

Data Science Solution in Improving the Occupancy of the Nursing Facilities

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10/15/2021





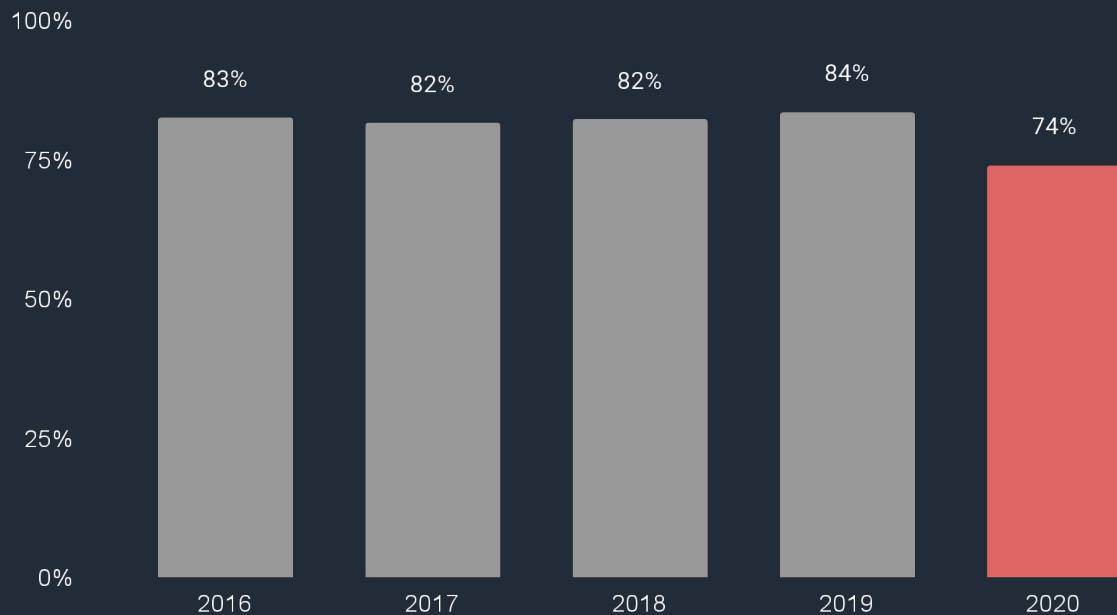
OUR TEAM

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

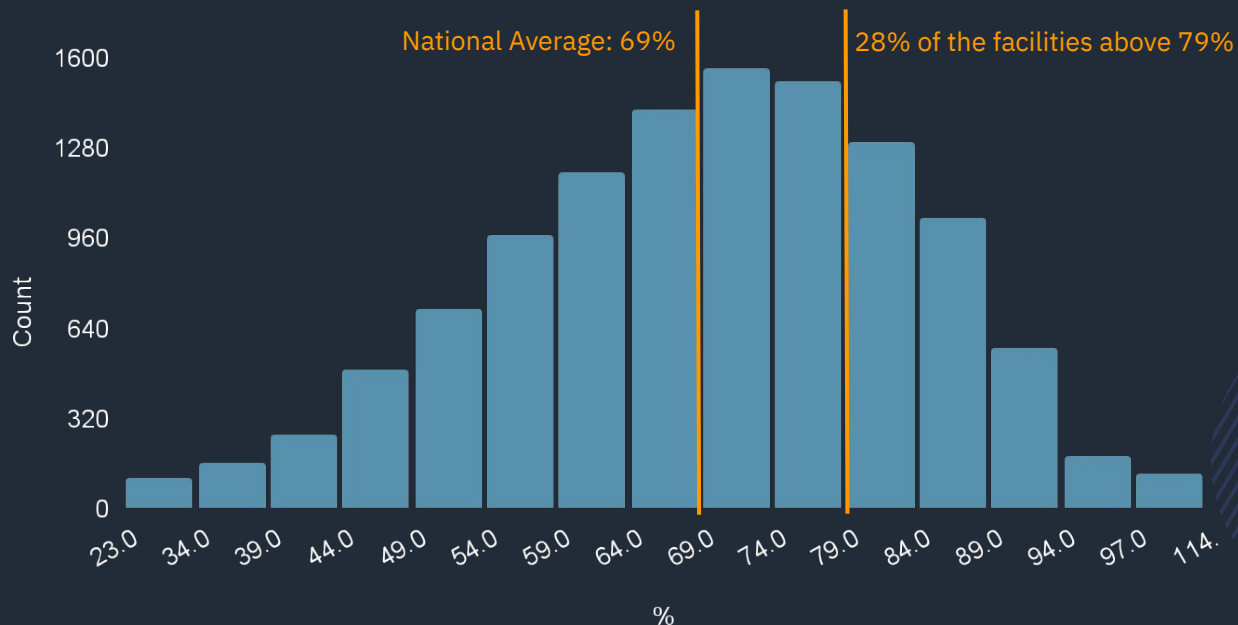


*Data source: National Investment Center

The Problem

Nursing facilities with low occupancy

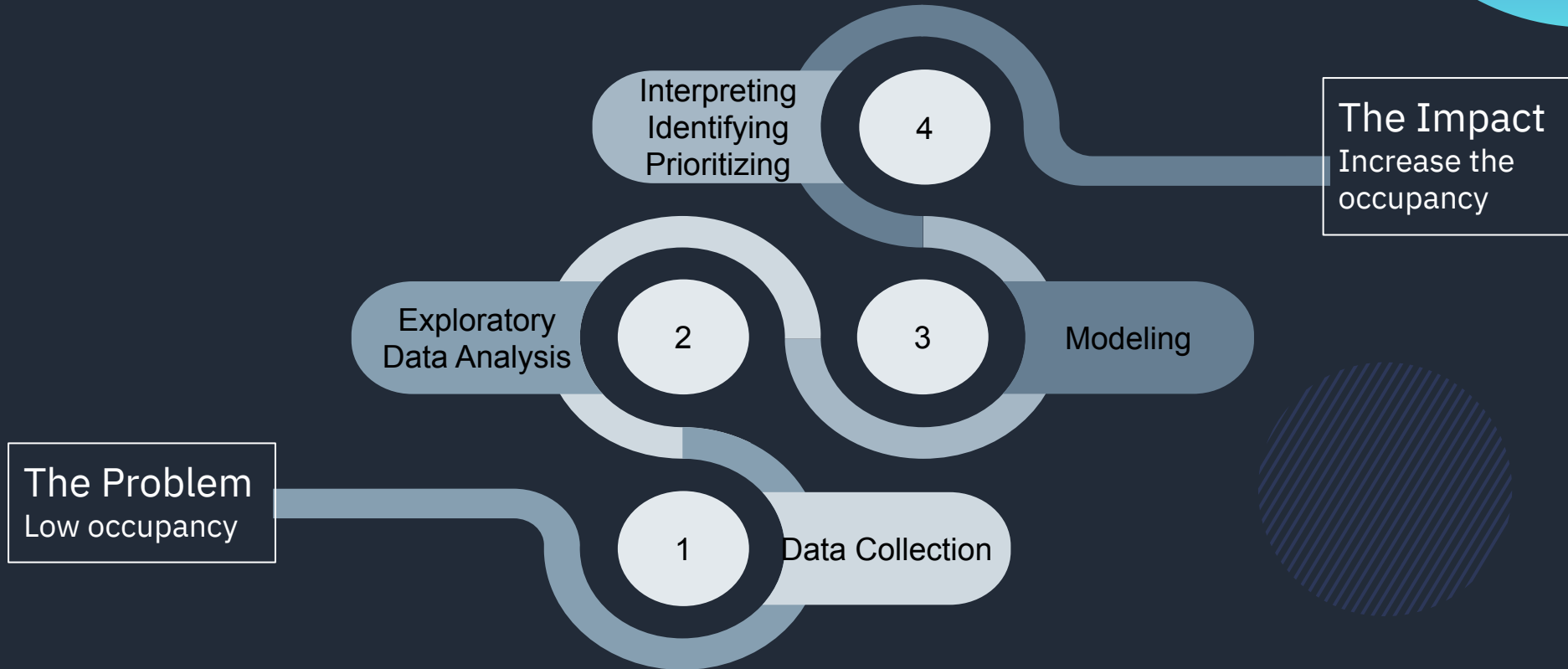
The Distribution of the Occupancy at U.S. Skilled Nursing Facilities



