WHEEL CHAIR ANALYSIS

OVERVIEW

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SO, WHAT'S THE BIG IDEA?

- **Big Idea:** To enhance the navigation experience of people using mobility aids through artificial intelligence for better accessibility, improved life quality and empowerment.

BACKGROUND INFORMATION

- The healthcare scene in England is getting a makeover! 🏥 With a spotlight on improving patient experiences and outcomes, things are shifting gears. 🔄 But hold on, there's a superhero spotlight on wheelchair services too! 🦸‍♂️

- Imagine this: Mobility challenges? No problem! We're diving into the world of wheelchair services, making sure everyone can roll through healthcare smoothly. 🛵

- Our project is all about jazzing up the data game! We're cooking up a super-smart crystal ball (well, a predictive model, but close enough) to tell us about wheelchair services and costs in different corners of England.

PROBLEM STATEMENT

- "In the ever-evolving landscape of healthcare optimization, we face a significant challenge: creating an innovative machine learning model that goes beyond traditional predictions.

- Current predictive methods fall short in capturing the intricate nuances of the healthcare domain.

- Our mission: Create a predictive framework that surpasses current models, revealing hidden insights in the complex world of healthcare – from medical services to patient outcomes and resource allocation.

PROJECT OBJECTIVES

- Analyze features: Region, patient sign-ups, and new referrals for their statistical significance and influence on target metrics.

- Address targeting efficiency: Optimize wheelchair service delivery and enhance outcomes for specific patient groups.

- Develop predictive model: Estimate costs for providing services to patients and facilities based on specific metrics.

KEY AUDIENCE

- People with mobility challenges
- Technological innovators
- Enterprenuers

DATA UNDERSTANDING

DATA SOURCES

- **Dataset source:** website link

- The dataset contains around 42 rows and 43 columns with comprehensive information.

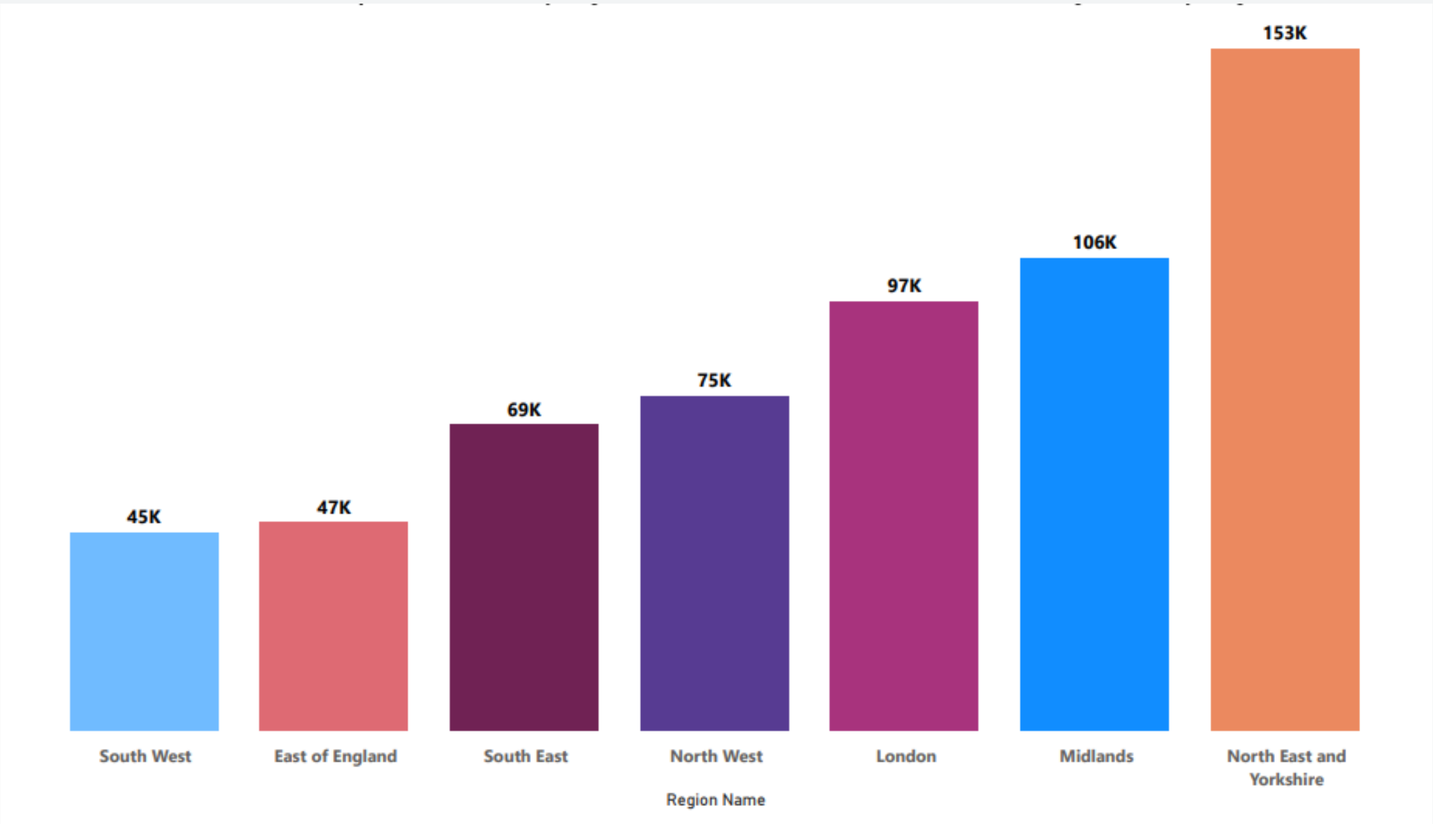
- For the EDA, we explored exclusively using the Power BI

