

FINAL PROJECT REPORT

GLOBAL MALNUTRITION TRENDS : A POWER BI ANALYSIS (1983 - 2019)

1. INTRODUCTION

1.1 PROJECT OVERVIEW

This project focuses on analyzing global malnutrition trends among children under the age of five using Power BI, with data sourced from UNICEF, WHO, and the World Bank. The dataset, spanning from 1983 to 2019, includes key health indicators such as underweight, overweight, and stunting rates, along with income classifications for different countries. By transforming this large-scale data into interactive visualizations, the project aims to uncover the relationship between economic status and malnutrition, identify countries most affected by these issues, and provide stakeholders with meaningful insights to support evidence-based decisions and targeted interventions for improving child health outcomes.

1.2 OBJECTIVES

The main objective of this project is to develop an interactive Power BI dashboard that visually represents global malnutrition trends among children under the age of five. By analyzing key indicators such as underweight, overweight, and stunting rates in relation to income classifications, the project aims to help stakeholders identify high-risk countries and regions. The dashboard is designed to make complex data easy to interpret, enabling policymakers, health organizations, and researchers to draw actionable insights, understand the economic influence on malnutrition, and support targeted interventions that improve child health outcomes globally.

2. PROJECT INITIALIZATION AND PLANNING PHASE

2.1 DEFINE PROBLEM STATEMENT

Malnutrition among children under five remains a persistent global health challenge, disproportionately affecting low and middle-income countries. Despite the availability of large-scale data from reliable organizations like UNICEF, WHO, and the World Bank, there is a lack of accessible, visual, and interactive tools to analyze and interpret this information effectively. Without clear insights into how malnutrition trends vary across countries and economic groups, policymakers and health organizations face difficulties in identifying high-risk regions, understanding the economic impact on child health, and implementing targeted interventions. This project addresses the need for an interactive visualization solution that makes complex malnutrition data easier to explore, compare, and act upon.

Customer Problem Statement Template				
I am	I'm trying to	But	Because	Which makes me feel
a government health official or policy maker.	identify which regions and income groups are most affected by child malnutrition and decide where to allocate funds.	I can't easily interpret static reports or spreadsheets filled with scattered malnutrition data.	they lack interactive visuals, summarized trends, and income-based segmentation.	overwhelmed, frustrated, and worried that I may make the wrong decision.

Customer Problem Statement Template				
I am	I'm trying to	But	Because	Which makes me feel
a data analyst working for a global NGO focused on childhood nutrition.	track malnutrition trends over time and understand how income levels impact conditions like stunting, underweight, and overweight.	I don't have an easy way to filter or compare country-wise data across decades in one place.	raw datasets are large, inconsistent, and not presented in a user-friendly dashboard.	inefficient, unproductive, and unsure if I'm drawing the right conclusions.

2.2 PROJECT PROPOSAL (PROPOSED SOLUTION)

The proposed solution is to create an interactive Power BI dashboard that visualizes global malnutrition data across income classifications and countries, enabling users to explore trends, compare regions, and derive actionable insights for better health outcomes.

Project Overview	
Objective	The project aims to analyze global malnutrition trends among children under five from 1983 to 2019 using Power BI. It focuses on visualizing underweight, overweight, and stunting rates to derive actionable insights.
Scope	This project focuses on analyzing historical malnutrition data (1983–2019) for children under five using Power BI. It covers data collection, cleaning, visualization, and dashboard development. The project excludes real-time data, predictive modeling, AI-driven forecasts, and mobile or web development beyond the Power BI platform.
Problem Statement	
Description	Child malnutrition remains a significant global health issue, with millions affected by underweight, overweight, and stunting. Current raw datasets lack interactive, visual insights, making it difficult for stakeholders to understand trends across countries and income groups, delaying informed decision-making.
Impact	By providing clear, interactive visualizations through Power BI, this project enables stakeholders to identify high-risk regions, prioritize interventions, and allocate resources effectively. Improved data understanding can directly contribute to reducing malnutrition rates and improving child health outcomes globally.
Proposed Solution	
Approach	The project follows a structured methodology involving data collection from trusted sources (UNICEF/WHO/World Bank), data cleaning and categorization, followed by designing interactive Power BI dashboards. Techniques include handling missing values, segmenting data by income levels, and creating visualizations such as

	line charts, stacked columns, ribbon charts, and KPI cards
Key Features	The project offers an interactive Power BI dashboard showcasing global malnutrition trends from 1983 to 2019. It includes visual comparisons by income groups, country-wise filters, dynamic charts, KPI indicators, and clear insights to support data-driven decision-making for reducing child malnutrition.

