



ANALYSIS OF INDEPENDENT MEDICAL REVIEWS (IMR) IN CALIFORNIA

GROUP 7





Agenda

- Introduction
- Project Objective
- Data description
- EDA
- Key Visualizations
- Recommendations



Introduction



- **IMR (Independent Medical Review)** lets patients appeal when treatment is **denied, delayed, or changed** by insurance.
- Independent medical experts do reviews.
- Ensures fairness and transparency in healthcare decisions.
- Data from California DMHC, covering cases from 2001–2023.



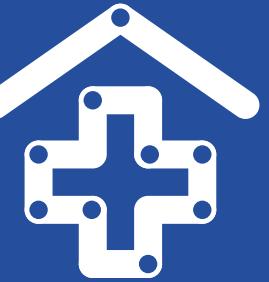
Project Objective

Analyze Independent Medical Review (IMR) decisions by the California Department of Managed Health Care (DMHC).

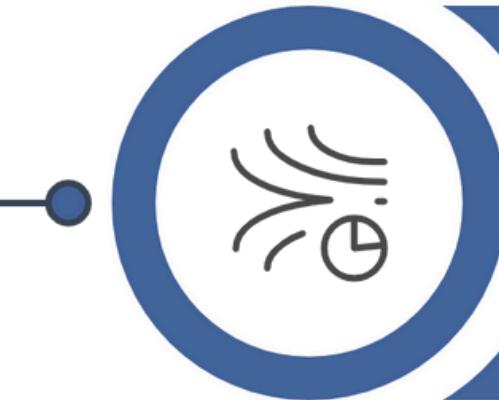
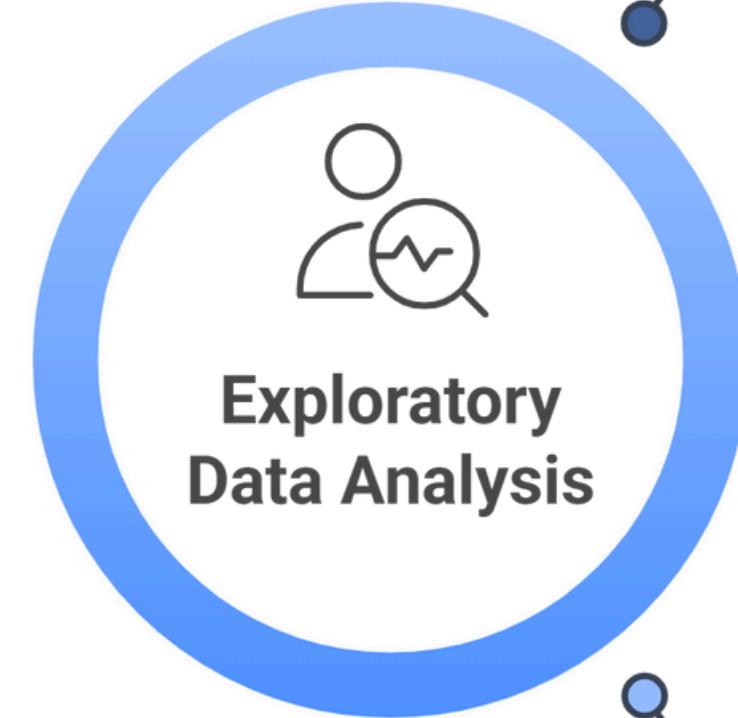
- Key Focus Areas:
 - Factors influencing case determinations.
 - Trends in review times.
 - Impact of patient demographics on decisions.
 - Influence of diagnoses and treatment categories.
- Methodology: Utilize healthcare analytics techniques for in-depth analysis.
- Expected Outcomes:
 - Derive actionable insights for enhancing healthcare decision-making.
 - Improve efficiency in the IMR process.



Data Description

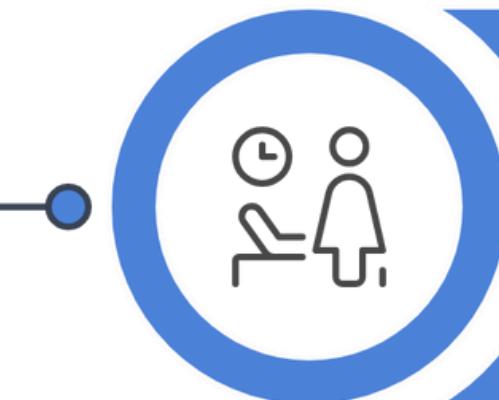


ReferenceID	ReferenceID	Text	Unique identifier for the case.
ReportYear	ReportYear	Number	Year the case was reported.
DiagnosisCategory	DiagnosisCategory	Text	The main diagnosis category.
Diagnosis SubCategory	DiagnosisSubCategory	Text	The secondary diagnosis category.
TreatmentCategory	TreatmentCategory	Text	The main treatment category.
TreatmentSubCategory	TreatmentSubCategory	Text	The secondary treatment category.
Determination	Determination	Text	Indicates if the determination was upheld or overturned.
Type	Type	Text	Indicates the type of case (Experimental/Investigational, Urgent Care, Medical Necessity)
PatientAge	PatientAge	Number	The age of the patient.
PatientGender	PatientGender	Text	The gender of the patient.
Findings	Findings	Text	A summary of the case findings.



Time-Series Analysis

Identifying trends in case determinations over 22 years.



Demographic Analysis

Exploring age, gender, and outcome relationships.



Diagnosis & Treatment Insights

Discovering conditions and treatments prone to overturning.



Review Time Trends

Assessing efficiency and bottlenecks in review timelines.

