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DATA
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WasteLess

DATA-DRIVEN STRATEGIES TO CUT FOOD WASTE & BOOST SAVINGS

WASTELESSAPP

CONTENT

EXECUTIVE SUMMARY

- **Objective**
  - Provide a data-driven solution to predict and minimize food waste.
- **WasteLess Streamlit App**
  - Developed to offer real-time recommendations for reducing food waste based on household data inputs, such as food items, storage methods, and purchasing behaviors.
- **Key Findings**
  - Food waste correlated with household purchasing and storage methods.
  - Omnivores have higher waste levels.
- **Strategic Recommendations**
  - Target campaigns for purchase planning, storage optimization, and sustainable disposal practices.
- **Expected Impact:**
  - Reduction in food waste through real-time recommendation systems and user education.

ANALYTICAL APPROACH

- **Methodology:**
  - Exploratory data analysis
  - Predictive modeling
  - Feature engineering
  - App development & deployment
- **Tools:**
  - Jupyter Notebook
  - Python (Pandas, Numpy, Scipy, Scikit-Learn, Seaborn, Matplotlib)
  - Streamlit
- **Process:**
  - Data preprocessing
  - Univariate and Bivariate analysis
  - Multivariate modeling
  - Correlation analysis
  - Predictive modeling
  - App development & deployment

DATA SUMMARY

- **Dataset Overview:**
  - Data from grocery stores, households, enriched with external temperature and storage data.
- **Key Metrics:**
  - Family size
  - Purchase amount
  - Waste amount
  - Storage
  - Disposal methods

Column Name	Description	Data Type
Household_ID	Unique identifier for each household	Object
Dietary_Preferences	Household dietary preferences (e.g., Vegan, Omnivore)	Object
Family_Size	Number of members in the household	Integer
Food_Item	Type of food item (e.g., Meat, Vegetables)	Object
Purchase_Amount	Amount of food purchased (in units)	Float
Consumption_Amount	Amount of food consumed (in units)	Float
Waste_Amount	Amount of food wasted (in units)	Float
Waste_Type	Type of food waste (e.g., Avoidable, Unavoidable)	Object
Storage_Method	Food storage method (e.g., Refrigeration, Frozen)	Object
Disposal_Method	Method of disposal (e.g., Trash, Compost)	Object
Timestamp	Date and time of data entry	Object

