Global Malnutrition Trends:
A Power BI Analysis (1983-2019)

Project Report

1. Introduction:

1.1 Project overviews:

ABC Company is undertaking an in-depth analysis of global malnutrition trends from 1983 to 2019 to better understand the prevalence and distribution of various forms of malnutrition among children under five years of age. Utilizing a comprehensive dataset from UNICEF/WHO/World Bank, the project aims to analyze severe wasting, wasting, stunting, underweight, and overweight conditions across different countries. By classifying countries according to their income levels (low, lower-middle, upper-middle, and high income) and other categories such as Least Developed Countries (LDC), Low Income Food Deficient (LIFD), Land Locked Developing Countries (LLDC), and Small Island Developing States (SIDS), the project seeks to uncover correlations between economic status and malnutrition rates. Through the use of advanced data visualization techniques in Power BI, including stacked bar charts and line charts, ABC Company aims to generate actionable insights that can guide policy-making and resource allocation to combat child malnutrition effectively.

Malnutrition remains a critical global health issue, with children in lower-income countries disproportionately affected. ABC Company aims to address the challenge of identifying key patterns and trends in child malnutrition data over several decades. The primary problem is to determine how various forms of malnutrition correlate with economic and geographical classifications of countries, and to identify which countries and regions are most affected. By leveraging historical data, the project will highlight areas needing urgent attention and support, helping stakeholders to prioritize interventions and strategies for reducing malnutrition and its associated health risks among children under five. This analysis is crucial for developing targeted, data-driven solutions to improve child health outcomes worldwide.

1.2 Objectives:

The primary objective of this project is to conduct a comprehensive analysis of global malnutrition trends among children under five years of age from 1983 to 2019. By utilizing authoritative data from UNICEF, WHO, and the World Bank, the study aims to examine the prevalence of key malnutrition indicators like severe wasting, wasting, stunting, underweight, and overweight across various countries and regions. A central goal is to assess how these forms of malnutrition correlate with income classifications (low, lower-middle, upper-middle, and high income) and special country groupings such as LDCs, LIFDs, LLDCs, and SIDS. Additionally, the project seeks to identify geographic and economic disparities in child malnutrition and provide evidence-based insights to inform policy, improve resource allocation, and support global efforts to combat undernutrition and overnutrition. Through dynamic Power BI

visualizations, the project aims to present these findings in a clear and actionable format, empowering stakeholders to make informed decisions to enhance child health outcomes globally.

2. Project Initialization and Planning Phase:

2.1. Define Problem Statement:

I am a global health policymaker and I am trying to understand how income levels affect child malnutrition but I can't interpret the data clearly because it's scattered across countries, years and other classifications which makes me feel uncertain about effective decision-making.

A health organization is trying to identify countries that need urgent intervention for child malnutrition but it's hard to detect trends in raw datasets because the data lacks effective visualizations which makes them feel confused and unable to prioritize.

2.2. Project Proposal (Proposed Solution):

The project uses Power BI to process and visualize the dataset. Tasks include:
- Data collection and import
- Cleaning and transforming data
- Creating visualizations such as stacked bar charts, ribbon charts, and line charts
- Analyzing trends by income classification and region
- Interpreting visual insights for policy recommendations

Key Features:
- Analysis of underweight, overweight, and stunting trends by income and geography
- Visual comparisons using charts like ribbons and bar graphs
- Identification of high-risk countries
- Data-driven insights to support targeted policy-making

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 & Loading	USN-1	Collect and import datasets into Power BI	1	High	Tanmayee	20-6-24	20-6-24
Sprint-1	Data Cleaning	USN-2	Handle missing values	2	High	Tanmayee	20-6-24	20-6-24
Sprint-1	Data Integration	USN-3	Merge datasets	2	High	Tanmayee	20-6-24	20-6-24
Sprint-1	Data Preparation	USN-4	Handle datasets and perform data type conversions	2	High	Tanmayee	20-6-24	20-6-24
Sprint-2	Dashboard & Report Development	USN-5	Make dashboard and report visualizations in Power BI	3	High	Tanmayee	21-6-24	22-6-24

3. Data Collection and Preprocessing Phase:

3.1. Data Collection Plan and Raw Data Sources Identified:

Section	Description
Project Overview	To analyze global malnutrition trends from 1983 to 2019 among children under five years of age using Power BI, and to generate actionable insights for policy-making and resource allocation based on economic and geographic classifications of countries.
Data Collection Plan	The datasets are collected from Kaggle
Raw Data Sources Identified	country-wise-average.csv: Contains country wise values along with under five population, income classification, and other data malnutrition-estimates.csv: Contains UNICEF/WHO/World Bank joint child malnutrition estimates (country level)

