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# Trends in Obesity and the Effectiveness of GLP-1 Agonists

Data Analytics & Visualisation  
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# Introduction and Rationale

## Obesity: A Global Public Health Crisis

- **Prevalence:** Over 650 million obese adults globally (WHO, 2021); prevalence tripled since 1975.
- **Health Impact:** Major driver of non-communicable diseases (e.g., type 2 diabetes, cardiovascular diseases, cancers) (Ng et al., 2014).
- **Economic Burden:** Obesity-related healthcare costs total \$2 trillion annually (2.8% of global GDP) (McKinsey Global Institute, 2014).

## GLP-1 Agonists: A Promising Treatment

- **Effectiveness:** GLP-1 receptor agonists support weight loss and metabolic health improvement (Astrup et al., 2014).
- **Challenges:** High cost, limited accessibility, and patient adherence issues hinder widespread use (Pharmaceutical Journal, 2022).

## The Need for Data-Driven Solutions

- **Solution:** A data visualisation dashboard to analyse obesity trends and GLP-1 therapy effectiveness.
- **Goal:** Provide actionable insights for healthcare professionals and policymakers, optimising decision-making.

## Dashboard (Created using Plotly & Dash)

- GitHub: [GitHub Link for Project](#)
- Dashboard: <http://127.0.0.1:8050>



# Objectives and Research Questions

**Objective:** To design and develop an interactive data visualisation and analysis dashboard to explore global and regional trends in obesity, assess the effectiveness of GLP-1 agonists, and provide predictive insights into future trends.

## **Research Questions:**

1. What are the global and regional trends in obesity prevalence over the last three decades?
2. How effective are GLP-1 agonists in promoting weight loss and improving metabolic health compared to other interventions?
3. Can machine learning predict future obesity trends and patient outcomes with GLP-1 agonist therapy?
4. How can the dashboard support healthcare professionals in decision-making and policy formulation?



# Methodology

## Data Sources:

- WHO datasets for obesity prevalence (WHO, 2024).
- Clinical trial results reporting GLP-1 inhibitor efficacy (Parker et al., 2024).
- GLP-1 agonist prescription trends (IQVIA, 2024, UBS, 2024).

## Data Pre-processing:

- *Data Cleaning*: Handle missing values, remove inconsistencies, and column parsing.
- *Feature Engineering*: Create features e.g. obesity trends by country, continent and GLP-1 usage.
- *Data Integration*: Merge datasets from multiple sources for comprehensive analysis.

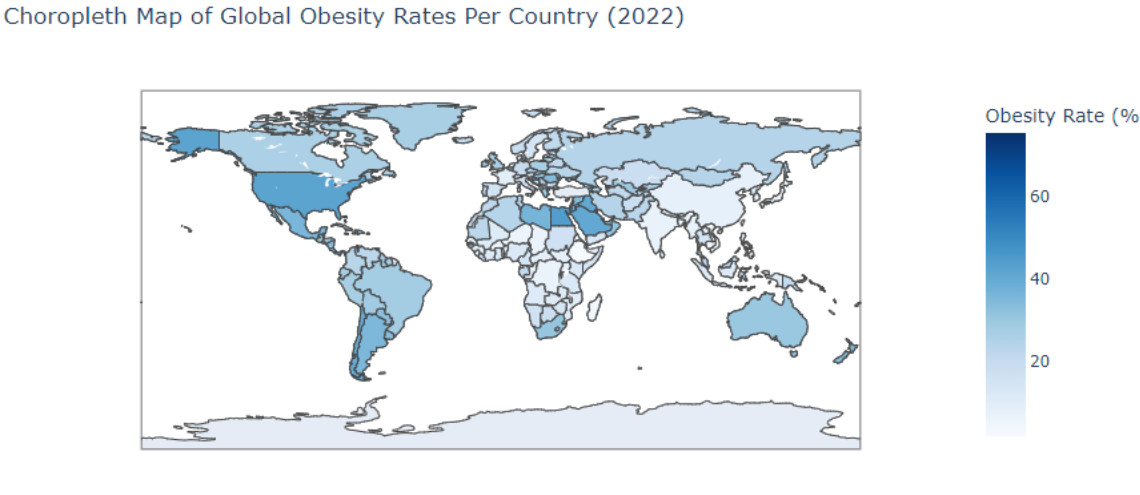
## Dashboard Features:

- *Trend Analysis*: Interactive visualisations displaying obesity and GLP-1 data.
- *Comparative Effectiveness*: Bar charts comparing different GLP-1 outcomes.
- *Predictive Insights*: Machine learning models to forecast future trends and outcomes using regression and time series analysis.
- *User-Friendly Interface*: Filters to customise views by location and year.

