Global Food Demand and Production

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Overview and Motivation

Overview

Goal: Show global food demand and production trends through two dashboards of visualizations

We want to explore demand and production trends across regions and food categories.

Motivation

We were motivated by the A2H case covered in our Problem Solving class.

We wanted to explore more regarding the global food demand and production with one question in mind, "How do we feed the world today?"

Inspiration and Related Works

Class Visualizations

Class visualizations were our key source of inspiration in determining the ways to deliver our quantitative messages

Example Projects

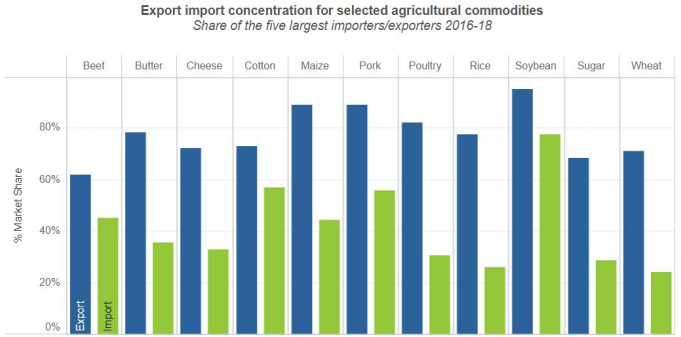
Example projects helped inspire our dashboard layouts and interactions.

OECD Article "How we feed the world today"

The article inspired the insights that we wanted to draw from the datasets and provided us a base understanding of food production trends.

https://www.oecd.org/agriculture/understanding-the-global-food-system/how-we-feed-the-world-today/

Related Visualizations



Questions

- **How does the food market size differ by region and food type?**
  - What are the top food categories by market size?
  - How did the market size change over 2018–2021?
  - How is the food market size geographically distributed?
  - How does the market size for each food category compare across regions?
  - What are the top 10 countries in terms of food market size?
- **What are the global food production trends?**
  - Which countries are the key contributors in reaching 80% total production?
  - How does the distribution of food production compare across regions?
  - How much food production do countries most frequently produce?

Questions

- **How does the food market size differ by region and food type?**
  - What are the top food categories by market size? Tree Map
  - How did the market size change over 2018–2021? Stacked Bar Chart
  - How is the food market size geographically distributed? Choropleth
  - How does the market size for each food category compare across regions? Category Matrix
  - What are the top 10 countries in terms of food market size? Bump Chart
- **What are the global food production trends?**
  - Which countries are the key contributors in reaching 80% total production? Pareto Chart
  - How does the distribution of food production compare across regions? Boxplot
  - How much food production do countries most frequently produce? Small Multiple Histograms

Data

Data Source
• Passport through Emory Library • Food and Agriculture Organization (FAO) of the United Nations
Data Acquisition
• Global Market Size data through Passport • Global Production Data through FAO
Data Cleanup
For *market size data*: • Removed pre-aggregated data entries (e.g., World data, Pet Food data) when data was available on an individual level • Removed confusing subcategories (e.g., "Good Source of Minerals Staple Foods" that is under the Fresh Foods category) • Pivot table longer for the year variable For *production data*: • Aggregate data on a country-year level • Convert values to be in thousand tonnes
Data Augmentation
• Joined the market size and production datasets based on a country-year level • Data blended to add region as part of the data analysis

Exploratory Data Analysis

Visualizations

- Horizontal bar chart for food sub-categories market size/Production
- Bar chart for regions and countries market size/Production

Insights

- Each Food Category has a lot of sub-categories
- Time-series data not particularly meaningful

Insight Implications

- Focus on comparisons across region and categories
- Hierarchical data allows us to explore ranking and part-to-whole relationships