KEY VARIABLE RELATIONSHIPS

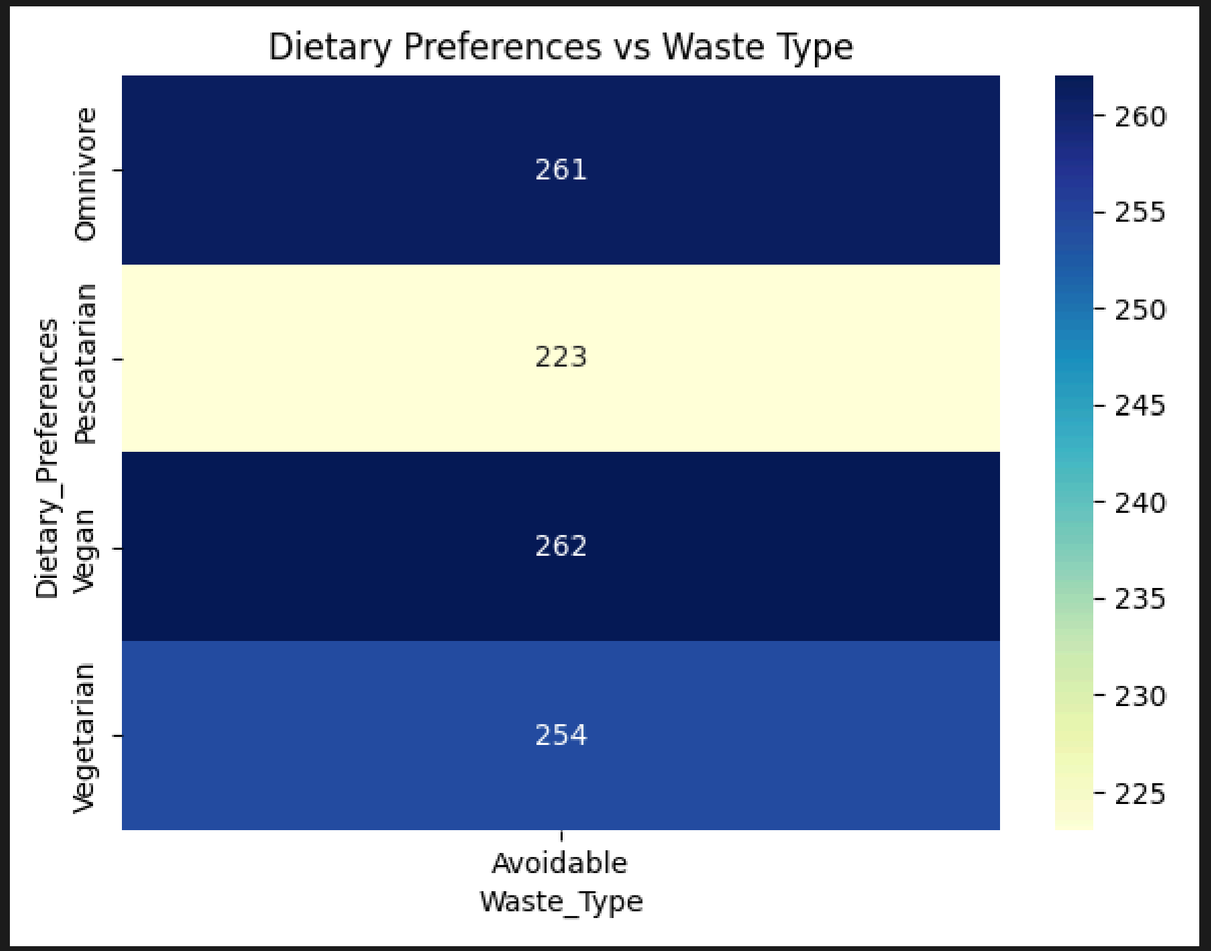
Purchasing Behavior and Waste

- **Finding:**
  - Higher purchase amounts are linked to increased food waste.
- **Visualization:**
  - Scatter plot showing the positive correlation between purchase amount and waste. Correlation coefficient: 0.65.
- **Implication:**
  - Encouraging households to align purchases with actual consumption can help reduce waste.

