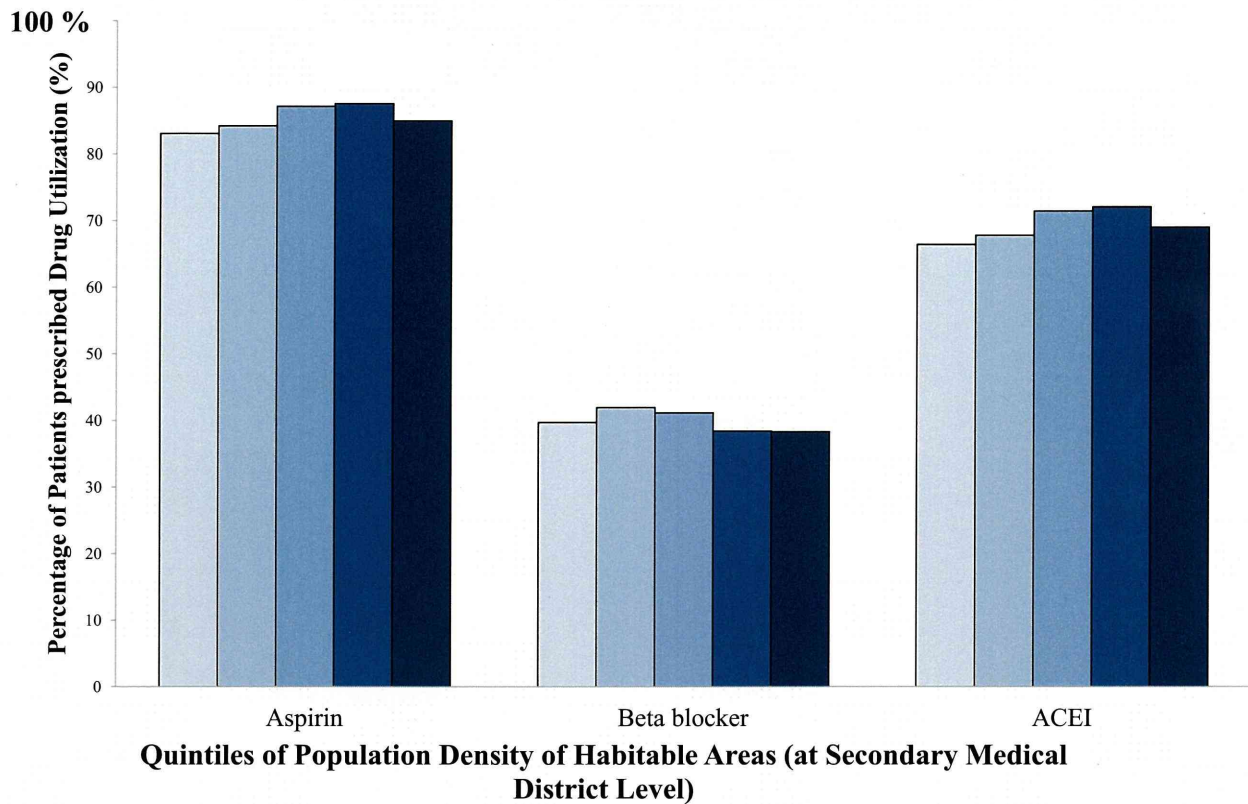


Percentage of Patients prescribed Aspirin, Beta blockers and ACEI by Quintiles of Population Density of Habitable Areas



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Summary-Hospital Analysis 1: AMI

Higher Quality in Process and Outcome in Higher Spending Subgroup

Hospital Spending varies according to Availability of Surgery/PCI and CCU/ICU.

Hospital Spending varies according to Number of Beds, Physicians, Nurses etc in Hospital.

Intensive Resources enable high performance in process and outcome.

Variations in Outcomes in AMI Patients by Hospital Competition Quintiles (at Secondary Medical District Level)

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The Effects of Hospital Competition and Case Volume on Mortality in AMI Patients

- **Hospital Competition: Herfindahl-Hirschman Index (HHI) was used**
 - Frequently used in economics as an indicator of competition
 - Considers not only the number of hospitals existing within the market area, but also the market share of the region
 - HHI value of 0 represents Perfect Competition, while a value of 1 represents Monopoly (or Oligopoly)
- **AMI Case Volume over a three-year period**
 - Estimated on the basis of the claims data of partial periods, which are then extrapolated to the full three-year period

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Example of Herfindahl-Hirschman Index (HHI) Calculation

	Hospitals					
	A	B	C	D	E	F
Proportion of Case volume within the market	0.35	0.25	0.20	0.15	0.03	0.02

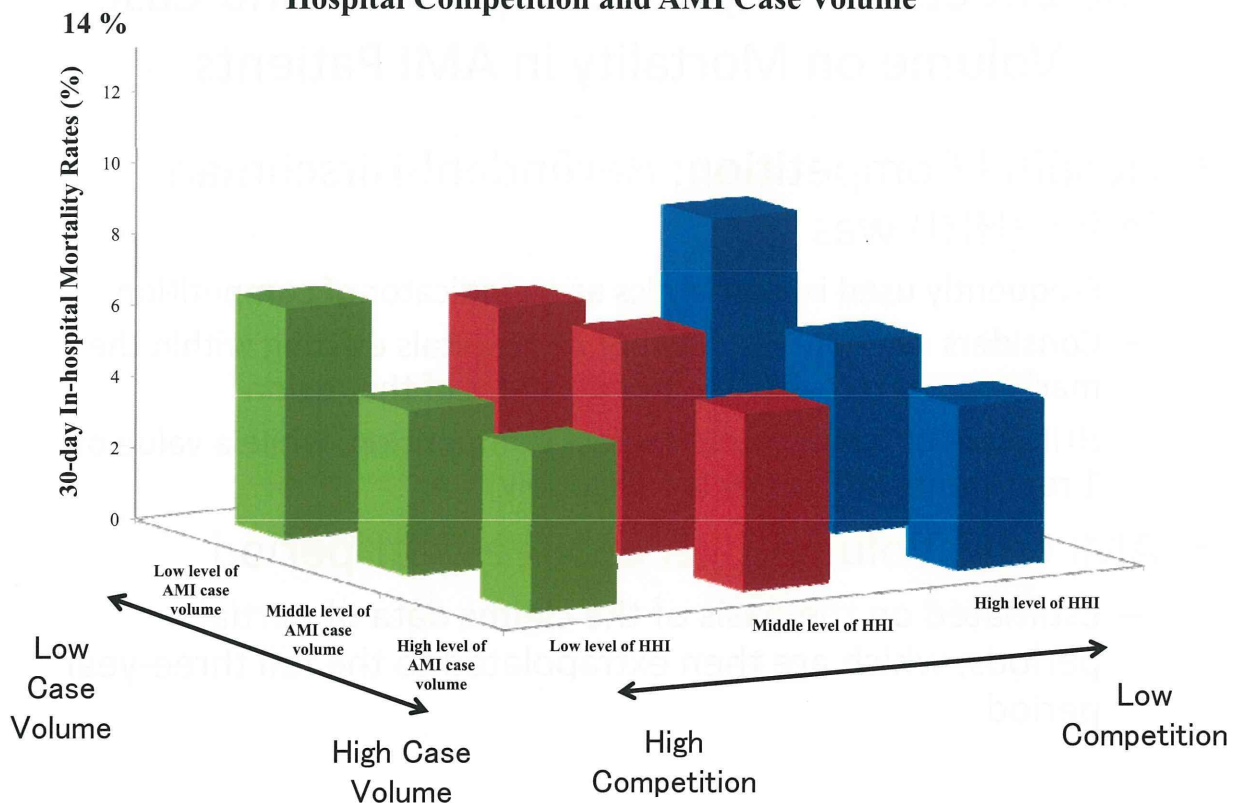
$$\begin{aligned}
 \text{HHI} &= (0.35)^2 + (0.25)^2 + (0.20)^2 + (0.15)^2 + (0.03)^2 + (0.02)^2 \\
 &= 0.1225 + 0.0625 + 0.04 + 0.0225 + 0.0009 + 0.0004 \\
 &= \mathbf{0.2488}
 \end{aligned}$$

HHI value of

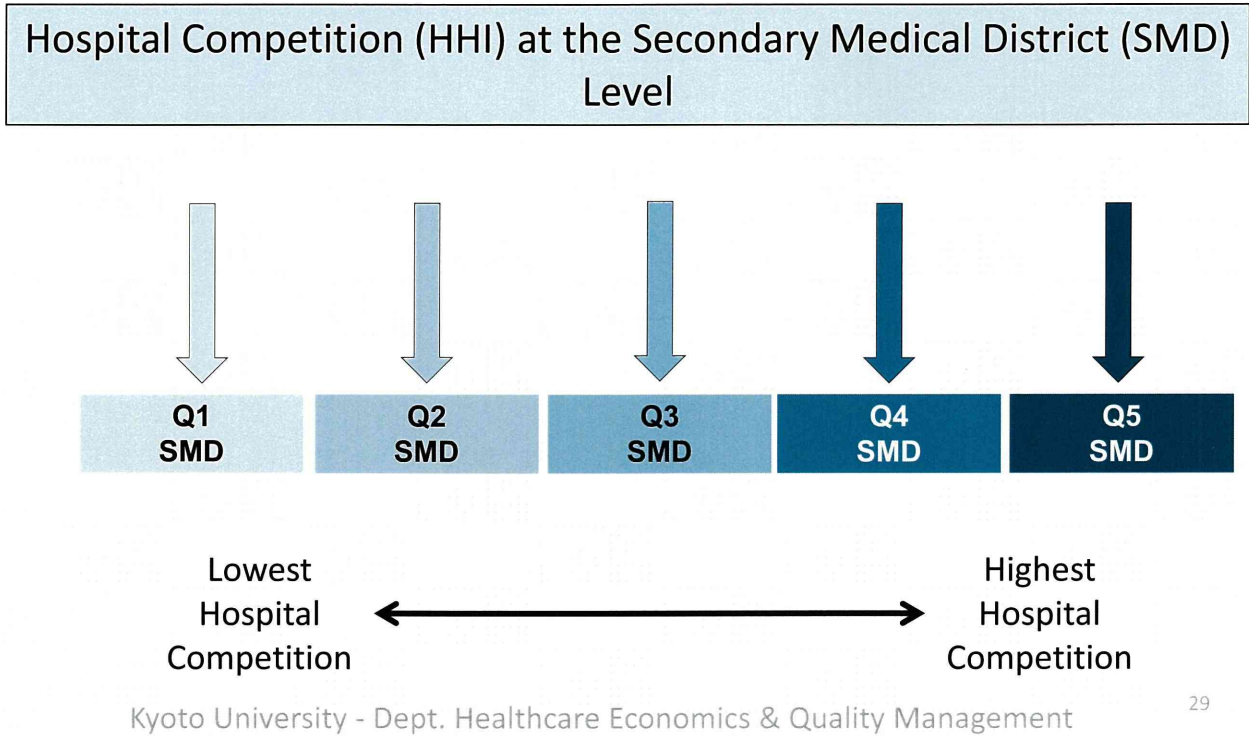
0 represents Perfect Competition

1 represents Monopoly (or Oligopoly)