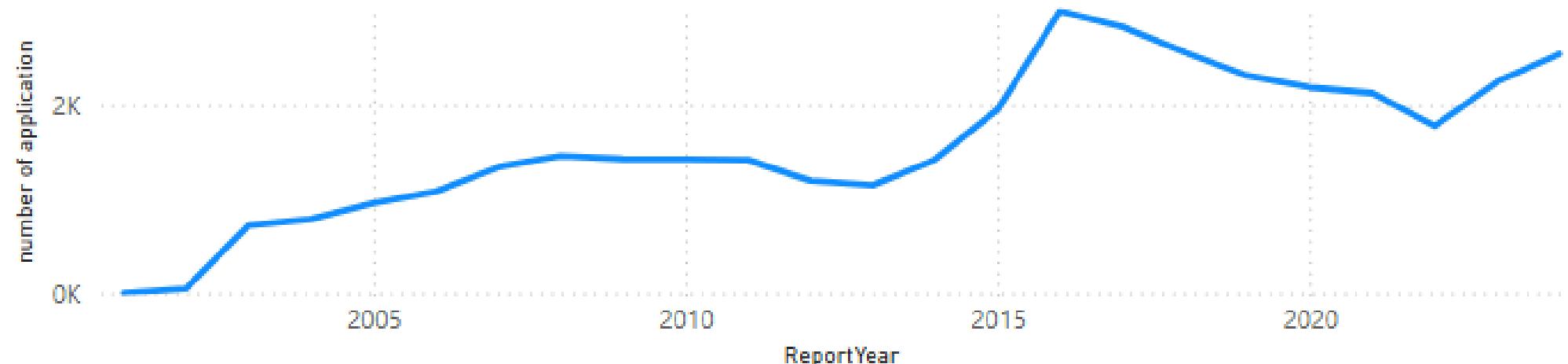
KEY VISUALIZATIONS



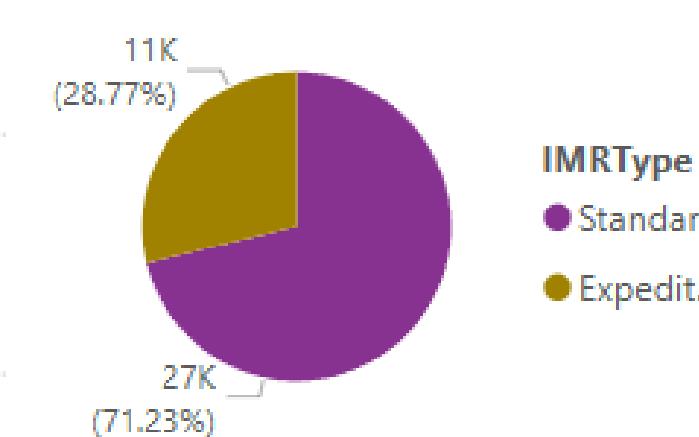
Medical Insurance Rejection Analysis

Overview of Diagnosis

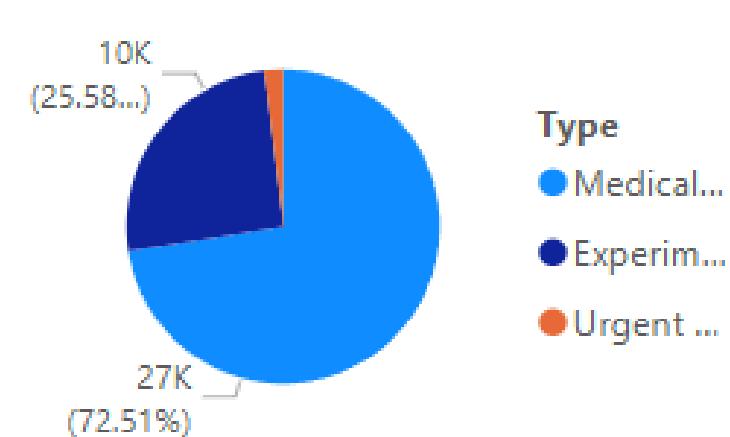
number of application by ReportYear



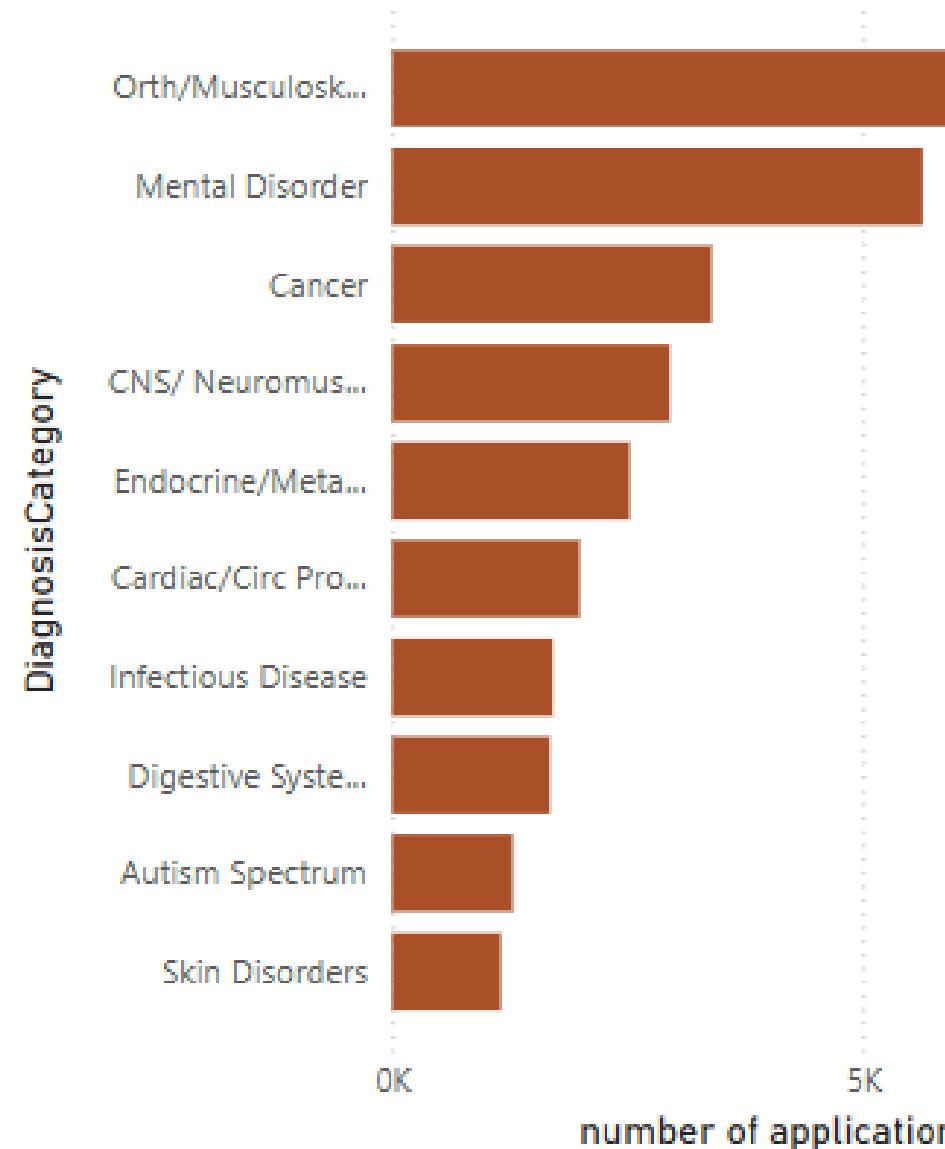
number of application by IMRTType



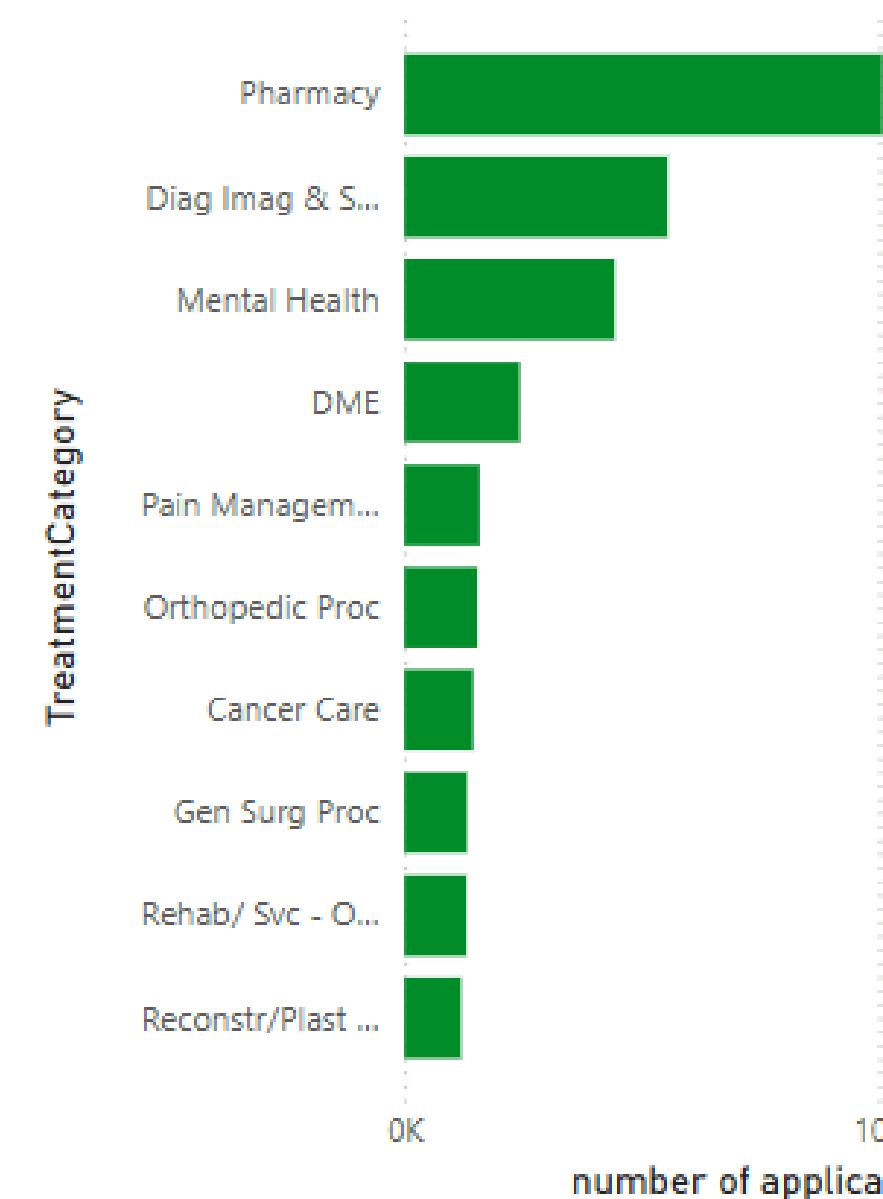
number of application by Type



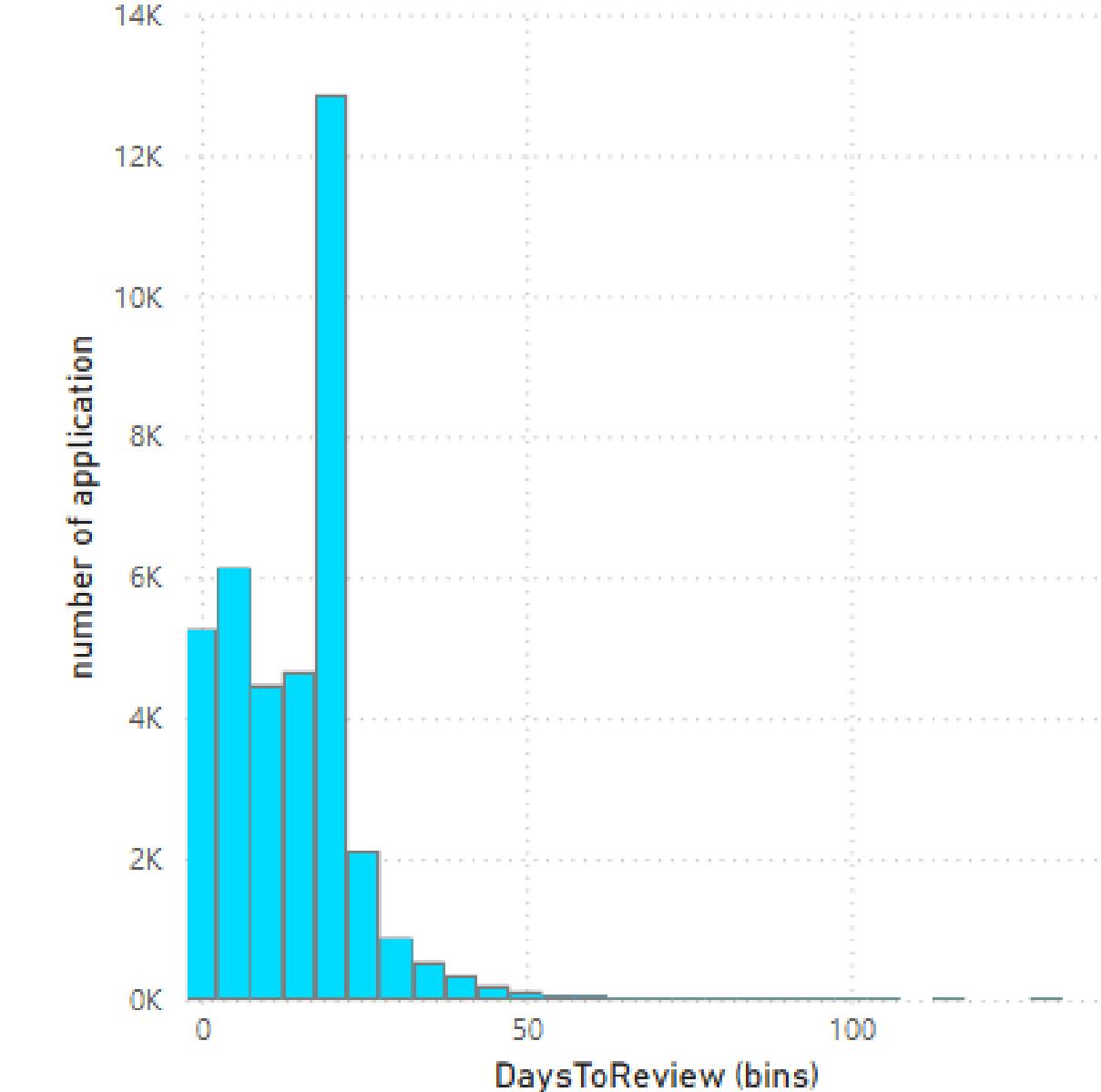
number of application by DiagnosisCategory