3.2. Data Quality Report:

Data Source	Data Quality Issue	Severity	Resolution Plan
Dataset	Mention the issues faced in the selected dataset.	Low/ Moderate / High	Give the solution for that issue technically.
malnutrition-estimates.csv	the survey samples column was showing error null values in the columns	Moderate	Removed the survey samples column completely Removed null values
country-wise-average.csv	Null values in the columns	Moderate	Removed null values

3.3. Data Exploration and Preprocessing:

Section	Description
Data Overview	malnutrition-estimates.csv: contains detailed malnutrition indicators (severe wasting, wasting, stunting, underweight, overweight) and it includes under five populations within countries. country-wise-average.csv: gives the same indicators with countries and gives more data.
Data Cleaning	Handled missing values and corrected formatting inconsistencies in both datasets.
Data Transformation	Used Power Query to correct data types, and remove null values in the datasets.
Data Type Conversion	Converted columns as needed to fixed decimal number, percentage, decimal number, etc.
Column Splitting and Merging	Columns were not splitted or merged.
Data Modeling	Both datasets were joined together using the Country column which is a common measure for both.
Save Processed Data	Saved the cleaned and processed data for future use.

4. Data Visualization:

4.1. Framing Business Questions:

4.2. Developing Visualizations:

1. **What is the total under-five population surveyed globally?**
- *Visualization*: Card showing count of U5 Population ('000s)
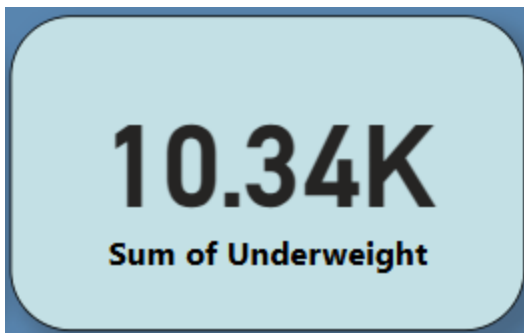- *Screenshot of visualisation*

2. What is the total under-five population surveyed globally?

- *Visualization*: Card displaying total Survey Sample (N)
- *Screenshot of visualisation*

317M

Sum of Survey Sample (N)
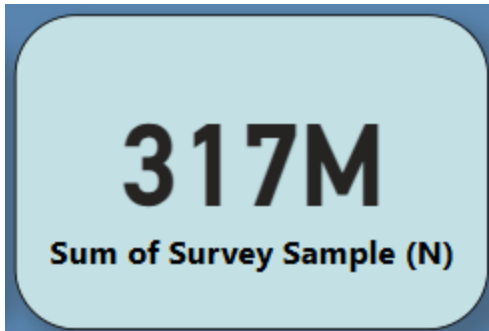
3. What is the total number of underweight children recorded?

- *Visualization*: Card showing Sum of Underweight
- *Screenshot of visualisation*

**10.34K**

Sum of Underweight

4. Which countries report the highest levels of overweight among children?

- *Visualization*: Line chart showing Sum of Overweight by Country
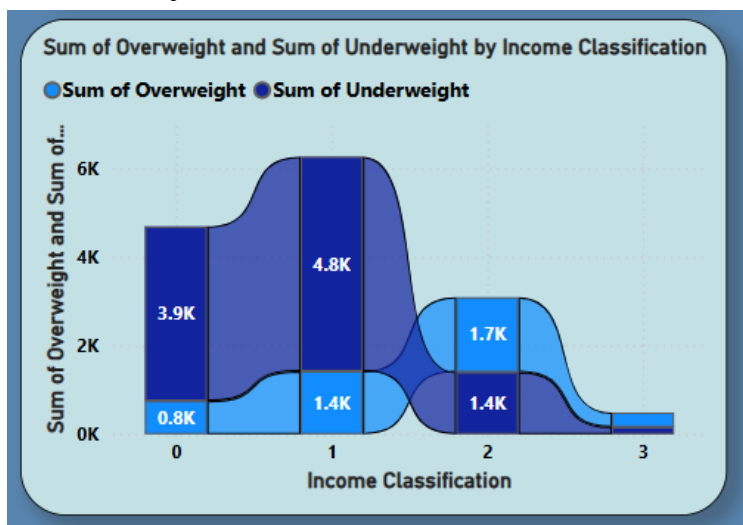- *Screenshot of visualisation*

Sum of Overweight by Country

Sum of Overweight

100

0

KUWAIT   COLOMBIA   BANGLA...   SEYCHEL...   SINGAPO...

