

Data Science Solution in Improving the Occupancy of the Nursing Facilities

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10/15/2021





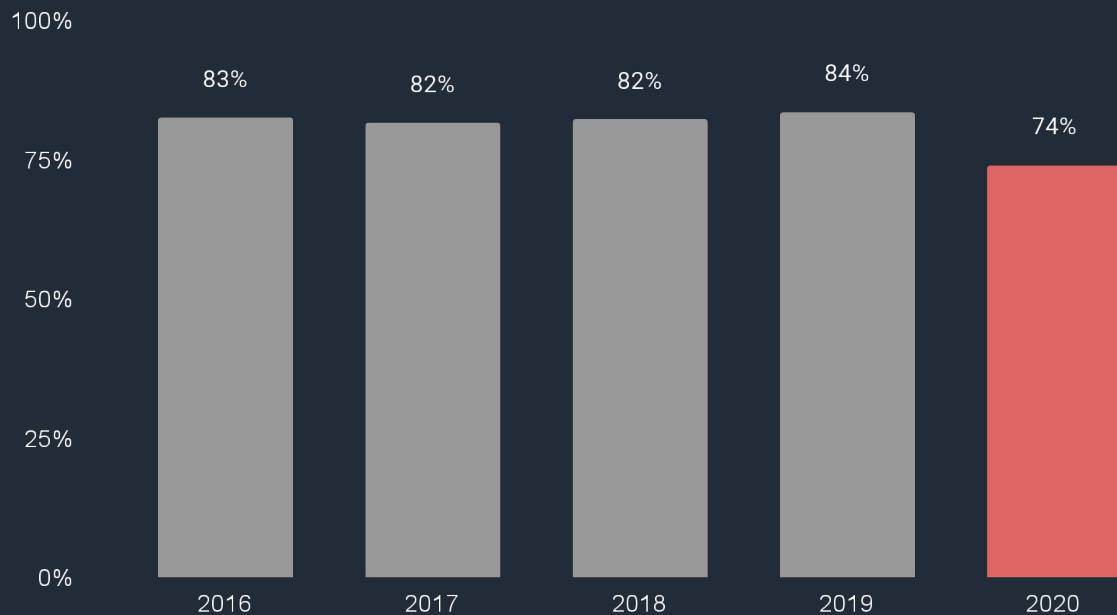
OUR TEAM

We provide data science,
machine learning and AI
solutions for our clients to
solve their problems