METRICS OF SUCCESS

- The project's success criterion is to identify a model with the lowest RMAE.

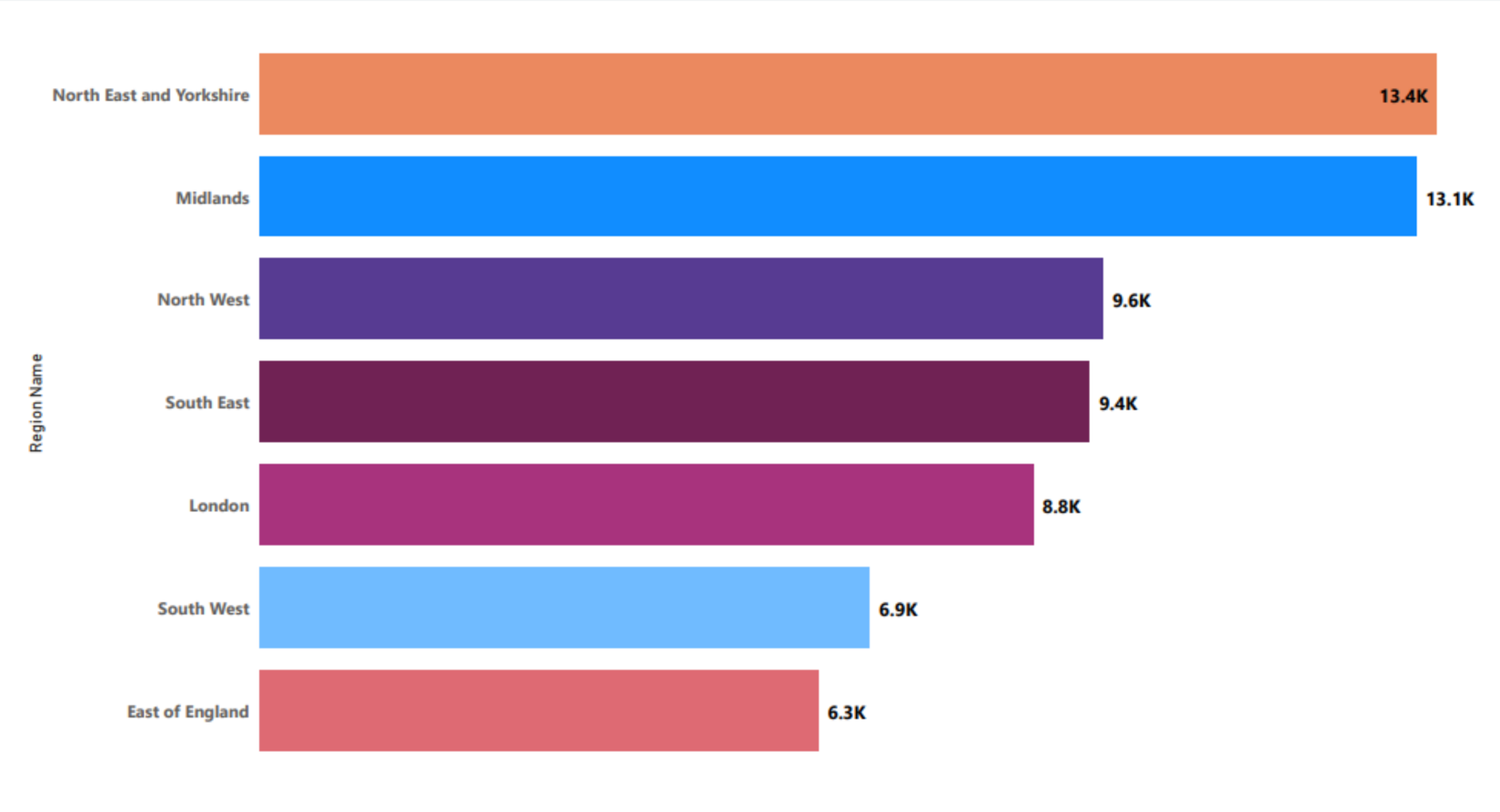
WHAT IS THE TOTAL NUMBER OF PATIENTS CURRENTLY REGISTERED WITH THE SERVICE 'QWC001_ADULTREGISTERED' CATEGORIZED BY THEIR REGION NAME?