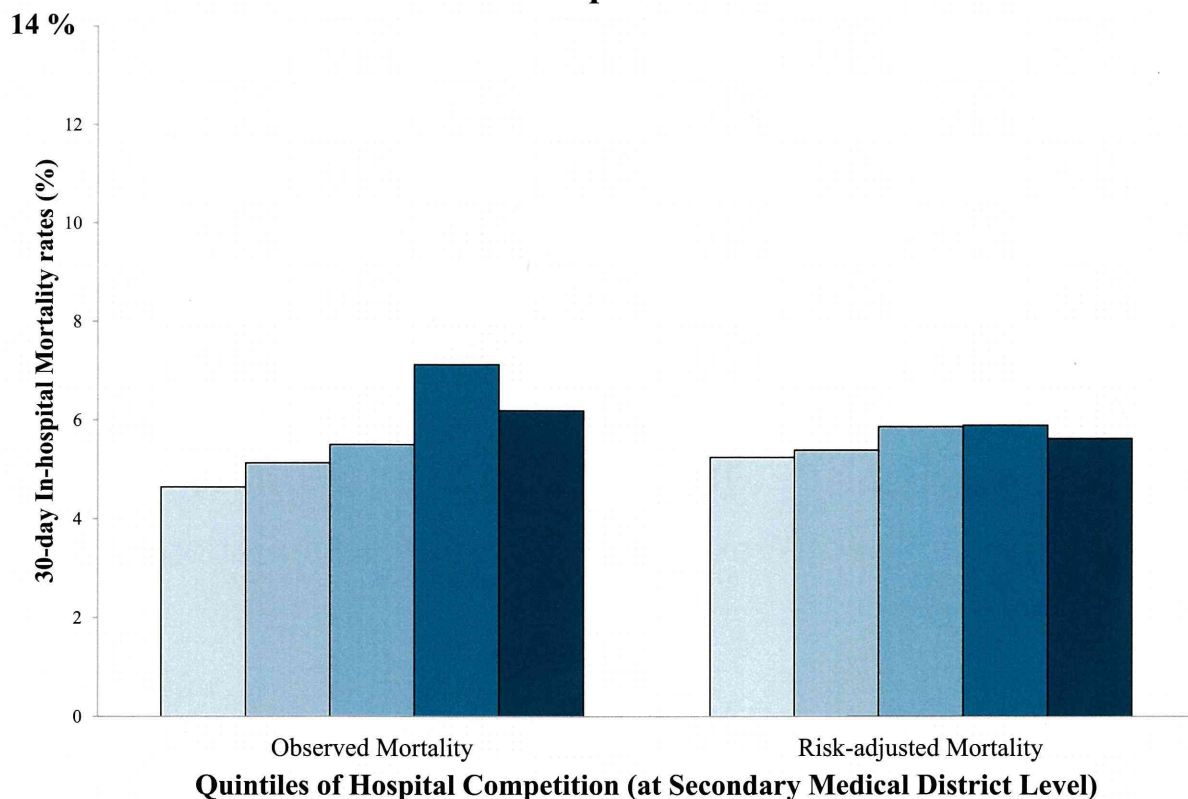
30-day In-hospital Mortality Rates in AMI Patients by the degree of Hospital Competition and AMI Case Volume



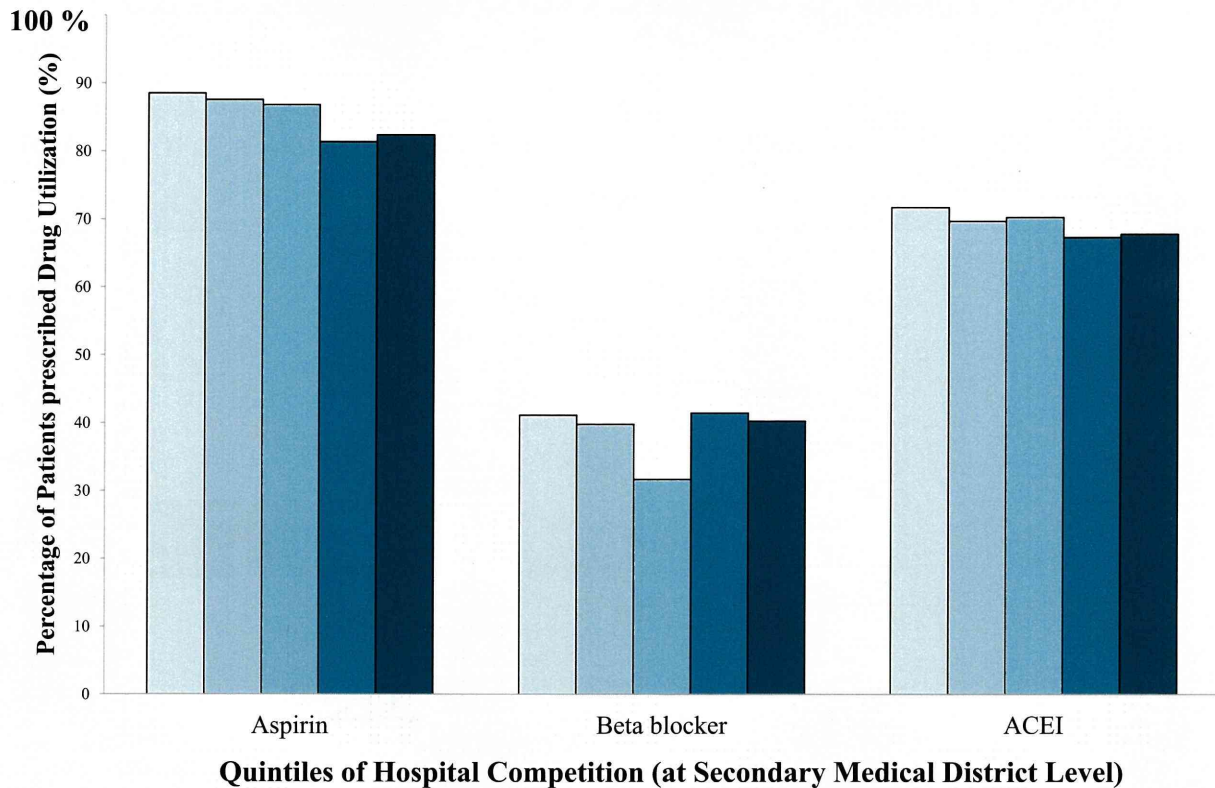
Hospital Competition Quintiles



30-day In-hospital Mortality Rates by Quintiles of Hospital Competition



Percentage of Patients prescribed Aspirin, Beta blockers and ACEI by Quintiles of Hospital Competition



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Summary- Hospital Analysis 2: AMI

Outcome correlates with Case Volume.

Besides,

Outcome correlates with Regional Competitive Status,

But, NOT with Regional Population Density

(Proxy of the degree of urbanization)

2. Kyoto Prefecture Project

- Claims data from all hospitals in Kyoto Prefecture
- Project conducted in close cooperation with the Kyoto Prefectural Government
- Information on patient and hospital regions, diagnoses, procedures, drug administration

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Kyoto Prefecture: One of 47 Prefectures in Japan

~ 1,781 sq miles

~ Population of 2.6 million

with 1.5 million people concentrated in Kyoto City

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Source: Google Maps

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Kyoto Prefecture:

- Divided into **26 Municipalities** including Kyoto City
- Kyoto City itself is further divided into **11 Wards**



Source: MapFan Japan

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Regional Variations in Quality of Care by Spending Quintiles (at Municipality Level) - Ischemic Stroke -

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- **Sample**

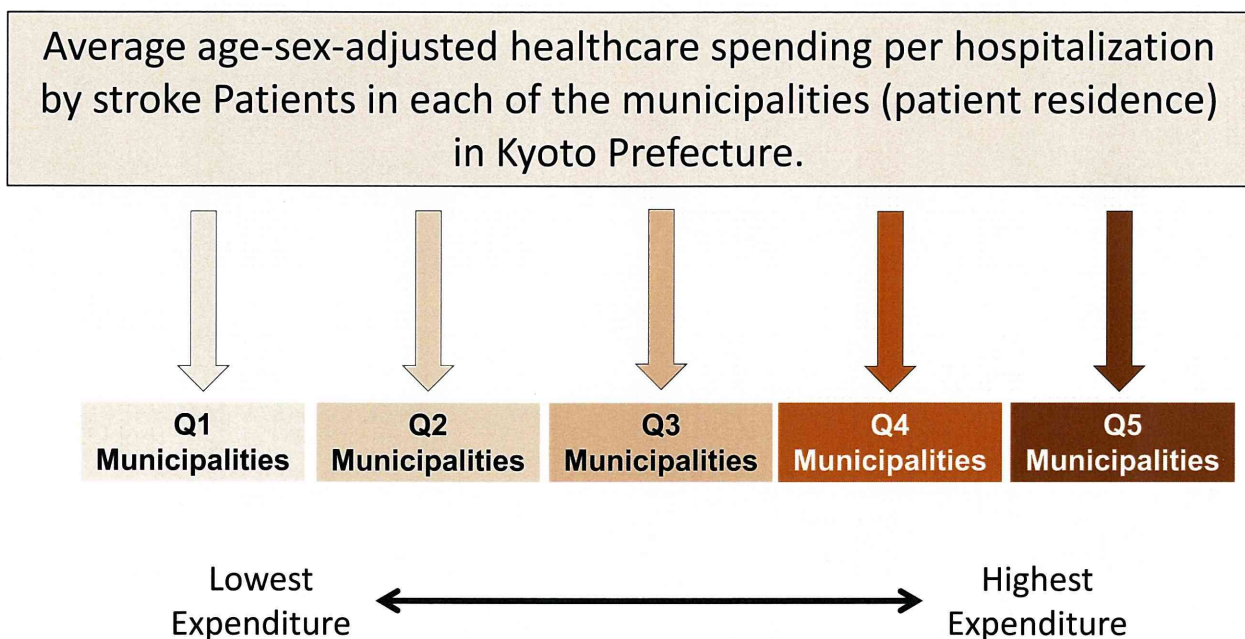
- 3,683 Patients admitted to 40 Kyoto Hospitals from 2009 to 2010 due to Ischemic Stroke

