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**BACHELOR OF SCIENCE IN APPLIED DATA SCIENCE AND COMMUNICATION**  
**INTAKE 41**

**LB 2114: ADVANCED SQL AND CLOUD DATABASES**

**ASSIGNMENT**

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# **Task - 03**

## **Technical Report**

### **Data Ingestion, Cleaning, Analysis and Visualization from the United Nations Sustainable Development Goals (SDG) Data Repository**



**THE GLOBAL GOALS**  
For Sustainable Development

## Table of Contents

1. Introduction .....	4
1.1. Data Acquisition and Initial Staging.....	5
1.2. Data Preview and Column Modification .....	11
2.Advanced SQL Operations .....	18
2.1. Data Cleaning Operations.....	18
2.2. Use of Views and Common Table Expressions (CTEs) .....	19
2.3. Stored Procedure for Power BI.....	20
2.4. Verified structure before Power BI.....	21
2.5. Data Cleaning Operations.....	22
2.6. Database Schema Design and Normalization.....	23
2.7. Schema Verification .....	26
2.8. Data Cleaning and Normalization .....	29
3.Query Editor Operations .....	31
3.1. Data Import and Navigation.....	31
3.2. Transformation .....	35
4. Implementation of DAX queries.....	41
5. Implementation of Power Bi Dashboard .....	50
5.1. Overview.....	50
5.2. Goal 1(No Poverty) .....	52
5.3. Goal 2 (Zero Hunger) .....	57
5.4. Goal 3 (Good Health and Wellbeing) .....	61
5.5. Goal 13 (climate change) .....	65
5.6. Key Findings and Revealed Trends .....	69
6. Challenges .....	69
7. Conclusion.....	69
7.1. What does this mean for policy makers and NGOs.....	70
7.2. Overview and Improving Workflow .....	70

## 1. Introduction



*Figure 1: Sustainable Development Goals*

In this report, we describe a project to use data analytics tools to analyze vast amounts of complex UN SDG Data into useful actionable insights. Using Power BI tools, we will walk through the entire process of collecting and preparing data to analyze and visualize it in Microsoft Power BI. The end project will be an interactive dashboard that presents critical trends and disparities among nations' Global issues such as poverty, health, energy & others. Building technical skills in modelling data, DAX, and creating interactive reports is just one benefit of this work but this work also highlights the significant role that the data professional community has in contributing to the attainment of sustainable development goals at the global level.

## UN Website interface



Figure 2: UN Interface

### 1.1. Data Acquisition and Initial Staging

The first step of this endeavor covered the careful identification and procurement of these datasets using the UN SDG Data Platform. As can be made out from the screenshots of the platform interface provided later, this repository banks on a wide set of indices. To carry out this evaluation, the multi-focal method could identify major indices of the four pivotal indices of:

**Goal 1** - End poverty in all its forms everywhere.

**Goal 2** - End hunger, achieve food security and improved nutrition and promote sustainable agriculture.

**Goal 3** - Ensure healthy lives and promote well-being for all ages.

**Goal 13** -Take urgent action to combat climate change and its impacts.

The screenshot shows the Global SDG Indicators Data Platform interface. At the top, there is a navigation bar with links for Home, SDG Indicators, Data, SDG Reports, HLG/PCCB, IALG/SDG's, Events, and Resources. A banner at the top right reads "Global SDG Indicators Data Platform". Below the banner, there are two sections: "Indicators (Selected 131 of 708 series)" and "Countries, areas or regions (Selected 294 of 294)". Under the indicators section, there is a search bar and a list of goals with checkboxes. The selected goals are Goal 1 (End poverty in all its forms everywhere) and Goal 3 (Ensure healthy lives and promote well-being for all at all ages). There are also other unselected goals like Goal 2, 4, 5, and 6.

Figure 3: Goal 1&3 Selection

This screenshot shows the same interface as Figure 3, but with a different set of selected goals. The "Indicators" section now shows Goal 2 (End hunger, achieve food security and improved nutrition and promote sustainable agriculture) is selected. Other goals like Goal 1, 3, 4, 5, and 6 are unselected. The "Countries, areas or regions" section remains at 0 selected items.

Figure 4: Goal 2 Selection

This screenshot shows the interface again with a different selection. Now, Goal 13 (Take urgent action to combat climate change and its impacts) is selected in the "Indicators" section. Other goals like Goal 11, 12, 14, 15, 16, and 17 are unselected. The "Countries, areas or regions" section still shows 0 selected items. At the bottom of the page, there are sections for "SDG Indicators" (with a link to the "Official list of SDG indicators") and "Resources" (with a link to "Regional Groupings").

Figure 5: Goal 13 Selection

The screenshot shows the United Nations Department of Economic and Social Affairs SDG Indicators Database. At the top, there are navigation links for Home, SDG Indicators, Data, SDG Reports, HLG-PCCB, IAEG-SDGs, Events, and Resources. On the right, there is a "SUSTAINABLE DEVELOPMENT GOALS" logo. The main area contains three filter sections: "Data Series (Selected 131 of 708)", "Countries, areas or regions (Selected 0 of 294)", and "Period (Range Years)". Below these are download buttons for "Show Results" and various file formats like CSV, Excel, and PDF. To the right, there is a "Important Information" section with links to "Read FAQs", "Metadata Repository", and a note about the new database launch.

*Figure 6: Datasets that are ready to download*

When this Project began, the raw Excel files were difficult to understand and contained not just technical codes and footnotes, but multiple columns of data in addition to standard columns of Country and Value. To clean and structure the data, the first step was to import the files into SQL Server. Staging tables were created in SQL Server using the SQL Server Import/Export Wizard. This created a secure landing area, where the imported data would remain unchanged until it had been transformed. The images labelled G1 import and Preview data(G1) show an initial preview of the data being imported and how the columns have been mapped in the import interface.

Name	Date modified	Type	Size
Goal1	11/21/2025 12:31 AM	Microsoft Excel Co...	40,912 KB
Goal2	11/23/2025 5:20 PM	Microsoft Excel Co...	63,457 KB
Goal3	11/21/2025 11:15 PM	Microsoft Excel Co...	82,353 KB
Goal13	11/21/2025 12:12 AM	Microsoft Excel Co...	10,679 KB

*Figure 7: Datasets*

This screenshot shows a Microsoft Excel spreadsheet titled 'Goal'. The data is organized into several columns: Goal, Target, Indicator, SeriesCode, SeriesDesc, GeoAreaC, GeoAreaN, TimePeriod, Value, Time\_Dets, TimeCover, UpperBou, LowerBou, BasePerio, Source, GeoInfoUI, FootNote, Age, Freq, Hazard ty, IHR, Capac, Location, and Name of R. The rows contain numerous entries, mostly 'Poverty' and 'Accessed J ALLAGE', spanning from 2000 to 2021 across various regions like World, Africa, and specific countries.

Figure 8: Goal 1 Datasets in excel

This screenshot shows a Microsoft Excel spreadsheet titled 'Goal'. The data is organized into several columns: Goal, Target, Indicator, SeriesCode, SeriesDesc, GeoAreaC, GeoAreaN, TimePeriod, Value, Time\_Dets, TimeCover, UpperBou, LowerBou, BasePerio, Source, GeoInfoUI, FootNote, Age, Freq, Location, Nature, Observatio, Quantite, Reporting, Severity, of Sex, Type of prc, and Units. The rows contain entries from various organizations like FAO, UN, and Food and Agriculture Organization of the United Nations (FAO), with values ranging from 1 to 2024.

Figure 9: Goal 2 Datasets in excel

Figure 9 shows a screenshot of Microsoft Excel with two datasets for Goal 3. The first dataset (rows 2-27) contains data for SH\_STA\_N Maternal mortality across various years and countries. The second dataset (rows 28-46) contains data for SH\_STA\_N Mortality across various years and countries.

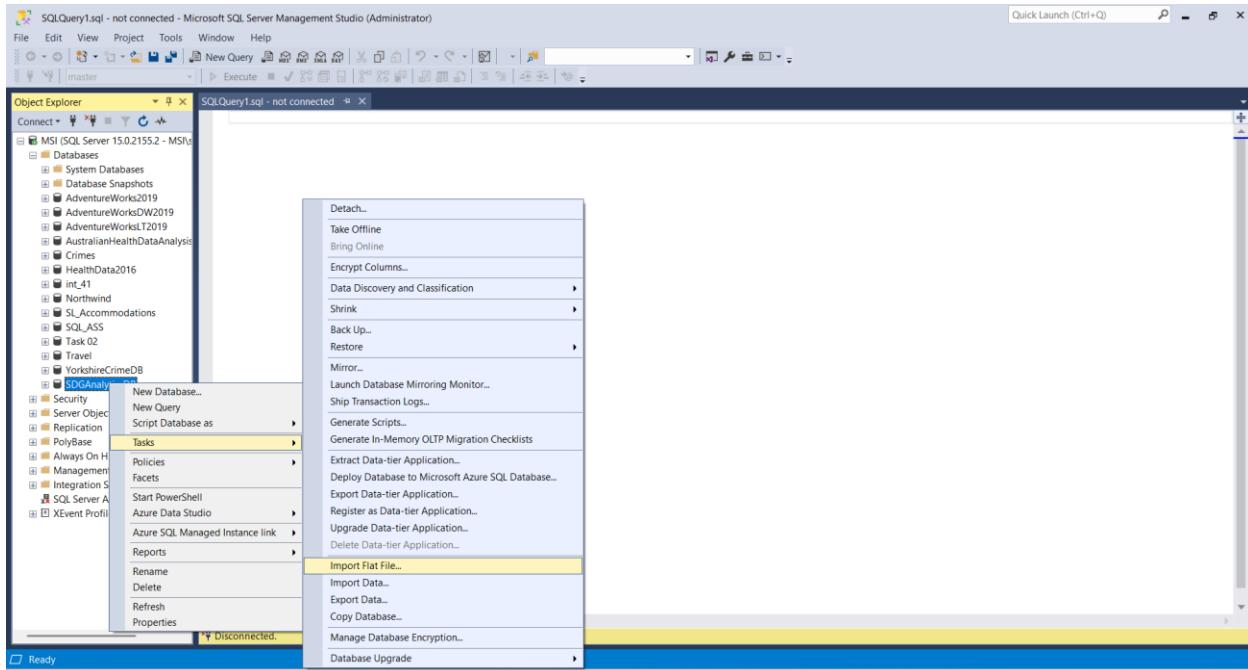
Goal	Target	Indicator	SeriesCode	SeriesDesc	GeoAreaC	GeoAreaN	TimePeriod	Value	Time_Deti	TimeCove	UpperBou	LowerBou	BasePerio	Source	GeoInfo	FootNote	Age	Freq	Hazard	ty	IHR	Capac	Location	Name of r	Nu
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2000	327.62899	2000	348.62009	308.78183	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2001	321.17522	2001	341.54419	303.03583	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2002	311.38922	2002	330.99688	293.99563	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2003	300.77099	2003	319.32004	284.33819	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2004	290.93301	2004	308.99006	275.28348	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2005	282.96247	2005	300.15311	267.64699	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2006	275.83494	2006	291.90574	261.31831	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2007	269.23864	2007	284.68276	255.41918	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2008	264.20238	2008	279.49171	250.32001	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2009	258.4926	2009	273.2839	244.90317	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2010	253.34397	2010	268.37577	239.6469	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2011	247.32633	2011	262.49452	233.09602	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2012	238.81865	2012	254.26637	224.17893	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2013	235.36088	2013	252.35813	220.08157	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2014	230.63485	2014	249.25838	214.65991	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2015	227.7372	2015	248.23762	210.95478	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2016	220.34515	2016	242.22765	203.36684	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2017	214.70836	2017	236.49714	197.10117	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2018	210.89553	2018	236.2302	192.83831	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2019	207.09742	2019	234.60247	188.56059	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2020	210.50068	2020	241.64968	190.49598	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2021	241.94014	2021	280.93988	217.09124	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2022	202.5805	2022	237.40361	181.56184	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	1	World	2023	197.30537	2023	233.99419	174.48509	MMEIG	es														N
3'3.1	3.1.1	SH_STA_N Maternal r	4	Afghanista	2000	1371.6459	2000	1828.32189	374.9588	MMEIG	es														M
3'3.1	3.1.1	SH_STA_N Maternal r	4	Afghanista	2001	1310.9589	2001	1734.1668	906.87293	MMEIG	es														M

Figure 9: Goal 3 Datasets in excel

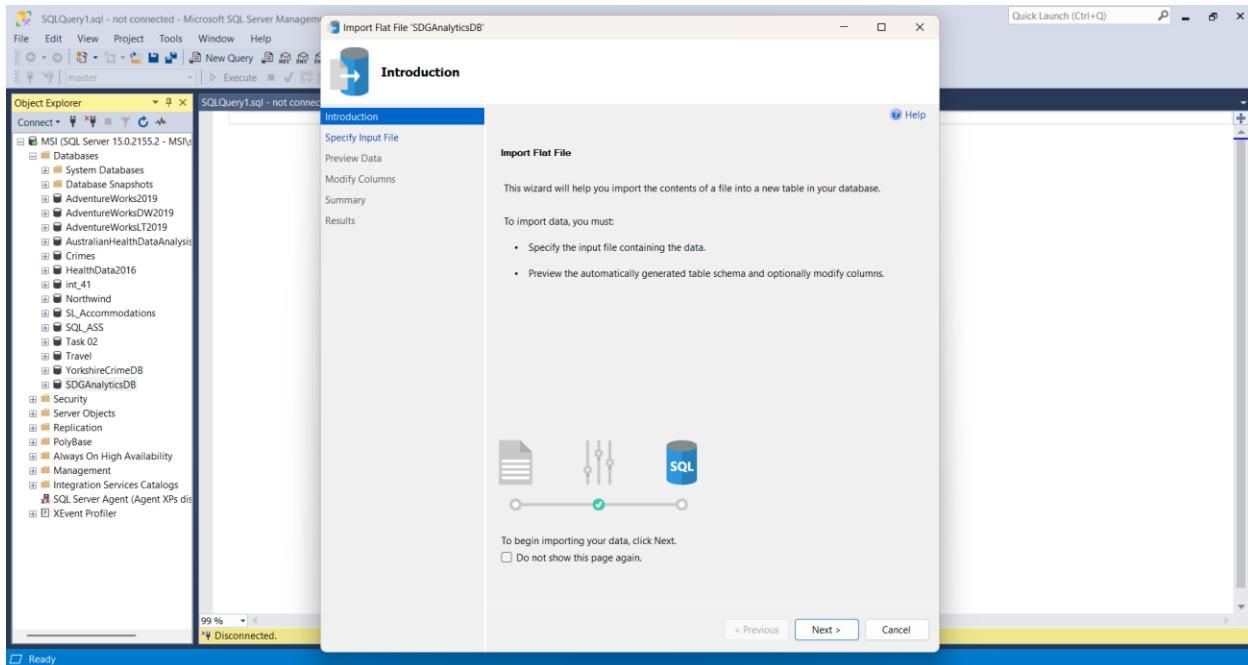
Figure 10 shows a screenshot of Microsoft Excel with two datasets for Goal 13. The first dataset (rows 2-27) contains data for VC\_DSR\_A Number of cases across various years and countries. The second dataset (rows 28-46) contains data for VC\_DSR\_A Number of cases across various years and countries.

Goal	Target	Indicator	SeriesCode	SeriesDesc	GeoAreaC	GeoAreaN	TimePeriod	Value	Time_Deti	TimeCove	UpperBou	LowerBou	BasePerio	Source	GeoInfo	FootNote	Hazard	ty	Location	Nature	Report	On	Reporting	Type of re	Ty
13'13.1	13.1.1	VC_DSR_A Number of	4	Afghanista	2017	24664	2017	2017	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	4	Afghanista	2018	9086	2018	2018	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	4	Afghanista	2019	289693	2019	2019	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2005	8867	2005	2005	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2006	975	2006	2006	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2007	226	2007	2007	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2008	243	2008	2008	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2009	7767	2009	2009	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2010	42221	2010	2010	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2011	692	2011	2011	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2012	1652	2012	2012	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2013	4801	2013	2013	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2014	4054	2014	2014	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2015	1091	2015	2015	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2016	699	2016	2016	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2017	5	2017	2017	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2018	4683	2018	2018	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2019	1453	2019	2019	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2022	135628	2022	2022	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2023	22971	2023	2023	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	8	Albania	2024	52	2024	2024	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	12	Algeria	2005	242	2005	2005	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	12	Algeria	2006	5638	2006	2006	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	12	Algeria	2007	355	2007	2007	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	12	Algeria	2008	30757	2008	2008	United Na	Disclaimer	C	G													
13'13.1	13.1.1	VC_DSR_A Number of	12	Algeria	2009	1164	2009	2009	United Na	Disclaimer	C	G													

Figure 10: Goal 13 Datasets in excel



*Figure 11: Newly created datasets after removing unnecessary data.*



*Figure 12: Import flat files to SQL*

## 1.2. Data Preview and Column Modification

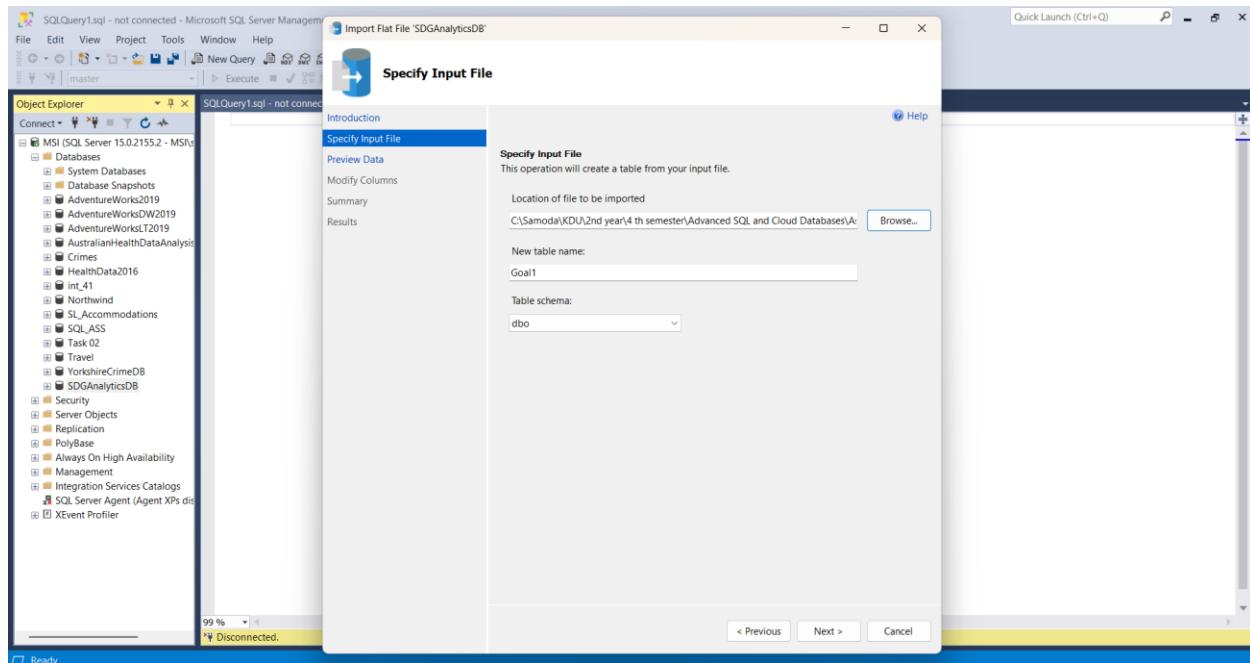


Figure 13: G1 import

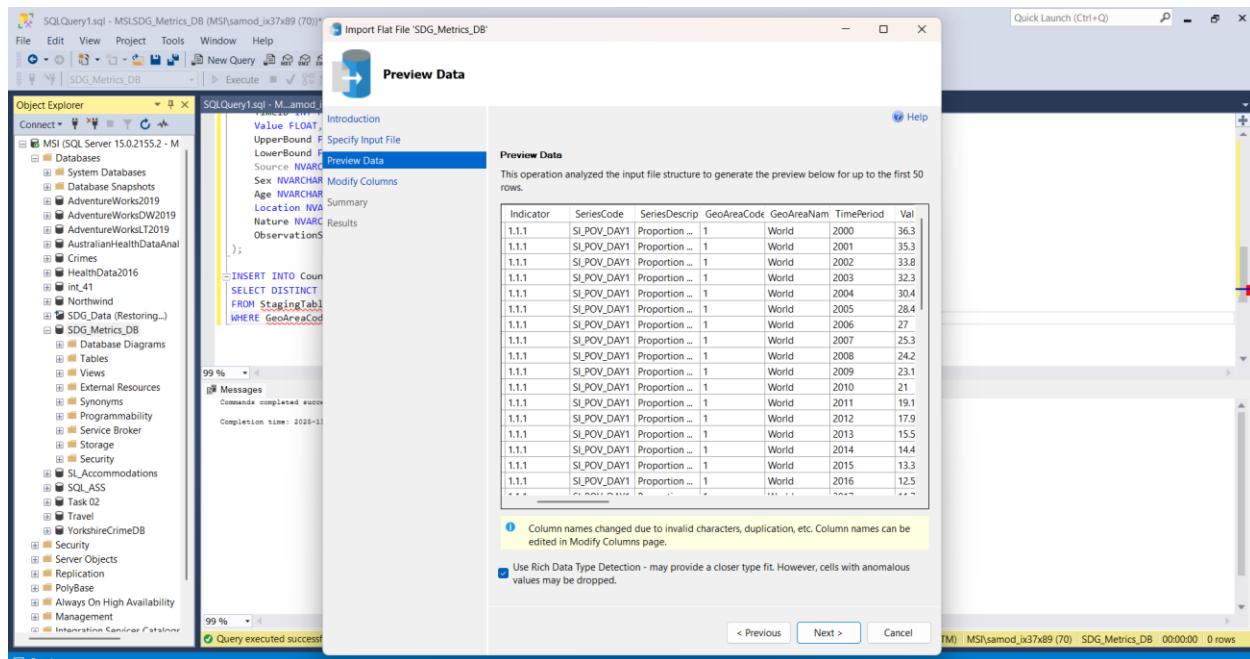


Figure 14: G1 preview data

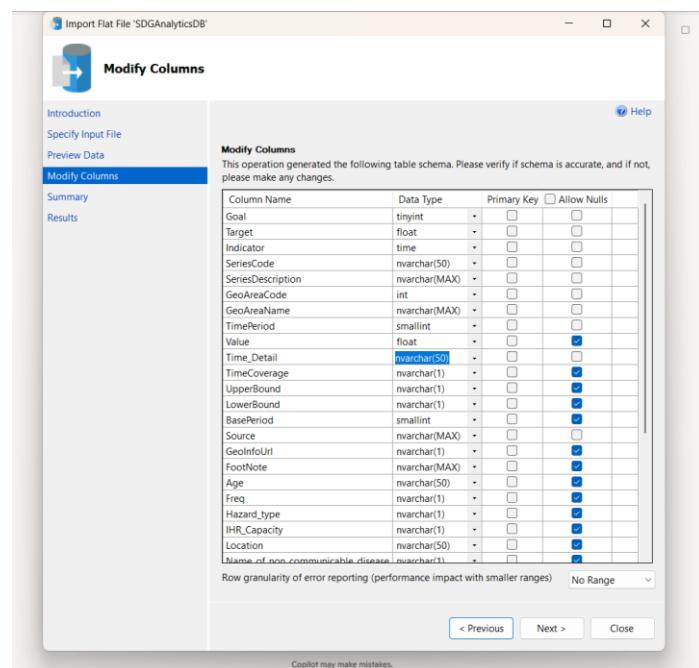


Figure 15: G1 Modify columns by checking nulls

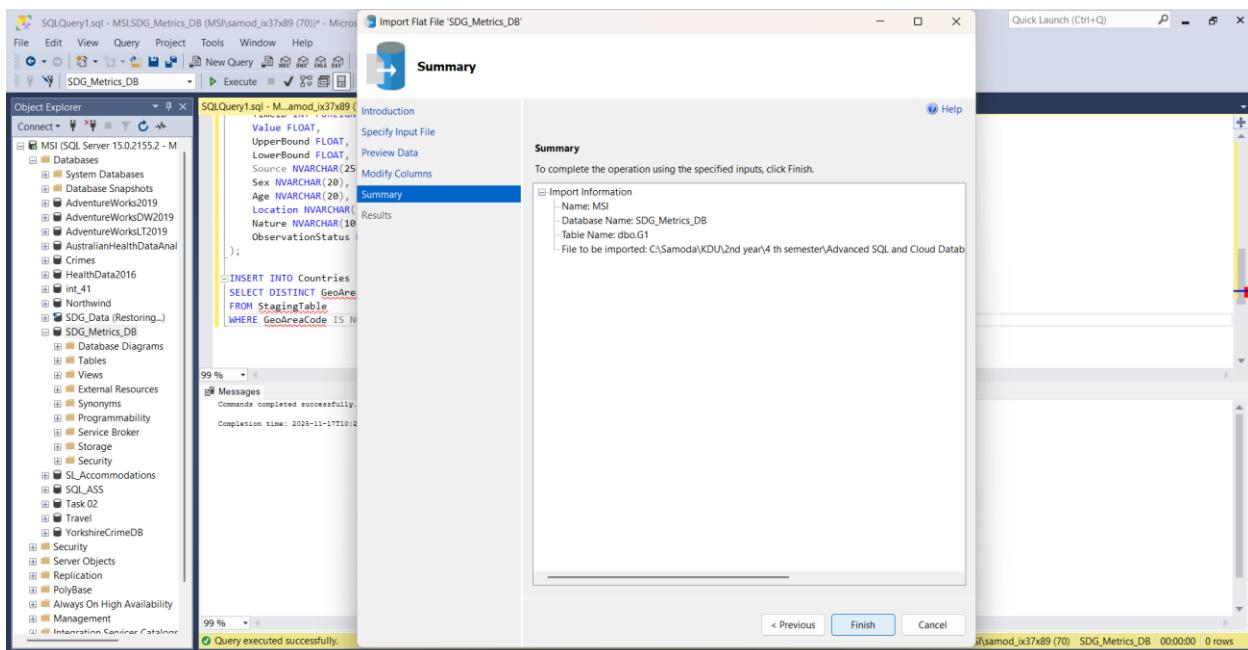


Figure 16: G1 Summary

SQLQuery1.sql - MSLSDG\_Metrics\_DB (MSI\samod\_1x37x89 (70)) - Microsoft SQL Server Management Studio

File Edit View Project Tools Window Help

Object Explorer

Databases

Tables

Views

External Resources

Synonyms

Programmability

Service Broker

Storage

Security

SL Accommodations

SQL ASS

Task 02

Travel

YorkshireCrimeDB

Security

Server Objects

Replication

PolyBase

Always On High Availability

Management

Integration Services Catalogs

SQL Server Agent (Agent XPs)

XEvent Profiler

SQLQuery1.sql - MSLSDG\_Metrics\_DB (MSI\samod\_1x37x89 (70))

New Query Execute Results Import Flat File 'SDG\_Metrics\_DB'

Introduction Specify Input File Preview Data Modify Columns Summary Results

Operation Complete

Summary:

Name	Result
Insert Data	Success

Messages

Commands completed successfully.