What Happened

Huge Drop in 2020 Due to the Pandemic

Occupancy at U.S. Skilled Nursing Facilities in Past 5 Years

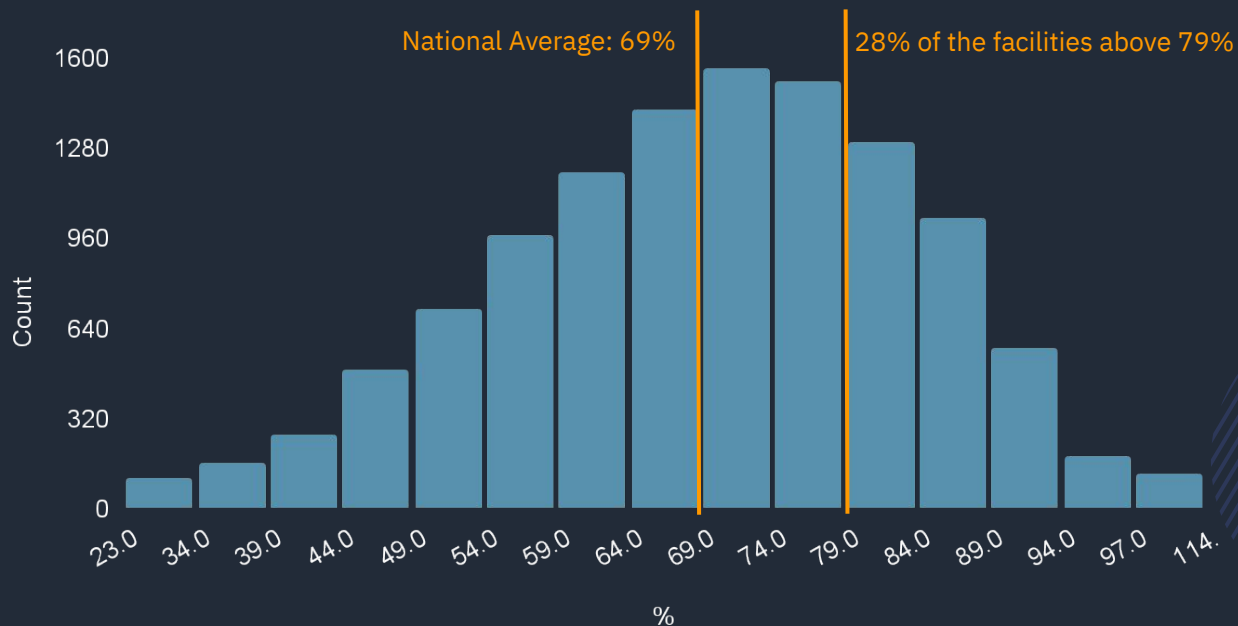


*Data source: National Investment Center

The Problem

Nursing facilities with low occupancy

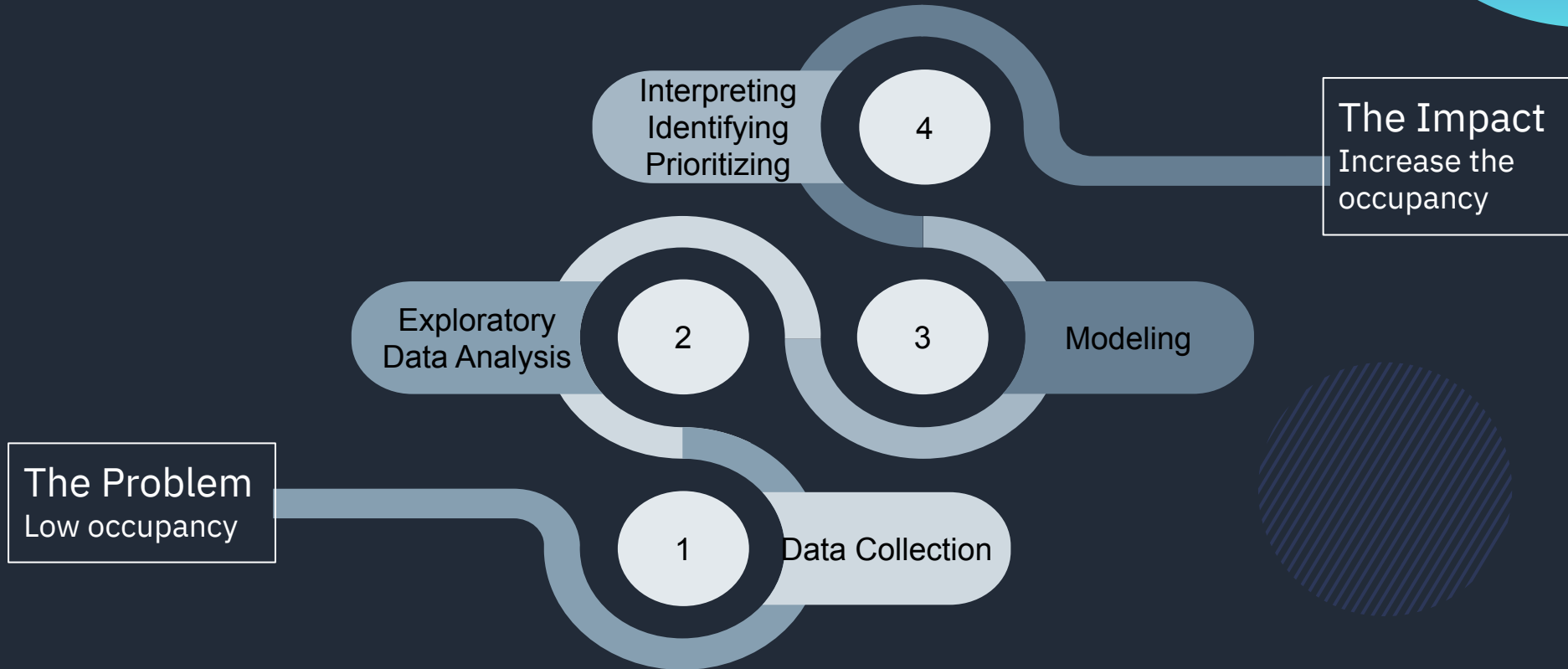
The Distribution of the Occupancy at U.S. Skilled Nursing Facilities



*Data source: Centers for Medicare & Medicaid Services

Our Data Science Solutions

A Regression Model to interpret the factors of the occupancy

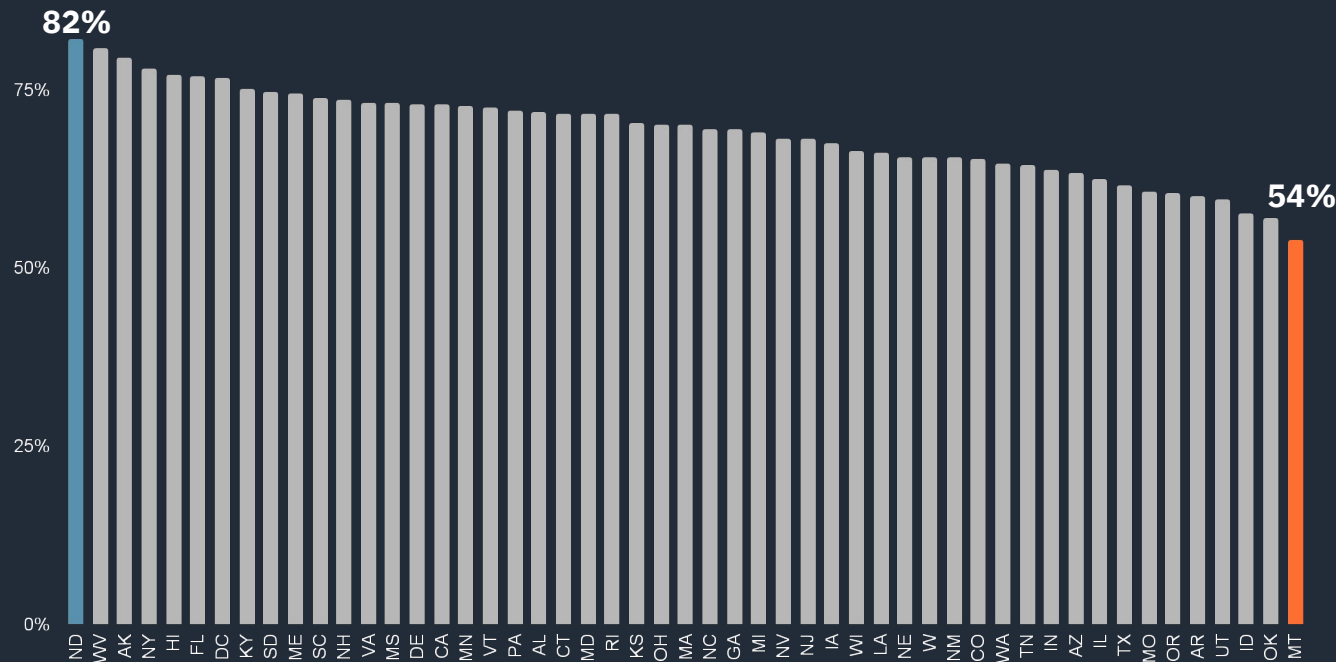


Preliminary Analysis - Dataset and Tools

- Data
 - “Provider Information” dataset
 - 15,265 nursing facilities with 88 columns
 - From CMS.gov (the Centers for Medicare & Medicaid Services)
 - 21 datasets of nursing homes including rehab services
- Tools
 - Excel
 - Data cleaning and analysis
 - Tableau
 - Map visualization
 - Google Slides
 - Visualizations and presentation
 - Python
 - Baseline regression model

Preliminary Analysis - Area

100%
Occupancy among States



Control regional effect:

Use the difference between each nursing home and its state average occupancy as the target for EDA