- **Measures**

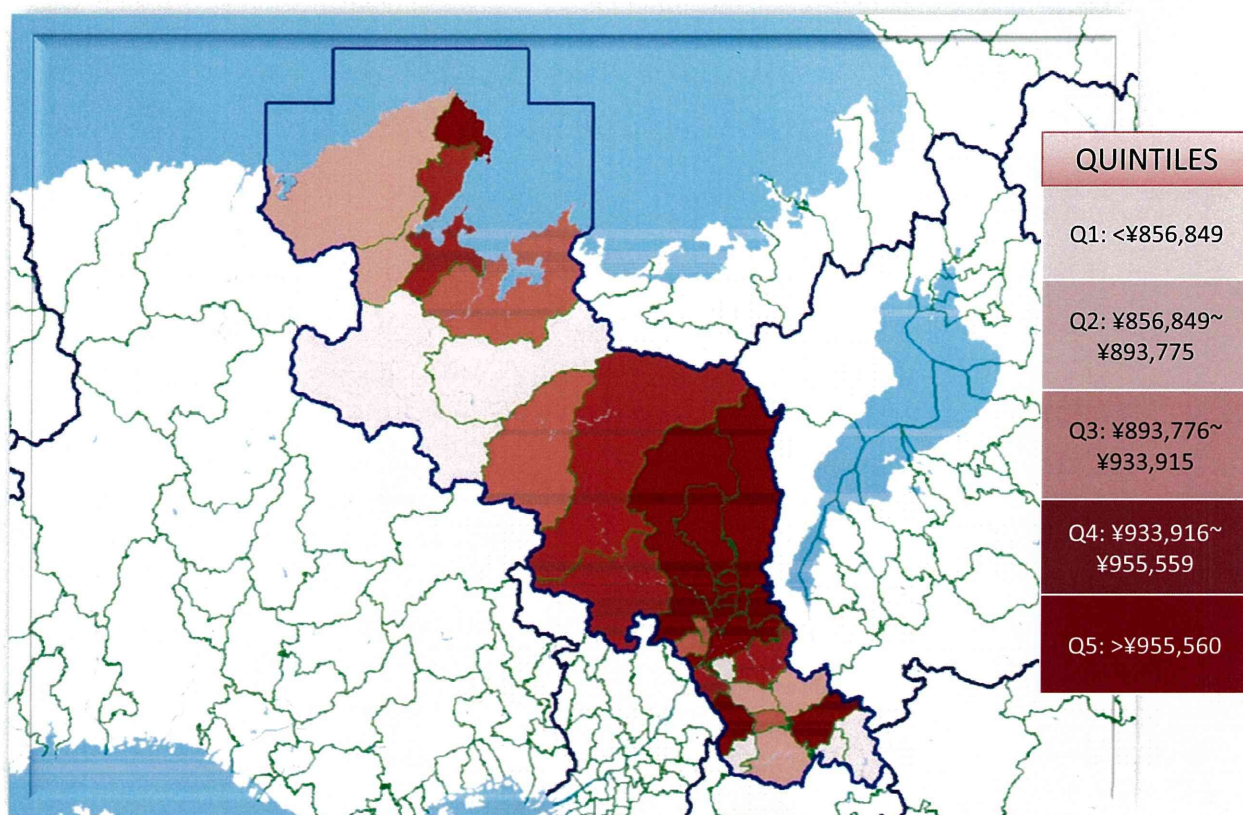
- Hospital Spending: Quintiles of Age-Sex-adjusted hospital spending
- Process Indicators: CT or MRI Scans, Sonogram/MRA/CTA Scans, Blood Lipid and Glucose Tests, Rehabilitation, Antithrombolytic drug administration, Warfarin in AF patients, t-PA Administration
- Outcomes Indicators: Mortality

- **Risk-Adjustment**

- Patient Age, Sex, Comorbidities, Length of Stay
- Hospital Teaching Status, DPC Status, Bed Numbers, Ownership



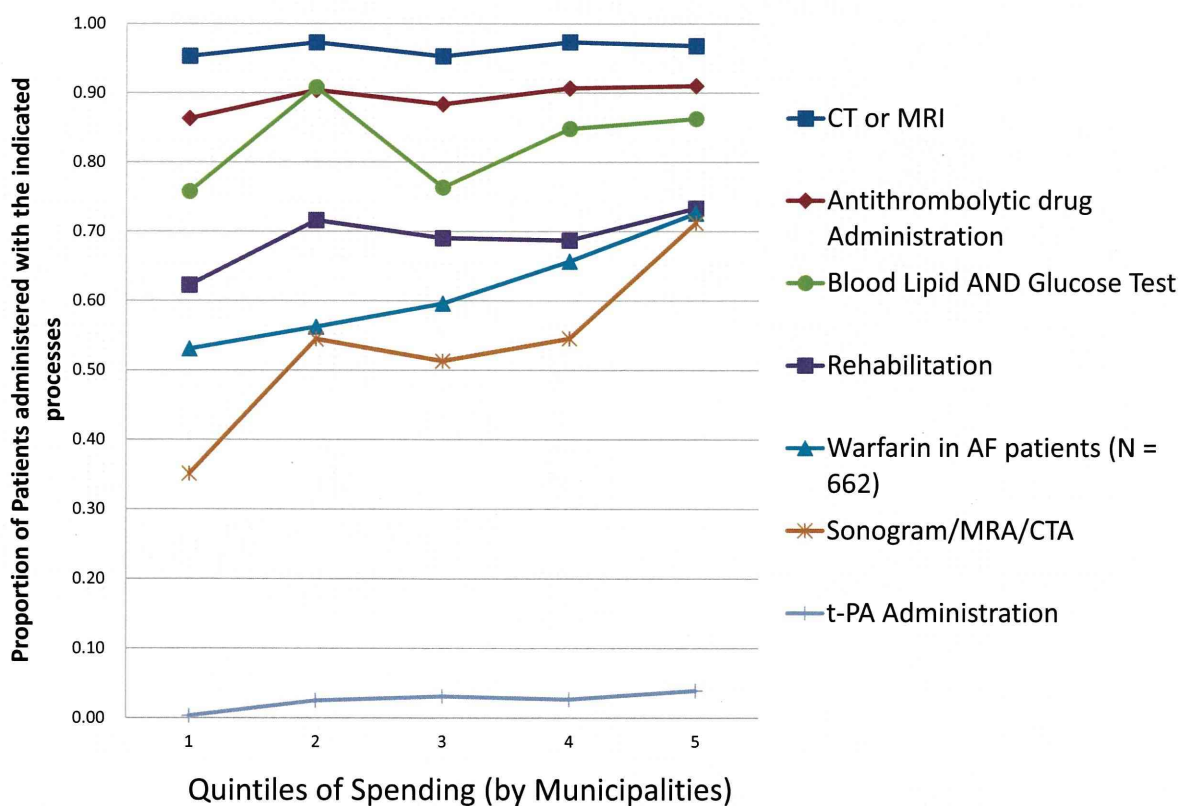
Spending Quintiles by Patient Residence Municipalities



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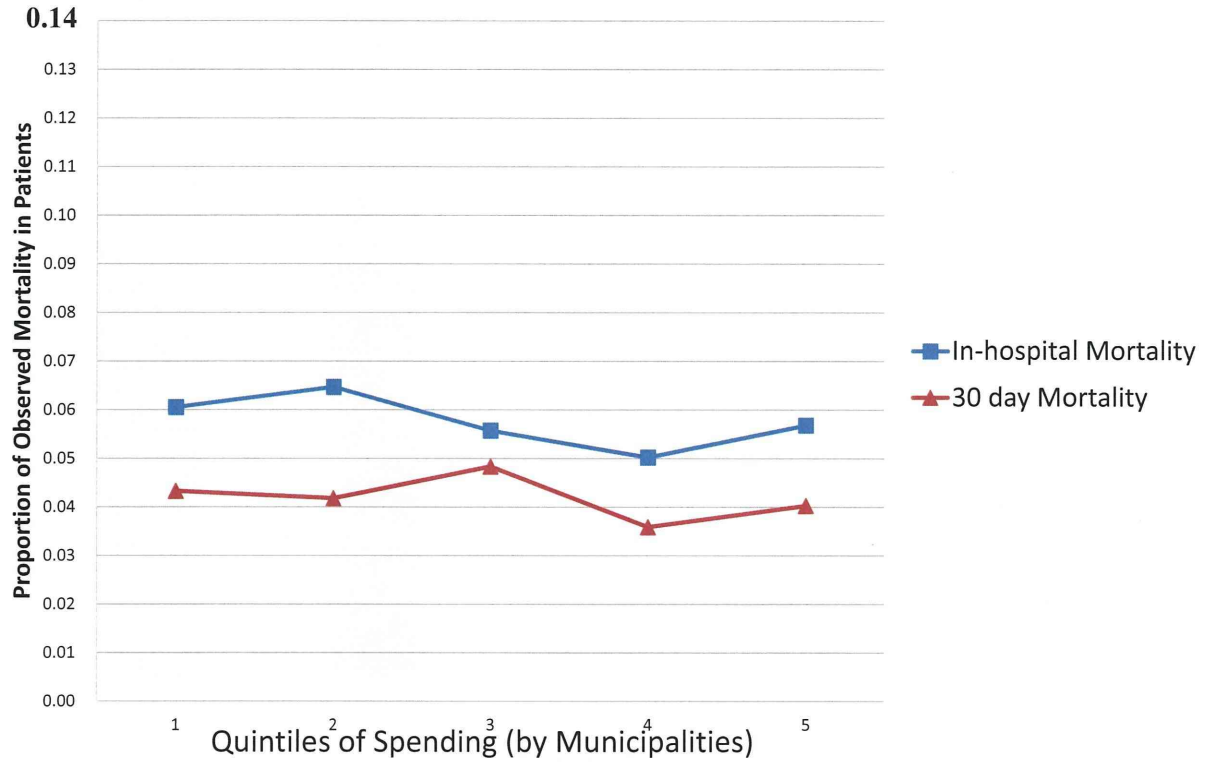
Process Indicators for Stroke Patients (by Spending Quintiles)



