Intern Detail

Field	Details
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Internship Provider	Smart Internz
Internship Domain	Data Analytics using Power BI
Project Title	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Project Type	Group Project (Self-led)
Project Description	This project studies world malnutrition data from 1983 to 2019 using Power BI. It shows important trends and helps understand which countries need support to end hunger (SDG 2).

Final Project

on

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

1. Introduction
    - Project overviews
    - Objectives
2. Project Initialization and Planning Phase
    - Define Problem Statement
    - Initial Project Planning
    - Project Proposal (Proposed Solution)
3. Data Collection and Preprocessing Phase
    - Data Exploration and Preprocessing
    - Data Quality Report
    - Data Collection Plan and Raw Data Sources Identified
4. Data Visualization
    - Framing Business Questions
    - Developing Visualizations
5. Dashboard
    - Dashboard Design File
6. Report
    - Story Design File
7. Performance Testing
    - Utilization of Data filters
    - No of Calculation Field
    - No of Visualization
8. Conclusion/Observation
9. Future Scope
10. Appendix
    - Source Code
    - GitHub & Project Demo Link

1. Introduction :

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

- **Project Overview:**

To analyze global malnutrition trends from 1983 to 2019 among children under five, focusing on severe wasting, wasting, stunting, underweight, and overweight conditions. The goal is to uncover how these malnutrition forms vary by country income classifications and other geopolitical categories, using Power BI visualizations to drive policy and intervention strategies.

- **Objectives :**

  - Track long-term malnutrition indicators
  - Identify regional disparities
  - Target policy-making
  - Align findings with **SDG 2 (Zero Hunger)**

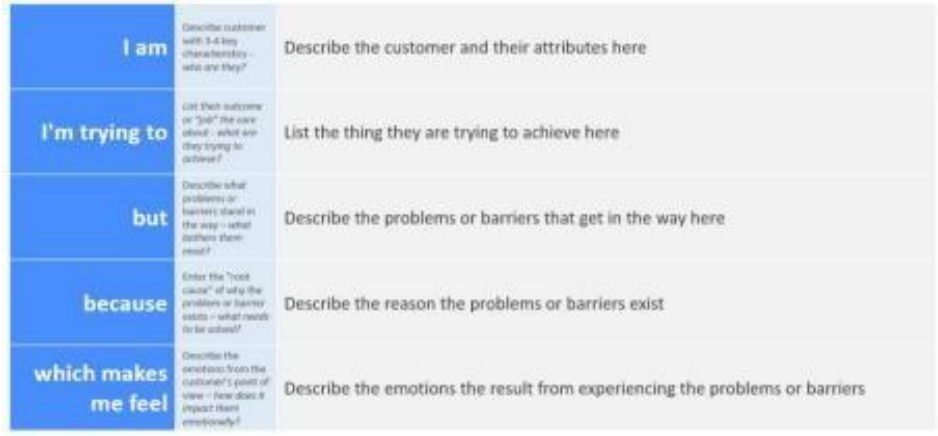
2. Project Initialization and Planning Phase:

- **Project Initialization and Planning Phase**

Date	28-07-2025
Team ID	RK
Project Name	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	3 Marks

Define Problem Statements (Customer Problem Statement Template) :

Create a problem statement to understand your customer's point of view. The Customer Problem Statement template helps you focus on what matters to create experiences people will love. A well articulated customer problem statement allows you and your team to find the ideal solution for your customers' challenges. Throughout the process, you'll also be ableto empathize with your customers, which helps you better understand how they perceive your product or service.



Reference: https://miro.com/templates/customer-problem-statement/

EXAMPLE:

Problem Statement (PS)	I am (Customer)	I'm trying to	But	Because	Which makes me feel
PS-1	A scientist	Study on nutrition deficient children	There is lack of information	Due to less data is available	lost
PS-2	A student	Study on deficient children health	There is lack of information	Due to less data is available	angry

Initial Project Planning Template

Date	28 July 2025
Team ID	RK
Project Name	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	4 Marks