Preliminary Analysis - Area

tableau public

DISCOVER

BLOG

RESOURCES

ABOUT

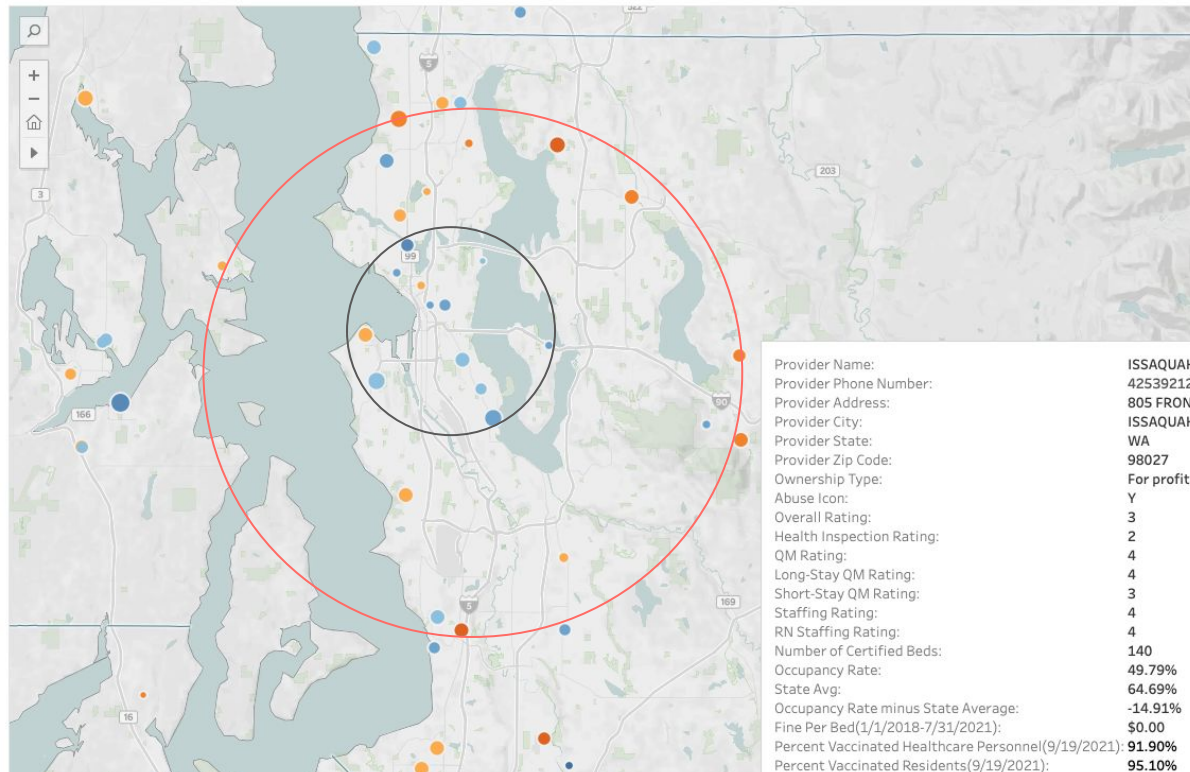


Nursing Facilities in U.S. (CMS data as of 9/1/2021) by [koscew](#)

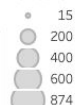


Map Occupancy_Histogram State Year Bed_Number Rating_Comparison_Dashboard Overall_Rating Health_Inspection QM Long_Stay_QM Short_Stay_QM Staffing RN_Staffing Ownership

