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TRACKING PROGRESS TOWARD SDG 2: ZERO HUNGER

(2015 -2025)



Abstract

This project performs advanced analysis focused on Sustainable Development Goals 2 (SDG 2) - Zero Hunger, utilizing the comprehensive multi-dimensional indicator data from the United Nations SDG Data Portal. Utilizing a methodical approach, a subset of the SDG raw data pertaining to food and nutrition (child and maternal nutrition, anemia, stunting), nutrition, agriculture (agriculture policy orientation), and governance (Agriculture Orientation Index) were cleaned, standardized, and normalized into a SQL Server relational database. This database was connected to Microsoft Power BI, an advanced analytical tools database containing a star-plot and DAX measure calculations of the Food Security Index and YoY measures. These interactive dashboards were and are still being provided to Stakeholders and Policy Makers to help them understand and analyze the root causes of food insecurity and malnutrition (food and nutrition) and the governmental commitment (Agri_Govt_SpendingShare) versus the agriculture (Agri_GDP_Share) value added) to the economy of the country. This study illustrates the potential of advanced data engineering and business intelligence tools to articulate complex data into visual dashboards to help design and implement zero hunger and resilient food systems for the world.

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1. Introduction

The Sustainable Development Goal 2, SDG 2, or Zero Hunger, aims at being achieved as an integral global issue as set out by the United Nations and facilitated as an objective for fulfillment by 2030. SDG 2 primarily aims at eliminating hunger and an end to hunger in all its forms and dimensions. That apart, it also aims at food security, nutrition – particularly among poorer sections of society who form vulnerable populations, including women and young ones. And on that note, it aims at sustainable agriculture and aims at sustainable agriculture as well. Not with standing these goals and aims, it should be noted that SDG 2 still plays an integral role with regard to ensuringarness and well-being.

The reason for choosing SDG 2 for this project is the importance and challenges associated with food insecurity around the world. In the recent past, food insecurity has been increasing due to factors such as global changes, economic instability, and conflict. SDG 2 indicators can be very useful for understanding the impact associated with these variables. SDG 2 indicators are rich and documented, and thus applicable for modeling. Also, SDG 2 is an area that impacts Sri Lanka and developing nations with regards to nutrition and food production.

A brief scenario about this project: This project focuses on an analysis of SDG 2 indicators based on United Nations SDG data. The project needs the dataset processed in SQL Server and requires that the organization carry out data cleanup with Microsoft Power BI data. The projects seek to achieve global trending insights on hunger and an understanding of country and regional progress as well as areas with a pressing needs intervention based on interactive tools and sophisticated DAX designs. By taking. Unprocessed insights from United Nations data and interpreting them into meaningful reasons, it becomes evident that these projects demonstrate data-driven insights as methods and tools for enhancing progress on zero hunger and SDG 2 impacts on sustainable food systems.

Data Source:

United Nations SDG Data Portal

<https://unstats.un.org/sdgs/dataportal/database>

2. Methodology

The project was carried out following a step by step, organized data analysis process designed according to the CRISP-DM model. Tools such as SQL Server and Power BI were efficiently used to collect, clean, model, analyse, and visualize the project's data.

2.1 Data Source

The dataset used for this study was taken from the United Nations SDG Global Database, which provides internationally comparable indicators that enable countries to compare and track progress towards the Sustainable Development Goals. For this task, indicators under SDG 2 – Zero Hunger were extracted. These indicators cover a wide range of themes related to food security, nutrition, agricultural productivity, government expenditure, and sustainability.

The indicators included values for:

- Anaemia prevalence among women (all, pregnant, non-pregnant)
- Agriculture value added share of GDP (%)
- Government expenditure on agriculture (%)
- Agriculture orientation index
- Large-scale and small-scale food producers' income and productivity
- Agricultural export subsidies
- Official flows for agriculture
- Food insecurity metrics (moderate and severe)
- Undernourishment data
- Dietary diversity indicators
- Sustainable agriculture performance scores (trend and current status)

These indicators were available across multiple years and countries, making them suitable for global comparative analysis.

2.2Data Collection

The selected datasets were downloaded in the form of CSV and Excel files and successfully imported into the SQL Server system using SQL Server Management Studio (SSMS). A dedicated database named SDG2_Project was created to store all tables.

The import process ensured:

- Consistent data types (numeric, text, date)
- Accurate loading of large datasets
- Preservation of indicator codes such as Series Code, Series Description, and Time Period

The main imported table was Fact_FoodData, containing all observations including country, indicator code, year, sex category, and numerical values.

2.3Data Preparation in SQL Server

The necessary data cleaning and data preparation steps were systematically implemented to transform the raw data sets obtained from the United Nations into a structured format suitable for analysis.

2.3.1 Cleaning and Standardisation

- The Value column contained inconsistent data formats, including numeric values, inequality-based values (e.g., >2, <5), and missing values (NaN).
- NaN values were replaced with NULL to standardize missing data handling.
- Inequality symbols (< and >) were removed from numeric entries to retain only valid numerical values.
- The cleaned Value column was converted into a numeric data type to enable aggregation and quantitative analysis.
- Records with missing or NULL values were filtered out where necessary to improve data quality.

2.3.2 Normalisation

The database was normalized to reduce redundancy:

- Fact_FoodData (main fact table)
- Geo (unique list of countries)
- Year (unique time periods)
- Sex_Table, ScaleTable, Series_Lookup, Nutrition, KeyMeasures, and other helper tables
- Bookmark tables to support navigation within Power BI

2.3.3 SQL Validation

SQL queries such as SELECT DISTINCT, COUNT (*), and grouped aggregations were used to confirm:

- Total number of valid countries
- Year distribution
- Indicator completeness
- Absence of structural inconsistencies

2.4 Connecting Power BI

After data cleaning in SQL Server, Power BI Desktop was connected directly to the SQL database. Power Query Editor was used to perform final data transformation:

- Removing unused columns
 - TimeCoverage
 - UpperBound
 - LowerBound
 - BasePeriod
 - GeoInfoUrl
- Filtering out blank values
- Creating calculated columns such as Region, using a SWITCH mapping based on the country list
- Building specialized tables using DAX such as:

- Anaemia_Indicators
- FoodSecurityFactors
- Productivity_Income_Table
- Sex_Table, ScaleTable, Year, and Geo

Advanced Power Query transformations included:

- UNION-based merging of different food insecurity datasets
- SELECTCOLUMNS extraction to standardise multiple indicators under one structure

2.5 Data Modelling

The Power BI data model was designed using a star-schema approach with:

2.5.1 Fact Table

- Fact_FoodData (core numerical indicators across countries and years)

2.5.2 Dimension Tables

- Geo (Country → Region)
- Year
- Sex_Table
- ScaleTable
- Series_Lookup
- Productivity_Income_Table
- FoodSecurityFactors
- Bookmark tables for navigation

2.5.3 Relationships

- GeoAreaName ↔ Fact_FoodData[GeoAreaName]
- Year ↔ Fact_FoodData[TimePeriod]
- Sex_Table ↔ Fact_FoodData[Sex]
- ScaleTable ↔ Productivity_Income_Table

2.5.4 Advanced DAX Measures Used

The project included **many advanced measures**, such as:

➤ **Agricultural & Economic Indicators**

- Agri_GDP_Share
- Agri_Govt_Spending_Share
- Agri_Orientation_Index

➤ **Income & Productivity**

- Avg_Income_LargeScale, Avg_Income_SmallScale
- Avg_Productivity_LargeScale, Avg_Productivity_SmallScale
- Metric_Value for toggle-based analysis
- Year-over-year (YoY) formulas for income & productivity

➤ **Food Security Calculations**

- FoodSecurityFactors
- FoodSecurityIndex
- FoodSecurityTreeValue

➤ **Sustainable Agriculture Indicators**

- Cumulative_Improvement
- Rank_By_CurrentStatus
- Yearly_Improvement
- Sustainable Agriculture Trend Score

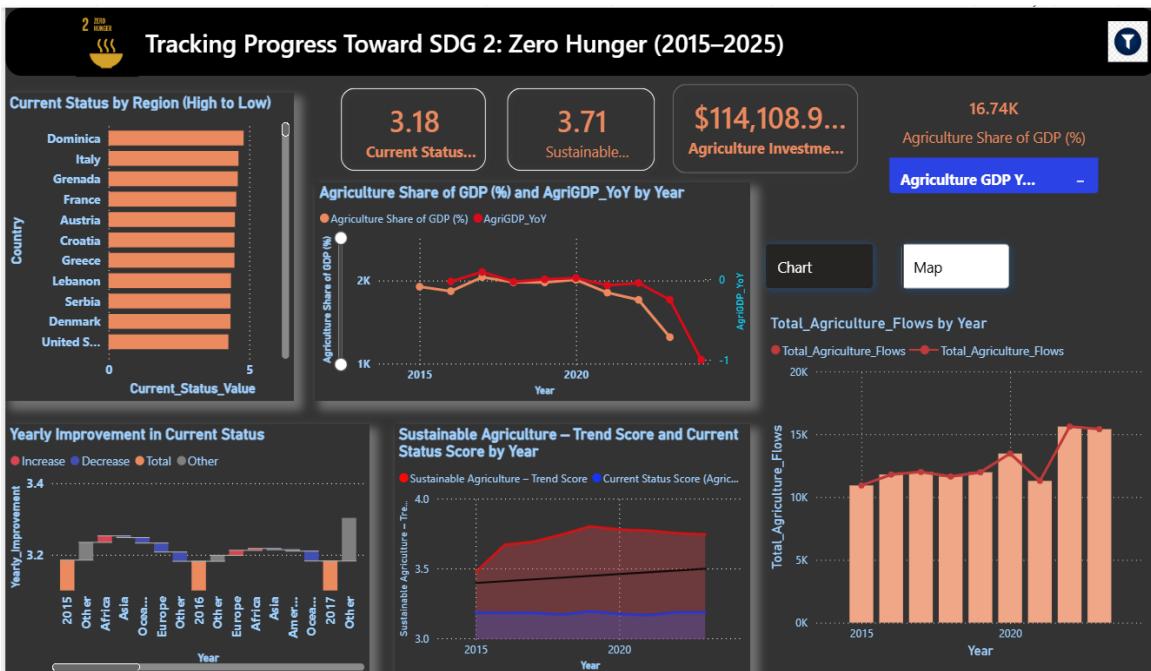
➤ **Anaemia Analysis**

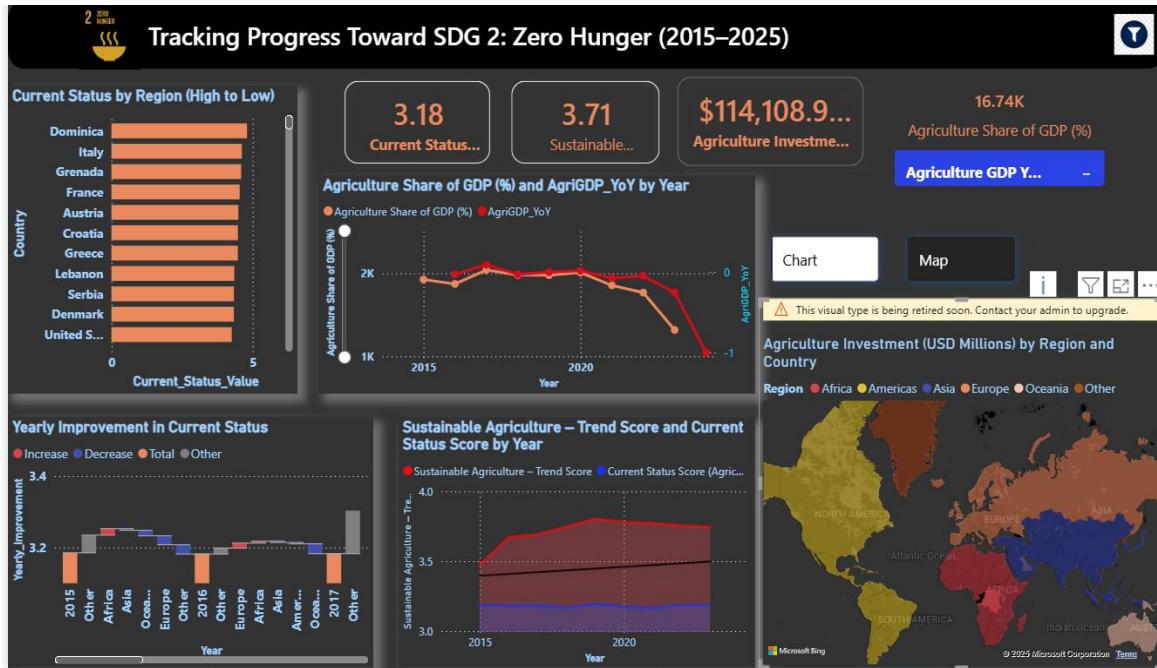
- Selected_Anæmia_Value
- Anæmia_Category

These DAX measures enabled interactivity, dynamic KPIs, drill-throughs, multi-indicator comparisons, and complex year-over-year trend analysis.