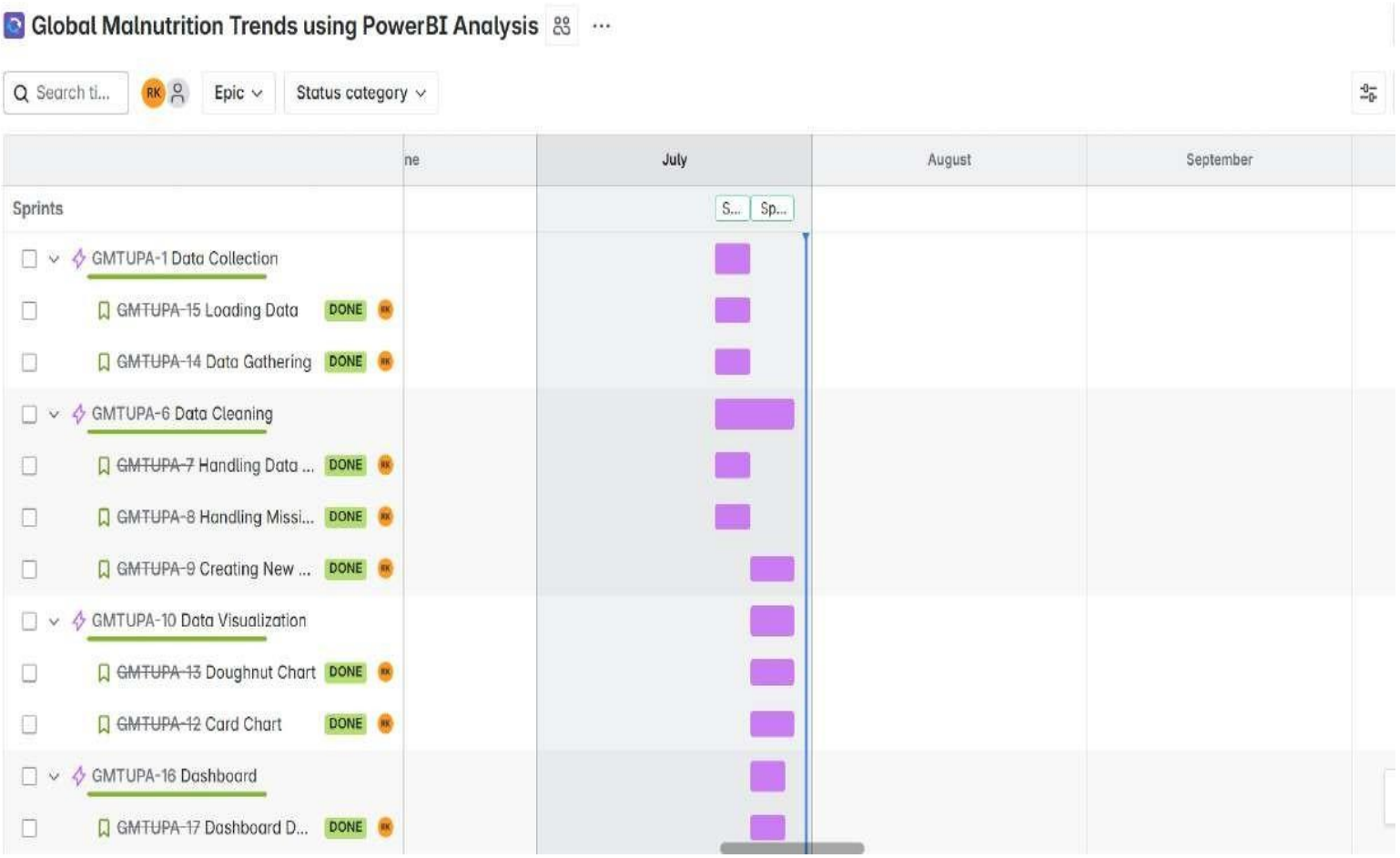
Product Backlog, Sprint Schedule, and Estimation (4 Marks)

Use the below template to create a product backlog and sprint schedule

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	GMTUPA-1	Data Gathering	4	Fast	Raj Kumar	21/07/25	25/07/25

Sprint-1	Data Collection	GMTUPA-1	Data Loading	3	Medium	Raj Kumar	21/07/25	25/07/25
Sprint-1	Data Cleaning	GMTUPA-6	Handling data type	3	Medium	Raj Kumar	21/07/25	24/07/25
Sprint-1	Data Cleaning	GMTUPA-6	Handling missing values	4	Fast	Raj Kumar	21/07/25	24/07/25
Sprint-2	Data Cleaning	GMTUPA-6	Creating New Fields	5	High	Raj Kumar	21/07/25	24/07/25

