

Project Design Phase-II
Solution Requirements (Functional & Non-functional)

Date	31 January 2025
Team ID	LTVIP2025TMID21323
Project Name	Global Malnutrition Trends:A Power BI Analysis (1983-2019)
Maximum Marks	4 Marks

Functional Requirements:

Following are the functional requirements of the proposed solution.

FR No.	Functional Requirement (Epic)	Sub Requirement (Story / Sub-Task)
FR-1	Data collection &Integration	Import datasets from various sources data must be CSV, Excel and SQL format
FR-2	Data cleaning & processing	Handling missing values perform data transformation.
FR-3	Data visualization	Creating interactive dashboards in power B. Provide graphical insights, drill-down and filtering options.
FR-4	Trend Analysis	Identify production trends.
FR-5	User Access& Authentication	Login via email, OTP,or third party authentication
FR-6	Data export	Export reports in pdf ,excel format

Non-functional Requirements:

Following are the non-functional requirements of the proposed solution.

FR No.	Non-Functional Requirement	Description
NFR-1	Usability	Ensure user-friendly interface, easy navigation and interactive elements.
NFR-2	Security	Implement data encryption and access control.
NFR-3	Reliability	Ensure data accuracy and consistency auto mated data backups to prevent loss.
NFR-4	Performance	Optimize data queries for faster loading. Handling large datasets efficiently.
NFR-5	Availability	Ensure and support multiple users accessing simultaneously.
NFR-6	Scalability	Allow integration of new datasets without affecting performance adapts to increasing data volumes over time.

Project Design Phase-II
Data Flow Diagram & User Stories

Date	31 January 2025
Team ID	LTVIP2025TMID21323
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Data Flow Diagrams: A Data Flow Diagram (DFD) is a traditional visual representation of the information flows within a system. A neat and clear DFD can depict the right amount of the system requirement graphically. It shows how data enters and leaves the system, what changes the information, and where data is stored.

Data Collection



Data Cleaning



Data Visualization



Trend analysis



User access and Interaction



Data Export

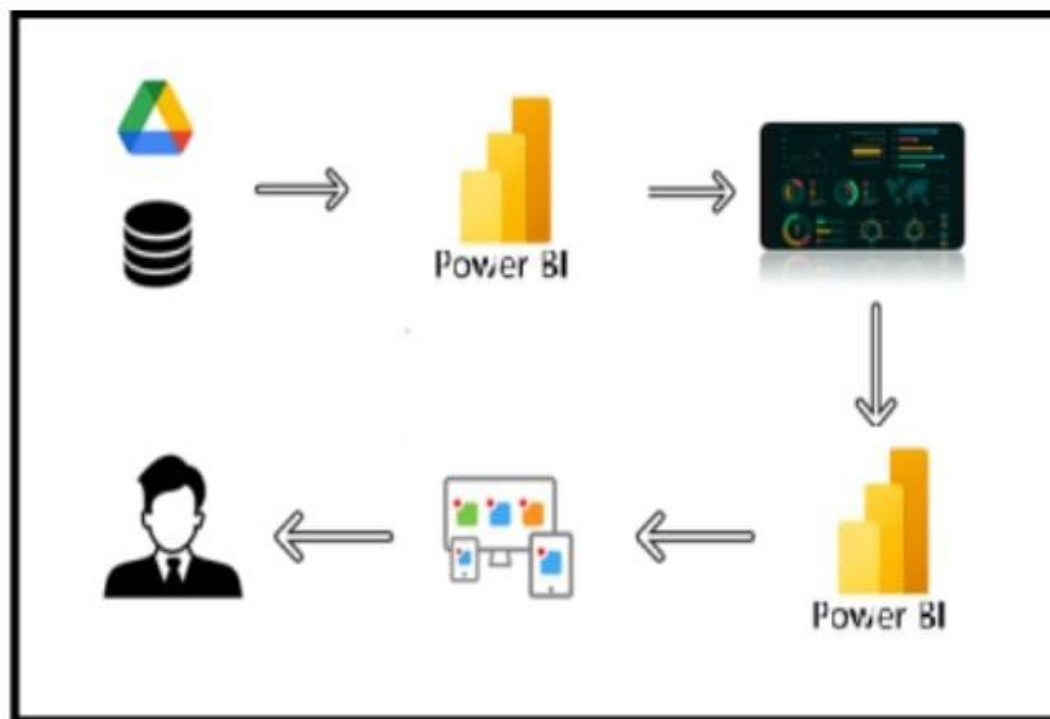
User Stories

Use the below template to list all the user stories for the product.