Completion time: 2025-11-17T10:2

99 %

99 %

Query executed successfully.

14:49 Col 59 Ch 59 INS

J:\samod\_1x37x89 (70) SDG\_Metrics\_DB 00:00:00 0 rows

Figure 17: G1 Results

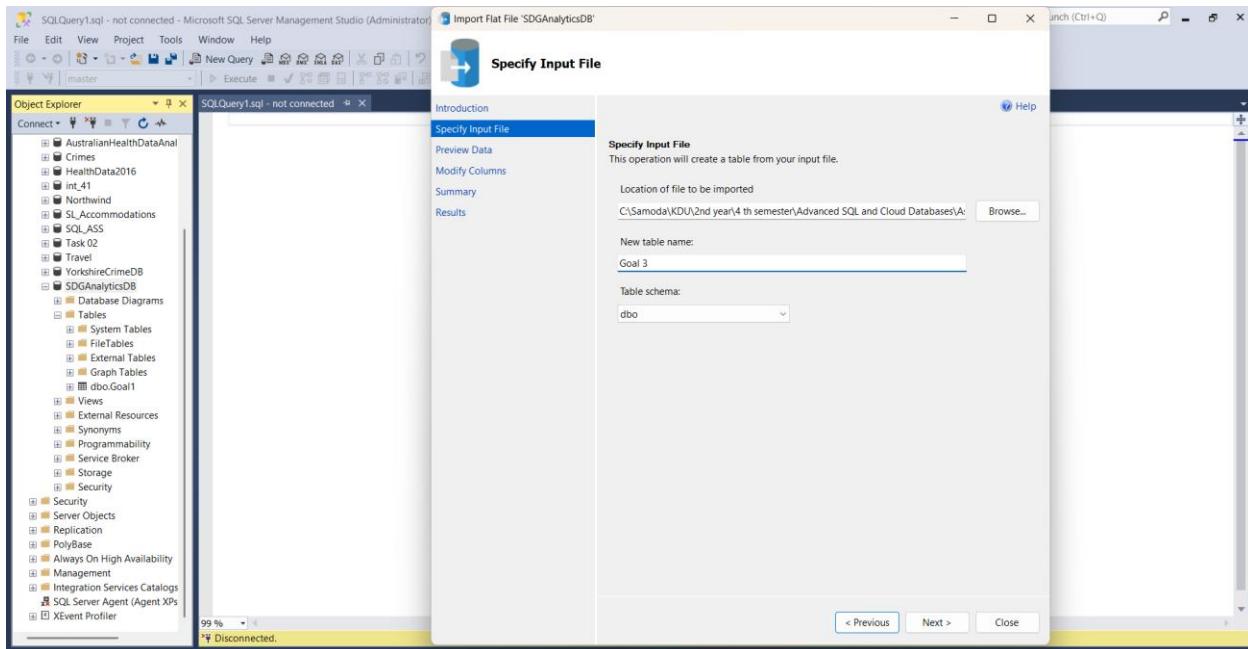


Figure 18: G3 Import

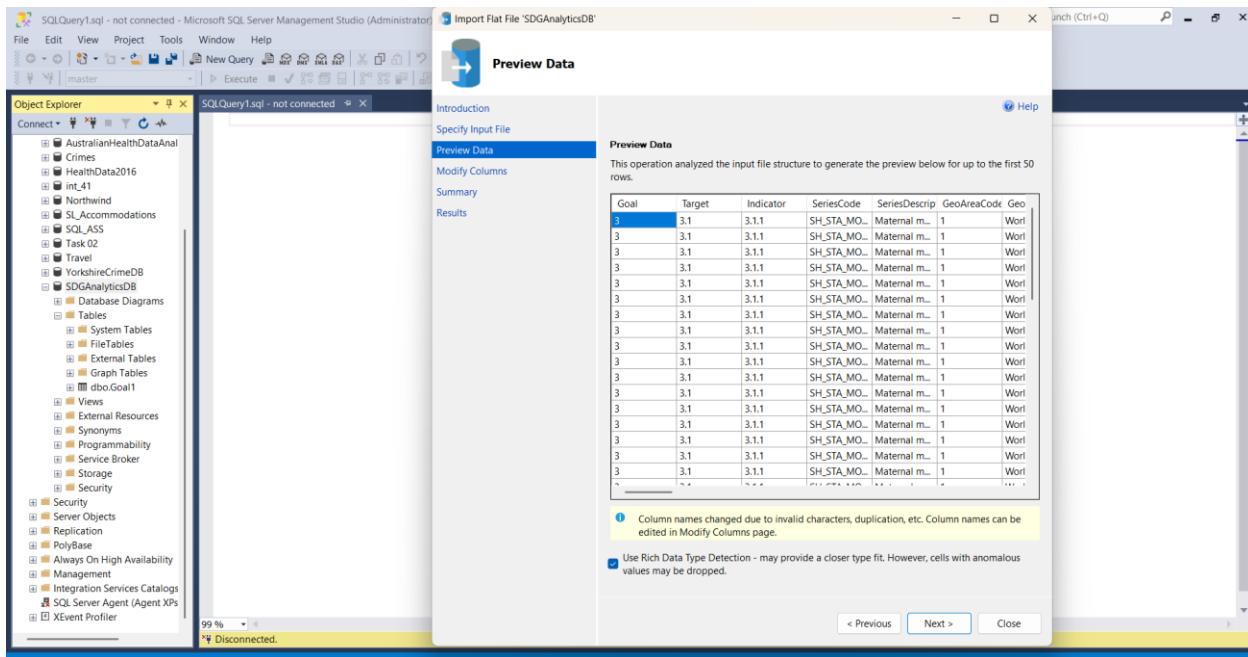


Figure 19: G3 preview data

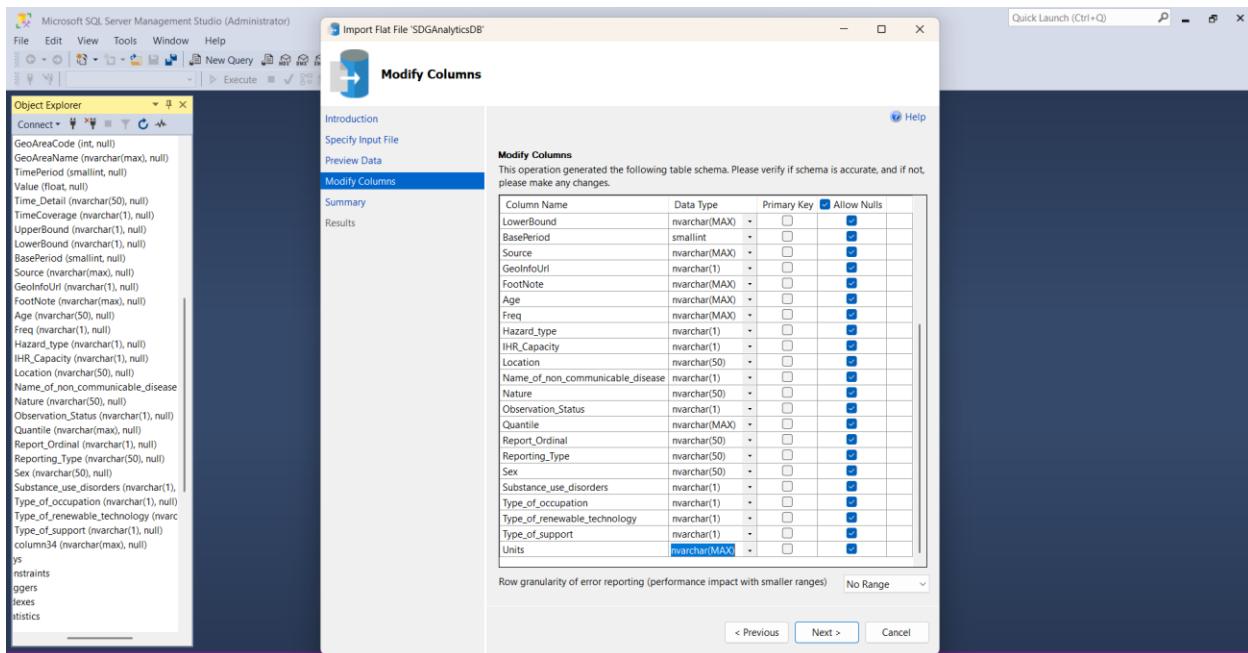


Figure 20: G3 Modify columns

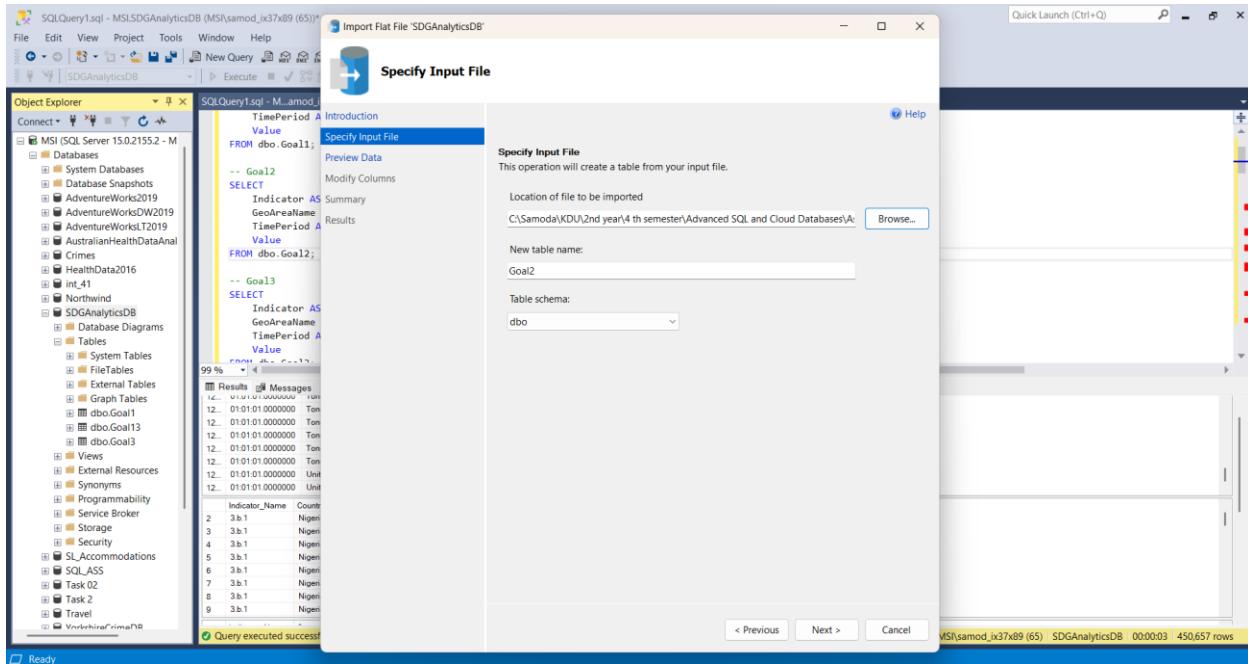


Figure 21: G2 import

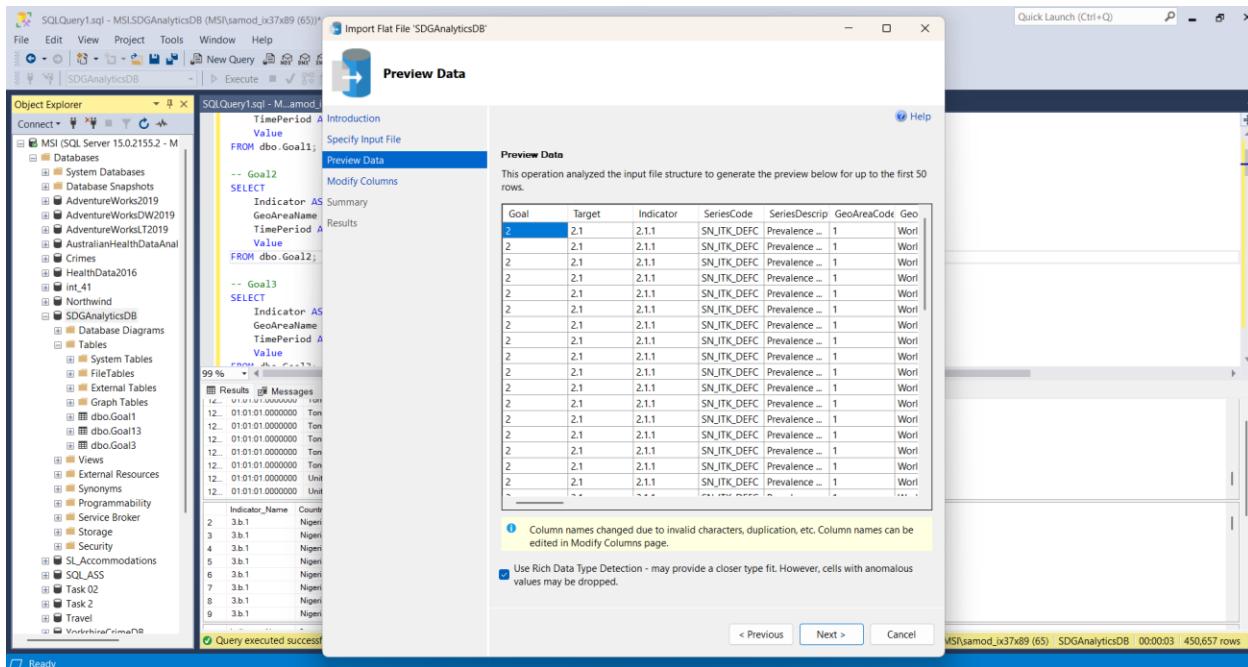


Figure 22: G2 Preview Data

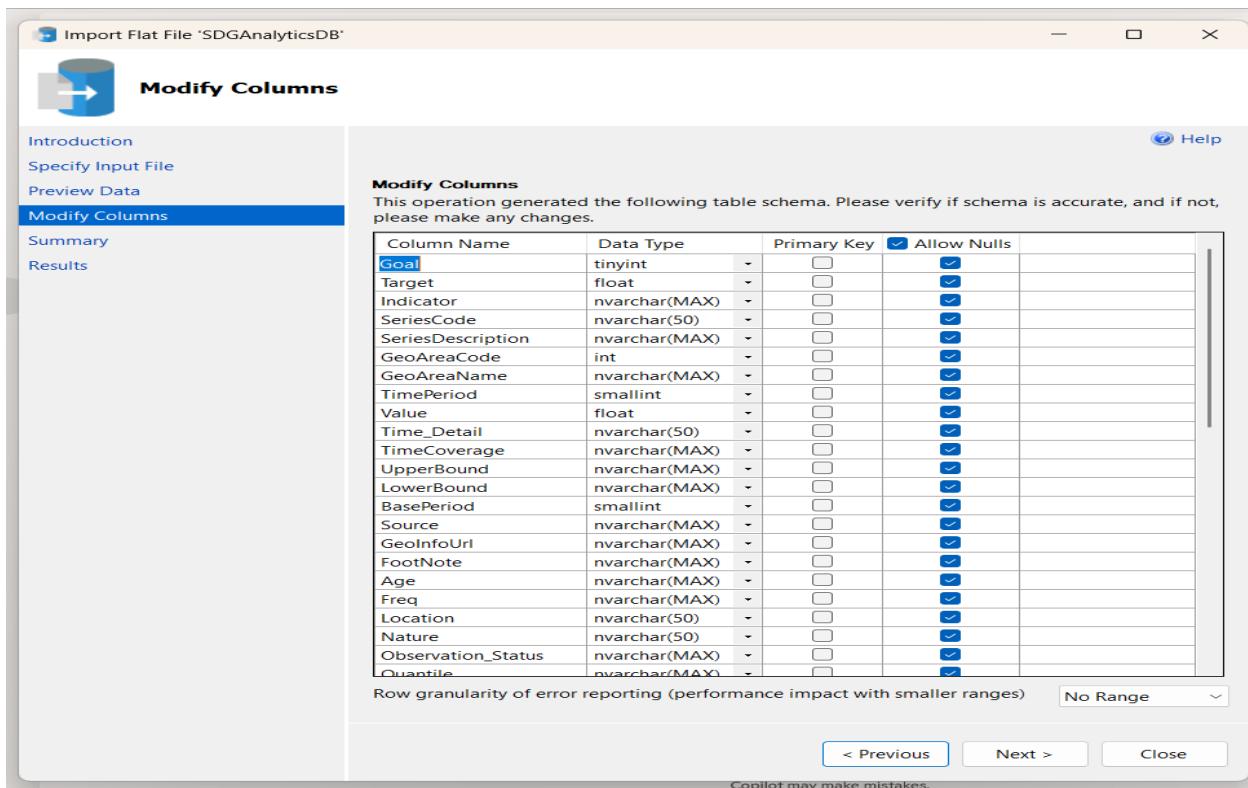


Figure 23: G2 Modify columns

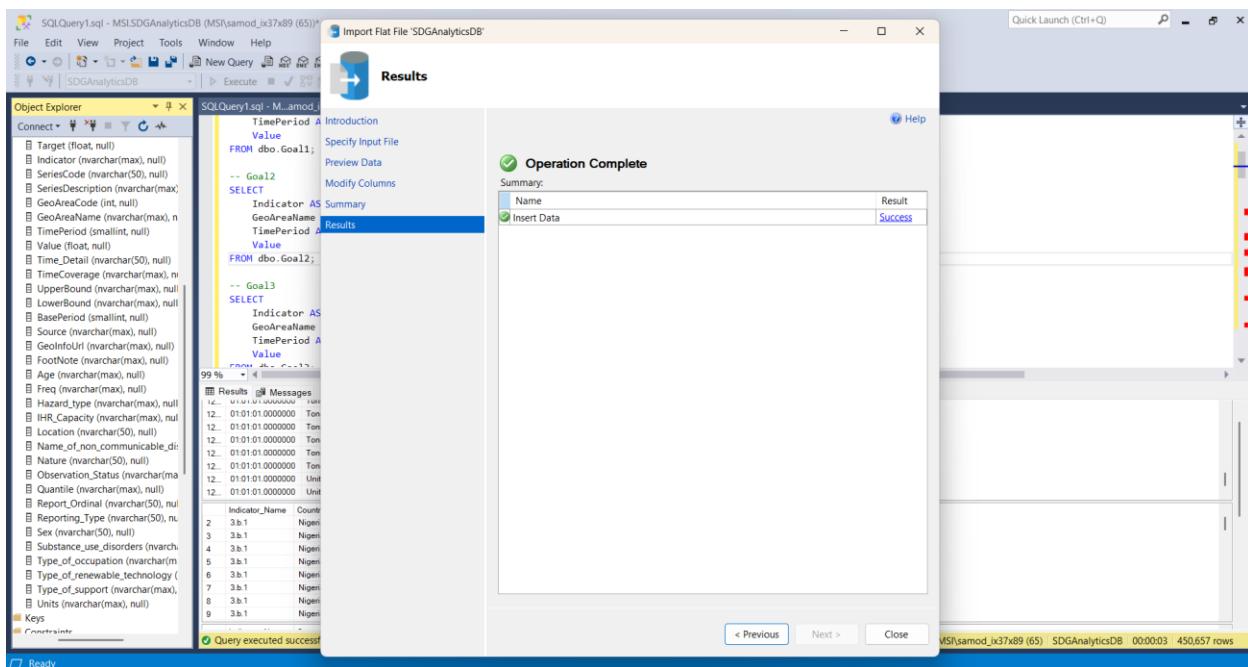


Figure 24: G2 Result

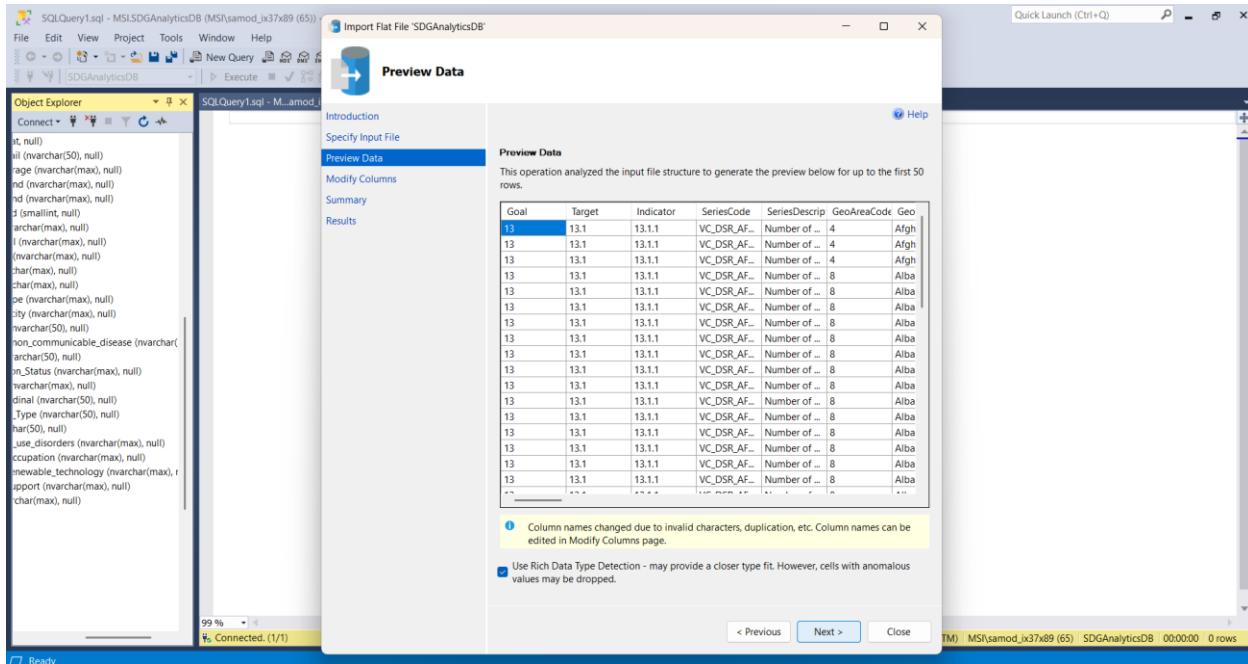


Figure 25: G13 Preview data

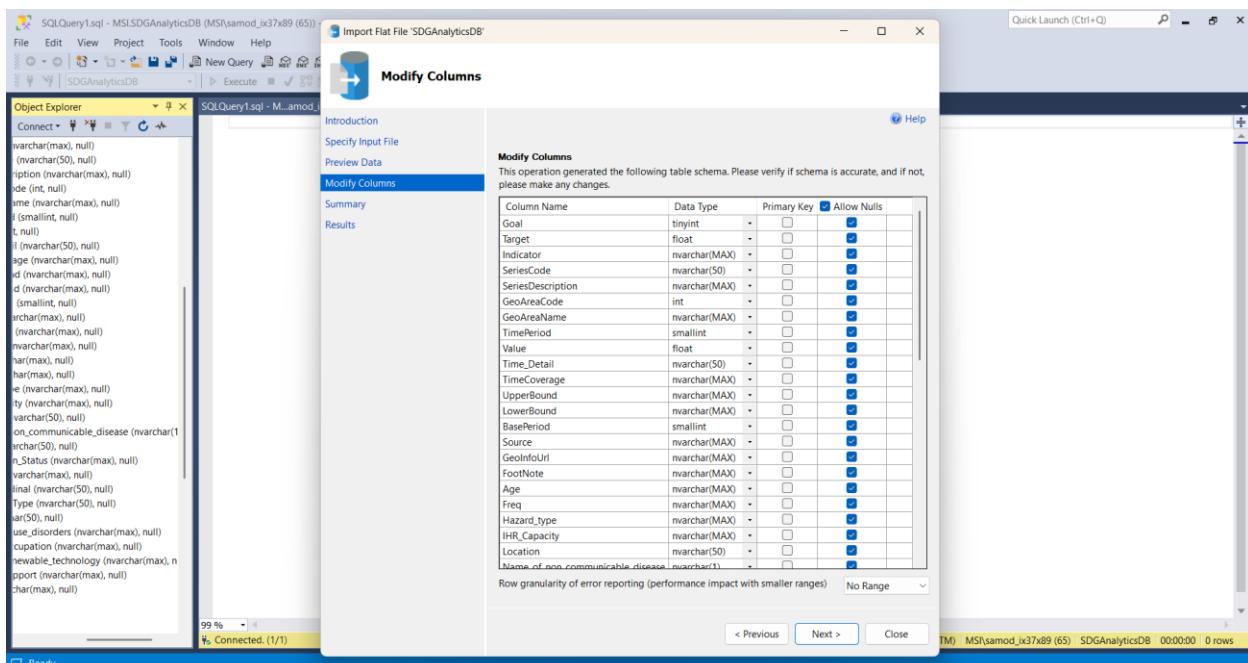
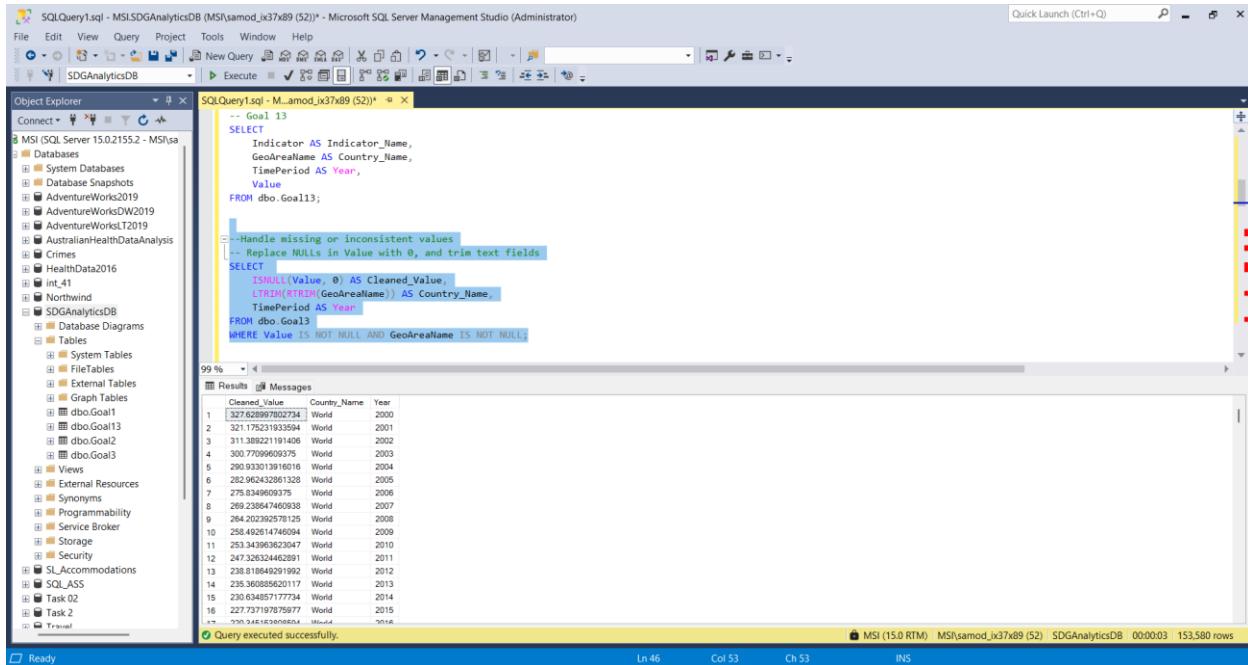


Figure 26: G13 Modify columns

## 2. Advanced SQL Operations

### 2.1. Data Cleaning Operations



The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left lists various databases and tables. The main pane displays a T-SQL script named 'SQLQuery1.sql' which handles missing or inconsistent values in the 'Goal13' table. The script uses ISNULL and LTRIM functions to replace NULLs and trim text fields respectively. The results pane shows 153,580 rows returned.

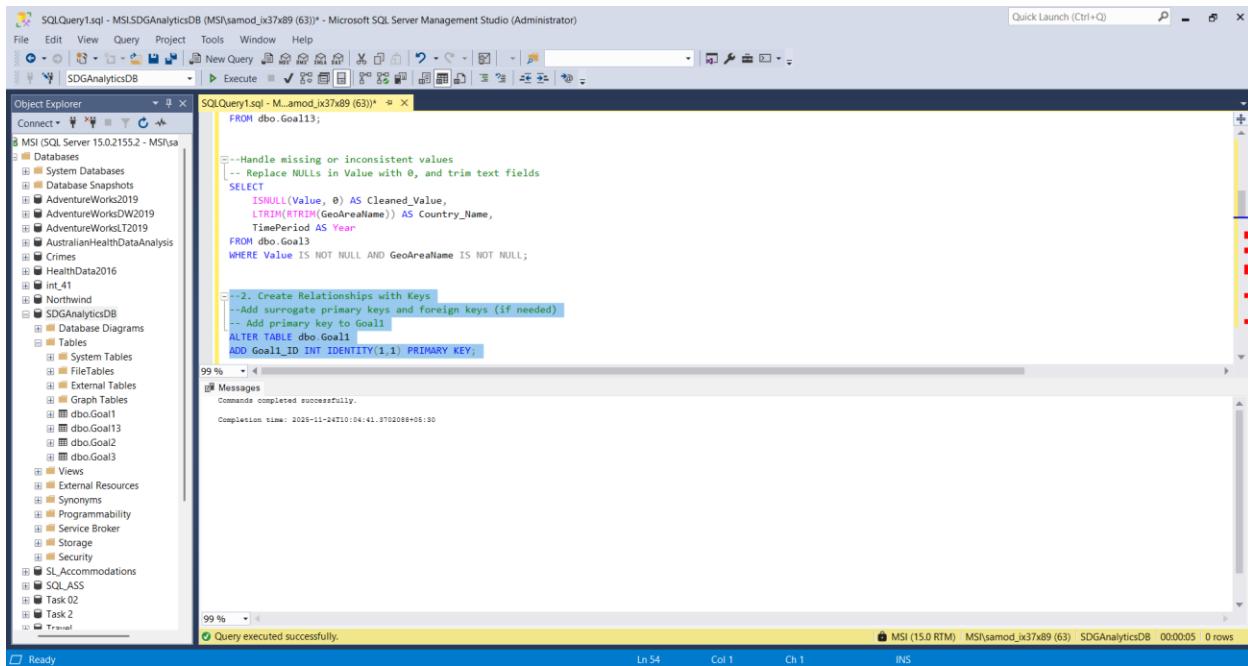
```
-- Goal 13
SELECT
    Indicator AS Indicator_Name,
    GeoAreaName AS Country_Name,
    TimePeriod AS Year,
    Value
FROM dbo.Goal13;

--Handle missing or inconsistent values
-- Replace NULLs in Value with 0, and trim text fields
SELECT
    ISNULL(Value, 0) AS Cleaned_Value,
    LTRIM(RTRIM(GeoAreaName)) AS Country_Name,
    TimePeriod AS Year
FROM dbo.Goal13
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;
```

Results pane (153,580 rows):

Cleaned_Value	Country_Name	Year
327.000000000000034	World	2000
321.75231033594	World	2001
311.280321101406	World	2002
300.7099609375	World	2003
290.033013916016	World	2004
282.62432861328	World	2005
275.8349609375	World	2006
269.238647460598	World	2007
264.022029578125	World	2008
258.4926147460598	World	2009
253.34393623047	World	2010
247.326324462891	World	2011
238.18646291982	World	2012
233.000000000000034	World	2013
230.03485177734	World	2014
227.37370769777	World	2015
220.44543050504	World	2016

Figure 27: Handle missing or Inconsistent values – Goal 13



The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left lists various databases and tables. The main pane displays a T-SQL script named 'SQLQuery1.sql' which creates relationships with keys. It adds a surrogate primary key to the 'Goal13' table using the ALTER TABLE and ADD PRIMARY KEY clauses. The messages pane indicates the command completed successfully.

```
FROM dbo.Goal13;

--Handle missing or inconsistent values
-- Replace NULLs in Value with 0, and trim text fields
SELECT
    ISNULL(Value, 0) AS Cleaned_Value,
    LTRIM(RTRIM(GeoAreaName)) AS Country_Name,
    TimePeriod AS Year
FROM dbo.Goal13
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

--2. Create Relationships with Keys
--Add surrogate primary keys and foreign keys (if needed)
-- Add primary key to Goal13
ALTER TABLE dbo.Goal13
ADD Goal1_ID INT IDENTITY(1,1) PRIMARY KEY;
```

Messages pane:

```
Commands completed successfully.
Completion time: 2028-11-24T10:04:41.3702088+05:30
```

Figure 28: Create relationships with Keys

The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left lists databases like MSI and SDGAnalyticsDB. The central pane displays a query window titled 'SQLQuery1.sql - MSLSDGAnalyticsDB (MSI\samod\_x37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)'. The query code is as follows:

```

--2. Create Relationships with Keys
-- Add surrogate primary keys and foreign keys (if needed)
-- Add primary key to Goal1
ALTER TABLE dbo.Goal1
ADD Goal1_ID INT IDENTITY(1,1) PRIMARY KEY;

-- foreign key setup (assuming you have a Countries table)
ALTER TABLE dbo.Goal1
ADD CONSTRAINT FK_Goal1_Countries FOREIGN KEY (CountryCode)
REFERENCES dbo.Countries(CountryCode);

```

The status bar at the bottom indicates 'Query executed successfully.'

*Figure 29: Foreign Key Setup*

## 2.2. Use of Views and Common Table Expressions (CTEs)

The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left lists databases like MSI and SDGAnalyticsDB. The central pane displays a query window titled 'SQLQuery1.sql - MSLSDGAnalyticsDB (MSI\samod\_x37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)'. The query code is as follows:

```

--3. Use of Views and CTEs
--Create a unified view across all four tables
CREATE VIEW vw_SDG_Combined AS
SELECT 'Goal1' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goal1
UNION ALL
SELECT 'Goal2' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goal2
UNION ALL
SELECT 'Goal3' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goal3
UNION ALL
SELECT 'Goal13' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goal13;

```

The status bar at the bottom indicates 'Query executed successfully.'

*Figure 30: Create a unified view across all 4 tables*

The screenshot shows the SSMS interface with the following details:

- File Bar:** File, Edit, View, Query, Project, Tools, Window, Help.
- Toolbar:** New Query, Execute, Save, Undo, Redo, Copy, Paste, Find, Replace, etc.
- Object Explorer:** Shows the database structure for 'MSI (SQL Server 15.0.21552 - MSI\sa)' including Databases, System Databases, Database Snapshots, AdventureWorks2019, AdventureWorksLT2019, AustralianHealthDataAnalysis, Crimes, HealthData2016, int\_41, Northwind, SDGAnalyticsDB, Tables, System Tables, FileTables, External Tables, Graph Tables, dbo.Goal1, dbo.Goal13, dbo.Goal2, dbo.Goal3, Views, External Resources, Synonyms, Programmability, Service Broker, Storage, Security, SL\_Accommodations, SQLASS, Task02, Task 2, and Transl.
- Query Editor:** Contains the following T-SQL code:

```

SELECT 'Goal12' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goal2
UNION ALL
SELECT 'Goal13' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goals
UNION ALL
SELECT 'Goal113' AS Source,
       Indicator, GeoAreaName, TimePeriod, Value FROM dbo.Goal13;
--Use CTE for ranking and aggregation
WITH RankedValues AS (
    SELECT
        GeoAreaName,
        TimePeriod,
        Value,
        RANK() OVER (PARTITION BY GeoAreaName ORDER BY Value DESC) AS RankByValue
    FROM dbo.Goal1
)
SELECT * FROM RankedValues WHERE RankByValue = 1;

```
- Results Grid:** Displays the results of the query, showing 2774 rows of data with columns: GeoAreaName, TimePeriod, Value, and RankByValue.
- Status Bar:** Shows 'Query executed successfully.', 'Ln 83 Col 50 Ch 50 INS', and 'MSI (15.0 RTM) | MSI\samod\_1x37x89 (63) | SDGAnalyticsDB | 00:00:01 | 2,774 rows'.

Figure 31: Use CTE for Ranking and aggregation

## 2.3. Stored Procedure for Power BI

The screenshot shows the SSMS interface with the following details:

- File Bar:** File, Edit, View, Query, Project, Tools, Window, Help.
- Toolbar:** New Query, Execute, Save, Undo, Redo, Copy, Paste, Find, Replace, etc.