3. Visualization

3.1 Tracking Progress Toward SDG 2 : Zero Hunger (2015 -2025) Dashboard Review

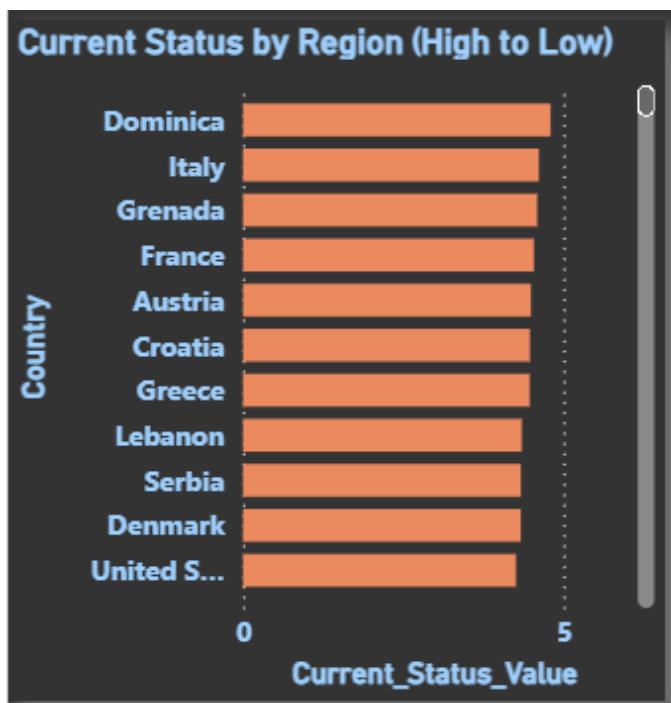




The "Tracking Progress toward SDG 2: Zero Hunger" dashboard uses Power BI's strong visual tools to turn tough worldwide data into something easy, hands-on, and useful. You can see right away that live charts, smart formulas from DAX, along with clickable options let analysts, decision makers, or involved parties dig deep into farming stats, money factors, and food access info. Because of this, spotting patterns becomes easier, checking how areas stack up side by side works smoother, also getting real takeaways on advances in sustainable crop methods gets faster.

The dashboard shows several visuals highlighting various parts of SDG 2 progress - like latest scores, shifts from last year, where money's going, movement trends, along with farming's share in the economy. Next up, every visual piece gets a closer look: what it means, how it's measured, plus what we can learn from it.

3.1.1 Current Status by Region (High to Low)



The 'Current Status by Region (High to Low)' graphic shows how each region is doing when it comes to farming that's both effective and eco-friendly it uses a scoring system called the Current Status Score. This display ranks areas from top to bottom, so you can quickly see who's ahead or behind because it lines up every region side by side through bars.

The chart shows data using a number called the Current Status Score it comes from a formula named CurrentStatus_Avg. That formula works out an average for one particular metric: [PROXY] how close we are to farming that's both efficient and eco-friendly.

DAX Measure:

```
1 CurrentStatus_Avg =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     KEEPFILTERS(
5         Fact_FoodData[SeriesDescription] =
6             "[PROXY] Progress toward productive and sustainable agriculture, current status score"
7     )
8 )
```

```
1 Top10_CurrentStatus_Value =
2 IF(
3     [Top10_Flag] = 1,
4     [CurrentStatus_Avg],
5     BLANK()
6 )
7
```

```
1 Top10_Flag = IF([Rank_By_CurrentStatus] <= 10, 1, 0)
```

Even though there are tools to spotlight the best 10, right now the chart shows scores from every region - lined up by position. Yet it doesn't single out the leaders clearly.

The bar chart provides a clear, comparative view of global performance:

- X-axis: Represents the Current Status Score
- Y-axis: Represents the individual Region/Country

Leading Regions (High Scores)

The chart's peak lists nations such as Dominica - rated 4.80 - alongside Italy, Grenada, France, also Canada, reflecting solid movement in effective, lasting farming.

Regions Requiring Improvement (Low Scores)

The chart's lower end shows areas with weak current ratings - like the Faroe Islands at 1.00, then Vanuatu, Lesotho, along with Botswana - which hints at tougher paths toward sustainable outcomes.

Key Insights

- Significant Global Disparity

The biggest takeaway? There's a huge difference between top and bottom scorers. Ranging from 4.80 in Dominica down to just 1.00 in the Faroe Islands - this spread reveals how uneven progress is when it comes to farming that's both efficient and eco-friendly worldwide. That kind of contrast hints at wildly varied conditions, such as exposure to climate risks, access to materials, or how well rules are put into action depending on where you look.

- Benchmark Setting by Top Performers

The Top_Flag measure shows places like Dominica and Italy hit top marks - leading the way worldwide. Since they're outperforming others, their results deserve a closer look. By checking how they manage policies and farm smarter with climate needs, different areas could borrow smart moves. Learning from them might help weaker spots improve step by step.

- Criticality of Intervention in Lagging Regions

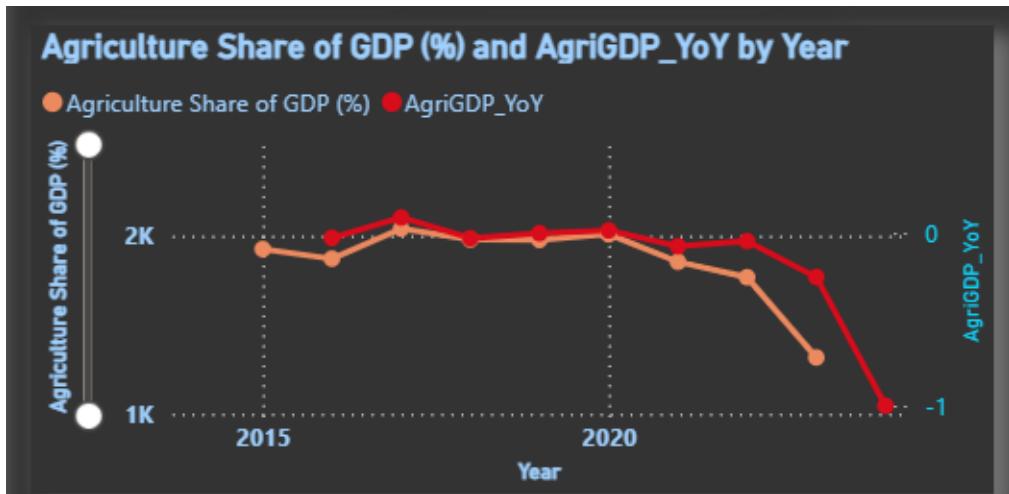
The lowest scores on the chart - like those in the Faroe Islands, Vanuatu, or Lesotho - point to places in deep trouble. These spots probably face basic struggles: harsh climates, little farmable soil, or a lack of funding for eco-smart farming methods. Because they're so far behind, focused help from global programs and strong policy steps might stop things getting worse when it comes to hunger and supply issues.

- Utility of Ranking for Strategic Focus

The main strength of this image is how it lines things up by rank. Showing results from best to worst helps you spot weak spots fast - those are at the bottom - while also showing what's already working well up top. Because everything's ordered, picking where to put time or money becomes easier. It gives a clear base for making smart moves without guessing.

The 'Current Status by Region (High to Low)' chart ranks performance using bars - so you can quickly see which areas are leading. While some regions show strong results, others lag behind, suggesting where action or better practices could help more. Because it lines everything up side by side, spotting trends across countries becomes much easier. This setup gives a clearer picture when looking at how development work plays out worldwide.

3.1.2 Agriculture Share of GDP(%) and AgriGDP_YoY by Year



The two-line graph shows how farming's part of the economy - measured by percent of GDP - moved alongside its yearly growth rate, called AgriGDP_YoY, between 2015 and 2024. This dual-scale chart lets you compare overall shares while tracking real-time ups and downs in farm output, giving clearer clues about shifts in agriculture.

The chart uses a dual-axis line format to display two key measures over time:

- **Primary Measure (Left Y-Axis): Agriculture Share of GDP (%) (Orange line).**

```
1 Agriculture Share of GDP (%) =  
2 CALCULATE(  
3     SUM(Fact_FoodData[Value]),  
4     Fact_FoodData[SeriesCode] = "AG_PRD_AGVAS"  
5 )  
6
```

- **Secondary Measure (Right Y-Axis): AgriGDP_YoY (Red line).**

```

1 AgriGDP_YoY =
2 VAR CY = [Agriculture Share of GDP (%)]
3 VAR PY = [AgriGDP_PY]
4 RETURN
5 IF(
6   NOT ISBLANK(PY),
7   DIVIDE(CY - PY, PY),
8   BLANK()
9 )

```

The X-axis represents the timeline (years), allowing for observation of long-term trends.

Trend Analysis (2015–2024)

This analysis looks at how the GDP piece changes over time - also checking how much growth shifts each year. Changes in growth are studied along with how wild those swings get from one year to another.

1. Agriculture Share of GDP (%) (Absolute Value)

The general pattern points to a clear drop in farming's share of GDP during the last part of the timeframe - mainly due to shifting economic focus toward services and manufacturing instead.

2015–2020 period:

From 2015 to 2020, this value can be seen to have remained stable at a level close to 2,000. In 2017, it reached a high of 2,040.50, and then declined slightly, but by 2020 it had risen again to 2,008.38.

Sharp decline during 2021–2023:

This value fell significantly after 2020. This value, which had decreased to 1,854.49 in 2021, fell further to 1,767.57 by 2022. There was a sharp and severe decline to 1,317.40 in 2023.

Low and Future Trend:

This value, recorded as 1,317.40 in the year 2023, is the lowest value of the entire period. Furthermore, the trend shown in the chart indicates that this value may fall further by 2024.

2. AgriGDP_YoY (Growth Rate)

The growth compared to last year swung wildly, ending up with a sudden drop.

2015-2020 Time Frame:

This value shows a fluctuation between 2015 and 2020. In 2017, it increased by 0.09, and in 2016 and 2018, it decreased by 0.03. By 2019, this value seems to have reached zero.

Steady decline between 2021–2024:

This trend has clearly turned downward after 2020, and a continuous and steady decline can be seen from 2021 to 2024. It is confirmed that no further increase is seen during this time frame.

- 2021: -0.08
- 2023: -0.25

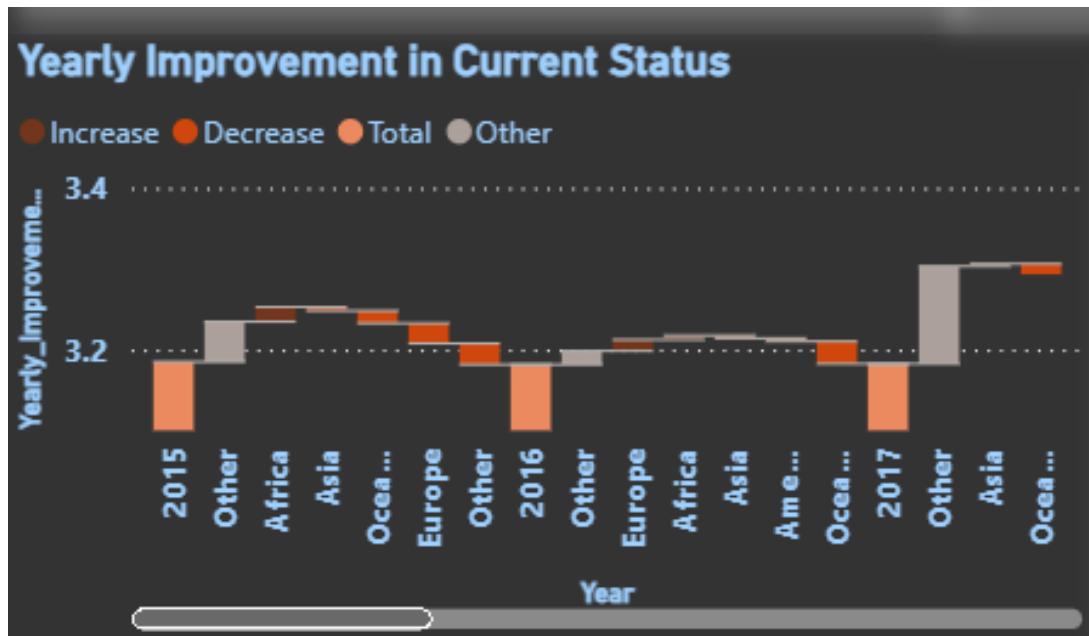
In 2024, things fell sharply - down to -1.00, which means it completely vanished compared to last year's number.

Key Insights

1. In later years, things got tough for farming. Not only did its share of the economy shrink fast after 2020, but yearly growth also plunged - hitting a low of -1.00 by 2024. That steep fall means agriculture isn't just slowing down - it's likely facing serious trouble lately.

2. From 2015 to 2020, the overall portion didn't change much - yet yearly changes swung sharply, so small gains often flipped into losses right after. Though totals stayed flat, spikes and drops showed instability underneath.
3. Risk of Sector Collapse: A drop to -1.00 YoY in 2024 isn't normal - it shows output or worth nearly vanished compared to 2023. That kind of plunge signals deep trouble across farming operations.

3.1.3 Yearly Improvement in Current Status



This waterfall chart shows yearly changes in the Current Status Score for better farming, giving a clear view of growth each year while tracking regions since 2015. Instead of just listing numbers, it highlights shifts over time through 2023 using bars that go up or down. Each segment reflects real gains or drops, making trends easier to grasp than tables. Rather than blending everything together, it separates contributions by region and year clearly. Because of this layout, spotting who's advancing becomes quick and intuitive. So overall, it turns complex data into something you can follow without effort.