KEY VARIABLE RELATIONSHIPS

Dietary Preferences and Waste

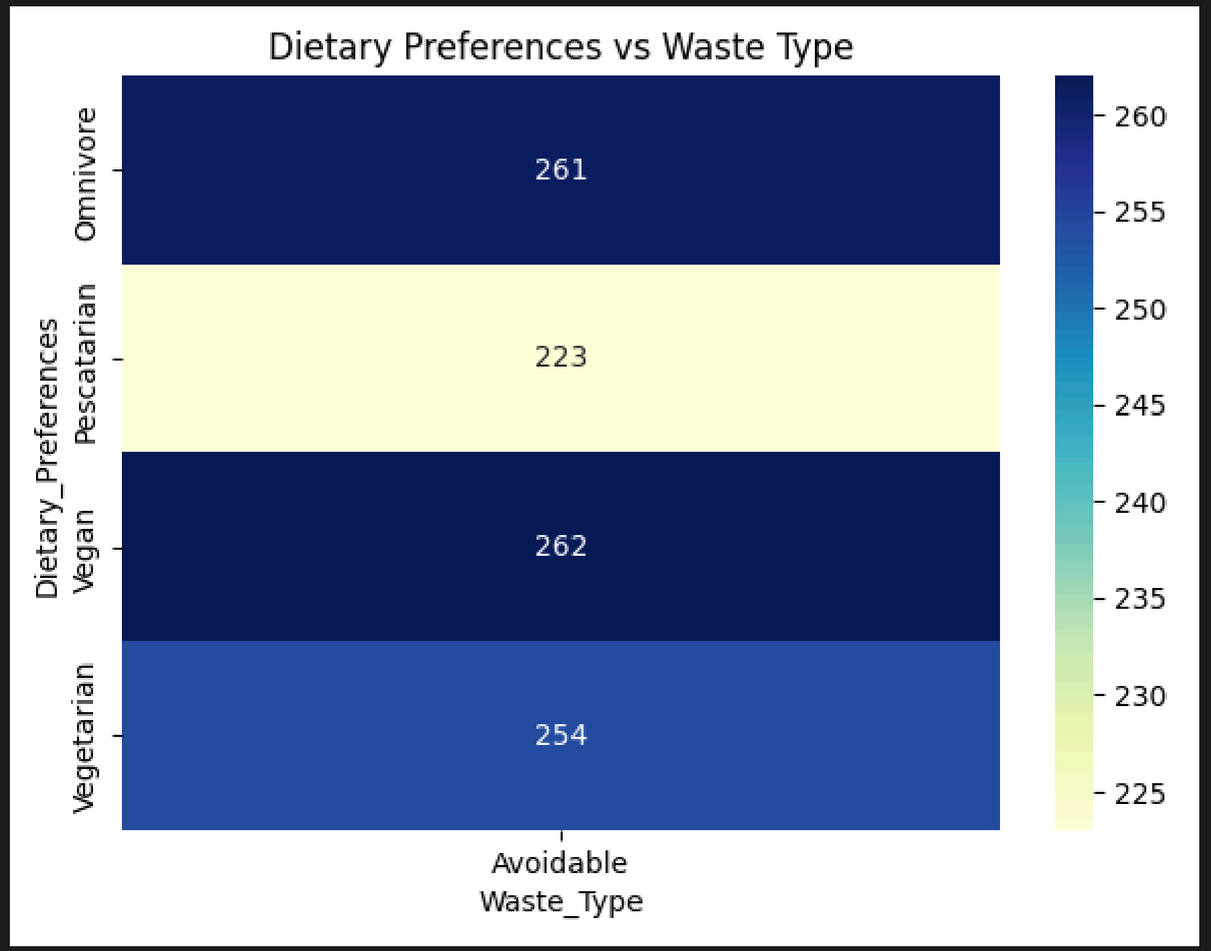
- **Finding:**
  - **Omnivorous** households have the highest waste incidents (**261**)
  - **Pescatarian** households report the fewest (**223**)
  - **Vegans** and **Vegetarians** have similar waste levels at **262** and **254**, respectively.
- **Visualization:**
  - Heatmap showing the distribution of avoidable waste across dietary preferences.
- **Implication:**
  - Targeting omnivorous households with educational campaigns on portion control and reducing avoidable waste could be effective.
  - Additionally, insights from pescatarian households could inform broader waste reduction strategies.