Resource Requirements

Resource Type	Description	Specification/Allocation
Hardware		
Computing Resources	Dell Inspiron 14 Laptop	Intel i3 processor, 4 cores
Memory	RAM specifications	8 GB RAM
Storage	Disk space for data, models, and logs	512 GB SSD
Software		
Frameworks	N/A	-
Libraries	DAX	Built into Power BI
Development Environment	BI Tools	Power BI Desktop
Data		
Data	Source, size, format	Kaggle dataset, Approximately 343 million survey records; summarized to 924 under-five data points, CSV/Excel files.

2.3 INITIAL PROJECT PLANNING

Sprint	Functional Requirement (Epic)	User Story Number	User Story / Task	Story Points	Priority	Team Members	Sprint Start Date	Sprint End Date (Planned)
Sprint-1	Data Collection	USN-1	Collect relevant data	1	High	Chaitra V	18 june 2025	18 june 2025
		USN-2	Load data to power bi	2	High	Chaitra V	18 june 2025	18 june 2025
Sprint-1	Data Preparation	USN-3	Handle missing values	3	High	Chaitra V	19 june 2025	19 june 2025
		USN-4	Split/Merge fields	3	Medium	Chaitra V	19 june 2025	19 june 2025
Sprint-1	Data visualization	USN-5	Build cards	2	Medium	Chaitra V	20 june 2025	20 june 2025
		USN-6	Underweight/Overweight visuals	5	High	Chaitra V	20 june 2025	20 june 2025
		USN-7	Stunting vs income charts	3	High	Chaitra V	20 june 2025	20 june 2025
Sprint-2	Dashboard Creation	USN-8	Add filters	2	Medium	Chaitra V	21 june 2025	22 june 2025
		USN-9	Design Layout	3	Medium	Chaitra V	22 june 2025	22 june 2025
Sprint-2	Reporting and documentation	USN-10	Create report page	3	High	Chaitra V	22 june 2025	23 june 2025
		USN-11	Record video	5	High	Chaitra V	23 june 2025	23 june 2025
		USN-12	Write documentation	3	High	Chaitra V	24 june 2025	25 june 2025

3. DATA COLLECTION AND PREPROCESSING PHASE

3.1 DATA COLLECTION PLAN & RAW DATA SOURCES IDENTIFICATION

- DATA COLLECTION PLAN

Section	Description
Project Overview	This project focuses on analyzing global malnutrition trends among children under five from 1983 to 2019 using Power BI. The objective is to visualize underweight, overweight, and stunting rates across countries and income classifications to help stakeholders derive actionable insights for reducing malnutrition.
Data Collection Plan	The data for this project is collected from globally recognized sources including UNICEF, WHO, and the World Bank. These organizations provide reliable, large-scale datasets on malnutrition and child health indicators that are publicly accessible and suitable for comprehensive analysis.
Raw Data Sources Identified	The raw data for this project is collected from UNICEF's global malnutrition database, WHO health statistics, and World Bank income classifications, providing reliable information on underweight, overweight, stunting, wasting rates, and economic groupings of countries worldwide

- **RAW DATA SOURCES**

Source Name	Description	Location/URL	Format	Size	Access Permissions
Kaggle - Malnutrition across the globe	Contains global malnutrition statistics (stunting, wasting, underweight) for multiple countries and years (1983-2019). Suitable for direct import and analysis in Power BI.	Malnutrition across the globe	CSV	~ 1MB	Public (kaggle login required)

3.2 DATA QUALITY REPORT

Data Source	Data Quality Issue	Severity	Resolution Plan
Kaggle Dataset	Missing values in key fields like malnutrition rates or income classification	Moderate	Handled missing values by removing incomplete records or applying conditional filters in Power Query to exclude nulls from analysis.

Kaggle Dataset	Inconsistent data types	Moderate	Converted all data types using power query to ensure numerical fields are properly formatted
Kaggle Dataset	Large dataset with multiple survey records causing performance lag	Moderate	Applied data reduction techniques like filtering unnecessary columns and summarizing records within Power BI to improve dashboard performance.
Kaggle Dataset	Duplicate records present in raw data	Low	Removed duplicates using Power Query's "Remove Duplicates" feature to maintain dataset integrity.