- Object Explorer:** Shows the database structure for 'MSI (SQL Server 15.0.21552 - MSI\sa)' including Databases, System Databases, Database Snapshots, AdventureWorks2019, AdventureWorksLT2019, AustralianHealthDataAnalysis, Crimes, HealthData2016, int\_41, Northwind, SDGAnalyticsDB, Tables, System Tables, FileTables, External Tables, Graph Tables, dbo.Goal1, dbo.Goal13, dbo.Goal2, dbo.Goal3, Views, External Resources, Synonyms, Programmability, Service Broker, Storage, Security, SL\_Accommodations, SQLASS, Task02, Task 2, and Transl.
- Query Editor:** Contains the following T-SQL code:

```

--4. Stored Procedure for Power BI
--Create a procedure to return cleaned, ranked data
CREATE PROCEDURE sp_GetCleanedSDGData
AS
BEGIN
    SET NOCOUNT ON;

    SELECT
        Indicator AS Indicator_Name,
        GeoAreaName AS Country_Name,
        TimePeriod AS Year,
        ISNULL(Value, 0) AS Cleaned_Value,
        RANK() OVER (PARTITION BY GeoAreaName ORDER BY Value DESC) AS RankByValue
    FROM vw_SDG_Combined
    WHERE Value IS NOT NULL;
END

```
- Results Grid:** Displays the results of the query, showing 0 rows.
- Status Bar:** Shows 'Query executed successfully.', 'Ln 102 Col 5 Ch 5 INS', and 'MSI (15.0 RTM) | MSI\samod\_1x37x89 (63) | SDGAnalyticsDB | 00:00:00 | 0 rows'.

Figure 32: Create a procedure to return Cleaned, Ranked data

## 2.4. Verified structure before Power BI

The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left shows the database structure for 'MSI' and 'SDGAnalyticsDB'. The 'Tables' node under 'SDGAnalyticsDB' contains 'dbo.Goal1', 'dbo.Goal2', and 'dbo.Goal3'. The 'Query' tab in the center displays a T-SQL script:

```

--> 5. Verify Structure Before Power BI
--> -Check for NULLs, duplicates, and schema
--> == Check for NULLs
SELECT COUNT(*) AS NullValues FROM dbo.Goal WHERE Value IS NULL;

--> - Check for duplicates
SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal
GROUP BY Indicator, GeoAreaName, TimePeriod
HAVING COUNT(*) > 1;

--> - Verify schema
EXEC sp_help 'dbo.Goal1';

```

The 'Results' pane shows the output of the first query:

	Indicator	GeoAreaName	TimePeriod	DuplicateCount
1	NULL	Afghanistan	2007	7
2	NULL	Afghanistan	2003	5
3	NULL	Afghanistan	2006	5
4	NULL	Afghanistan	2008	5
5	NULL	Afghanistan	2009	5
6	NULL	Mghanistan	2009	5
7	NULL	Mghanistan	2004	5
8	NULL	Mghanistan	2012	5
9	NULL	Mghanistan	2011	5
10	NULL	Mghanistan	2014	5
11	NULL	Mghanistan	2013	5

The status bar at the bottom indicates 'Query executed successfully.'

Figure 33: Check for NULLs, Duplicates

The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left shows the database structure for 'MSI' and 'SDGAnalyticsDB'. The 'Tables' node under 'SDGAnalyticsDB' contains 'dbo.Goal1', 'dbo.Goal2', and 'dbo.Goal3'. The 'Query' tab in the center displays a T-SQL script:

```

SELECT COUNT(*) AS NullValues FROM dbo.Goal WHERE Value IS NULL;

--> - Check for duplicates
SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal
GROUP BY Indicator, GeoAreaName, TimePeriod
HAVING COUNT(*) > 1;

--> - Verify schema
EXEC sp_help 'dbo.Goal1';

```

The 'Results' pane shows the output of the first query:

	Name	Owner	Type	Created_datetime
1	Goal	dbo	user table	2025-11-21 19:37:04.860

Below the table, the schema information for the 'Goal' table is shown:

Column_name	Type	Computed	Length	Prec	Scale	Nullable	TrimTrailingBlanks	FixedLenNullSource	Collation
1 Goal	tinyint	no	1	3	0	yes	(n/a)	NULL	NULL
2 Target	float	no	8	53	NULL	yes	(n/a)	NULL	NULL
3 Indicator	time	no	5	16	7	yes	(n/a)	(n/a)	NULL
4 SeriesCode	nvarchar	no	100			yes	(n/a)	SQL_Latin1_General_CI_AS	SQL_Latin1_General_CI_AS
5 SeriesDescription	nvarchar	no	-1			yes	(n/a)	SQL_Latin1_General_CI_AS	SQL_Latin1_General_CI_AS
6 GeoAreaCode	int	no	4	10	0	yes	(n/a)	NULL	NULL
7 GeoAreaName	nvarchar	no	-1			yes	(n/a)	SQL_Latin1_General_CI_AS	SQL_Latin1_General_CI_AS
8 TimePeriod	smallint	no	2	5	0	yes	(n/a)	NULL	NULL

Below the schema, the 'Identity' and 'RowGuidCol' sections are shown:

Identity	Seed	Increment	Not For Replication
1	Goal_ID	1	0

RowGuidCol
1 No rowguidcol column defined.

The status bar at the bottom indicates 'Query executed successfully.'

Figure 34: Verify Schema

## 2.5. Data Cleaning Operations

```

--Missing Data Cleaning for Goal1, Goal2, Goal13
-- Clean Goal1
SELECT
    ISNULL(Value, 0) AS Cleaned_Value,
    LTRIM(RTRIM(GeoAreaName)) AS Country_Name,
    TimePeriod AS Year
FROM dbo.Goal1
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

-- Clean Goal2
SELECT
    ISNULL(Value, 0) AS Cleaned_Value,
    LTRIM(RTRIM(GeoAreaName)) AS Country_Name,
    TimePeriod AS Year
FROM dbo.Goal2
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

-- Clean Goal13

```

Results

Cleaned_Value	Country_Name	Year
1	27.100000314698	Western Africa
2	32.990001678468	Least Developed Countries (LDCs)
3	12.639840126078	Brazil
4	24.280000068646	Melanesia
5	36.299999237065	World
6	28.52000457737	Western Africa
7	37.970000302324	Western Africa
8	33.110000610316	Western Africa
9	28.640999618523	Western Africa
10	25.77000457837	Western Africa
11	28.52000457737	Western Africa
12	37.049999237065	Western Africa
13	24.829999237065	Western Africa
14	40.349998474121	Western Africa
15	26.729999542283	Western Africa
16	31.219999313545	Western Africa
17	34.040000340198	Mountainous Africa

Executing query...

Figure 35: Cleaning - Goal 1

```

--Missing Data Cleaning for Goal1, Goal2, Goal13
-- Clean Goal1
SELECT
    ISNULL(Value, 0) AS Cleaned_Value,
    LTRIM(RTRIM(GeoAreaName)) AS Country_Name,
    TimePeriod AS Year
FROM dbo.Goal1
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

-- Clean Goal2
SELECT
    ISNULL(Value, 0) AS Cleaned_Value,
    LTRIM(RTRIM(GeoAreaName)) AS Country_Name,
    TimePeriod AS Year
FROM dbo.Goal2
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

-- Clean Goal13

```

Results

Cleaned_Value	Country_Name	Year
1	14.2	South Africa
2	13.3	South Africa
3	12.5	South Africa
4	13.3	South Africa
5	12.5	South Africa
6	14.2	South Africa
7	12.5	South Africa
8	14.2	South Africa
9	13.3	South Africa
10	12.5	South Africa
11	14.1	South Africa
12	13.3	South Africa
13	13.937743	Morocco
14	14	South Africa
15	12.4	South Africa
16	13.2	South Africa
17	15.1	South Africa

Query executed successfully.

Figure 36: Cleaning - Goal 2

-- Clean Goal2  
SELECT  
    ISNULL(Value, 0) AS Cleaned\_Value,  
    LTRIM(RTRIM(GeoAreaName)) AS Country\_Name,  
    TimePeriod AS Year  
FROM dbo.Goal2  
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

-- Clean Goal13  
SELECT  
    ISNULL(Value, 0) AS Cleaned\_Value,  
    LTRIM(RTRIM(GeoAreaName)) AS Country\_Name,  
    TimePeriod AS Year  
FROM dbo.Goal13  
WHERE Value IS NOT NULL AND GeoAreaName IS NOT NULL;

-- 2. Create Relationships with Keys  
--Add surrogate primary keys and foreign keys (if needed)

	Cleaned_Value	Country_Name	Year
1	28844	Afghanistan	2017
2	2009	Afghanistan	2018
3	28893	Afghanistan	2019
4	6887	Albania	2005
5	975	Albania	2006
6	226	Albania	2007
7	243	Albania	2008
8	7767	Albania	2009
9	42221	Albania	2010
10	692	Albania	2011
11	1652	Albania	2012
12	4801	Albania	2013
13	4054	Albania	2014
14	1091	Albania	2015
15	699	Albania	2016
16	5	Albania	2017
17	4885	Albania	2018

Query executed successfully.