Country
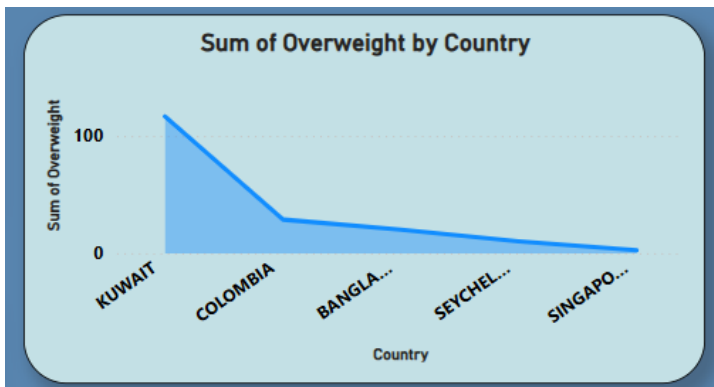
5. **How do special categories like LDC, LIFD, LLDC, or SIDS contribute to stunting across income classifications?**
- *Visualization*: Combo chart with stacked bars (LDC, LIFD, LLDC/SID2) and line (Average of Stunting) by Income Classification
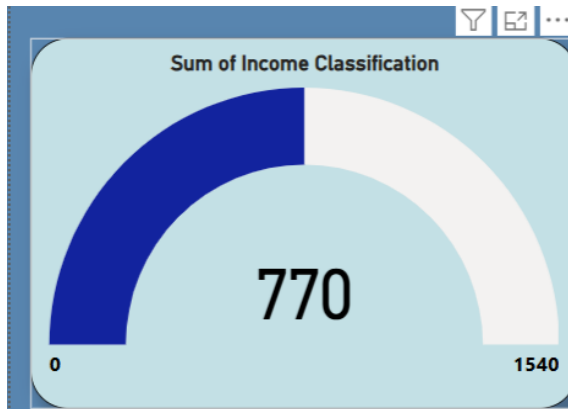- *Screenshot of visualisation*
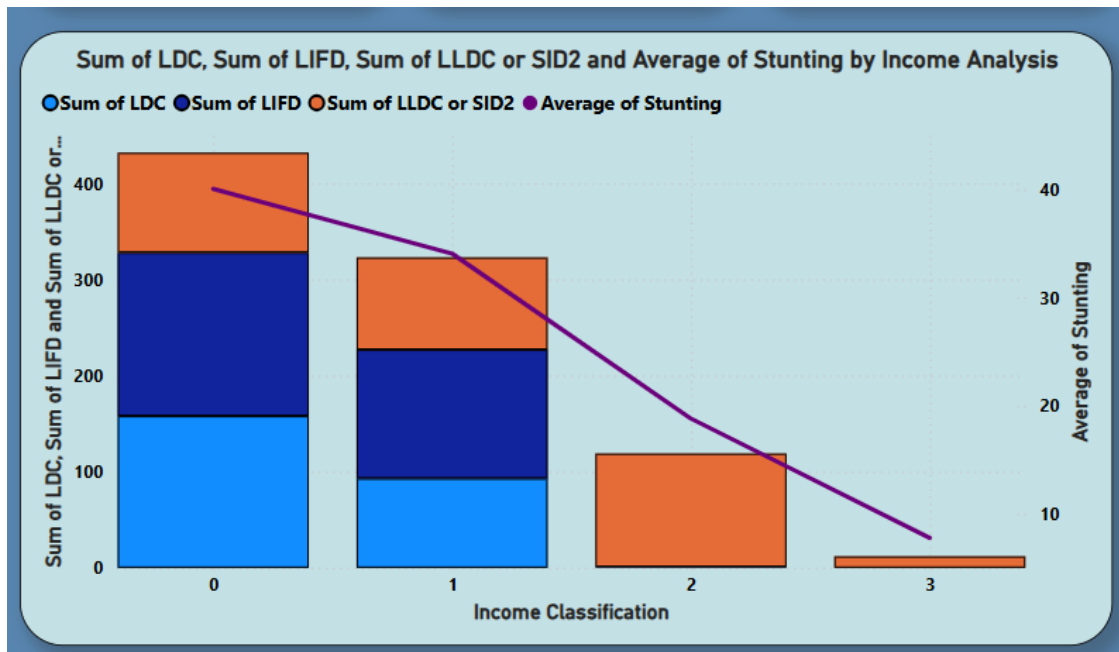
6. **How are overweight and underweight cases distributed across different income levels?**
- *Visualization*: Stacked area chart showing Sum of Overweight and Underweight by Income Classification
- *Screenshot of visualisation*