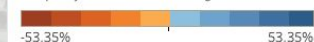
<Nursing Facility Map>



Number of Certified Beds



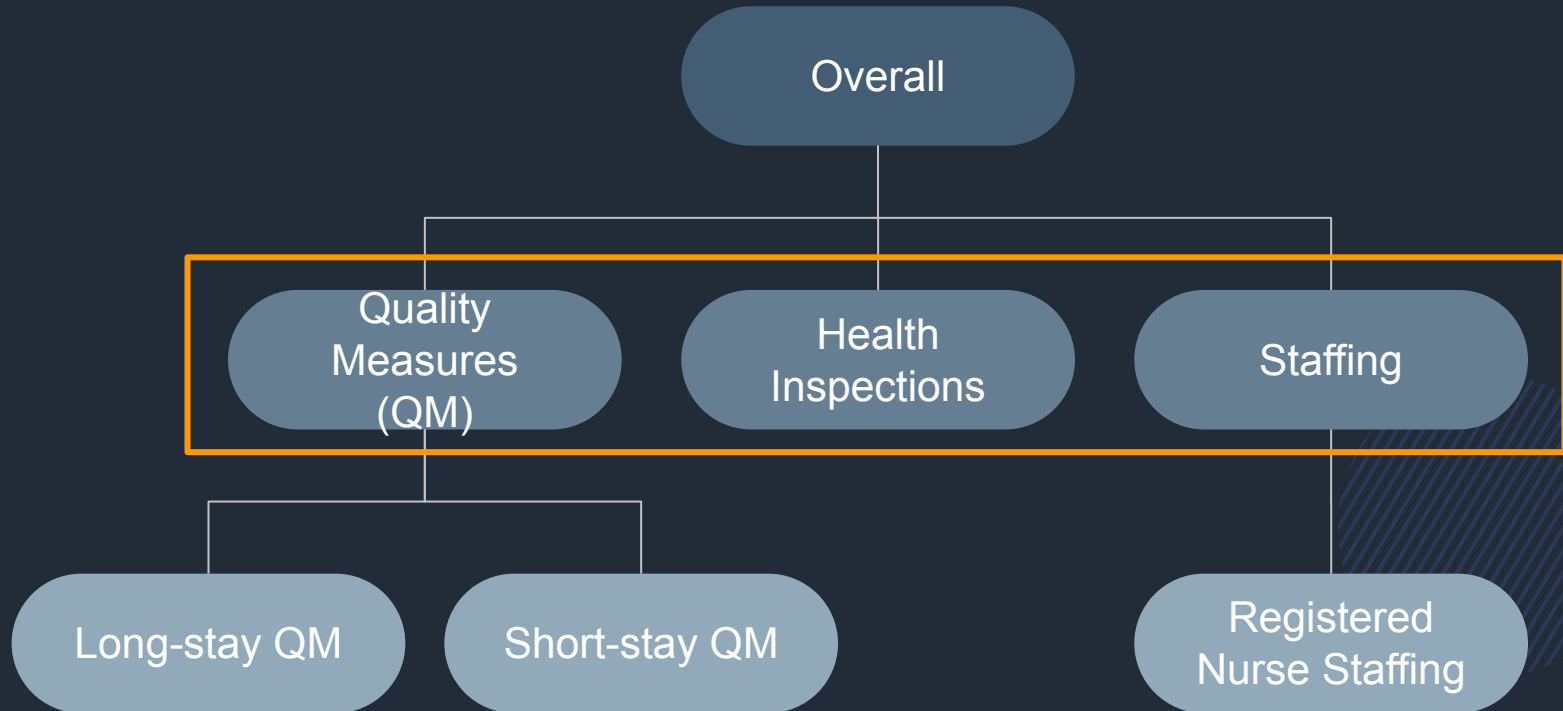
Occupancy Rate minus State Avg



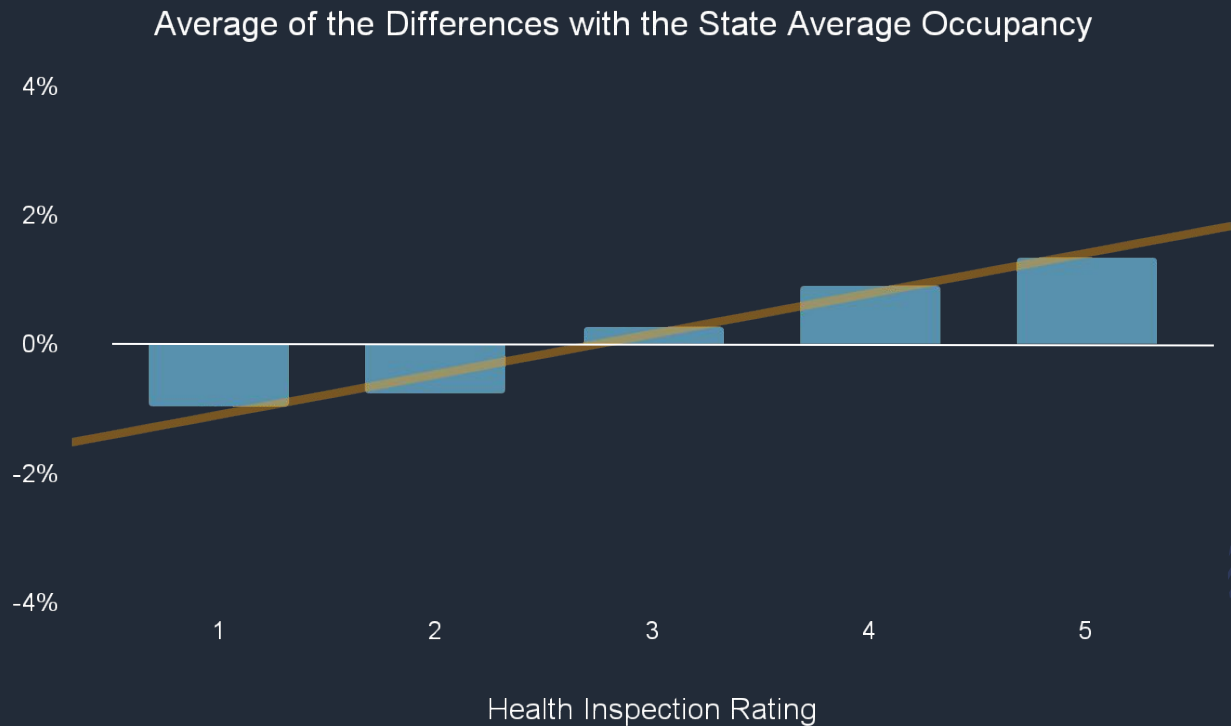
Provider Name:	ISSAQUAH NURSING AND REHABILITATION CENTER
Provider Phone Number:	4253921271
Provider Address:	805 FRONT STREET
Provider City:	ISSAQUAH
Provider State:	WA
Provider Zip Code:	98027
Ownership Type:	For profit - Corporation
Abuse Icon:	Y
Overall Rating:	3
Health Inspection Rating:	2
QM Rating:	4
Long-Stay QM Rating:	4
Short-Stay QM Rating:	3
Staffing Rating:	4
RN Staffing Rating:	4
Number of Certified Beds:	140
Occupancy Rate:	49.79%
State Avg:	64.69%
Occupancy Rate minus State Average:	-14.91%
Fine Per Bed(1/1/2018-7/31/2021):	\$0.00
Percent Vaccinated Healthcare Personnel(9/19/2021):	91.90%
Percent Vaccinated Residents(9/19/2021):	95.10%