KEY VARIABLE RELATIONSHIPS

Storage Methods and Waste

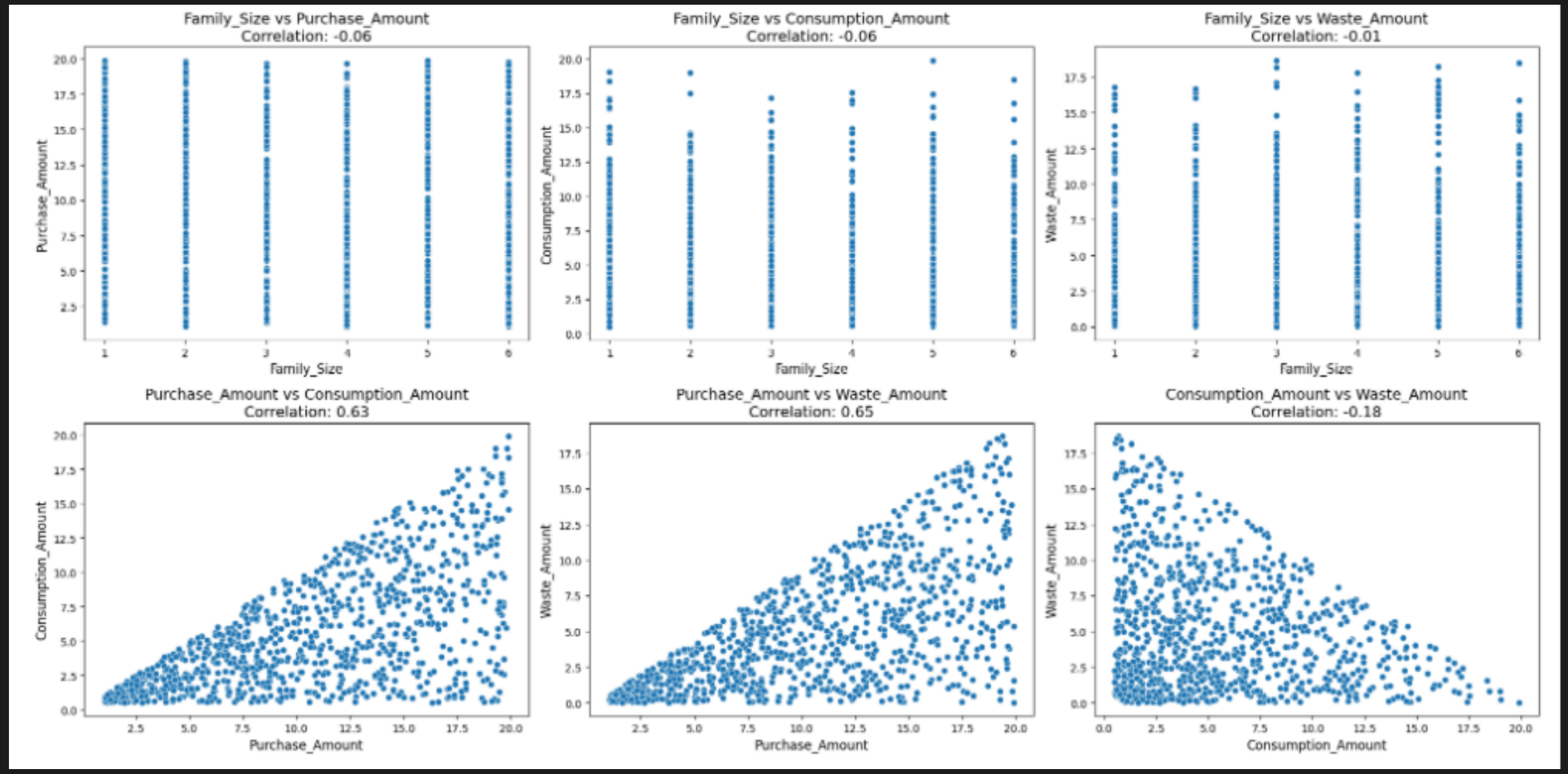
- **Finding:**
  - **Refrigeration** is linked to higher levels of avoidable food waste (**355**)
  - **Frozen storage** (**331**)
  - **Pantry storage** (**314**).
- **Visualization:**
  - Heatmap showing the relationship between storage methods and waste levels.
- **Implication:**
  - Promoting better storage practices, such as freezing, can help households reduce waste, particularly for perishable items.