User Type	Functional Requirement (Epic)	User Story Number	User Story / Task	Acceptance criteria	Priority	Release
Data analyst	Data Collection	USN-1	As a data analyst, I want to collect ect malnutrition data from reliable sources such as UNICEF and WHO.	Data is collected from verified sources.	High	Sprint-1
Data analyst	Data Cleaning	USN-2	As a data analyst, I want to clean the dataset by removing duplicates and handling missing values.	The dataset should be error-free and standardized.	medium	Sprint-1
Data analyst	Data Visualization	USN-3	As a data analyst, I want to visualize malnutrition trends using Power BI. so that I can generate meaningful insights.	Power BI dashboards should include charts and trend analysis.	High	Sprint-2
Public Health Researcher	Trend analysis	USN-4	As a researcher ,I want to analyze the relationship between malnutrition and economic leve is..	Identify correlations between income leve is and malnutrition rates.	High	Sprint-2
Policy maker	User access and interaction	USN-5	As a policy maker , I want to generate reports for decision-making.	Reports should include malnutrition hot spots and policy recommendations.	High	Sprint-2
NGO / Government official	Data Export	USN-6	As a NGO official , I want to identify high-risk are as for immediate intervention.	Data should help n targeting severey malnourished regions.1	high	Sprint-2

Project Design Phase-II
Technology Stack (Architecture & Stack)

Date	31 January 3035
Team ID	LTVIP2025TMID21323
Project Name	Global Malnutrition Trends:A Power BI Analysis (1983-2019)
Maximum Marks	4 Marks



Technical Architecture:

The Deliverable shall include the architectural diagram as below and the information as per the table1 & table 2

Table-1 : Components & Technologies:

S.No	Component	Description	Technology
1.	Data Collection	Collecting malnutrition data from UNICEF / WHO World bank .	Power BI, Excel
2.	Data Loading	Importing malnutrition datasets.	Power BI
3.	Data Cleaning	Cleaning malnutrition rates & country classifications.	Power BI
4.	Data Visualization	Malnutrition trends (stunting, wasting , weight , overweight).	Power BI
5.	Scenario-1	Count of U5 (under-5) population.	Power BI Visualization(KPI Card)
6.	Scenario-2	Sum of survey (total sample size).	Power BI Visualization(KPI Card)
7.	Scenario-3	Sum of underweight cases.	Power BI Visualization(card)
8.	Scenario-4	Stunting by income classification (LDC, LIFD, LLDC,SIDS)	Power BI Visualization(Line and stacked Column Chart)
9.	Scenario-5	Overweight cases by county.	Power BI Visualization(Ribbon Chart)
10.	Scenario-6	Overweight & underweight by income classification.	Power BI Visualization(Line Chart)
11.	Scenario-7	Sum of income classification.	Power BI Visualization(Gauge Chart)
12.	Report Creation	Malnutrition trends reports for insights	Power BI
13.	Data Export	Exporting processed data for further use	Power BI, Excel

Table-2: Application Characteristics:

S.No	Characteristics	Description	Technology
1.	Scalability	Handles large datasets from 1983-2019	Power BI, Excel
2.	Interactivity	Filters for income levels , country classification.	Power BI(DAX, Power Query)
3.	performance	Optimized for multi-year malnutrition trends.	Power BI(DAX)
4.	usability	User-friendly dashboards for policy makers & health organizations.	Power BI
5.	Automation	Scheduled refresh for latest malnutrition insights.	Power BI

Project Design Phase
Proposed Solution Template

Date	15 February 2025
Team ID	LTVIP2025TMID21323
Project Name	Global Malnutrition Trends:A Power BI Analysis (1983-2019)
Maximum Marks	2 Marks

Proposed Solution Template:

Project team shall fill the following information in the proposed solution template.

S.No.	Parameter	Description
1.	Problem Statement (Problem to be solved)	Understanding global malnutrition trends (1983-2019) among children under five, analyzing severe wasting, wasting stunting under weight and over weight.
2.	Idea / Solution description	Utilizing power BI for data visualization of malnutrition trends, correlating economic/geographical factors with malnutrition rates for inform policy making.
3.	Novelty / Uniqueness	Combines historical UNICEF/WHO World Bank data with advanced visual analytics classifies countries based on income & development status for deeper insights.
4.	Social Impact / Customer Satisfaction	Provides data-driven insights for policymakers, NGO's , and governments to target intervention, reducing child malnutrition and improving health outcomes.
5.	Business Model (Revenue Model)	Potential for consulting services, data-driven reports, and partnerships with health organizations, Governments and NGO's for actionable policy implementation.
6.	Scalability of the Solution	Highly scalable with expending datasets, AI integration, real-time analytics and applications to broader public health and nutrition initiatives.