7. What is the cumulative income classification value across the dataset?

● *Visualization*: Gauge showing Sum of Income Classification
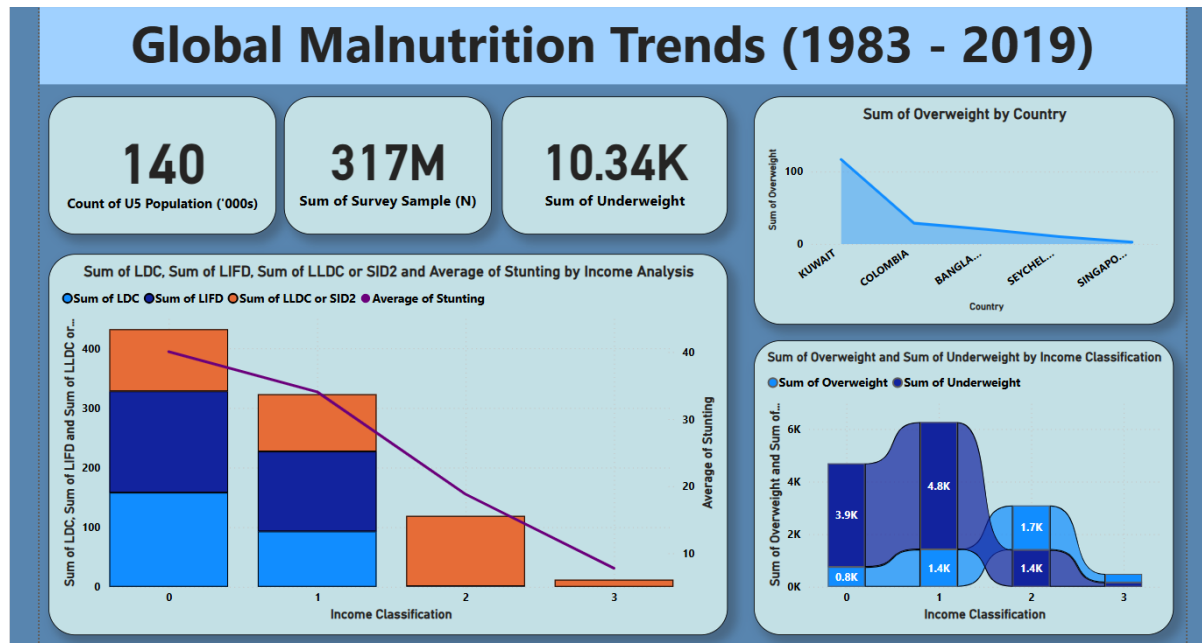● *Screenshot of visualisation*