*Data source: Centers for Medicare & Medicaid Services

Our Data Science Solutions

A Regression Model to interpret the factors of the occupancy

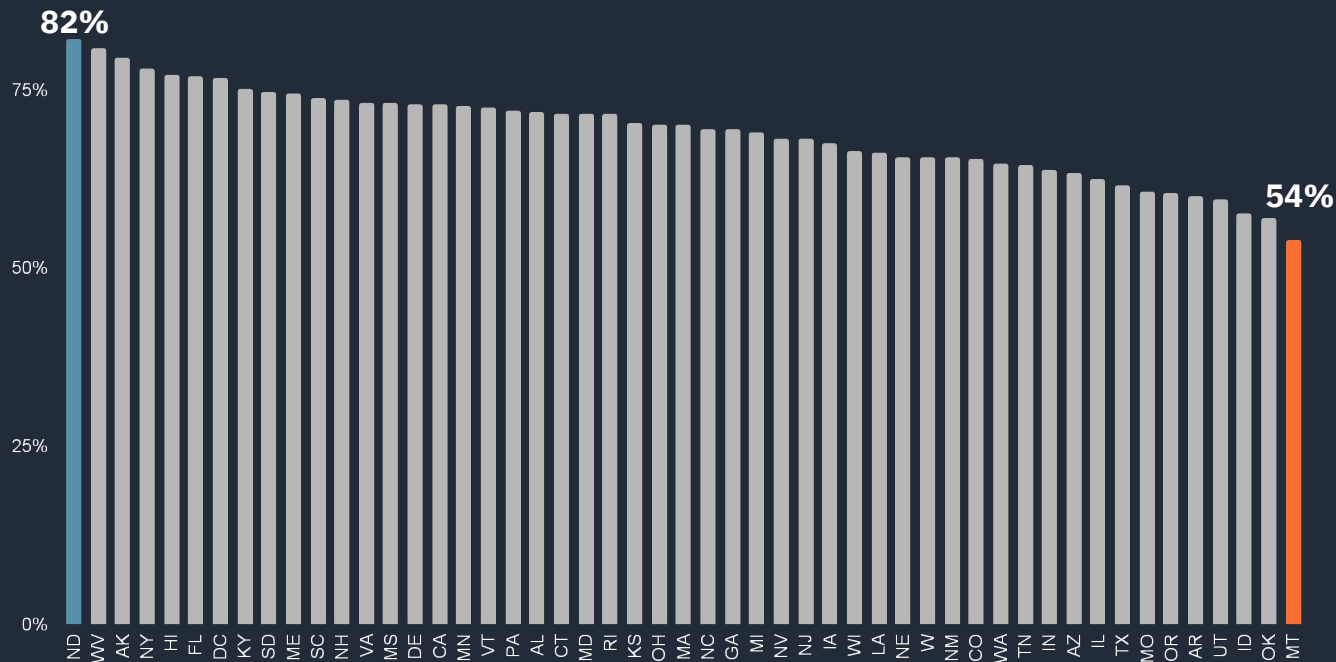


Preliminary Analysis - Dataset and Tools

- 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

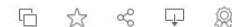
ABOUT

SIGN UP

SIGN IN

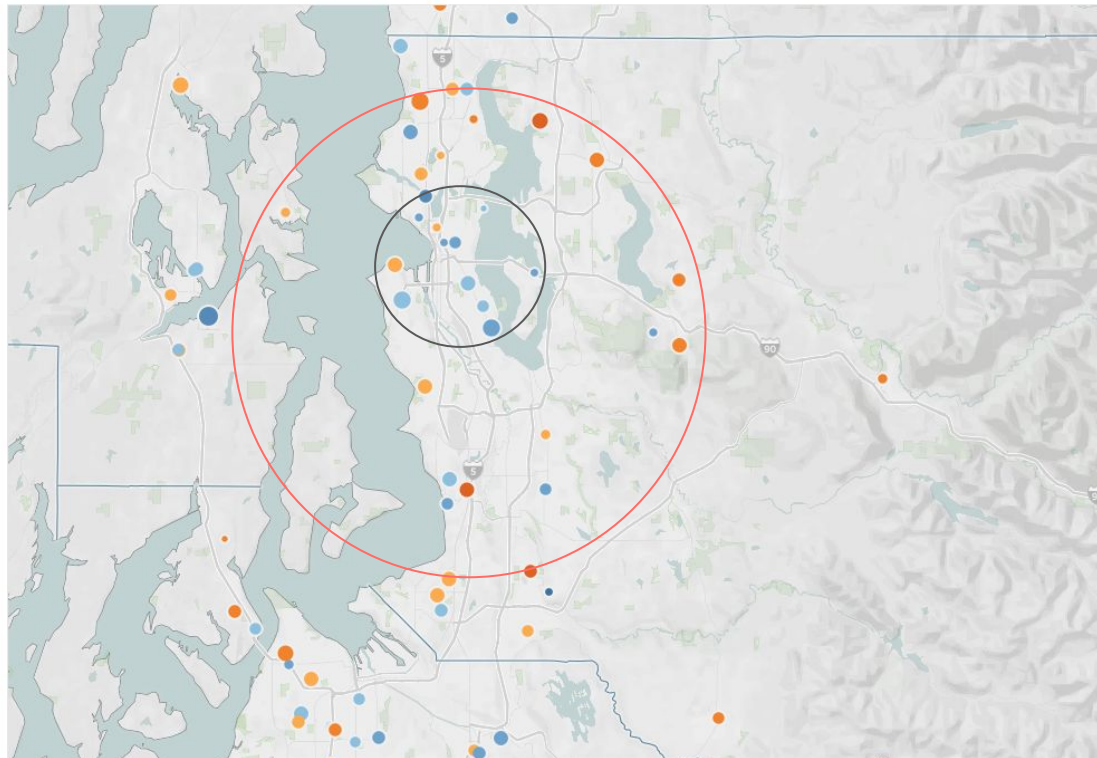


Nursing Facilities in U.S. (CMS data as of 9/1/2021) by [koscew](#)

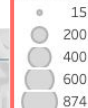