*Figure 37: Cleaning - Goal 13*

## 2.6. Database Schema Design and Normalization

## Missing Foreign Key Relationships

The screenshot shows the Microsoft SQL Server Management Studio (Administrator) interface. The Object Explorer on the left lists various databases, including 'MSI\_SQLAnalyticsDB' which is currently selected. The central pane displays a query results window for 'SQLQuery1.sql'. The results show the creation of a 'Countries' table with a primary key 'CountryCode' and a foreign key constraint 'FK\_Goal2\_Countries' linking it to the 'dbo.Countries' table. The command was completed successfully, and the execution time was 2025-11-24T10:18:12.8872141+05:30.

```
-- Add CountryCode INT;
-- Missing Foreign Key Relationships
-- Create Countries table
CREATE TABLE dbo.Countries
(
    CountryCode INT PRIMARY KEY,
    Country_Name NVARCHAR(100)
);

-- Add CountryCode to other tables
ALTER TABLE dbo.Goal2 ADD CountryCode INT;
ALTER TABLE dbo.Goal3 ADD CountryCode INT;
ALTER TABLE dbo.Goal13 ADD CountryCode INT;

-- Add foreign key constraints
ALTER TABLE dbo.Goal2 ADD CONSTRAINT FK_Goal2_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal3 ADD CONSTRAINT FK_Goal3_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal13 ADD CONSTRAINT FK_Goal13_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
```

*Figure 38: Create Countries Table*

```

SQLQuery1.sql - MSI\SDGAnalyticsDB (MSI\samod_ix37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)
File Edit View Query Project Tools Window Help
New Query Execute
Object Explorer
Connect
MSI (SQL Server 15.0.21552 - MSI\sa)
Databases
System Databases
Database Snapshots
AdventureWorks2019
AdventureWorksDW2019
AdventureWorksLT2019
AustralianHealthDataAnalysis
Crimes
HealthData2016
int_41
Northwind
SDGAnalyticsDB
Database Diagrams
Tables
System Tables
FileTables
External Tables
Graph Tables
dbo.Goal1
dbo.Goal13
dbo.Goal2
dbo.Goal3
Views
External Resources
Synonyms
Programmability
Service Broker
Storage
Security
SL_Accommodations
SQLASS
Task02
Task2
Travel

```

```

-- Create Countries Table
CREATE TABLE dbo.Countries (
    CountryCode INT PRIMARY KEY,
    Country_Name NVARCHAR(100)
);

-- Add CountryCode to other tables
ALTER TABLE dbo.Goal2 ADD CountryCode INT;
ALTER TABLE dbo.Goal3 ADD CountryCode INT;
ALTER TABLE dbo.Goal13 ADD CountryCode INT;

-- Add foreign key constraints
ALTER TABLE dbo.Goal2 ADD CONSTRAINT FK_Goal2_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal3 ADD CONSTRAINT FK_Goal3_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal13 ADD CONSTRAINT FK_Goal13_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);


```

Messages

Commands completed successfully.

Completion time: 2020-11-24T10:18:21.5407589+05:00

Query executed successfully.

Figure 39: Add Country Code to other tables

```

SQLQuery1.sql - MSI\SDGAnalyticsDB (MSI\samod_ix37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)
File Edit View Query Project Tools Window Help
New Query Execute
Object Explorer
Connect
MSI (SQL Server 15.0.21552 - MSI\sa)
Databases
System Databases
Database Snapshots
AdventureWorks2019
AdventureWorksDW2019
AdventureWorksLT2019
AustralianHealthDataAnalysis
Crimes
HealthData2016
int_41
Northwind
SDGAnalyticsDB
Database Diagrams
Tables
System Tables
FileTables
External Tables
Graph Tables
dbo.Goal1
dbo.Goal13
dbo.Goal2
dbo.Goal3
Views
External Resources
Synonyms
Programmability
Service Broker
Storage
Security
SL_Accommodations
SQLASS
Task02
Task2
Travel

```

```

-- Create Countries Table
CREATE TABLE dbo.Countries (
    CountryCode INT PRIMARY KEY,
    Country_Name NVARCHAR(100)
);

-- Add CountryCode to other tables
ALTER TABLE dbo.Goal2 ADD CountryCode INT;
ALTER TABLE dbo.Goal3 ADD CountryCode INT;
ALTER TABLE dbo.Goal13 ADD CountryCode INT;

-- Add foreign key constraints
ALTER TABLE dbo.Goal2 ADD CONSTRAINT FK_Goal2_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal3 ADD CONSTRAINT FK_Goal3_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal13 ADD CONSTRAINT FK_Goal13_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);

-- 3. Use of Views and CTEs
-- Create a unified view across all four tables
CREATE VIEW [dbo].[v_Countries] AS
SELECT * FROM dbo.Countries
UNION ALL
SELECT * FROM dbo.Goal1
UNION ALL
SELECT * FROM dbo.Goal2
UNION ALL
SELECT * FROM dbo.Goal3;


```

Messages

Commands completed successfully.

Completion time: 2020-11-24T10:18:49.1922786+05:00

Query executed successfully.

Figure 40: Add Foreign Key Constraints

SQLQuery1.sql - MSLSDGAnalyticsDB (MSI\samod\_ix37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)

```

CountryCode INT PRIMARY KEY,
Country_Name NVARCHAR(100)
);

-- Add CountryCode to other tables
ALTER TABLE dbo.Goal2 ADD CountryCode INT;
ALTER TABLE dbo.Goal3 ADD CountryCode INT;
ALTER TABLE dbo.Goal13 ADD CountryCode INT;

-- Add primary keys to other tables
ALTER TABLE dbo.Goal2 ADD Goal2_ID INT IDENTITY(1,1) PRIMARY KEY;
ALTER TABLE dbo.Goal3 ADD Goal3_ID INT IDENTITY(1,1) PRIMARY KEY;
ALTER TABLE dbo.Goal13 ADD Goal13_ID INT IDENTITY(1,1) PRIMARY KEY;

-- Add foreign key constraints
ALTER TABLE dbo.Goal2 ADD CONSTRAINT Goal2_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal3 ADD CONSTRAINT Goal3_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);
ALTER TABLE dbo.Goal13 ADD CONSTRAINT Goal13_Countries FOREIGN KEY (CountryCode) REFERENCES dbo.Countries(CountryCode);

```

99 %

Messages

Commands completed successfully.

Completion time: 2026-11-24T10:23:49.2493124+05:00

99 %

Query executed successfully.

Ln 99 Col 1 Ch 1 INS

Figure 41: Add Primary Keys to other tables

SQLQuery1.sql - MSLSDGAnalyticsDB (MSI\samod\_ix37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)

```

SELECT DISTINCT ROW_NUMBER() OVER (ORDER BY GeoAreaName), GeoAreaName
FROM (
    SELECT GeoAreaName FROM dbo.Goal1
    UNION
    SELECT GeoAreaName FROM dbo.Goal2
    UNION
    SELECT GeoAreaName FROM dbo.Goal3
    UNION
    SELECT GeoAreaName FROM dbo.Goal13
) AS AllCountries;

-- Update CountryCode in each table
UPDATE G
SET G.CountryCode = C.CountryCode
FROM dbo.Goal1 G
JOIN dbo.Countries C ON LTRIM(RTRIM(G.GeoAreaName)) = C.Country_Name;

-- Repeat for Goal2, Goal3, Goal13

```

99 %

Messages

(293 rows affected)

(126439 rows affected)

Completion time: 2026-11-24T10:23:10.7063284+05:00

99 %

Query executed successfully.

Ln 181 Col 1 Ch 1 INS

Figure 42: Update Country Code in each Table

SQLQuery1.sql - MSILSDGAnalyticsDB (MSI\samod\_idx37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)

File Edit View Query Project Tools Window Help

SDGAnalyticsDB

Object Explorer

SQLQuery1.sql - M...\_amod\_idx37x89 (63)\* X

```
UPDATE G
SET G.CountryCode = C.CountryCode
FROM dbo.Goal1 G
JOIN dbo.Countries C ON LTRIM(RTRIM(G.GeoAreaName)) = C.Country_Name;

-- Repeat for Goal2, Goal3, Goal13
UPDATE G SET G.CountryCode = C.CountryCode
FROM dbo.Goal2 G JOIN dbo.Countries C ON LTRIM(RTRIM(G.GeoAreaName)) = C.Country_Name;

UPDATE G SET G.CountryCode = C.CountryCode
FROM dbo.Goal3 G JOIN dbo.Countries C ON LTRIM(RTRIM(G.GeoAreaName)) = C.Country_Name;

UPDATE G SET G.CountryCode = C.CountryCode
FROM dbo.Goal13 G JOIN dbo.Countries C ON LTRIM(RTRIM(G.GeoAreaName)) = C.Country_Name;

-- Verify schema
EXEC sp_help 'dbo.Goall';
```

99 %

Messages

(222343 rows affected)

(279920 rows affected)

(22649 rows affected)

Completion time: 2025-11-12T10:26:26.4235781+05:30

99 %

Query executed successfully.

*Figure 43: Repeat for Goal2, Goal3, Goal13*

## 4.7. Schema Verification

SQLQuery1.sql - MSLSAnalyticsDB (MS\samod\_ix37x89 (63)) - Microsoft SQL Server Management Studio (Administrator)

File Edit View Query Project Tools Window Help

New Query Save All Open Recent Connect Object Explorer

SDGAnalyticsDB

SQLQuery1.sql - M...\_amod\_ix37x89 (63)\*

```
--Verify structure for all tables
-- Check for Nulls
SELECT COUNT(*) AS NullValues_Goal2 FROM dbo.Goal2 WHERE Value IS NULL;
SELECT COUNT(*) AS NullValues_Goal3 FROM dbo.Goal3 WHERE Value IS NULL;
SELECT COUNT(*) AS NullValues_Goal13 FROM dbo.Goal13 WHERE Value IS NULL;

-- Check for duplicates
--SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
--FROM dbo.Goal2 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;
--SELECT Indicator, GeoAreaName, [ ] column Indicator(nvarchar, null), DuplicateCount
--FROM dbo.Goal3 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;
--SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
--FROM dbo.Goal13 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

-- Verify schema
```

Results Messages

	NullValues_Goal2
1	0

	NullValues_Goal3
1	126340

	NullValues_Goal13
1	7232

Query executed successfully.

*Figure 44: Check for NULLs*

SQLQuery1.sql - MSLSDGAnalyticsDB (MSI\samod\_3x7x89 (63)) - Microsoft SQL Server Management Studio (Administrator)

```
--> Verify structure for all tables
--> Check for NULLs
SELECT COUNT(*) AS NullValues_Goal2 FROM dbo.Goal2 WHERE Value IS NULL;
SELECT COUNT(*) AS NullValues_Goal3 FROM dbo.Goal3 WHERE Value IS NULL;
SELECT COUNT(*) AS NullValues_Goal13 FROM dbo.Goal13 WHERE Value IS NULL;

--> Check for duplicates
--> SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal2 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

--> SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal3 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

--> SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal13 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

--> Verify schema

```

**Results**

Indicator	GeoAreaName	TimePeriod	DuplicateCount	
1	2.1.1	Afghanistan	2006	2
2	2.1.1	Afghanistan	2005	2
3	2.1.1	Afghanistan	2001	2
4	2.1.1	Afghanistan	2002	2
5	2.1.1	Afghanistan	2007	2
6	2.1.1	Afghanistan	2014	2
7	2.1.1	Afghanistan	2008	2
8	2.1.1	Afghanistan	2011	2
9	2.1.1	Afghanistan	2003	2
10	2.1.1	Afghanistan	2012	2
11	2.1.1	Mohakistan	2016	2
12	2.1.1	Mohakistan	2015	2
13	2.1.1	Mohakistan	2013	2
14	2.1.1	Mohakistan	2019	2
15	2.1.1	Mohakistan	2004	2
16	2.1.1	Afghanistan	2020	2
17	3.1.1	Mohakistan	2021	2

Query executed successfully.

Figure 45: Check for Duplicates

SQLQuery1.sql - MSLSDGAnalyticsDB (MSI\samod\_3x7x89 (63)) - Microsoft SQL Server Management Studio (Administrator)

```
--> Check for duplicates
--> SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal2 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

--> SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal3 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

--> SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
FROM dbo.Goal13 GROUP BY Indicator, GeoAreaName, TimePeriod HAVING COUNT(*) > 1;

--> Verify schema
EXEC sp_help 'dbo.Goal1';
EXEC sp_help 'dbo.Goal2';
EXEC sp_help 'dbo.Goal3';
EXEC sp_help 'dbo.Goal13';


```

**Results**

Indicator	GeoAreaName	TimePeriod	DuplicateCount	
1	3.2.1	Afghanistan	2002	12
2	3.2.1	Afghanistan	2003	12
3	3.2.1	Afghanistan	2004	12
4	3.2.1	Afghanistan	2001	12
5	3.2.1	Afghanistan	2000	12
6	3.2.1	Afghanistan	2005	12
7	3.2.1	Afghanistan	2007	12
8	3.2.1	Afghanistan	2009	12

Indicator	GeoAreaName	TimePeriod	DuplicateCount	
1	13.1.1	Afghanistan	2017	9
2	13.1.1	Afghanistan	2018	9
3	13.1.1	Afghanistan	2019	10
4	13.1.1	Afghanistan	2008	8
5	13.1.1	Albania	2006	8
6	13.1.1	Albania	2007	8
7	13.1.1	Albania	2008	8

Query executed successfully.

Figure 46: Check for Duplicates

```
-- Check for duplicates
--SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
--FROM dbo.Goal1
--GROUP BY Indicator, GeoAreaName, TimePeriod
--HAVING COUNT(*) > 1;

-- Verify schema
EXEC sp_help 'dbo.Goal1';
EXEC sp_help 'dbo.Goal12';
EXEC sp_help 'dbo.Goal13';
EXEC sp_help 'dbo.Goal13';

99 % ▾ Results ▾ Messages
Name Owner Type Created_datetime
1 Goal1 dbo user table 2025-11-23 17:38:41.320

Column_name Type Computed Length Prec Scale Nullable TrimTrailingBlanks FixedLenNullSource Collation
1 Goal tinyint no 1 3 0 yes (n/a) NULL
2 Target float no 8 53 NULL yes (n/a) NULL
3 Indicator nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
4 SeriesCode nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
5 SeriesDescription nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
6 GeoAreaCode int no 4 10 0 yes (n/a) (n/a) NULL
7 GeoAreaName nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
8 TimePeriod smallint no 2 5 0 yes (n/a) (n/a) NULL

Identity Seed Increment NotForReplication
1 No identity column defined. NULL NULL NULL

RowGuidCol
1 No rowguidcol column defined.

Data_located_on_filegroup
Query executed successfully.
```

Figure 47: Verify Schema

```
-- Check for duplicates
--SELECT Indicator, GeoAreaName, TimePeriod, COUNT(*) AS DuplicateCount
--FROM dbo.Goal1
--GROUP BY Indicator, GeoAreaName, TimePeriod
--HAVING COUNT(*) > 1;

-- Verify schema
EXEC sp_help 'dbo.Goal1';
EXEC sp_help 'dbo.Goal12';
EXEC sp_help 'dbo.Goal13';
EXEC sp_help 'dbo.Goal13';

99 % ▾ Results ▾ Messages
Name Owner Type Created_datetime
1 Goal1 dbo user table 2025-11-23 18:24:43.077

Column_name Type Computed Length Prec Scale Nullable TrimTrailingBlanks FixedLenNullSource Collation
1 Goal tinyint no 1 3 0 yes (n/a) NULL
2 Target float no 8 53 NULL yes (n/a) NULL
3 Indicator nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
4 SeriesCode nvarchar no 100 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
5 SeriesDescription nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
6 GeoAreaCode int no 4 10 0 yes (n/a) (n/a) NULL
7 GeoAreaName nvarchar no -1 yes (n/a) (n/a) SQL_Latin1_General_CI_AS
8 TimePeriod smallint no 2 5 0 yes (n/a) (n/a) NULL

Identity Seed Increment NotForReplication
1 No identity column defined. NULL NULL NULL

RowGuidCol
1 No rowguidcol column defined.

Data_located_on_filegroup
Query executed successfully.
```

Figure 48: Verify Schema

## 2.8. Data Cleaning and Normalization

The screenshot shows the Microsoft SQL Server Management Studio interface. The Object Explorer on the left lists the database structure, including the SDGAnalyticsDB. The central pane displays a T-SQL script named 'SQLQuery1.sql' with two SELECT statements. The first statement, labeled 'Goal1', renames fields for clarity: 'Indicator AS Indicator\_Name', 'GeoReadName AS Country\_Name', 'TimePeriod AS Year', and 'Value'. It then selects from the 'dbo.Goal1' table. The second statement, labeled 'Goal2', renames the same fields and selects from the 'dbo.Goal2' table. Below the script, the 'Results' tab shows the output of the query. The results table has columns: Indicator\_Name, Country\_Name, Year, and Value. The data includes rows for Nigeria from 2012 to 2019 and the United Arab Emirates for 2013 and 2018. A message at the bottom indicates 'Query executed successfully.'

```
-->1. Data Cleaning & Normalization
-- Rename fields for clarity (using SELECT AS)
-- Goal1
SELECT
    Indicator AS Indicator_Name,
    GeoReadName AS Country_Name,
    TimePeriod AS Year,
    Value
FROM dbo.Goal1;

-- Goal2
SELECT
    Indicator AS Indicator_Name,
    GeoReadName AS Country_Name,
    TimePeriod AS Year,
    Value
FROM dbo.Goal2;
```

Indicator_Name	Country_Name	Year	Value
3.b.1	Nigeria	2012	NULL
3.b.1	Nigeria	2013	NULL
4	Nigeria	2014	NULL
6	Nigeria	2015	NULL
6	Nigeria	2016	NULL
7	Nigeria	2017	NULL
8	Nigeria	2018	NULL
9	Nigeria	2019	NULL
12	United Arab Emirates	2013	0
12	United Arab Emirates	2018	0

Query executed successfully.

Figure 49: Rename Fields for Clarity

This screenshot is identical to Figure 49, showing the same T-SQL script for data cleaning and normalization. The results table shows the same data for Nigeria and the United Arab Emirates. A message at the bottom indicates 'Query executed successfully.'

```
-->1. Data Cleaning & Normalization
-- Rename fields for clarity (using SELECT AS)
-- Goal1
SELECT
    Indicator AS Indicator_Name,
    GeoReadName AS Country_Name,
    TimePeriod AS Year,
    Value
FROM dbo.Goal1;

-- Goal2
SELECT
    Indicator AS Indicator_Name,
    GeoReadName AS Country_Name,
    TimePeriod AS Year,
    Value
FROM dbo.Goal2;
```

Indicator_Name	Country_Name	Year	Value
1	Western Africa	2015	27.100003814697
2	Western Africa	2016	28.3700008392334
3	Western Africa	2016	26.8700008392334
4	Western Africa	2016	33.1100006103516
5	Western Africa	2016	28.8499996185367
6	Western Africa	2016	25.7700004577637
7	Western Africa	2016	28.5200004577637
8	Western Africa	2016	37.0499992370605
1	South Africa	2016	14.2
2	South Africa	2016	13.3
3	South Africa	2017	12.5
4	South Africa	2017	13.3
5	South Africa	2017	12.5
6	South Africa	2017	14.2
7	South Africa	2018	12.5

Query executed successfully.

Figure 50: Data Cleaning and Normalization

The screenshot shows the SSMS interface with the following details:

- File Bar:** File, Edit, View, Query, Project, Tools, Window, Help.
- Toolbar:** New Query, Execute, Save, Print, etc.
- Object Explorer:** Shows the database structure for 'MSI (SQL Server 15.0.21552 - MSI\sa)'. It includes Databases (AdventureworksDW2019, AdventureworksLT2019, AustralianHealthDataAnalysis), Tables (dbo.Goal1, dbo.Goal12, dbo.Goal13), Views, External Resources, Synonyms, Programmability, Service Broker, Storage, Security, and various system objects like SL\_Accommodations, SQLASS, Task02, Task2, and Trans.
- Query Editor:** Contains two queries. The first query is:

```

    Value
    FROM dbo.Goal12;
    -- Goal13
    SELECT
        Indicator AS Indicator_Name,
        GeoReadName AS Country_Name,
        TimePeriod AS Year,
        Value
    FROM dbo.Goals1;
    -- Goal 13
    SELECT
        Indicator AS Indicator_Name,
        GeoReadName AS Country_Name,
        TimePeriod AS Year,
        Value
    FROM dbo.Goal13;

```

The second query is:

```

    SELECT
        Indicator_Name, Country_Name, Year, Value
    FROM
        (
            SELECT
                Indicator_Name, Country_Name, Year, Value
            FROM
                (
                    SELECT
                        Indicator_Name, Country_Name, Year, Value
                    FROM
                        (
                            SELECT
                                Indicator_Name, Country_Name, Year, Value
                            FROM
                                (
                                    SELECT
                                        Indicator_Name, Country_Name, Year, Value
                                    FROM
                                        (
                                            SELECT
                                                Indicator_Name, Country_Name, Year, Value
                                            FROM
                                                (
                                                    SELECT
                                                        Indicator_Name, Country_Name, Year, Value
                                                    FROM
                                                        (
                                                            SELECT
                                                                Indicator_Name, Country_Name, Year, Value
                                                                FROM
                                                                    (
                                                                        SELECT
                                                                            Indicator_Name, Country_Name, Year, Value
                                                                            FROM
                                                                                (
                                                                                    SELECT
                                                                                        Indicator_Name, Country_Name, Year, Value
                                                                                        FROM
                                                                                            (
                                                                                                SELECT
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
                                                                                                 
................................................................

```
- Results Grid:** Displays the results of the executed queries. The first query returns two rows of data. The second query returns 24 rows of data for the indicator '3.d.1' across different countries and years.
- Status Bar:** Shows 'Query executed successfully.' and other status information like 'Ln 34 Col 1 Ch 1 INS'.

Figure 51: Data Cleaning and Normalization

## 3.Query Editor Operations

The Query Editor tool was used for the final shaping of the structure of the data for the UN SDGs using a three-step process contains import, transformation, and modeling. This included the importation of the cleaned SQL tables for goals 1, 2, 3, and 13 into Power BI. This helped in the shaping of the data into an optimized schema structure. This provided a well-founded platform for easy filtering, comparison, and construction of a dashboard for analysis.

### 3.1. Data Import and Navigation

Dataset SDG on goals 1, 2, 3, and 13 were imported in Power BI using the Navigator on Query Editor, confirming table selection and their initial structure.