3.3 DATA EXPLORATION AND PREPROCESSING

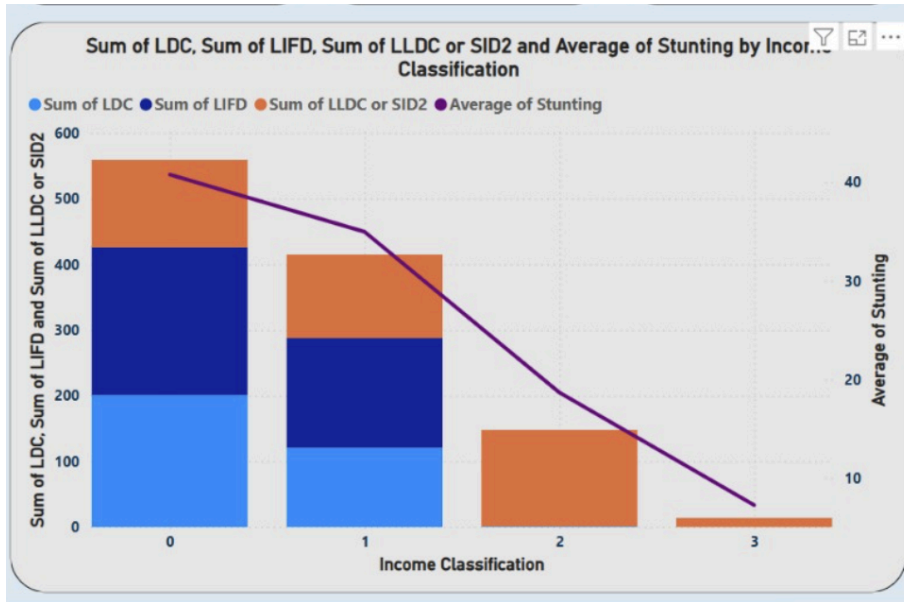
Section	Description
Data Overview	The dataset was obtained from reliable sources including UNICEF, WHO, and the World Bank, containing detailed malnutrition statistics for children under the age of five between 1983 and 2019, covering indicators such as underweight, overweight, stunting, wasting, and income classifications globally.
Data Cleaning	Data cleaning was essential to ensure accuracy by removing duplicate records, correcting data entry errors, and handling missing values, thereby preparing the dataset for smooth

	analysis and avoiding misinterpretations that could arise from incomplete or incorrect information.
Data Transformation	Power Query was utilized extensively for transforming the data, including filtering out irrelevant entries, sorting the dataset based on income classifications and country, creating calculated columns for additional insights, and pivoting data structures to make trend identification and analysis easier.
Data Type Conversion	Data type conversion was carried out to ensure consistency across the dataset by rectifying mismatches, such as converting year columns to numerical format and appropriately formatting text, numeric, and categorical fields, which is crucial for accurate calculations and visualizations.
Column Splitting and Merging	Column splitting and merging were performed where necessary to reorganize the dataset, such as separating combined fields for clearer filtering or merging relevant columns to simplify analysis and enhance the usability of the dataset within Power BI.
Data Modeling	Data modeling was conducted by defining logical relationships between tables and fields, ensuring seamless connections between country, income group, malnutrition indicators, and survey data, along with creating calculated measures that enable accurate, dynamic visualizations and insights within the Power BI environment.
Save Processed Data	The cleaned, transformed, and modeled dataset was saved in multiple formats, including <code>.pbix</code> for Power BI dashboards and <code>.xlsx</code> for raw data reference, ensuring the data remains accessible, reusable, and ready for future analysis or project demonstrations.