number of application by TreatmentCategory



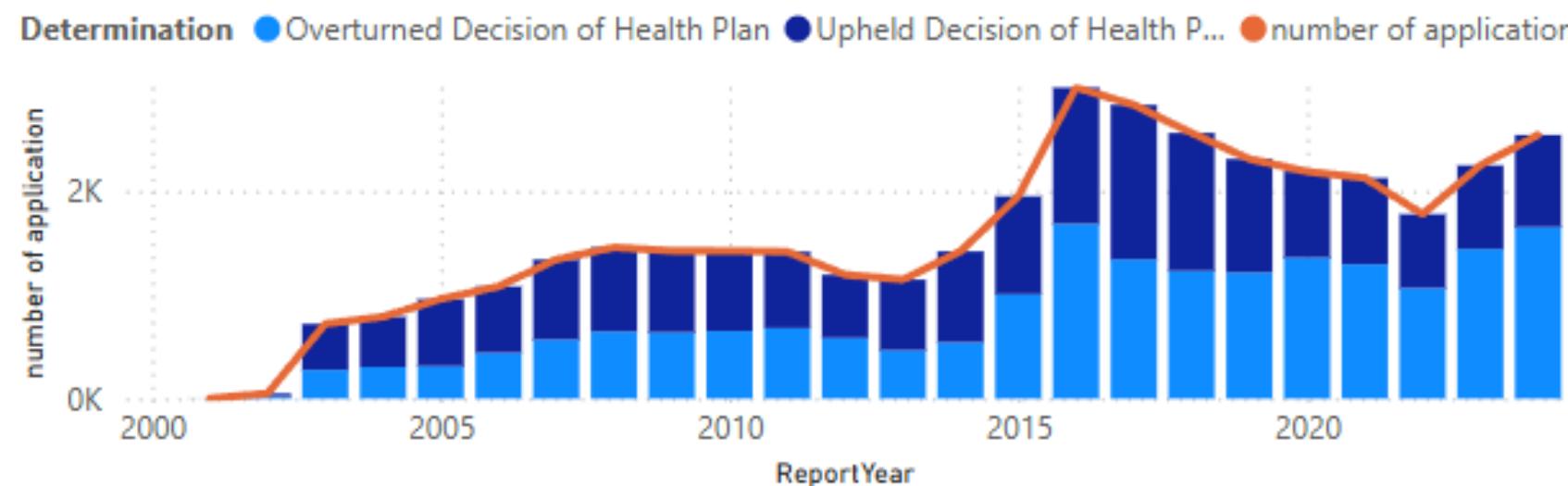
number of application by DaysToReview (bins)



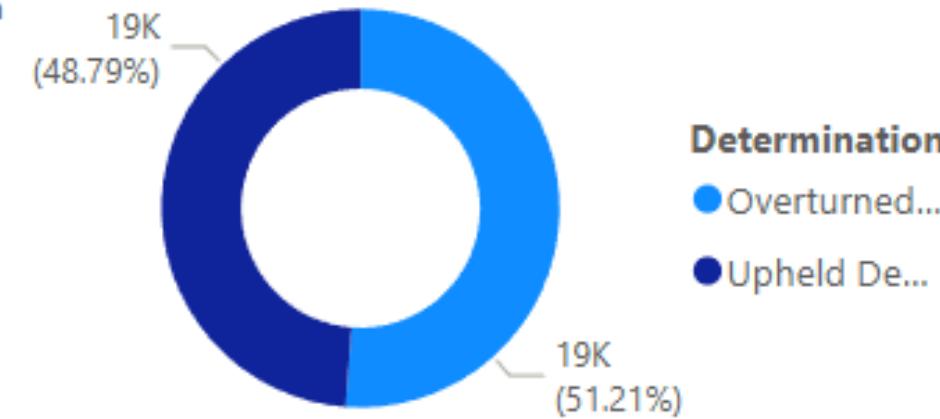
Medical Insurance Rejection Analysis

Overview of Patients

number of application and number of application by ReportYear and Determination



number of application by Determination



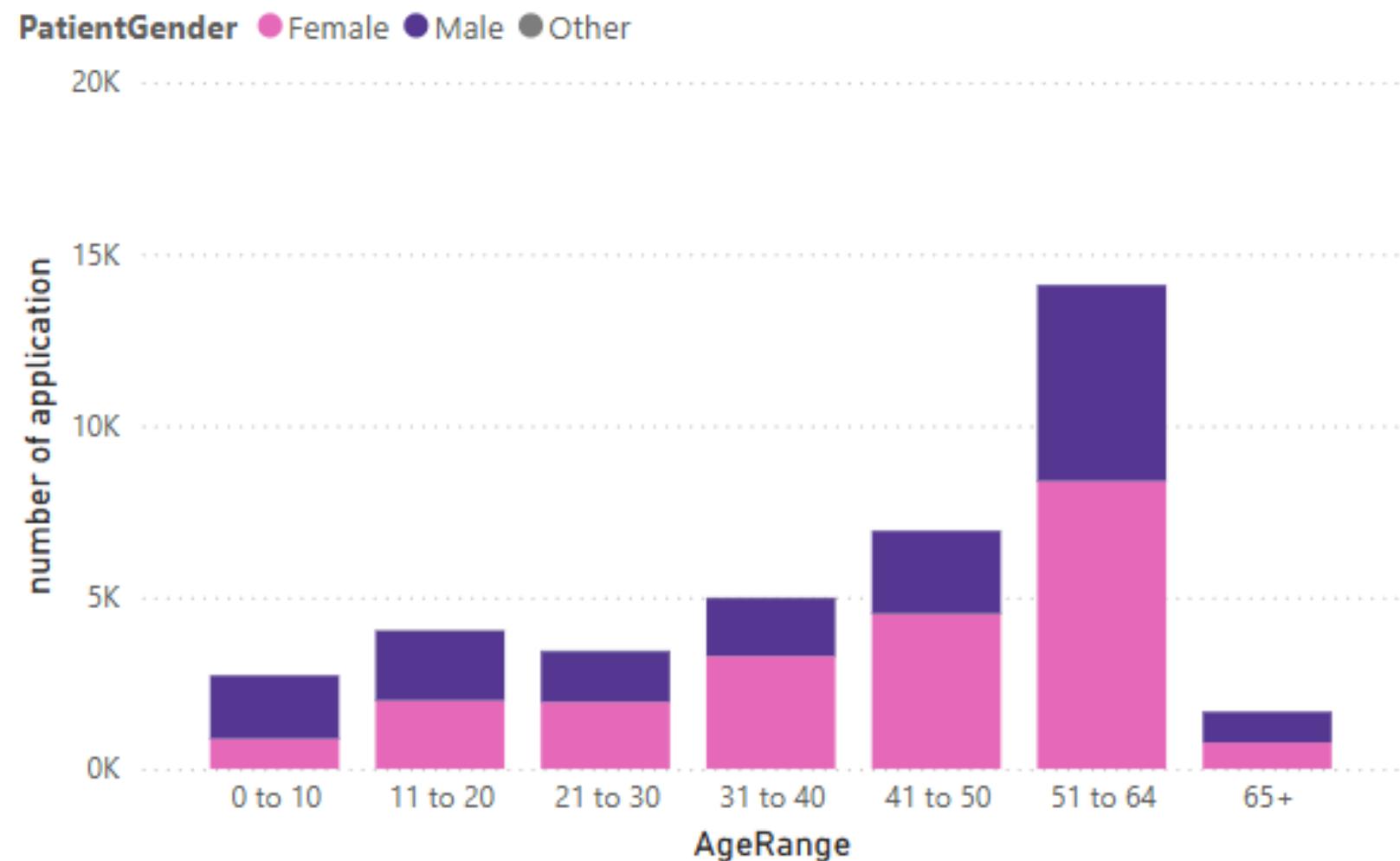
Determination

- Select all
- Overturned Decision of Health Plan
- Upheld Decision of Health Plan

PatientGender

- Select all
- Female
- Male
- Other

number of application by AgeRange and PatientGender



DiagnosisCategory	TreatmentCategory	Avg. of DaysToReview	Avg. of DaysToAdopt	Num. of Application
Mental Disorder	Mental Health	15.63	37.97	4258
Endocrine/Metabolic	Pharmacy	18.44	38.89	1740
Infectious Disease	Pharmacy	16.17	33.81	1562
Orth/Musculoskeletal	Orthopedic Proc	15.03	34.72	1438
Cancer	Cancer Care	9.77	23.20	1406
Cancer	Diag Imag & Screen	17.51	37.87	1365
CNS/ Neuromusc Dis	Pharmacy	15.28	33.40	1336
Orth/Musculoskeletal	Pain Management	12.06	28.89	1304
Orth/Musculoskeletal	Pharmacy	15.03	34.01	1163
Autism Spectrum	Autism Related Tx	17.13	44.20	923
Orth/Musculoskeletal	DME	18.15	40.18	711
Prevention/Good Hlth	Diag Imag & Screen	17.47	37.87	678
Orth/Musculoskeletal	Diag Imag & Screen	14.79	34.59	633
Digestive System/ GI	Pharmacy	12.78	29.58	623
Skin Disorders	Pharmacy	16.92	36.77	623
Immuno Disorders	Pharmacy	14.30	32.23	618
Total		16.28	37.52	37922

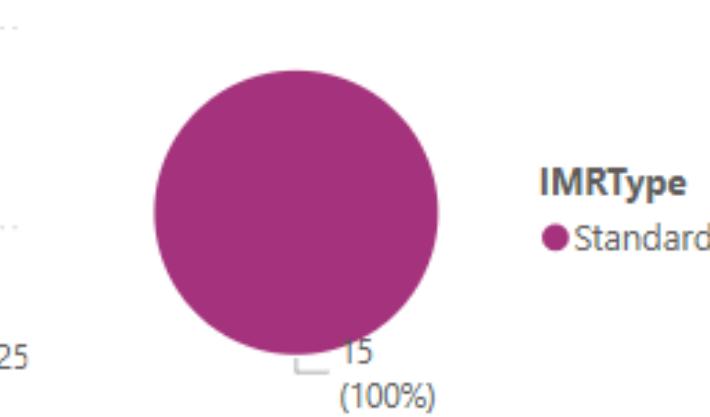
Medical Insurance Rejection Analysis

Why days of review taking more than 100 before 2018 ?