- The highest number of registered patients is in North East and Yorkshire
- The least being in South West
- The distribution of registered patient is almost evenly distributed in between the least and most



WHAT'S THE TOTAL NUMBER OF PATIENTS REGISTERED UNDER 'QWC001_CHILDREGISTERED' PER REGION NAME?

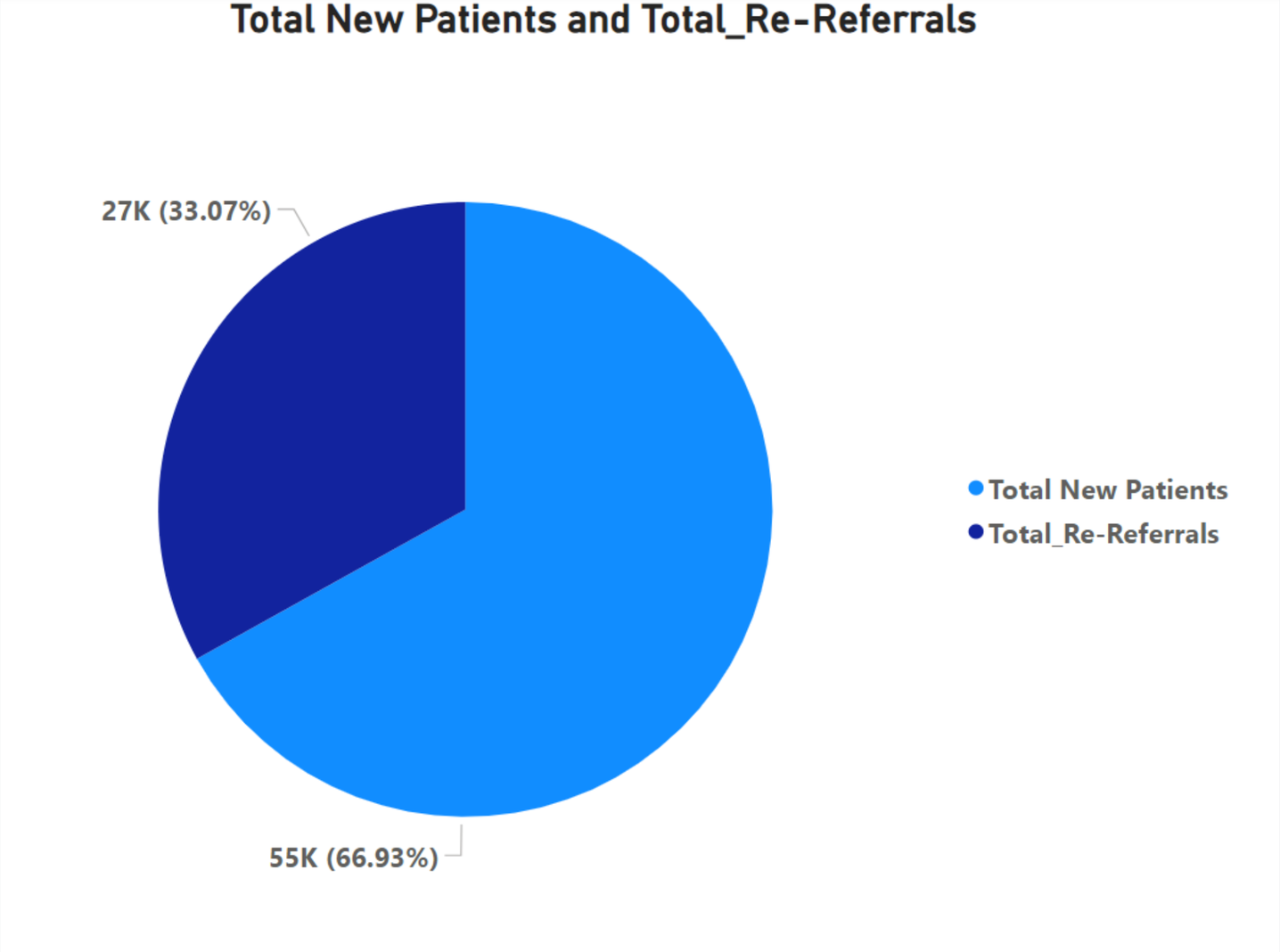
- The highest number of registered children patients is in North East and Yorkshire
- The distribution of registered patient is almost evenly distributed with the least being in East of England



WHAT IS THE MAXIMUM EXPENDITURE BY REGION?