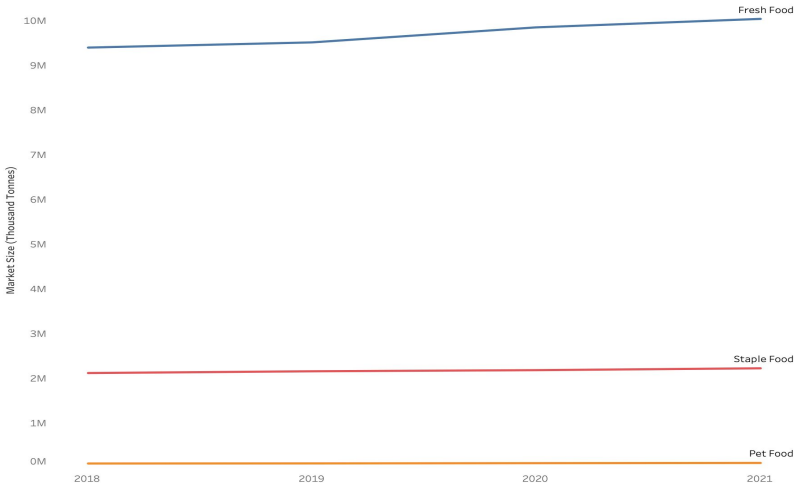
Data Transformation

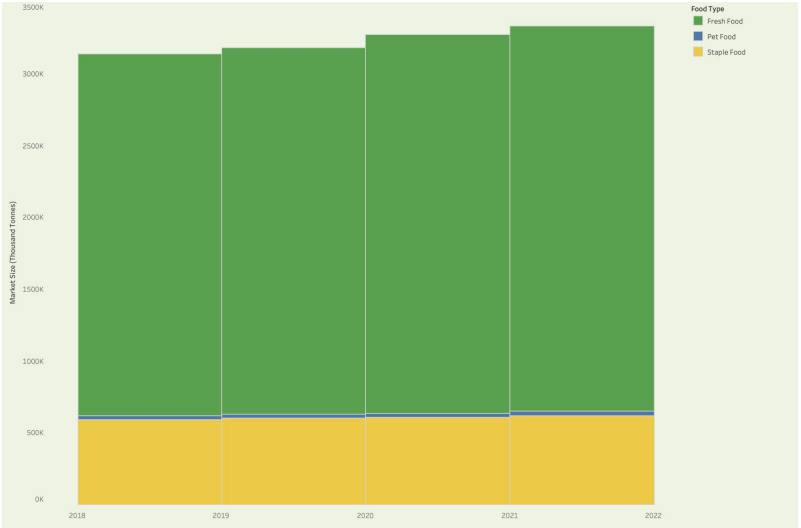
- Market size and production values transformed into thousand tonnes
- Assign category to each food subcategory
- Aggregate data on a country-year level

Design Evolution

Type of Visualization	Question Addressed	Quantitative Relationship	Why this visualization?
Tree Map	What are the top food categories by market size?	Magnitude, part-to-whole	Displays data in a grouped and nested structure while showing magnitude
Stacked Bar Chart	How did the market size change over 2018-2021?	Change over time	Shows total value and category value changes over time
Choropleth	How is the food market size geographically distributed?	Magnitude, spatial	Shows geographical distribution and relative magnitude
Category Matrix	How does the market size for each food category compare across regions?	Magnitude	Shows relative magnitude of each subcategory across regions
Bump Chart	What are the top 10 countries in terms of food market size?	Ranking, change over time	Shows the top 10 countries ranked over years 2018-2021
Pareto Chart	Which countries are the key contributors in reaching 80% total production?	Distribution, part-to-whole	Shows the countries that contribute the most to the running total of production %
Boxplot	How does the distribution of food production compare across regions?	Distribution	Shows the distribution of countries at an individual level across regions
Small Multiple Histograms	How much food production do countries most frequently produce?	Change over time and distribution	Shows the distribution in bins, allowing us to assess the frequency of each production size group