Map | Occupancy_Histogram | State | Year | Bed_Number | Rating_Comparison_Dashboard | Overall_Rating | Health_Inspection | QM | Long_Stay_QM | Short_Stay_QM | Staffing | RN_ >

<Nursing Facility Map>



Number of Certified Beds



Occupancy Rate minus State Avg



*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - Area

tableau public

DISCOVER

BLOG

RESOURCES

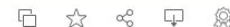
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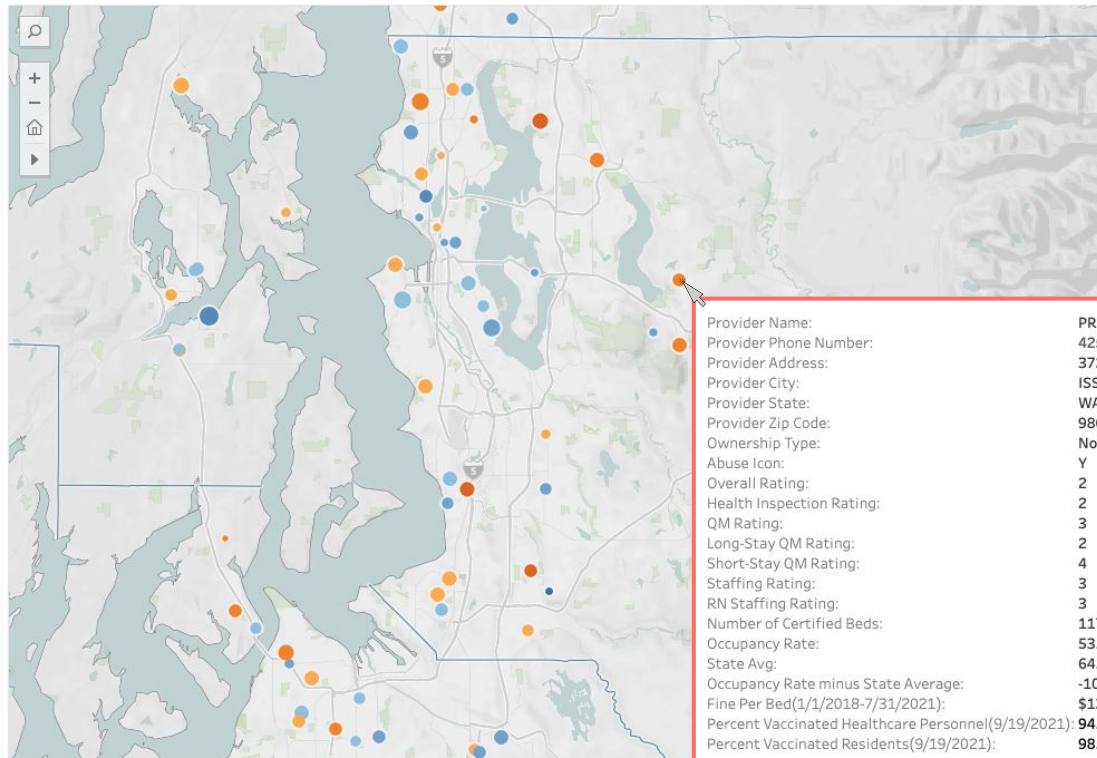