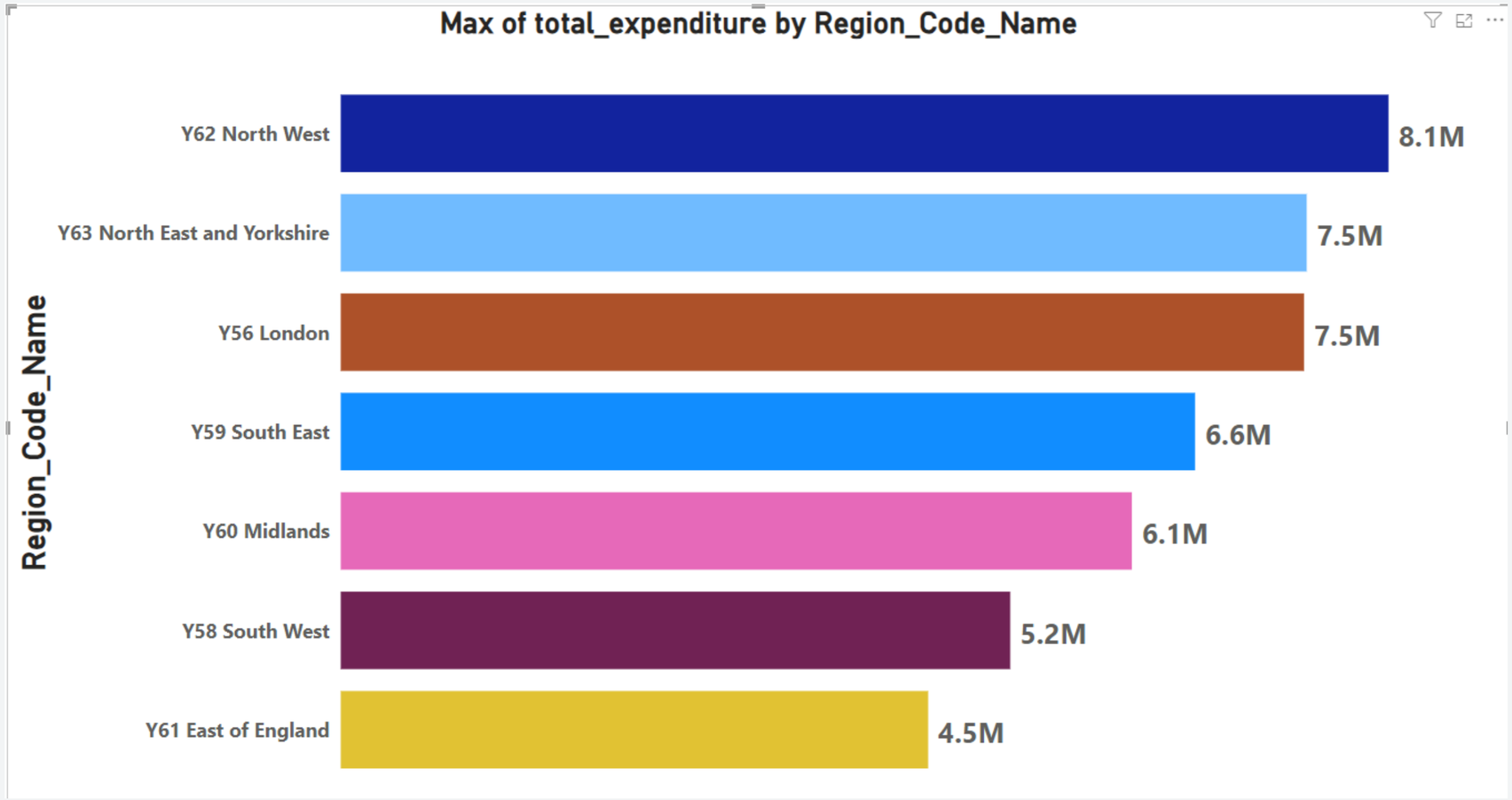
- Compared to new patients, It seems 66 percent of the patients are re-registered.

- These are patients that were already beneficiaries of the service and it came to a close but re-registered or the service nature was modified.



WHAT IS THE MAXIMUM TOTAL EXPENDITURE BY REGION?