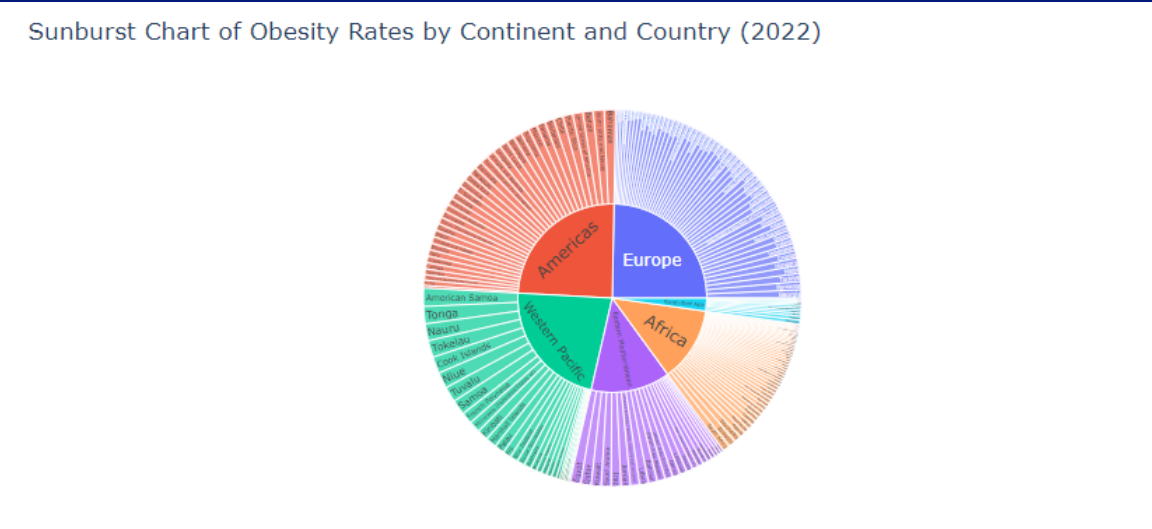


# Key Findings - Obesity Trends

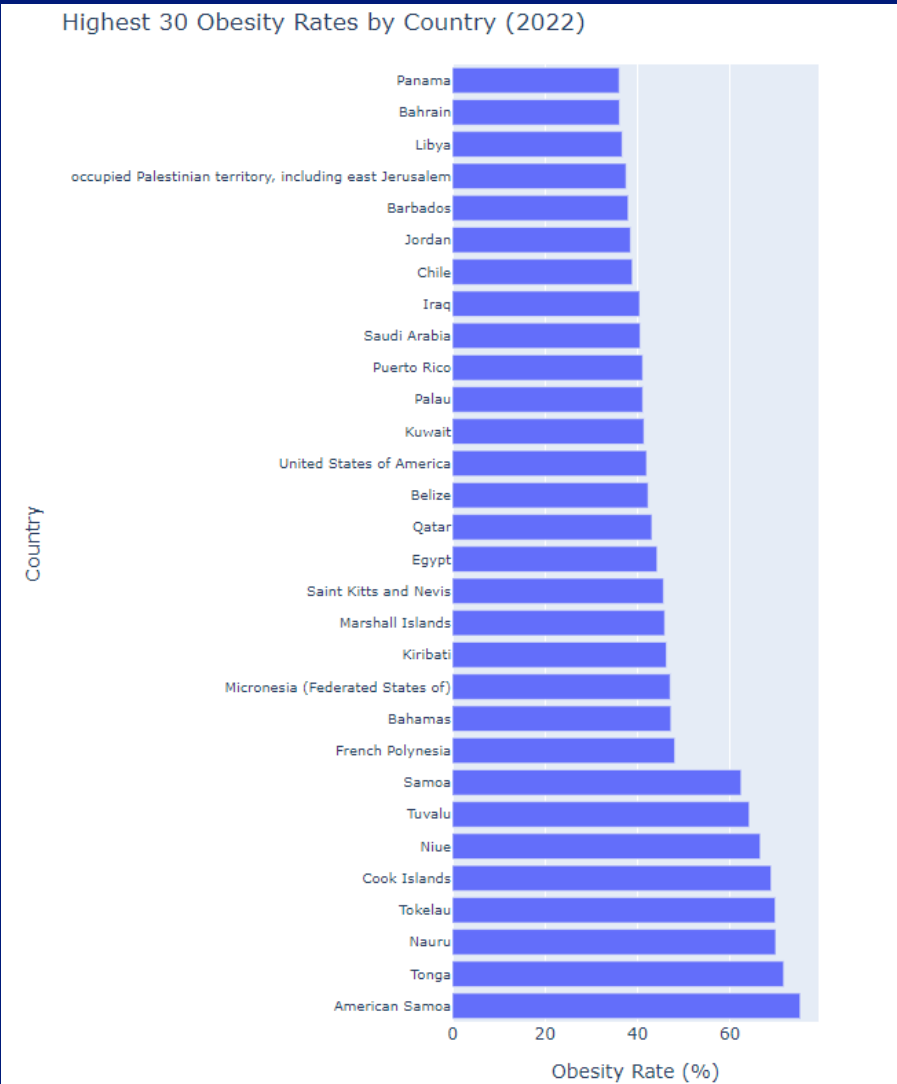
## Choropleth Map of Obesity Rates by Country