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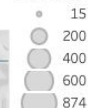


Map Occupancy_Histogram State Year Bed_Number Rating_Comparison_Dashboard Overall_Rating Health_Inspection QM Long_Stay_QM Short_Stay_QM Staffing RN

<Nursing Facility Map>



Number of Certified Beds



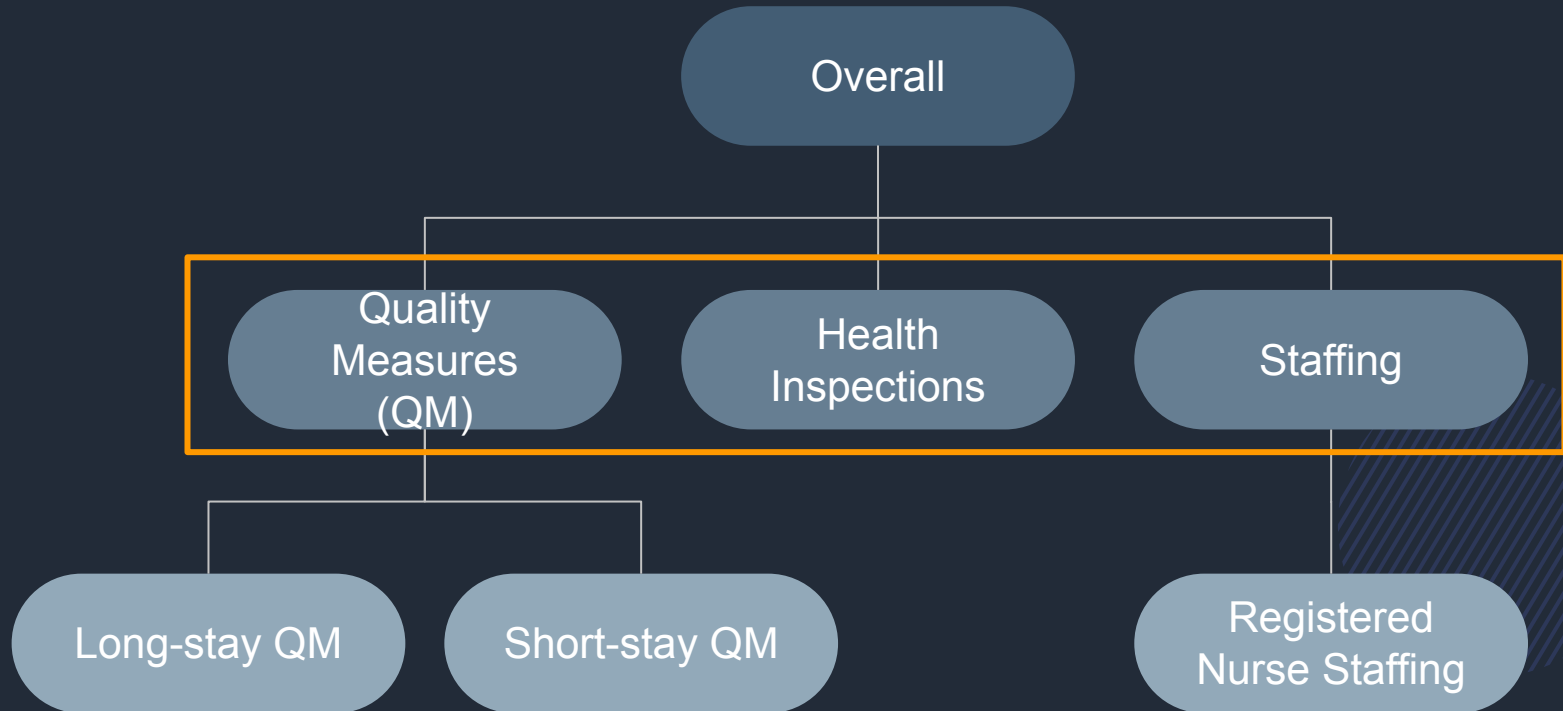
Occupancy Rate minus State Avg



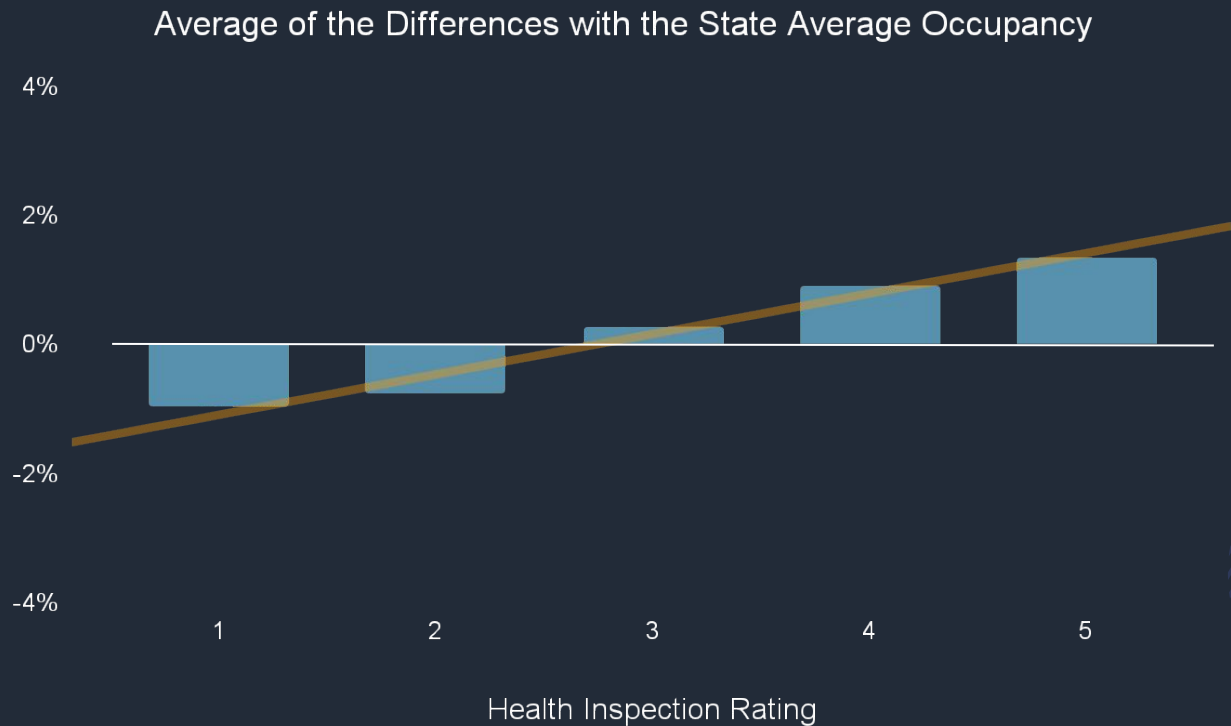
Provider Name:	PROVIDENCE MARIANWOOD
Provider Phone Number:	4253912800
Provider Address:	3725 PROVIDENCE POINT DRIVE SOUTHEAST
Provider City:	ISSAQUAH
Provider State:	WA
Provider Zip Code:	98029
Ownership Type:	Non profit - Corporation
Abuse Icon:	Y
Overall Rating:	2
Health Inspection Rating:	2
QM Rating:	3
Long-Stay QM Rating:	2
Short-Stay QM Rating:	4
Staffing Rating:	3
RN Staffing Rating:	3
Number of Certified Beds:	117
Occupancy Rate:	53.76%
State Avg:	64.69%
Occupancy Rate minus State Average:	-10.93%
Fine Per Bed(1/1/2018-7/31/2021):	\$130.17
Percent Vaccinated Healthcare Personnel(9/19/2021):	94.20%
Percent Vaccinated Residents(9/19/2021):	98.60%