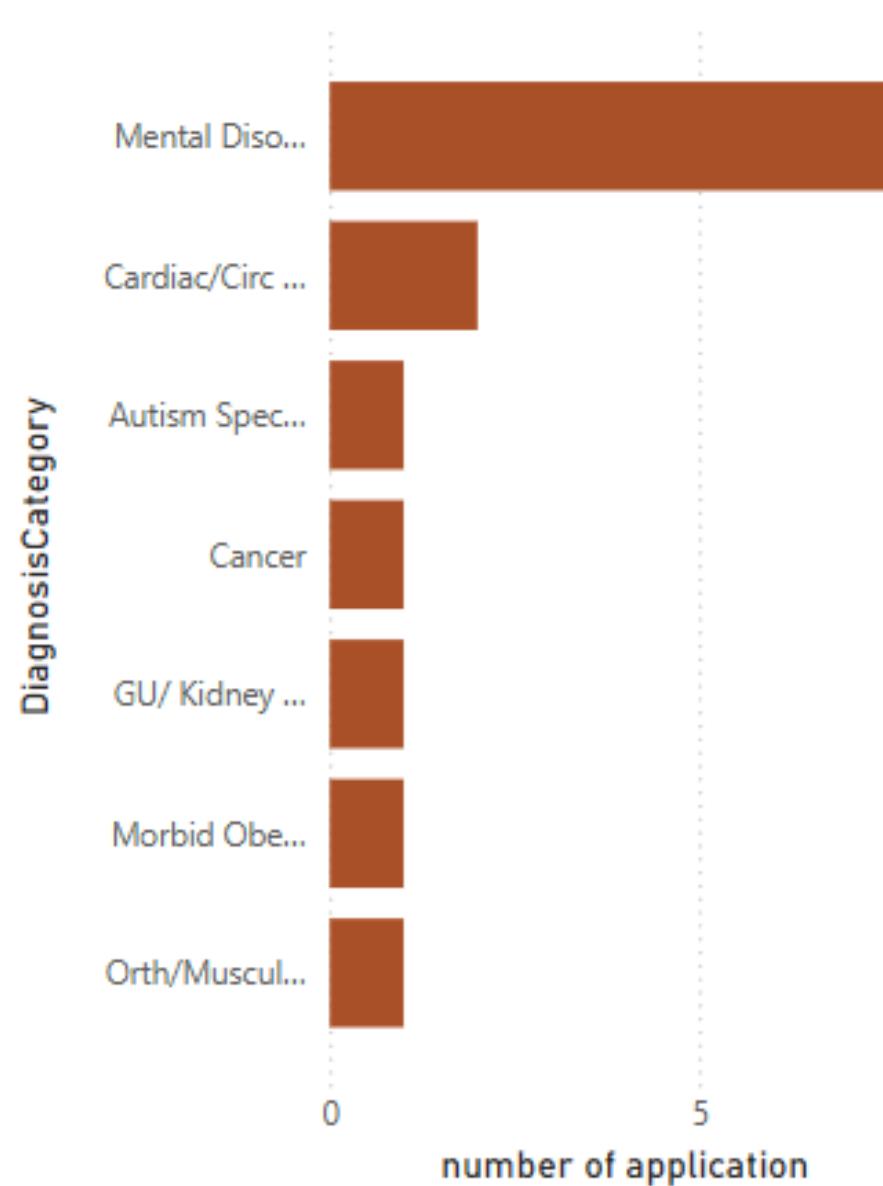
number of application by ReportYear



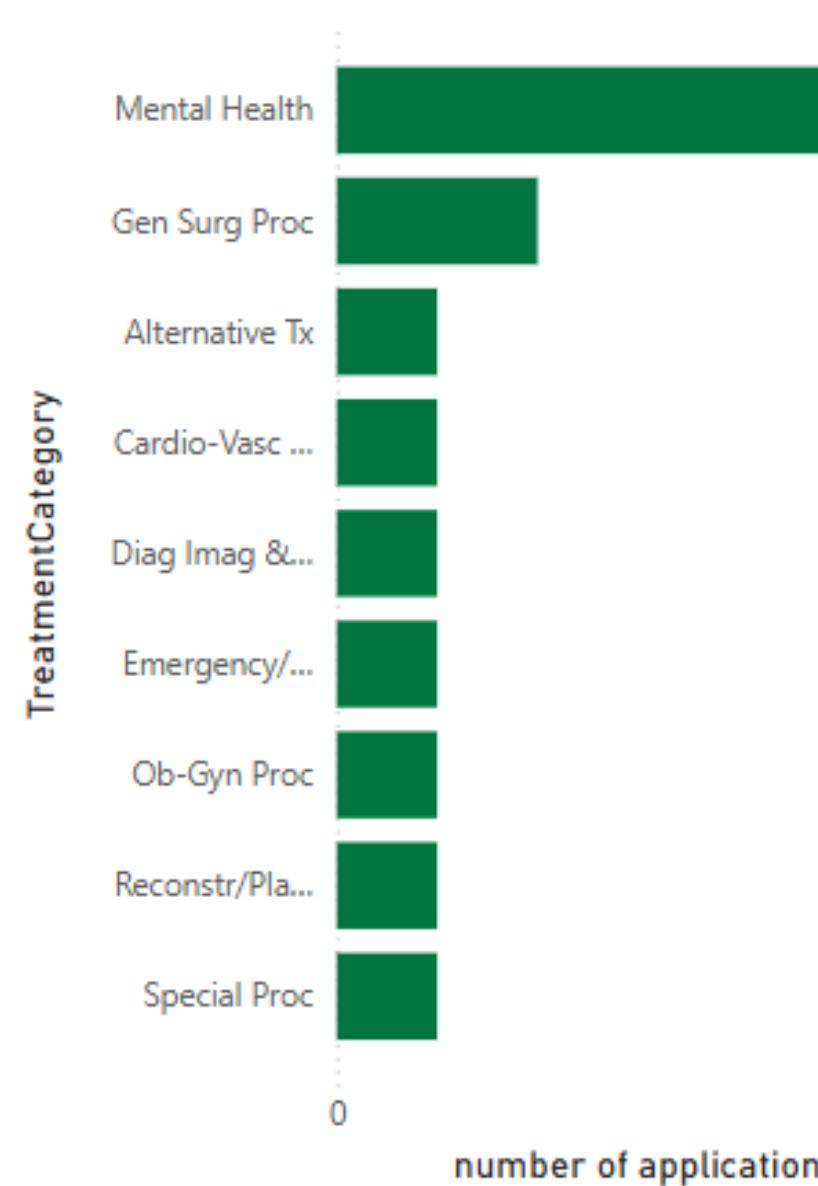
number of application by IMRTType



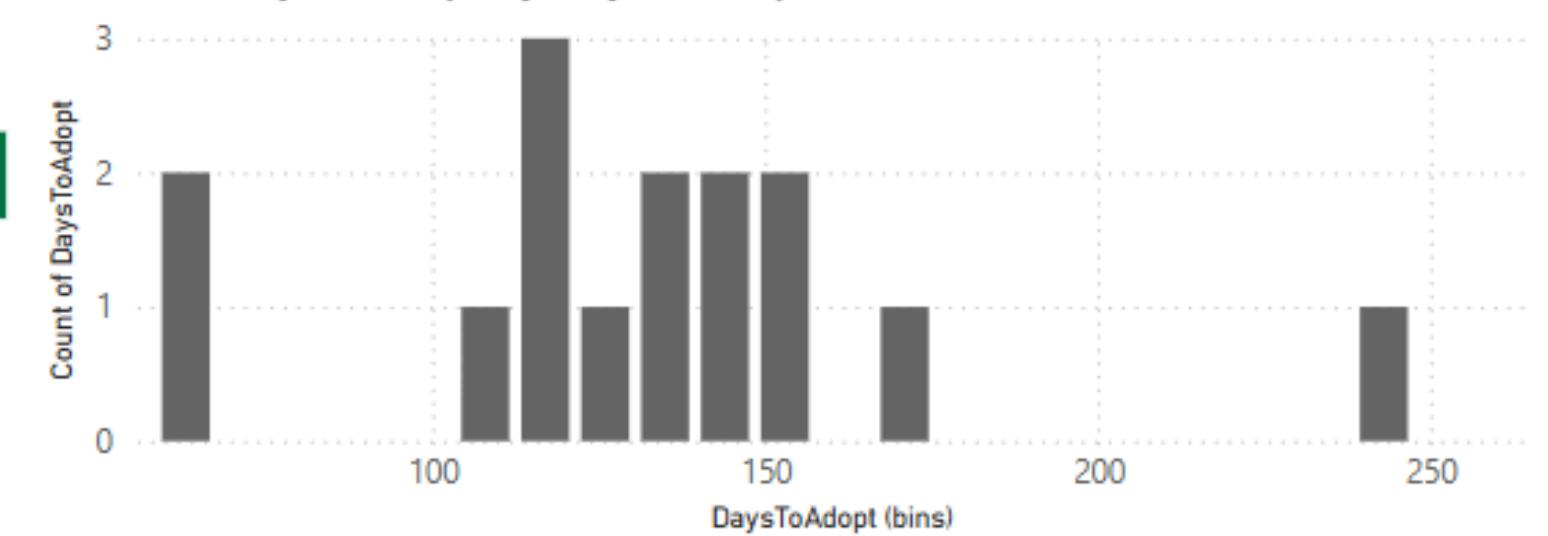
number of application by DiagnosisCategory