## Sunburst Chart for Obesity Rates by Continent & Country



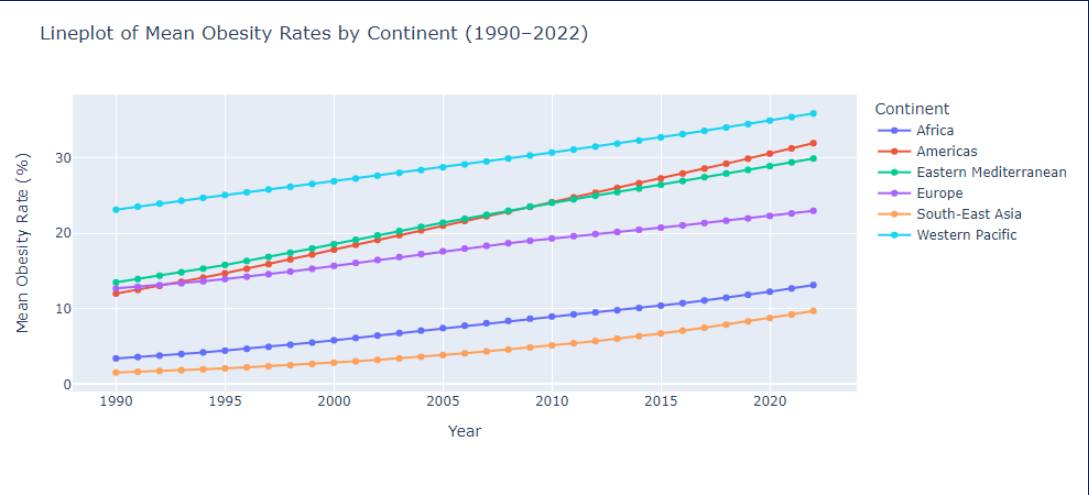
## Top 30 Obesity Rates by Country



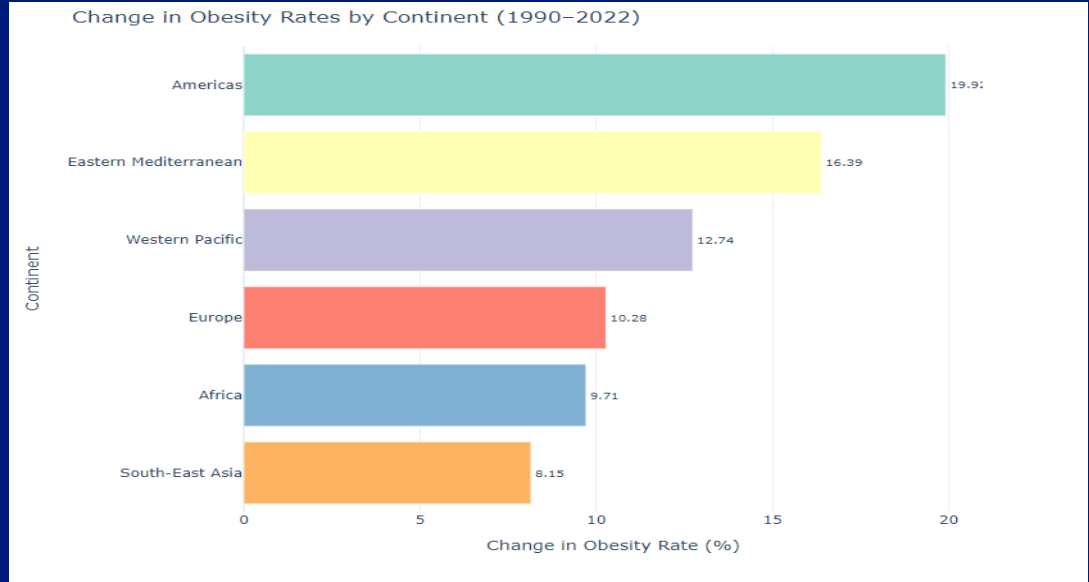
Note: All charts shown above are configurable by year using interactive filters on the dashboard (1990 – 2022).