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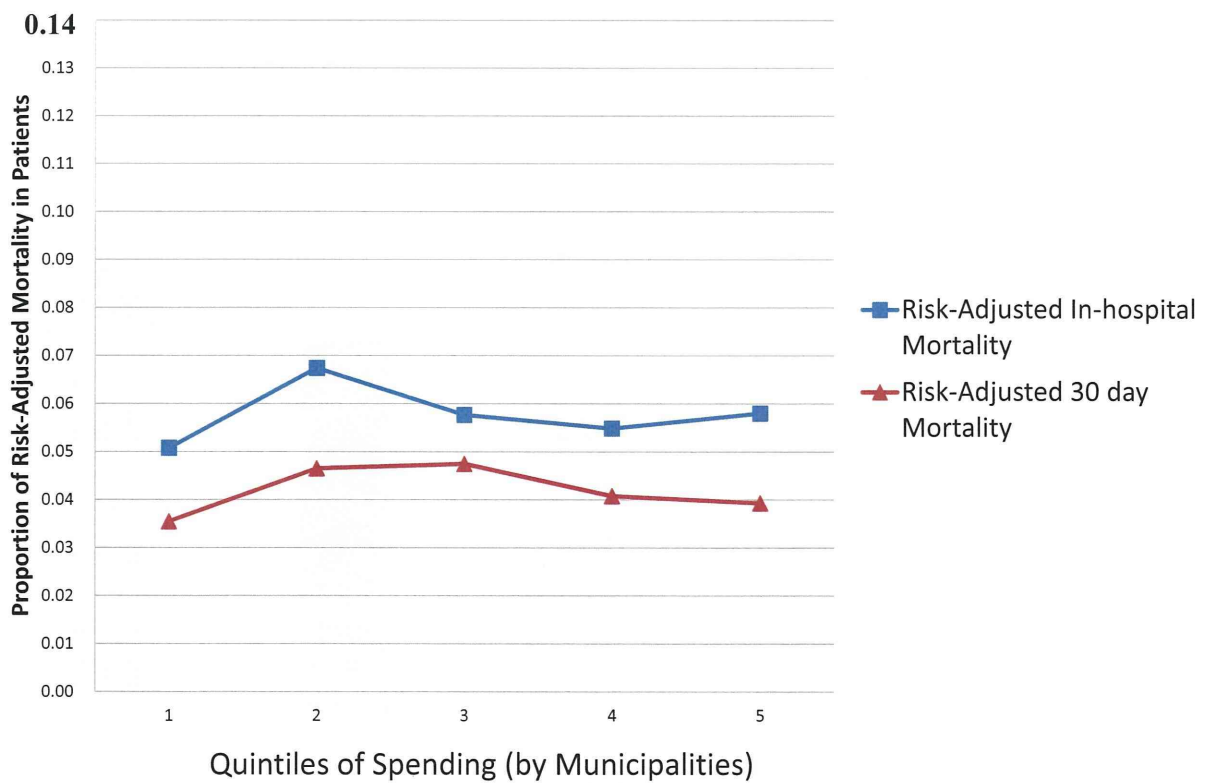
Observed Mortality within Stroke Patients (by Spending Quintiles)



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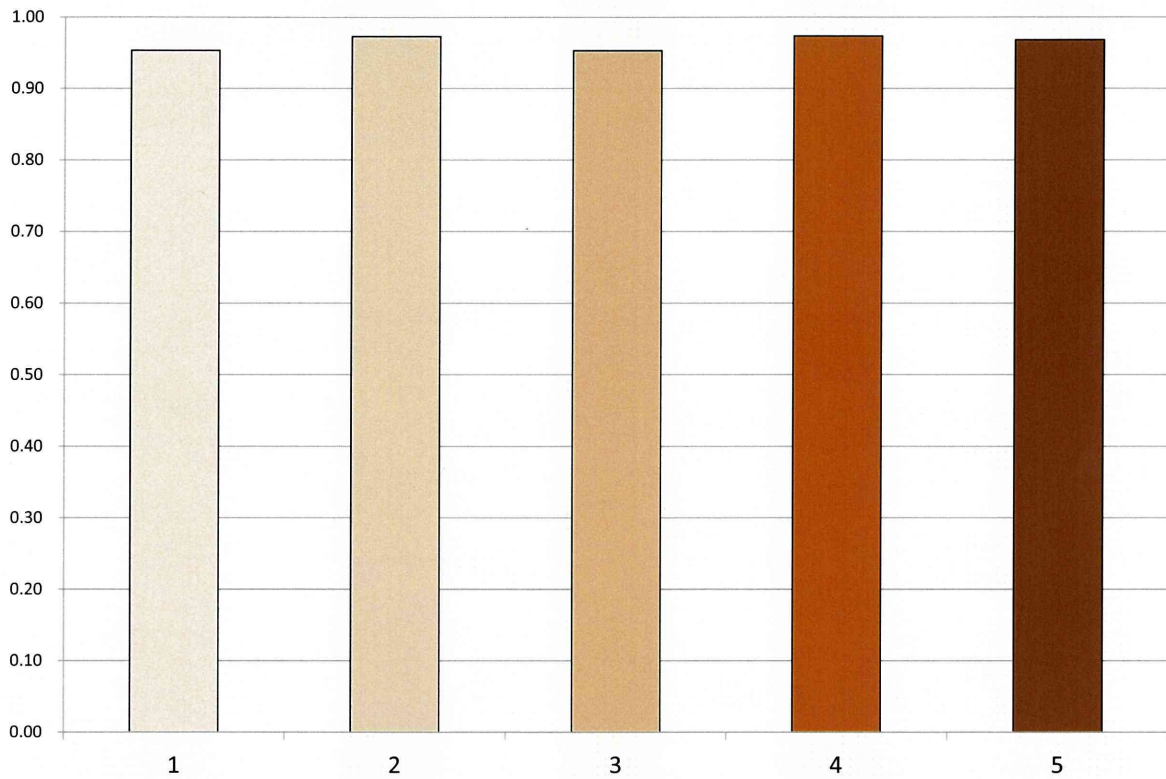
Risk-Adjusted Mortality within Stroke Patients (by Spending Quintiles)



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Proportion of Patients given CT or MRI Scans

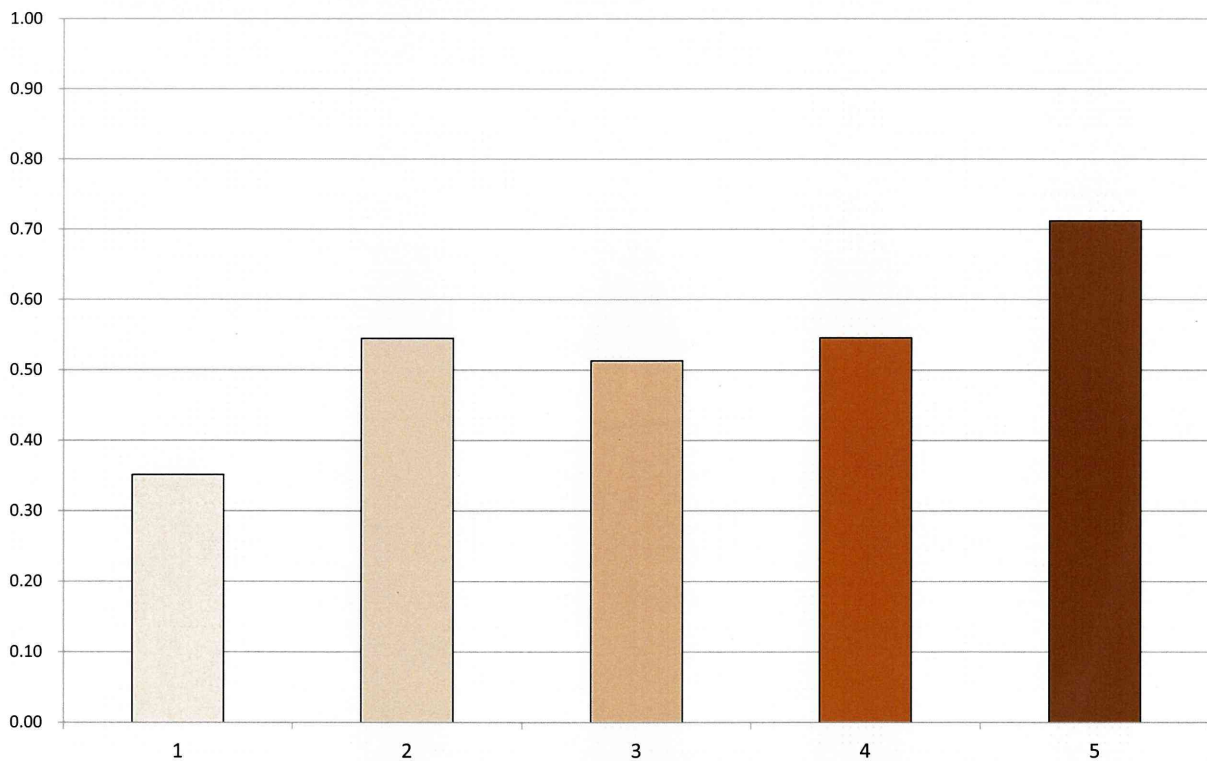


Quintiles of Spending (by Municipalities)

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Proportion of Patients given Sonogram/MRA/CTA