Project Design Phase Solution Architecture

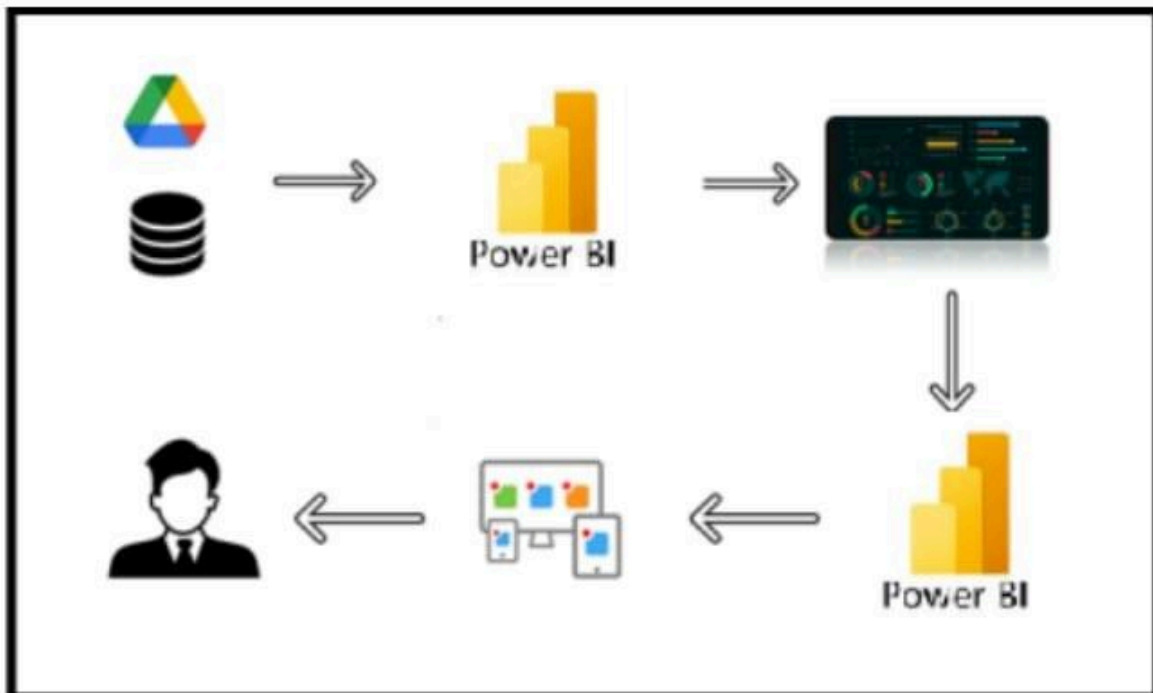
Date	15 February 2025
Team ID	LTVIP2025TMID21323
Project	Global Malnutrition Trends: A Power BI Analysis (1983-2019)
Maximum Marks	4 Marks

Solution Architecture:

Solution architecture is a complex process – with many sub-processes – that bridges the gap between business problems and technology solutions. Its goals are to:

- Find the best tech solution to solve existing business problems.
- Describe the structure, characteristics, behaviour, and other aspects of the software to project stakeholders.
- Define features, development phases, and solution requirements.
- Provide specifications according to which the solution is defined, managed, and delivered.

Example - Solution Architecture Diagram:



Project Planning Phase

Project Planning Template (Product Backlog, Sprint Planning, Stories, Story points)

Date	15February2025
Team ID	LTVIP2025TMID21323
Project Name	Global Malnutrition Trends: A Power BI Analysis (1983-2019).
MaximumMarks	5 Marks

ProductBacklog,SprintSchedule,andEstimation(4Marks)

Use the below template to create product backlog and sprint schedule

Sprint	Functional Requirement(Epic)	UserStory Number	UserStory/Task	StoryPoints	Priority	Team Members
Sprint-1	DataCollection	USN-1	As a data analyst,I want to collect malnutrition data from reliable sources.	2	High	S.Revathi
Sprint-1	DataCleaning	USN-2	As a data analyst, I want to clean and preprocess the collected data so that it is free from errors and ready for visualization.	3	medium	S.Revathi
Sprint-2	DataVisualization	USN-3	As a data analyst, I want to visualize global malnutrition trends using Power BI so that I can generate meaningful insights.	5	high	S.Anusha
Sprint-2	Trendanalysis	USN-4	Analyze historical malnutrition patterns.	3	high	Y.Kalpana
Sprint-2	ReportCreation	USN-5	Create reports for policymaker.	3	medium	Y.Mounika
Sprint-2	DataExport	USN-6	Export analyzed data for further studies.	2	low	Y.Mounika