*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - Ratings

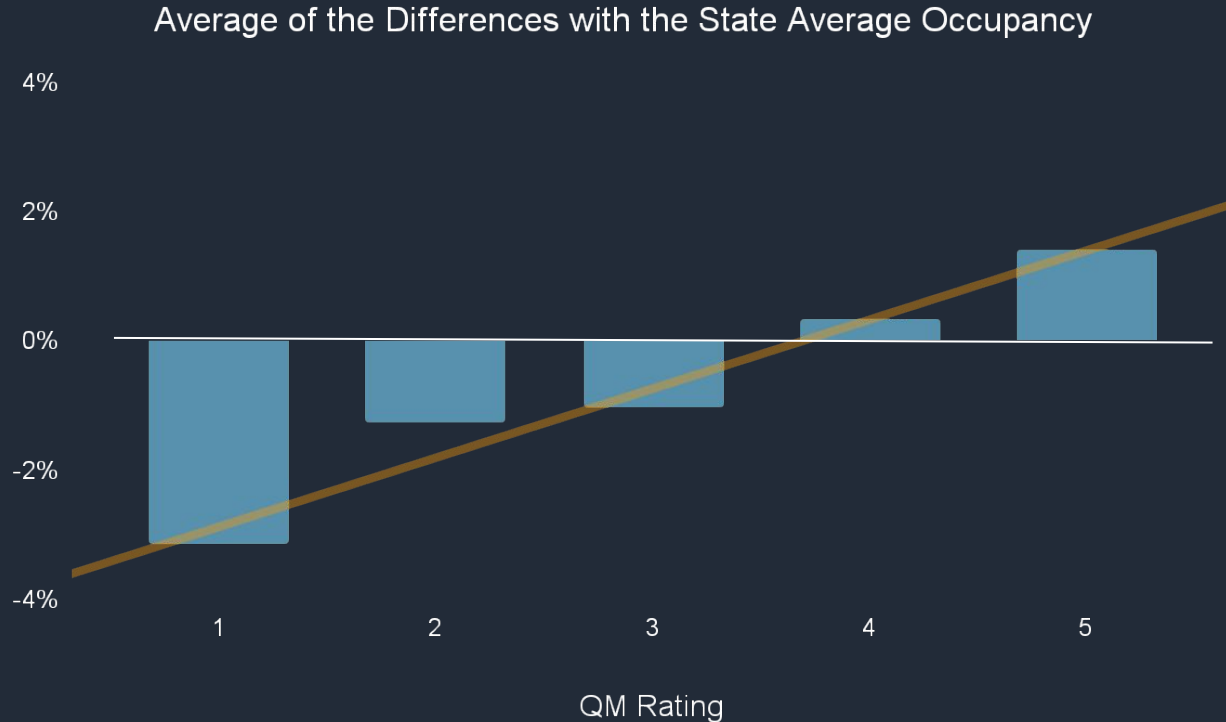


Preliminary Analysis - Health Inspection Rating



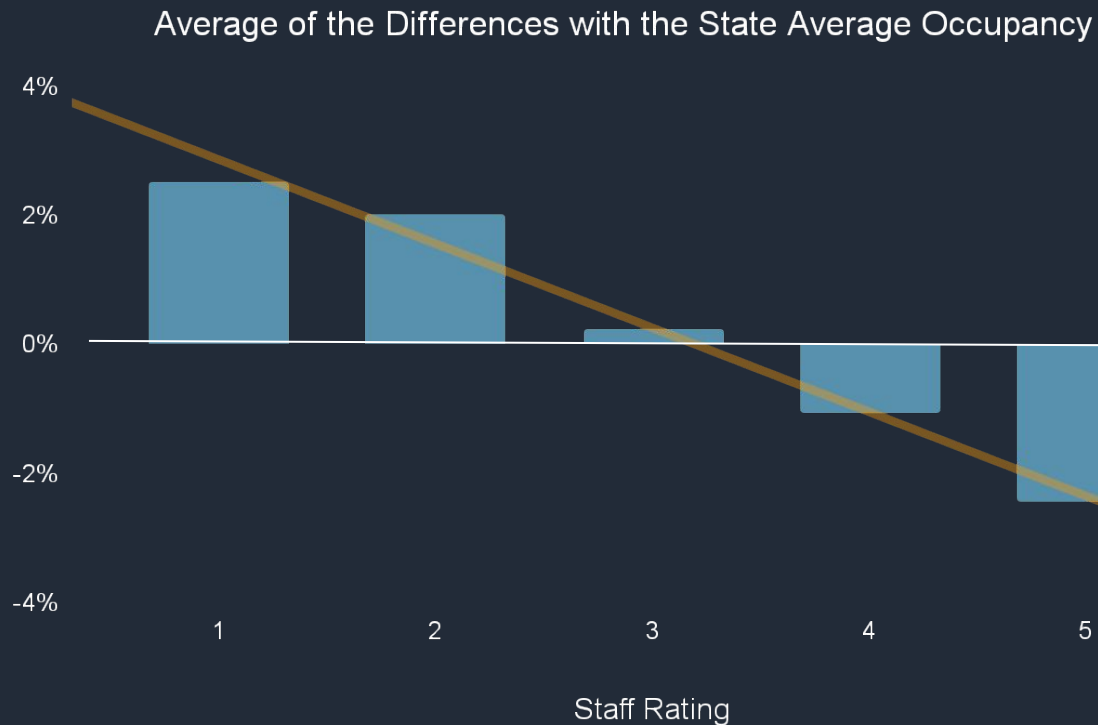
*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - QM Rating