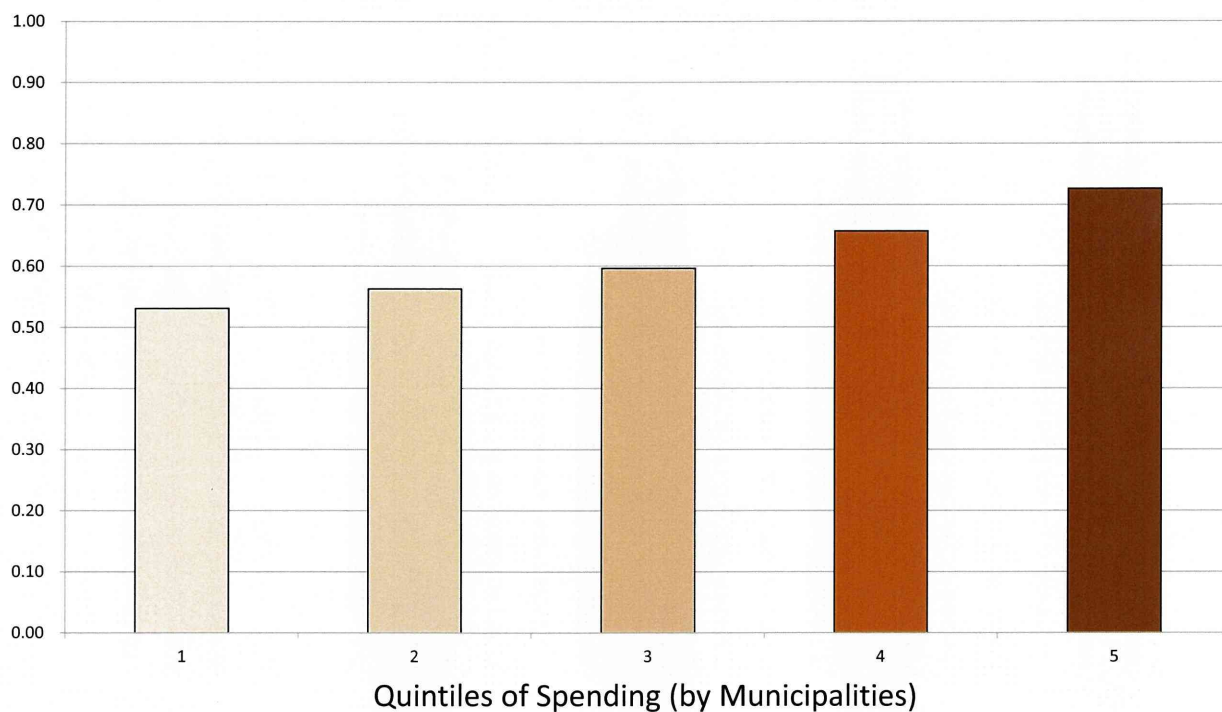


Quintiles of Spending (by Municipalities)

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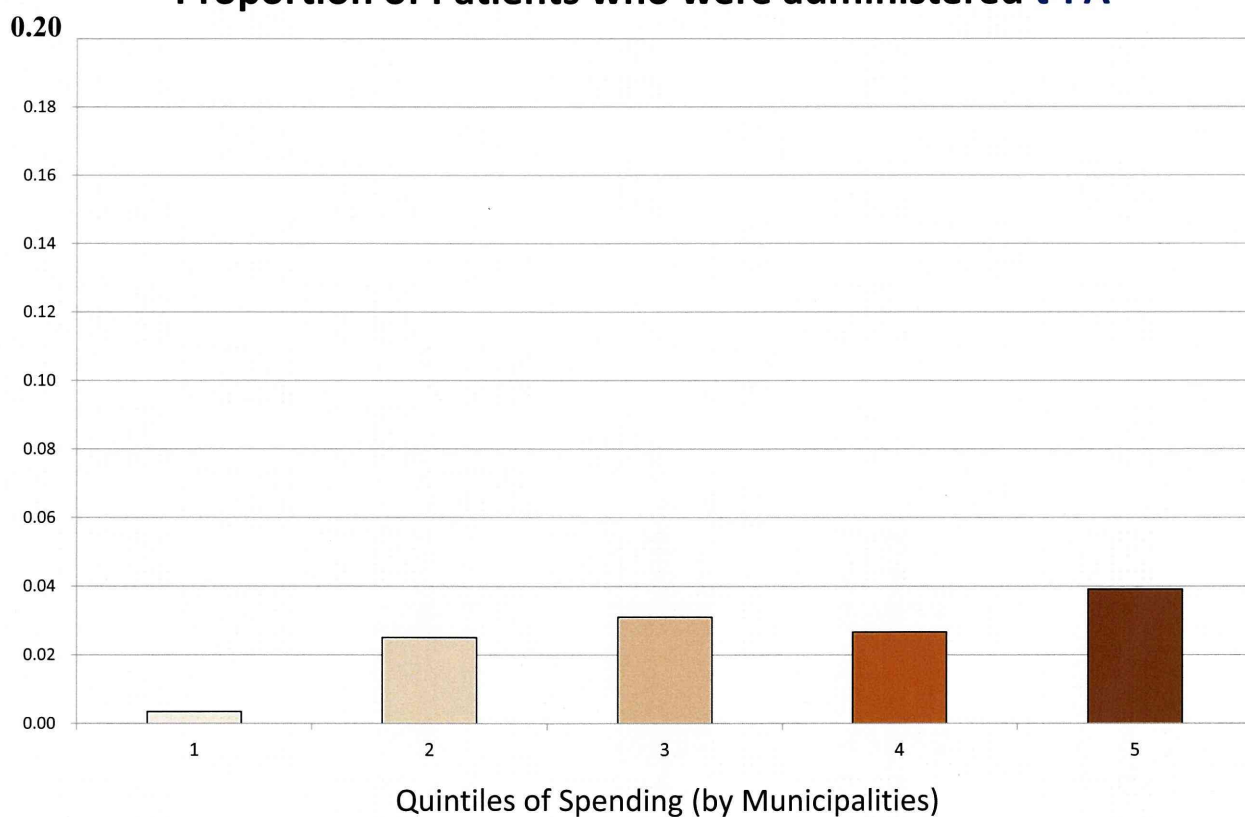
Proportions of Patients with Atrial fibrillation who were administered Warfarin



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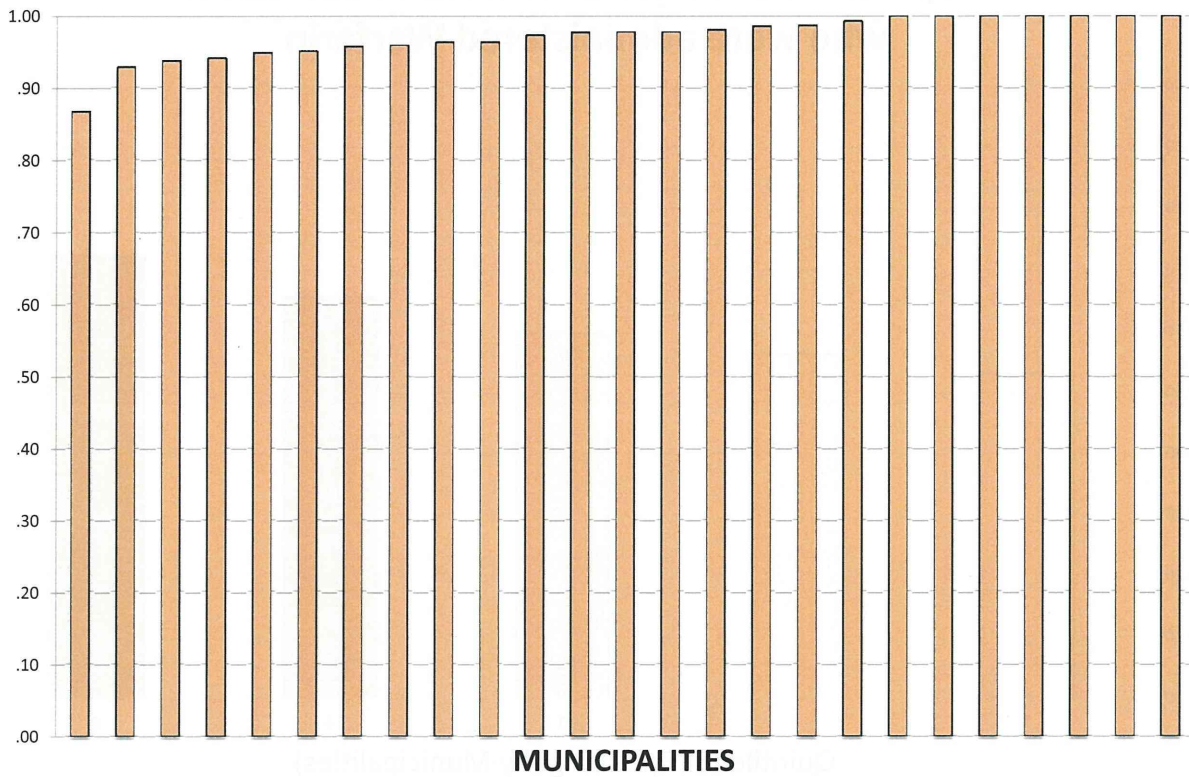
Proportion of Patients who were administered t-PA



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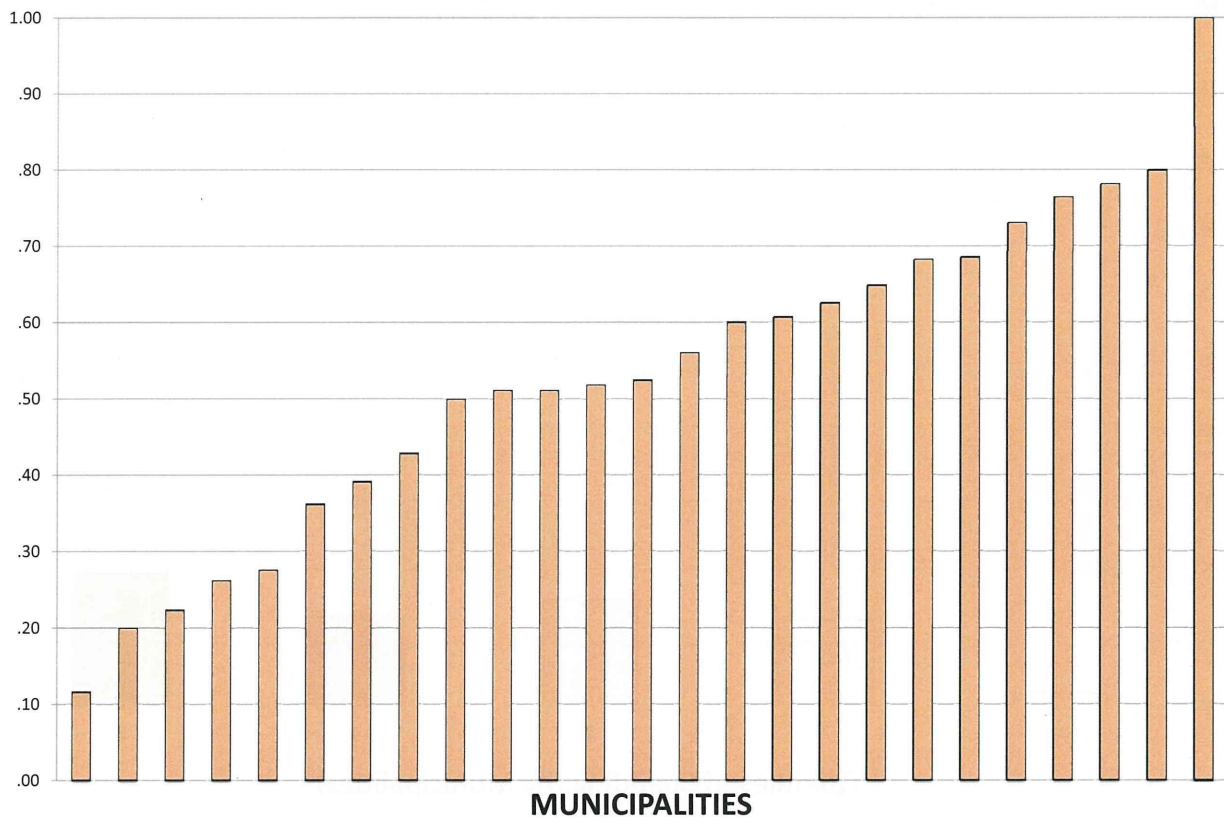
Proportion of Patients given CT or MRI Scans