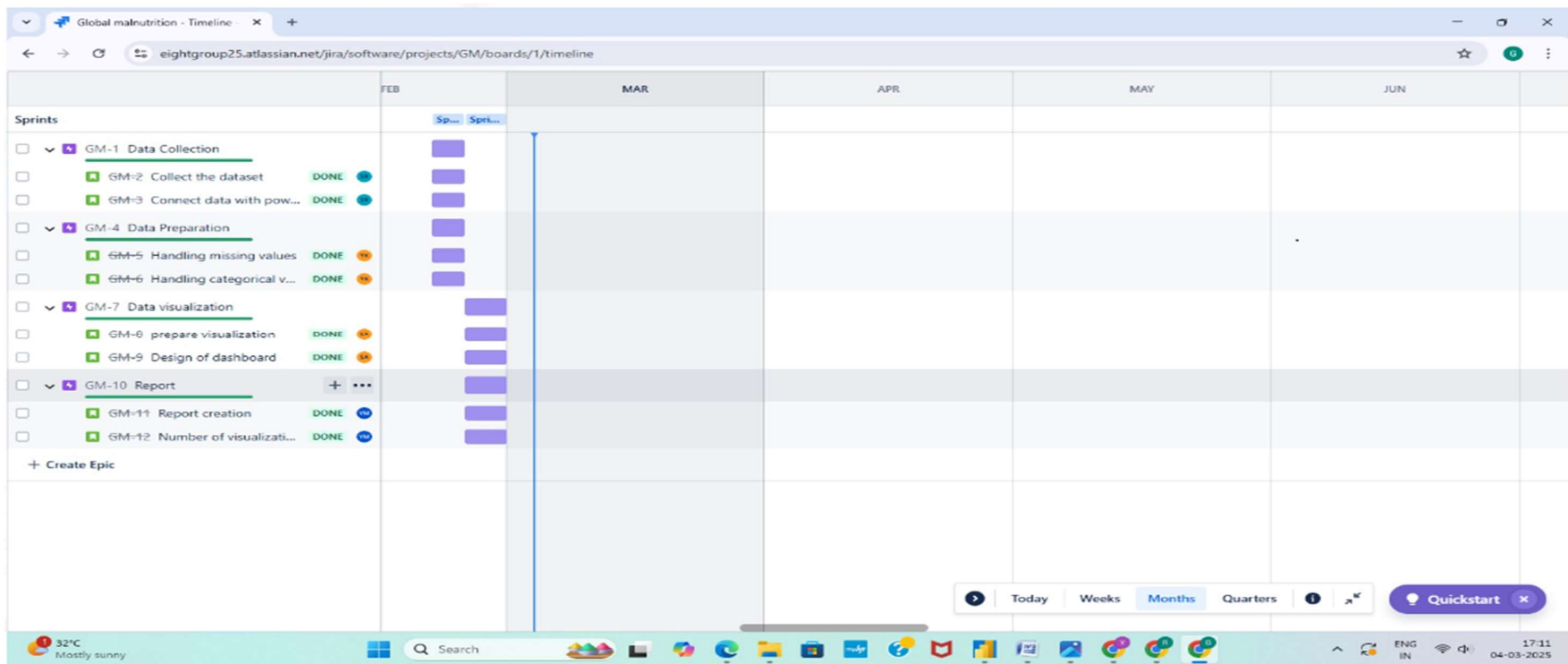
ProjectTracker,Velocity&BurndownChart:(4Marks)

Sprint	TotalStory Points	Duration	SprintStartDate	SprintEndDate (Planned)	Story Points Completed(ason PlannedEndDate)	SprintReleaseDate (Actual)
Sprint-1	24	2Days	20FEB 2025	21FEB2025	24	21FEB 2025
Sprint-2	24	2Days	22FEB 2025	23FEB 2025	24	23FEB 2025
Sprint-3	24	2Days	24FEB 2025	26FEB 2025	24	26FEB 2025
Sprint-4	24	2Days	27FEB 2025	28FEB 2025	24	28FEB 2025

Velocity:

Imaginewehavea10-daysprint duration, andthevelocity of the teamis20(pointspersprint). Let'scalculatetheteam'saveragevelocity(AV)per iteration unit (story points per day)

$$AV = \frac{\text{sprint duration}}{\text{velocity}} = \frac{20}{10} = 2$$



ProjectDevelopmentPhase
Model Performance Test

Date 10February2025
TeamID LTVIP2025TMID21323
ProjectName Global Malnutrition Trends: A Power BI Analysis (1983-2019)

MaximumMarks

ModelPerformanceTesting:

Projectteamshallfillthefollowinginformationinmodelperformancetestingtemplate.

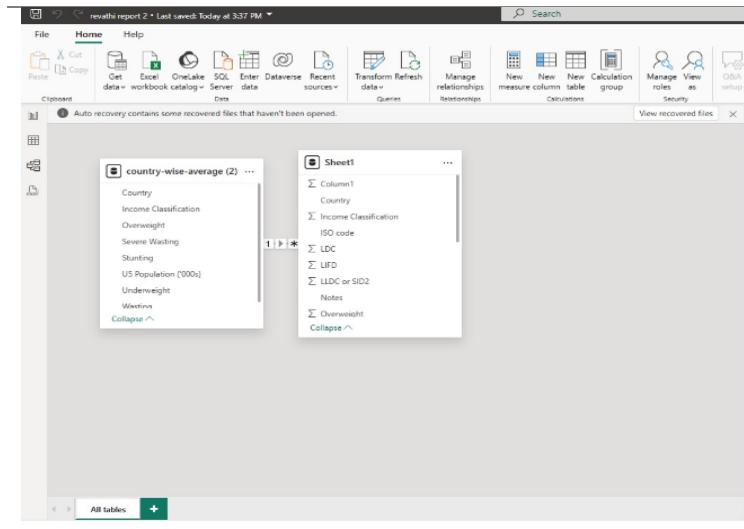
S.N	Parameter	Screenshot/Values
o.		
1.	Data Rendered	ctivity 1.1: Understand the dataData contains all the meta information regarding the columns described in the CSV Column Description of the Dataset:ISO code: Standardized two-letter country codes.Country: Name of the country.Survey Year: The year in which the survey data was collected.Year: The specific year of the data point.Income Classification: Income classification of countries (0: Low Income, 1: Lower Middle Income, 2: Upper Middle Income, 3: High Income).LDC: Indicator for Least Developed Countries (LDCs).LIFD: Indicator for Low Income Food Deficient (LIFD) countries.LLDC or SID2: Classification for Land Locked Developing Countries (1), Small Island Developing States (2), and Others (0).Survey Sample (N): The size of the survey sample.Severe Wasting: Average percentage of children with severe wasting.Wasting: Average percentage of children with wasting.Overweight: Average percentage of overweight children.Stunting: Average percentage of children with stunting.Underweight: Average percentage of underweight children.U5 Population ('000s): Population of children under five years old (in thousands)