Design Evolution

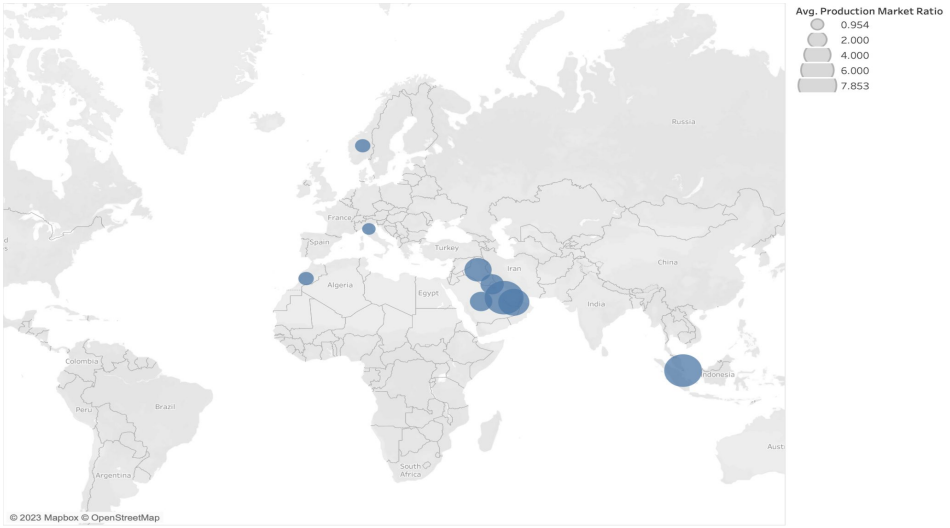


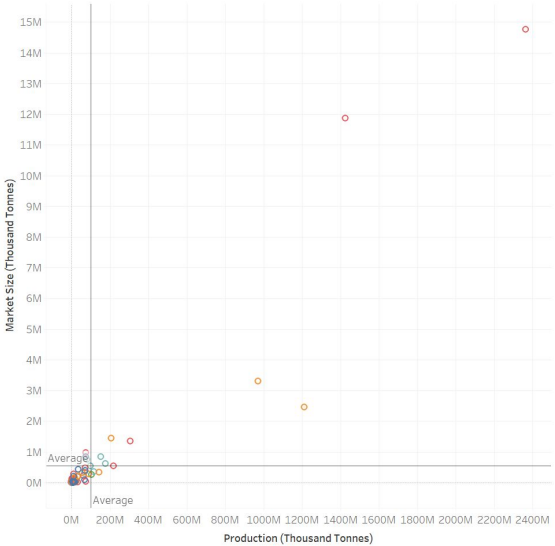


We initially included a time-series line chart but came to realize that a stacked bar graph would convey the same message and more, making the line chart redundant.

In addition to changes over time, the stacked bar shows the proportion of each food type category in the entire market size. The visualization now shows the part-to-whole relationship as opposed to the line chart that is not clear on whole market size trend. We kept the stacked bar chart and eliminated the line chart for this reason.