*Data source: Centers for Medicare & Medicaid Services

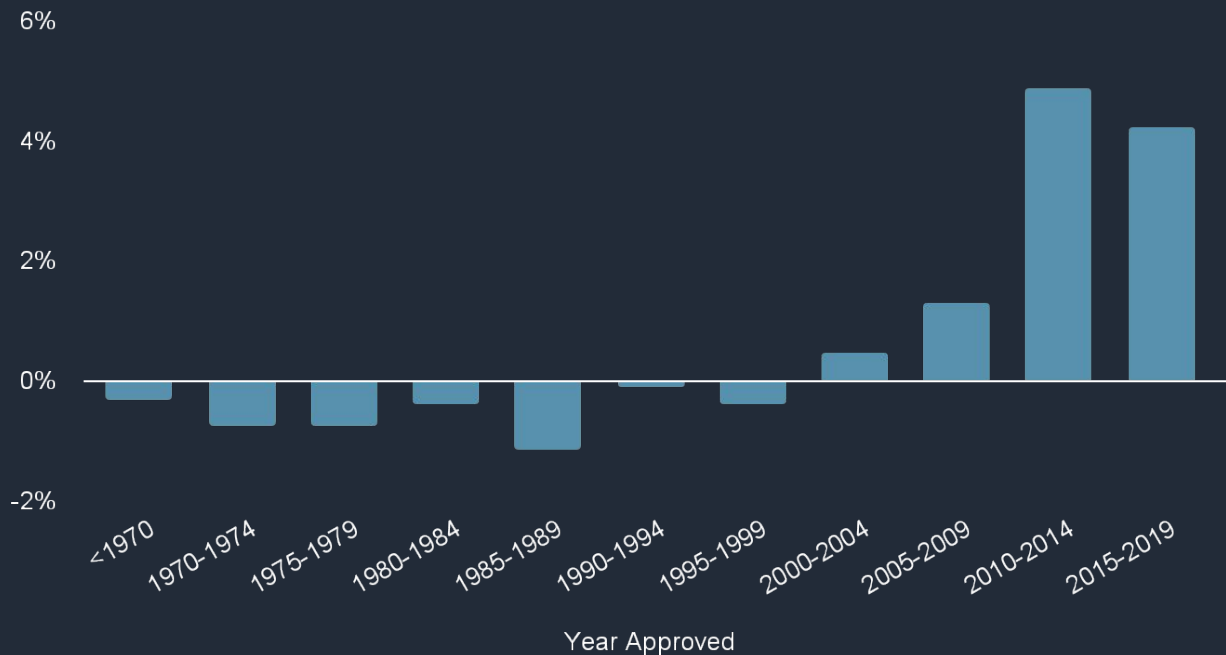
Preliminary Analysis - Staffing Rating



*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - Year Approved

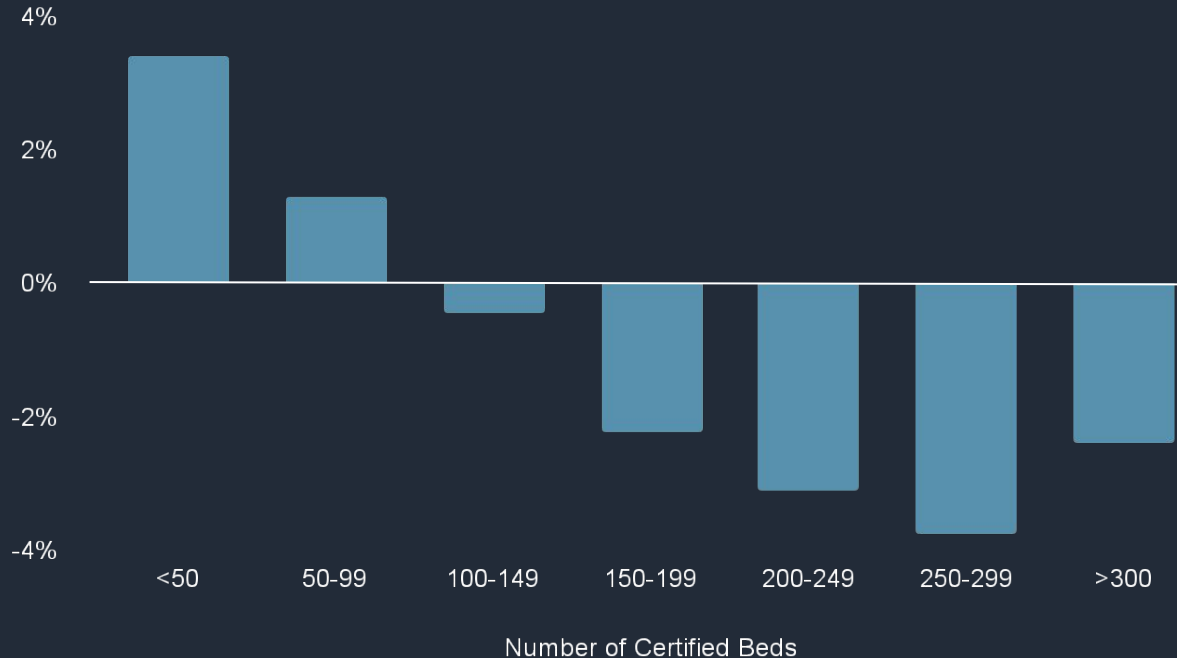
Average of the Difference with the State Average Occupancy By Years