2. Data Preprocessing

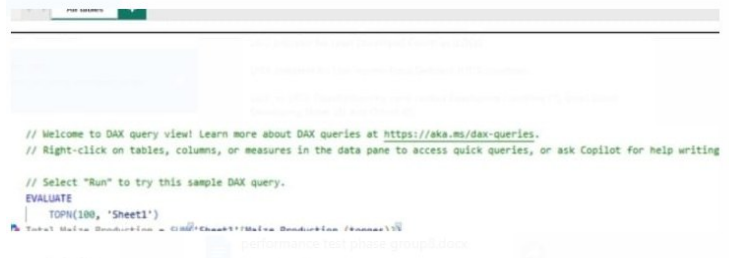
The screenshot displays a data preprocessing interface. On the left, a 'Data' panel lists various variables for selection, including 'US Population...', 'Underweight', 'Wasting', 'Country', 'Income Classif...', 'ISO code', 'LDC', 'LFD', 'LDC or SID2', 'Notes', 'Overweight', 'Report Author', 'Severe Wasting', 'Short Source', 'Source', 'Shunting', 'Survey Sampl...', 'Survey Year', 'US Population...', 'Underweight', 'Wasting', and 'Year'. The main area shows a data table with columns: 'Country', 'Survey Year', 'Year', 'Income Classification', 'LDC', 'LFD', 'LDC or SID2', 'Survey Sample (N)', 'Severe Wasting', 'Wasting', and 'Overweight'. The table contains data for various countries, including Albania, Bangladesh, Cambodia, and Colombia, with rows representing different survey years and population samples.

Country	Survey Year	Year	Income Classification	LDC	LFD	LDC or SID2	Survey Sample (N)	Severe Wasting	Wasting	Overweight
ALB	2010-2013	2010		0	0	0	1000	5.3	14	
ALB	2011-13	2012		2	0	0	2387	0.3	1.6	
AND	2011-16	2013		1	1	0	7688	1.1	4.8	
BAN	1995-97	1997		1	1	1	5394	6.6	20.7	
BAN	1999-02	2000		1	1	1	8007	3.2	12.3	
BAN	2004	2004		1	1	1	6232	3.2	14.6	
BAN	2007	2007		1	1	1	5988	2.9	17.3	
BAN	2011	2011		1	1	1	8179	6.1	19.7	
BAN	2014	2014		1	1	1	7942	3.2	14.4	
BAN	2017-18	2018		1	1	1		1.3	6.4	
BDI	2001	2001		0	1	1	4138	3.1	8	
BDI	2017-18	2018		0	1	1	5282	1.1	5	
BRA	1996	1996		2	0	0	4138	1	2.6	
CAM	2000	2000		1	1	0	3617	7.2	17.1	
CAM	01-06-2005	2002		1	1	0	3696	1.6	8.1	
CAM	01-11-2010	2010		1	1	0	4027	2.7	11	
CAM	2014	2014		1	1	0	3382	2.5	9.7	
CAM	1991	1991		1	0	1	2421	1.1	4.3	
CAM	2004	2004		1	0	1	3887	2.3	6.2	
CAM	2011	2011		1	0	1	8014	2	5.7	
COL	1995	1995		2	0	0	4458	0.3	1.7	
COL	2000	2000		2	0	0	4718	0.4	1	
COL	01-05-2004	2004		2	0	0	10752	0.4	1.6	
COL	01-10-2008	2010		2	0	0	10173	0.2	0.8	
CON	2003	2003		1	0	1	4937	1	8	
CON	01-12-2011	2011		1	0	1	4948	1.7	8	
CON	1995-97	1996		1	0	1	1051	1.9	6.5	

3 Utilization of Data Filters

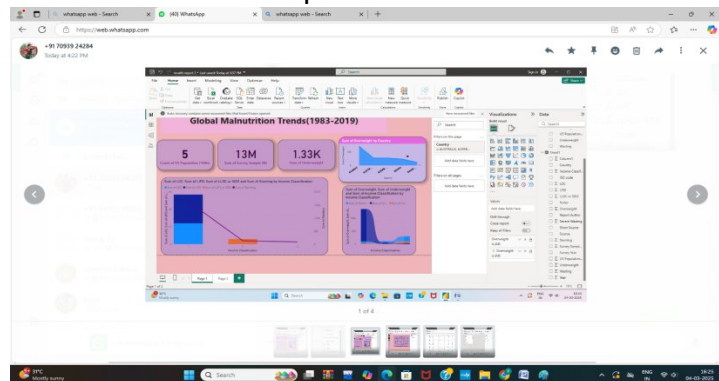


4 DAX Queries Used



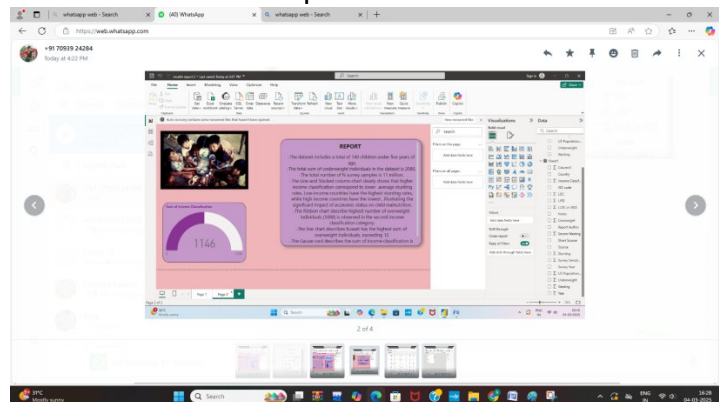
5 Dashboard design

Noof Visualizations/Graphs-8



6 Report Design

Noof Visualizations/Graphs-8



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

Introduction :

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.