The chart uses a waterfall setup so you can see the full net shift in the Current Status Score every year. Every annual section kicks off with one main bar - that's the number from last year - then adds on chunks from six areas (Asia, Europe, Africa, Oceania, America, Other), piling them up, then ends with this year's final sum. That way, you spot how each place pushes the yearly change either up or down - the change itself shows how much the average shifts compared to the earlier year, based on what the DAX formula Yearly_Improvement sets.

Key Insights

The chart shows three key points about how farming around the world is becoming more eco-friendly - first, some regions are improving faster than others; instead of slowing down, efforts have picked up in rural areas; at the same time, funding isn't matching the need in developing countries

1. High Volatility and Cyclical Performance

- The numbers jump up and down - no smooth climb. Gains worldwide don't last, instead they fade fast
- After big gains in 2018 - close to 3.40 - the level fell sharply in 2019; then another jump in 2020, almost hitting 3.35, but dropped again by 2021 into 2022.
- Score drops fast in 2022 - by 2023, it's even lower than before, so gains earlier didn't last.

2. The 'Other' Region as the Primary Volatility Driver

The 'Other' region stands out as the main force behind shifts in the global score. Its impact shapes how much the number swings overall.

This area usually delivers the biggest red spike when numbers jump - like in 2018 - but also hits the deepest blue drop when things crash, such as in 2015 or 2023.

How things go worldwide each year hangs on a shaky group of countries we don't fully understand - so pinning down what's pushing shifts in that 'Other' pile is key. Their swings shape outcomes way more than expected, meaning tracking real causes instead of guesses matters now. Without clearer focus, surprises from this cluster could keep throwing plans off track.

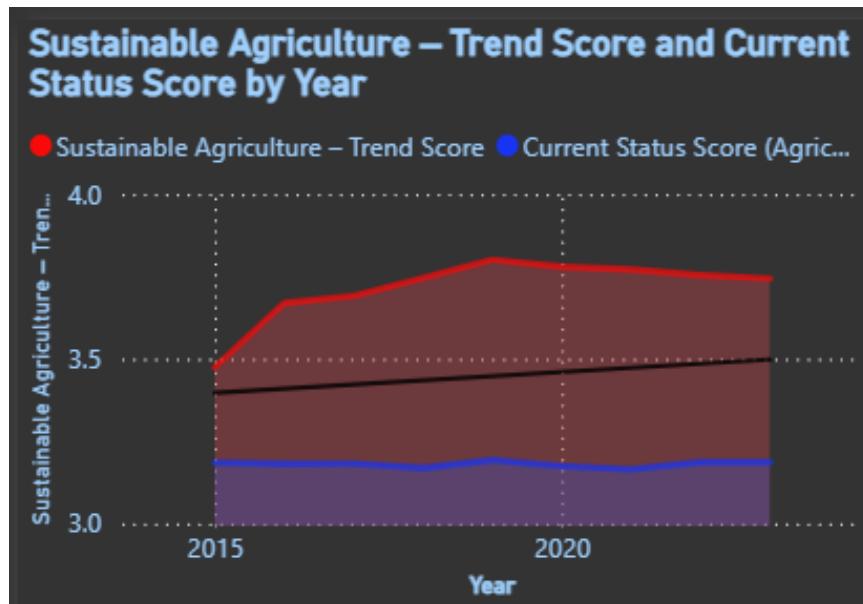
3. Shifting Regional Trajectories

- Europe's involved, yet Asia's role's shifting - meanwhile, elsewhere things are changing too
- Asia often adds a solid boost - shown by the red bars - in several years like 2018, 2020, or 2021; this region tends to lift the overall number. Instead of dragging it down, its impact stays reliably upbeat through those times.
- Oceania's changing trends-In Oceania, the impacts are largely negative in the early period (2015–2018), and are mainly depicted in blue. However, the positive effects, shown in red, increase between 2020 and 2023, a clear indication that Oceania has made real progress during that period.

DAX Measure:

```
1 Yearly_Improvement =
2 VAR CurrentYear = MAX(Fact_FoodData[TimePeriod])
3 VAR PrevYear = CurrentYear - 1
4 VAR CurrentValue = CALCULATE(
5     AVERAGE(Fact_FoodData[Value]),
6     Fact_FoodData[SeriesDescription] = "[PROXY] Progress toward productive and sustainable agriculture, current status score",
7     Fact_FoodData[TimePeriod] = CurrentYear
8 )
9 VAR PreviousValue = CALCULATE(
10    AVERAGE(Fact_FoodData[Value]),
11    Fact_FoodData[SeriesDescription] = "[PROXY] Progress toward productive and sustainable agriculture, current status score",
12    Fact_FoodData[TimePeriod] = PrevYear
13 )
14 RETURN
15 CurrentValue - PreviousValue
16
```

3.1.4 Sustainable Agriculture- Trend Score and Current Status Score by Year



This shaded line chart compares two indicators on the progress towards productive and sustainable agriculture from 2015 to 2023 using Trend Score and Current Status Score. This graph shows Current Status Score (Agriculture) and the Sustainable Agriculture and its Trend Score. The two lines tell the story of agricultural sustainability together by giving information on how the performance of the agricultural system is currently and what the change in direction and velocity of the trend is. The two indicators are plotted together on the Y axis and the horizontal axis represents the years.

Current Status Score (Agriculture)[Blue Line]: It is the average of the values of the indicator that best describes what productive and sustainable agriculture is at the moment. It is overall a pretty low and stable line at 3.17 and 3.19.

- Trend Score (Red Line)-Sustainable Agriculture: This is the average of the indicator that measures the improvement decline over the years. It is a line that lies much higher and is more dynamic. It reached a peak of 3.80 in 2019 only to decline a little after that.

- Shaded Area: The following shaded area between the two lines represents the huge and enduring gap between the current performance level and what is perceived as momentum or trend.
- Trend Line (Black Dashed Line): The Trend Score, or Red Line, includes a trend line in order to give a greater degree of textured visualization to the overall direction of the trend over time, confirming that there has been a modest, long-term upward trajectory despite temporary fluctuations.

Taken together, the two lines, the broad shaded area, and the analytical trend line support deeper insights into the divergence between a stable, lower current state versus a higher yet slightly plateauing long-term improvement trajectory.

Key Insights

This contrast between the two scores exposes a critical disconnection in the development of sustainable agriculture:

1. Big Gap between the Current Status and the Momentum

- The Sustainable Agriculture Trend Score (momentum) and Current Status Score (Agriculture) (current performance) differ significantly.
- The Current Status Score remains at a low value and almost flat level, fluctuating between 3.17 to 3.19 over the entire horizon, meaning the current condition of sustainable agriculture remains as low and stagnant as before.
- In contrast, the Trend Score is substantially higher, varying between 3.47 and 3.80 which means that there is positive momentum or growth over the years, but there is no substantial change in the company's core situation related to the problem at hand.

2. Plateauing Trend Score Momentum

Though the momentum of improvement is strong, it seems to weaken or stagnate since 2019.

- The Trend Score moved up from 3.47 in 2015 to 3.8 in 2019.

- The scores remained stable after 2019, declining slightly to 3.74 by 2023.
- The overall trend line (black dashed line) is slightly positive, suggesting Minor progression has been made over t. However, it is clear that there has been a considerable slowing down in the rate of progression in the momentum curve since 2019.

DAX Measures

The visualization relies on two separate DAX measures to calculate the average score for each indicator:

1. Current Status Score (Agriculture) measure calculates the average current performance level.

```

1 Current Status Score (Agriculture) =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     FILTER(
5         Fact_FoodData,
6         Fact_FoodData[SeriesDescription] = "[PROXY] Progress toward productive and sustainable agriculture, current status score"
7     )
8 )
9

```

2. Sustainable Agriculture – Trend Score

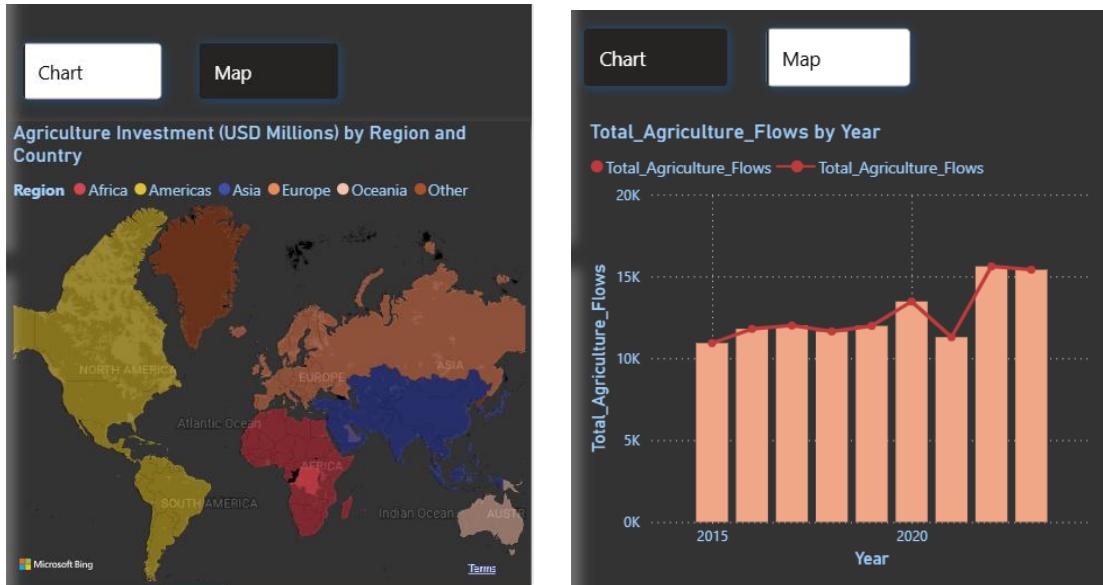
This measure calculates the average momentum (year-to-year change).

```

1 Sustainable Agriculture - Trend Score =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     FILTER(
5         Fact_FoodData,
6         Fact_FoodData[SeriesDescription] =
7             "[PROXY] Progress toward productive and sustainable agriculture, trend score"
8     )
9 )

```

3.1.5 Total_Agriculture_Flows by Year



This part looks at the charts and numbers for yearly farm investments - shown in million dollars - tracked under code DC_TOF_AGRL from the food dataset.

The Chart View shows how Total Agriculture Flows change over time - mixing a line graph with grouped bars. It tracks movement across periods while comparing chunks side by side through visuals that blend trends and totals. Each part highlights shifts, not just single points, giving a fuller picture without stacking jargon or fluff.

X-axis shows the year, running from 2015 up to 2023.

Y-axis shows Total_Agriculture_Flows in thousands.

Data Series: Columns show yearly farm investment amounts. Meanwhile, the line - complete with dots - displays identical numbers, making it easier to spot trends across time.

The linked map view gives a geographical angle, showing where investments land country by country while grouping them into regions - so you can spot worldwide trends fast.

Key Insights

The info along with the graph shows wild swings plus a rise in farm-related cash movements:

- Over the years, TotalAgricultureFlows continued to increase. It rose substantially from \$10,925.62 M in 2015 to \$15,407.38 M in 2023. However, unlike the previous years, 2021 was a terrible year. In 2021, the figure was \$11,288.02 M, down from \$13,466.42 M in 2020. It was a massive loss of almost \$2.2 billion in a year.
- Peak Investment Years - cash inflows reached top values towards the end of the dataset, with 2022 in the first position with \$15,613.22 M, and 2027 in the second position at \$15,407.38 M.
- In 2021, funding declined, however, in 2022, it increased by a record high of \$4.3 billion, meaning significant changes or new funds were introduced into the ecosystem.

DAX Measures

The total investment values are calculated and formatted using the following DAX measures:

1. Total_Agriculture_Flows

This measure calculates the sum of all investment values for the specified indicator.

```
1 Total_Agriculture_Flows =
2 CALCULATE(
3     SUM(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesCode] = "DC_TOF_AGRL"
5 )
```

2. Agriculture Investment (USD Millions)

This measure takes the calculated total flow amount and formats it for presentation.

```
1 Agriculture Investment (USD Millions) =
2 VAR Amt = [Total_Agriculture_Flows]
3 RETURN
4 FORMAT(Amt, "#,0.00") & " M"
5
```

3.1.6 Year-on-Year Change in Agriculture Share of GDP



This card visual represents the Year-on-Year YoY% change in the Share of Agriculture in GDP. The value shown, 16.74K, refers to the growth percentage on a yearly basis and indicates if agriculture's economic contribution to Gross Domestic Product has grown or shrunk during the latest complete year of available data.

DAX Measures

1. Agriculture Share of GDP

```
1 Agriculture Share of GDP (%) =
2 CALCULATE(
3     SUM(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesCode] = "AG_PRD_AGVAS"
5 )
```

This measure calculates the total agricultural value added for the current year by summing the [Value] for the series code "AG_PRD_AGVAS". This is the Current Year (CY) value used in the final calculation.

2. AgriGDP_PY

```
1 AgriGDP_PY =
2 CALCULATE(
3     SUM(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesCode] = "AG_PRD_AGVAS",
5     FILTER(
6         ALL('Year'),
7         'Year'[Year] = MAX('Year'[Year]) - 1
8     )
9 )
```

This measure retrieves the corresponding Previous Year (PY) value. It uses the CALCULATE function to apply a time-shifting filter that retrieves the agricultural value added ("AG_PRD_AGVAS") for the year prior to the current context (MAX('Year'[Year]) - 1).