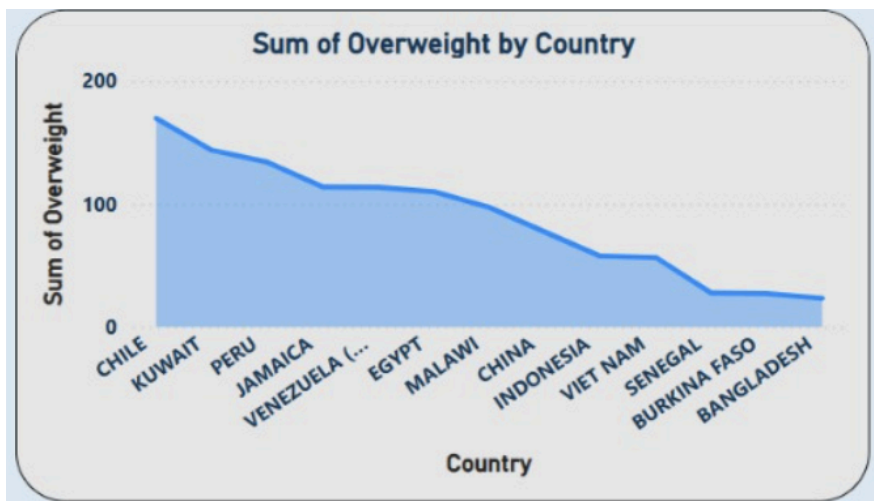
4.DATA VISUALIZATION

4.1 FRAMING BUSINESS QUESTIONS

1. What are the malnutrition trends across income classifications?
 - o *Visualization:* Line and Stacked Column chart showing stunting rates by income groups (Low, Lower-Middle, Upper-Middle, High)



2. Which countries report the highest number of overweight children?
 - o *Visualization:* Stacked Area Chart showing overweight trends by country, highlighting Chile as the outlier with over 167 cases.



3. What is the overall count of under-five population records in the dataset?

- o *Visualization:* Card showing the total count of 924 under-five population records.



4. How many total survey samples were collected globally?

- o *Visualization:* Card displaying the sum of survey samples, approximately 343 million.



5. What is the total number of underweight cases reported?

- o *Visualization:* Card showing the total of 14,290 underweight children globally.



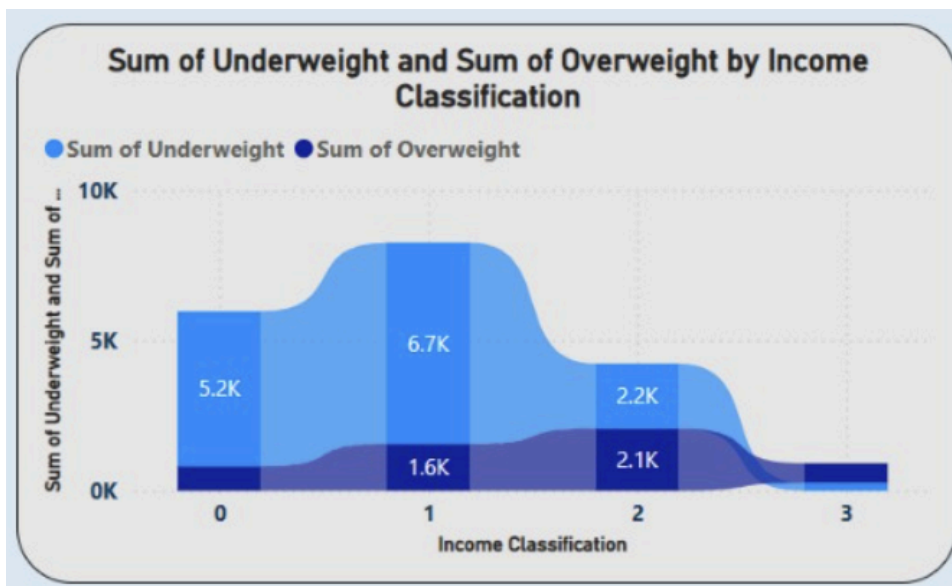
6. Which income classification group reports the highest overweight population?

- o *Visualization: Ribbon Chart* highlighting that the second income classification group has the highest overweight population with 6,700 cases.