# Key Findings - Obesity Trends

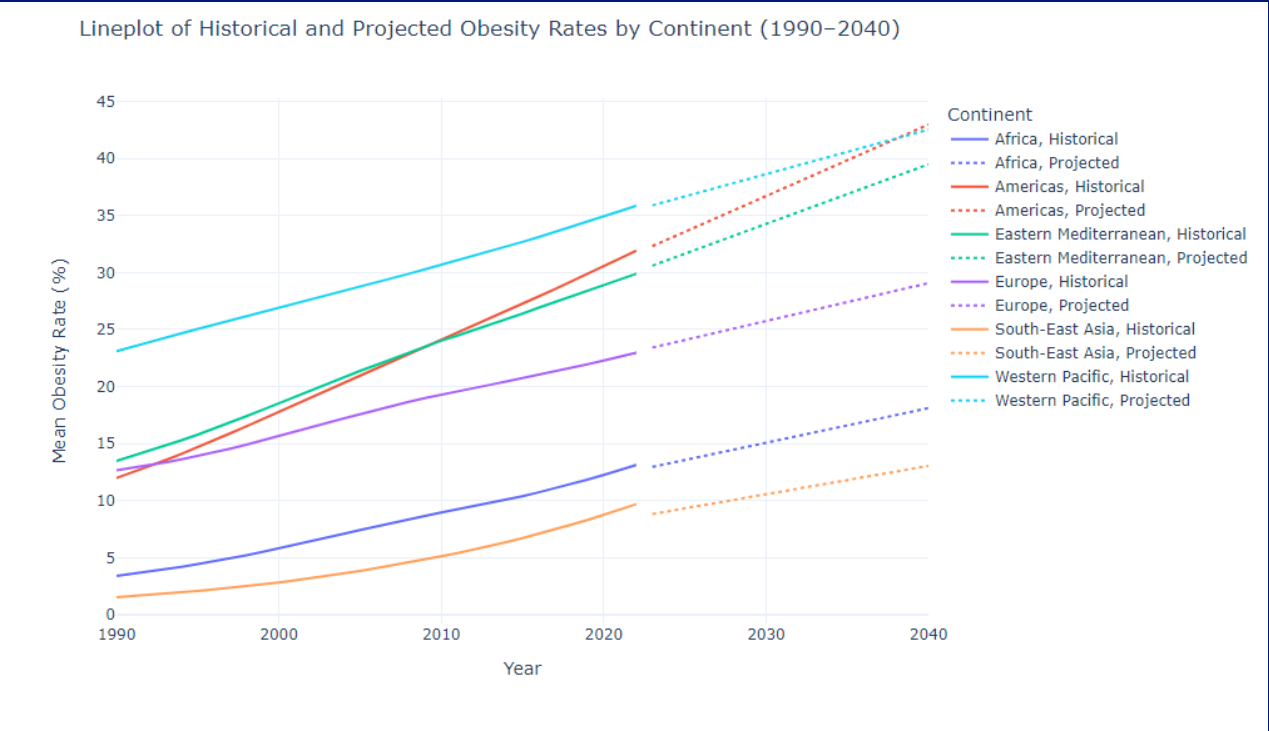
## Mean Obesity Rates by Continent (1990 – 2022)