Scenario 1: Count of U5 Population (140)

This metric represents the number of observations related to the under-five population in the dataset. It indicates the sample size or the count of data points collected.

Scenario 2: Sum of Survey Sample (11M)

The total sum of survey samples collected is 11 million. This large sample size adds robustness to the analysis and findings, ensuring that the insights derived are based on a substantial amount of data.

Scenario 3: Sum of Underweight (2.08K)

The total number of underweight cases is 2,080. This highlights the prevalence of underweight conditions among children under five, which is a critical aspect of malnutrition to address.

Scenario 4: Sum of LDC,LIFD,LLDC or SID2 and Average of Stunting by Income Analysis

The visualization is about the average spending by income. The x-axis shows income classification, likely divided into segments, and the y-axis shows the average spending. There is a trend line that shows that as income classification goes up, average spending also goes up.

Scenario 5: Sum of Overweight by Country

The visualization is about the total number of overweight people in various countries, according to a dataset titled "Sum of Overweight".

Scenario 6: Sum of Overweight and Underweight under Income Classification.

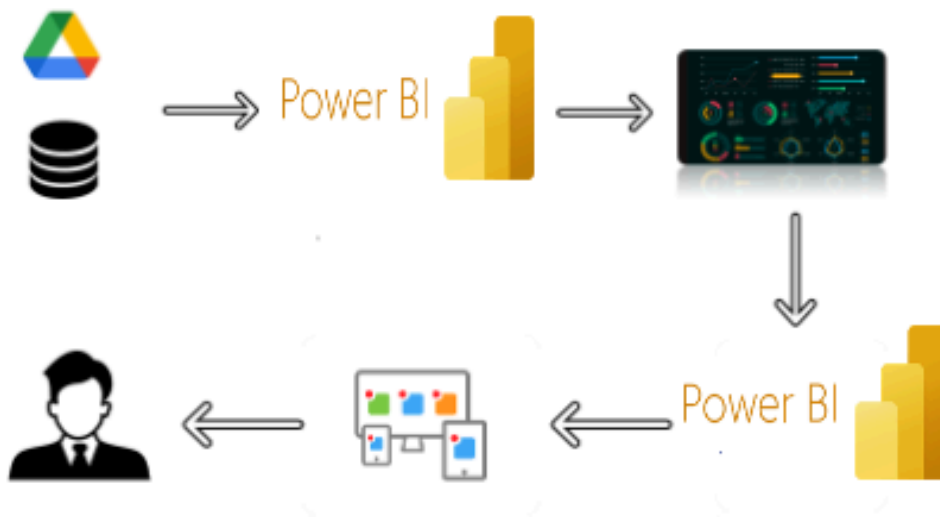
The width of each ribbon segment (overweight or underweight) for a specific income level indicates the relative size of that population group within that income bracket.

By following the ribbon's path, you can see if overweight or underweight populations become more or less dominant as income levels change.

Scenario 7: Sum of Income Classification

It represents the total income within each income bracket, but without knowing the number of people in each bracket, it's difficult to interpret. A high total could be due to a few very high earners or many people with moderate incomes. Labels for each income bracket (e.g., low, middle, high).

Technical Architecture:



Project Flow

To accomplish this, we have to complete all the activities listed below,

- Data Collection
 - Collect the dataset,
 - Connect Data with Power BI
- Data Preparation
 - Prepare the Data for Visualization
- Data Visualizations
 - Visualizations
- Dashboard
 - Responsive and Design of Dashboard
- Report
 - Report Creation
- Performance Testing
 - Utilization of Data Filters
 - No. of Calculation fields
 - No. of Visualizations/Graphs

- Project Demonstration & Documentation
 - Record explanation Video for project end to end solution
 - Project Documentation-Step by step project development procedure

Milestone 1: Data Collection & Extraction from Database

Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, evaluate outcomes and generate insights from the data.