8. How does the average stunting rate change with income classification?

● *Visualization*: Line over bar combo chart showing Average of Stunting across Income Classifications
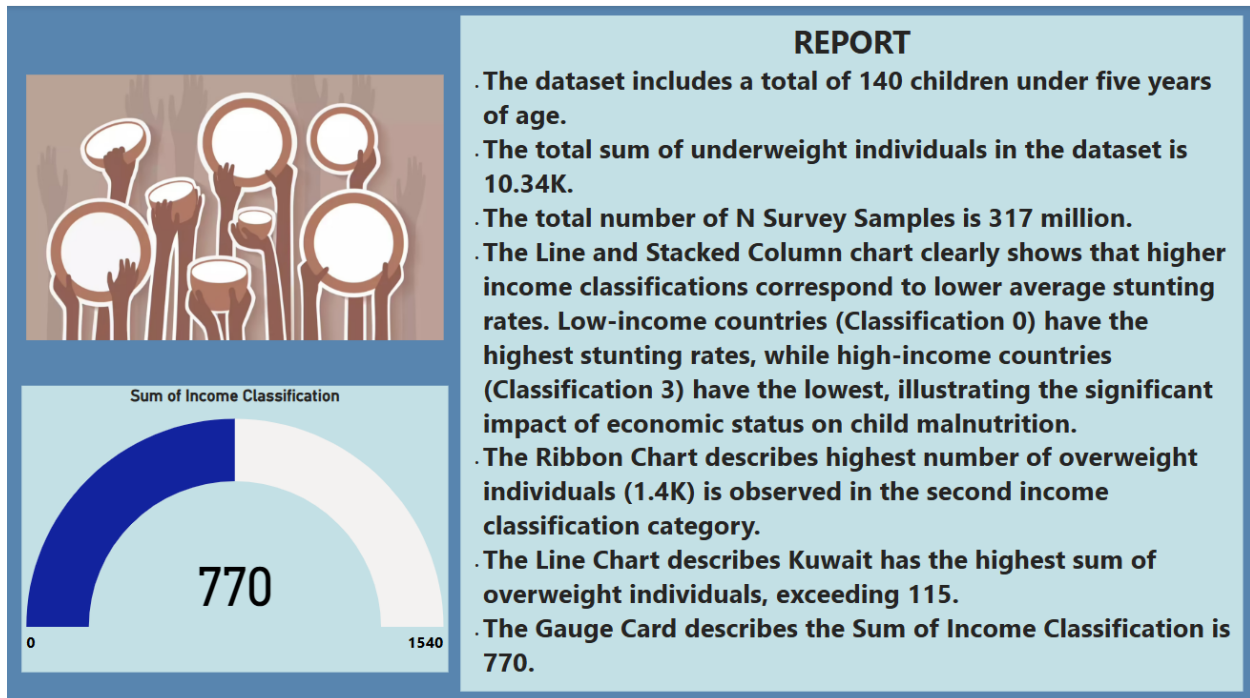● *Screenshot of visualisation*
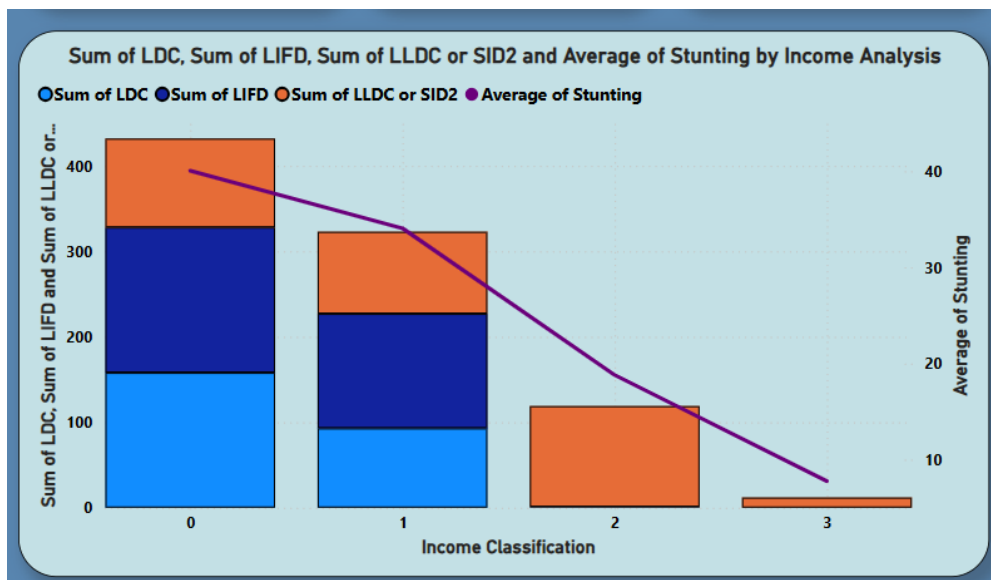
5. Dashboard:

5.1. Dashboard Design File:

1. **Under-5 Population Coverage:** The dashboard includes data from a total of **140 million under-5 children**, representing extensive global coverage of malnutrition metrics.
2. **Survey Sample Size:** A total of **317 million survey responses** have been collected, emphasizing the depth and reliability of the dataset used for the analysis.
3. **Underweight Prevalence:** The visual shows a **total of 10.34K underweight cases**, highlighting persistent undernutrition challenges among children globally.
4. **Overweight by Country:** The line chart reveals that **Kuwait** has the highest count of overweight children, followed by Colombia and Bangladesh, indicating regional disparities in overnutrition.
5. **Income-Level Analysis:** The stacked column and area charts demonstrate that **lower income classifications (0 and 1)** have the **highest rates of stunting, underweight, and overweight**, suggesting a **double burden of malnutrition** in economically disadvantaged regions.