*Data source: Centers for Medicare & Medicaid Services

Preliminary Analysis - Certified Beds

Average of the Differences with the State Average Occupancy by Certified Beds

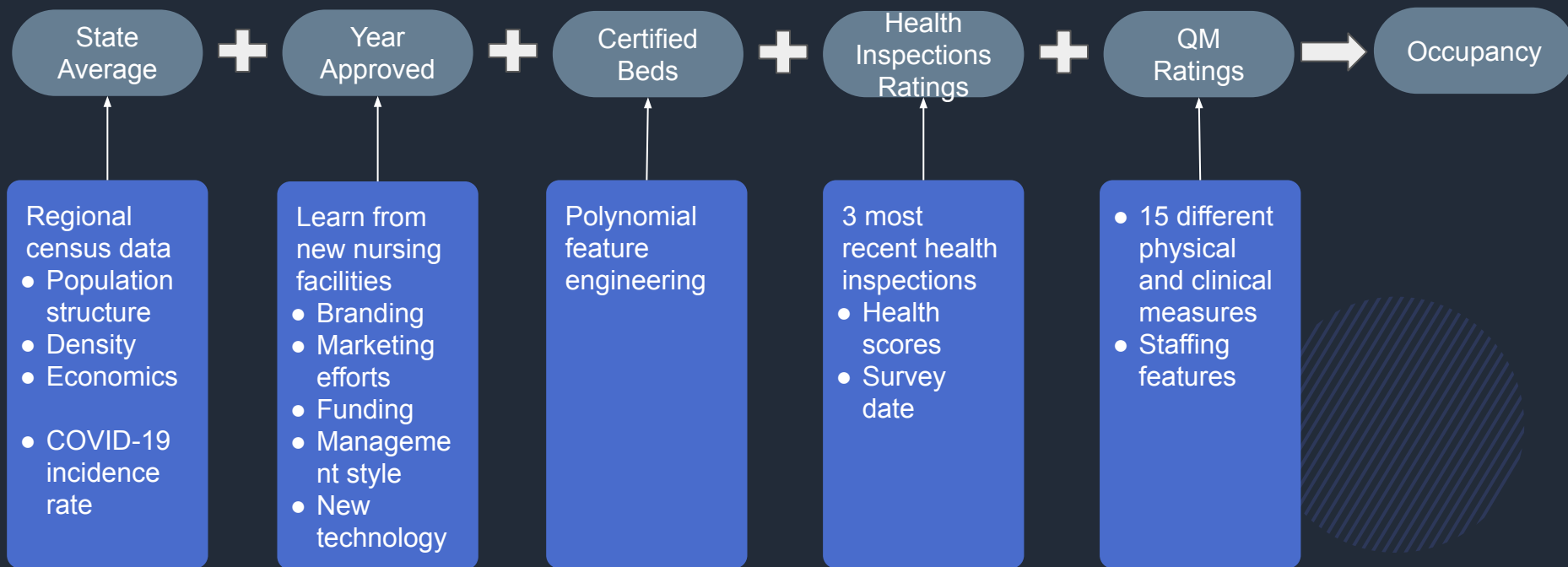


Baseline Model

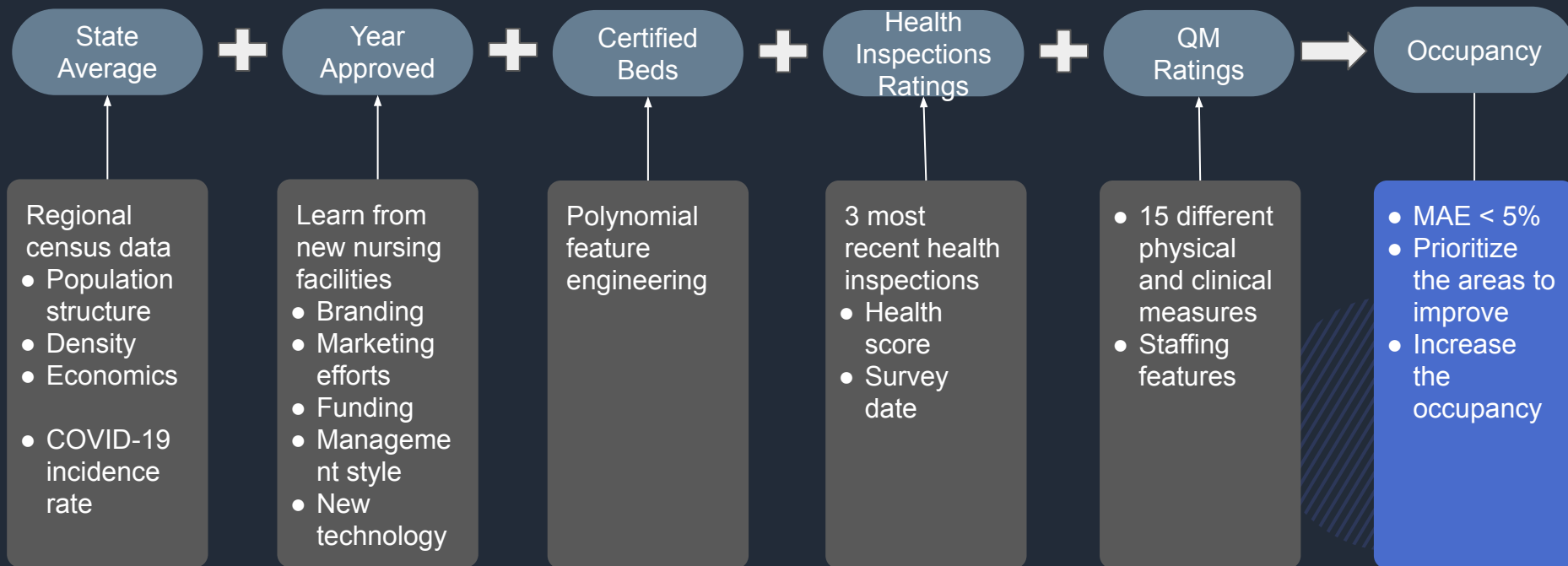


MAE = 0.105 (10.5%)

Future Work



Final Goal - MAE < 5%



Other Opportunities with Data Science

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

Thank You!

Do you have any
questions?



CREDITS: This presentation template was
created by **Slidesgo**, including icons by