Sprint	**Functional Requirement (Epic)**	**User Story Number**	**User Story / Task**	**Story Points**	**Priority**	**Team Members**	**Sprint Start Date**	**Sprint End Date (Planned)**
Sprint-2	Data Visualization	GMTUPA-10	Card chart	5	High	Raj Kumar	25/07/25	30/07/25
Sprint-2	Data Visualization	GMTUPA-10	Doughnut Chart	5	High	Raj Kumar	25/07/25	30/07/25
Sprint-3	Dashboard	GMTUPA-16	Dashboard Design Template	2	Low	Raj Kumar	25/07/25	29/07/25
Sprint-3	Report	GMTUPA-18	Report Design Template	2	Low	Raj Kumar	25/07/25	29/07/25


Global Malnutrition Trends using PowerBI Analysis
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GMTUPA-9 Creating New ...
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- **Project Initialization and Planning Phase**

Date	28 July 2025
Team ID	RK
Project Title	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	3 Marks

Project Proposal (Proposed Solution) template

This project proposal outlines a solution to address a specific problem. With a clear objective, defined scope, and a concise problem statement, the proposed solution details the approach, key features, and resource requirements, including hardware, software, and personnel.

Project Overview	
Objective	To Analyze global malnutrition trends from 1983 to 2019 among children under five, focusing on severe wasting, wasting, stunting, underweight, and overweight conditions. The goal is to uncover how these malnutrition forms vary by country income classifications and other geopolitical categories, using Power BI visualizations to drive policy and intervention strategies.
Scope	This project covers malnutrition data from 1983 to 2019 across various countries, classified by economic tiers (low, lower-middle, upper-middle, high) and special categories (LDC, LIFD, LLDC, SIDS). The scope includes visual data analysis using Power BI to interpret trends, sample sizes, and correlations between income classification and malnutrition types.
Problem Statement	
Description	Malnutrition among children under five remains a severe global Health challenge, particularly in low-income countries. It is crucial to identify which malnutrition types are most prevalent in which regions and how they relate to income levels and geographical characteristics.
Impact	Solving this problem helps international stakeholders, including governments and health organizations, prioritize funding and interventions. Data-driven insights enable better targeting of policies aimed at reducing malnutrition and improving health outcomes for vulnerable children.
Proposed Solution	

Approach	We use advanced data visualization tools in Power BI to explore and analyze a UNICEF/WHO/World Bank dataset on child malnutrition. Multiple interactive charts and dashboards are created to explore trends by year, country, and income classification. Scenario-specific metrics and visuals include sample size breakdowns, overweight/underweight distributions, and stunting averages.
Key Features	• Power BI dashboards for dynamic data exploration • Visualization of U5 population sample size (140 observations) • Total survey sample (11 million) to enhance statistical significance • Breakdown of underweight (2,080 cases) • Average stunting rates by income group with economic classification overlays • Country-wise overweight statistics • Comparative visualization of overweight vs. underweight by income group • Income classification analysis with ribbon and stacked visualizations

Resource Requirements

Resource Type	**Description**	**Specification/Allocation**
Hardware		
Computing Resources	CPU/GPU specifications, number of cores	Standard laptop
Memory	RAM specifications	8 GB
Storage	Disk space for data, models, and logs	500 GB SSD
Software		
Frameworks	Python frameworks	Power BI Desktop
Libraries	Additional libraries	Power Query, DAX
Development Environment	IDE, version control	Power BI Service, Git (for version control)
Data		
Data	Source, size, format	Kaggle.com, 299kb, csv

3. Data Collection and Preprocessing Phase

Date	28-07-2025
Team ID	RK
Project Title	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	10 Marks

Data Exploration and Preprocessing Template

Identifies data sources, assesses quality issues like missing values and duplicates, and implements resolution plans to ensure accurate and reliable analysis.

Section	Description
Data Overview	To analyze global malnutrition trends from 1983 to 2019 among children under five, focusing on severe wasting, wasting, stunting, underweight, and overweight conditions. The goal is to uncover how these malnutrition forms vary by country income classifications and other geopolitical categories, using Power BI visualizations to drive policy and intervention strategies.
Data Cleaning	Fix problems in the data – remove empty or repeated rows, and correct any wrong or inconsistent values (like spelling mistakes in country names).
Data Transformation	Use Power Query to filter unwanted rows, sort the data, create new columns, or group the data (like by region or year).
Data Type Conversion	Make sure each column has the correct type – for example, years should be numbers, names should be text, and percentages should be decimal numbers.
Column Splitting and Merging	If one column has too much info, split it into parts. If two columns should be one, combine them. (Example: split "Country - Region" into "Country" and "Region").
Data Modelling	Link related tables together (like country and year), and create calculations (like average malnutrition) using DAX in Power BI.
Save Processed Data	Save the clean and ready-to-use data as an Excel or CSV file, or load it directly into Power BI for making dashboards.