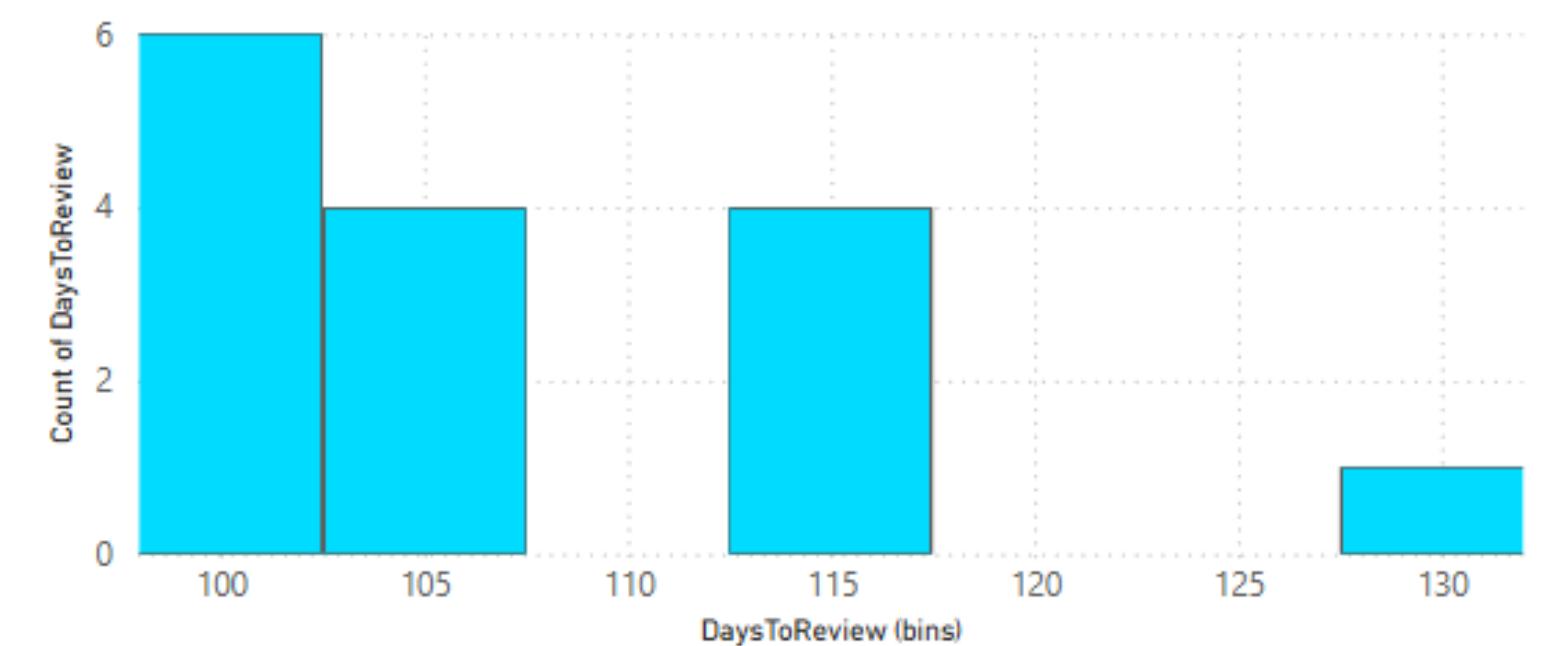
number of application by TreatmentCategory



Count of DaysToAdopt by DaysToAdopt (bins)



Count of DaysToReview by DaysToReview (bins)

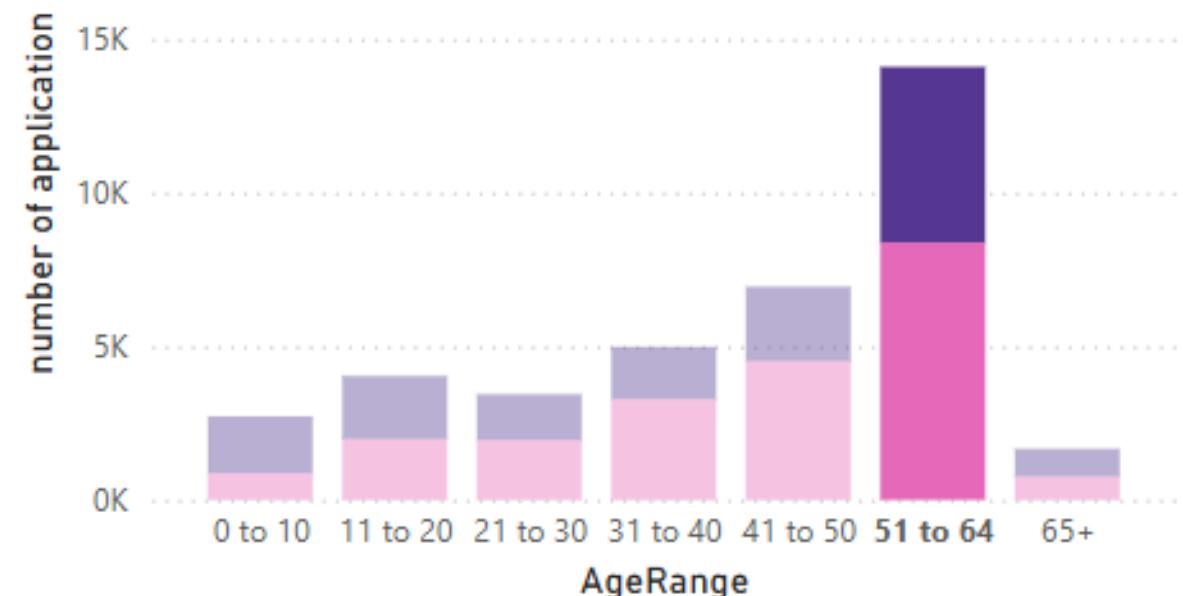


Age Group 51–64 Shows Higher Infection Disease Diagnosis; Mental Disorders Remain Most Common Overall

number of application by AgeRange and PatientGender

PatientGender ● Female ● Male ● Other

20K



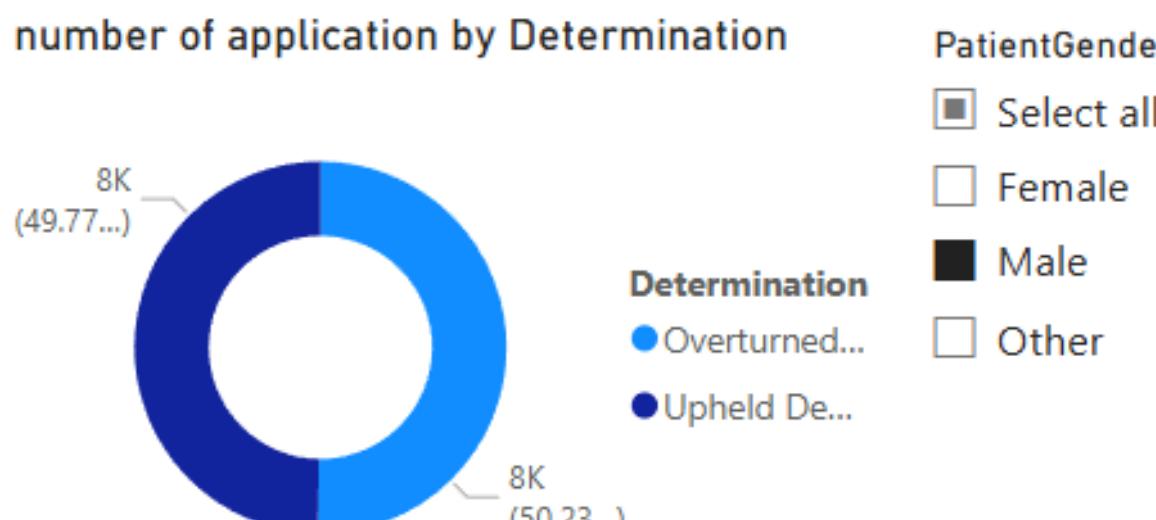
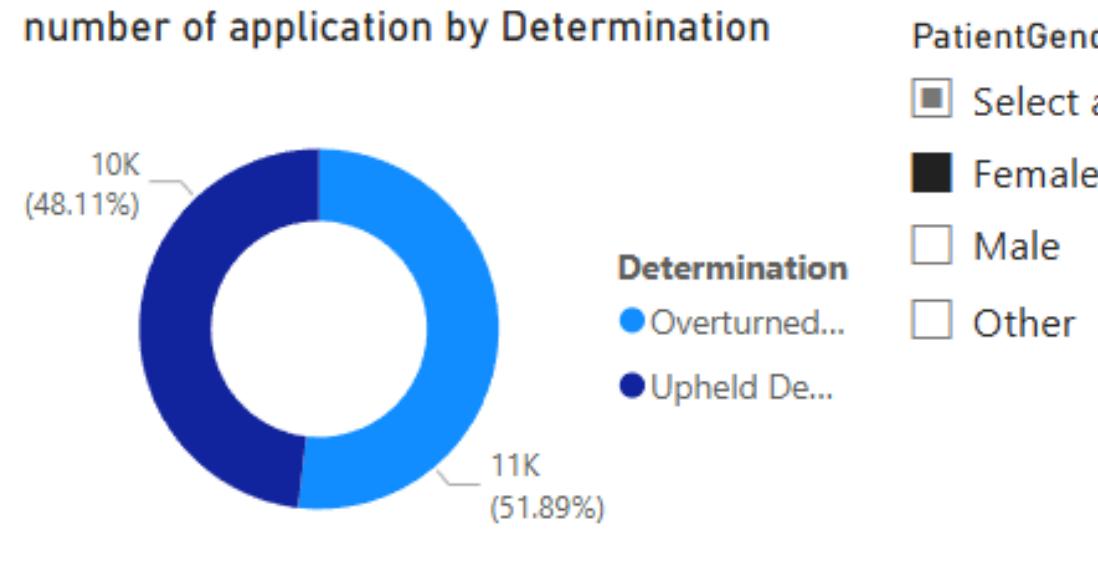
PatientGender