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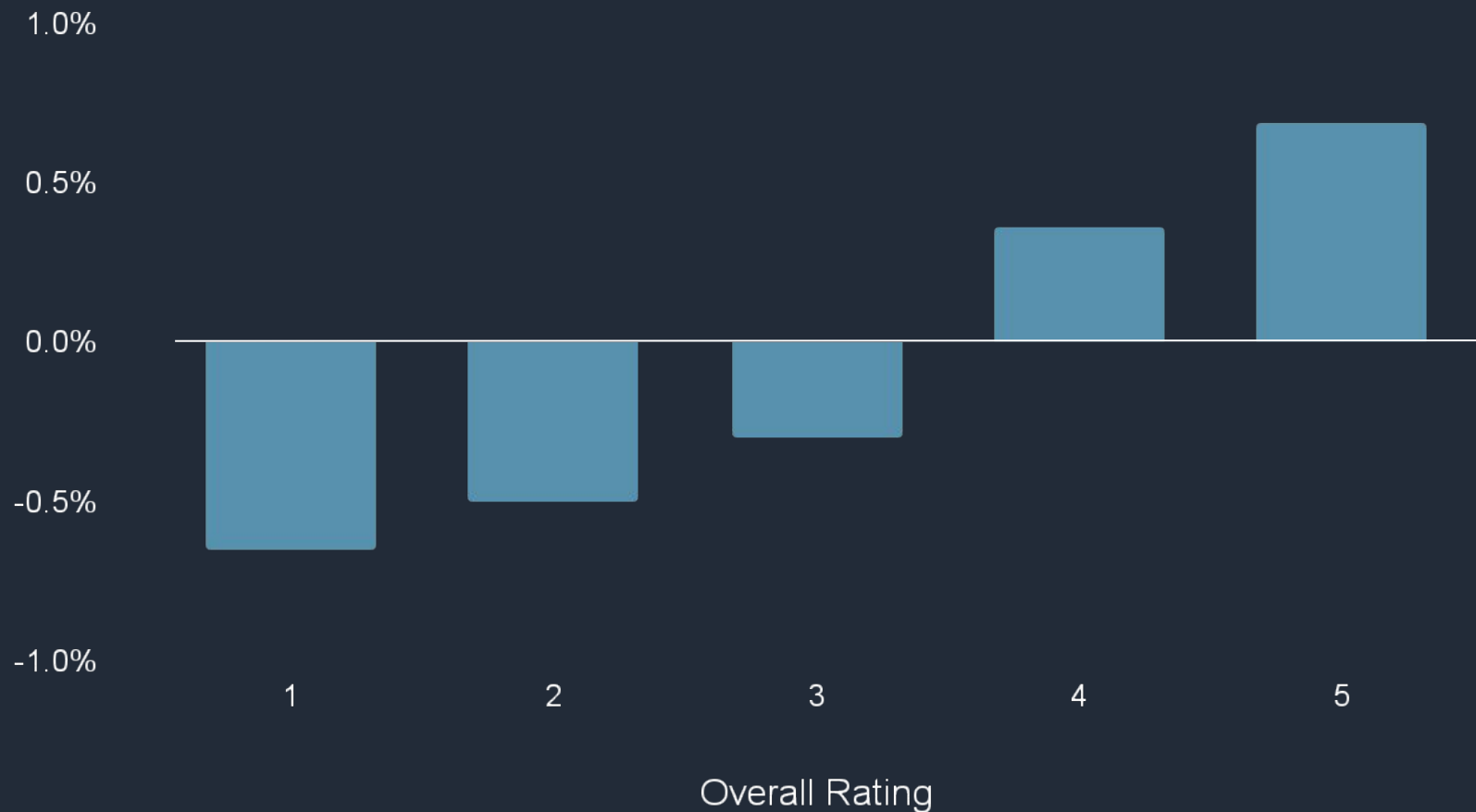
An abstract graphic featuring a dark blue background. In the center, there is a series of concentric circles. The outermost circle is a light blue ring. Inside this, there are several darker blue rings. A spiral pattern of thin, dark blue lines winds inward from the outer rings towards the center. The word "Appendix" is written in white, bold, sans-serif font, centered within the spiral.

Appendix

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