Activity 1: Collect the dataset

Please use the link to download the dataset:

<https://www.kaggle.com/datasets/ruchi798/malnutrition-across-the-globe?select=malnutrition-estimates.csv>

Activity 1.1: Understand the data

Data contains all the meta information regarding the columns described in the CSV files

Column Description of the Dataset:

- ISO code: Standardized two-letter country codes.
- Country: Name of the country.
- Survey Year: The year in which the survey data was collected.
- Year: The specific year of the data point.
- Income Classification: Income classification of countries (0: Low Income, 1: Lower Middle Income, 2: Upper Middle Income, 3: High Income).
- LDC: Indicator for Least Developed Countries (LDCs).
- LIFD: Indicator for Low Income Food Deficient (LIFD) countries.
- LLDC or SID2: Classification for Land Locked Developing Countries (1), Small Island Developing States (2), and Others (0)
- Survey Sample (N): The size of the survey sample
- Severe Wasting: Average percentage of children with severe wasting.
- Wasting: Average percentage of children with wasting.
- Overweight: Average percentage of overweight children.
- Stunting: Average percentage of children with stunting.
- Underweight: Average percentage of underweight children.
- U5 Population ('000s): Population of children under five years old (in thousands).

Milestone 2: Data Preparatio

Preparing the data for visualization involves cleaning the data to remove irrelevant or missing data, transforming the data into a format that can be easily visualized, exploring the data to identify patterns and trends, filtering the data to focus on specific subsets of data, preparing the data for visualization software, and ensuring the data is accurate and complete. This process helps to make the data easily understandable and ready for creating visualizations to gain insights into the performance and efficiency. Since the data is already cleaned, we can move to visualization.

3.1: Data Loading :

<https://drive.google.com/file/d/1RYVFNkKA4hGTTgreAG1oD89a1Zt1VN3D/view>

3.2 Data Cleaning:

<https://drive.google.com/file/d/1Ra3PTOYfCchGPTcsCtKDR6R8hx7gWuld/view>

Milestone 3: Data Visualization

Data visualization:

<https://drive.google.com/file/d/1RaH6TaOlqdkOuKTKlawCZxVIEJhucjAP/view>

Data visualization is the process of creating graphical representations of data to help people understand and explore the information. The goal of data visualization is to make complex data sets more accessible, intuitive, and easier to interpret. By using visual elements such as charts, graphs, and maps, data visualizations can help people quickly identify patterns, trends, and outliers in the data.

Global Malnutrition Trends(1983-2019)

Activity 1.1: Count of U5 Population



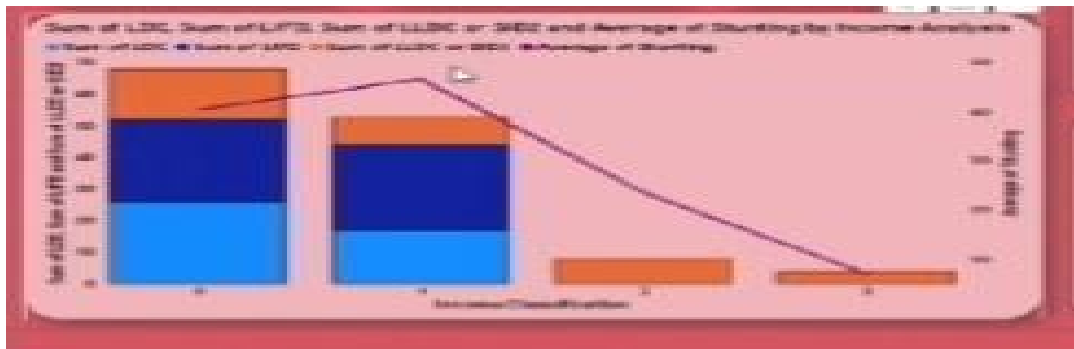
Activity 1.2: Sum of Survey Sample



Activity 1.3: Sum of Underweight



Activity 1.4: Sum of LDC,LIFD,LLDC or SID2 and Average of Stunting by Income Analysis



Activity 1.5: Sum of Overweight by Country



Activity 1.6: Sum of Overweight and Underweight under Income Classification.



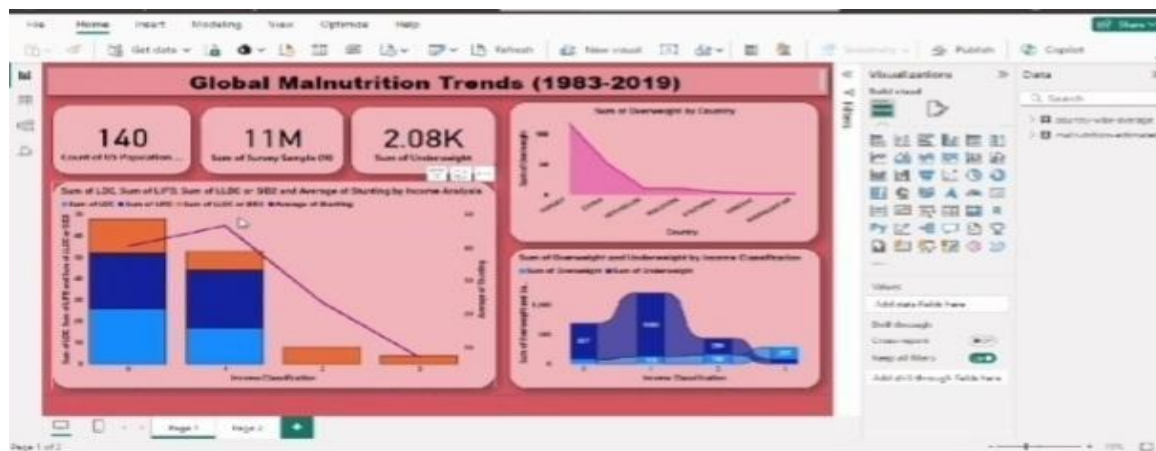
Activity 1.7: Sum of Income Classification



Milestone 4: Dashboard

A dashboard is a graphical user interface (GUI) that displays information and data in an organized, easy-to-read format. Dashboards are often used to provide real-time monitoring and analysis of data and are typically designed for a specific purpose or use case. Dashboards can be used in a variety of settings, such as business, finance, manufacturing, healthcare, and many other industries. They can be used to track key performance indicators (KPIs), monitor performance metrics, and display data in the form of charts, graphs, and tables.