3. AgriGDP_YoY

```
1 AgriGDP_YoY =
2 VAR CY = [Agriculture Share of GDP (%)]
3 VAR PY = [AgriGDP_PY]
4 RETURN
5 IF(
6     NOT ISBLANK(PY),
7     DIVIDE(CY - PY, PY),
8     BLANK()
9 )
```

This is the final calculation measure. It first defines variables for the Current Year (CY) and Previous Year (PY) values. It then calculates the percentage change. The IF statement ensures the calculation is only performed if the Previous Year value is not blank.

The card visual uses a referenced label to display this calculated AgriGDP_YoY value prominently, offering a quick snapshot of agricultural economic performance.

3.1.7 Current Status Score



This card visual displays the Current Status Score for sustainable agriculture as a single, prominent value. The score shown is 3.18, representing the present level of progress toward productive and sustainable agricultural systems.

DAX Measure

The value displayed is calculated using the following DAX measure:

```
1 Current Status Score (Agriculture) =  
2 CALCULATE(  
3     AVERAGE(Fact_FoodData[Value]),  
4     FILTER(  
5         Fact_FoodData,  
6         Fact_FoodData[SeriesDescription] = "[PROXY] Progress toward productive and sustainable agriculture, current status score"  
7     )  
8 )  
9
```

The measure calculates the average value (AVERAGE(Fact_FoodData[Value])) for the specific indicator "[PROXY] Progress toward productive and sustainable agriculture, current status score". Progress toward productive and sustainable agriculture, current status score", summarizing the overall performance across all available data.

The card serves as a key indicator in the dashboard. By presenting the score as a quick, summarized benchmark, it allows users to rapidly understand the current standing of sustainable agriculture without having to interpret a full chart.

1.1.8 Trend Score in Sustainable Agriculture



This card visual displays the Sustainable Agriculture -Trend Score as a single, prominent value, which is 3.71.The score provides a quick snapshot of the direction and momentum of progress toward productive and sustainable agricultural systems. It reflects whether overall performance in sustainable agriculture is improving, declining, or stable over time Progress toward productive and sustainable agriculture, trend score”, reflecting whether performance is improving, declining, or stable over time

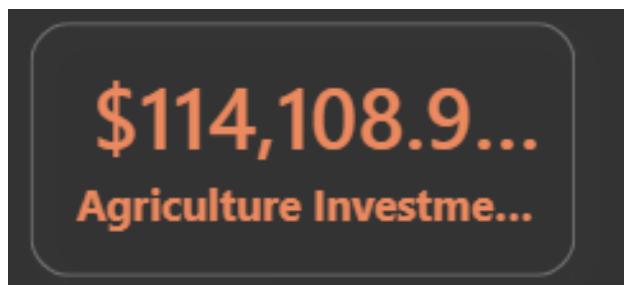
DAX Measure

```
1 Sustainable Agriculture - Trend Score =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     FILTER(
5         Fact_FoodData,
6         Fact_FoodData[SeriesDescription] =
7             "[PROXY] Progress toward productive and sustainable agriculture, trend score"
8     )
9 )
```

The measure computes the average value (AVERAGE(Fact_FoodData[Value])) across all available data for the indicator designated as the trend score ("[PROXY] Progress toward productive and sustainable agriculture, trend score") Progress toward productive and sustainable agriculture, trend score", reflecting whether performance is improving, declining, or stable over time.

This card serves as a key indicator for monitoring progress. It allows users to quickly grasp the overall trend in sustainability, complementing other visuals that show the current status (like the Current Status Score of 3.18) and historical changes.

1.1.9 Total Agriculture Investment (USD Millions)



This card visual displays the Total Agricultural Investment in USD millions as a single, prominent value. The score shown is \$114,108.9 representing the overall scale of financial flows into the agricultural sector across all available data.

DAX Measure

The value displayed is calculated and formatted using the following DAX measure:

```
1 Agriculture Investment (USD Millions) =
2 VAR Amt = [Total_Agriculture_Flows]
3 RETURN
4 FORMAT(Amt, "#,0.00") & " M"
5
```

1. It first uses a variable, Amt, to capture the total value calculated by the hidden measure [Total_Agriculture_Flows].
2. It then uses the FORMAT function to convert this numerical amount into a user-friendly currency string (e.g., "\$120.50") and appends "M" (for Millions).

This card serves as a key financial indicator for assessing overall funding levels and tracking investment patterns over time. It provides a concise overview of financial flows, complementing detailed visuals like the Total_Agriculture_Flows by Year chart and the Agriculture Investment Map View that show regional distribution and yearly trends.

3.2 Nutrition And Food Security



This tool gives a clear look at major worldwide factors tied to food access and health - especially for kids and moms. It shows data from different angles without getting too technical or using vague terms. The layout helps you spot trends fast while staying focused on those most at risk.

The setup mixes bar graphs, pie charts, split trees, donut charts, along with combined views like charts plus maps or tables - giving a clear look at how common things are, how varied they're spread, also how they change over time depending on location or group.

Key Findings:

1. Child hunger levels go up or down depending on where you look. This tool shows how common being too thin, too short for age, or overweight is among kids. You can check changes over years through charts that shift between map views and tables. Each screen gives a different angle on the problem without repeating info.

2. Diet quality check: kids plus women who aren't pregnant get scored on food variety - points 2, 6, 7 show how many types they eat. For children, city versus countryside matters - it shows where meals are less nutritious.

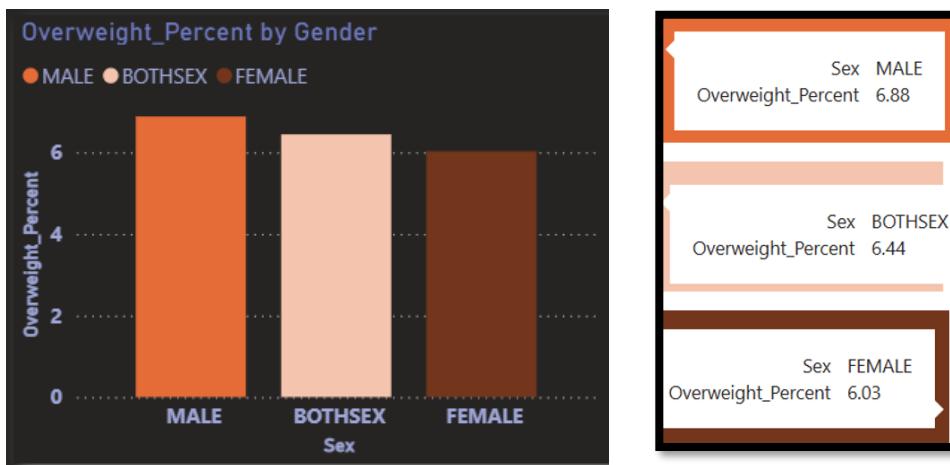
3. Food Security Index breakdown: The tree diagram (point 3) helps split the big picture into smaller parts - such as lack of food or varying levels of hunger (mild vs serious) - so people can explore what's really driving problems.

4. Females' food-related well-being: this screen zooms in on low blood count rates among certain female clusters - like all women, expecting moms, or those not carrying - a sorting them by how serious it is - light, medium, heavy - which matters when shaping mom-and-baby health rules.

5. Most charts split data by sex (point 1) yet also show city vs countryside or nations vs areas - helping spot gaps fast while guiding help to places that need it most.

In short, the "Nutrition & Food Security" dashboard works as a single hub for analysis - helping people make choices based on real data. It lets users see current conditions at a glance, follow changes over time, while spotting key factors behind nutrition and access issues.

3.2.1 Overweight_Percent by Gender



This graph uses bars to display how common being overweight is among kids, split into three groups: boys, girls, or everyone together - probably meaning the total group average.

Key Insights

The graph shows - using clear labels - that boys have the highest average rate of being overweight.

- Male: 6.88%
- Both Sexes: 6.44%
- Female: 6.03%

This points to a possible gap - meaning boys might have a greater share of moderate to severe excess weight compared to girls in this data set.

DAX Measures

The visual is driven by two components: the measure that calculates the prevalence and the supporting table that defines the categories.

1. Overweight_Percent Measure (The Value)

This measure calculates the average value of the "moderately or severely overweight" indicator, dynamically filtering for the selected sex category.

```
1 Overweight_Percent =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesCode] = "SN_STA_OVWGT",
5     Fact_FoodData[Sex] IN VALUES(Sex_Table[Sex])
6 )
```

2. Sex_Table Definition (The Categories)

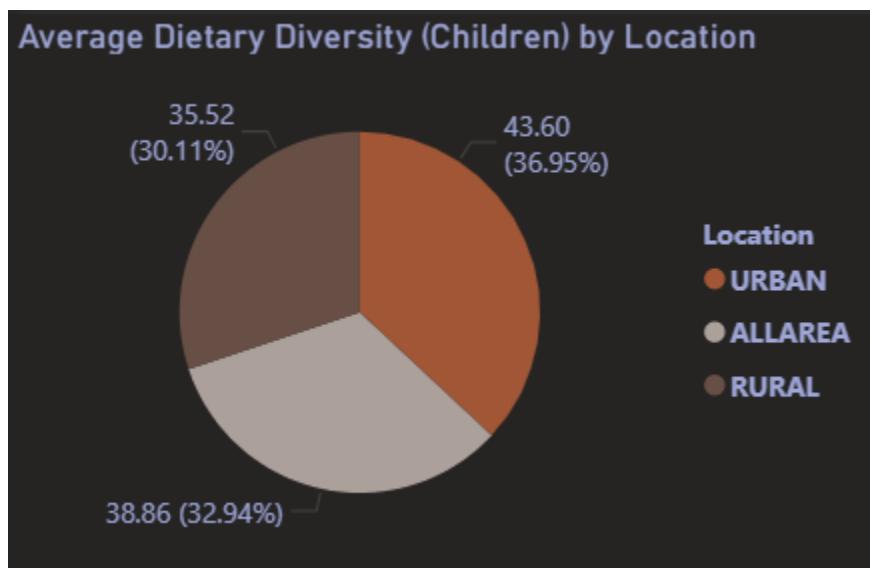
This is a disconnected table used to explicitly define the categories shown on the X-axis (Sex) and used in the measure's filtering context.

```

1 Sex_Table =
2 DATATABLE(
3     "Sex", STRING,
4     {
5         {"MALE"},
6         {"FEMALE"},
7         {"BOTHSEX"} -- include BOTHSEX as separate category
8     }
9 )

```

3.2.2 Average Dietary Diversity (Children) by Location



This graph uses a pie chart to display how varied kids' diets are across locations. Because it separates findings by residence, you can see the typical score for every region. A section represents each place category, with size matching its portion. Colors make differences quick to spot. Information is pulled from questionnaires on children's everyday meals.

Key Insights

The chart breaks down food variety scores by urban, rural, and combined groups - using bigger shapes for larger shares. One piece stands for cities, a different one for countryside spots, while the whole group forms the complete image. How big each

section looks matches how much it counts in the blend. The layout makes it easy to see which area plays a bigger role.

- Urban residents hit the highest score for food diversity - 43.60 - that's close to 37% of the total portion.
- All areas average 38.86 - around 32.94% of max range - close to national numbers.
- Rural areas have the least diverse diets - about 35.52 points, or nearly a third of the total share.

This suggests urban children tend to consume a wider variety of meals compared to rural ones - meaning your location could shape your diet.

DAX Measures

The visual is based on a measure that calculates the average dietary diversity and a supporting table that defines the location categories.

1. Average Dietary Diversity (Children) Measure

This measure calculates the average value for the indicator reflecting the diversity of children's diets.

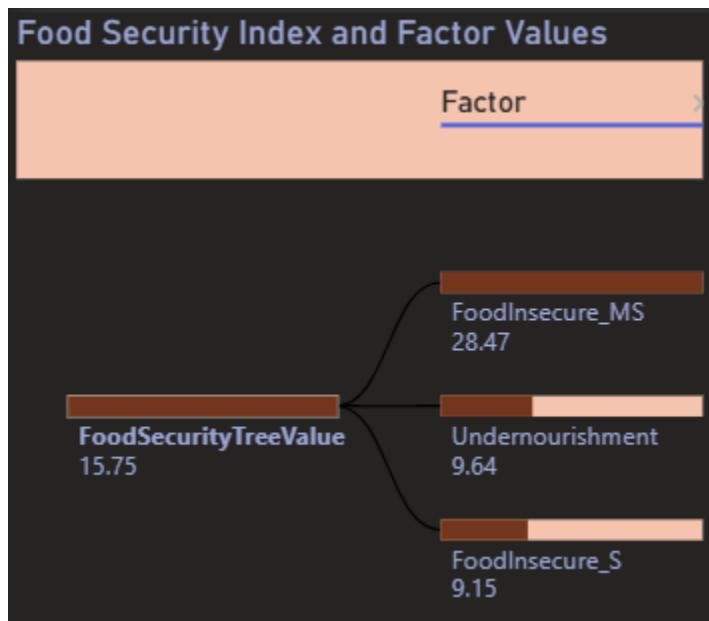
```
1 Average Dietary Diversity (Children) =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     KEEPFILTERS(Fact_FoodData[SeriesCode] = "SH_MDD_CHLD")
5 )
6
```

2. Location_Table Definition (The Categories)

This is a filtered table that ensures only valid location categories (Rural, Urban, All Area) are used.

```
1 Location_Table =  
2 FILTER(  
3     DISTINCT(  
4         SELECTCOLUMNS(  
5             Fact_FoodData,  
6             "Location", Fact_FoodData[Location]  
7         )  
8     ),  
9     NOT ISBLANK([Location]) &&  
10    [Location] <> "NULL"  
11 )
```

3.2.2 Food Security Index and Factor Values



This chart works like a family tree, revealing how food safety breaks down into chunks - tap through each level slowly, noticing how every bit builds the whole view piece by piece.

