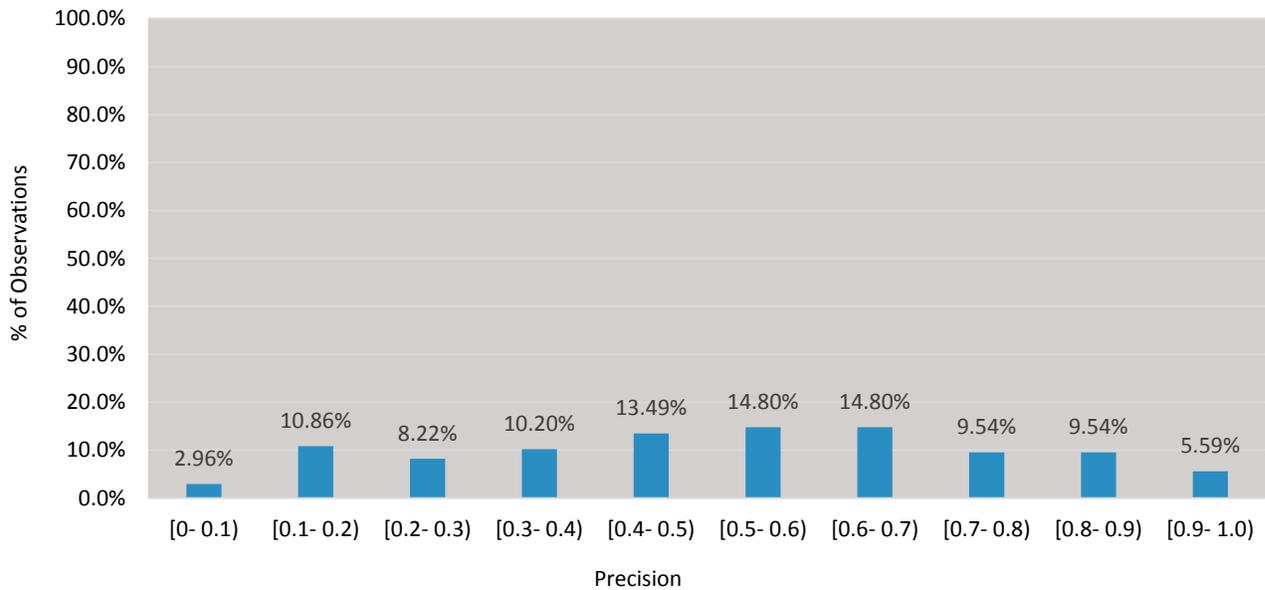
<sup>2</sup> There was one audit report in the dataset (Audit Number: 13-1434) where the reported mean point estimate was smaller than the lower confidence limit. The precision value from this audit report was excluded from our calculations.

One of the first questions that attorneys usually ask a statistician about any sample is "if the population is so large, isn't this sample size too small for reliable extrapolation?" FTI Consulting looked at the sample sizes in these audits and had the findings listed directly below. Notably, OMIG's sample size selected is almost always 100, 150 or 200.