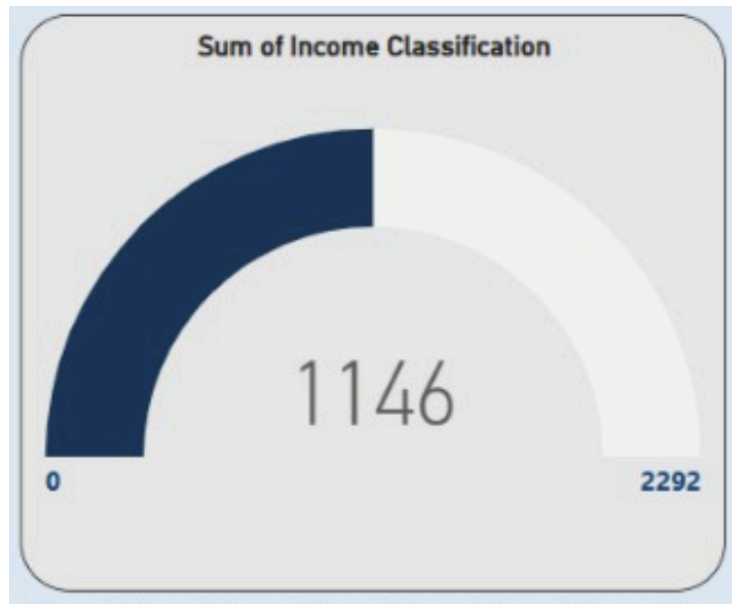
7. What is the comparative distribution of overweight and underweight populations across income groups?

- o *Visualization: Ribbon Chart* comparing underweight and overweight trends as income levels change.



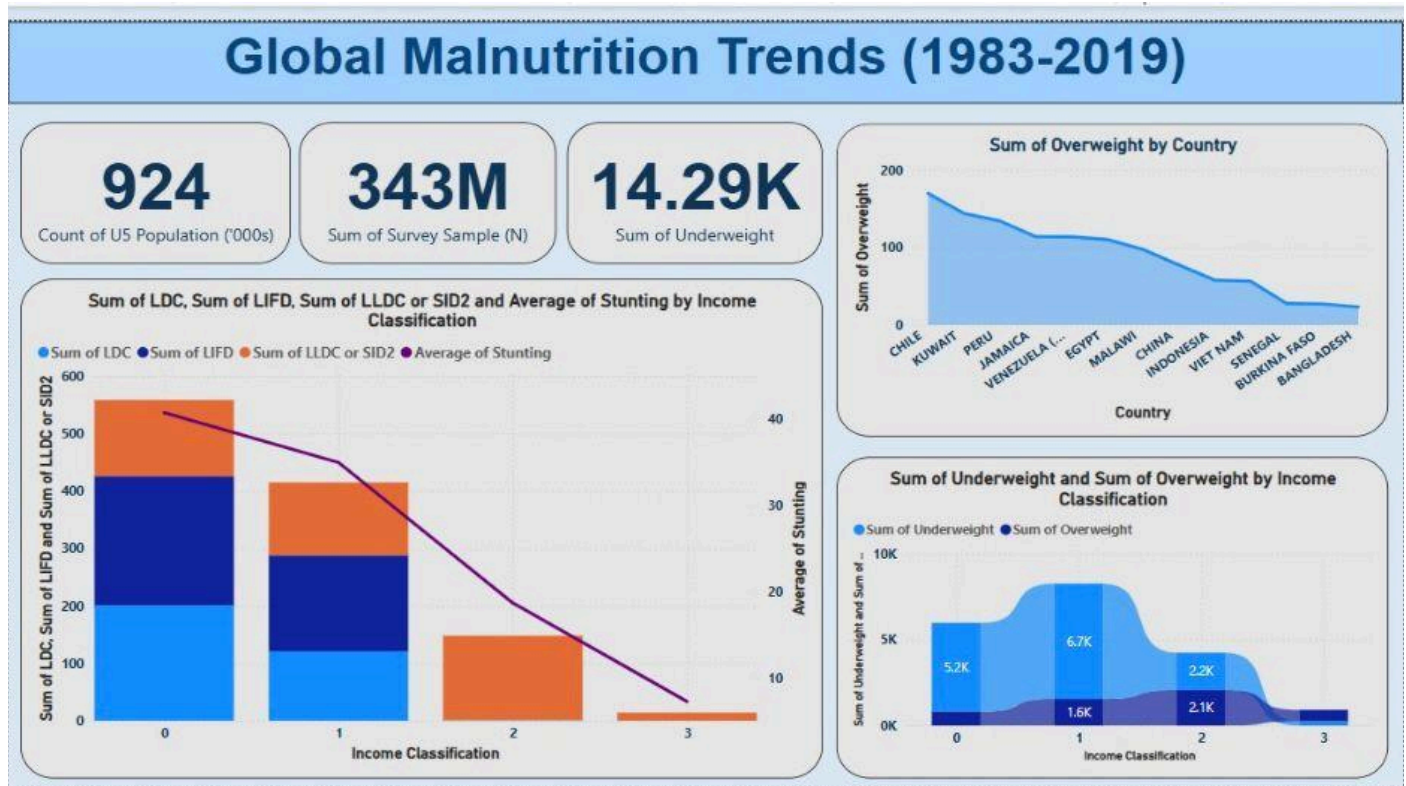
8. What is the sum of income classifications across the dataset?