- Select all
- Female
- Male
- Other

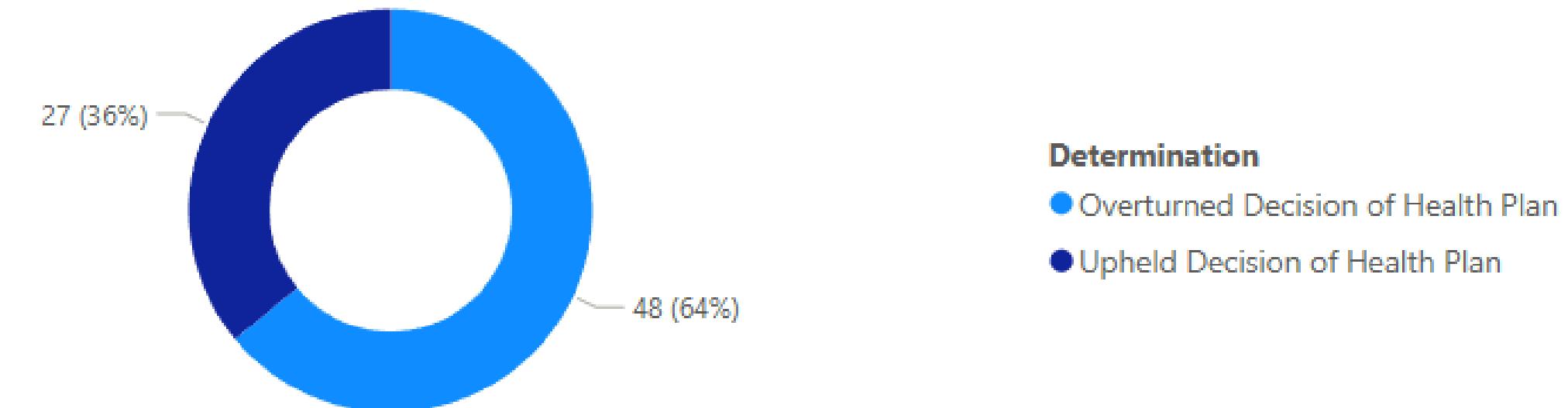
DiagnosisCategory	TreatmentCategory	Avg. of DaysToReview	Avg. of DaysToAdopt	Num. of Application
Infectious Disease	Pharmacy	16.08	33.41	943
Cancer	Cancer Care	9.67	23.18	887
Cancer	Diag Imag & Screen	17.24	37.40	811
Orth/Musculoskeletal	Pain Management	11.74	28.29	810
Orth/Musculoskeletal	Orthopedic Proc	14.44	34.00	673
Orth/Musculoskeletal	Pharmacy	15.14	34.41	664
Endocrine/Metabolic	Pharmacy	18.13	38.78	597
CNS/ Neuromusc Dis	Pharmacy	15.72	34.40	495
Mental Disorder	Mental Health	16.13	38.30	478
Prevention/Good Hlth	Diag Imag & Screen	17.16	37.53	403
Orth/Musculoskeletal	Diag Imag & Screen	14.83	34.69	301
Orth/Musculoskeletal	DME	18.50	40.26	280
Cardiac/Circ Problem	Diag Imag & Screen	19.77	41.38	278
Immuno Disorders	Pharmacy	14.07	31.78	222
Total		15.73	35.70	14103

DiagnosisCategory	TreatmentCategory	Avg. of DaysToReview	Avg. of DaysToAdopt	Num. of Application
Mental Disorder	Mental Health	15.63	37.97	4258
Endocrine/Metabolic	Pharmacy	18.44	38.89	1740
Infectious Disease	Pharmacy	16.17	33.81	1562
Orth/Musculoskeletal	Orthopedic Proc	15.03	34.72	1438
Cancer	Cancer Care	9.77	23.20	1406
Cancer	Diag Imag & Screen	17.51	37.87	1365
CNS/ Neuromusc Dis	Pharmacy	15.28	33.40	1336
Orth/Musculoskeletal	Pain Management	12.06	28.89	1304
Orth/Musculoskeletal	Pharmacy	15.03	34.01	1163
Autism Spectrum	Autism Related Tx	17.13	44.20	923
Orth/Musculoskeletal	DME	18.15	40.18	711
Prevention/Good Hlth	Diag Imag & Screen	17.47	37.87	678
Orth/Musculoskeletal	Diag Imag & Screen	14.79	34.59	633
Digestive System/ GI	Pharmacy	12.78	29.58	623
Skin Disorders	Pharmacy	16.92	36.77	623
Immuno Disorders	Pharmacy	14.39	32.23	618
Total		16.28	37.52	37922

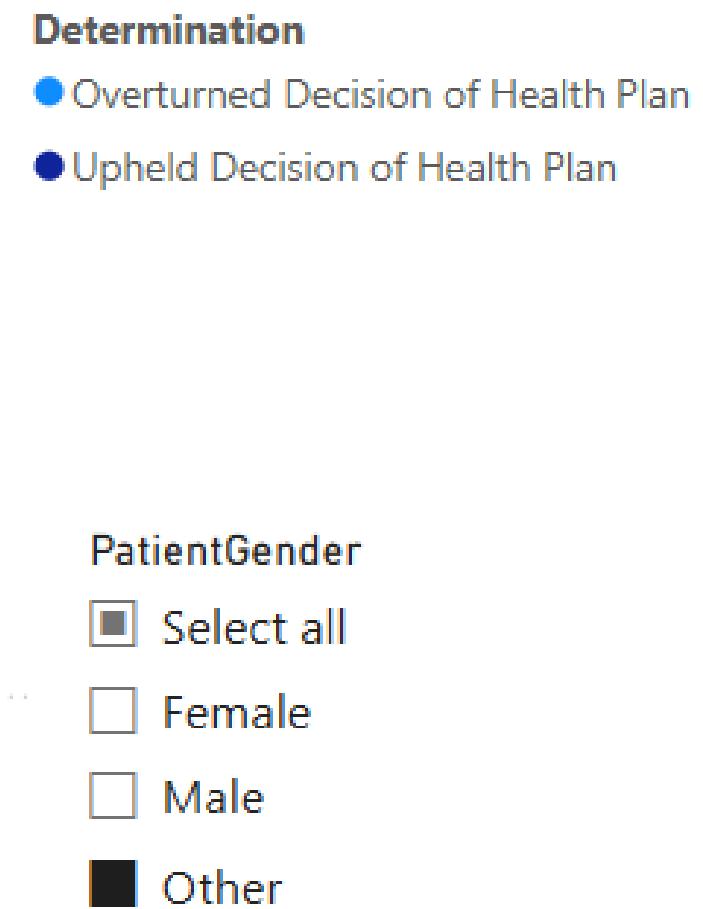
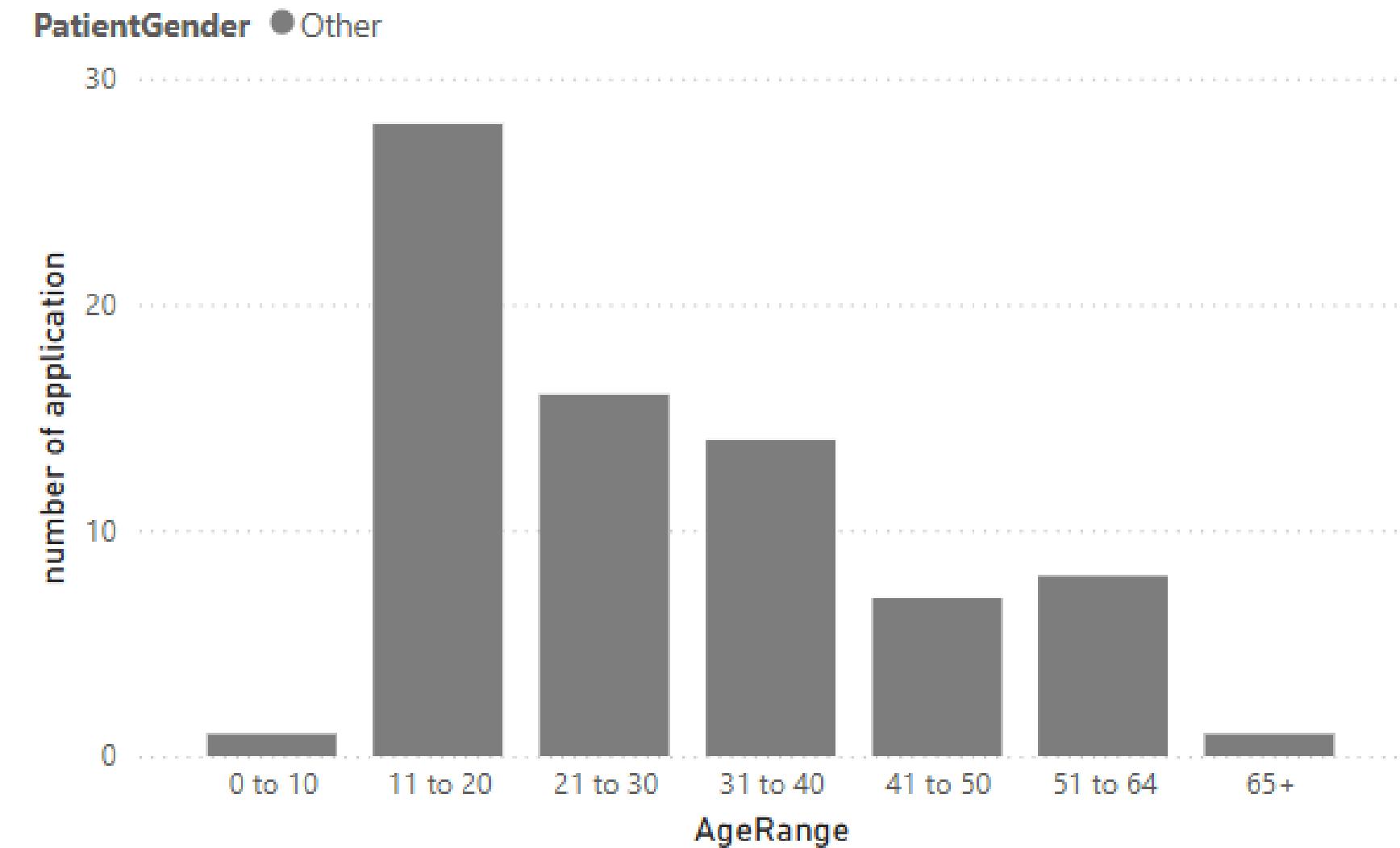
**In the 'Others' Gender Category,
Applications from the 11–20 Age
Range Show the Highest Acceptance
Rate Upon Reapplication.**