*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - Ratings

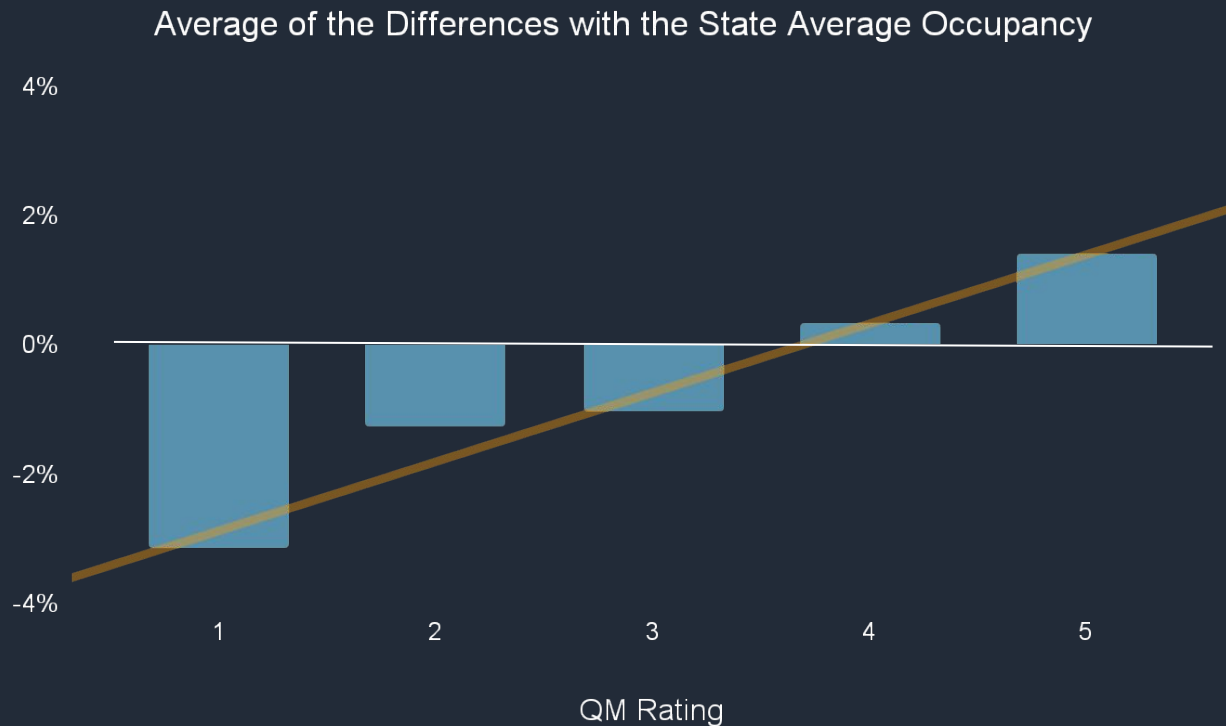


Preliminary Analysis - Health Inspection Rating



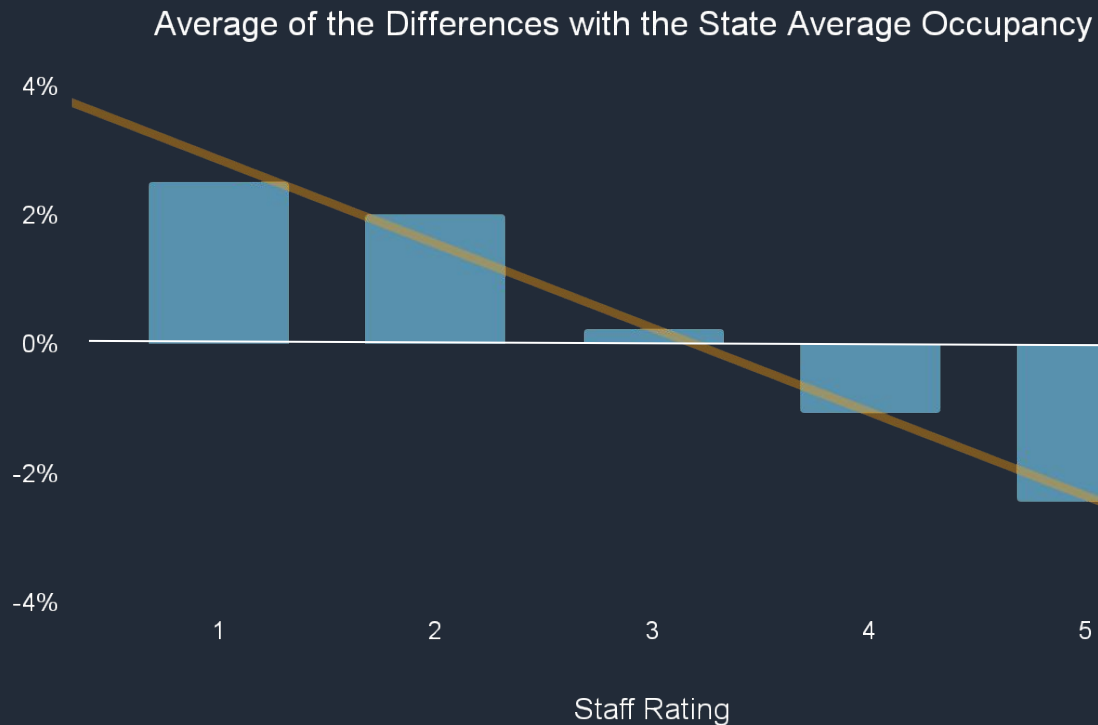
*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - QM Rating