- o *Visualization:* **Gauge Card** showing the total income classification sum of 1,146 across all records.



5. DASHBOARD

5.1 DASHBOARD DESIGN



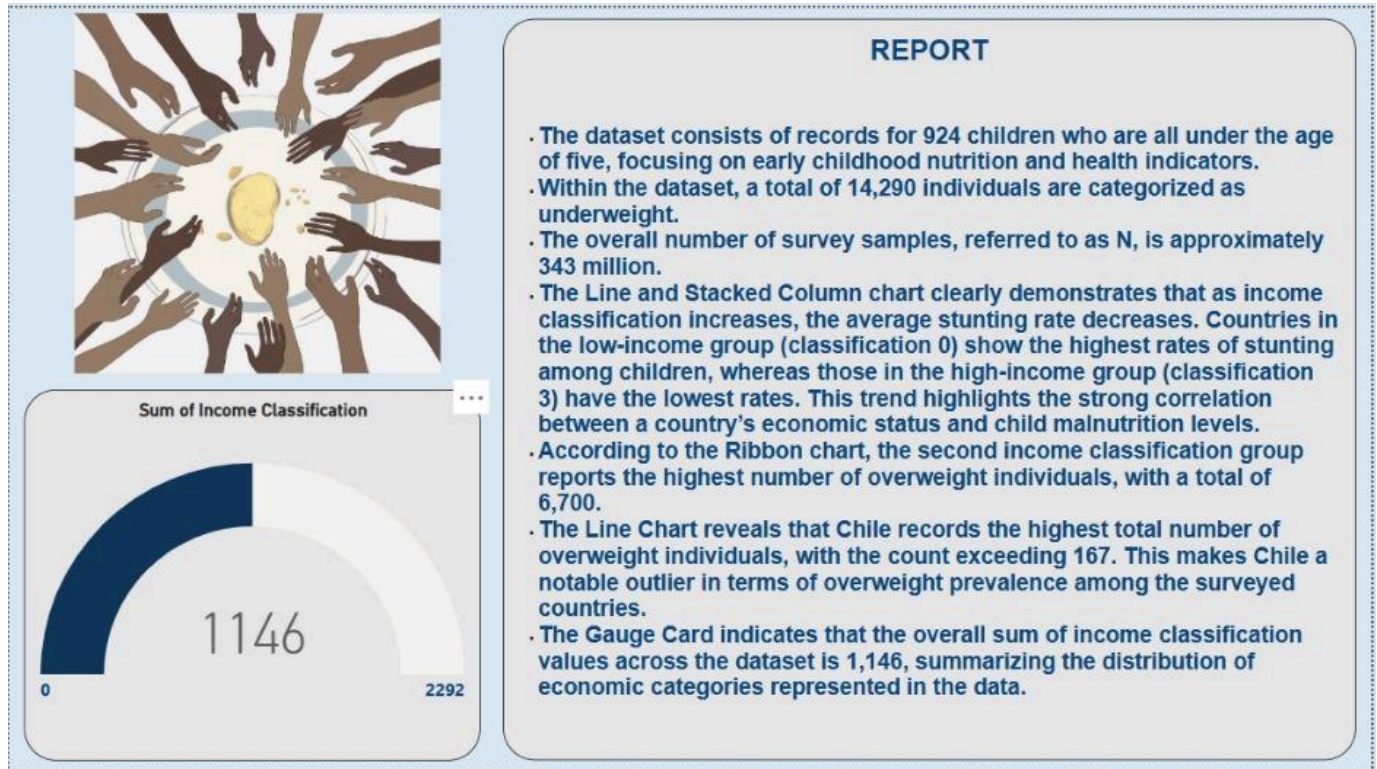
Here are five potential outcomes from the dashboard image provided:

1. The dataset includes **343 million survey samples**, providing a large-scale foundation for global malnutrition analysis.
2. There are **14,290 underweight cases** identified, highlighting the severe undernutrition issue among children under five.
3. The **Line and Stacked Column Chart** shows that stunting rates significantly decrease as income classification increases.