number of application by Determination



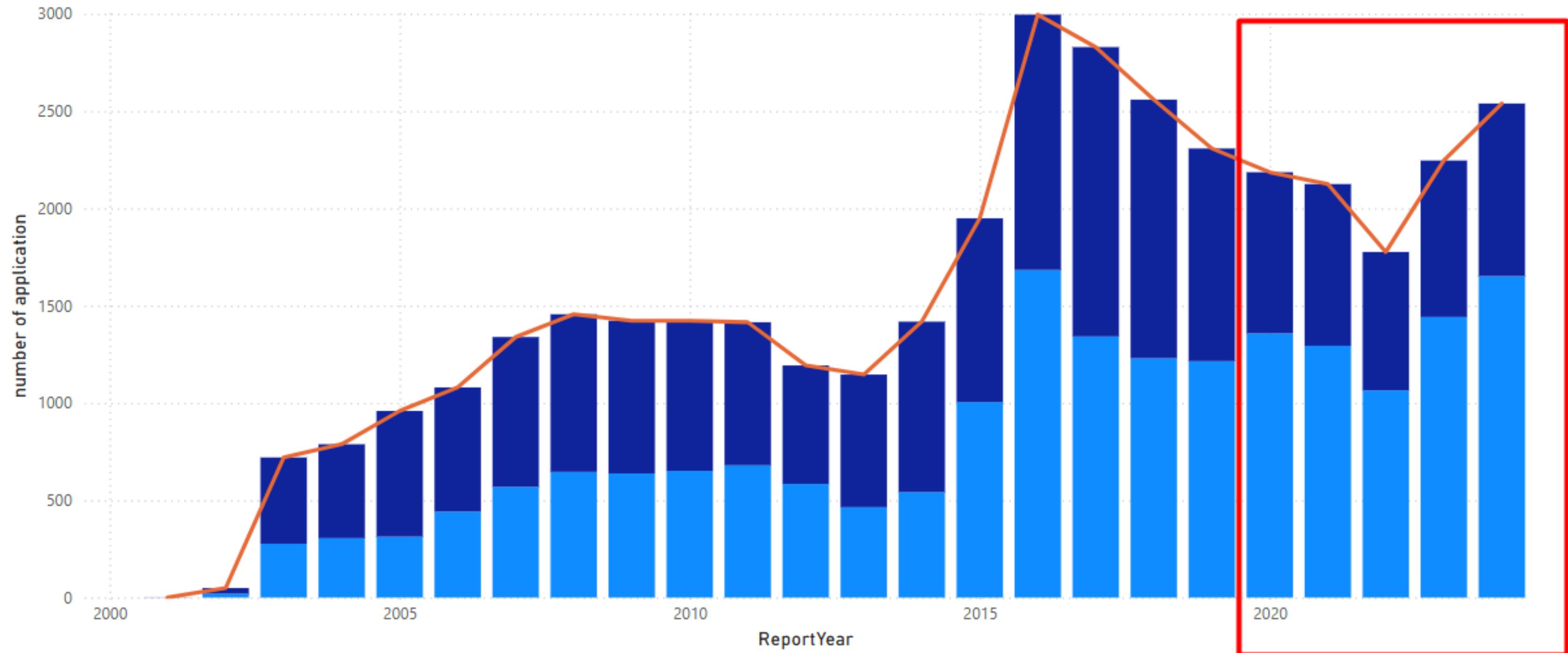
number of application by AgeRange and PatientGender



After 2019, the ratio of Overturned to Upheld Determinations has improved, indicating a positive shift in decision outcomes.

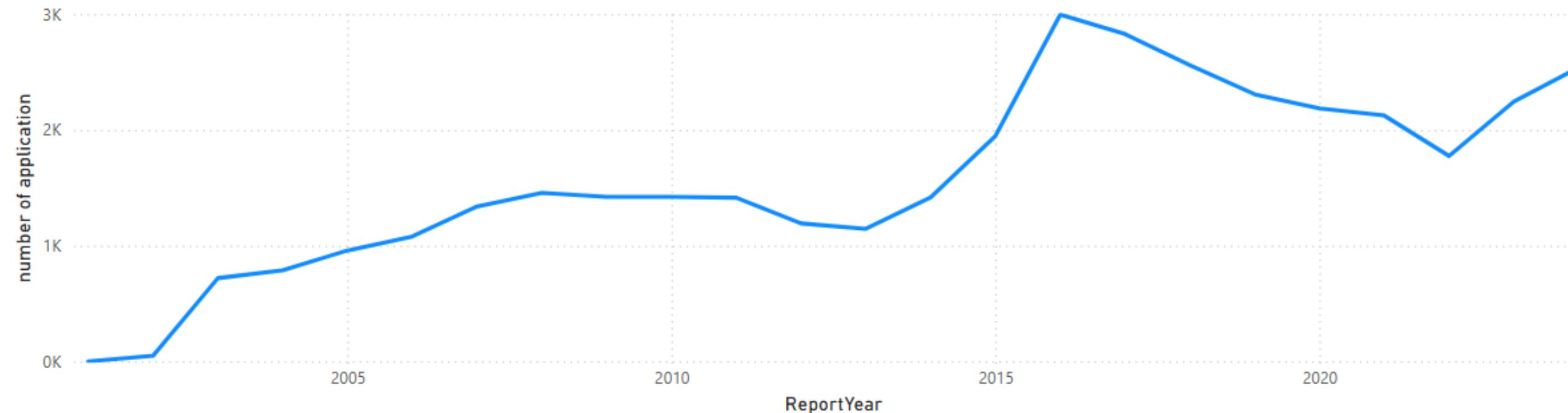
number of application and number of application by ReportYear and Determination

Determination ● Overturned Decision of Health Plan ● Upheld Decision of Health Plan ● number of application