Design Evolution

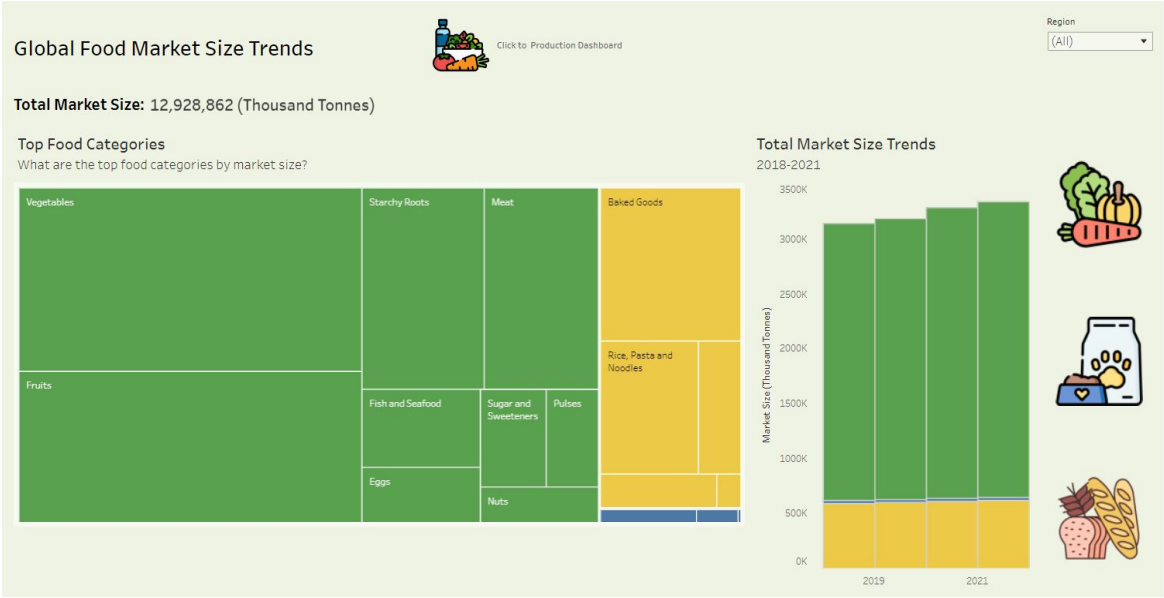




We attempted to analyze the relationship between market size and production during our design phase. Example visualizations include a bubble map and correlation chart as shown above.

We ultimately decided against these visualizations because we discovered that the market size and production data do not offer a fair analysis between the two. The two datasets contains different information (e.g., market size data contains pet food while the production data is more in-depth with agricultural production).

Implementation

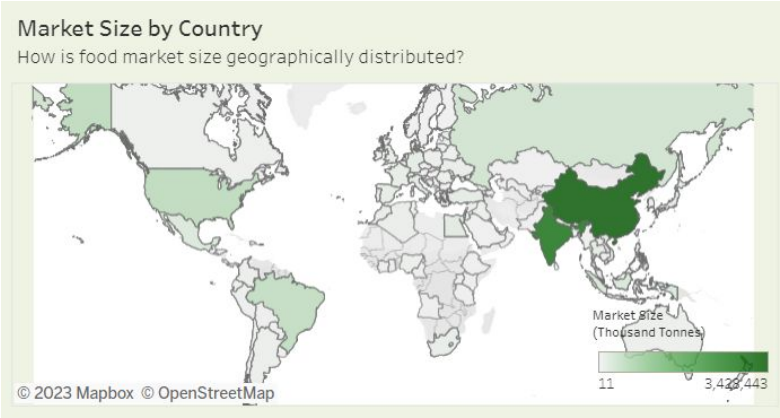


Treemap:

- Show hierarchical proportions of food market size by food categories
- Color by different food types

Stacked Bar Chart:

- Indicate the ratio of a specific food type over the whole food market for a specific year

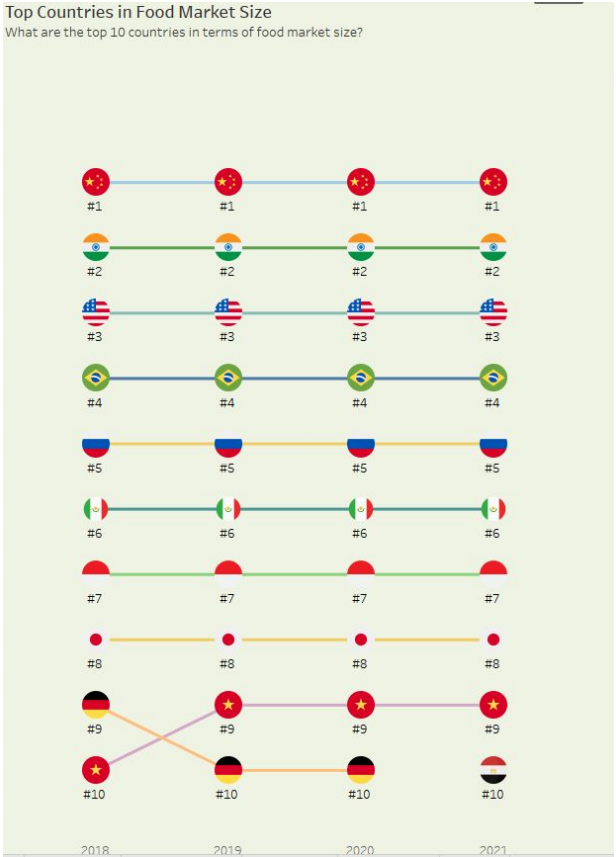


Food Category Matrix:

- Display the difference in market size for each food category across 5 regions

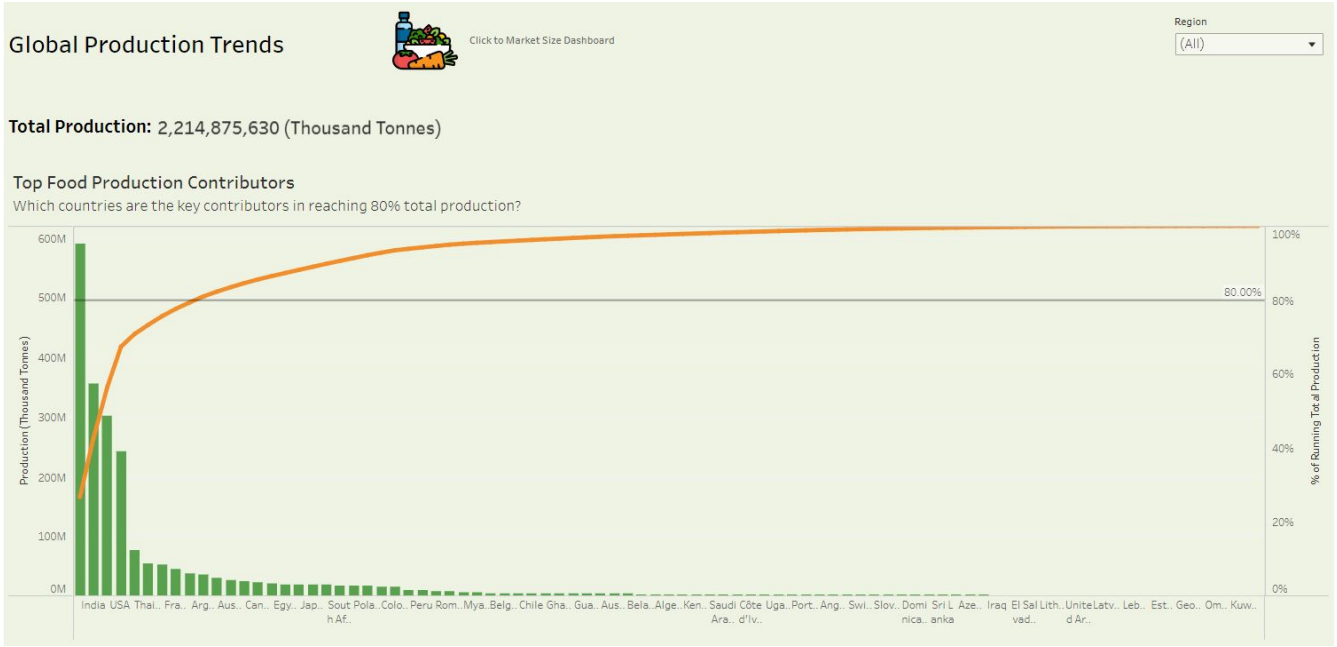
Choropleth:

- Exhibit the geographical distribution of the food market by size and food type



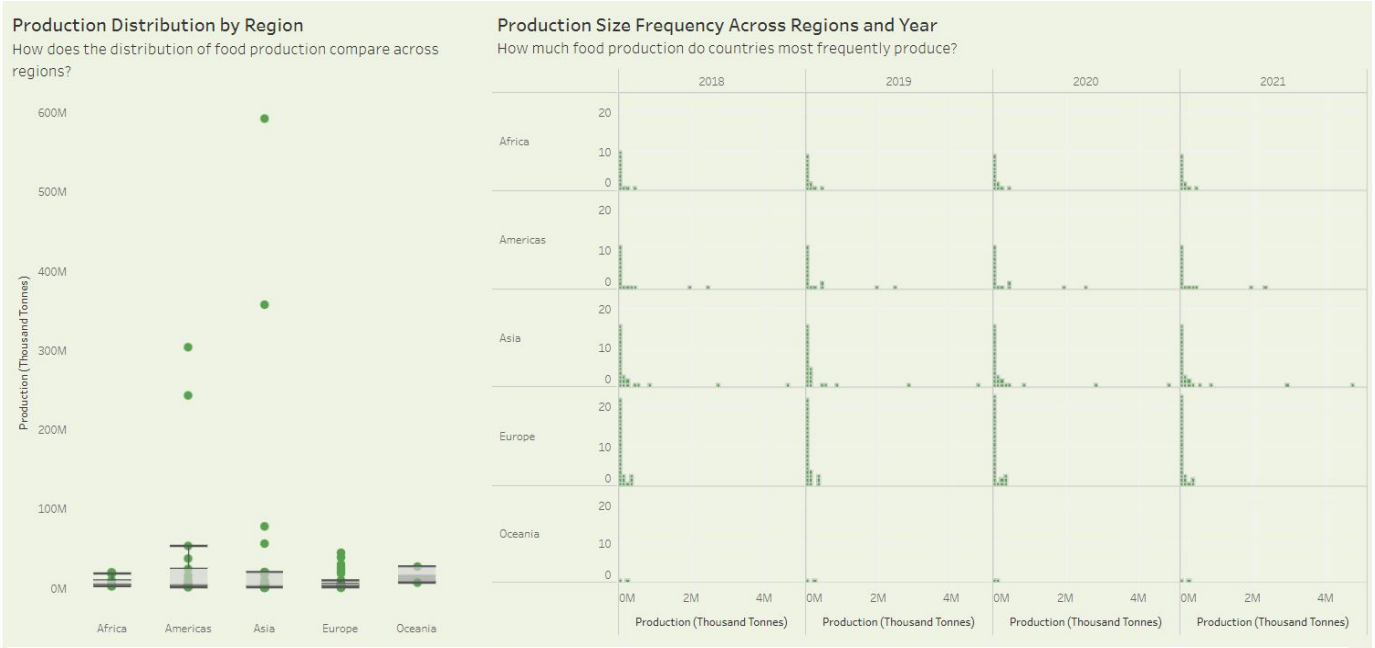
Bump Chart:

- Identify the top 10 countries with the largest food market size with a filter by region and food type available



Pareto Chart:

- Illustrate each country's contribution to the world's total production and identify the top contributing countries



Boxplot:

- Present the distribution of food production across 5 regions

Small Multiples Histogram:

- Show the frequency of food production size in each country within five regions from 2018 through 2021

Insights

- **How does the food market size differ by region and food type?**
  - What are the top food categories by market size?

    Fresh foods is the biggest category and vegetables is the biggest subcategory.
  - How did the market size change over 2018–2021?

    The market size for all three categories increased slightly across the years, and the total food market increased as a whole.
  - How is the food market size geographically distributed?

    China and India stand out from the choropleth as countries with the largest market size.
  - How does the market size for each food category compare across regions?

    Asia has by far a significantly larger market size for vegetables and fruits.
  - What are the top 10 countries in terms of food market size?

    Overall, China, India, and US are the top countries in food market size.

Insights

- **What are the global food production trends?**
  - Which countries are the key contributors in reaching 80% total production?

    Very few countries were needed to reach the 80% total production. The top producers are China, India, Brazil, US, and Indonesia.
  - How does the distribution of food production compare across regions?