## Change in Obesity Rates (1990-2022)



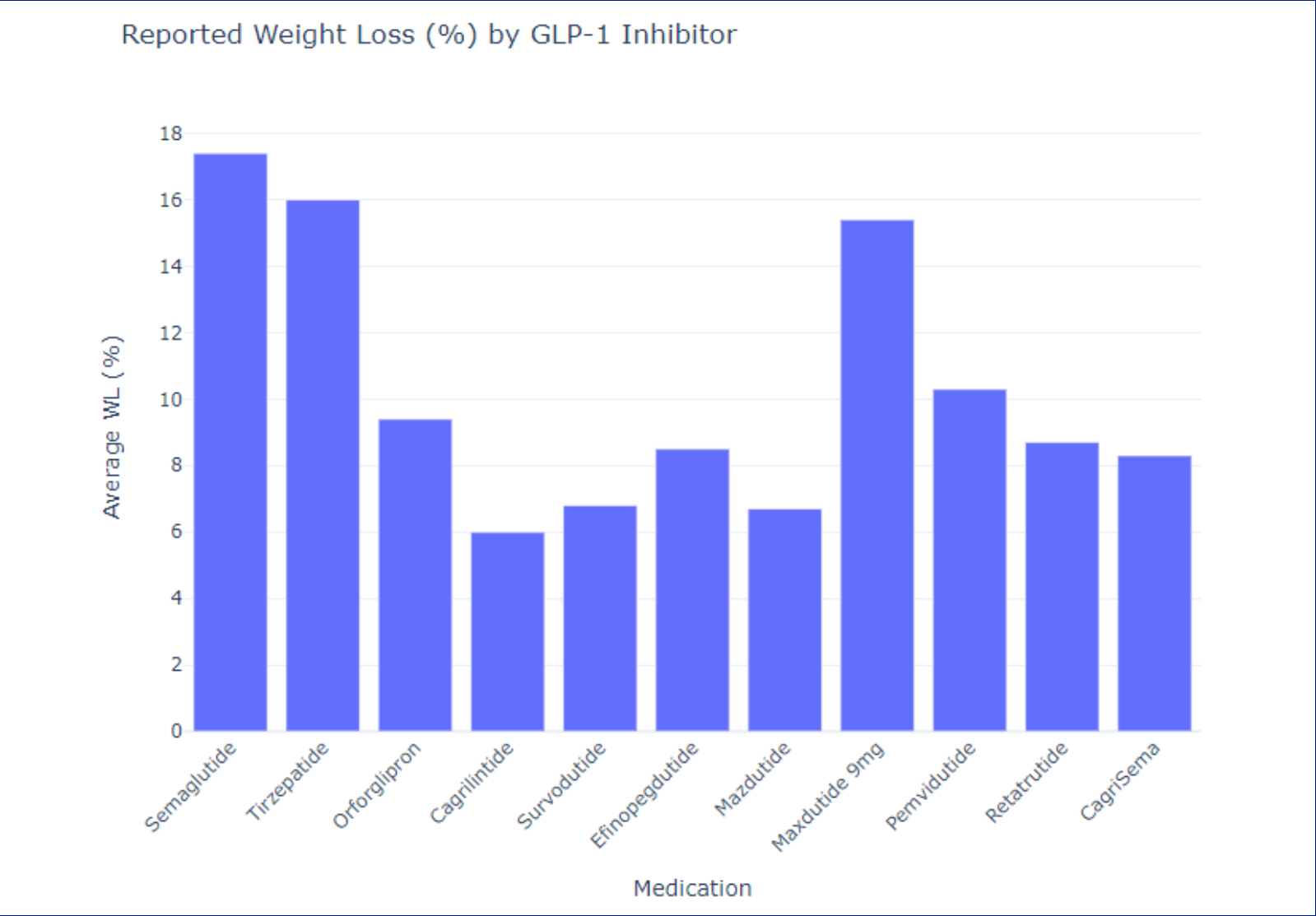
## Lineplot of Projected Obesity Rates to 2040 (Linear Regression)



Note: Data from 1990-2022 was used for linear regression to project the obesity rates from 2023–2040.