4. **Chile** recorded the highest number of overweight cases, exceeding **167**, making it a major outlier in global comparisons.
5. The **Ribbon Chart** indicates that the second income group (middle-income countries) has the highest overweight population, with **6,700** cases reported

6.REPORT

6.1 REPORT DESIGN



1. Underweight Cases Distribution:

The dataset reveals that a total of 14,290 underweight cases were recorded globally, highlighting undernutrition as a major concern among children under five, especially in low-income regions

2. Overweight Population by Income Group:

The second income classification group reports the highest overweight cases at 6,700, showing a significant overweight burden in middle-income countries, suggesting the dual challenge of undernutrition and obesity as economies transition.

3. Country-Level Outlier:

Chile shows the highest number of overweight cases, exceeding 167, making it a global outlier and highlighting the need for targeted health policies addressing childhood overweight issues in specific regions.

4. Economic Status vs. Stunting:

The Line and Stacked Column Chart illustrates that as income classification improves, average stunting rates drop significantly, confirming the strong correlation between economic development and improved child nutrition outcomes.

5. Total Survey Scale:

With over 343 million survey samples collected, the dataset provides a large-scale foundation for meaningful trend analysis across countries, ensuring reliable insights for policy-making and intervention strategies.

7. PERFORMANCE TESTING

7.1 UTILIZATION OF DATA FILTERS

Filters and Slicers used:

- Country Slicer — allows users to select one or multiple countries to view their indicators.
- Year Slicer - filters visuals to show trends for a selected year or time range.
- Top N Filters — used in visuals to show the Top 10 countries for highest or lowest malnutrition rates (e.g., Top 10 by stunting).
- Indicator-Based Filters — some visuals were built using filtered fields (e.g., only stunting or only overweight).

7.2 NUMBER OF CALCULATED FIELDS(DAX MEASURES)

1. Total Underweight Cases
2. Total Overweight Cases
3. Total Stunting Cases
4. Average Stunting by Income Group
5. Total Survey Samples
6. Total Under-Five Population Count
7. Overweight % of Total Population
8. Total Income Classification Sum
9. Overweight by Income Group (Dynamic Measure)

7.3 NUMBER OF VISUALIZATIONS

1. KPI Card – Total Under-Five Population Count
2. KPI Card – Total Survey Samples
3. KPI Card – Total Underweight Cases
4. Line and Stacked Column Chart – Stunting Trends by Income Classification
5. Stacked Area Chart – Overweight Population by Country
6. Ribbon Chart – Overweight Cases by Income Classification
7. Gauge Card – Total Income Classification Sum

8.CONCLUSION

The Power BI dashboard developed for this project provides meaningful insights into global malnutrition trends among children under the age of five. The visual analysis clearly highlights the correlation between economic status and malnutrition indicators such as underweight, overweight, and stunting rates. It is observed that countries in lower income groups face higher rates of undernutrition and stunting, while middle-income countries show a noticeable rise in overweight prevalence among children. Chile stands out as an outlier with the highest overweight cases in the dataset. Overall, the project demonstrates how economic development can significantly influence child health outcomes and emphasizes the importance of targeted interventions to address malnutrition in vulnerable regions.

9. FUTURE SCOPE

The current project provides a strong foundation for understanding global malnutrition trends, but there is significant potential for future enhancements. Incorporating additional indicators such as severe wasting, micronutrient deficiencies, and access to healthcare services could provide a more comprehensive view of child health. Integrating real-time data sources would enable continuous monitoring and faster response to emerging malnutrition risks. Furthermore, predictive analytics and machine learning models can be added to forecast future trends and identify high-risk regions proactively. Expanding the dashboard to include interactive maps and country-specific drill-down reports will further support policymakers and health organizations in making targeted, data-driven decisions to reduce global malnutrition.

10. APPENDIX

1. Github :

<https://github.com/vchaitra2005/malnutrition-global-trends.git>

2. Project demo:

<https://drive.google.com/file/d/1J1sRICwd9lYzIKKLlxuA8UkifsMhrhfh/view?usp=sharing>