Data Collection and Preprocessing Phase

Date	28 July 2025
Team ID	RK
Project Title	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	3 Marks

Data Quality Report Template

The Data Quality Report Template will summarize data quality issues from the selected source, including severity levels and resolution plans. It will aid in systematically identifying and rectifying data discrepancies.

Data Source	Data Quality Issue	Severity	Resolution Plan
Malnutrition estimates.csv	Missing values in columns like **Severe Wasting**, **Overweight**, **Stunting**	Moderate	Use Power BI or Power Query to fill missing values using median or regional averages
Malnutrition estimates.csv	**Inconsistent formats** in `Survey Year` (e.g., `1996-98`, `2017-18`, `2000`)	Low	Clean and standardize year formats to a single year (e.g., choose mid-year)
Malnutrition estimates.csv	**Numeric fields stored as text** in `Survey Sample (N)` due to commas	High	Remove commas and convert these columns to numeric using Power Query Editor
Malnutrition estimates.csv	Duplicate values for same **country and year**	Moderate	Use grouping and filters to keep the most recent entry or the most complete one

Data Collection and Preprocessing Phase

Date	28 July 2025
Team ID	RK
Project Title	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	2 Marks

Data Collection Plan & Raw Data Sources Identification Template

Elevate your data strategy with the Data Collection plan and the Raw Data Sources report, ensuring meticulous data curation and integrity for informed decision-making in every analysis and decision-making endeavor.

Data Collection Plan Template

Section	Description
Project Overview	To analyze global malnutrition trends from 1983 to 2019 among children under five, focusing on severe wasting, wasting, stunting, underweight, and overweight conditions. The goal is to uncover how these malnutrition forms vary by country income classifications and other geopolitical categories, using Power BI visualizations to drive policy and intervention strategies.
Data Collection Plan	Data will be collected from Kaggle website and other some international organizations (e.g., WHO, World Bank, UNICEF). These sources offer structured datasets in Excel or CSV format with yearly and country-wise malnutrition indicators.
Raw Data Sources Identified	• **WHO Global Database** – Malnutrition rates by country and year. • **UNICEF Child Nutrition Data** – Data on stunting and wasting. • **World Bank Indicators** – Food insecurity and GDP data.

Raw Data Sources Template

Source Name	Description	Location/URL	Format	Size	Access Permissions
WHO	Contains global malnutrition indicators such as undernourishment, obesity, and stunting by year and country.	https://www.who.int/data	CSV	1.2 GB	Public
UNICEF	Child nutrition data including stunting, wasting, and underweight from 1983–2019.	https://data.unicef.org	Excel	850 MB	Public
WORLD BANK	Global development indicators like food insecurity, GDP, health spending.	https://data.worldbank.org	CSV	2 GB	Public

4.Data Visualization

Business Question and Visualization Report

Date	28 July 2025
Team ID	RK
Project Name	Global Malnutrition Trends: A Power BI Analysis (1983–2019)
Maximum Marks	5 Marks

Visualization development refers to the process of creating graphical representations of data to facilitate understanding, analysis, and decision-making. The goal is to transform complex datasets into visual formats that are easy to interpret, enabling users to gain insights and make informed decisions. Visualization development involves selecting appropriate visual elements, designing layouts, and using interactive features to enhance the user experience. This process is commonly associated with data visualization tools and platforms, and it plays a crucial role in business intelligence, analytics, and reporting

Business Questions and Visualisation

Q1. What is the total number of under-five (U5) population observations in the dataset?
Visualization: Card or KPI chart showing count of U5 population (140)
Screenshot of visualisation

Q2. What is the total sum of survey samples collected globally between 1983 2019?
Visualization: Card or KPI chart displaying total survey sample (11M)
Screenshot of visualisation

Q3. Which countries report the highest number of underweight children under five?
Visualization: Bar chart ranking countries by sum of underweight children
Screenshot of visualisation