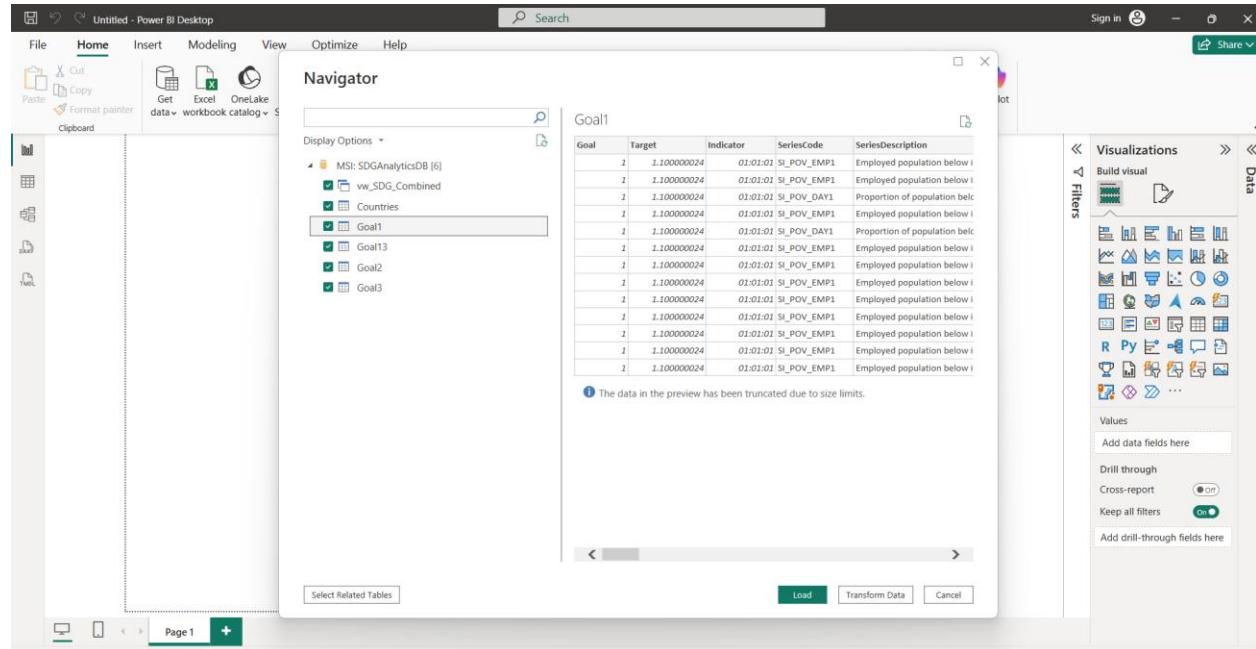


Figure 52: Data Navigation

Queries [6]

L2 Goal

	L2 Goal	L2 Target	A#C Indicator	A#C SeriesCode	A#C SeriesDescription	I#3 GeoAreaCode
1	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
2	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
3	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
4	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
5	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
6	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
7	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
8	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
9	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
10	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
11	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
12	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
13	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
14	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
15	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
16	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
17	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
18	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
19	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	
20	3	3.099999905	3.1.1	SH_STA_MORT	Maternal mortality ratio	

37 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

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Figure 53: Source Connection- Goal 3

Queries [6]

A#P Source

	A#P Source	A#P Indicator	A#P GeoAreaName	L2 TimePeriod	L2 Value
1	Goal1		01:01:01 Western Africa	2015	27.10000038
2	Goal1		01:01:01 Least Developed Countries (LDCs)	2010	32.99000168
3	Goal1		01:01:01 Brazil	2019	12.63984013
4	Goal1		01:01:01 Melanesia	2016	24.28000069
5	Goal1		01:01:01 World	2000	36.29999924
6	Goal1		01:01:01 Western Africa	2016	28.37000084
7	Goal1		01:01:01 Western Africa	2016	26.87000084
8	Goal1		01:01:01 Western Africa	2016	33.11000061
9	Goal1		01:01:01 Western Africa	2016	28.64999962
10	Goal1		01:01:01 Western Africa	2016	25.77000046
11	Goal1		01:01:01 Western Africa	2016	28.52000046
12	Goal1		01:01:01 Western Africa	2016	37.04999924
13	Goal1		01:01:01 Western Africa	2016	24.82999992
14	Goal1		01:01:01 Western Africa	2016	40.34999847
15	Goal1		01:01:01 Western Africa	2017	26.72999954
16	Goal1		01:01:01 Western Africa	2017	31.21999931
17	Goal1		01:01:01 Western Africa	2017	24.94000053
18	Goal1		01:01:01 Western Africa	2017	26.45000076
19	Goal1		01:01:01 Western Africa	2017	38.56000137
20	Goal1		01:01:01 Western Africa	2017	22.88999939

5 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

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Figure 54: Source Connection - Other Goals

Queries [6]

vw\_SDG\_Combined

Countries

Goal1

Goal13

Goal2

Goal3

CountryCode

Country\_Name

Goal13

Goal2

Goal3

1 Afghanistan

2 Africa

3 Africa (ILO)

4 Åland Islands

5 Albania

6 Algeria

7 American Samoa

8 Americas

9 Andorra

10 Angola

11 Anguilla

12 Antigua and Barbuda

13 Argentina

14 Armenia

15 Aruba

16 Asia

17 Australia

18 Australia and New Zealand

19 Austria

20 Azerbaijan

5 COLUMNS, 293 ROWS Column profiling based on top 1000 rows

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Figure 55: Configuring the Data Table Schema

Queries [6]

vw\_SDG\_Combined

Countries

Goal1

Goal13

Goal2

Goal3

Target

Indicator

SeriesCode

SeriesDescription

1 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

2 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

3 1.10000024 01:01:01 SI\_POV\_DAY1 Proportion of population below international pov

4 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

5 1.10000024 01:01:01 SI\_POV\_DAY1 Proportion of population below international pov

6 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

7 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

8 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

9 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

10 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

11 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

12 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

13 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

14 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

15 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

16 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

17 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

18 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

19 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

20 1.10000024 01:01:01 SI\_POV\_EMP1 Employed population below international pov

36 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

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Figure 56: Source Connection- Goal 1

Power Query Editor - Untitled - Goal13

**Properties**

- Name: Goal13
- All Properties

**Applied Steps**

- Source
- Navigation

Query Settings

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1.2 Goal	1.2 Target	A <sub>B</sub> C Indicator	A <sub>B</sub> C SeriesCode	A <sub>B</sub> C SeriesDescription
1	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
2	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
3	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
4	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
5	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
6	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
7	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
8	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
9	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
10	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
11	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
12	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
13	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
14	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
15	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
16	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
17	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
18	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
19	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)
20	13	13.10000038	13.1.1	VC_DSR_AFFCT Number of people affected by disaster (number)

55 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

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Figure 57: Source Connection- Goal 13

Power Query Editor - Untitled - Goal2

**Properties**

- Name: Goal2
- All Properties

**Applied Steps**

- Source
- Navigation

Query Settings

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1.2 Goal	A <sub>B</sub> C Target	A <sub>B</sub> C Indicator	A <sub>B</sub> C SeriesCode	A <sub>B</sub> C SeriesDescription
1	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
2	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
3	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
4	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
5	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
6	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
7	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
8	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
9	2 2.2	2.2.2	SN_STA_OVWGT	Proportion of children moderately or severely
10	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
11	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
12	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
13	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
14	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
15	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
16	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
17	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
18	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
19	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)
20	2 2.1	2.1.1	SN_ITK_DEF	Prevalence of undernourishment (%)

55 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 12:22

Figure 58: Source Connection- Goal 2

## 3.2. Transformation

Final cleaning steps included column removal, column renaming, data type standardization, and creating calculated columns.

The screenshot shows the Power BI Data Editor interface. The 'Applied Steps' pane on the right indicates that the 'Removed Columns' step has been applied to the 'Goal13' query. The main preview area displays a table with columns: Age, Freq, Hazard\_type, and IHR\_Capacity. All rows in the preview show null values for these columns. The status bar at the bottom indicates '53 COLUMNS, 999+ ROWS' and 'Column profiling based on top 1000 rows'.

Figure 59: Remove Unnecessary Columns – Goal 13

The screenshot shows the Power BI Data Editor interface. The 'Applied Steps' pane on the right indicates that the 'Removed Columns' step has been applied to the 'Goal2' query. The main preview area displays a table with columns: Target, Indicator, SeriesCode, and SeriesDescription. The 'SeriesDescription' column contains repeated entries such as 'Proportion of children moderately or severely', 'Prevalence of undernourishment (%)', etc. The status bar at the bottom indicates '53 COLUMNS, 999+ ROWS' and 'Column profiling based on top 1000 rows'.

Figure 60: Remove Unnecessary Columns – Goal 2

Queries [6]

vw\_SDG\_Combined

Countries

**Goal1**

Goal13

Goal2

Goal3

11 Western Africa 2015 27.10000038 2015

199 Least Developed Countries (LDCs) 2010 32.99000168 2010

76 Brazil 2019 12.63984013 2019

54 Melanesia 2016 24.28000069 2016

1 World 2000 36.29999924 2000

11 Western Africa 2016 28.37000084 2016

11 Western Africa 2016 26.87000084 2016

11 Western Africa 2016 33.11000061 2016

11 Western Africa 2016 28.64999962 2016

11 Western Africa 2016 25.77000046 2016

11 Western Africa 2016 28.52000046 2016

11 Western Africa 2016 37.04999924 2016

11 Western Africa 2016 24.82999992 2016

11 Western Africa 2016 40.34999847 2016

11 Western Africa 2017 26.72999954 2017

11 Western Africa 2017 31.21999931 2017

11 Western Africa 2017 24.94000053 2017

11 Western Africa 2017 26.45000076 2017

11 Western Africa 2017 38.56000137 2017

11 Western Africa 2017 33.99000030 2017

34 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 12:27

Figure 61: Rename Columns – Goal 1

Queries [6]

vw\_SDG\_Combined

Countries

Goal1

Goal13

**Goal2**

Goal3

12 Goal 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

2 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

3 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

4 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

5 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

6 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

7 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

8 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

9 2.2 2.2.2 SN\_STA\_OVWGT Proportion of children moderately or severely

10 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

11 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

12 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

13 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

14 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

15 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

16 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

17 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

18 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

19 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

20 2.1 2.1.1 SN\_ITK\_DEF C Prevalence of undernourishment (%)

53 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 12:28

Figure 62: Rename Columns – Goal 2

Figure 63: Rename Columns – Goal 3

Figure 64: Custom Column -Region Grouping

The screenshot shows the Power Query Editor interface with the following details:

- File**, **Home**, **Transform**, **Add Column**, **View**, **Tools**, **Help** menu items.
- General** ribbon tab selected.
- Applied Steps** pane shows "Added Custom" step.
- Properties** pane shows "Name: Goal1".
- Query Settings** pane shows "Source", "Navigation", "Removed Columns", and "Renamed Columns".
- Table View** pane displays a table with columns: **Type\_of\_support**, **Goal1\_ID**, **CountryCode**, and **Region Grouping**. The formula used is: `= Table.AddColumn(#"Renamed Columns", "Region Grouping", each if Text.Contains([Country_Name], "Africa") then`.
- Bottom Status Bar**: 35 COLUMNS, 999+ ROWS, Column profiling based on top 1000 rows, Smart (GPT-5), PREVIEW DOWNLOADED AT 12:39.

Figure 65: Add Column as African and Other-Goal 1

The screenshot shows the Power Query Editor interface with the following details:

- File**, **Home**, **Transform**, **Add Column**, **View**, **Tools**, **Help** menu items.
- General** ribbon tab selected.
- Applied Steps** pane shows "Added Custom" step.
- Properties** pane shows "Name: Goal2".
- Query Settings** pane shows "Source", "Navigation", "Removed Columns", and "Renamed Columns".
- Table View** pane displays a table with columns: **columns2**, **Goal2\_ID**, **CountryCode**, **Countries**, and **Region Grouping**. The formula used is: `= Table.AddColumn(#"Renamed Columns", "Region Grouping", each if [Target] >= 3.1 then "Above Target" else "Below"`.
- Bottom Status Bar**: 54 COLUMNS, 999+ ROWS, Column profiling based on top 1000 rows, Smart (GPT-5), PREVIEW DOWNLOADED AT 12:28.

Figure 66: Add Column as Regional Grouping- Goal 2

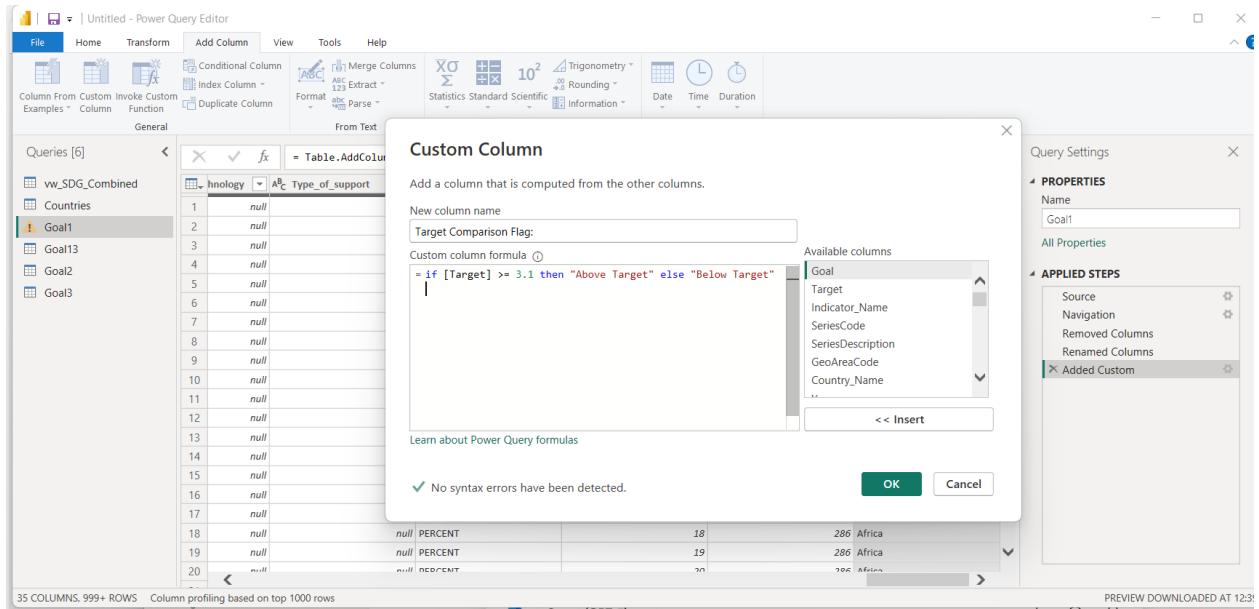


Figure 67: Custom Columns – Target Comparison Flag

The screenshot shows the Power Query Editor interface with the 'Table.AddColumn' dialog open. The formula bar contains the custom column formula:

```
=Table.AddColumn(#"Added Custom", "Target Comparison Flag:", each if [Target] >= 3.1 then "Above Target" else
```

The preview pane shows the first 20 rows of data, including the newly added 'Target Comparison Flag' column which contains values like 'Above Target' and 'Below Target'.

Figure 68: Add Column as Target Comparison Flag-Goal 1

The screenshot shows the Power Query Editor interface with the title bar "Untitled - Power Query Editor". The ribbon menu includes File, Home, Transform, Add Column, View, Tools, and Help. The "Transform" tab is selected. The "Conditional Column" button is highlighted. The main area displays a table with columns: CountryCode, Goal3\_ID, Countries, Region Grouping, and Target Comparison Flag. A conditional column step is applied, with the formula: `= Table.AddColumn(#"Added Custom", "Target Comparison Flag", each if [Target] >= 3.1 then "Above Target" else "Below Target")`. The "APPLIED STEPS" pane on the right shows the step "Added Custom1". The "Query Settings" pane on the far right shows the query name "Goal3".

Figure 69: Goal 3

The screenshot shows the Power Query Editor interface with the title bar "Untitled - Power Query Editor". The ribbon menu includes File, Home, Transform, Add Column, View, Tools, and Help. The "Transform" tab is selected. The "Conditional Column" button is highlighted. The main area displays a table with columns: CountryCode, Goal13\_ID, Countries, Region Grouping, and Target Comparison Flag. A conditional column step is applied, with the formula: `= Table.AddColumn(#"Added Custom", "Target Comparison Flag", each if [Target] >= 3.1 then "Above Target" else "Below Target")`. The "APPLIED STEPS" pane on the right shows the step "Added Custom1". The "Query Settings" pane on the far right shows the query name "Goal13".

Figure 70: Goal 13

**Data Modeling and Schema Design** By associating fact tables with shared dimension tables, a schema was established that allowed efficient filtering and cross goal analysis in Power BI.

## 4. Implementation of DAX queries

The screenshot shows the Power BI Desktop interface. In the top ribbon, the 'Home' tab is selected. The main area displays the Query Editor with the following DAX code:

```

1 Date =
2 ADDCOLUMNS(
3     CALENDAR(DATE(2000,1,1), DATE(2030,12,31)),
4     "Year", YEAR([Date]),
5     "MonthNumber", MONTH([Date]),
6     "MonthName", FORMAT([Date], "MMM"),
7     "YearMonth", FORMAT([Date], "YYYY-MM")
8 )

```

Below the Query Editor, the Data view shows three tables: 'Goal1', 'vw\_SDG\_Combined', and 'Date'. The 'Date' table is currently selected. The Properties pane on the right shows settings for the 'Date' table, including 'General' properties like Name (Date) and Description (Enter a description), and a 'Row label' dropdown set to 'Select a row label'. The 'Data' pane on the far right lists various tables and models available in the workspace.

Figure 71: Date adds columns

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected in the top ribbon. A table named 'Goal1' is displayed in the main area. The first column of the table shows the measure 'Current Value' with the formula: `1 Current Value =  
2 SUM('Goal1'[SDG_Value])`. The Properties pane on the right shows the structure of the 'Current Value' measure, which is a sum of the 'SDG\_Value' column from the 'Goal1' table. The Data pane on the right lists various tables and models available in the workspace.

Figure 72: Current Value

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. A measure named 'Previous Year Value' is being defined. The formula is:

```

1 Previous Year Value =
2 CALCULATE(
3     [Current Value],
4     DATEADD(Date[Date], -1, YEAR)
5 )

```

A tooltip at the bottom of the formula bar states: "The syntax for [Date] is incorrect. DAX(CALCULATE([Current Value], DATEADD(Date[Date], -1, YEAR)))".

The Data pane on the right lists various tables and their schema.

Figure 73: Previous Year Value calculation

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. A measure named 'Previous Year Value' is being defined. The formula is:

```

1 Previous Year Value =
2 CALCULATE(
3     [Current Value],
4     DATEADD(Date[Date], -1, YEAR)
5 )

```

A tooltip at the bottom of the formula bar states: "The syntax for [Date] is incorrect. DAX(CALCULATE([Current Value], DATEADD(Date[Date], -1, YEAR)))".

The Data pane on the right shows a detailed view of the 'Date' table, including columns like Date, Year, MonthNumber, MonthName, and YearMonth.

Figure 74: Previous Year Value

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. A new measure is being defined with the following DAX code:

```

1 Previous Year Value =
2 CALCULATE(
3     [Current Value],
4     DATEADD('Date'[Date], -1, YEAR)
5 )

```

The Data pane on the right shows the structure of the 'Date' table, including columns for Date, Year, MonthNumber, MonthName, and YearMonth.

Figure 75: Previous Year Value

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. A new measure is being defined with the following DAX code:

```

1 YoY Change = [Current Value] - [Previous Year Value]
2
3

```

The Data pane on the right shows the structure of the 'Date' table, including columns for Date, Year, MonthNumber, MonthName, and YearMonth.

Figure 76: YoY change

Measure tools

Structure

Properties

Calculations

Date    Year    MonthNumber    MonthName    YearMonth

Date	Year	MonthNumber	MonthName	YearMonth
01/01/2000 00:00:00	2000	1	Jan	2000-01
02/01/2000 00:00:00	2000	2	Feb	2000-02
03/01/2000 00:00:00	2000	3	Mar	2000-03
04/01/2000 00:00:00	2000	4	Apr	2000-04
05/01/2000 00:00:00	2000	5	May	2000-05
06/01/2000 00:00:00	2000	6	Jun	2000-06
07/01/2000 00:00:00	2000	7	Jul	2000-07
08/01/2000 00:00:00	2000	8	Aug	2000-08
09/01/2000 00:00:00	2000	9	Sep	2000-09
10/01/2000 00:00:00	2000	10	Oct	2000-10
11/01/2000 00:00:00	2000	11	Nov	2000-11
12/01/2000 00:00:00	2000	12	Dec	2000-12
13/01/2000 00:00:00	2000	13		
14/01/2000 00:00:00	2000	14		
15/01/2000 00:00:00	2000	15		
16/01/2000 00:00:00	2000	16		
17/01/2000 00:00:00	2000	17		
18/01/2000 00:00:00	2000	18		
19/01/2000 00:00:00	2000	19		
20/01/2000 00:00:00	2000	20		
21/01/2000 00:00:00	2000	21		
22/01/2000 00:00:00	2000	22		
23/01/2000 00:00:00	2000	23		
24/01/2000 00:00:00	2000	24		
25/01/2000 00:00:00	2000	25		
26/01/2000 00:00:00	2000	26		

Data

Search

- Countries
- Date
  - MonthName
  - MonthNumber
  - Year
  - YearMonth
  - Year
  - YearMonth
  - YoY Change
  - YoY Change %
- Goal1
- Goal13
- Goal2
- Goal3
- vw\_SDG\_Combined
  - Data
  - Item
  - Kind
  - Name
  - Schema

Figure 77: YoY Change Percentages

Measure tools

Structure

Properties

Calculations

Goal    Target    Indicator\_Name    SeriesCode    SeriesDescription    GeoAreaCode    Country\_Name    Year    SDG\_Value    Time\_Detail

Goal	Target	Indicator_Name	SeriesCode	SeriesDescription	GeoAreaCode	Country_Name	Year	SDG_Value	Time_Detail
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	16	American Samoa	2022	100	2022	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	16	American Samoa	2023	100	2023	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2000	100	2000	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2001	100	2001	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2002	100	2002	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2003	100	2003	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2004	100	2004	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2005	100	2005	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2006	100	2006	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2007	100	2007	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2008	100	2008	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2009	100	2009	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2010	100	2010	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2011	100	2011	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2012	100	2012	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2013	100	2013	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2014	100	2014	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2015	100	2015	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	20	Andorra	2000	100	2000	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	20	Andorra	2001	100	2001	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2017	100	2017	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	20	Andorra	2002	100	2002	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	40	Austria	2018	100	2018	
I_39999997615814	01:0401	SP.AC5.BSRVH20	Proportion of population using basic drinking water services, by location (%)	20	Andorra	2003	100	2003	

Data

Search

- Countries
- Date
  - MonthName
  - MonthNumber
  - Year
  - YearMonth
  - Year
  - YearMonth
  - YoY Change
  - YoY Change %
- Goal1
  - Age
  - BasePeriod
  - column34
  - Country\_Name
  - Current Value
  - Freq
  - GeoAreaCode
  - Goal
  - Goal1\_ID
  - Hazard\_type
  - IHR\_Capacity
  - Indicator\_Name
  - Location
  - LowerBound
  - Name\_of\_non\_communicable...
  - Nature
  - Observation\_Status
  - Quantile
  - Region\_Grouping

Figure 78: Target Values-Goal 1

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Target Value 3 Format: General Data category: Uncategorized

Home table: Goal3 \$ % Auto New Quick measure measure Calculations

Structure Properties

1 Target Value 3 =  
2 AVERAGE([Goal3[Target]])

Goal Target Indicator\_Name SeriesCode

SeriesDescription GeoAreaCode Country\_Name Year SDG\_Value Time\_Detail

International Health Regulations (IHR) capacity, by type of IHR capacity (%) 4 Afghanistan 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 8 Albania 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 24 Angola 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 12 Algeria 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 26 Antigua and Barbuda 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 32 Argentina 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 40 Austria 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 36 Australia 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 37 Azerbaijan 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 44 Bahamas 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 50 Bangladesh 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 48 Bahrain 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 57 Armenia 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 68 Bolivia (Plurinational State of) 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 56 Belgium 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 76 Brazil 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 84 Belize 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 64 Bhutan 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 70 Bosnia and Herzegovina 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 90 Solomon Islands 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 112 Belarus 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 72 Botswana 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 104 Myanmar 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 116 Cambodia 2021 2021  
International Health Regulations (IHR) capacity, by type of IHR capacity (%) 124 Canada 2021 2021

Data

SDG\_Value SeriesCode SeriesDescription Sex Source Substance\_use\_disorders Target Target Comparison Flag

Time\_Detail TimeCoverage Type\_of\_occupation Type\_of\_renewable\_technology Type\_of\_support Units UpperBound

Year

vw\_SDG\_Combined Data Item Kind Name Schema

Table: Goal3 (279,920 rows) Column: Target Value 3 (0 distinct values)

Figure 79: Goal 3

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Target Value 13 Format: General Data category: Uncategorized

Home table: Goal13 \$ % Auto New Quick measure measure Calculations

Structure Properties

1 Target Value 13 =  
2 AVERAGE([Goal13[Target]])

Goal Target Indicator\_Name SeriesCode

SeriesDescription GeoAreaCode Country\_Name Year SDG\_Value Time\_Detail

Number of directly affected persons attributed to disasters per 100,000 population (number) 4 Afghanistan 2017 2017  
Number of directly affected persons attributed to disasters per 100,000 population (number) 4 Afghanistan 2018 2018  
Number of directly affected persons attributed to disasters per 100,000 population (number) 4 Afghanistan 2019 2019  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2005 2005  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2006 2006  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2007 2007  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2008 2008  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2009 2009  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2010 2010  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2011 2011  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2012 2012  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2013 2013  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2014 2014  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2015 2015  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2016 2016  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2017 2017  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2018 2018  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2019 2019  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2020 2020  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2021 2021  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2022 2022  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2023 2023  
Number of directly affected persons attributed to disasters per 100,000 population (number) 8 Albania 2024 2024  
Number of directly affected persons attributed to disasters per 100,000 population (number) 12 Algeria 2005 2005  
Number of directly affected persons attributed to disasters per 100,000 population (number) 12 Algeria 2006 2006  
Number of directly affected persons attributed to disasters per 100,000 population (number) 12 Algeria 2007 2007  
Number of directly affected persons attributed to disasters per 100,000 population (number) 12 Algeria 2008 2008  
Number of directly affected persons attributed to disasters per 100,000 population (number) 12 Algeria 2009 2009