# Key Findings - Obesity Trends

Bar Chart of Reported Weight Loss across Top 10 GLP-1 Inhibitors



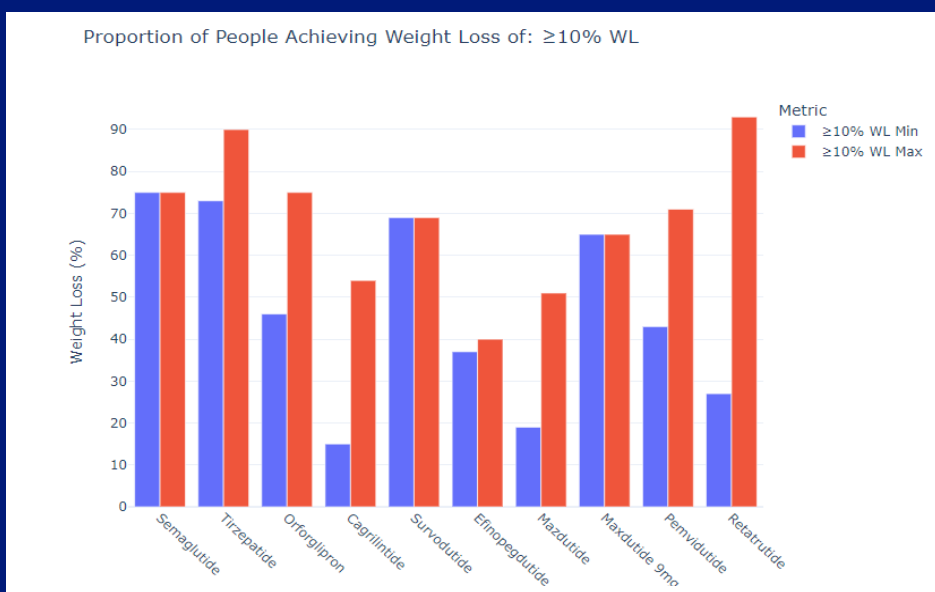
# Key Findings – GLP-1 Inhibitor Trends

Bar Chart of Proportion of People Achieving Various Weight Loss (%)