6. Report:

6.1. Story Design File:

REPORT

- The dataset includes a total of 140 children under five years of age.
- The total sum of underweight individuals in the dataset is 10.34K.
- The total number of N Survey Samples is 317 million.
- The Line and Stacked Column chart clearly shows that higher income classifications correspond to lower average stunting rates. Low-income countries (Classification 0) have the highest stunting rates, while high-income countries (Classification 3) have the lowest, illustrating the significant impact of economic status on child malnutrition.
- The Ribbon Chart describes highest number of overweight individuals (1.4K) is observed in the second income classification category.
- The Line Chart describes Kuwait has the highest sum of overweight individuals, exceeding 115.
- The Gauge Card describes the Sum of Income Classification is 770.

Sum of Income Classification

770

0   1540

1. **Stunting and Income Correlation:**
   Lower income classifications (especially Classification 0) show the **highest stunting rates**, while higher income classifications (Classification 3) exhibit the lowest, which emphasizes the **negative impact of poverty on child growth**.

2. **Overweight Distribution by Income:**
   The **highest count of overweight individuals (1.4K)** appears in the **second income classification**, indicating that middle-income countries may be experiencing a **dual burden of malnutrition**.

3. **Country-Level Overweight Insight:**
   Kuwait has the **highest recorded overweight cases**, exceeding **115**, pointing to regional overnutrition trends in wealthier nations.

4. **Overall Economic Coverage:**
   The **Sum of Income Classification is 770** (out of a possible 1540), reflecting a **broad inclusion of countries across varying economic levels** in the dataset.

7. Performance Testing:

7.1 Utilization of Data filters:

Visualization: Sum of Overweight by Country: Chose certain countries for line graph

Country 🔒
is BANGLADESH, KU...

Filter type ⓘ

| Basic filtering | ⌄ |

🔍 Search

▣	Select all	
☐	AFGHANISTAN	2
☐	ALBANIA	4
☐	ALGERIA	6
☐	ANGOLA	2
☐	ARGENTINA	1
☐	ARMENIA	5

☐ Require single selection

Sum of Overweight 🔒
is (All)

7.2 No of Calculation Field:

The visualizations used Count, Sum, and Average where it was needed.

7.3 No of Visualization:

1. Count of U5 Population
2. Sum of Survey Sample(N)
3. Sum of Underweight
4. Sum of Overweight by Country
5. Sum of Income Classification
6. Sum of Overweight and Sum of Underweight by Income Classification
7. Sum of LDC, Sum of LIFD, Sum of LLDC or SID2 and Average of Stunting by Income Analysis

8. Conclusion/Observation:

Global trends in under-five malnutrition from 1983 to 2019 show notable differences depending on a country's economic classification. The highest rates of stunting and underweight are found in low-income countries, highlighting the pervasive effects of poverty on children's health. On the other hand, rising trends in childhood overweight in certain high-income nations point to a shift toward multiple burdens of malnutrition. These intricate patterns are successfully clarified by the visualizations, which facilitates the identification of crucial areas that require intervention. These results highlight the critical need for focused, evidence-based approaches that take into account both undernutrition and overnutrition and are customized to the unique socioeconomic circumstances of each area. Deeper, diverse analysis and dynamic monitoring tools will be necessary in the future to direct efficient policymaking and enhance child health outcomes worldwide.

9. Future Scope:

In the future, this project can grow in many useful ways. One important step is to include more recent data beyond 2019, so we can understand how malnutrition trends have changed in recent years, especially after events like the COVID-19 pandemic. Adding other health and development factors such as access to clean drinking water, sanitation, healthcare services, and education can help paint a more complete picture of what causes malnutrition in different countries. The project can also be improved by using advanced tools like machine learning to predict which countries or regions might face high malnutrition risks in the future. These predictions can help health organizations and policymakers plan early interventions. Additionally, interactive dashboards and real-time updates can be created for decision-makers to easily explore the data and spot problem areas quickly. By sharing these insights with international health groups, NGOs, and governments, this project can help guide smarter investments, better nutrition programs, and stronger support systems for the most affected children around the world.

10. Appendix:

10.1. GitHub & Project Demo Link:

GitHub: https://github.com/TanmayeeI/GlobalMalnutritionTrends_PowerBI
Project Demo:
https://drive.google.com/file/d/1baSefWySjJklAOw3P7BvzKl89oFWA8mE/view?usp=sharing