STATISTICAL ANALYSIS SUMMARY

KEY INSIGHTS

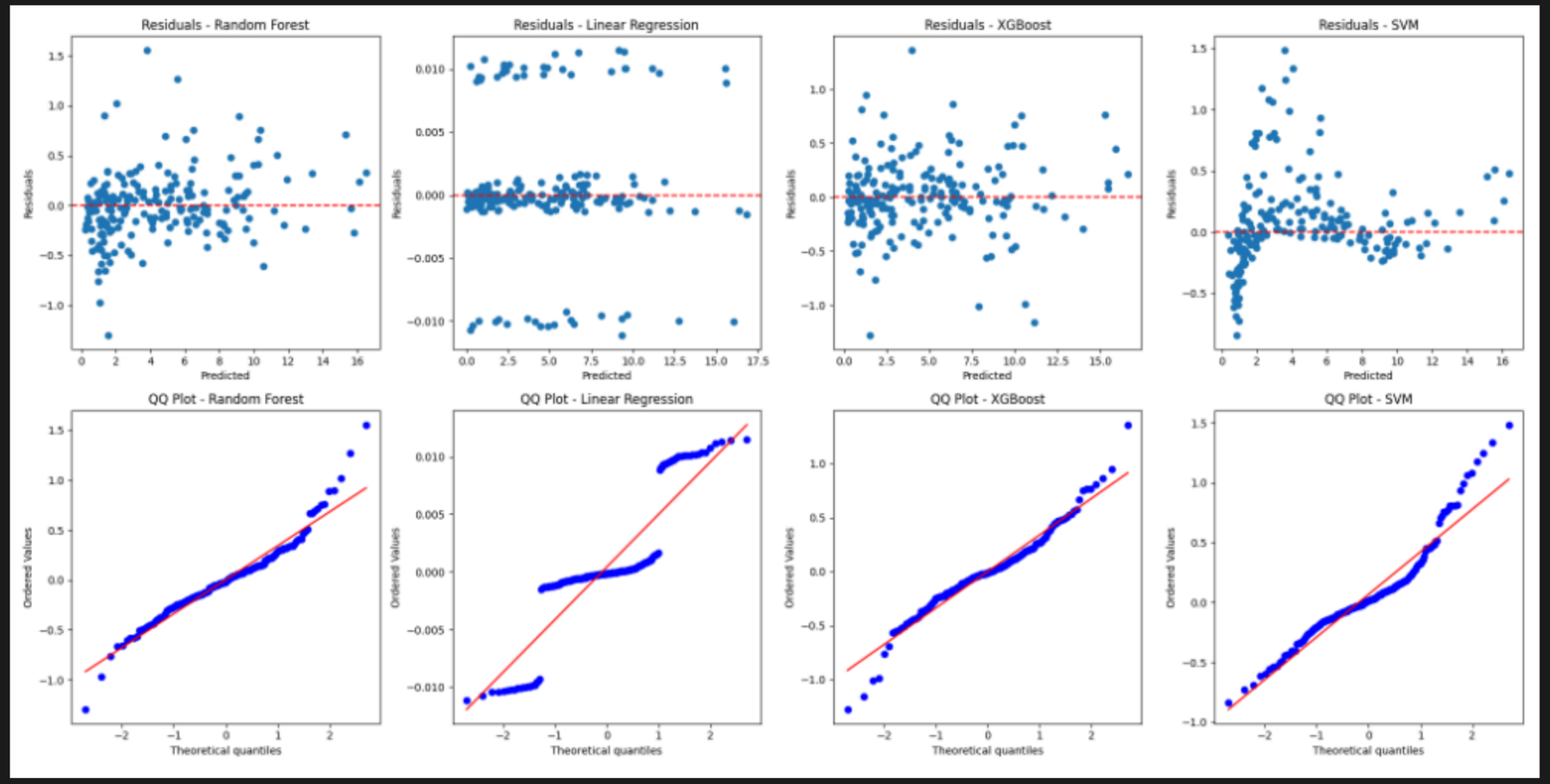
- Analysis revealed significant relationships between purchasing habits, dietary preferences, and storage methods on waste levels.
- Purchase amount, dietary preferences, and storage method significantly influence waste levels, highlighting areas for targeted interventions.



PREDICTIVE MODELING & FINDINGS

- **Models Used:**
  - Random Forest
  - Linear Regression
  - XGBoost
  - Support Vector Machine (SVM).
- **Model Performance:**
  - All models performed well, with R-squared values ranging from 0.99 to 1.00.
- **Key Insights:**
  - Random Forest and XGBoost showed strong prediction capabilities with minimal errors
  - Linear Regression achieved near-perfect predictions but may be prone to overfitting.
- **Visuals:**
  - Model evaluation summary table and residual plots.

Model	MAE	MSE	RMSE	R-Squared
Random Forest	0.25	0.12	0.35	0.99
Linear Regression	0.00	0.00	0.01	1.00
XGBoost	0.24	0.11	0.34	0.99
SVM	0.25	0.14	0.38	0.99



WasteLess App & Recommendation System

- **Recommendation System Overview:**
  - The WasteLess Streamlit App provides tailored suggestions to reduce food waste by optimizing purchasing, storage, and consumption behaviors.
- **App Features:**
  - Input household data to receive personalized recommendations for reducing waste.
- **Key Functionalities:**
  - Real-time insights, storage method suggestions, and waste reduction tips.
- **Visual:**
  - Screenshot of the WasteLess app interface.

WasteLess

Welcome to WasteLess - a smart food waste prediction and recommendation system! This app helps households minimize food waste by predicting potential waste and providing actionable insights. Using machine learning models, we generate personalized recommendations to help you reduce waste, save money, and contribute to sustainability.