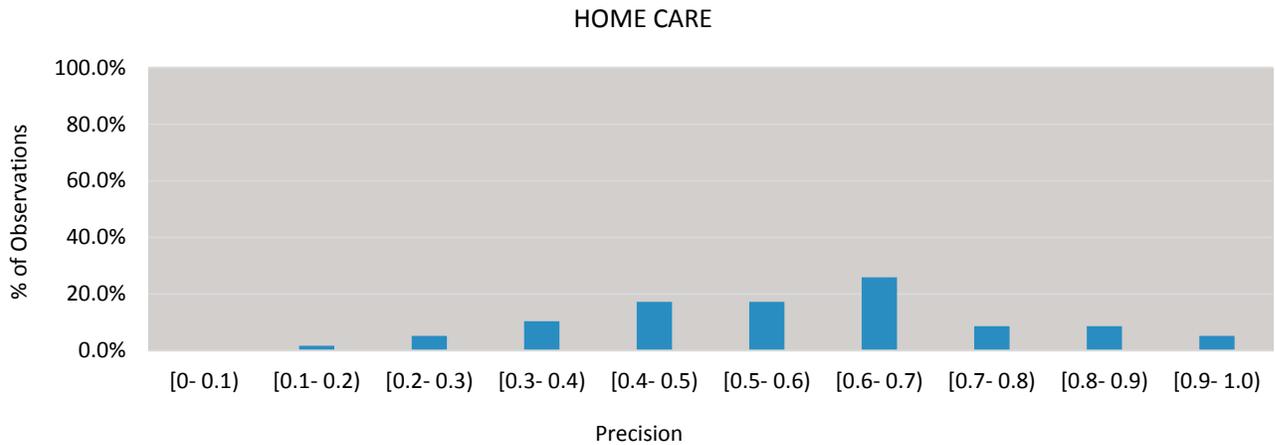
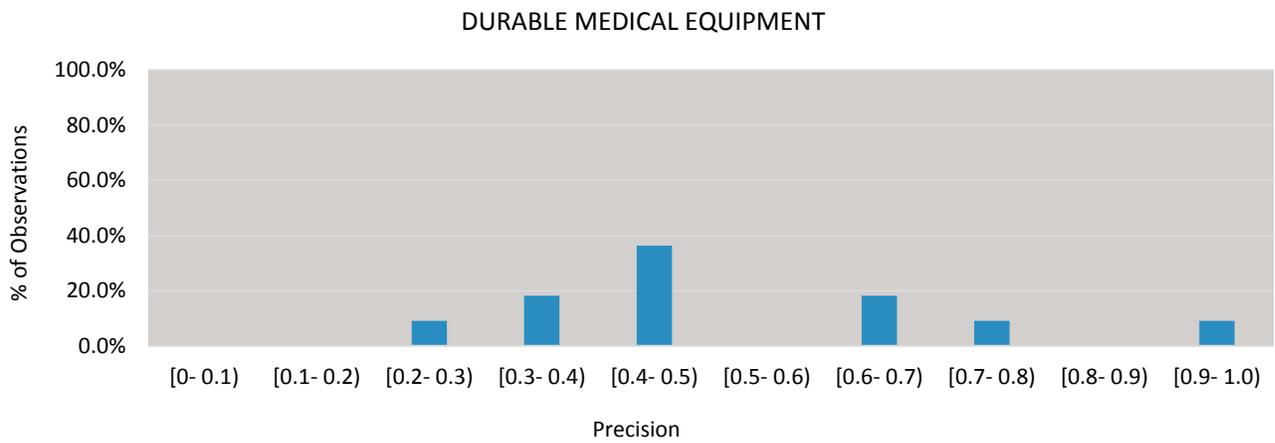
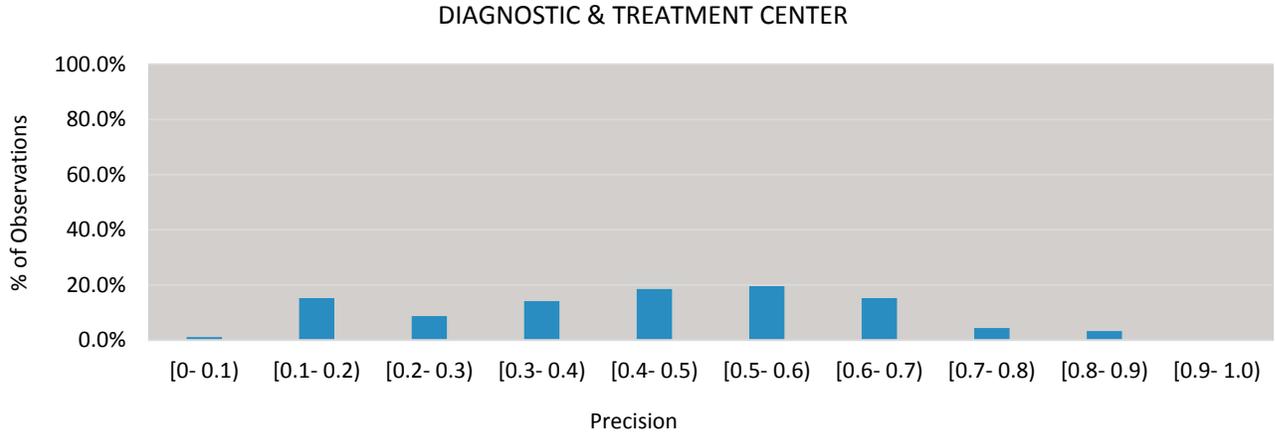
Services in Sample	Frequency	Percent
50	1	0.33%
61	1	0.33%
63	1	0.33%
73	1	0.33%
96	1	0.33%
100	170	55.74%
150	31	10.16%
185	1	0.33%
200	85	27.87%
244	1	0.33%
250	6	2.95%
300	2	0.66%
1,168	1	0.33%