*Data source: Centers for Medicare & Medicaid Services

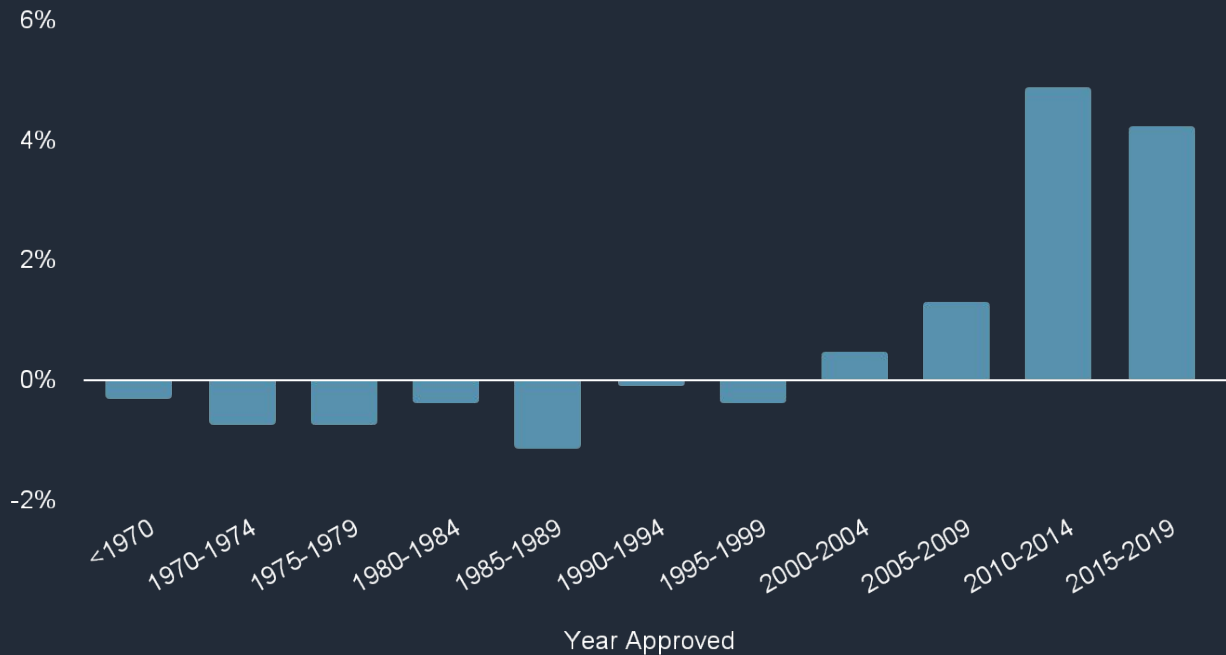
Preliminary Analysis - Staffing Rating



*Data source: Centers for Medicare & Medicaid Services

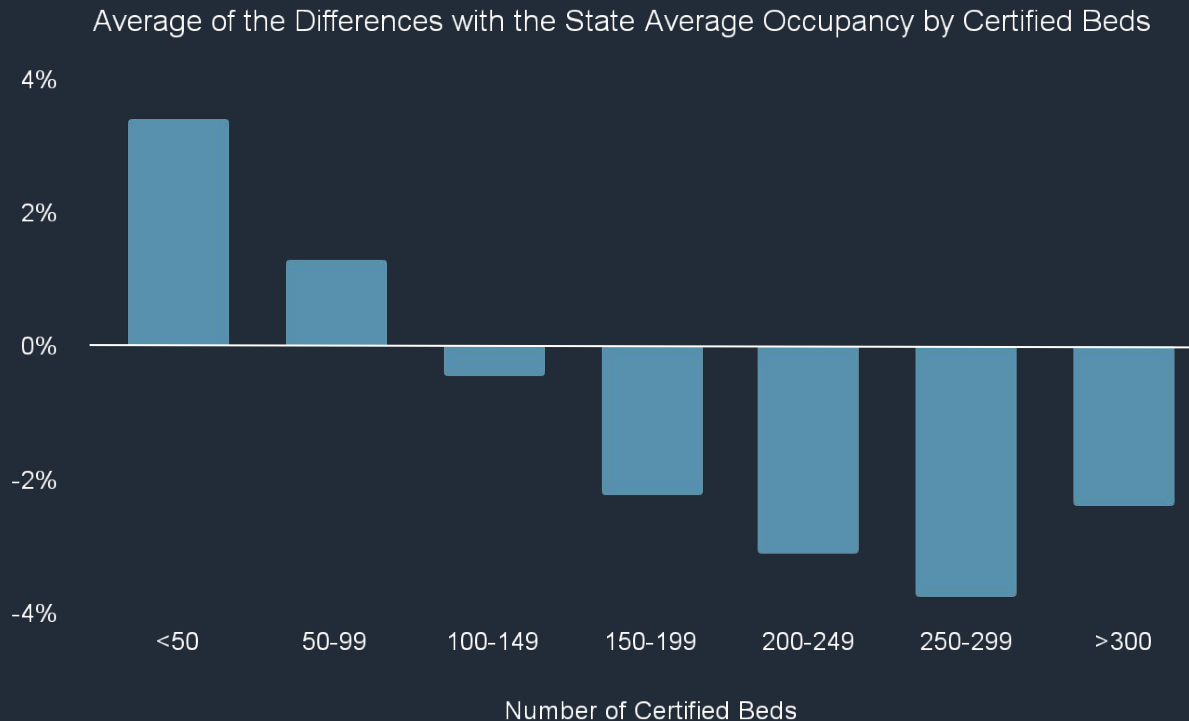
Preliminary Analysis - Year Approved

Average of the Difference with the State Average Occupancy By Years



*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - Certified Beds

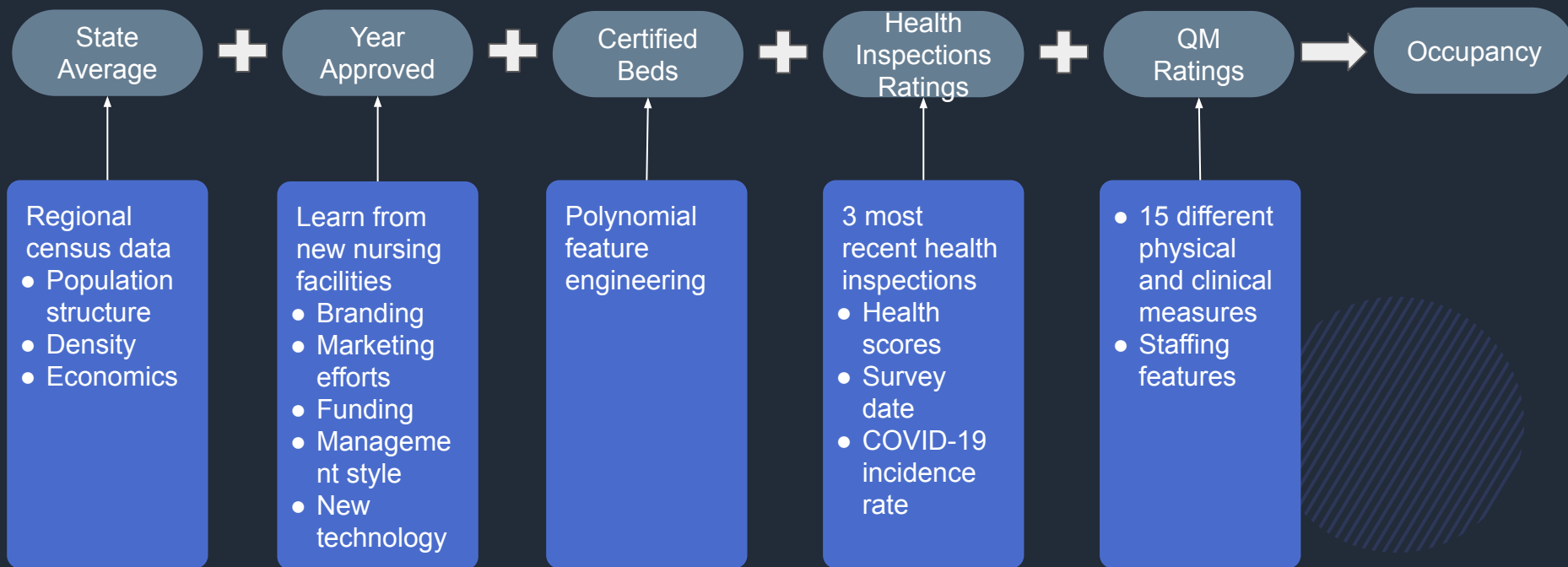


Baseline Model

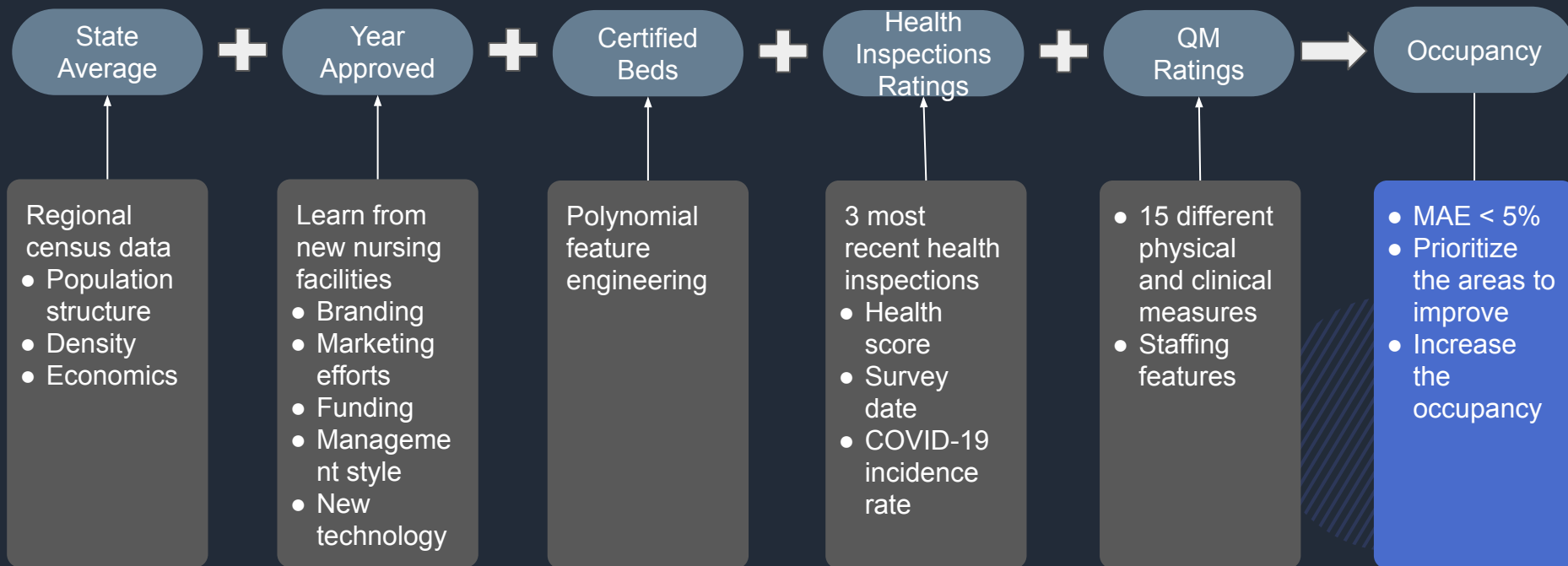


MAE = 0.105 (10.5%)

Future Work



Final Goal - MAE < 5%



Other Opportunities

- Fines
 - Readmission Rate