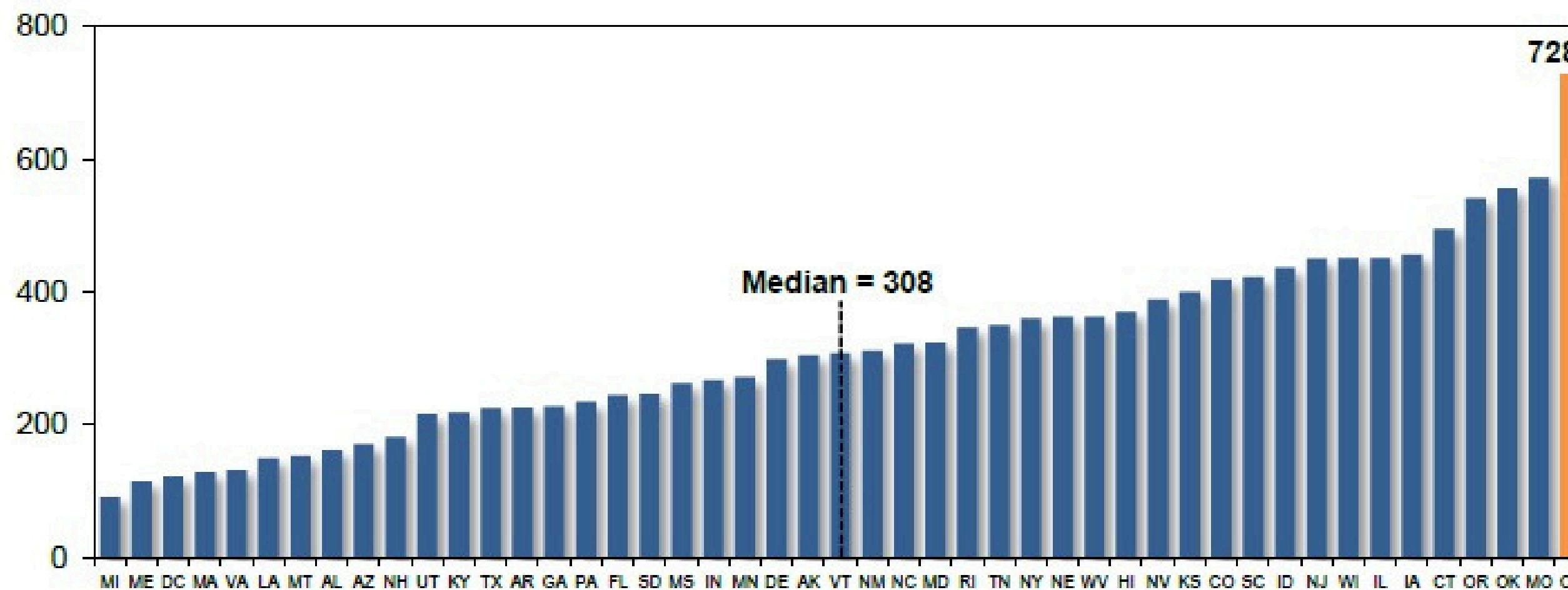


2016 Sees Unusual Rise in Rejected Applications: A Year Worth Investigating

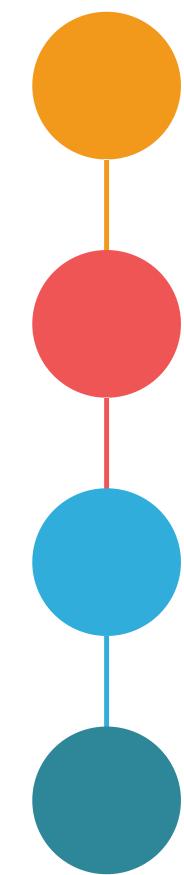
number of application by ReportYear



Median = 308



CAUSES



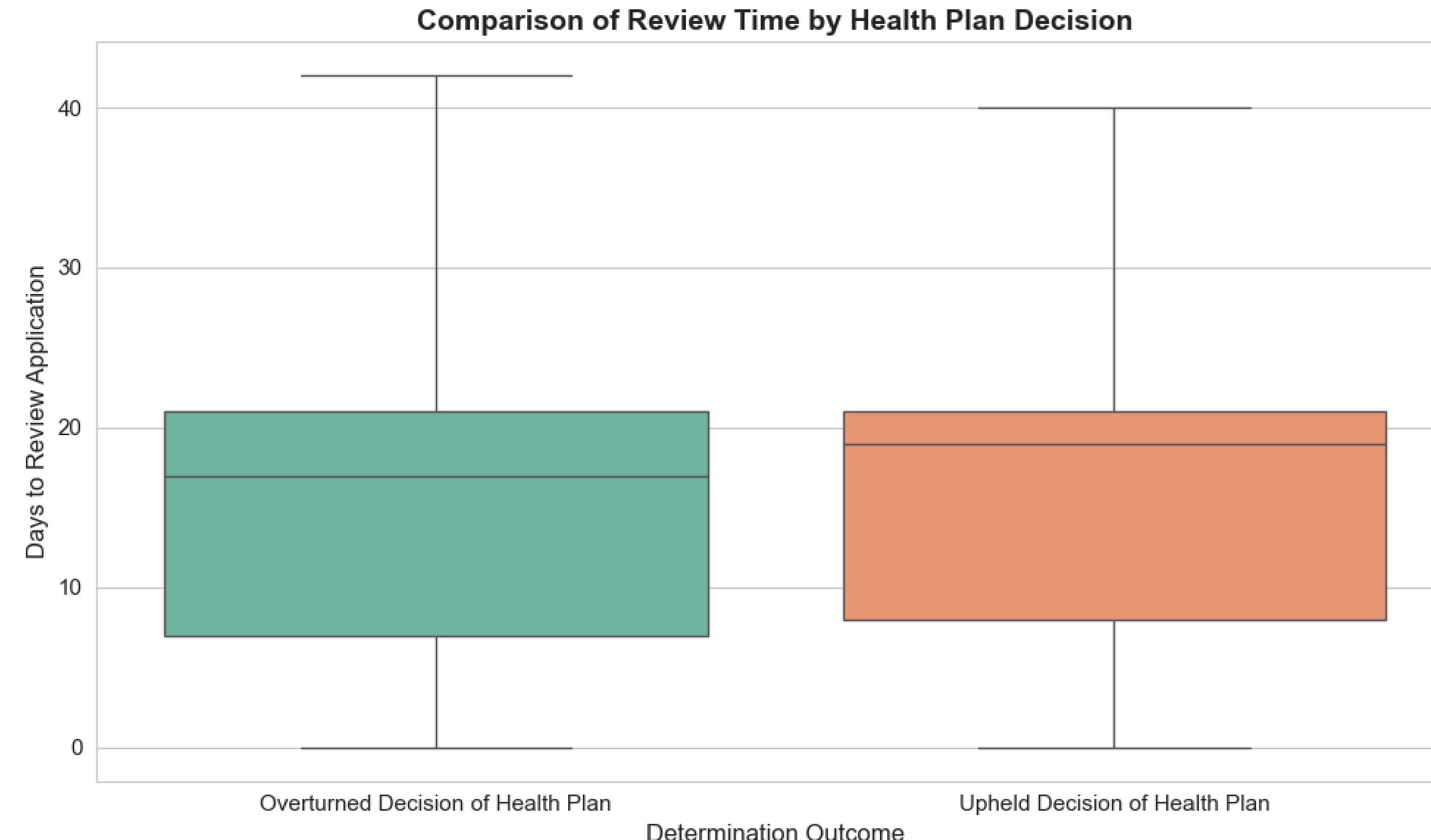
Senate Bill 863

**High Rate of Treatment Denials or
Modifications**

**IMR Requests Concentrated Among Few
Providers**

Growing Awareness and Legal Advocacy

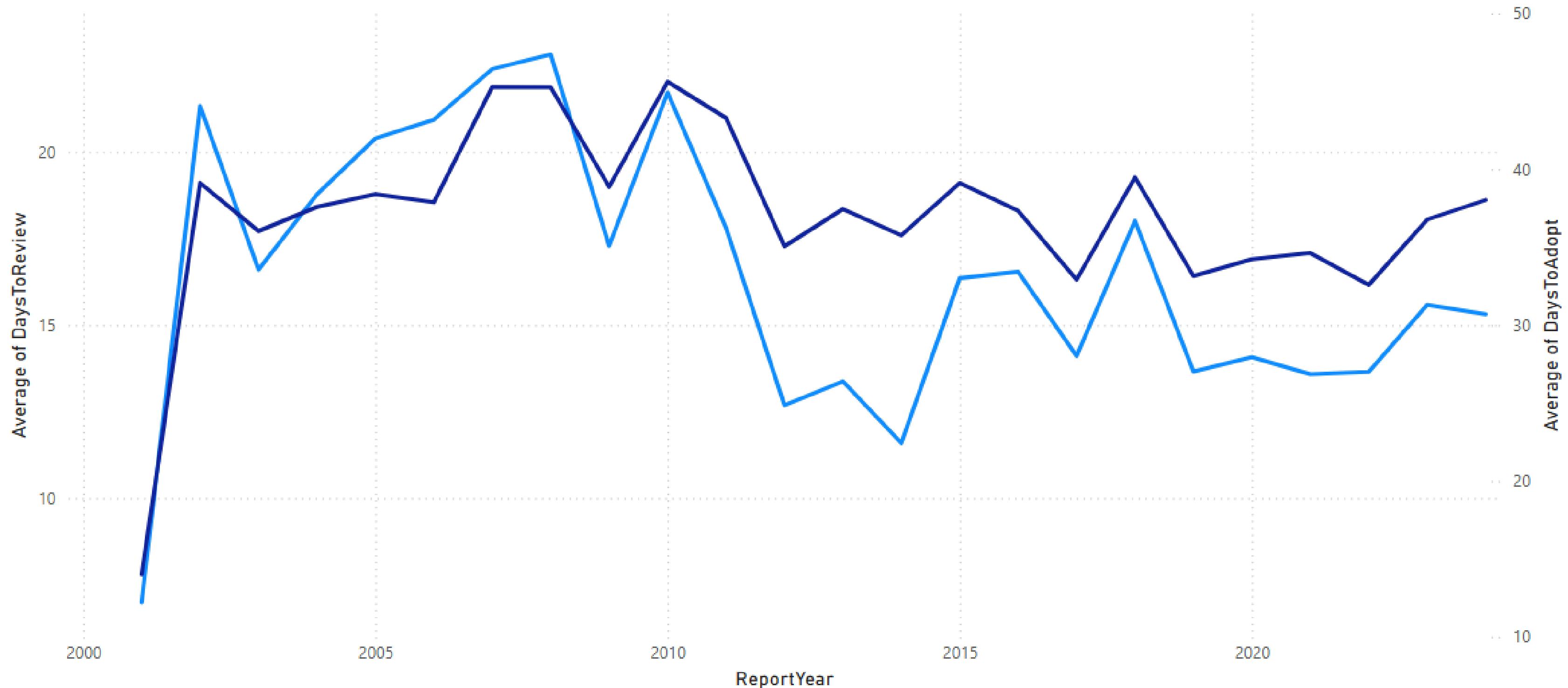
Overturned Decisions Tend to Be Reviewed Slightly Faster Than Upheld Ones



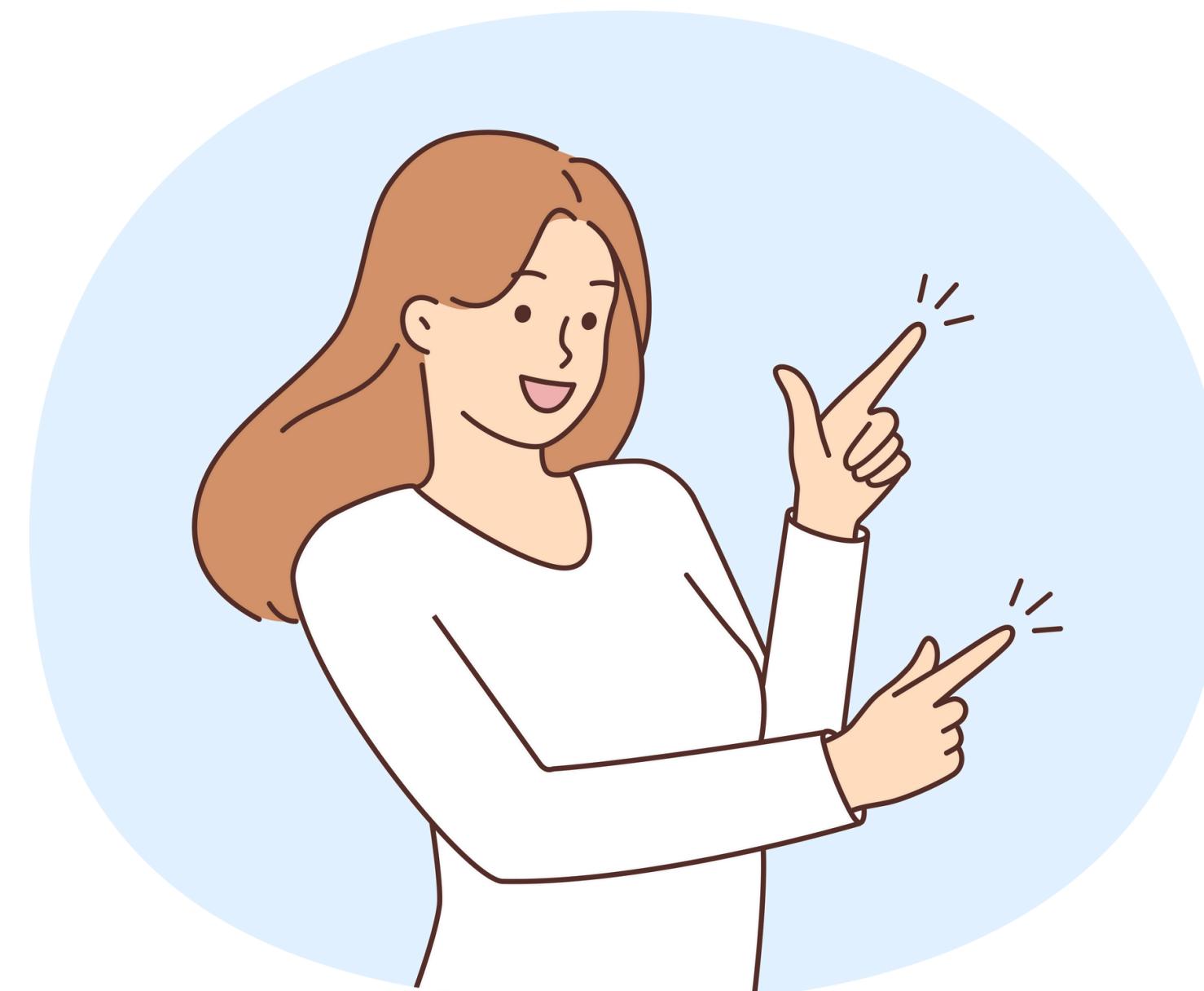
After 2008, Decision Adoption Took Longer Than Reviews – What Changed?

Average of DaysToReview and Average of DaysToAdopt by ReportYear

● Average of DaysToReview ● Average of DaysToAdopt



RECOMMENDATIONS



- Transparent communication strategies for youth and guardians during initial submissions.
- Tailor health programs and outreach specifically for age group
- Conduct Quality Audits of Initial Decisions
- Implement a Feedback Loop to Update Decision Guidelines
- AI-Powered Recommendation Engine (Future Phase)

CONCLUSION

✨ Key Takeaways from the IMR Analysis:

- Mental health and infectious diseases top the list of concerns, especially in ages 51–64
- Younger and underrepresented patients often face higher rejections – but show success in reapplications
- Decision fairness is improving – more overturned outcomes after 2019
- Faster reviews = more overturned decisions – highlighting the role of timely processing



*Thank
You*

TAKE CARE OF YOUR MENTAL HEALTH :)