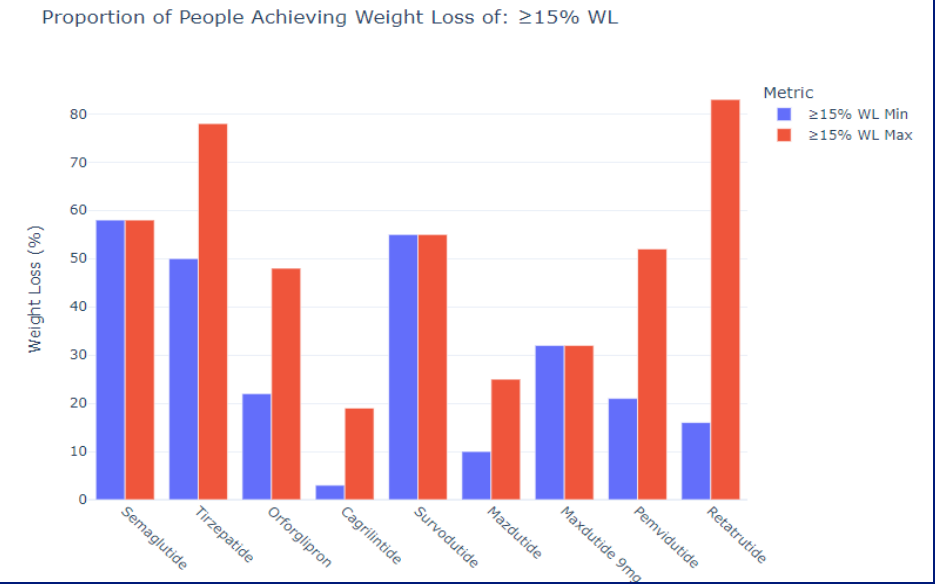
≥ 5%



≥ 10%



≥ 15%



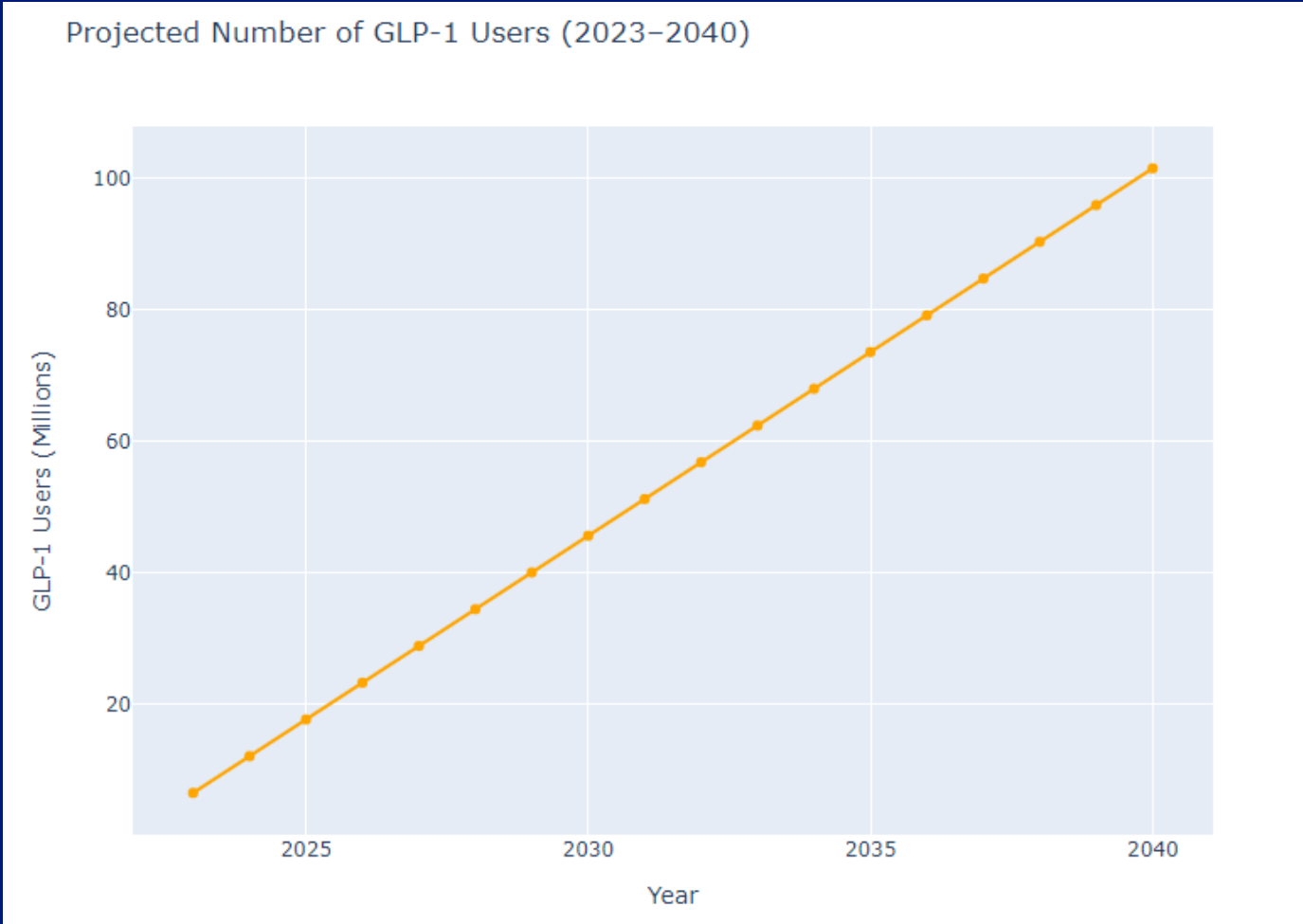
≥ 20%





# Key Findings – GLP-1 Inhibitor Trends

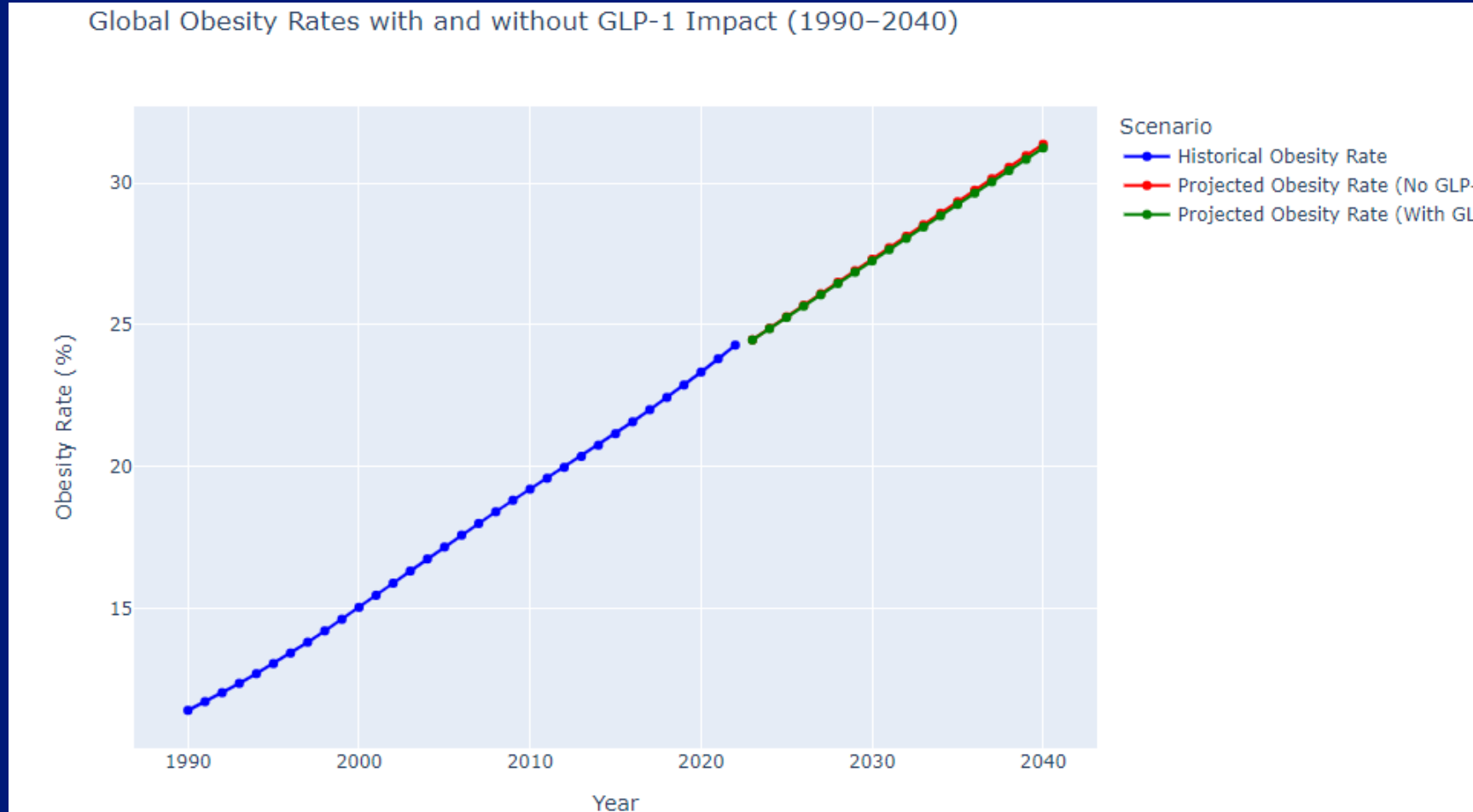
*Lineplot of Projected Number of GLP-1 Users by 2040 (Linear Regression)*