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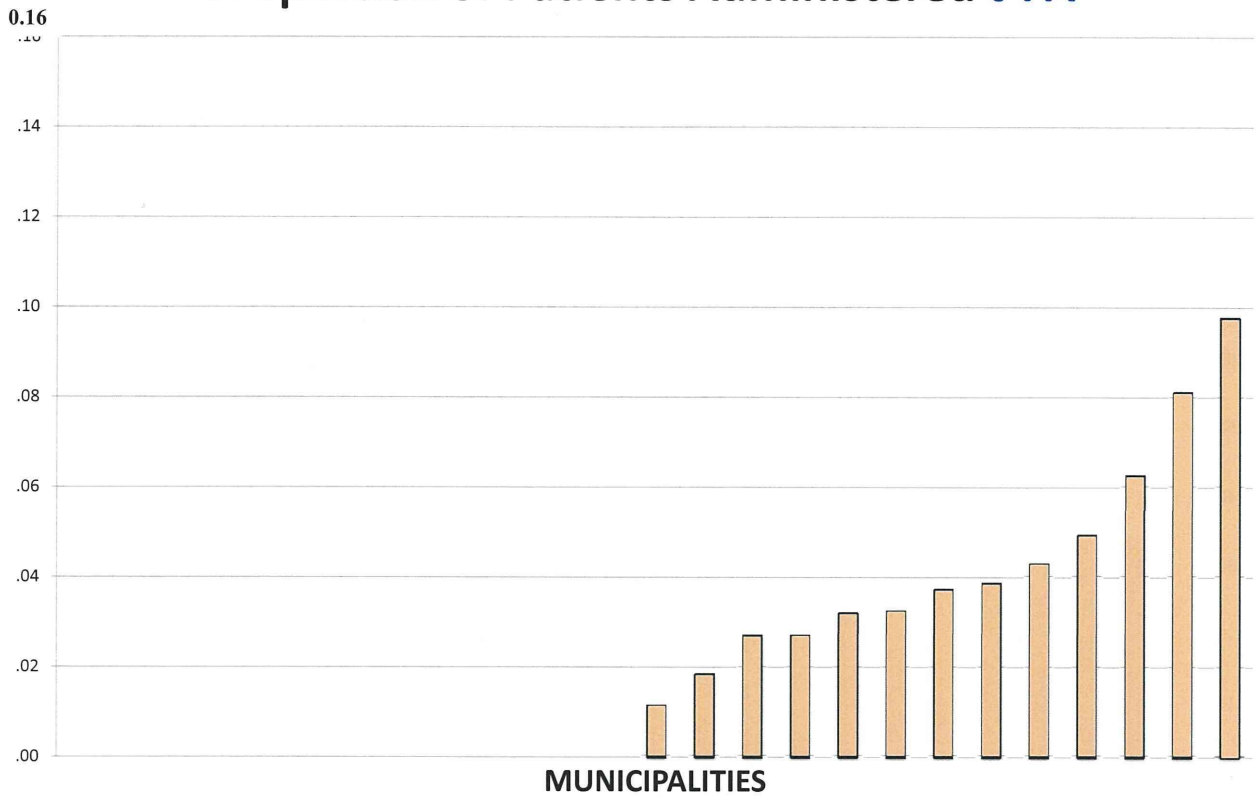
Proportion of Patients given Sonogram/MRA/CTA



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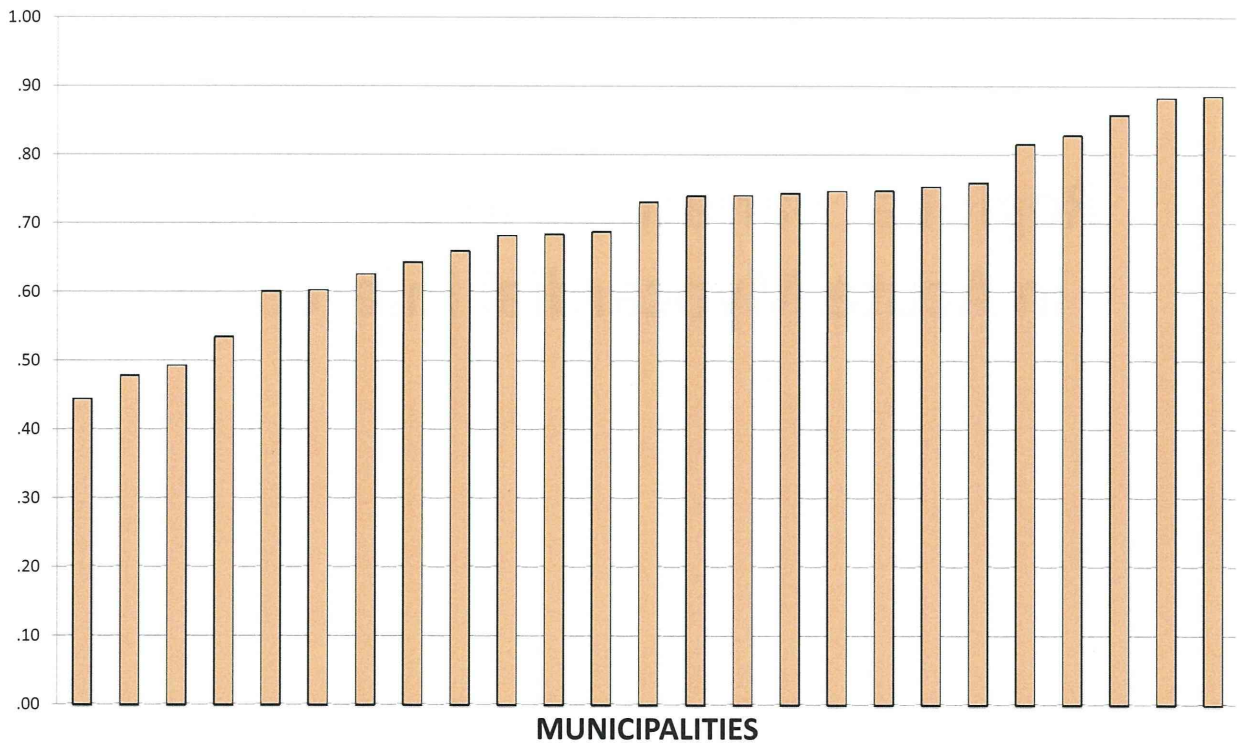
Proportion of Patients Administered t-PA



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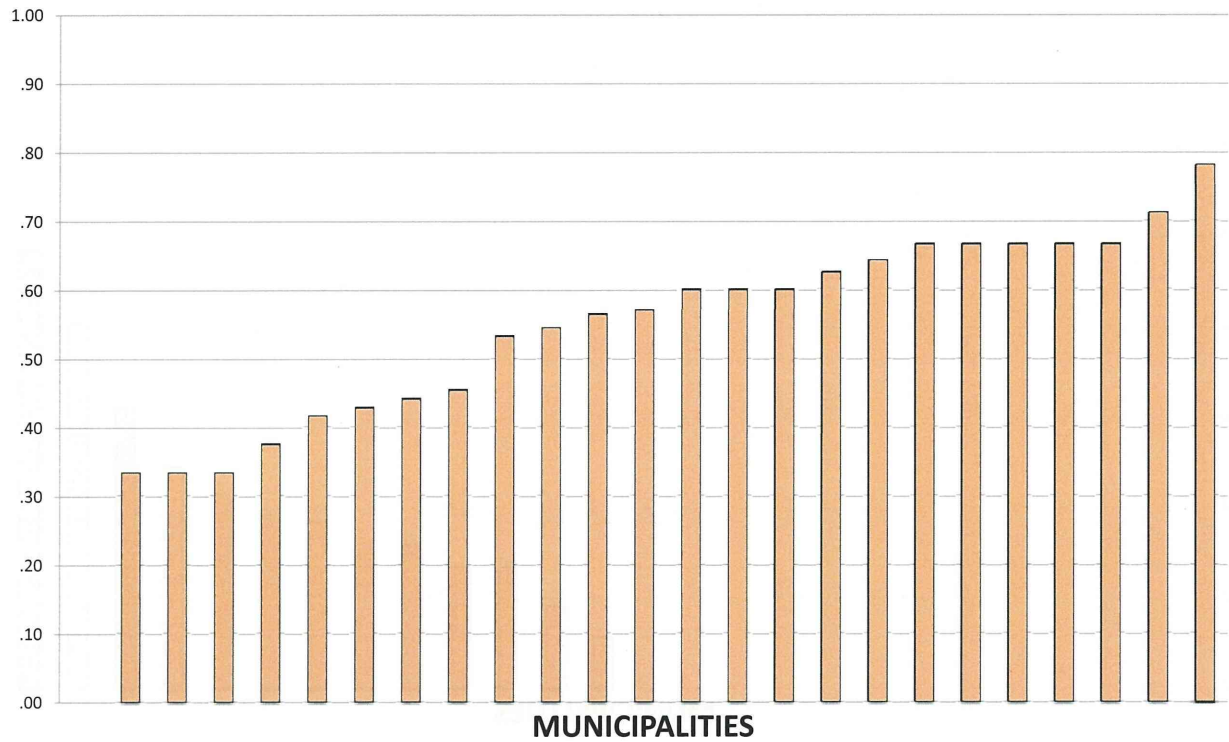
Proportion of Patients who had undergone Rehabilitation during Hospitalization



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Proportion of Patients with Atrial fibrillation who were administered Warfarin