Key Insights

The breakdown map shows what makes up the full FoodSecurityTreeValue - fixed at 15.75 with no filters applied - but that key number changes depending on each contributing piece.

The main causes of food safety inspections are - one, having plenty of meals available; also, reliable delivery routes stepping up; plus, how much cash folks earn deciding what they're able to buy

1. FoodInsecure_MS (Moderately Food Insecure): 28.47
2. Undernourishment: 9.64
3. FoodInsecure_S (Severely Food Insecure): 9.15

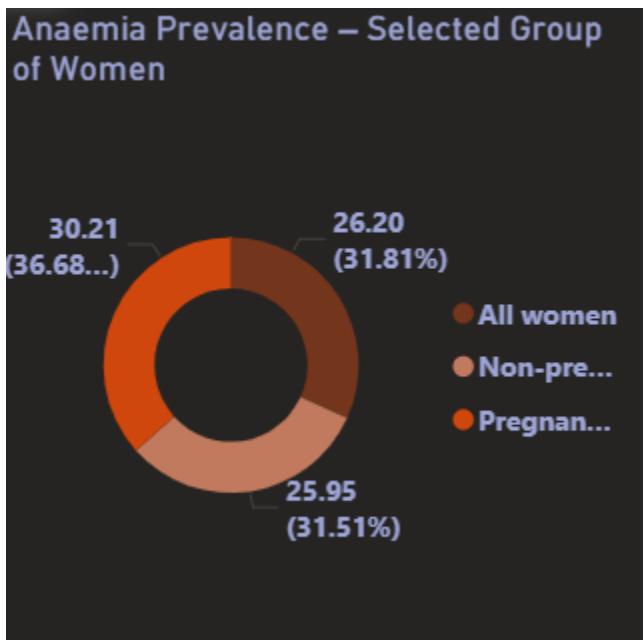
The highest mean value goes to FoodInsecure_MS (28.47), which suggests this form of food problem appears more frequently than the rest - making it stand out as the leading case here.

DAX Measure:

FoodSecurityTreeValue

```
1 FoodSecurityTreeValue =
2 VAR SelectedFactor =
3     SELECTEDVALUE(FoodSecurityFactors[Factor])
4
5 RETURN
6 SWITCH(
7     TRUE(),
8
9
10    SelectedFactor = "Undernourishment",
11        CALCULATE(
12            AVERAGE(FoodSecurityFactors[Value]),
13            FoodSecurityFactors[Factor] = "Undernourishment"
14        ),
15
16
17    SelectedFactor = "FoodInsecure_MS",
18        CALCULATE(
19            AVERAGE(FoodSecurityFactors[Value]),
20            FoodSecurityFactors[Factor] = "FoodInsecure_MS"
21        ),
22
23
24    SelectedFactor = "FoodInsecure_S",
25        CALCULATE(
26            AVERAGE(FoodSecurityFactors[Value]),
27            FoodSecurityFactors[Factor] = "FoodInsecure_S"
28        ),
29
```

3.2.3 Anaemia Prevalence – Selected Group of Women



This graph uses a circular layout to display rates of anaemia across three groups of women - those overall, non-pregnant ones, along with expectant mothers. Every slice reflects actual numbers for its category, built straight from the stats. The design keeps things clean, so it's easier to spot differences fast. No messy extras get in the way when checking one against another.

Key Insights

The donut chart shows how often anaemia happens overall, divided into the three groups using separate sections.

- Pregnant women often face anaemia - around 30 out of every 100 cases, making nearly 37 percent overall.
- All women fall near 26.20%, totaling roughly 31.81% when combined.
- Women not expecting have the lowest share on average - 25.95%, accounting for 31.51% in total.

Since all three figures fall within 20% to 39%, each selected category reflects medium-level severity based on Anaemia_Category guidelines. This suggests a notable health issue particularly for pregnant women.

DAX Measures

The visual is driven by two main DAX measures: one to calculate the prevalence value and another to classify the severity.

1. Selected_Anaemia_Value Measure (The Prevalence)

This measure dynamically calculates the average anaemia prevalence based on the specific group of women selected for analysis, using the relevant SeriesCode from the Fact_FoodData table.

```

1 Selected_Anaemia_Value =
2 VAR sel = SELECTEDVALUE(Anaemia_Indicators[Indicator])
3 RETURN
4 SWITCH(
5     sel,
6     "All women", CALCULATE(AVERAGE(Fact_FoodData[Value]), Fact_FoodData[SeriesCode]="SH_STA_ANEM"),
7     "Pregnant women", CALCULATE(AVERAGE(Fact_FoodData[Value]), Fact_FoodData[SeriesCode]="SH_STA_ANEM_PREG"),
8     "Non-pregnant women", CALCULATE(AVERAGE(Fact_FoodData[Value]), Fact_FoodData[SeriesCode]="SH_STA_ANEM_NPRG"),
9     BLANK()
10 )

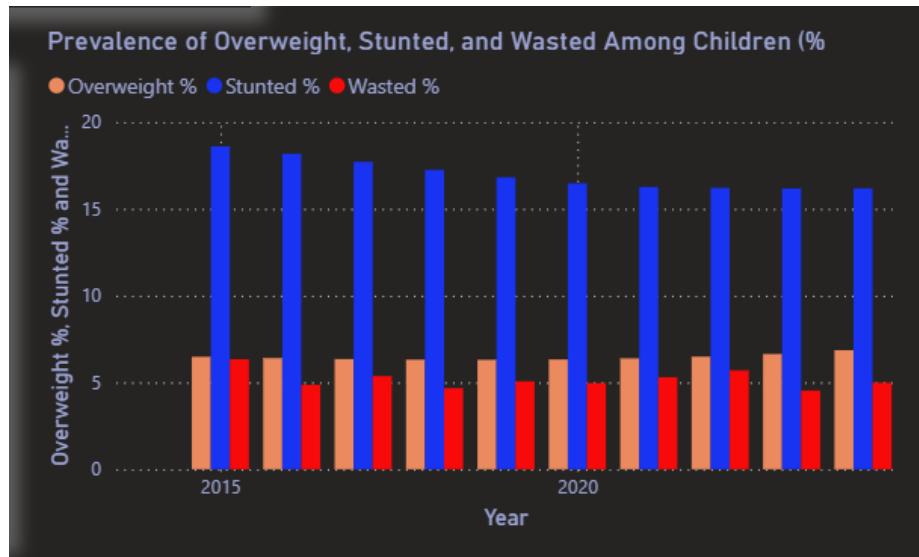
```

2. Anaemia_Category Measure (The Severity Classification)

```
1 Anaemia_Category =
2 SWITCH(
3   TRUE(),
4   [Selected>Anaemia_Value] < 20, "Mild",
5   [Selected>Anaemia_Value] >= 20 && [Selected>Anaemia_Value] < 40, "Moderate",
6   [Selected>Anaemia_Value] >= 40, "Severe",
7   "Unknown"
8 )
```

3.2.4 Prevalence of Overweight , Stunted , and Wasted Among Children (%)

This picture shows kid nutrition troubles in three ways - all packed into one thing - choose either Graph, World View or List. Use it to watch shifts across years, notice hotspots worldwide, while figuring out what's most common: low height for age, low weight for height, or high weight for their size.



A clustered column chart is used to show the temporal trends of child malnutrition indicators over the year, representing years (2015–2024) on the X-axis, showing the prevalence percentage on the Y-axis. This visualization compares well the prevalence of stunting, wasting, and overweight in a single view from different years. The chart clearly depicts that the condition of stunting—which is represented with blue bars—is always at the top and the most prevailing, followed by overweight and wasting. Since all three indicators for the respective years are presented side by side, one can easily observe how each particular component has changed from year to year, thus making comparisons and trend analysis much easier.



A map type of visualization is utilized to provide a geographical outlook of child malnutrition among various nations, with the locations shown for the nation and classified by global regions such as Africa, Americas, and Asia via the legend. Interactive tooltip features provide important indicators such as the total child malnutrition score, as well as percentage breakdowns of stunting, wasting, and being overweight. The map allows for easier interpretation of not only the severity of malnutrition but also its relative weight among various nations. Such interpretation becomes easier with regard to regional observations, differences, and areas of policy concerns.

Year	ChildMalnutritionScore	Over_Contribution %	Stunt_Contribution %	Wast_Contribution %
2015	10.47	0.62	1.78	0.61
2016	9.81	0.65	1.85	0.50
2017	9.81	0.65	1.81	0.55
2018	9.41	0.67	1.83	0.50
2019	9.39	0.67	1.79	0.54
2020	9.25	0.68	1.78	0.54
2021	9.31	0.69	1.75	0.57
2022	9.46	0.69	1.71	0.60
2023	9.11	0.73	1.77	0.50
2024	9.34	0.73	1.73	0.53
Total	9.54	0.68	1.78	0.54

The table view presents a detailed numerical summary of child malnutrition indicators with columns showing the Child Malnutrition Score, StuntContribution %, WastContribution %, and OverContribution %. In this format, the user can analyze the exact values and the relative contribution of each component for a corresponding year, or for a specific country or region when filters are applied. The values presented in this table demonstrate that the StuntContribution % continues to be the highest relative contributor to the total Child Malnutrition Score with an average value of 1.78 out of the total average score of 9.54. This is of course positive that stunting is the most prevalent malnutrition concern, as opposed to wasting and overweight, contrary to other visual analyses.

Integrating these three views, the visual provides an extensive understanding of child malnutrition showing not only time series analysis, child malnutrition across diverse geographical units and the child malnutrition with relative contribution of stunting, wasting, overweight which is crucial for addressing child malnutrition with designed measures and policy actions.

DAX Measures

Core Prevalence Measures: Calculate the average percentage of children affected by each type of malnutrition.

```
1 Overweight % =  
2 CALCULATE(  
3     AVERAGE(Fact_FoodData[Value]),  
4     FILTER(Fact_FoodData, Fact_FoodData[SeriesCode] = "SN_STA_OVWGT")  
5 )  
6
```

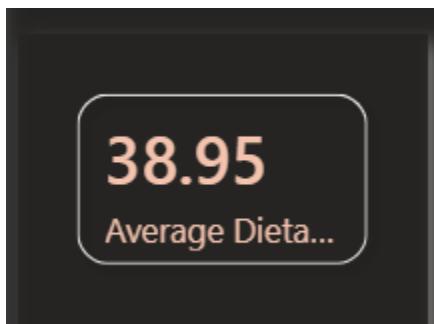
```
1 Stunted % =  
2 CALCULATE(  
3     AVERAGE(Fact_FoodData[Value]),  
4     FILTER(Fact_FoodData, Fact_FoodData[SeriesCode] = "SH_STA_STNT")  
5 )  
5
```

```
1 Wasted % =  
2 CALCULATE(  
3     AVERAGE(Fact_FoodData[Value]),  
4     FILTER(Fact_FoodData, Fact_FoodData[SeriesCode] = "SH_STA_WAST")  
5 )  
6
```

Overall Score Measure: Combines the three core indicators into a single metric, rounded to two decimals.

```
1 ChildMalnutritionScore =
2 ROUND(
3     AVERAGEX(
4         {
5             [Stunted %],
6             [Wasted %],
7             [Overweight %]
8         },
9         [Value]
10    ),
11    2
12 )
```

3.2.5 Average Dietary Diversity among Children



This visualization is a card visual to get an at-a-glance, summarized view into the average nutritional variety in children's diets.

Key Insight

Above all, the card indicates that the overall Average Dietary Diversity Children is 38.95; this is just a single figure average value of the indicator for reflecting the diversity of food groups consumed by children in the entire dataset, or the context currently filtered by slicers/regions.

DAX Measure

Average Dietary Diversity (Children)

The card is based on a single measure that calculates the average value of the dietary diversity indicator.

```
Average Dietary Diversity (Children) =  
CALCULATE(  
    AVERAGE(Fact_FoodData[Value]),  
    KEEPFILTERS(Fact_FoodData[SeriesCode] = "SH_MDD_CHLD")  
)
```

3.2.6 Average Dietary Diversity Among Non-Pregnant Women



This visualization is a card visual that provides a concise, single-figure summary of the average nutritional variety in the diets of non-pregnant women.

Key Insight

The card mainly presents Average Dietary Diversity (Non-Pregnant Women) score as 59.71. This score means that, on average, the non-pregnant women in the specific context (country, year, and region) of interest were able to consume food from 59.71 different food groups.