 - Human Resources
-
- Many other potentials!

Thank You!

Do you have any
questions?

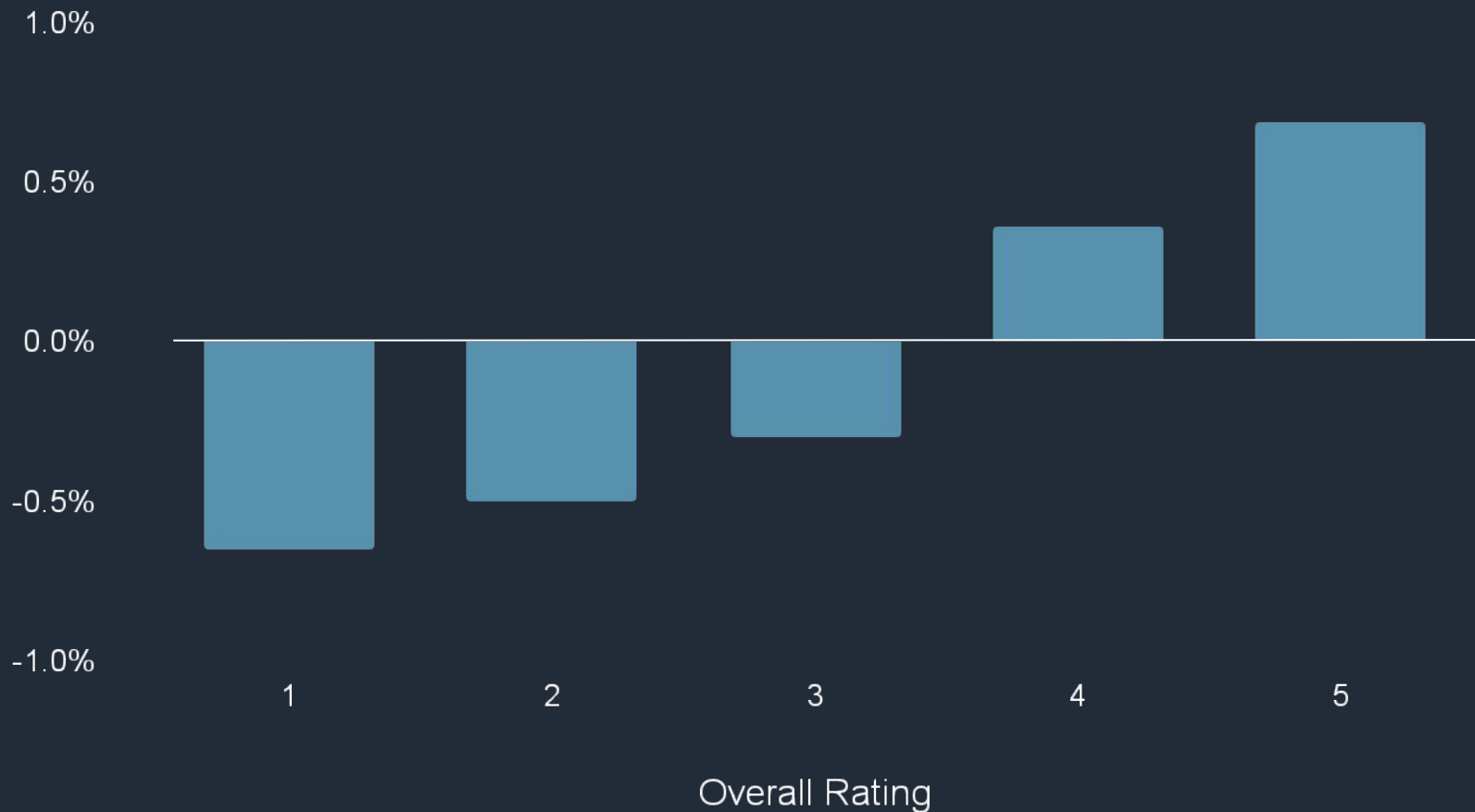


CREDITS: This presentation template was
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Freepik.

Resources

- Datasets of nursing homes including rehab services on CMS.gov
 - <https://data.cms.gov/provider-data/topics/nursing-homes>
- Five-Star Quality Rating System
 - <https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/CertificationandCompliance/FSQRS>
- Tableau Public Dashboard
 - https://public.tableau.com/app/profile/koscew/viz/NursingFacilitiesinU_S_CMSdata/Map