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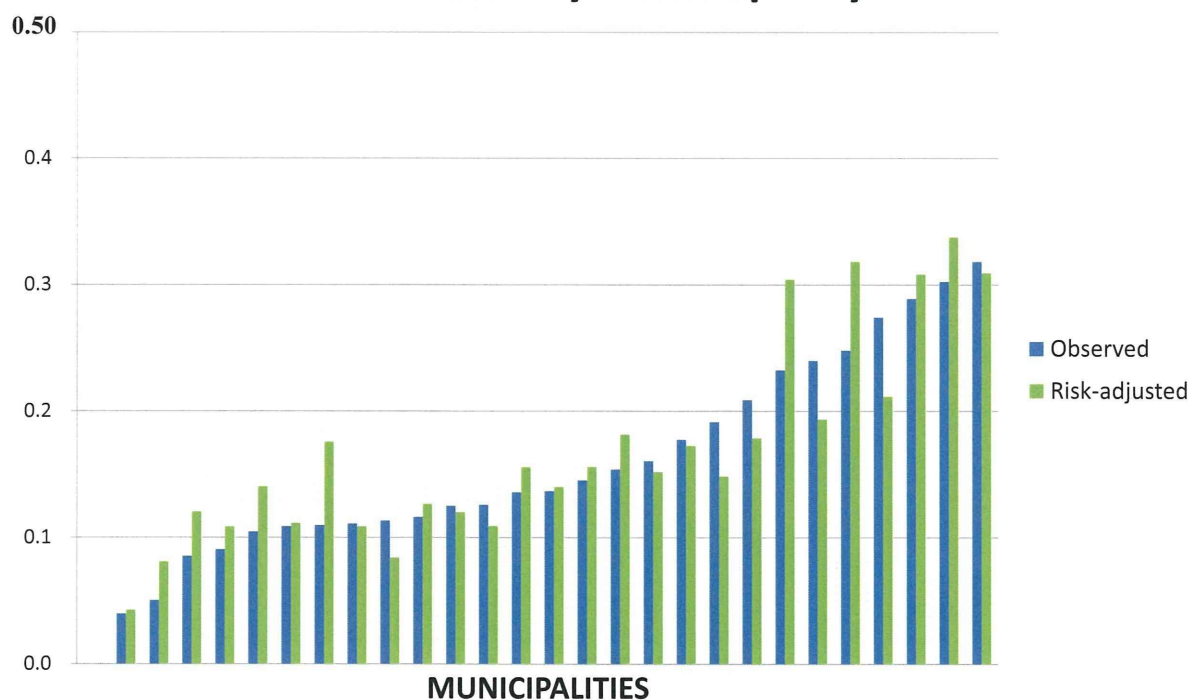
Regional Variations in Outcomes in Acute Myocardial Infarction

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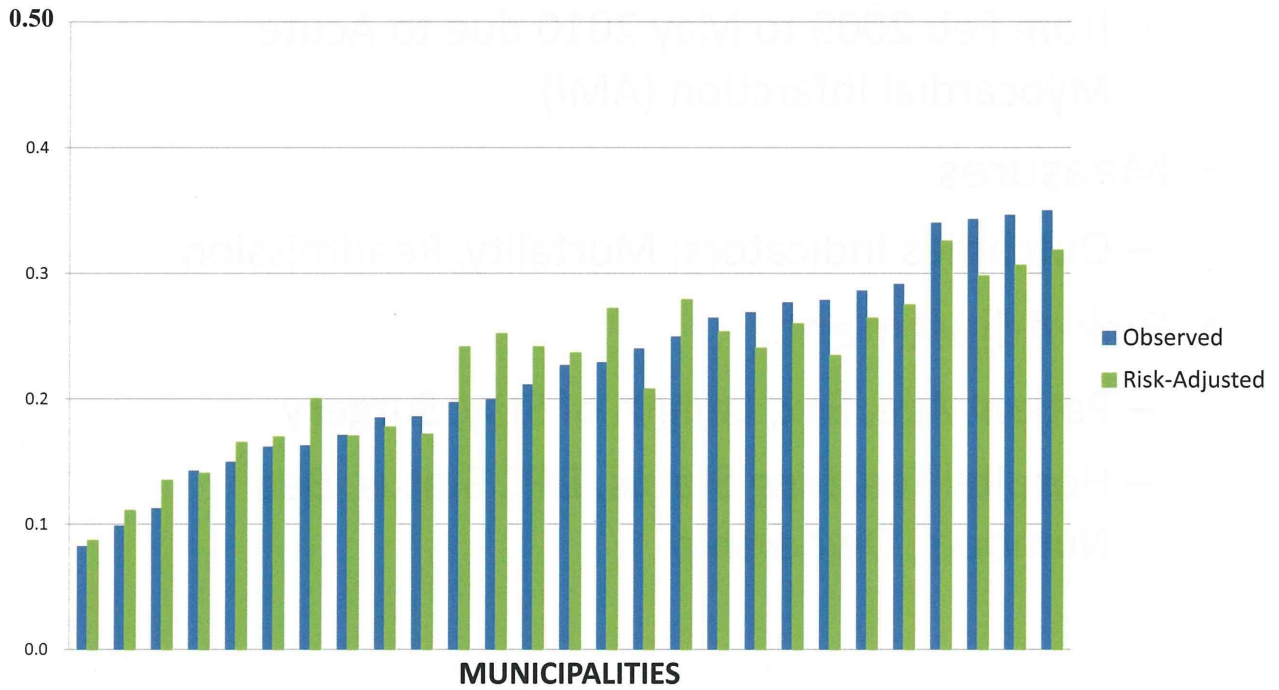
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- **Sample**
 - 5,043 Patients admitted to 132 Kyoto Hospitals from Feb 2009 to May 2010 due to Acute Myocardial Infarction (AMI)
- **Measures**
 - Outcomes Indicators: Mortality, Readmission
- **Risk-Adjustment**
 - Patient Age, Sex, Length of Stay, Surgery
 - Hospital Teaching Status, DPC Status, Bed Numbers, Ownership

Variations in In-Hospital Mortality in AMI Patients by Municipality



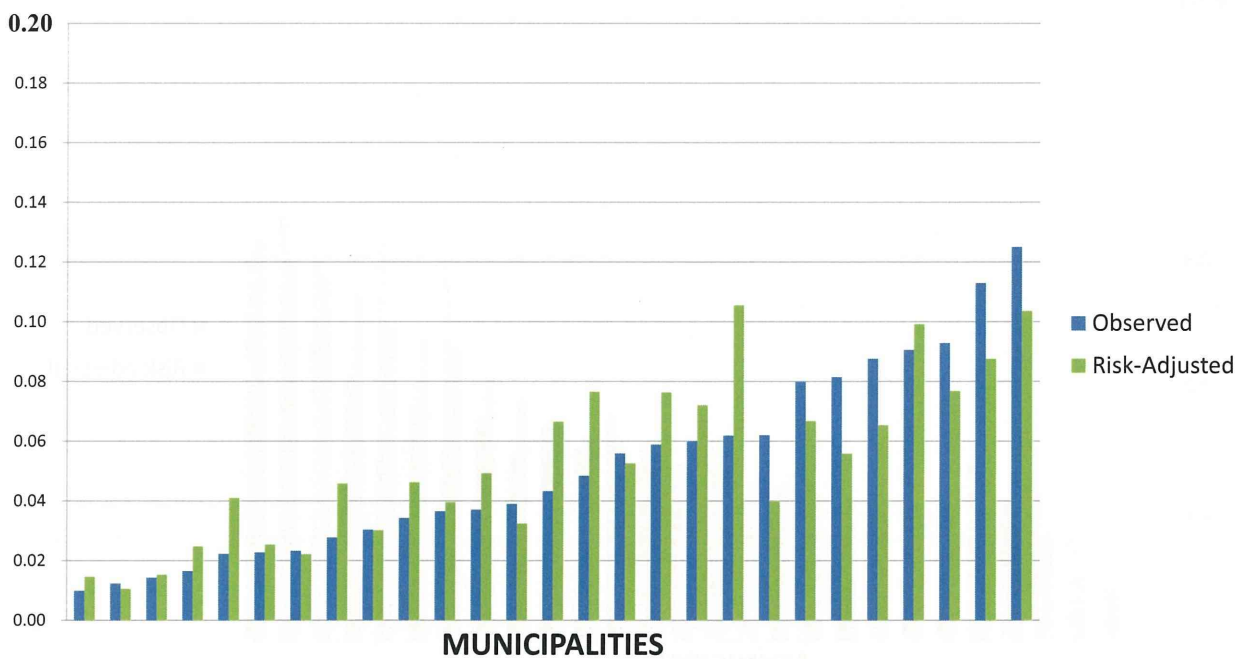
Variations in All-Cause Readmission in AMI Patients by Municipality



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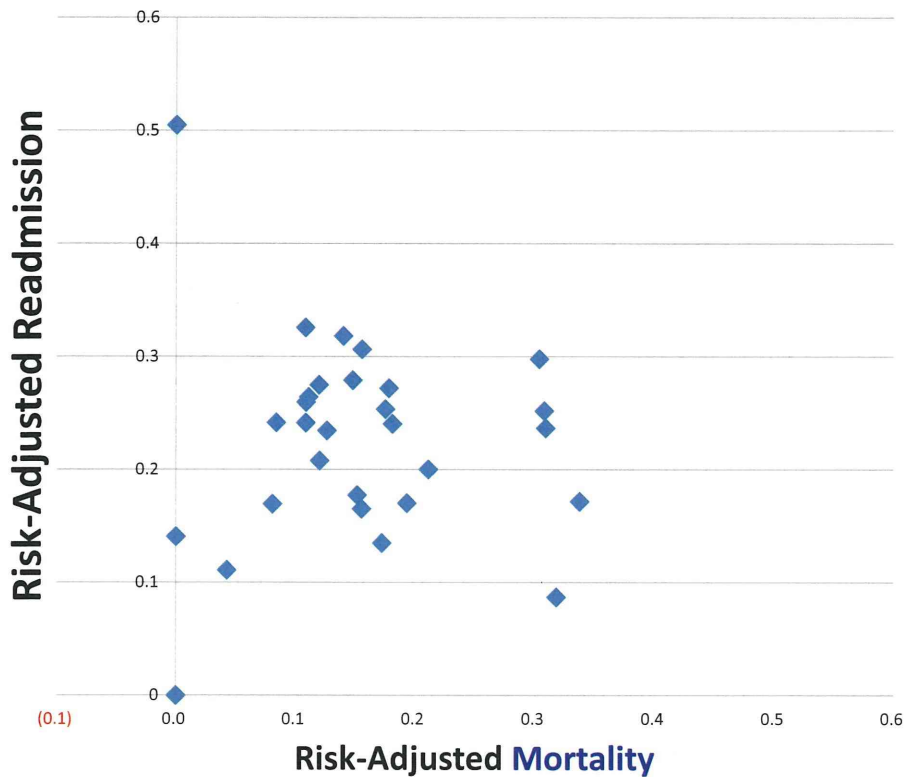
Variations in AMI Readmission in AMI Patients by Municipality