DAX Measure

Average Dietary Diversity (Non-Pregnant Women)

The card is driven by a single measure that calculates the average value of the specific dietary diversity indicator for this population group.

```
1 Average Dietary Diversity(Non-Pregnant Women) =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesCode] = "SH_MDD_WMN_NPRG"
5 )
```

3.3 Agricultural Productivity & Income

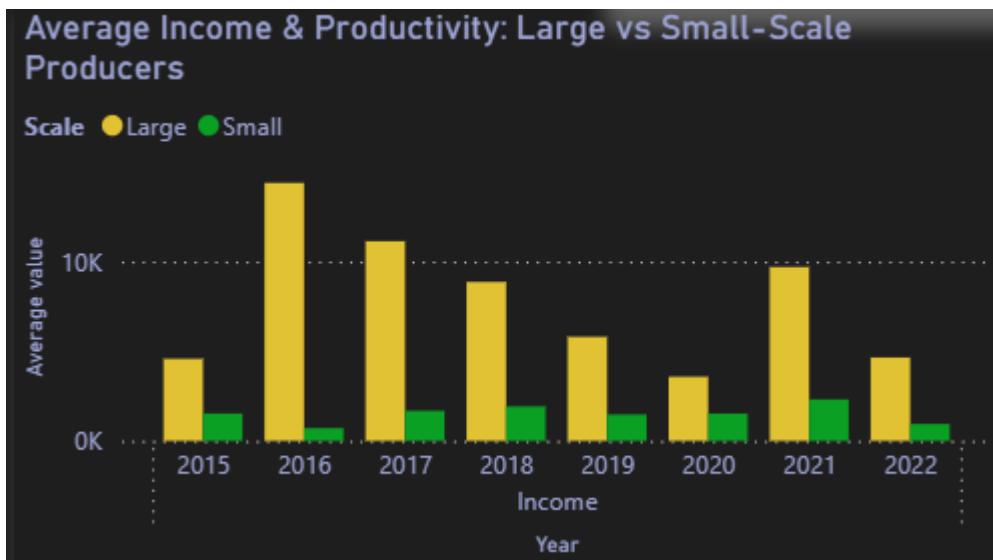


This dashboard provides a clear view of farm data related to size, zooming in on Productivity and Income from various locations through various times. This allows users to compare the performance of large farms relative to small ones, pointing out inconsistencies in the agricultural sector. One area points out income differences for various sizes of agricultural production, while tracking year by year growth through each passing year, other areas point out on maps where income is being received from various nations. Overall, it assists in understanding living conditions, income stability, and agricultural effectiveness for a country.

3.3.1 Average Income: Large vs Small-Scale Producers

In order to effectively evaluate the inequalities in agricultural productivity and income, two important graphical representations were made to compare the average income and average productivity of large and small agricultural producers between 2015 and 2022.

Average Income: Large vs Small Scale Producers

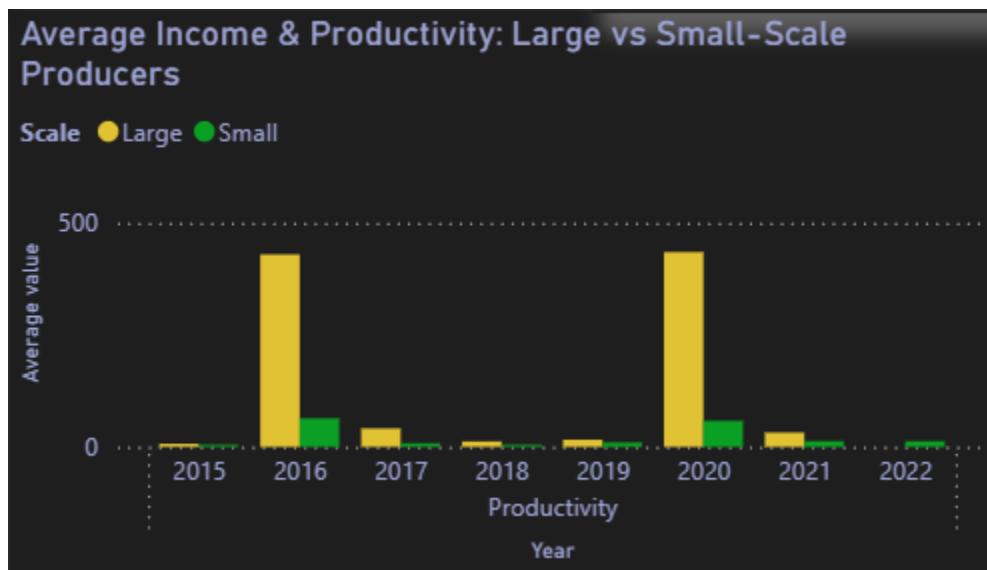


A column chart helps to compare average income levels between large and small producers of agricultural products over several years. Large producers' data has been depicted using yellow columns, while that of small producers has been depicted using green columns.

The graph shows greater income averages for large producers than for small producers which is more visible in peaks that the large producers have in 2016 and 2021. This reflects improved market or resource levels during these years. It can also be linked to higher productivity or low poverty ratios. Meanwhile, the income level for small-scale producers is low and constant. This creates income disparity among farmers.

Interactive slicers for year and country enable the viewer to examine the variations of income by region and year, providing insight into the regional and structural elements that determine earnings abilities.

Average Productivity: Large vs Small Producers



This bar graph shows a comparison of average productivity between large and small-scale producers. The graph is the same as that of income. Large producers are in yellow, small producers are in green.

This shows that large scale farmers have greater productivity with more peaks being in 2016 and 2020 than the others. The factors include, but are not limited to, access to modern technology and modern farming methods. On the other hand, the productivity of small-scale farmers is low and remains low in all periods.

Users are able to explore the country and year trends in productivity, growth or stagnation phases, and understand the effects of size in terms of agricultural productions through the employment of the available slicers.

Key Insight

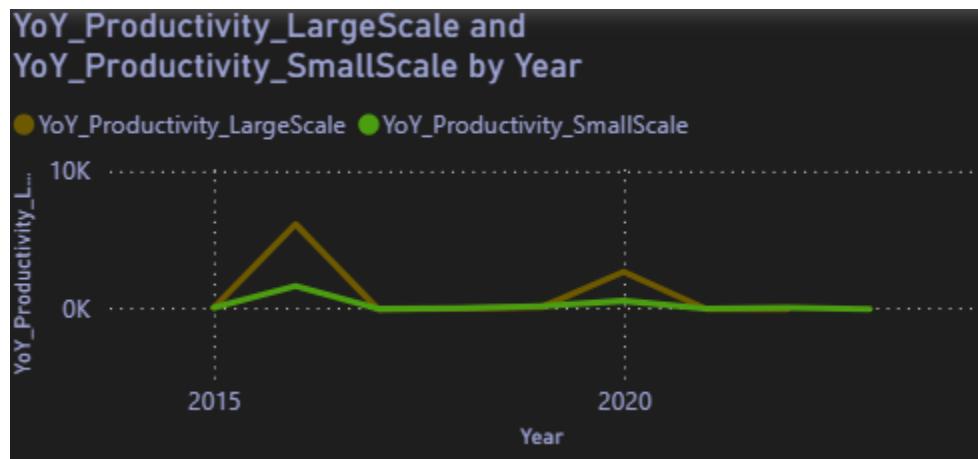
Through these representations, there is a clear link between the scale of production, income status, and productivity. Large-scale producers have superior productivity and income compared to small-scale ones. This makes it essential to offer special policies and interventions in favor of small-scale farmers to help them increase productivity and earn better incomes.

DAX Measure

```
1 Productivity_Income_Table =
2 DATABASE(
3     "Metric", STRING,
4     "Scale", STRING,
5     "Value", DOUBLE,
6     {
7         {"Income", "Large", 0},
8         {"Income", "Small", 0},
9         {"Productivity", "Large", 0},
10        {"Productivity", "Small", 0}
11    }
12 )
```

```
1 Metric_Value =
2 SWITCH(
3     TRUE(),
4     SELECTEDVALUE(Productivity_Income_Table[Metric]) = "Income" &&
5     SELECTEDVALUE(Productivity_Income_Table[Scale]) = "Large", [Avg_Income_LargeScale],
6
7     SELECTEDVALUE(Productivity_Income_Table[Metric]) = "Income" &&
8     SELECTEDVALUE(Productivity_Income_Table[Scale]) = "Small", [Avg_Income_SmallScale],
9
10    SELECTEDVALUE(Productivity_Income_Table[Metric]) = "Productivity" &&
11    SELECTEDVALUE(Productivity_Income_Table[Scale]) = "Large", [Avg_Productivity_LargeScale],
12
13    SELECTEDVALUE(Productivity_Income_Table[Metric]) = "Productivity" &&
14    SELECTEDVALUE(Productivity_Income_Table[Scale]) = "Small", [Avg_Productivity_SmallScale],
15
16    BLANK()
17 )
```

3.3.2 YoY Productivity: LargeScale and SmallScale



The YoY Productivity: Large-scale and Small-scale demonstrated the change in agricultural productivity for both large-scale and small-scale sectors using Line Chart. The visual tracks the percentage growth or decline in productivity annually over time. For a more accurate and clear data representation, several DAX measures were used in creating this chart.

The line chart reveals that year-on-year productivity changes follow an uneven and intermittent pattern, and are particularly biased towards the large-scale sector. While both sectors remain relatively stable over long periods, they are occasionally interrupted by short-term sharp spikes.

Here, the large-scale sector shows more volatility and higher growth rates than the small-scale sector. There was a significant positive growth in productivity, especially in the periods around 2016 and 2020, and in both cases the growth rate of large-scale operations was clearly higher than that of small-scale operations.

Key Insights

- Large-scale farming has achieved higher growth rates and productivity gains continually compared to small-scale farming.
- This means they deserve differentiated policies and interventions for small scale farmers to assist them in more productivity and higher income.
- The sector of small-scale farmers shows only minor changes in productivity on an annual basis over the years with no lasting and noticeable changes in production. The 2016 and 2020 peaks identified large-scale farming.

DAX Measure

```
1 YoY_Productivity_SmallScale =
2 VAR PrevYear =
3     CALCULATE(
4         [Avg_Productivity_SmallScale],
5         FILTER(
6             ALL(Fact_FoodData),
7             Fact_FoodData[TimePeriod] = MAX(Fact_FoodData[TimePeriod]) - 1
8         )
9     )
10 RETURN
11 DIVIDE([Avg_Productivity_SmallScale] - PrevYear, PrevYear, 0) * 100
12
```

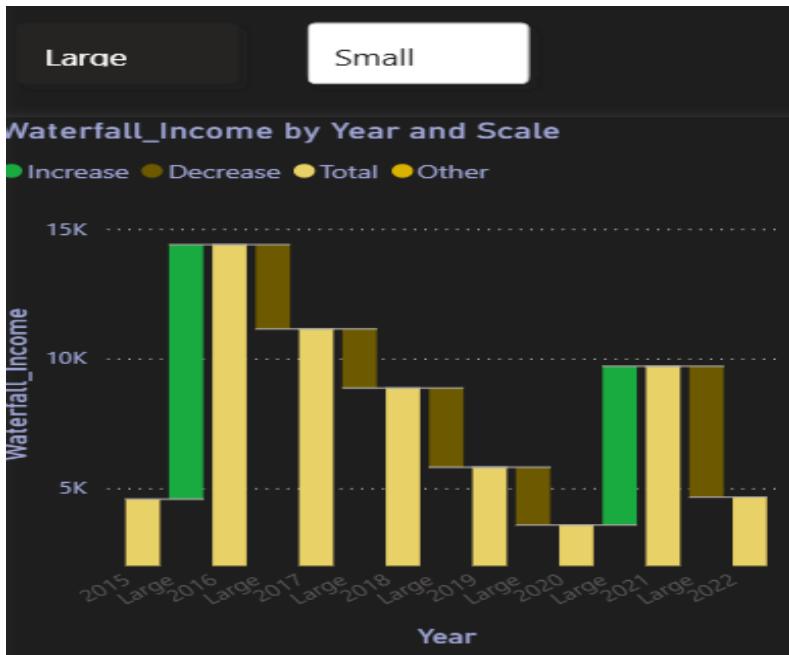
```
1 YoY_Productivity_LargeScale =
2 VAR PrevYear =
3     CALCULATE(
4         [Avg_Productivity_LargeScale],
5         FILTER(
6             ALL(Fact_FoodData),
7             Fact_FoodData[TimePeriod] = MAX(Fact_FoodData[TimePeriod]) - 1
8         )
9     )
10 RETURN
11 DIVIDE([Avg_Productivity_LargeScale] - PrevYear, PrevYear, 0) * 100
```

3.3.3. Waterfall Chart: YoY Income (Large Scale & Small Scale)

Waterfall charts were utilized for the evaluation of the changes in the income over time. A waterfall chart is a very useful tool for analyzing how a value changes over

time and how a value increases or reduces from one year to another. Region and country selectors are used in the waterfalls for a better analysis of the changes in the income over time.

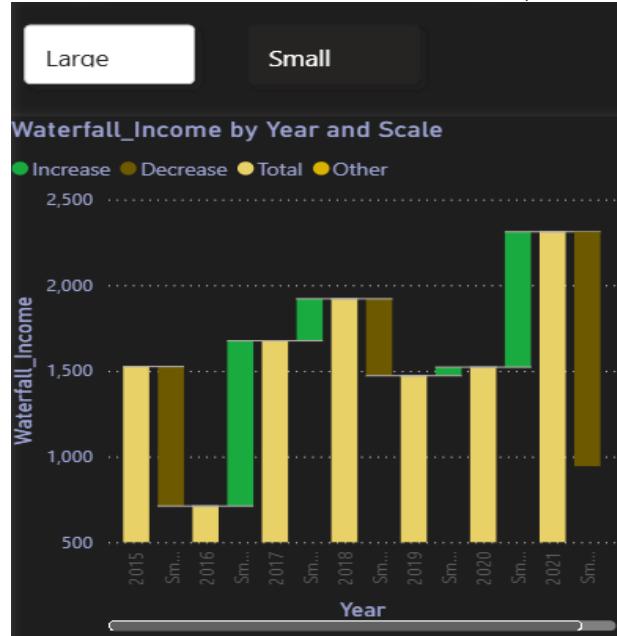
Waterfall Chart: YoY Income for Large-scale Producers



The waterfall chart provided above shows how the annual income levels change for large agricultural enterprises. The bars show changes in income levels from the previous year. Green bars show a boost in income levels. On the other hand, brown bars show a reduction in income levels.