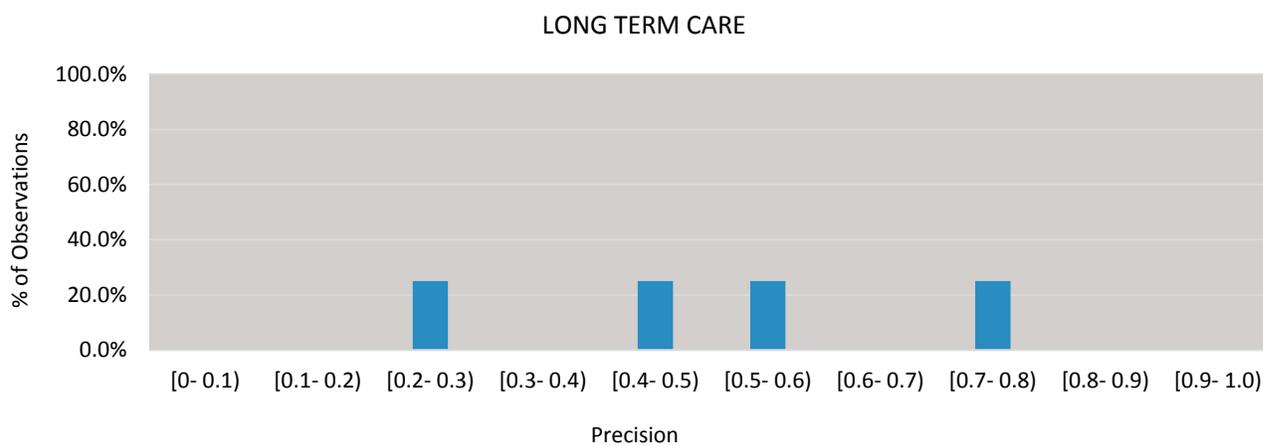
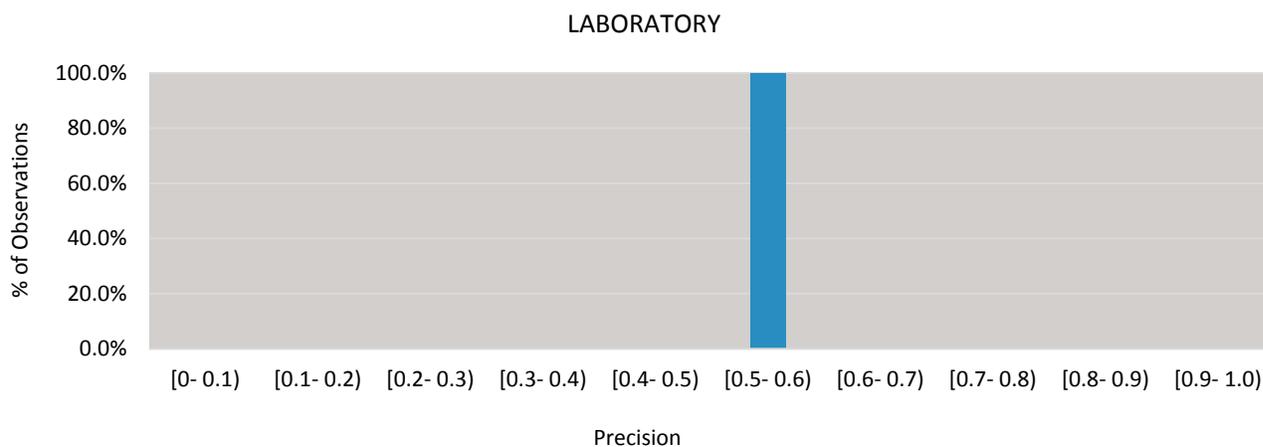
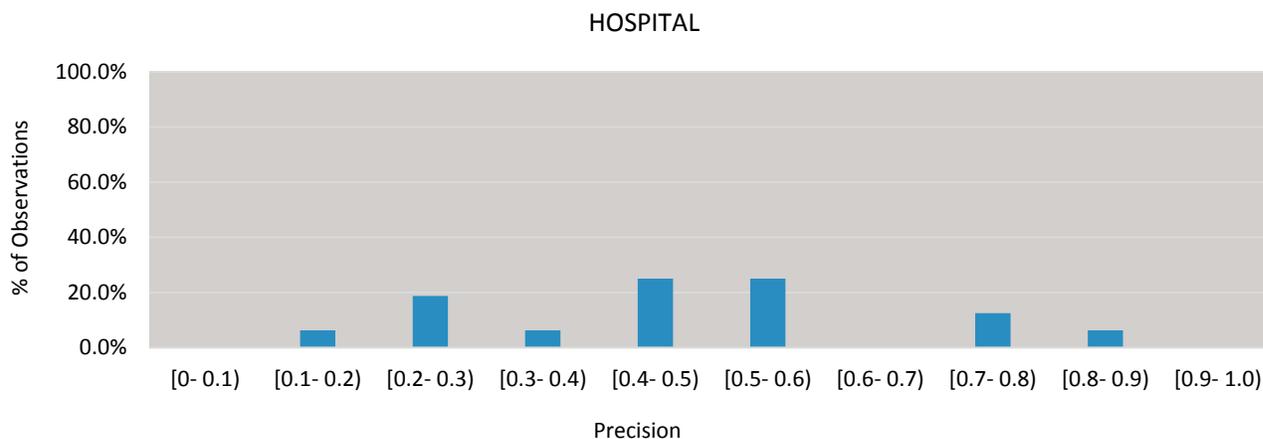
Precision levels accepted in OMIG audits have a wide dispersion with a range from 3.4 percent to nearly 100 percent with a median of 52 percent.