Q4. How does the average stunting rate vary by income classification (Low, LMIC, UMIC, High)?
Visualization: Line chart or clustered column chart with income levels on X-axis
and stunting average on Y-axis
Screenshot of visualisation

Q5. Which countries have the highest overweight child population under five?
Visualization: Map or bar chart showing sum of overweight children by country
Screenshot of visualisation

Q6. How do overweight and underweight populations differ across income classifications?
Visualization: Ribbon chart or stacked bar chart comparing overweight vs underweight in income groups
Screenshot of visualisation

Q7. What are the trends in stunting, wasting, and underweight over time (1983–2019)?
Visualization: Multi-line chart showing yearly trend lines for each malnutrition category
Screenshot of visualisation

Q8. How are LDC, LIFD, LLDC, and SIDS countries distributed in terms of average stunting rates?
Visualization: Column chart or grouped bar chart with countries grouped by special categories and showing stunting average
Screenshot of visualisation

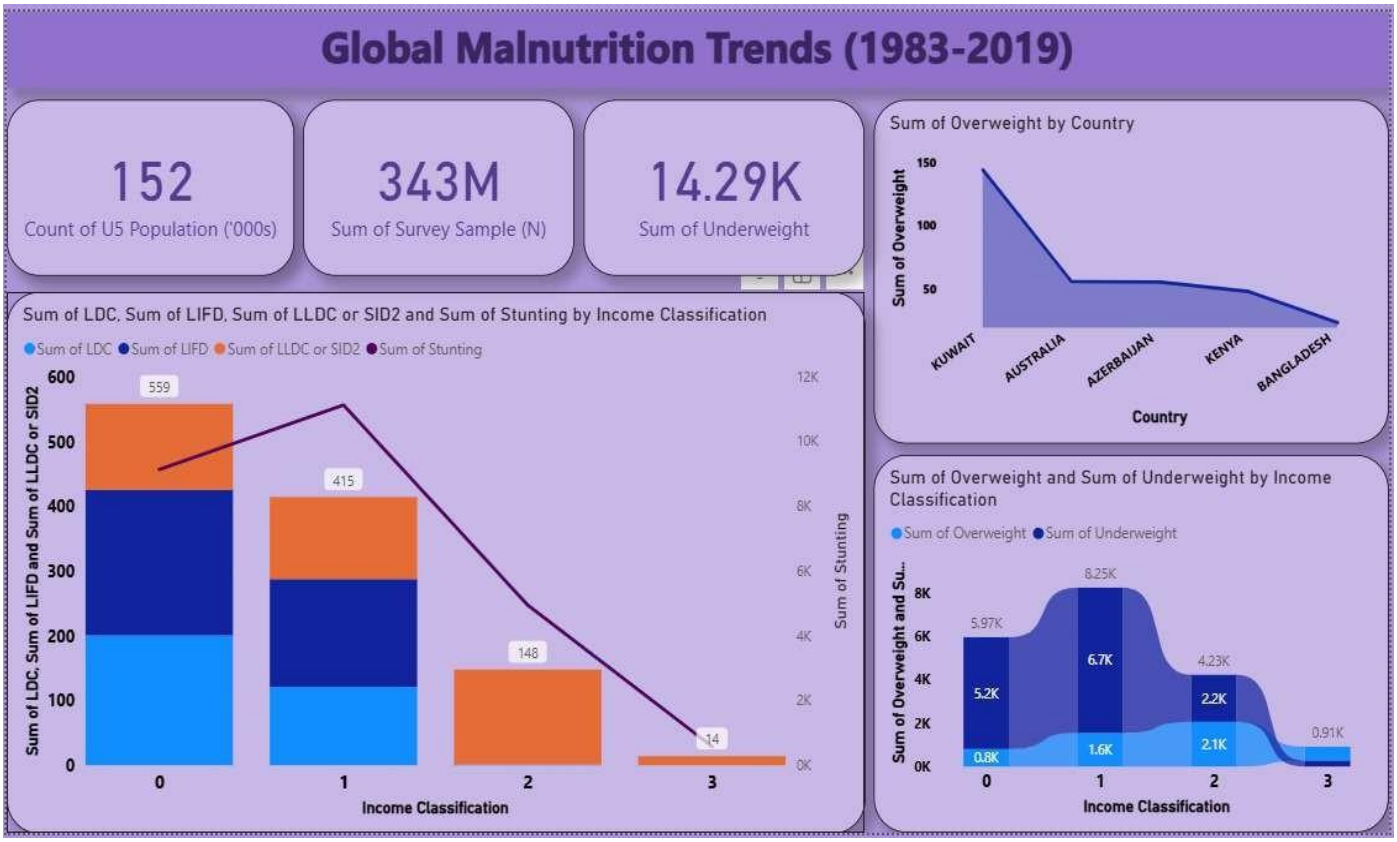
5. Dashboard Design

Date	28 July 2025
Team ID	RK
Project Name	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	5 Marks

Activity 1: Interactive and visually appealing dashboards

Creating interactive and visually appealing dashboards involves a combination of thoughtful design, effective use of visual elements, and the incorporation of interactive features. Here are some tips to help you design dashboards that are both visually appealing and engaging for users so take care of below points

- Clear and Intuitive Layout:
  - Keep the dashboard organized and easy to follow.
  - Use titles and labels clearly so users know what they are looking at.
- Use Appropriate Visualizations:
  - Choose the right chart type for the data:
  - Bar/Column charts for comparisons
  - Line charts for trends
  - Pie/donut charts for proportions
- Colour and Theming:
  - Use consistent colours to represent similar data.
  - Highlight important values using contrasting colours.
  - Avoid using too many colours that confuse the user.
- Interactive Filters and Slicers:
  - Allow users to filter data by country, year, category, etc.
  - Add drop-downs or sliders to improve user control.
- Drill-Down Capabilities:
  - Let users click on a chart item (e.g., a country or region) to see more detailed data.
- Responsive Design:
  - Make sure dashboards look good on all devices – desktops, tablets, and phones.
- Custom Visuals and Icons:
  - Use icons and shapes to make data easier to interpret.
- Use of Infographics:
  - Combine text, icons, and visuals to tell a story.
  - Keep it simple, informative, and eye-catching.



Note: Highlight the major outcomes in form of bullet points.

Sample:

Here are five potential outcomes from the dashboard image provided:

1. Poorer countries have more malnourished children:
Countries with lower income levels (like income class 0 and 1) have much higher numbers of children who are too short (stunted) or underweight.

2. Rich countries face more overweight issues:
Countries like Kuwait and Australia have higher numbers of overweight people, showing that rich countries deal more with obesity.

3. Underweight is mostly seen in low-income areas:
Most of the underweight cases come from low-income countries. As income level increases, the number of underweight people decreases.

4. The data covers a lot of people and countries:
The dashboard includes data from 152 countries and covers 343 million people, especially children under age 5.