Note: Data from 2023 (IQVIA, 2024) and projected data at 2029 (UBS, 2024) were used for linear regression to continue the projection of GLP-1 users from 2029 – 2040.

# Key Findings – GLP-1 Inhibitor Trends

*Lineplot of Projected Global Obesity Rates With & Without use of GLP-1 Inhibitors by 2040 (Linear Regression)*



- Projected Obesity Rate in 2040 without GLP-1 impact: 31.36%
- Projected Obesity Rate in 2040 with GLP-1 impact: 31.23%

# Key Findings - Discussion

## Obesity: Summary of Analysis

- Obesity rates have risen for all continents in the period 1990 to 2022.
- The continent with the consistently highest obesity rates is **Western Pacific**.
- Using linear regression, by 2040 the **Americas** mean obesity rate will surpass Western Pacific (approx. 43%).
- **Americas** has the highest change in obesity rate from 1990 to 2022 reporting a 19.92% increase.



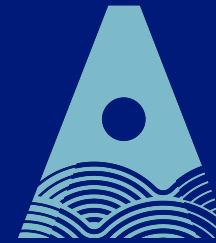
## GLP-1 Inhibitors: Summary of Analysis

- Semaglutide (Ozempic / Wegovy, Novo Nordisk) reported the highest weight loss at **17.4%** compared with other GLP-1 inhibitors.
- When comparing proportion of people with specified weight loss thresholds, **Tirzepitide** (Mounjaro / Zepbound, Eli Lilly) and **Retatrutide** (No current brand name, Eli Lilly) both showed a notably high proportion of people reaching past the higher weight loss thresholds ( $\geq 15\%$  &  $20\%$ ).
- The number of projected GLP-1 users by 2040 is expected to be approx. **105 million**.
- Projected Obesity Rate in 2040 without GLP-1 impact: **31.36%**. Projected Obesity Rate in 2040 with GLP-1 impact: **31.23%** (difference 0.13%).

# Conclusions & Recommendations

- Obesity rates have steadily increased since 1992 and are projected to continue to increase by 2040.
- GLP-1 inhibitors prove to be significantly effective based on reported clinical trial data.
- The projected impact of GLP-1 inhibitors on global obesity rates is negligible (0.13% decrease compared without GLP-1 by 2040).
- Limitations to use of GLP-1 inhibitors include high cost, limited accessibility, and patient adherence issues hinder widespread use (Pharmaceutical Journal, 2022).
- Other (more widely used) solutions to obesity such as diet, exercise, surgical interventions and wearable devices were not included in this analysis. Further analysis could include multiple weight loss solutions in prediction models.
- This dashboard can support healthcare professionals in decision-making and policy formulation both by viewing the reported weight loss associated with 10 GLP-1 inhibitors combined with projected obesity rates.





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# Thank You

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