Recommendations | Insights | Developer Tools

Generate Recommendations

Choose a model for prediction

Random Forest

Generate Recommendations

Predicted Waste Amount: 2.24 kg

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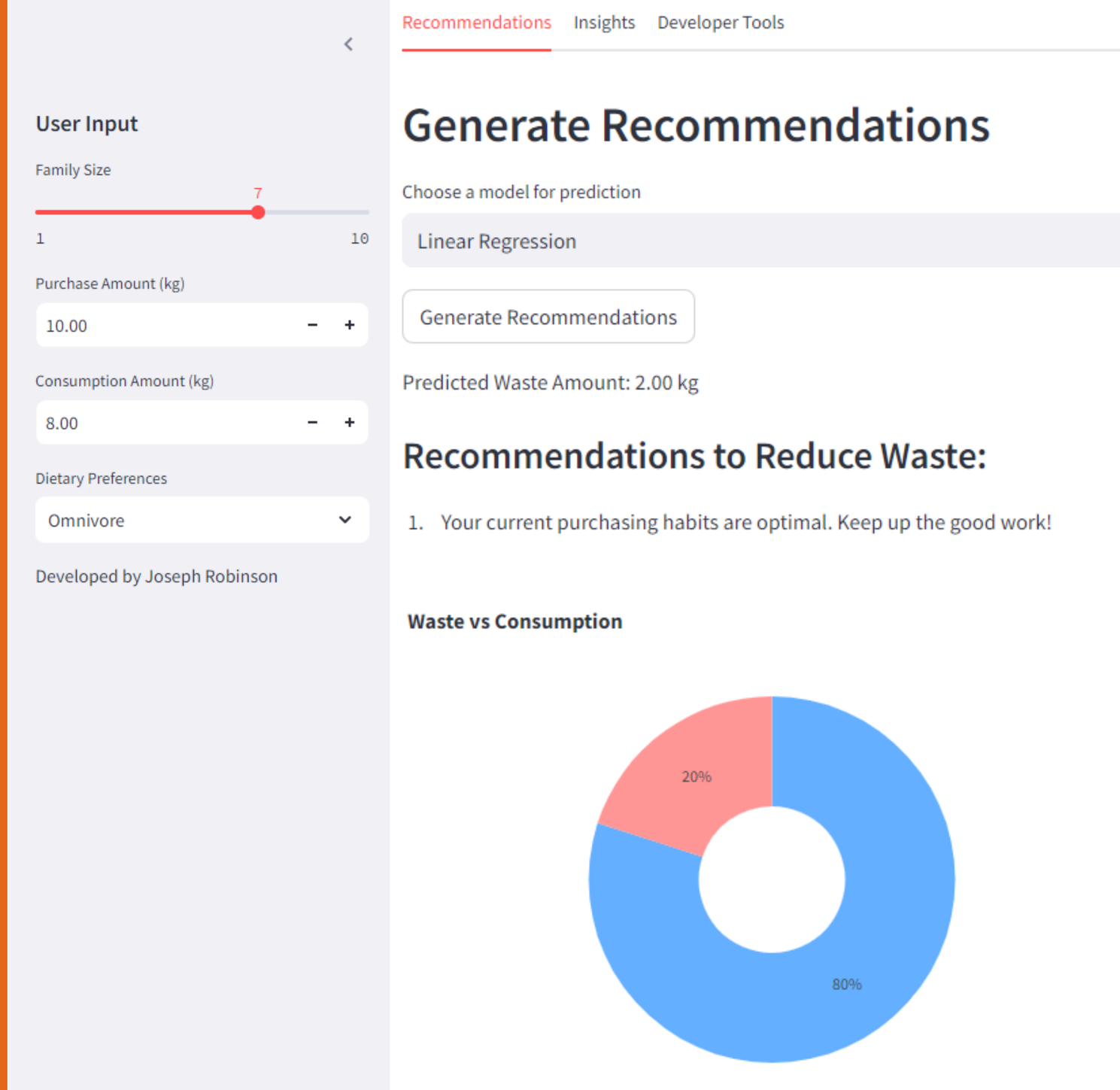

CONCLUSION & NEXT STEPS

- **Summary:**
  - Predictive models identified key waste factors
  - Solutions include targeted education and optimized storage.
- **Call to Action:**
  - Engage households with the Streamlit app for real-time insights.
- **Next Steps:**
  - Deploy the app
  - Integrate feedback
  - Refine prediction models.


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THANK YOU
WASTE LESS, SAVE MORE—SMARTER ACTIONS FOR A GREENER FUTURE!