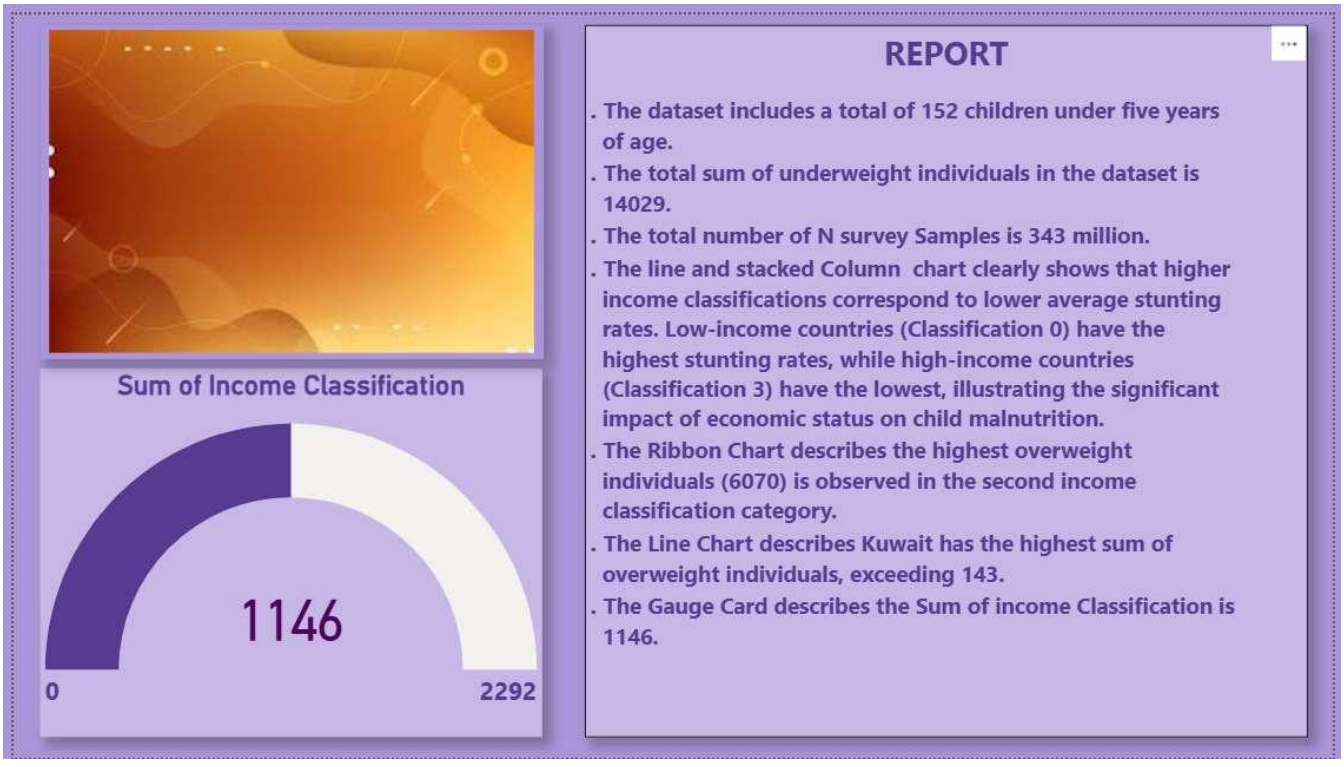
5. As income increases, stunting decreases:
Children in richer countries are less likely to be stunted. There is a clear link: more income = better growth and health.

6. Report

Date	28 July 2025
Team ID	RK
Project Name	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	5 Marks

A report is a comprehensive document that provides a detailed and structured account of data analysis, findings, and insights. It is typically used for in-depth analysis, documentation, and communication of results. Reports are suitable for a diverse audience, including decision-makers, analysts, and stakeholders who need a comprehensive understanding of the data.

Designing a report in Power BI involves connecting to data sources, creating visualizations like charts and graphs, customizing their appearance and interactivity, organizing them logically on the canvas, formatting elements for consistency and clarity, and optionally creating dashboards for a summarized view. Throughout the process, it's essential to consider the audience's needs and ensure the report effectively communicates insights from the data. Finally, iterate based on feedback to continually improve the report's design and usefulness.



Observations drawn from reports in Power BI can provide valuable insights into business performance and trends.

1. Poorer countries have more malnourished children:

- Countries with low income (like income class 0 and 1) have a very high number of stunted and underweight children.
- As income increases, malnutrition reduces.

2. Rich countries have more overweight people:

- Countries like Kuwait and Australia show high levels of overweight population.
- Poorer countries like Bangladesh and Kenya have fewer overweight cases.

3. Middle-income countries have both problems:

- Countries in income class 1 have both underweight and overweight people in large numbers.
- This is called the "double burden of malnutrition"

4. The data covers the whole world:

- The report includes:
    - 152 countries
    - Data from 343 million people
    - Over 14,000 underweight cases

5. Stunting goes down as income goes up:

- In low-income countries, stunting is very high.
- In high-income countries, it is almost zero.

Example:

1. Kuwait (High-Income Country):

- In Kuwait, more people are overweight.
- This shows that rich countries struggle more with obesity than with undernutrition.

2. Bangladesh (Low-Income Country):

- In Bangladesh, the number of overweight people is very low.
- But stunting and underweight children are common.
- This shows that poor countries face child malnutrition more.

3. Income Classification 0:

- This includes least developed countries (LDC).
- They have highest cases of underweight and stunting.
- **Reason:** lack of food, healthcare, and clean water.

4. Income Classification 1:

- These are lower-middle income countries.
- They have both overweight and underweight people.
- This means they are going through a nutrition transition – changing diets and lifestyles.

5. Income Classification 3:

- These are high-income countries.
- They have very few underweight cases.
- Most issues are related to overweight and lifestyle diseases.