Average of the Differences with the State Average Occupancy



*Data source: Centers for Medicare & Medicaid Services

Occupancy among States

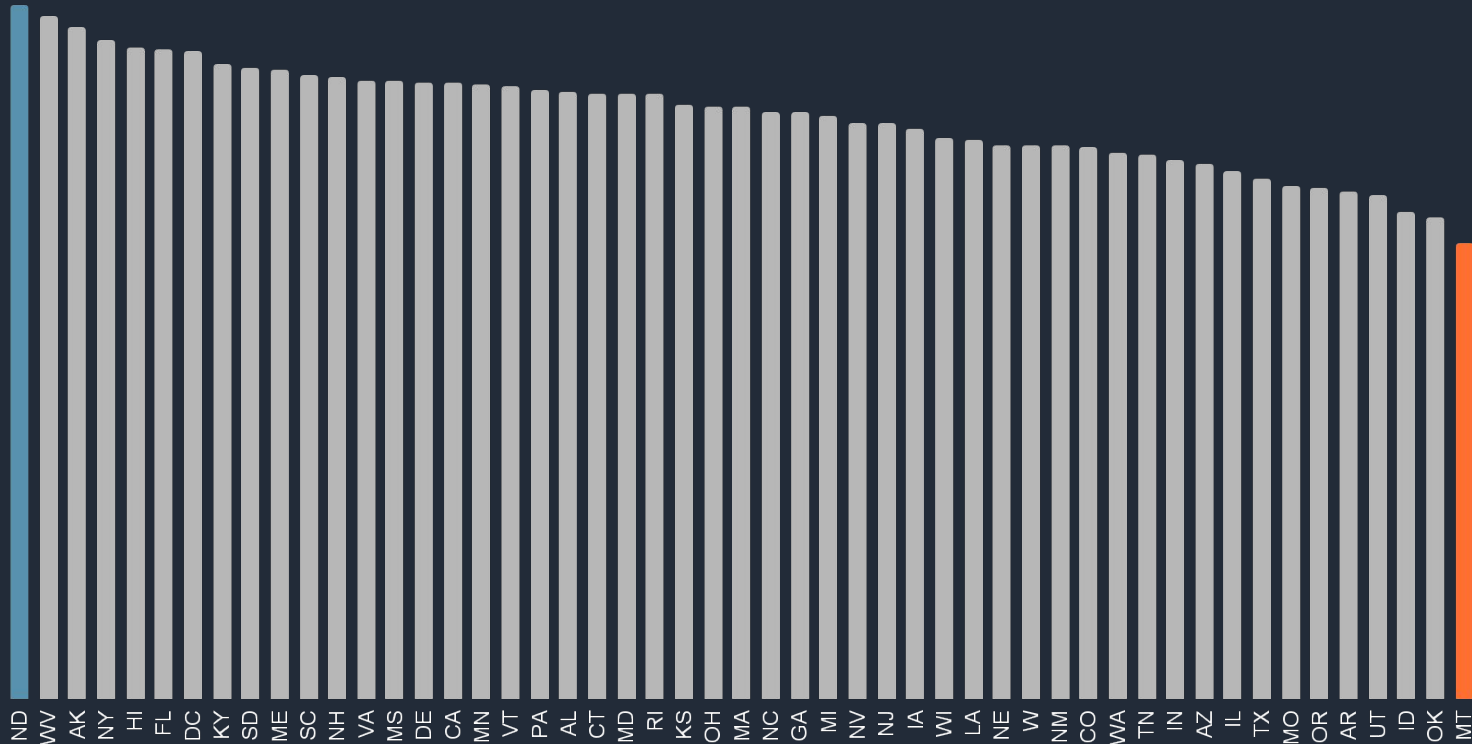
100%

75%

50%

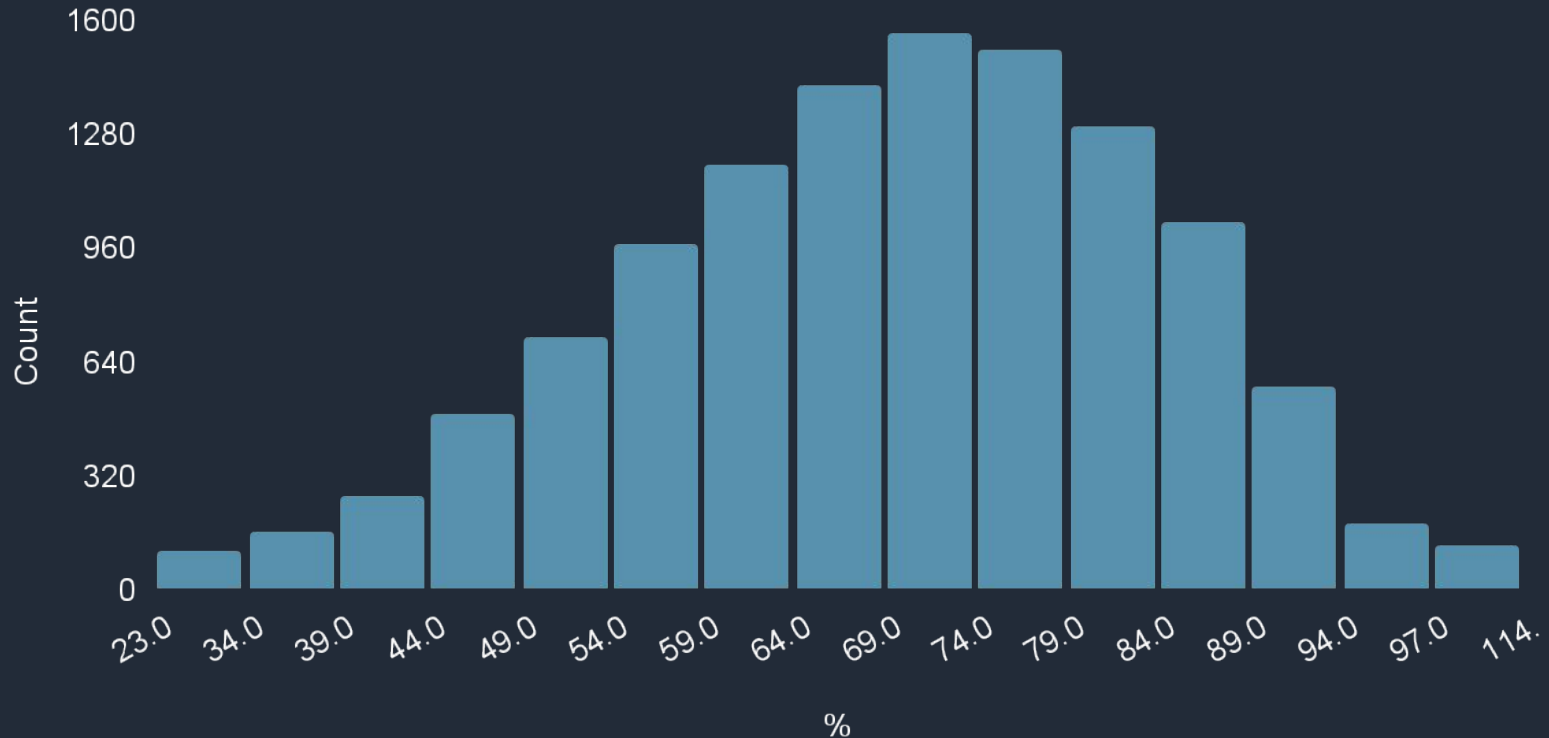
25%

0%



*Data source: Centers for Medicare & Medicaid Services

The Distribution of the Occupancy at U.S. Skilled Nursing Facilities



*Data source: Centers for Medicare & Medicaid Services