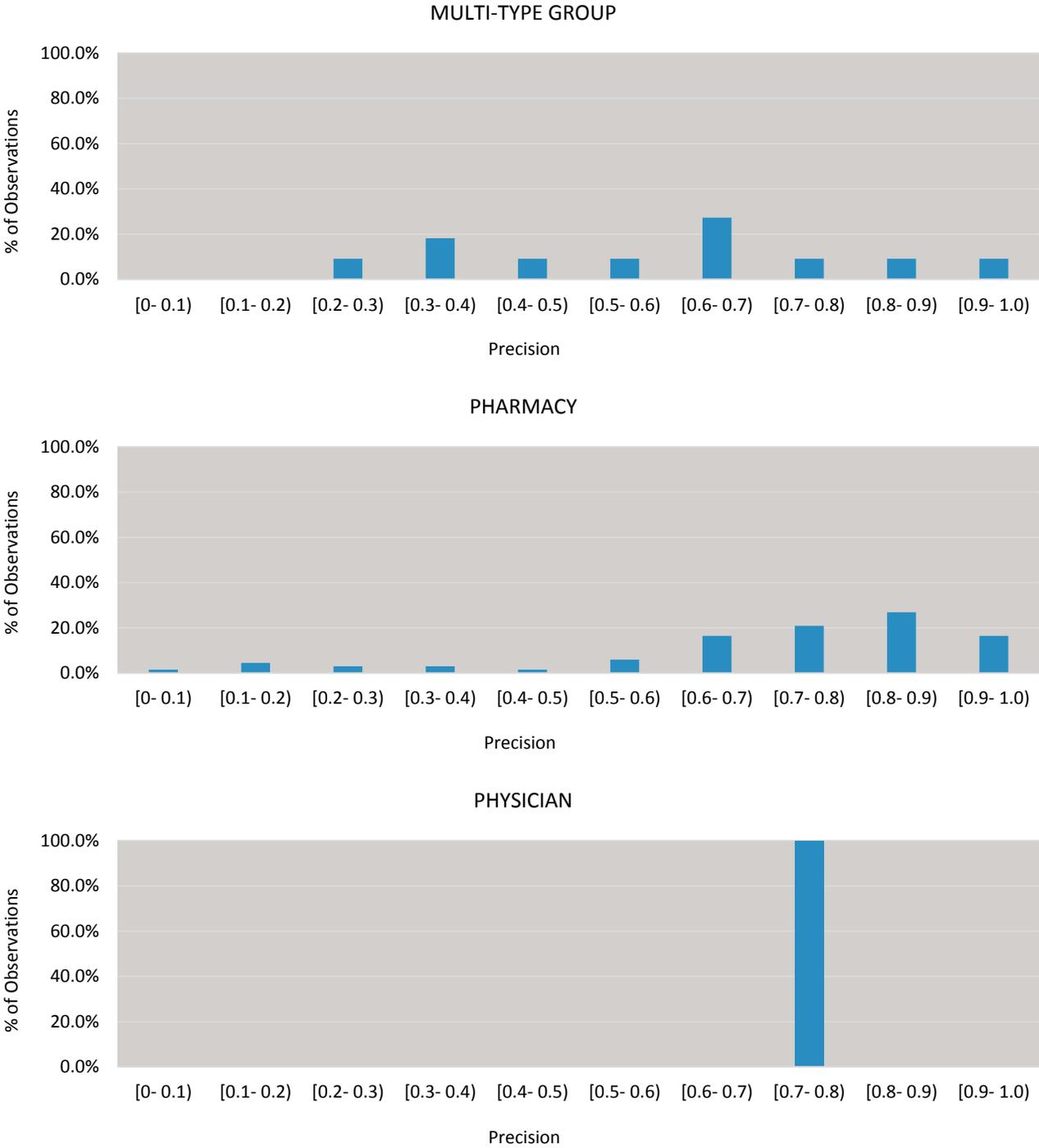
HISTOGRAM OF PRECISION LEVELS

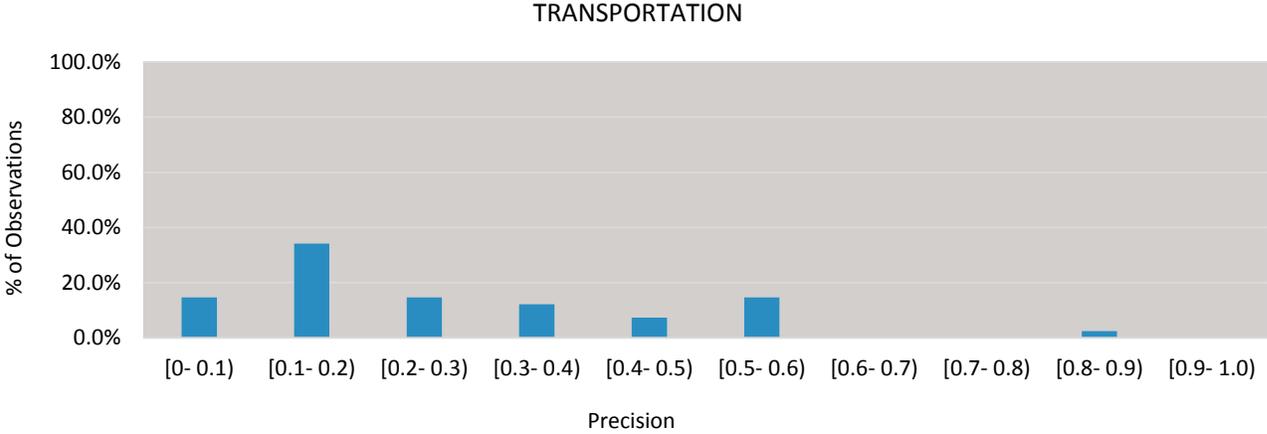
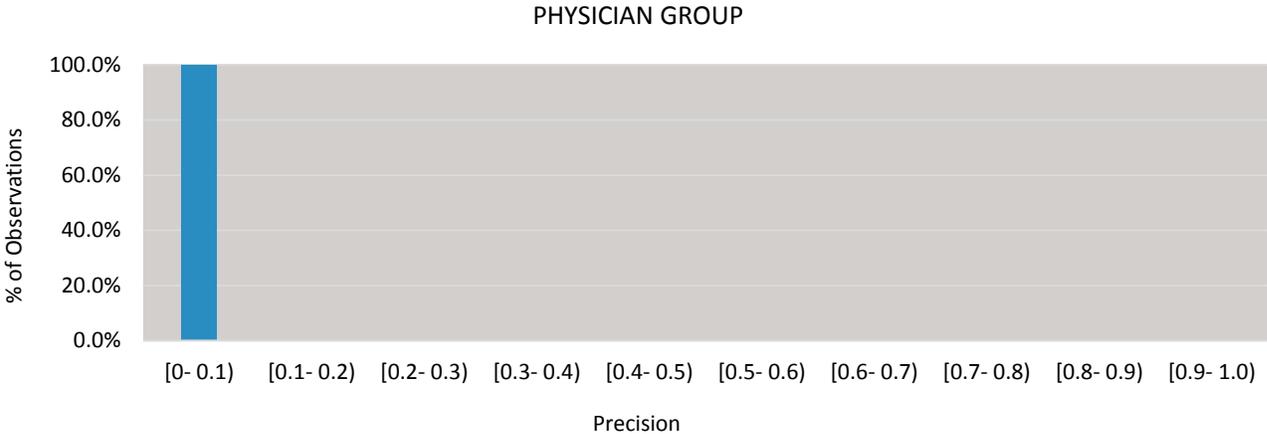


The distribution of precision levels varies considerably by the type of provider (i.e., Hospital, Pharmacy, etc.).









## CONCLUSION

Until now, no one has looked comprehensively at historical healthcare audits by the New York OMIG to determine if there was an acceptable or reasonable precision level used in its overpayment estimations. This was mainly due to the fact that these audit reports were not accessible for use in a comprehensive analysis. FTI Consulting was able to use web scraping software and combine it with data analysis to reveal the descriptive statistics of the results of years of healthcare auditing in New York State. There was no limit placed on the overpayment precision levels of these audits. There was also no indication in the audit reports themselves of any thresholds or requirements for a precision level to be deemed appropriate or reasonable for purposes of extrapolating a sample result to a population. Some of the key findings of this analysis are the following:

- In the majority of the audits, NY OMIG uses a sample size of 100.
- In the majority of the audits, NY OMIG samples less than 1 percent of the population.
- In the majority of the audits, NY OMIG uses overpayment estimates with precision levels that are worse than 50 percent and can even reach very close to 100 percent.
- In the majority of the audits, NY OMIG found an error rate less than 10 percent.

FTI Consulting’s Applied Statistical Data Sciences team constructed a first-of-its-kind dataset consisting of Medicaid audit review metrics for providers in the State of New York to be able to report these statistics. This analysis required both computer science programming tools and applied statistics data analysis.

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## About FTI Consulting

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