The graphic calls attention to the variances of growth within the income, showing sharp periods of revenue growth and times of decline. Through the illustration of the cumulation of year-to-year change, the graphic facilitates comprehension of the total income dynamics and financial stability for massive farms. The employment of region and country slicers facilitates the evaluation of total income dynamics by location and financial situation for deeper processing of the data.

Waterfall Chart – YoY Income (Small-Scale Producers)



This waterfall chart shows the year-to-year changes for the income of small-scale agricultural enterprises. As in the case of the large-scale chart, the green bars represent an increase in income, and brown bars represent a reduction in income.

The importance of the resilience of the income trends for small-scale producers is highlighted in the diagram, where the positive and negative changes are seen in the graph. The visual presentation of the changes will help in selecting the years where the income has increased or decreased and will enable the comparison of the income trends of small-scale and large-scale producers. The diagram will be more effective in its analysis if the regional and country slicers are used.

Key Insight

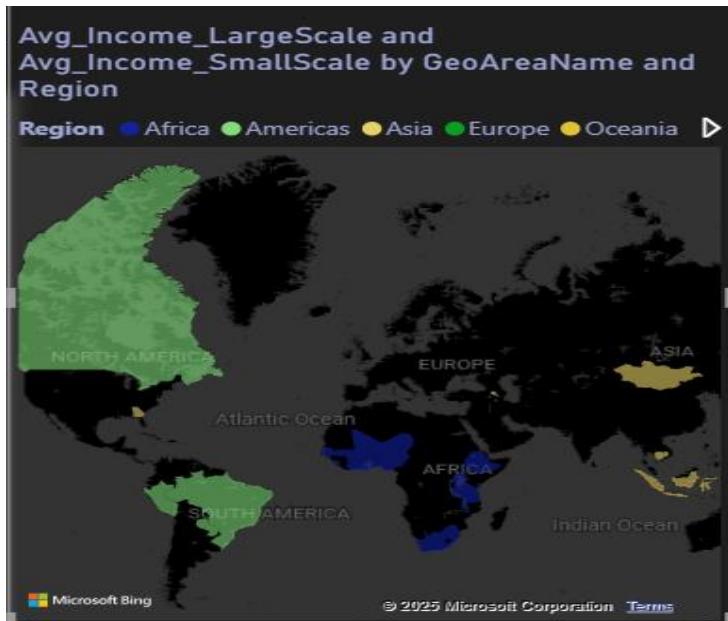
These three waterfall charts collectively offer valuable insight into volatility and growth trends in producer scales of agricultural income. These charts promote comparisons between large and small producer organizations based on differences in financial performance and sensitivity. The method of discussing and displaying these results through graphics can facilitate informed analysis of agricultural income sustainability and disparities.

DAX Measure

```
1 ScaleTable =  
2 DATATABLE(  
3     "Scale", STRING,  
4     {  
5         {"Large"},  
6         {"Small"}  
7     }  
8 )  
9
```

```
1 Waterfall_Income =  
2 SWITCH(  
3     SELECTEDVALUE(ScaleTable[Scale]),  
4     "Large", [Avg_Income_LargeScale],  
5     "Small", [Avg_Income_SmallScale],  
6     BLANK()  
7 )  
8
```

3.3.4 Filled Map: Avg Income LargeScale and SmallScale by Region



This is a filled map visual which represents how average agricultural income earned is distributed around the world and the different regions of the world. The different the average income is, the different the color of the region is on the map, and if the average income is really different, if you hover over the region, you get a tooltip showing both the average income of the large scale producer, and the average income of the small scale producer of the country. The visual map uses the region legend and the year slicer.

The provided map screenshot displays average levels of income by region and country. Of the regions, the Americas has the biggest landmass area that has a relatively high income level compared to other regions. Other regions like Africa and the Asian continents and Oceania have particular structured patterns of income levels. The overall income level in these regions indicates that the income level is largely driven by the geography income structure, which shows that income average levels.

Key Insights:

- The geographic map makes it easy to spot high-income (parts of the Americas) and low-income (parts of Africa and Asia) regions in agriculture instantly.
- The variation in income by region is essential to make it possible to focus and direct policy and investments in the regions where agriculture is performing the worse.
- Tooltips that compare large and small scale income within the same country adds contextual value to analysts trying to determine if a region's high income is coming from large commercial farms alone or if there is a significant smallholder contribution.

3.3.5 Average Productivity – Large Scale



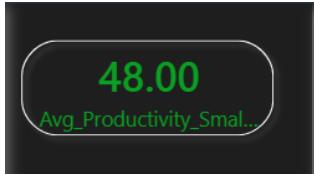
This indicator shows the average agricultural output that is produced per labor day by large-scale farms, using Purchasing Power Parity (PPP). This indicates the efficiency of large-scale farms in using labor.

A higher number stands for progress in terms of mechanization, technology use, as well as agricultural management practices, implying that large-scale agriculture is becoming more productive and more efficient.

DAX Measure

```
1 Avg_Productivity_LargeScale =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Productivity of large-scale food producers (agricultural output per labour day, PPP) (constant 2017 international $)"
6 )
7
```

3.3.6 Average Productivity – Small Scale



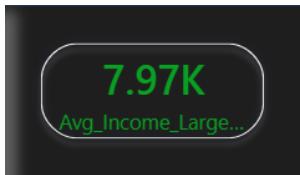
This measure reveals the average production per labor day of small-scale or smallholder cropping. This is important in portraying the measure of productivity of small farmers who are of utmost significance in the rural area.

This indicator is significant for evaluating rural livelihoods, food security, and the efficiency of support policies for smallholder agricultural systems.

DAX Measure

```
1 Avg_Productivity_SmallScale =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Productivity of small-scale food producers (agricultural output per labour day, PPP) (constant 2017 international $)"
6 )
7
```

3.7 Average Income – Large Scale



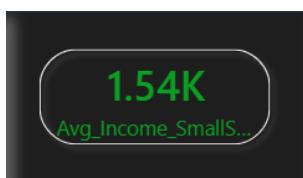
This indicator reflects the average income earned by large-scale agricultural producers in PPP-adjusted constant 2017 US\$. This is an indicator of the profitability and the financial viability of farming.

High income levels mean strong market access, economies of scale, and stable agricultural growth. It is, therefore, one of the critical indicators for measuring agriculture's contribution to national economic development.

DAX Measure

```
1 Avg_Income_LargeScale =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Average income of large-scale food producers, PPP (constant 2017 international $)"
6 )
7
```

3.3.8 Average Income – Small Scale



The measure of average income earned by small-scale agricultural producers. This is a key indicator related to the economic well-being of smallholder farmers.

Low income values may reflect several challenges, such as low market prices, limited access to inputs, or even policy constraints. Improvement in this indicator is necessary if there is to be SDG 2: Zero hunger: end hunger, achieve food security, and promote sustainable agriculture.

DAX Measure

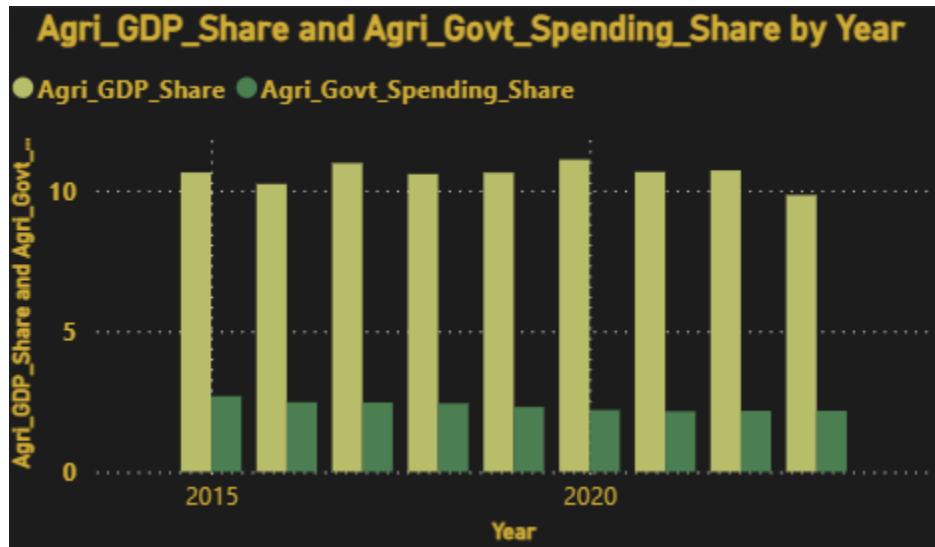
```
1 Avg_Income_SmallScale =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Average income of small-scale food producers, PPP (constant 2017 international $)"
6 )
7
```

3.4 Agricultural Economy & Policy Dashboard Overview



This dashboard offers a detailed analysis of the Agricultural Economy & Policy using five key visuals and one high-level card to render its contribution to the economy in regard to investment by the concerned government policies. This dashboard analysis is carried out using key indicators such as Agriculture GDP Share, Government Spending Share, and Agricultural Orientation Index, which make it possible for the user to understand that the investment by the concerned governments is in line with the significance of the agricultural sector, as positive policies imply positive productivity. These key visuals enable the user to compare Financial Government Supports (Export Subsidies, Official Flows), monitor trends over a certain time period, and obtain geospatial information about the distribution of agricultural investments by sensing slicers on select geospatial data.

3.4.1 GDP Share vs Government Spending(changes with country slicer)



The column chart, “Agri_GDP_Share and Agri_Govt_Spending_Share by Year,” is a comparator of the economic significance of the agricultural sector against the level of government policy commitment over time. It visualizes two key indicators for each year: the Agriculture Value Added Share of GDP (%) shown by light yellow-green bars, and the Agriculture Share of Government Expenditure (%) represented by dark green bars. In placing these measures side by side, the chart offers one the ability to assess whether government investment in agriculture is proportionate to the sector’s contribution to the national economy. A noticeable gap—where agriculture has contributed a high share to GDP but gets a relatively low share of government spending—highlights potential underinvestment or policy misalignment, suggesting that priorities in budgets may not reflect the full economic importance of agriculture. Contrastingly, a closer alignment among the two indicators reflects a more effective and balanced prioritizing of policies. An interactive country slicer complements analysis by providing the opportunity to explore these trends in different countries.

Key Insight

The most critical insight derived from this chart is the persistent, wide, and disproportionate gap between the agricultural sector's economic contribution and the government's financial support. Across the entire 2015-2023 period, the Agri_GDP_Share consistently exceeded 9.8% (peaking at 11.10% in 2020), yet the Agri_Govt_Spending_Share never rose above 2.69% (2015) and showed a slight overall decline. This stark difference—where the sector contributes roughly four to five times more to GDP than the government allocates in spending share clearly indicates a long-term pattern of underinvestment relative to the sector's economic importance.

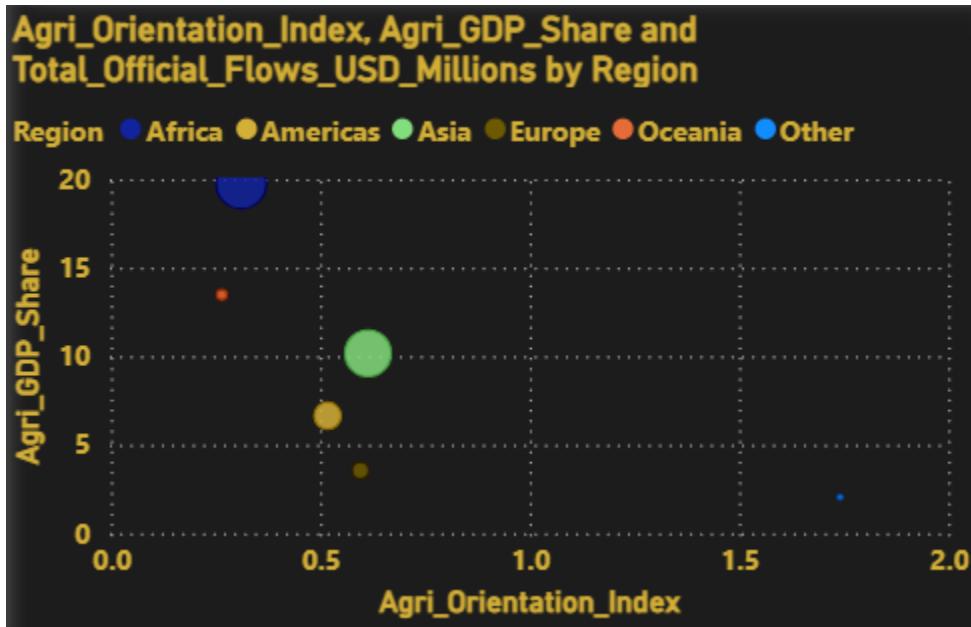
DAX Measures

The visualization relies on two separate DAX measures to calculate the average percentage for each indicator from the Fact_FoodData table, filtering on the specific Series Description values:

```
1 Agri_Govt_Spending_Share =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Agriculture share of Government Expenditure (%)"
6 )
7
```

```
1 Agri_GDP_Share =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Agriculture value added share of GDP (%)"
6 )
7
```

3.4.2 Orientation Index vs GDP Share



The most important observations that can be made by using this graph is the large disparity between the economic significance of the agricultural sector and the amount of funding it is getting from the government. During the total period of 2015-2023, the value of the Agri_GDP_Share remained above 9.8%, with the maximum contribution of 11.10% in 2020 itself, whereas the maximum percentage of the Agri_Govt_Spending_Share of 2.69% was witnessed in 2015, with a gradual decline in total percentage. This clearly reveals that funding is low despite the economic significance of the agricultural sector being approximately four to five times higher.