Data

Name\_of\_non\_communicable... Nature Observation\_Status Quantile Region\_Grouping Report\_Ordinal Reporting\_Type SDG\_Value SeriesCode SeriesDescription Sex Source Substance\_use\_disorders Target Target Comparison Flag

Time\_Detail TimeCoverage Type\_of\_occupation Type\_of\_renewable\_technology Type\_of\_support Units UpperBound

Table: Goal13 (22,649 rows) Column: Target Value 13 (0 distinct values)

Figure 80: Goal 13

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name Progress % Format General Data category Uncategorized New Quick measure measure Calculations

Home table Goal1

Structure

Properties

1 Progress % = 2 DIVIDE([Current Value], [Target Value])

Goal Target Indicator\_Name SeriesCode SeriesDescription GeoAreaCode Country\_Name Year SDG\_Value Time\_Detail

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 16 American Samoa 2022 100 2022

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 16 American Samoa 2023 100 2023

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 16 American Samoa 2024 100 2024

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2000 100 2000

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2001 100 2001

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2002 100 2002

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2003 100 2003

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2004 100 2004

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2005 100 2005

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2006 100 2006

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2007 100 2007

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2008 100 2008

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2009 100 2009

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2010 100 2010

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2011 100 2011

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2012 100 2012

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2013 100 2013

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2014 100 2014

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2015 100 2015

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2016 100 2016

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 20 Andorra 2000 100 2000

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 20 Andorra 2001 100 2001

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2017 100 2017

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 20 Andorra 2002 100 2002

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 40 Austria 2018 100 2018

1 1.39999997615814 01:0401 SP,ACS,BSRVH20 Proportion of population using basic drinking water services, by location (%) 20 Andorra 2003 100 2003

Data Search Countries Date Goal1 Age BasePeriod column34 Country\_Name CountryCode Current Value Freq GeoAreaCode Goal Goal\_ID Hazard\_type IHR\_Capacity Indicator\_Name Location LowerBound Name\_of\_non\_communicable... Nature Observation\_Status Progress % Quantile

Table: Goal1 (125,439 rows) Column: Progress % (0 distinct values)

Figure 81: Progress Percentages-Goal 1

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name Progress 2% Format Whole number Data category Uncategorized New Quick measure measure Calculations

Home table Goal2

Structure

Properties

1 Progress 2% = DIVIDE(SUM('Goal2'[SDG\_Value]), SUM('Goal2'[Target]))

Goal Target Indicator\_Name SeriesCode SeriesDescription GeoAreaCode Country\_Name Year SDG\_Value Time\_Detail

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2004 NaN 2004

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2005 NaN 2005

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2006 NaN 2006

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2007 NaN 2007

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2009 NaN 2009

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2010 NaN 2010

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2011 NaN 2011

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2012 NaN 2012

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2013 NaN 2013

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2014 NaN 2014

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2015 NaN 2015

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2016 NaN 2016

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2017 NaN 2017

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2018 NaN 2018

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2019 NaN 2019

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2020 NaN 2020

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2021 NaN 2021

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 68 Bolivia (Plurinational State of) 2022 NaN 2022

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2001 NaN 2001

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2004 NaN 2004

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2005 NaN 2005

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2006 NaN 2006

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2007 NaN 2007

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2008 NaN 2008

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2009 NaN 2009

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2010 NaN 2010

2 2.3 2.3.2 SI,AGR,SSFP Average income of small-scale food producers, PPP (constant 2017 international \$) 76 Brazil 2011 NaN 2011

Data Search column50 column51 column52 Country\_Name CountryCode Cumulative Since 2015 Freq GeoAreaCode Goal Goal\_ID Indicator\_Name Location LowerBound Nature Observation\_Status Progress 2% Quantile Region Grouping Reporting\_Type SDG\_Value SeriesCode SeriesDescription

Figure 82: Goal 2

Figure 83: Goal 3

Table: Goal3 (279,920 rows) Column: Progress 3 % (0 distinct values)

SeriesDescription	GeoAreaCode	Country_Name	Year	SDG_Value	Time_Detail
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	4	Afghanistan	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	8	Albania	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	24	Angola	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	12	Algeria	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	28	Antigua and Barbuda	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	32	Argentina	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	40	Austria	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	36	Australia	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	37	Azerbaijan	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	44	Bahamas	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	50	Bangladesh	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	48	Bahrain	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	51	Armenia	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	68	Bolivia (Plurinational State of)	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	56	Belgium	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	76	Brazil	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	84	Belize	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	64	Bhutan	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	70	Bosnia and Herzegovina	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	100	Bulgaria	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	90	Solomon Islands	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	112	Belarus	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	72	Botswana	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	104	Myanmar	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	116	Cambodia	2021	2021	
SH_IHR_CAPS International Health Regulations (IHR) capacity, by type of IHR capacity (%)	124	Canada	2021	2021	

Figure 83: Goal 3

Figure 84: Goal 13

Table: Goal13 (113 rows) Column: Progress13 % (0 distinct values)

SeriesDescription	GeoAreaCode	Country_Name	Year	SDG_Value	Time_Detail
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	4	Afghanistan	2017		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	4	Afghanistan	2018		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	4	Afghanistan	2019		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2005		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2006		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2007		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2008		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2009		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2010		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2011		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2012		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2013		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2014		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2015		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2016		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2017		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2018		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2019		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2022		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2023		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2024		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	12	Algeria	2005		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	12	Algeria	2006		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	12	Algeria	2007		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	12	Algeria	2008		
VC_DSR_DAFF Number of directly affected persons attributed to disasters per 100,000 population (number)	12	Algeria	2009		

Figure 84: Goal 13

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Rank By Indicator Format: Whole number Data category: Uncategorized

Home table: Goal1 \$ % 0 New Quick measure measure Calculations

Structure Properties

```

1 Rank By Indicator =
2 VAR _Indicator = SELECTEDVALUE('Goal1'[Indicator_Name])
3 VAR _Year = SELECTEDVALUE('Goal1'[Year])
4 RETURN
5 RANK(
6   FILTER(ALLSELECTED('Goal1'[Country_Name]),
7     CALCULATE(SELECTEDVALUE('Goal1'[Indicator_Name])) = _Indicator &&
8     CALCULATE(SELECTEDVALUE('Goal1'[Year])) = _Year
9   ),
10   [Current Value],
11   DESC,
12   DENSE
13 )
14

```

Goal	Target	Indicator Name	SeriesCode	SeriesDescription	GeoAreaCode	Country Name	Year	SDG Value	Time_Detail
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	16	American Samoa	2022	100	2022
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	16	American Samoa	2023	100	2023
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	16	American Samoa	2024	100	2024
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2000	100	2000
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2001	100	2001
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2002	100	2002
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2003	100	2003
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2004	100	2004
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2005	100	2005
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2006	100	2006
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2007	100	2007
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2008	100	2008
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2009	100	2009
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2010	100	2010
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2011	100	2011
1	1.39999997615814	01:04:01	SP_ACS_BSRVH2O	Proportion of population using basic drinking water services, by location (%)	40	Austria	2012	100	2012

Table: Goal1 (125,439 rows) Column: Rank By Indicator (0 distinct values)

Figure 85: Rank By Indicator-Goal 1

Untitled - Power BI Desktop

File Home Help Table tools Measure tools

Name: Top N Value Format: General Data category: Uncategorized

Home table: Goal13 \$ % Auto New Quick measure measure Calculations

Structure Properties

```

1 Top N Value =
2 VAR N = SELECTEDVALUE(Goal1[Age], 5)
3 RETURN
4 IF(
5   [Rank By Indicator] <= N,
6   [Current Value]
7 )

```

Goal	Target	Indicator Name	SeriesCode	SeriesDescription	GeoAreaCode	Country Name	Year	SDG Value	Time_Detail
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	4	Afghanistan	2017		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	4	Afghanistan	2018		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	4	Afghanistan	2019		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2005		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2006		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2007		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2008		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2009		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2010		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2011		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2012		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2013		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2014		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2015		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2016		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2017		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2018		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2019		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2022		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2023		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	8	Albania	2024		
13	13.1000003814697	13.1.1	VC_DSR_DAFF	Number of directly affected persons attributed to disasters per 100,000 population (number)	12	Algeria	2005		

Table: Goal13 (53,640 rows) Column: Top N Value (0 distinct values)

Figure 86: Top N Value

The screenshot shows the Power BI Desktop interface with the 'Measure tools' tab selected. A new measure named 'Top Countries' is being defined:

```

1 Top Countries =
2 TOP(5,
3 | SUMMARIZE(Countries, Country_Name, "Progress", [Progress %]),
4 | [Progress %], DESC
5 )

```

A tooltip indicates that the 'SUMMARIZE' function expects a column name as argument number 2. The 'Data' pane on the right shows the 'Countries' table structure.

CountryCode	Country_Name
1	Afghanistan
2	Africa
3	Africa (ILO)
4	Åland Islands
5	Albania
6	Algeria
7	American Samoa
8	Americas
9	Andorra
10	Angola
11	Anguilla
12	Antigua and Barbuda
13	Argentina
14	Armenia
15	Aruba
16	Asia
17	Australia
18	Australia and New Zealand
19	Austria
20	Azerbaijan
21	Bahamas
22	Bahrain
23	Bangladesh

Table: Countries (293 rows) Column: Top Countries (0 distinct values)

Figure 87: Top Countries

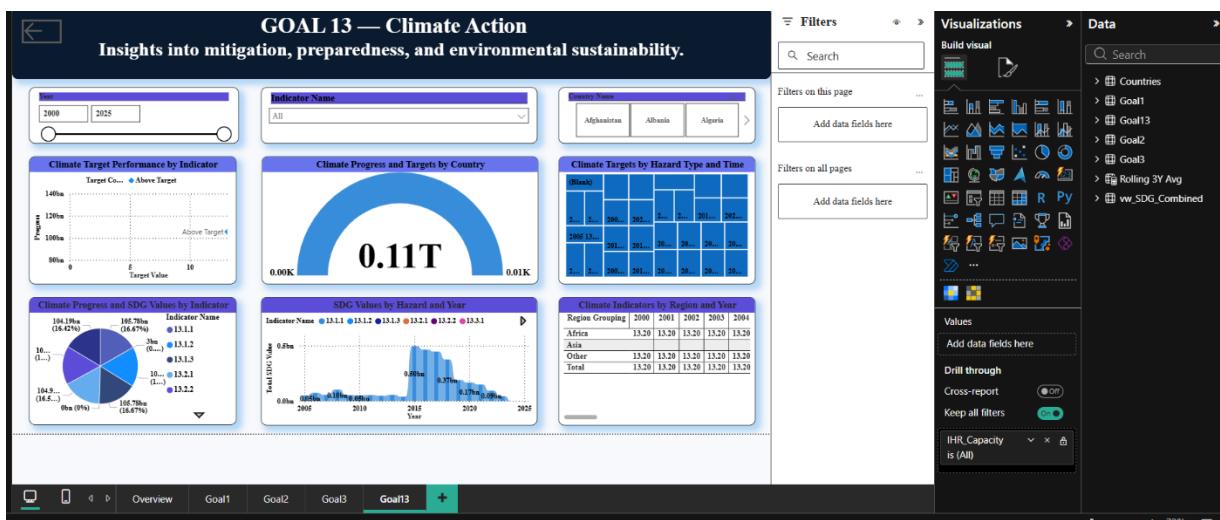
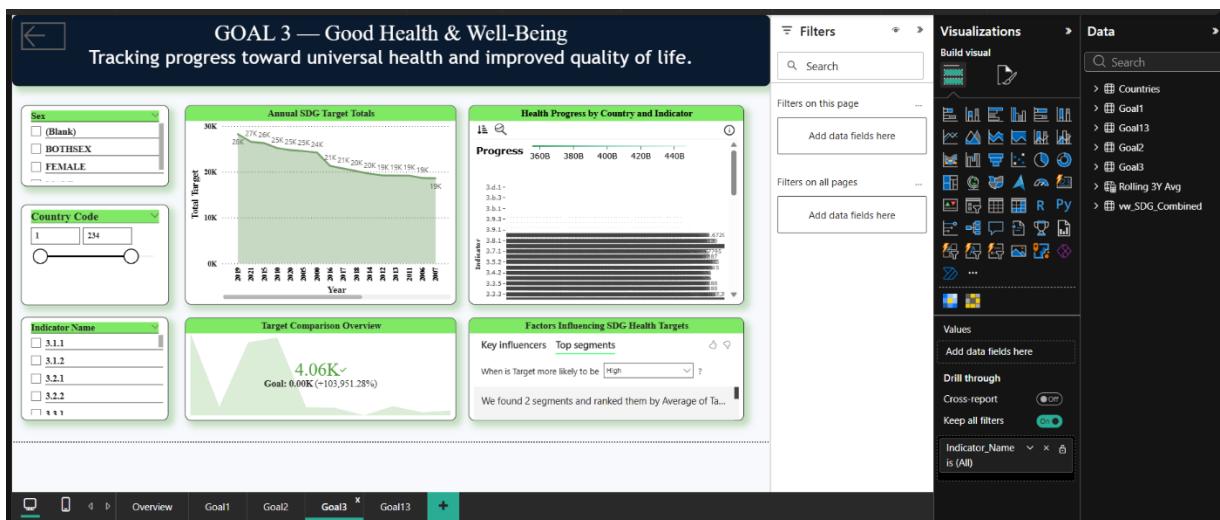
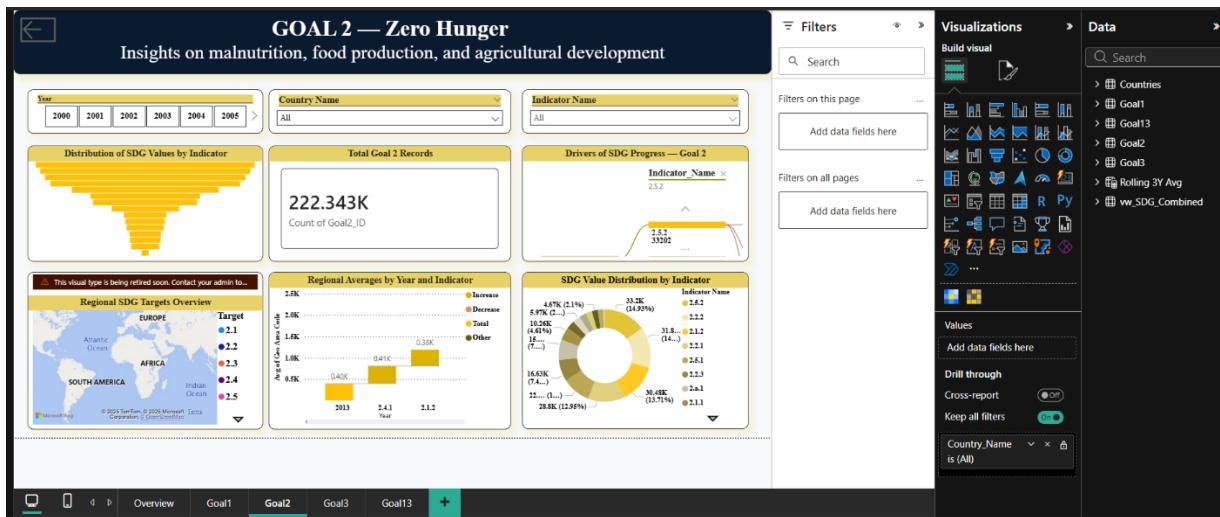
# 5. Implementation of Power BI Dashboard

## 5.1. Overview

This Power BI dashboard is an interactive analytical tool for monitoring and analyzing progress made in the four core United Nations' Sustainable Development Goals, No Poverty (Goal 1), Zero Hunger (Goal 2), Good Health and Well-being (Goal 3), and Climate Action (Goal 13). Analysis of each of the aims is done at the report level, using similar and synchronized filters of Country, Year, and Indicator that allow comprehensive analysis. The use of strategic KPI cards, maps, and influencer visuals together in this analysis makes it possible for the user to easily move between gaining insights at the organizational level and exploring possible explanations for specific factors in the observed phenomenon.

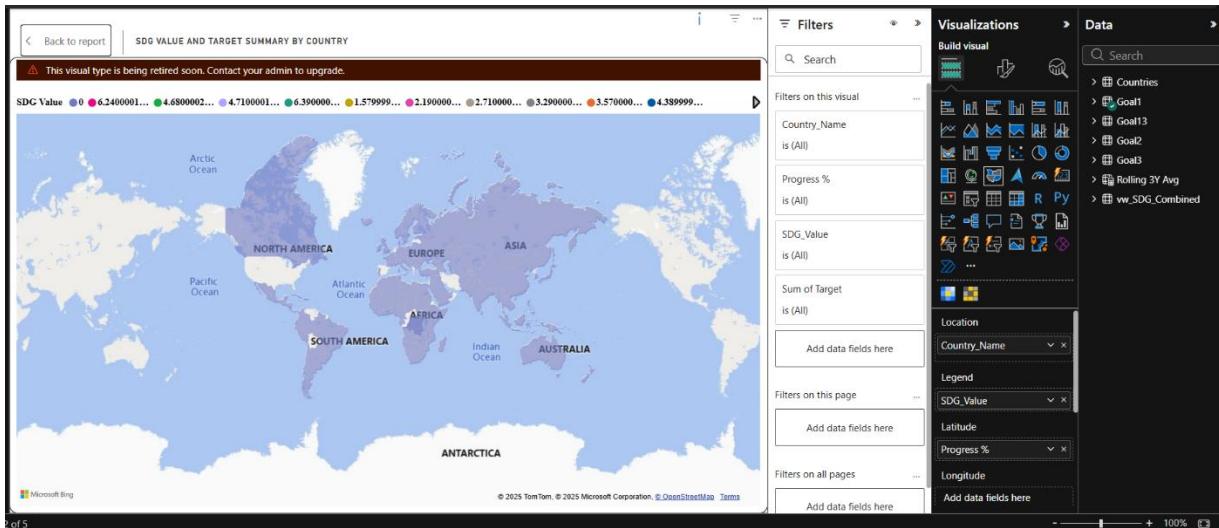
The screenshot shows the main 'Sustainable Development Goals Monitoring Dashboard' page. At the top, there's a title bar with the dashboard name and a subtitle 'Interactive overview of SDG Progress'. Below the title, there are four large callout boxes corresponding to Goal 1, Goal 2, Goal 3, and Goal 13, each containing a brief summary of progress. To the right of these boxes is a 'Filters' pane and a 'Visualizations' pane. The 'Filters' pane includes search fields and dropdown menus for 'Add data fields here' and 'Values'. The 'Visualizations' pane lists various chart and map types. On the far right is a 'Data' pane with a search field and a tree view of data sources, including 'Countries', 'Goal1', 'Goal13', 'Goal2', 'Goal3', 'Rolling 3Y Avg', and 'vw\_SDG\_Combined'.

The screenshot shows the 'GOAL 1 — No Poverty' report page. It features several interactive components: a 'Country Name' dropdown, a date range selector ('Year' from 2000 to 2022), an 'Indicator Name' dropdown, and a 'Region Grouping' checkbox for 'Africa', 'Asia', and 'Other'. Below these are three main visualizations: a 'Regional Breakdown of SDG Values' bar chart, an 'Indicator Progress by Region' treemap, and a 'Yearly Progress %' chart. The 'Visualizations' and 'Data' panes are also visible on the right side of the dashboard.



## 5.2. Goal 1(No Poverty)

### Filled Map



This map gives a graphical representation of the worldwide distribution of the headcount ratios of poverty. A gradient paints the countries in it, with the darkest colors showing the highest levels of poverty. This makes it crystal clear and visible at first glance the global inequality situation is such that Sub-Saharan Africa and sections of Southern Asia emerge as the poorest regions of the world.

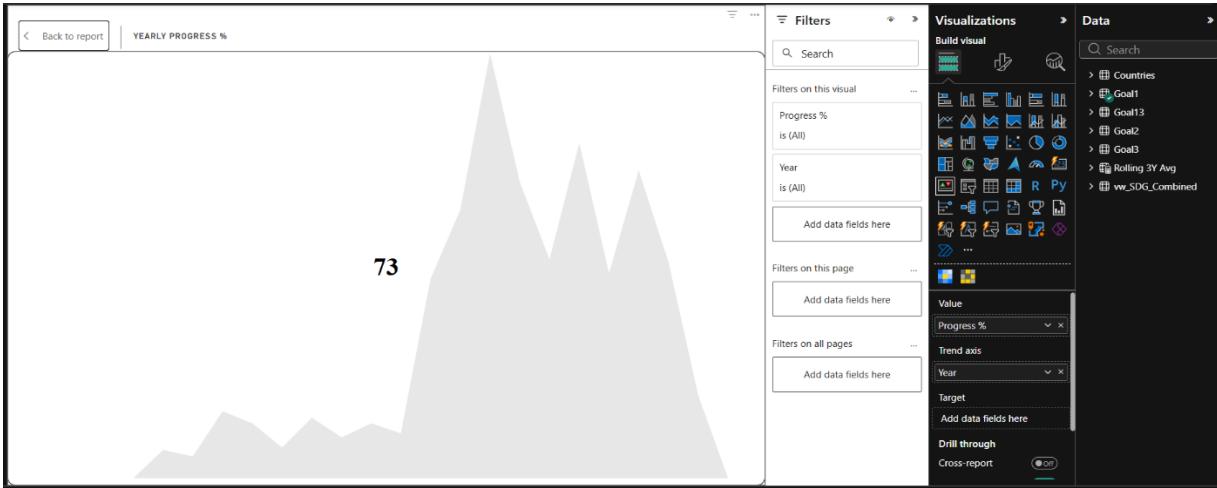
### Heat Map



This matrix visualization shows countries on the vertical axis and years on the horizontal axis, with color intensity indicating the poverty value. It efficiently uncovers both time-related

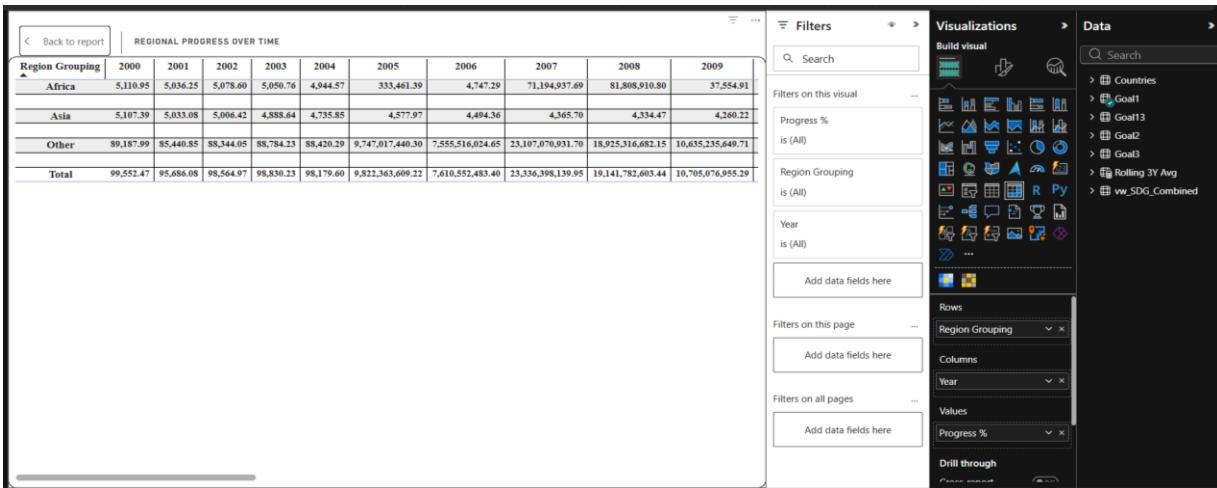
transformations and geographical comparisons, thus enabling us to quickly spot the countries that have made great progress (cells getting lighter over time) and those that have stayed the same or declined (dark cells always present).