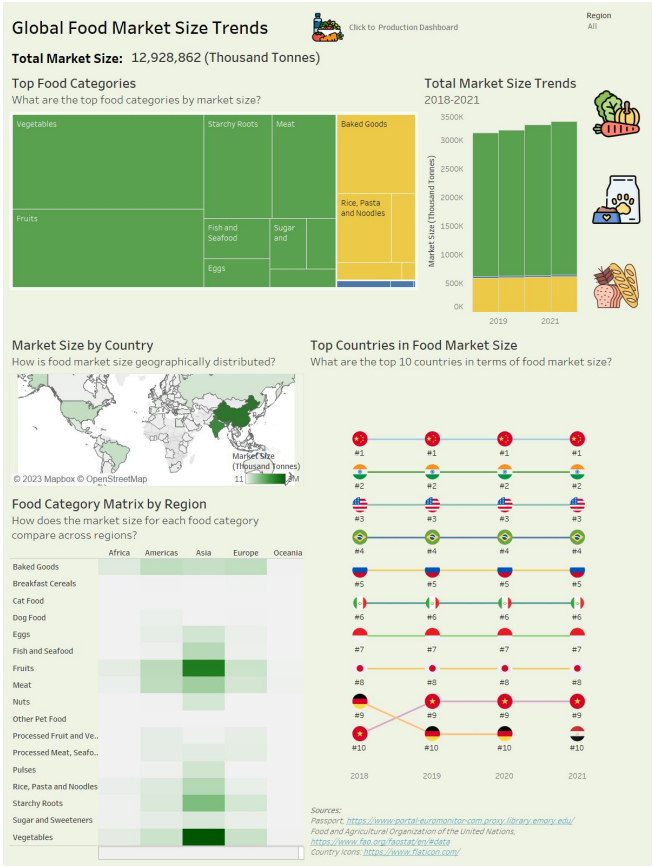
    Production of European countries are a lot more similar with one another whereas there is more deviation in countries in Asia and the Americas.
  - How much food production do countries most frequently produce?

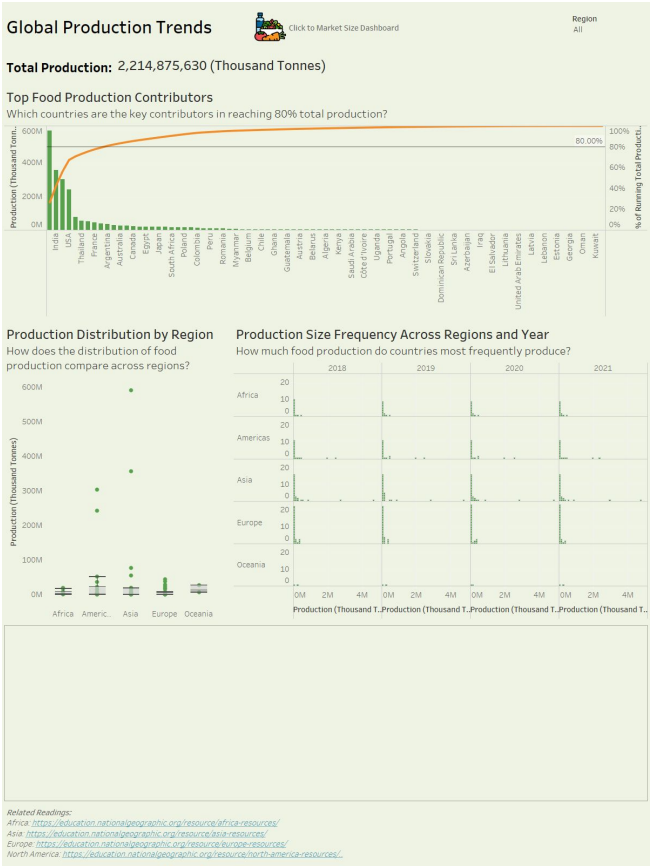
    The vast majority of countries produce under 100k thousand tonnes, or 100 million tonnes.

Based on the gathered insights and our visualization, we would be able to make recommendations such as: For a pet food company seeking global expansion, it is best to prioritize entry into the US market followed by Brazil, as the market size for pet foods is the largest in these two countries.

Potential Improvements

- Acquire **additional time-related data**, allowing for a more comprehensive exploration of trends over extended periods
- Source external datasets that further **categorize food types** and combine with our production dataset to more effectively connect with the market size dataset and enrich the analysis between food market size and world production
- Include **climate and environmental datasets** to better understand the difference in food production and the change in market trends





https://public.tableau.com/app/profile/yifei.wang7456/viz/GlobalFoodDemandsandProduction/MarketDashboard

Thank you!

Any questions?