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Risk-Adjusted Mortality and Risk-Adjusted Readmission by Municipalities



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Regional Variations in Long-term Care

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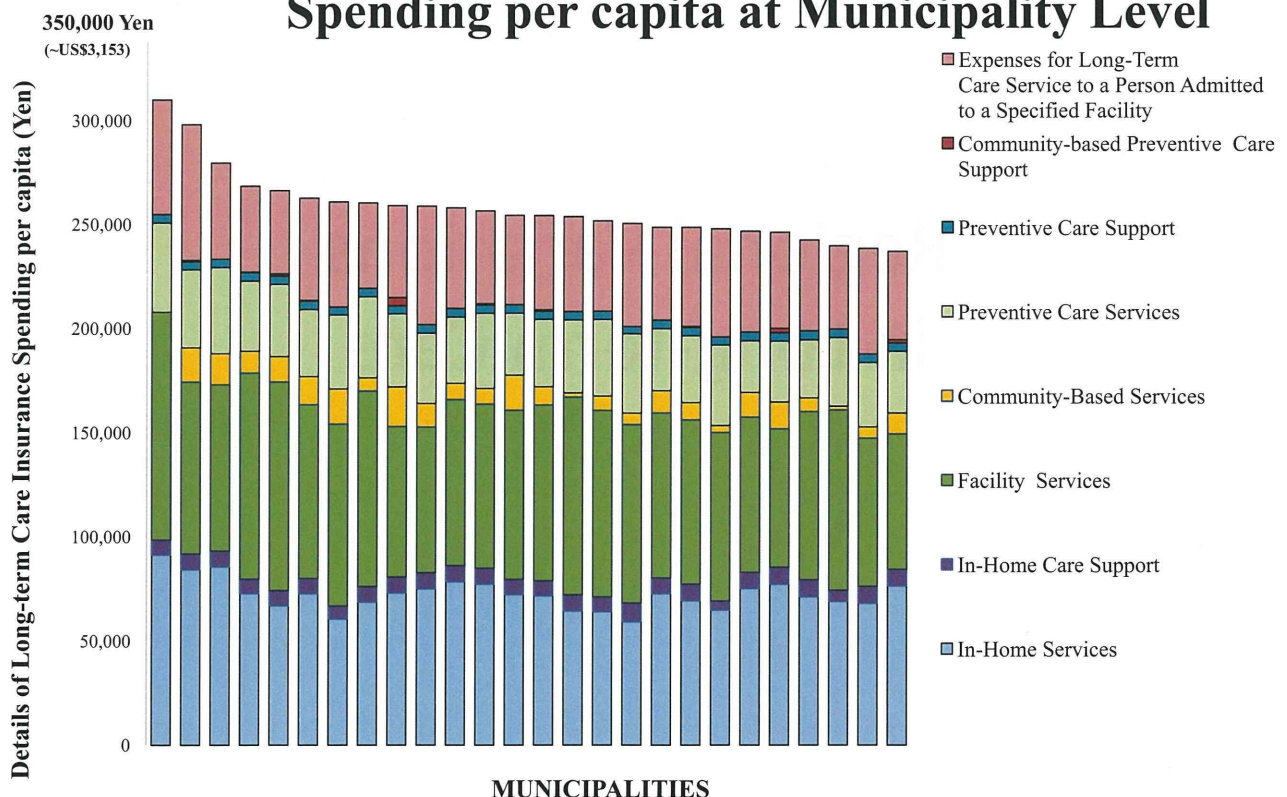
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- **Sample**

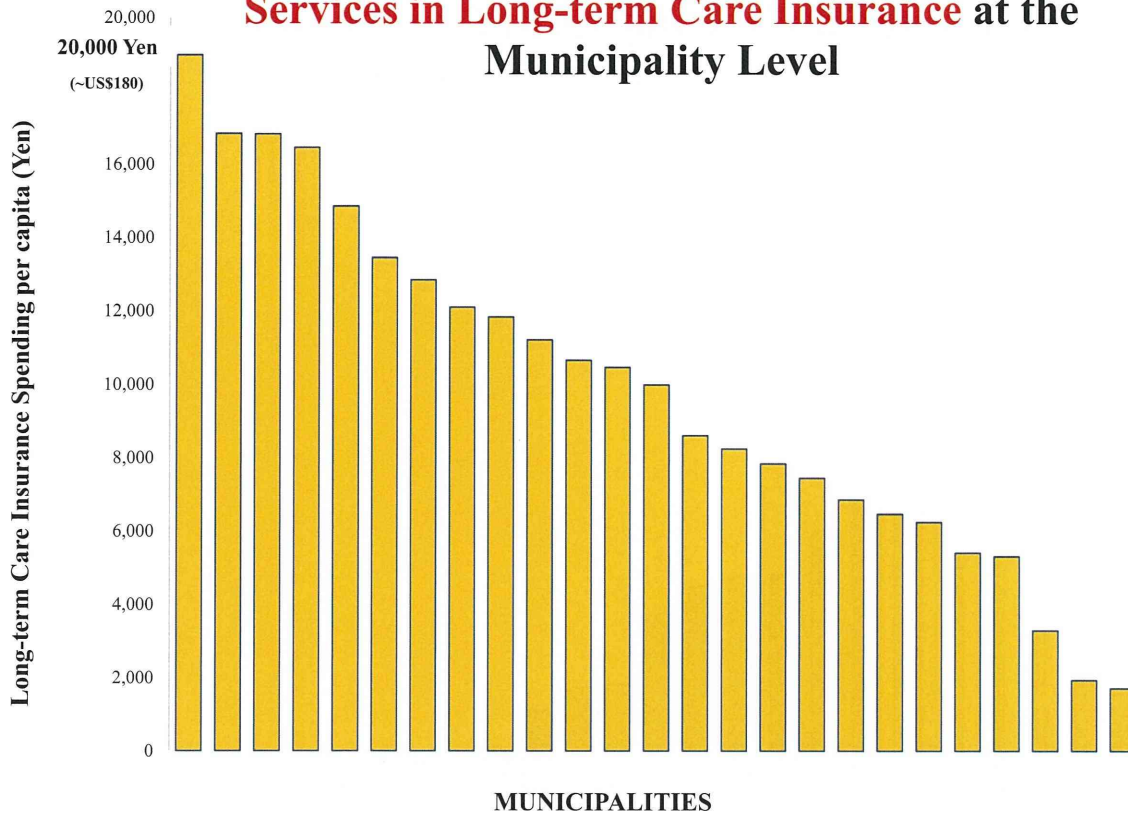
- 79,492 Patients over 65 years of age who utilized Long-Term Nursing Care and Prevention Benefits in Kyoto Prefecture during April 2008
- The Long-Term care insurance system was designed to “separate long-term care from coverage of health insurance, and to establish a system which aims to decrease cases of ‘social hospitalization’”*

* <http://www.mhlw.go.jp/english/topics/elderly/care/2.html>

Long-term Care Insurance Spending per capita at Municipality Level



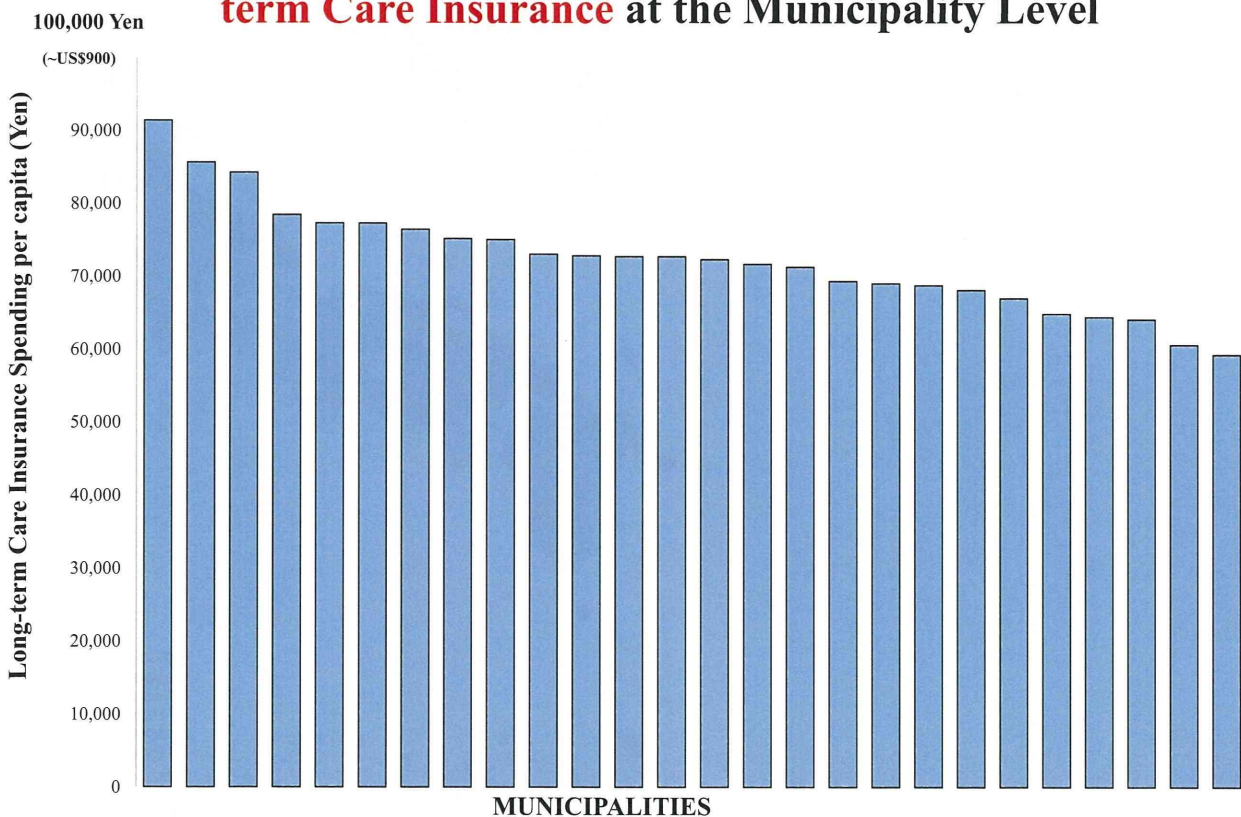
Spending per capita of **Community-Based Services in Long-term Care Insurance** at the Municipality Level



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Spending per capita of **In-Home Services in Long-term Care Insurance** at the Municipality Level



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