## KPI



The Key Performance Indicator (KPI) visual gives a very important summary statistic like the global average poverty rate or the total number of people living below the poverty line. It serves as a very high-level summary, providing a very immediate, at-a-glance understanding of the overall problem's magnitude.

## Matrix



This tabular visual shows a comprehensive, multi-level disaggregation of the information. Users can expand hierarchies (for example, Region > Country > Year) to see exact numerical values for

poverty indicators. It acts as the detailed data source for the more aggregated visualizations, ideal for those who require accurate numbers.

## Slicer

The following interactive filters are the dashboard main controls. These allow the users to filter out one specific country, say Sri Lanka, one area, say South-eastern Asia, one period, say 2005-2015, or one poverty indicator. All the other charts on this page will automatically update and show the selected criteria.

### Slicer-Country

This screenshot shows the Power BI report interface. On the left, there is a red header bar with the text 'Country Name'. Below it is a dropdown menu set to 'All'. To the right of the header is a 'Filters' pane containing three sections: 'Filters on this visual', 'Filters on this page', and 'Filters on all pages', each with a 'Add data fields here' button. Below these is a 'Field' section with a dropdown set to 'Country\_Name'. Underneath is a 'Drill through' section with 'Cross-report' and 'Keep all filters' options, and a 'Country Name' dropdown also set to 'All'. On the far right, there is a 'Visualizations' pane with various chart icons and a 'Data' pane listing data sources: Countries, Goal1, Goal13, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined.

### Slicer-Indicator

This screenshot shows the Power BI report interface. On the left, there is a red header bar with the text 'Indicator Name'. Below it is a dropdown menu set to 'All'. To the right of the header is a 'Filters' pane containing three sections: 'Filters on this visual', 'Filters on this page', and 'Filters on all pages', each with a 'Add data fields here' button. Below these is a 'Field' section with a dropdown set to 'Indicator\_Name'. Underneath is a 'Drill through' section with 'Cross-report' and 'Keep all filters' options, and a 'Country Name' dropdown also set to 'All'. On the far right, there is a 'Visualizations' pane with various chart icons and a 'Data' pane listing data sources: Countries, Goal1, Goal13, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined.

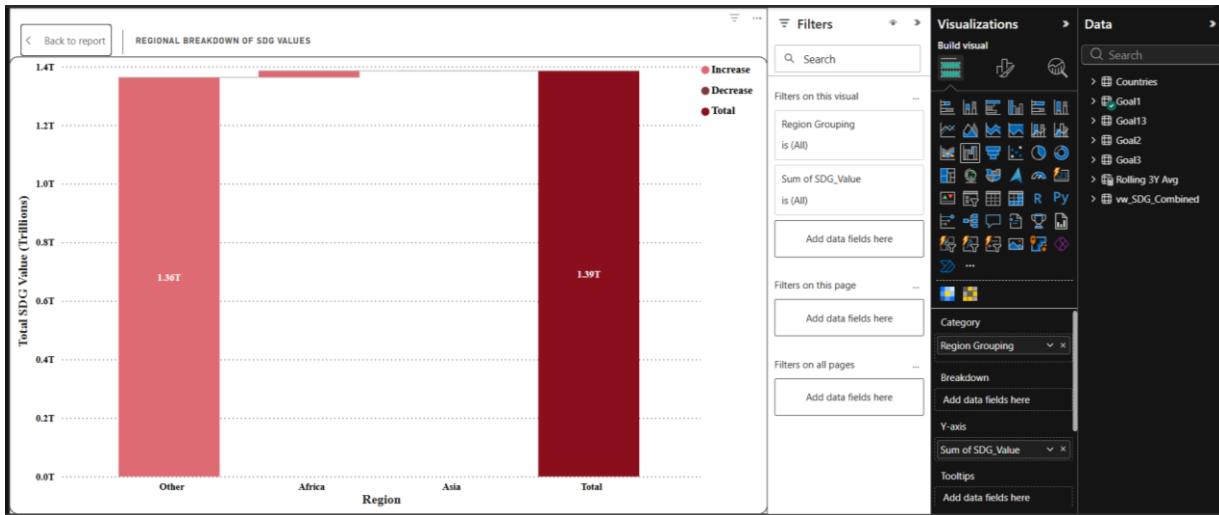
## Slicer-Region

The screenshot shows a Power BI report interface. On the left, there is a "Region Grouping" slicer with three options: Africa, Asia, and Other. The "Back to report" button is visible above the slicer. The main area is currently empty. On the right side, there is a "Filters" pane, a "Visualizations" pane with various chart icons, and a "Data" pane listing data sources like Countries, Goal1, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined.

## Slicer-Year

The screenshot shows a Power BI report interface. On the left, there is a "Year" slicer with two options: 2000 and 2025. The "Back to report" button is visible above the slicer. The main area is currently empty. On the right side, there is a "Filters" pane, a "Visualizations" pane with various chart icons, and a "Data" pane listing data sources like Countries, Goal1, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined.

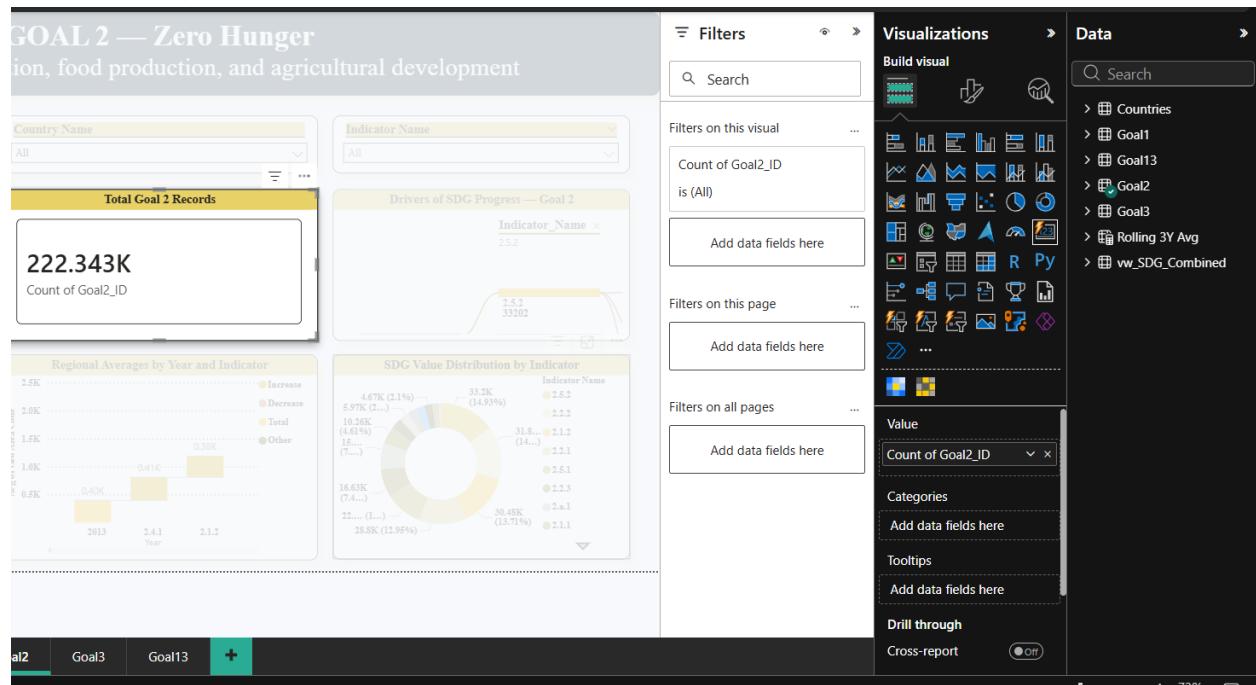
## Waterfall Chart



The waterfall chart is a very useful tool with which to see the overall impact of changes that take place one after another. For example, the chart can show the starting poverty count of the world, then add and subtract amounts from various regions over a certain period to present a total. This masterfully breaks down the net change into its positive and negative parts.

## 5.3. Goal 2 (Zero Hunger)

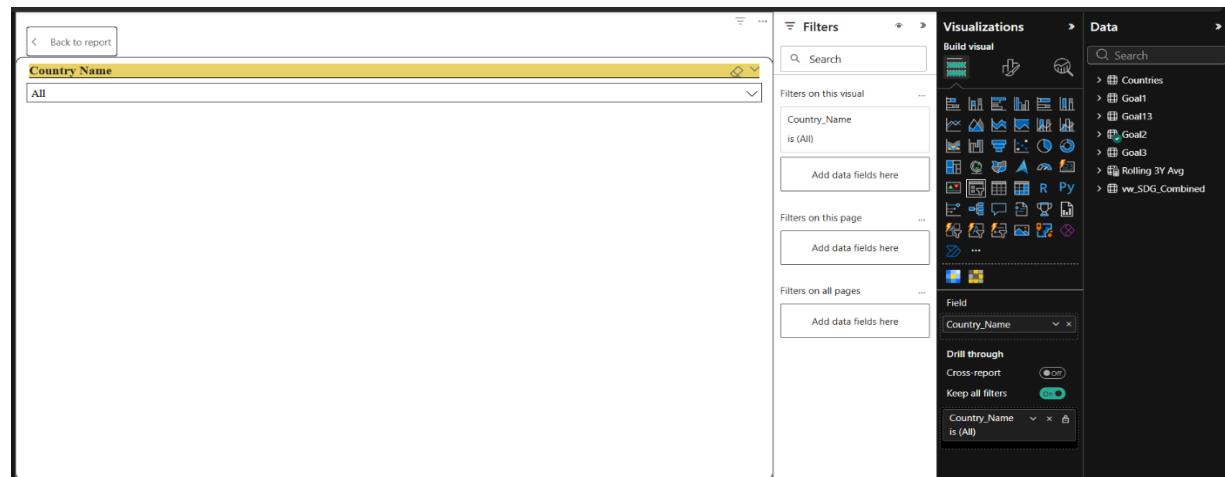
### Card



The large number visual is important because it shows a critical indicator like prevalence of undernourishment or number of children under five years stunted. It can act as a dominant report number because it gives an overview of the status of hunger and food insecurity globally.

### Slicer

#### Slicer (Country Name)



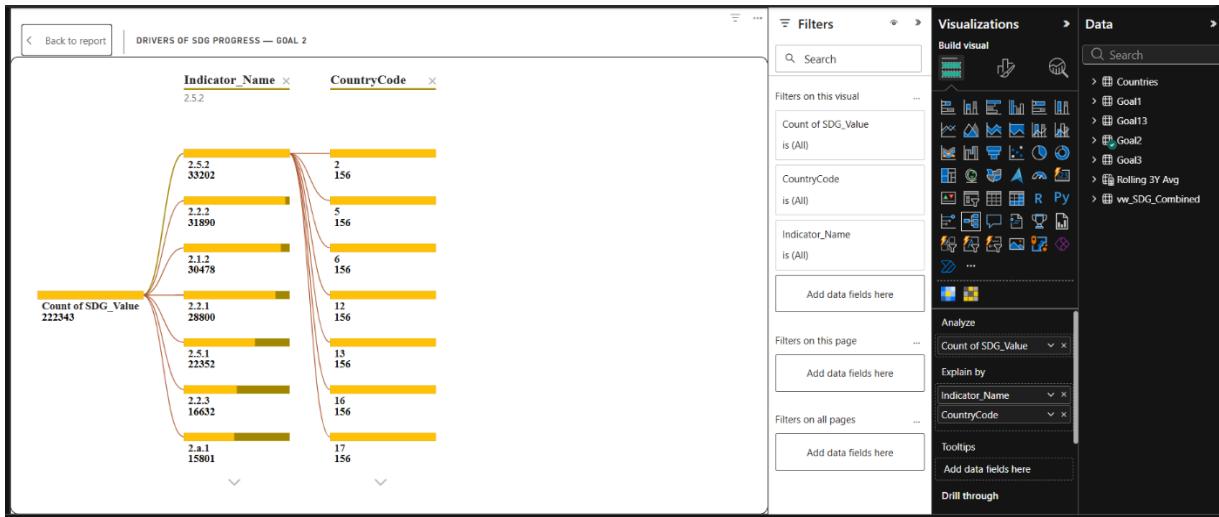
## Slicer (Indicator Name)

The screenshot shows a Power BI report interface. On the left is a large white area containing a single-line text input field labeled "Indicator Name" with the placeholder "All". To the right of this is a vertical ribbon-style menu bar with three main sections: "Filters", "Visualizations", and "Data". The "Filters" section contains several dropdown menus and search fields. One dropdown under "Filters on this visual" is set to "Indicator\_Name is (All)". Another dropdown under "Filters on all pages" is set to "Field Indicator\_Name". The "Visualizations" section contains icons for various chart types like bar charts, line graphs, and maps. The "Data" section on the far right lists data sources: "Countries" (with sub-options for Goal1, Goal13, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined), "Indicator Name" (with sub-options for All, 2000, 2006, 2012, 2018, 2024, 2001, 2007, 2013, 2019, 2025, 2002, 2008, 2014, 2020, 2003, 2009, 2015, 2021, 2004, 2010, 2016, 2022, 2005, 2011, 2017, and 2023), and "Year" (with sub-options for All, 2000, 2006, 2012, 2018, 2024, 2001, 2007, 2013, 2019, 2025, 2002, 2008, 2014, 2020, 2003, 2009, 2015, 2021, 2004, 2010, 2016, 2022, 2005, 2011, 2017, and 2023).

## Slicer (Year)

This screenshot is identical to the one above, showing the same Power BI report interface. It features a large white area with a "Year" slicer containing a grid of years from 2000 to 2023. To the right is the same ribbon-style menu bar with "Filters", "Visualizations", and "Data" sections. The "Filters" section shows "Year is (All)" and "Field Year". The "Data" section on the right lists the same data sources as the first screenshot, including the "Year" section which lists all the years from 2000 to 2023.

## Decomposition Tree



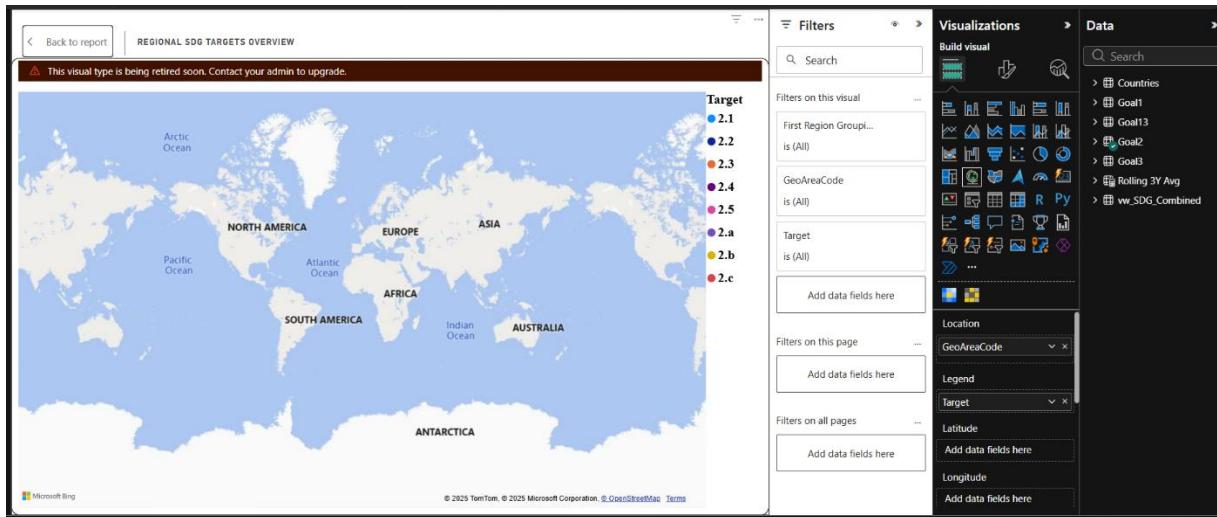
This interactive graphic breaks down a core indicator into multiple dimensions. It's possible to drill down into Region, Country, and Year, allowing for analysis of which areas drive or trail behind others about Total Number of Undernourished People.

## Donut Chart



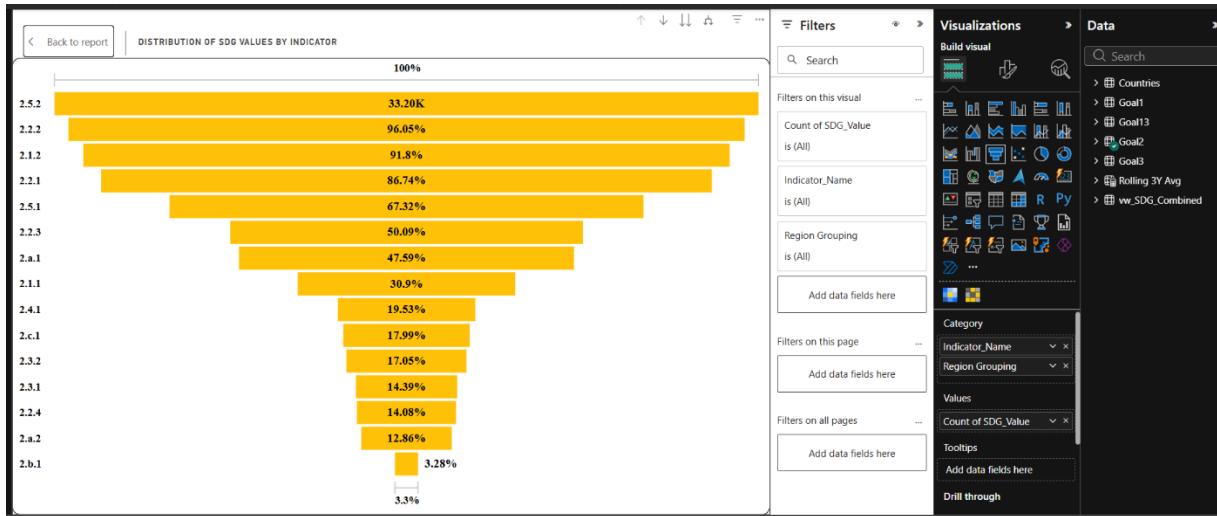
The donut chart reveals how a whole divides into percentages, with areas such as the prevalence of moderate or severe food insecurity among the population considered. It serves as an insightful tool for grasping how hunger is manifested at the selected region or state level.

## Filled Map



Filled map shows important hunger measures like stunting or undernutrition prevalence among countries. It literally shows how different countries lack food security, hence important spots requiring urgent attention can easily be determined.

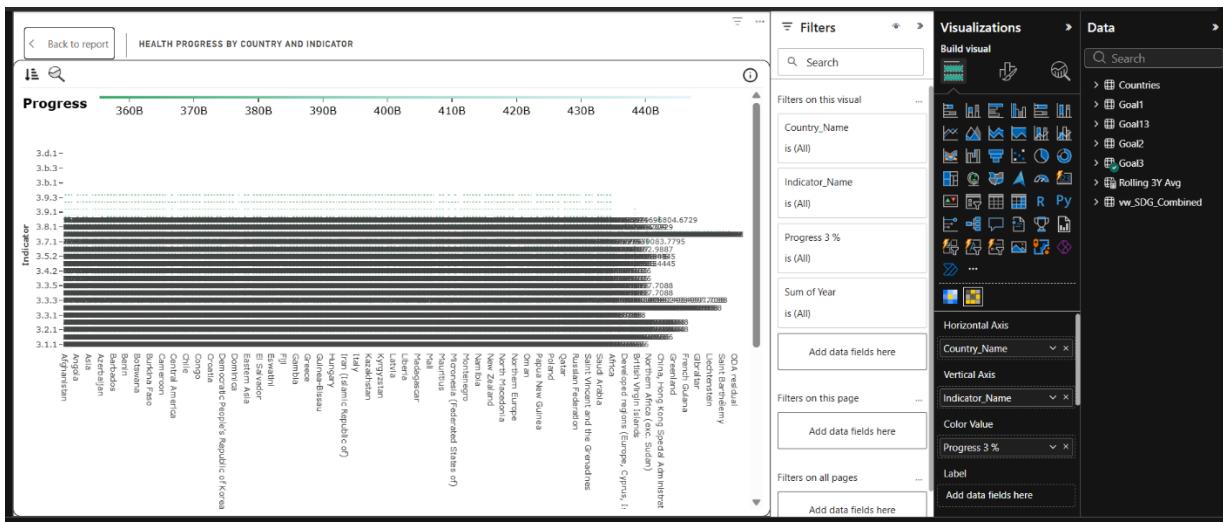
## Funnel Chart



The funnel chart can be applied to show the phases of a process or severity levels. In relation to this topic, it would demonstrate how food insecurity can progress, with more of the population experiencing moderate food insecurity at the top and fewer experiencing severe hunger at the bottom.

## 5.4. Goal 3 (Good Health and Wellbeing)

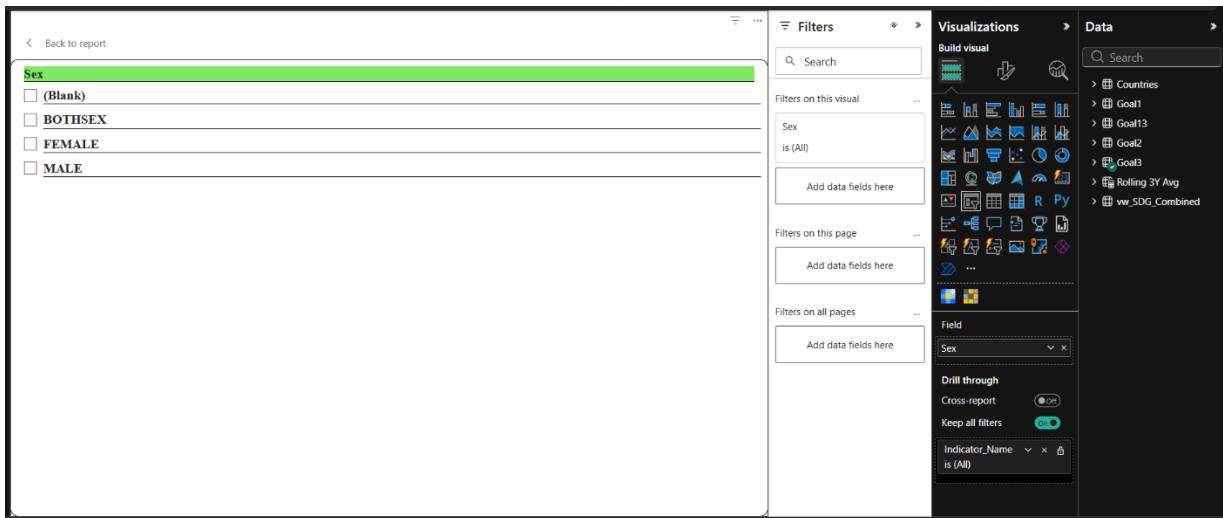
### Heat Map



Heat Map This is a heat map like Goal 1 that cross-references health indicator categories by countries and years. It instantly highlights geographical hotspots and cold spots for health issues that may be difficult to identify using traditional charts.

### Slicer

#### Slicer (Sex)



The Sex slicer is of particular importance for Goal 3, which enables the analysis of health disparities between male and female populations-a key dimension of health inequality.