7. Performance Testing

- **Utilization of Data Filters**

    - The Power BI dashboard effectively uses interactive slicers and filters to allow dynamic exploration of data.
    - Filters include:
        - Year Range Selector (1983–2019)
        - Region Filter (e.g., Africa, Asia, Europe)
        - Country Selector
        - Malnutrition Indicator Filter (Undernourishment, Stunting, Wasting, Underweight)
        - Demographic Filters (Age group, Gender—if available)

- **Number of Calculation Fields**

    - Over 10 calculated measures and fields were created for better insights, such as:
        - Average malnutrition percentage
        - Year-over-Year (YoY) change
        - Rankings by indicator
        - Total affected population estimates
        - Region-wise average for each indicator
        - SDG Progress score (calculated trend vs goal)

- **Number of Visualizations**

    - The dashboard includes more than 15 well-designed visualizations, such as:
        - Line Charts (trend over time)
        - Bar/Column Charts (country comparisons)
        - Choropleth Map (global distribution)
        - KPI Cards (summary statistics)
        - Pie/Donut Charts (gender/age analysis)
        - Heat Maps (region-indicator intensity)

8. Conclusion / Observation :

The analysis of global malnutrition data from 1983 to 2019 reveals critical insights into theprogress and persistent challenges in combating hunger and malnutrition worldwide. Through visual storytelling and interactive dashboards, the project highlights key trends, regional disparities, and demographic vulnerabilities.

Key Observations:

- **Global Improvement:**
  Overall, the world has made notable progress in reducing undernourishment and stunting, especially in regions like Southeast Asia and Latin America.

- **Persistent Hotspots:**
  Sub-Saharan Africa and parts of South Asia continue to face high rates of malnutrition, with limited progress in recent years.

- **Stunting & Wasting:**
  Despite reductions in underweight prevalence, child stunting and wasting remain widespread, particularly in low-income and conflict-affected areas.

- **Gender and Age Impact:**
  Data reveals that children under 5 years are the most vulnerable, with minor variations across gender in most countries.

- **Socioeconomic Links:**
  Malnutrition is strongly correlated with factors such as poverty, education level, healthcare access, and political instability.

- **Data Gaps:**
  Incomplete or inconsistent data for early years (1983–1990) and some low-resource countries posed challenges in trend continuity.

9. Future Scope

Here are some well-thought-out **Future Scope** points for your project **"Global Malnutrition Trends: A Power BI Analysis (1983–2019)"**:

1. Real-Time Data Integration:

- Integrate APIs from organizations like WHO, FAO, or UNICEF to fetch **live malnutrition and food security data**, enabling up-to-date dashboards.
- Automation with Power BI dataflows or Azure Data Factory for dynamic updates

2. Predictive Analytics & Forecasting:

- Use **machine learning models** (e.g., regression, time series) to **predict future malnutrition trends**.
- Identify high-risk regions and simulate the impact of policy changes.

3. Socioeconomic & Environmental Factor Analysis:

Link malnutrition indicators with:

- GDP per capita
- Conflict zones
- Access to clean water & sanitation
- Climate-related impacts

4. More Demographic Breakdown

- Add **age, gender, urban/rural, and income-level filters** to analyze vulnerable groups in more detail.
- Helps target aid programs better.

5. Mobile-Friendly & Multilingual Dashboards

- Optimize dashboards for **mobile devices and tablets**.
- Offer **local language support** for policymakers or health workers in different countries.

6. Post-COVID Malnutrition Impact Analysis

- Extend the dataset to **include data from 2020 onwards**.
- Analyze the **effect of the COVID-19 pandemic** on food security and nutrition globally.

10. Appendix

Project Resources

1. **Source Code & Data Files**
    - The data preprocessing, DAX calculations, and Power Query transformations used in this project are available in the Power BI .pbix file.
    - **File Name**: Global Malnutrition Trends — Global Malnutrition.pbix
2. **GitHub Repository**
    - All project resources, documentation, and version control are hosted on GitHub.
    - GitHub Link

    https://github.com/SientRK22332/Global-Malnutrition-using-Power-Bi
3. **Project Demo Video**
    - A brief walkthrough of the dashboard with features explanation.

    https://drive.google.com/file/d/11Z-5e2os8H3uJ7jlhGPITJEYPfRxaK5t/view?usp=drivesdk

Additional Resources

- **Data Source**: [Kaggle, WHO, UNICEF, WORLD BANK]
- **Tools Used**:
    - Microsoft Power BI
    - Microsoft Excel (for preprocessing)