Activity 1- Responsive and Design of Dashboard



Milestone 5: Report

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.

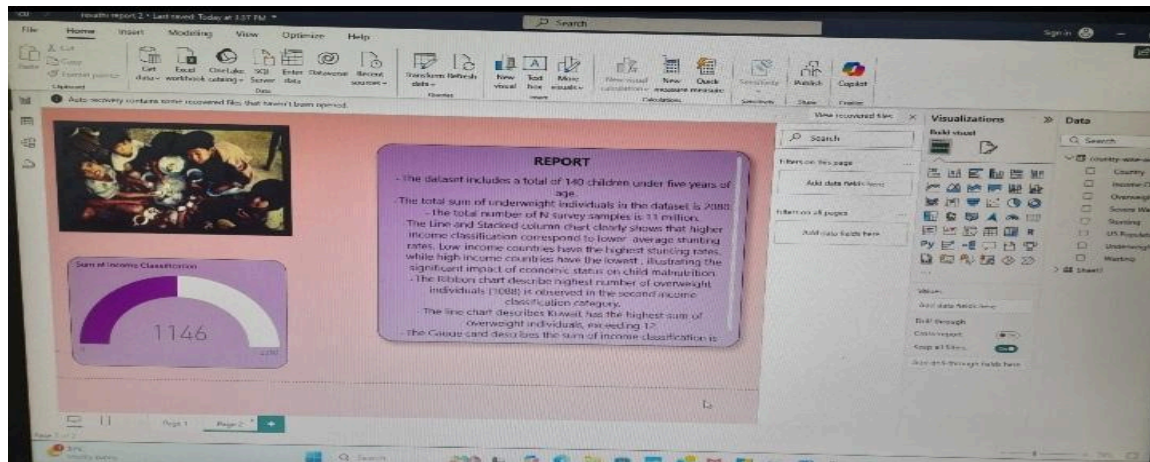
Design of Report

Data report:

<https://drive.google.com/file/d/1RkNc33UbclS2A3JgZRyifUg0PovrozE7/view>

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



Milestone 6: Performance Testing

Amount of Data Loaded

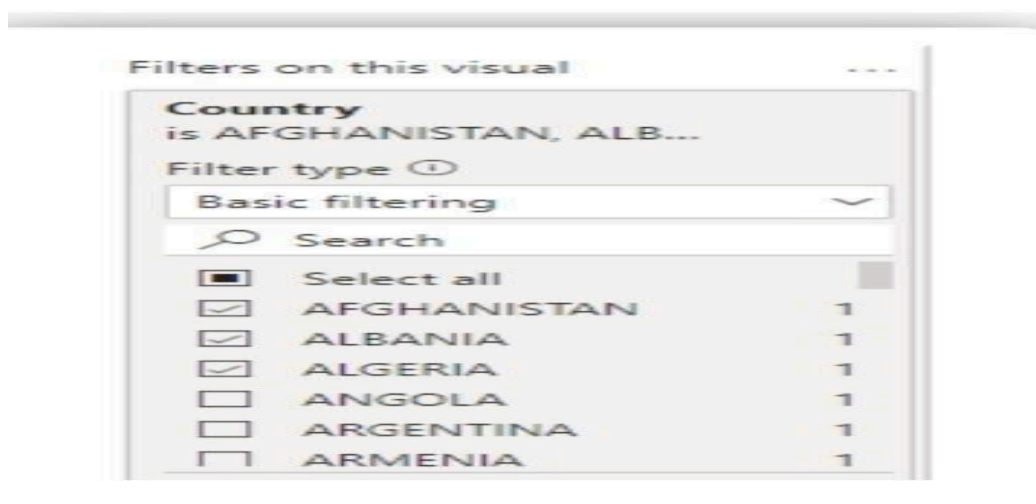
"Amount of Data Loaded" refers to the quantity or volume of data that has been imported, retrieved, or loaded into a system, software application, database, or any other data storage or processing environment. It's a measure of how much data has been successfully processed and made available for analysis, manipulation, or use within the system.



Utilization of Filters

"Utilization of Filters" refers to the application or use of filters within a system, software application, or data processing pipeline to selectively extract, manipulate, or analyze data based on specified criteria or conditions.

Activity 2.1: Selected "Country" as a Filter



No of Visualizations/ Graphs

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

Milestone 7: Project Demonstration & Documentation

Below mentioned deliverables to be submitted along with other deliverables

Activity 1: - Record explanation Video for the project's end-to-end solution

Activity 2: - Project Documentation-Step by step project development procedure

Create document as per the template provided