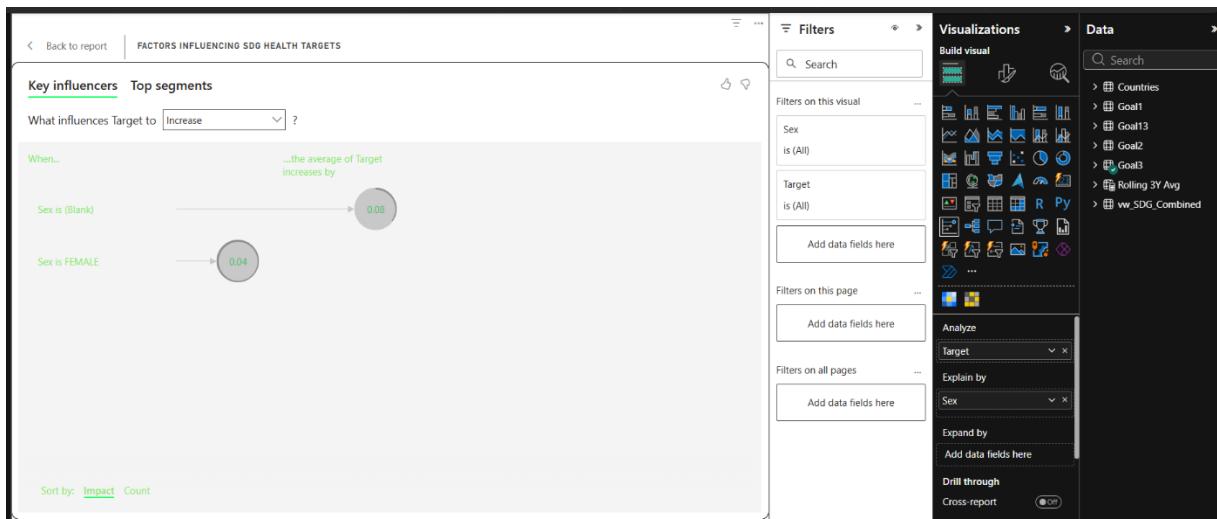
## Slicer (Country Code)

The screenshot shows a Power BI report interface. On the left, there is a Slicer titled "Country Code" with two input fields: one containing "1" and another containing "234". To the right of the Slicer is a large, empty white area representing the main visualization space. The top navigation bar includes a "Back to report" button. The right side of the screen features the Power BI ribbon with sections for "Filters", "Visualizations", and "Data". The "Filters" section contains three filter cards: "Filters on this visual" (CountryCode is (All)), "Filters on this page" (Add data fields here), and "Filters on all pages" (Add data fields here). The "Data" section shows a tree view of data sources: Countries, Goal1, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined.

## Slicer (Indicator Name)

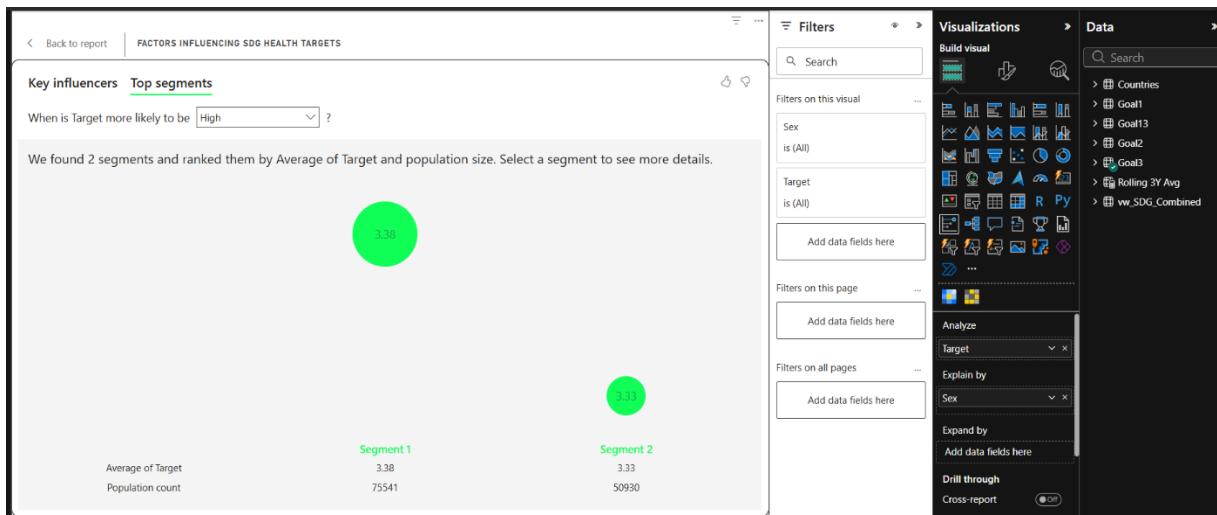
The screenshot shows a Power BI report interface. On the left, there is a Slicer titled "Indicator Name" containing a list of indicator names from 3.1.1 to 3.9.9. To the right of the Slicer is a large, empty white area representing the main visualization space. The top navigation bar includes a "Back to report" button. The right side of the screen features the Power BI ribbon with sections for "Filters", "Visualizations", and "Data". The "Filters" section contains three filter cards: "Filters on this visual" (Indicator\_Name is (All)), "Filters on this page" (Add data fields here), and "Filters on all pages" (Add data fields here). The "Data" section shows a tree view of data sources: Countries, Goal1, Goal2, Goal3, Rolling 3Y Avg, and vw\_SDG\_Combined.

## Key Influencers



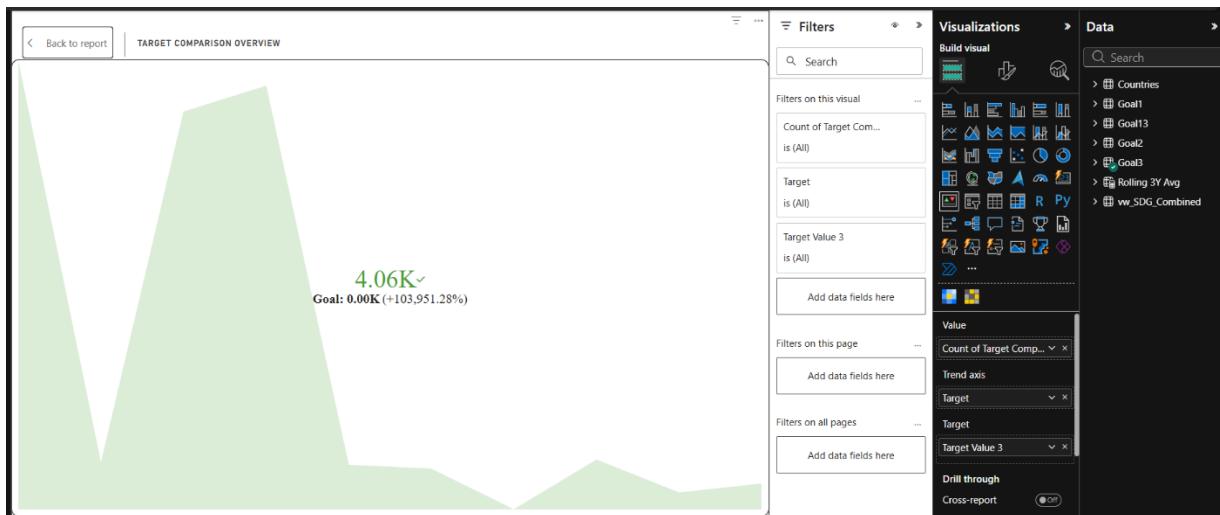
**Key Influencers** This advanced analytic identifies what factors are most strongly influencing any one key health metric such as country, region, or an associated indicator. It might answer a question like What are the top influences for high neonatal mortality rates. Through statistical analysis of the entire dataset.

## Key Influencers (Top Segment)



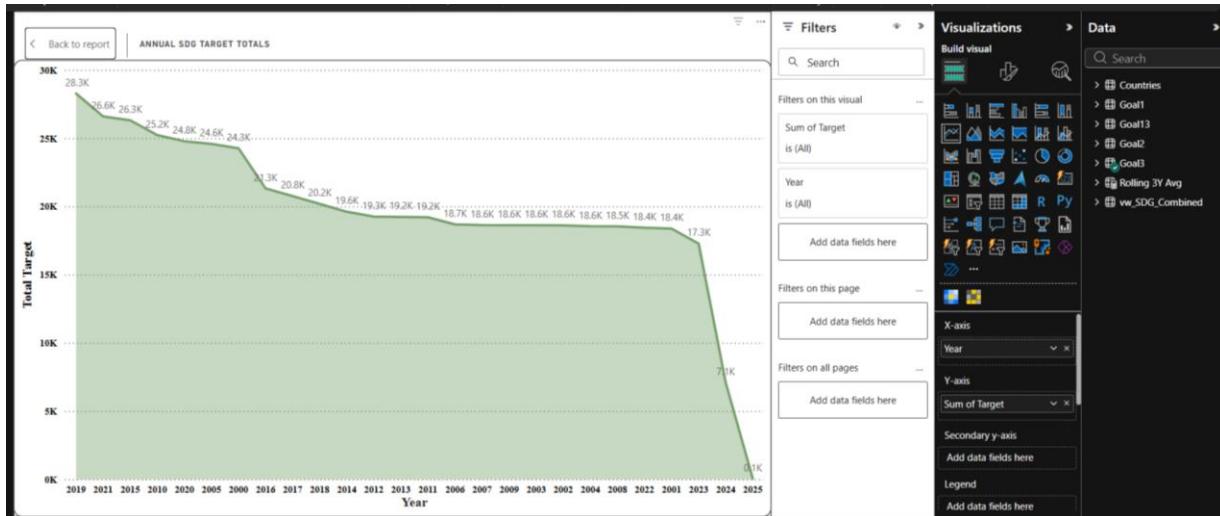
Major influencers of a segment (key influencers) are identified at the deepest part of the segment being analyzed. The segment that is analyzed in this example is the 20% of countries that have the highest rates of death per 1,000 people. Descriptions of this very at risk population contain the most valuable information regarding who will require health interventions and what they will look like.

## KPI



This graph visualizes the core health metric, or indicator, on aspects such as average mortality rates or vaccination coverage. It provides a clear, singular focus on a primary health target and enables a quick grasp of the status against a desired goal.

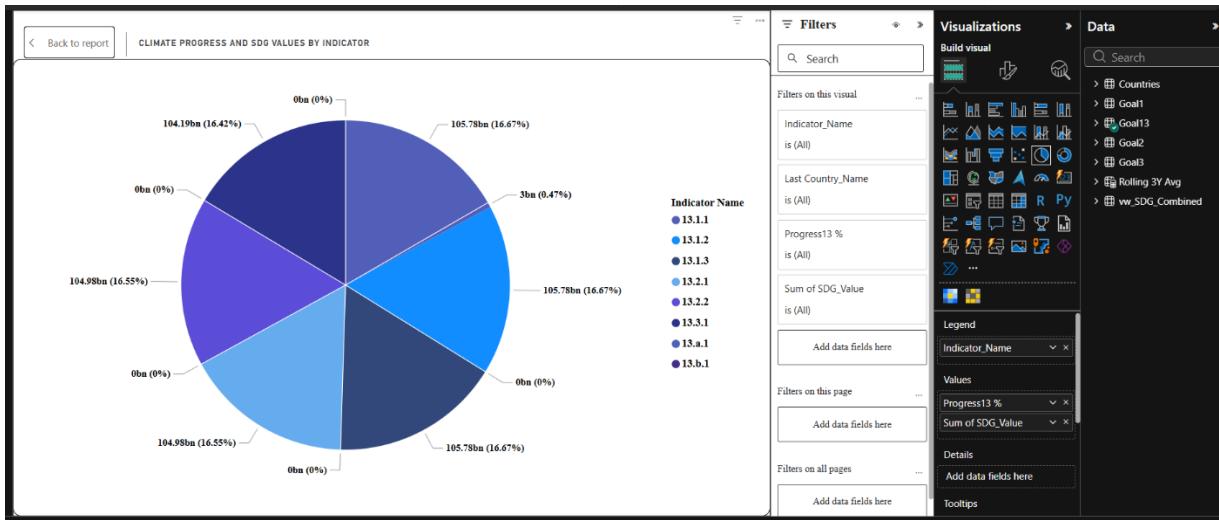
## Line Chart



Line chart is a good graph type in which to track progressions in health outcomes over time. By plotting trends on the same axes for multiple countries or regions, the chart identifies clearly which entities are on pace to meet health targets and which are lagging, thereby highlighting successes and failures in health policy.

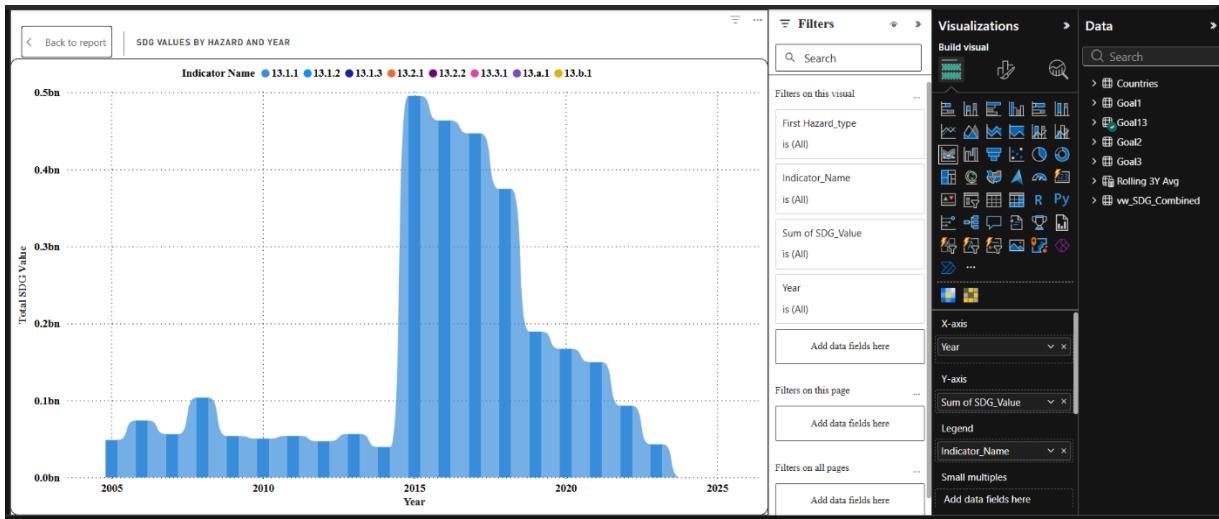
## 5.5. Goal 13 (climate change)

### Pie chart



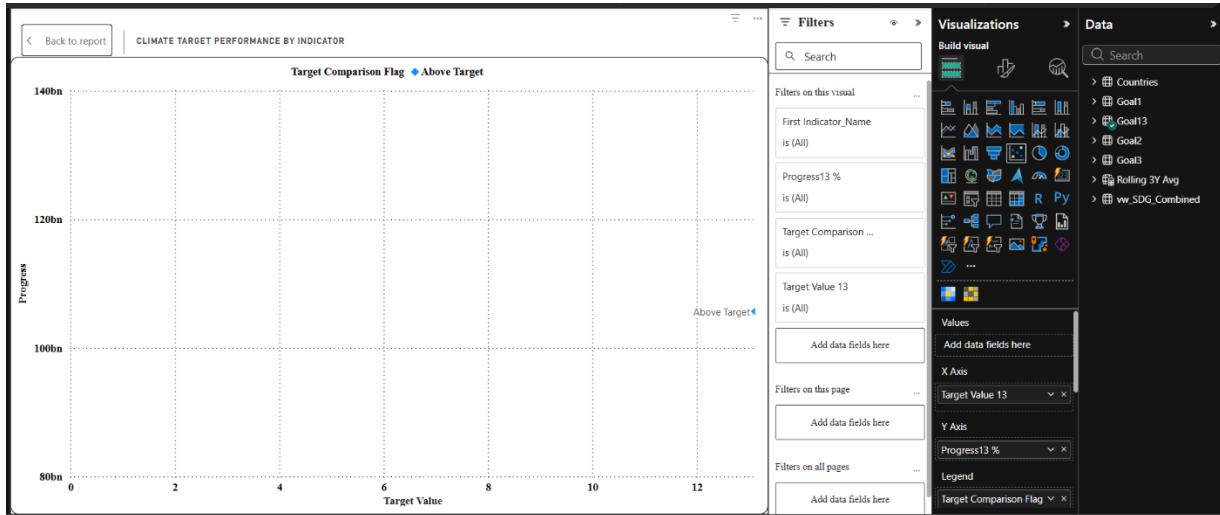
This figure shows the global CO2 emissions composition by region or country grouping. It immediately conveys the relative responsibility of various parts of the world for the climate crisis, focusing attention on major current emitters.

### Ribbon Chart



The ribbon chart excels in showing the evolution of a part-to-whole relationship over time. It can show changes in how much each region contributes to global emissions, for instance, the increase in the share coming from the rapidly industrializing economies.

## Scatter Chart



This is a great visualization for finding correlations between two metrics, such as a country's GDP per capita and its per capita CO2 emissions. The resulting pattern can either support or refute assumptions about the relationship that exists between economic development and environmental impact.

## Tree Map



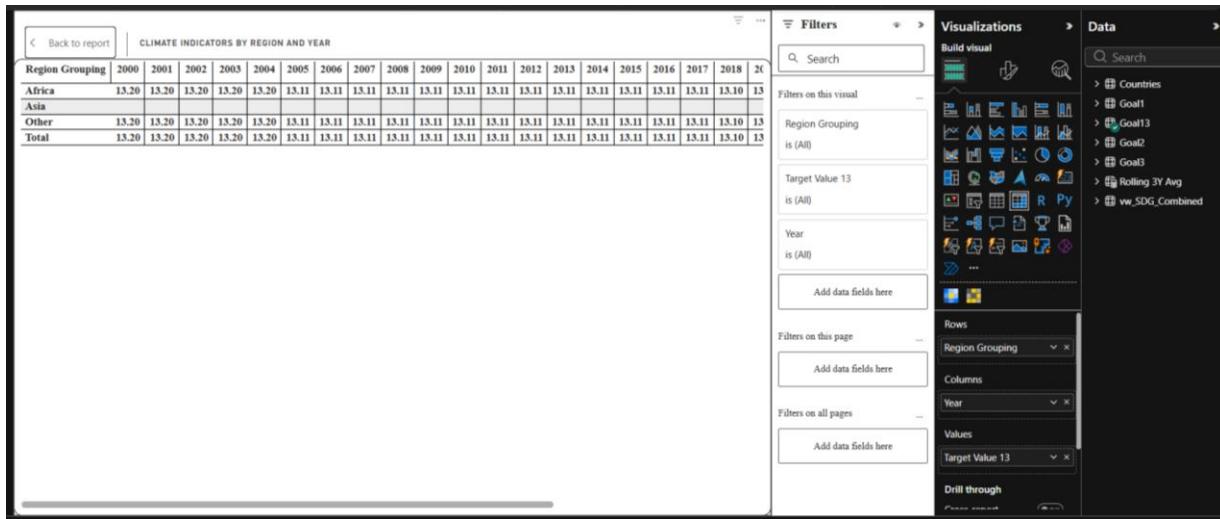
This Tree Map the climate hazards can be visualized by TYPE and TIME period as well as exhibiting frequency through the size and color of each rectangle. The trend of a specific climate hazard (Flood, Drought, etc.) can also be displayed clearly over time from year-to-year.

## Gauge Chart



This Chart highlights the percentage of progress being made towards the overall climate goal. The needle indicates the current level of performance compared to the target goal and the color zones allow for immediate visual assessments of whether progress is on track or not.

## Matrix



The table shows the detailed numbers behind the climate data, permitting users to see exact emission figures, growth rates, and other indicators for specific country-year combinations that are essential for in depth policy analysis and reporting.

## Slicer

### Slicer (Country name)

The screenshot shows a Power BI report interface. On the left is a table titled "Country Name" with 10 columns and 10 rows of country names. The columns are: Afghanistan, Australia and New Z..., Benin, Burundi, Colombia, Democratic Republic o..., Equatorial Guinea, Gabon, Guinea-Bi...; Albania, Austria, Bhutan, Cabo Verde, Comoros, Denmark, Estonia, Gambia, Guyana; Algeria, Azerbaijan, Bolivia (Plurinatio..., Cambodia, Cook Islands, Djibouti, Eswatini, Georgia, Haiti; Andorra, Bahrain, Bosnia and Herzegovina, Cameroon, Costa Rica, Dominica, Ethiopia, Germany, Honduras; Angola, Bangladesh, Botswana, Canada, Côte d'Ivoire, Dominican Republic, Europe and Northern ..., Ghana, Hungary; Antigua and Barbuda, Barbados, Brazil, Central African Re..., Croatia, Eastern and South-East..., European Union, Greece, Iceland; Argentina, Belarus, Brunei Darussalam, Central and Southern ..., Cuba, Ecuador, Fiji, Grenada, India; Armenia, Belgium, Bulgaria, Chile, Cyprus, Egypt, Finland, Guatemala, Indonesia; Australia, Belize, Burkina Faso, China, Czechia, El Salvador, France, Guinea, Iran (Islamic Republic of). The right side of the screen displays the Power BI visualizations and data browser panes.

### Slicer (Indicator Name)

The screenshot shows a Power BI report interface. On the left is a table titled "Indicator Name" with 10 columns and 10 rows. The columns are: All, All, All, All, All, All, All, All, All, All. The right side of the screen displays the Power BI visualizations and data browser panes.

### Slicer (Year)

The screenshot shows a Power BI report interface. On the left is a table titled "Year" with two columns: 2000 and 2025. A slider is positioned between these values. The right side of the screen displays the Power BI visualizations and data browser panes.

## 5.6. Key Findings and Revealed Trends

There exists a very strong mixture between poverty, hunger, and health, and Sub-Saharan Africa has been worse affected in this case. Although international hunger has decreased, it remains in hotspots. In addition, it has been exposed that climate vulnerabilities are threatening food security and that a gap exists in greenhouse gas emissions, and that developed countries' emissions are plateauing, whereas those of developing countries are rising.

## 6. Challenges

Our pivot from Goal 7 to Goal 2 necessitated the comprehensive redesign of our data model and the selection of new indicators for hunger. We were overwhelmed by the effort needed to clean and organize the complex, extensive UN datasets in SQL, and convert them into a more compact, workable star schema. Furthermore, the presence of many NULL values presented a difficult challenge in making decisions regarding how best to handle missing data. In addition, while learning to use advanced Power BI capabilities like DAX functions and decomposition trees, it was important to exercise extreme care both in our use of technical skills and in vacuuming up right analytical information, so that the visualizations we created would be meaningful.

## 7. Conclusion

We encountered several challenges in this project that were enough to test our technical abilities. UN SDG data is enormous with no standardization of names, numerous null observations, as well as duplicates. Consider the number of null observations of historical emissions for small island developing states for Goal 13, for which about 30% of observations were null for small island developing states. Should these nulls be treated by imputation, omission, or highlighting. We chose to highlight nulls, with attendant implications for data ethics that could inform policy decisions.

A significant challenge for us was adapting our SQL database design as we switched the emphasis from Goal 7 to Goal 2. We were initially storing data from each goal in separate tables, causing redundancy issues as well as issues with multi goal analysis. We adapted to a star database design with fact tables and dimension tables, which was more conducive to analysis using Power BI. We learned that database design is crucial for analysis. Learning about more complex features of Power BI, such as DAX calculations and decomposition trees, was also something that had to be developed through iteration and testing. We learned that using the wrong time intelligence functions initially caused trends to be incorrectly calculated.

## 7.1. What does this mean for policy makers and NGOs

This dashboard serves as a pragmatic source of real-life takeaways for policymaking and NGO work. It underlines regional SDG hotspots and trends; it provides the ability to track progress by showing key performance indicators and offers drill through capabilities provided by the government. Real-time policy adjustments can be considered by officials as circumstances change. NGOs are given clarity on where converging needs of poverty, hunger, and health in Africa so interventions can be precisely targeted. Climate visuals connect funding choices to emissions responsibility to aid in explaining the reasoning behind certain investments. The goal cross insights help with integrated program design. The data is transformed into transparent, evidence-based decision support tools that drive meaningful and impactful decisions.

## 7.2. Overview and Improving Workflow

This project educated us on the use of integrated data analysis solutions that can be harnessed to solve challenges and issues encountered by communities and organizations globally. We were able to establish a flexible and repeatable framework (pipeline) for tracking the Sustainable Development Goals by establishing a dynamic Power BI dashboard that is linked to the SQL Server database, ensuring that our processes are optimized with reduced human error and the ability to refresh data automatically. Data integrity is also a crucial consideration apart from data analysis. Time invested in data normalizing and validating is beneficial to the end-users in the following ways: the end-users were able to build confidence in their data, which aided in making more informed decisions, and data analysis became more flexible through the application of the validated data. If we were to do it again, it would mean that we would engage policymakers (stakeholders) earlier, that a dashboard could be created for monitoring data quality, and that bookmarks could be used in power bi to help with storytelling in analysis. Finally, what this project shows is that data is more than a number. Data is a series of stories that can be used to implement change. This dashboard that was developed is what will make it easier for policymakers and nongovernmental organizations to make decisions with the data that is related to the SDGs.