Key Insight

Evidence suggests that there is only weak, non-linear relationship between policy focus spend and economic indicators, with funding being more of a variable of interest:

- Africa is the most economically dependent on the agriculture sector (highest Agri_GDP_Share at 19.76%) and it is the most financially supported (\$51.79\$ billion). However, the policy commitment is relatively low (Agri_Orientation_Index at 0.31).

- Asia is economically significant (Agri_GDP_Share 10.17\%) and with a relatively strong policy orientation (0.61), it is the second most supported financially (\$43.82\$ billion).
- The Americas and Europe have higher policy orientation than Africa (0.52 and 0.60 respectively), but have agricultural sectors that contribute far less to the GDP (Share 6.64\% and 3.55\% respectively).

DAX Measures

The scatter chart utilizes three DAX measures to aggregate the indicators by region:

```

1 Agri_GDP_Share =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Agriculture value added share of GDP (%)"
6 )
7

```

```

1 Agri_Orientation_Index =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesCode] = "AG_PRD_ORTIND"
5 )
6

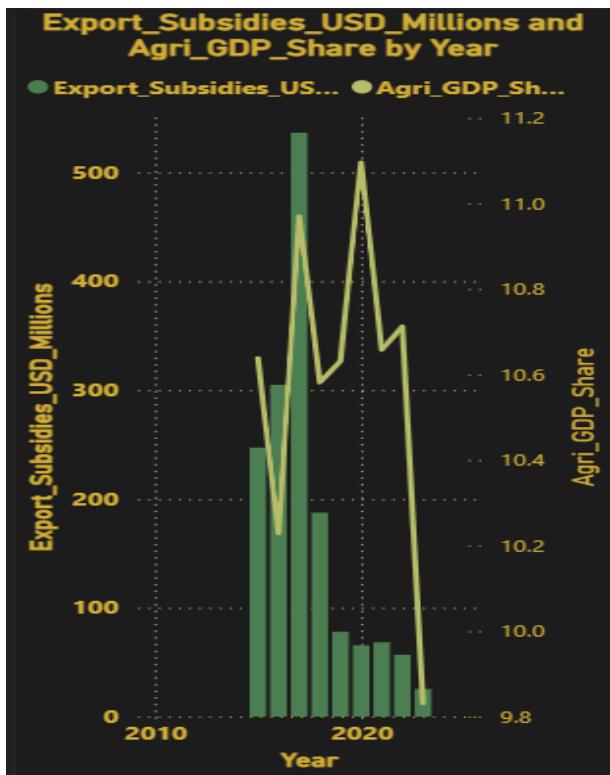
```

```

1 Total_Official_Flows_USD_Millions =
2 CALCULATE(
3     SUM(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Total official flows (disbursements) for agriculture, by recipient countries (millions of constant 2023 United States dollars)"
6 )
7

```

3.4.3 Export Subsidies vs GDP Share (changes with region slicer)



This combo chart is using a two-axis graphing approach that helps in analyzing the correlation between government export subsidy schemes and agricultural sector performance. This graph plots Agricultural Export Subsidies in green bars on the left axis, measured in terms of 'USD Millions,' with the Agriculture Value Added Share of GDP (%) plotted using a yellow line on the right axis. This graph facilitates the monitoring of both variables together in order to evaluate if any positive correlation between agricultural export subsidy support levels and agricultural contributions to GDP is evident. This approach offers significant support for determining the effectiveness of export-oriented interventions by monitoring the correlation between trends in agricultural export subsidy support levels, as shown by peak levels for both variables. Furthermore, it is beneficial to note that an interactive region slicer is also utilized for more effective policy analysis.

Key Insight

The strong correlation, and subsequently, the total decoupling between export subsidies and GDP contribution of the agriculture sector is most revealing:

- Strong Correlation (2015-2018): Amid high export subsidies (\$187.36 million to \$536.40 million) during the period, the Agri_GDP_Share was high, and stable at 10.23% - 10.97%. The highest subsidy was \$536.40M in 2017, which was at a high GDP share of 10.97%.
- Decoupling (2019-2023): Following 2018, there was a drastic decline in export subsidy support, and by 2023, it reached a meager amount of \$25.37 million. Notably, even as there was a substantial decline in financial support, the Agri_GDP_Share did not fall but continued and even reached a high of 11.10% in 2020, when export subsidy support was almost at its lowest point of \$65.45 million.

DAX Measures

The visualization requires two DAX measures to aggregate the distinct financial and economic indicators:

```
1 Agri_GDP_Share =
2 CALCULATE(
3     AVERAGE(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Agriculture value added share of GDP (%)"
6 )
7
```

```
1 Export_Subsidies_USD_Millions =
2 CALCULATE(
3     SUM(Fact_FoodData[Value]),
4     Fact_FoodData[SeriesDescription] =
5         "Agricultural export subsidies (millions of current United States dollars)"
6 )
7
```

3.4.4 Agricultural Expenditure by Country (changes with country and year slicer)



This filled map shows the spending on agriculture in a geospatial manner, allowing the user to make a quick and intuitive evaluation of government commitment to the agricultural sector across nations. Color intensity is utilized to show Agriculture Share of Total Government Expenditure (%). Used in tandem with the Agriculture GDP Share indicator, this map will help reveal whether public spending is proportionate with the sector's economic importance. The deeper shades in countries reflect stronger policy prioritization through higher expenditure shares, while lightly shaded countries may indicate potential policy gaps-particularly where agriculture contributes a great deal to national GDP. In addition, the presence of interactive country and year slicers further enhances this analysis by enabling the user to explore how funding patterns of agriculture change through time and across different regions.

Key Insight

The map's primary key insight lies in its ability to immediately highlight geographical policy gaps and variations in government prioritization. By visualizing the Agriculture Govt Spending Share across the globe, the map quickly reveals which countries or regions are dedicating a larger portion of their budget to agriculture, and conversely, which are not. When this is mentally contrasted with the knowledge of the sector's economic importance (GDP Share), the map serves as an effective diagnostic tool to identify regions with the most severe underinvestment relative to the sector's proven economic contribution.

3.4.5 Agri orientation index Over Years(changes with country slicer)



This line graph presents the development of the Agricultural Orientation Index for the years 2015 to 2023, allowing for effective observation of agricultural policy concerns over the years. Using this graph to plot the Agri_Orientation_Index for each year, it is easier to monitor the development of agricultural policy concerns over time. An upward trend on this graph indicates that in the respective years, more agricultural concerns were taken into consideration by governments through their respective agricultural policies. A downward trend, on the other hand, indicates that in such years, little attention or progress was involved in agricultural concerns or that agricultural policy re-orientation occurred. Additionally, using an interactive country filter allows for more agricultural policy analysis by allowing various national agricultural policy concerns to be observed.

Key Insight

What emerges from the data is that the Agricultural Orientation Index was characterized by strong fluctuations, as well as an evident trend of weakening, through the discernible drop in policy support in a crucial year:

- Initial Volatility (2015-2019): Volatility showed fluctuations with values ranging from 0.53 in 2015, then slightly dropping to 0.49 for 2017, then rising back to 0.53 for 2018. This can indicate the inconsistency of policy or policy support for the agricultural sector coinciding with the year considerations for the initial five.

- Sharpest Fall (2019-2020): In this scenario, the sharpest fall in the index is observed. The value fell significantly from 0.51 in 2019 to a record low of 0.45. This indicates a profound change in the drift away from the agricultural sector around the year 2020. The index partially recovered to 0.51 in 2022 but again dropped to 0.49.

3.4.6 Total Official Flows (USD Millions)



This card provides a graphical representation of one type of aggregated data: Total Official Flows that are channeled into the agricultural sector, in millions of U.S. dollars. This card immediately reveals the total amount of financial support both from outside and within the country that is allocated for agricultural growth. It is set up to provide a big, prominent numerical figure that helps the user quickly understand the amount of investment channeled into the sector. Though it is fixed with a current value of \$3.70K for the current filter setting applied, the card is fully interactive, automatically updating with any changes made to the slicers for country or year. This helps the user make comparisons between various countries and years to better evaluate the relationship between any type of support given to the agricultural sector.

Key Insight

The immediate quantification of investment magnitude is the key insight. The card gives a quick, high-level snapshot of the financial commitment—in other words, a starting point for investment analysis. Via manipulation of the country and year slicers, the following can be easily observed:

- Peak Funding Years: What years accounted for the highest amount of official financial flows.

- Top Recipient Countries: Which countries have the most significant external and domestic financial support.

This aggregated funding for the regional view captured in the scatter chart means that regions like Africa, which got funding of \$51,790.60\$ million, and Asia, with \$43,817.56\$ million, have the largest bubble sizes in that visualization. The card offers the total sum that is distributed across these regions.

3.5 Slicers and filter pane

It should be noted that the analytical abilities of the dashboard are considerably enhanced with the incorporation of interactive slicers and Filter Panes, which enable the application of dynamic filtering on the data with regard to time or geographic areas.

1. Slicer: Year Selection

A critical component of this ability is the “Year Selection” slicer, which impacts almost all the visuals related to various indicators like dietary diversity, child malnutrition, and anemia. It works by filtering all the visuals for the year or years selected by the user. This slicer is enabled by the following DAX query:

```
1 Year =  
2 DISTINCT(SELECTCOLUMNS(Fact_FoodData, "Year", Fact_FoodData[TimePeriod]))  
3
```

which allows the user to select only the distinct list of years that are available in the data set. A critical aspect of this slicer is that it helps the user to make dynamic comparisons related to various indicators over time.

2. Slicer: Geographic Area Selection (Geo)

The other slicer is the Geographic Area Selection (Geo) slicer, which allows for geospecific analysis by filtering any graph on a dashboard by selected countries or geographic areas. It is primarily utilized to filter data on the selected geographic areas. This slicer is created from the DAX formula:

```
1 Geo =  
2 DISTINCT(SELECTCOLUMNS(Fact_FoodData, "GeoAreaName", Fact_FoodData[GeoAreaName]))  
3
```

which returns a distinct list of geographic areas that are contained in the data. This feature is used to investigate geographic differences in key indicators, among other things. It is of importance since it allows for an analysis of the differences in key indicators in various geographic areas.

3. Filter Pane Bookmark: Interactive Filtering for the Dashboard

Filter Pane Bookmark: This bookmark is intended to improve the dashboard interactivity features by allowing for centralized and dynamic control of filter options. This filter option allows users to toggle the filter pane opened or closed dynamically, allowing for the application of any required filters before maximizing the space for in-depth analysis. This filter pane allows for dynamic filtering using year, region, or country (Geo) filters, which support dynamic analysis of both temporal and geographic data. This bookmark significantly enhances the user experience by allowing for personalized analysis through dynamic filter options.

4. Conclusion

This project demonstrated how the application of advanced data engineering and business intelligence methods was used to monitor global progress towards Sustainable Development Goal 2 (Zero Hunger), by using official United Nations SDG data from 2015 to 2025. Integration of SQL Server for data preparation and Microsoft Power BI for modeling and visualization will transform complex multi-dimensional indicators about food security, nutrition, agricultural productivity, income, and policy commitment into meaningful interactive insights.

According to the analysis, there were vast differences in the progress towards Zero Hunger: whereas in some regions and countries progress is firm in terms of momentum on the implementation of sustainable agricultural practices and investment growth, for others the challenges on the ground persist regarding child malnutrition, food insecurity, low dietary diversity, and high prevalence of anaemia among women and children. Stunting, the most prevalent form of child undernutrition at global level, elucidates chronic nutritional deficiencies among vulnerable populations.

The results of this study, from an economic and policy perspective, clearly indicate a systematic misalignment between the two: agriculture's contribution to GDP, and government expenditure on the sector. Though still an important determining factor in most economies, especially in developing countries, the level of public investment and focus is uncomparatively low. There still exists a disparity in the level of productivity and income between large-scale and small-scale producers, thus underlining the structural disparity that undermines the capacity of farmers on a smaller scale to make a meaningful contribution towards food security.

This project's dashboards allow stakeholders to dynamically explore, in depth, various trends over time, geography, and population groupings. Enhanced depth of analytics is delivered through advanced DAX measures and star-schema data modeling and interactive slicers that will make the solution relevant for application by policymakers, researchers, and development agencies in search of evidence-based decision-making functionalities.

This research indicates that there has been a trend and momentum in the pursuit of target 2 on the SDGs, but there is not adequate performance to meet the zero hunger target by the year 2030. The fulfilment of target two of the SDGs requires improved policy alignment, higher investments in agriculture, and a focus on nutrition and small farmers.