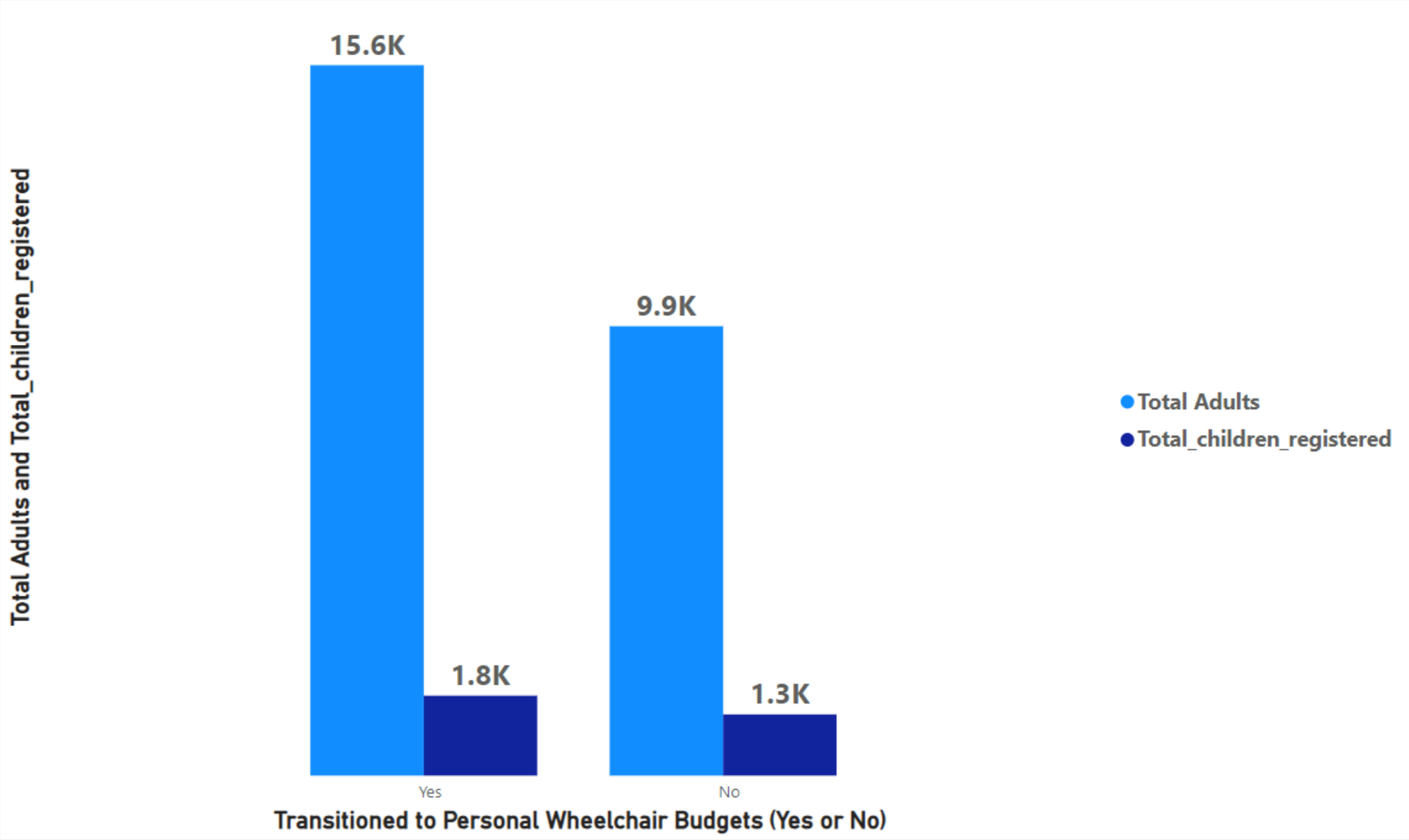
- The North West spends immensely on the service followed closely by North East and Yorkshire
- This is not indicative of registered patients as North West does not have nearly as much patients compared to other regions
- However, East of England reflects the number of actual registered patients since it has less in both instances of adults and children



WHAT IS THE MAXIMUM TOTAL EXPENDITURE BY REGION?

- In both instance, both adults and children often switch to personal wheelchair budgets.

- However, the margin is most pronounced in adults more than children



MODELLING AND EVALUATION: BEST MODEL

- Models evaluated prediction accuracy.

- Decision Tree: Low RMSE on training but high RMSE (1729.632) on test, suggesting potential overfitting.

- Random Forest: RMSE values (679.897 for training, 1510.124 for test) show better balance between complexity and generalization.

- **Random Forest preferred** for improved balance and predictive performance.

	Model	RMAE (Train)	RMAE (Test)
0	DecisionTreeReg	0.000	1729.632
1	RandomForestRegr	679.897	1510.124

CONCLUSION

- Project achieved goals via advanced machine learning: Decision Tree and Random Forest models.
- Models identified factors impacting wheelchair service engagement in English regions.
- Captured features affecting sign-ups, refining understanding of relationships.
- Pinpointed patient groups for targeted interventions, optimizing service delivery.
- Predictive models (Decision Tree, Random Forest) accurately forecasted sign-ups, with best model: 'Random Forest Regressor'.
- Outcomes match objectives, providing insights to improve wheelchair services across regions

RECOMMENDATIONS

- Implement targeted interventions based on demographic insights to encourage sign-ups and referrals.

- Personalize outreach efforts to specific age groups, regions, or demographics identified by the models.

STRATEGY N°3

- Allocate resources efficiently to ensure optimal support where needed.

- Regularly update models with new data to maintain accuracy and relevance.

- Refine features and variables if model performance deviates from expected levels.

- Collaborate with healthcare professionals to enhance models' understanding of patient dynamics.

Any Question?