**Background and Problem Statement**

Ensuring healthy lives and promoting well-being for all is a core focus of the United Nations’ Sustainable Development Goal 3 (SDG 3). This goal is especially challenging for countries struggling with food insecurity, where access to nutritious diets is limited, and health outcomes are often poor. Food insecurity not only leads to malnutrition but is also closely tied to increased child and maternal mortality, shortened life expectancy, and higher incidences of preventable diseases. The complexity of this problem makes it a significant concern for policymakers, international organizations, and governments across the globe. A better understanding of how food security impacts health outcomes is crucial to designing effective interventions that can alleviate these issues.

The significance of this problem extends beyond national borders, affecting low and middle-income countries worldwide. Food insecurity limits access to the basic nutrition needed for good health, which in turn exacerbates health disparities. If solutions are found to make nutritious food more affordable and accessible, it could lead to better health outcomes, reduced mortality rates, and a longer life expectancy for millions of people. Solving this issue is not only important for improving individual well-being but also for driving global health equity and sustainable development.

To explore this challenge, we will use three datasets: **Food Insecurity and Nourishment Indicators, Food Prices for Nutrition,** and **Health-Related Indicators**.

1. Food Insecurity and Nourishment Indicators Dataset: This dataset tracks various indicators of food insecurity and nourishment in different countries. It provides key data points on undernourishment rates, food insecurity levels, and health-related expenditures.

* Key Characteristics:
  + Food Insecurity Level: Measures the percentage of the population that lacks regular access to sufficient food, indicating the severity of food insecurity.
  + Undernourishment Rates: The proportion of the population that does not meet the minimum dietary energy requirements.
  + Health Expenditures: The amount spent by countries on health services per capita, providing insight into how much investment is made in healthcare systems in relation to food insecurity.
* Significance: This dataset is crucial for understanding how food scarcity impacts nourishment and health outcomes. It helps to analyze whether countries with higher food insecurity are also experiencing worse health indicators such as higher child and maternal mortality rates.

**2**. Food Prices for Nutrition Dataset:This dataset captures the cost of maintaining a nutritious diet in various countries and tracks the percentage of populations that are unable to afford such diets.

* Key Characteristics:
  + Cost of a Healthy Diet: The average cost required for an individual to maintain a diet that meets nutritional guidelines.
  + Percentage Unable to Afford a Healthy Diet: The portion of the population that cannot afford a healthy diet based on their income and economic conditions.
* Significance: The cost of nutrition is a key factor in assessing food security. Countries with higher food prices may have a larger portion of the population unable to afford a healthy diet, leading to poor health outcomes. This dataset helps identify economic barriers to achieving proper nutrition and highlights regions where affordability is a critical issue.

3. Health-Related Indicators Dataset: This dataset provides a comprehensive view of public health outcomes across different countries. It includes metrics such as maternal and child mortality rates, disease prevalence, vaccination coverage, and life expectancy.

* Key Characteristics:
  + Maternal and Child Mortality: Tracks the number of deaths of mothers during childbirth and children under five, indicating the quality of healthcare and nutrition.
  + Life Expectancy: The average number of years a person is expected to live based on current health conditions in the country.
  + Disease Prevalence: Prevalence rates of communicable diseases such as tuberculosis and HIV, which are often higher in food-insecure regions.
  + Vaccination Coverage: The percentage of the population that is vaccinated against major preventable diseases.
* Significance: These health-related indicators provide a direct link between food security, healthcare access, and public health outcomes. This dataset allows for the examination of how food insecurity and the affordability of nutrition impact critical health metrics such as mortality and life expectancy.

Together, these datasets allow us to explore the connections between food security, economic affordability, and public health outcomes, helping to identify where the most pressing issues lie. Understanding this data is essential for informing policy decisions on health services, nutrition programs, and food subsidies. By analyzing the relationship between food security and health outcomes, this study aims to provide insights into how countries can better allocate resources and create targeted interventions that will improve the health and well-being of vulnerable populations. A better solution to this problem could not only reduce preventable deaths and diseases but also contribute significantly to global efforts to meet SDG 3, ensuring a healthier future for all.

**Questions**

1. How does food insecurity impact key health indicators such as child mortality and maternal mortality across different countries?

(This question links food insecurity to vital health indicators, helping to identify how it affects vulnerable populations, particularly children and mothers.)

1. What is the relationship between the cost of a healthy diet and health outcomes, such as life expectancy and disease incidence? (It explores economic barriers to nutrition, revealing how diet affordability influences overall health, guiding policies for better access to nutritious food.)
2. How do countries with higher health expenditures fare in reducing mortality rates and increasing life expectancy compared to those with lower health investments? (This assesses the effectiveness of healthcare spending, showing whether increased investments lead to improved health outcomes, which can inform resource allocation.)
3. What percentage of the population in various countries is unable to afford a healthy diet, and how does this affect disease prevention and overall health? (Understanding this percentage highlights the extent of food insecurity and its effects on public health, emphasizing the need for nutritional support programs.)
4. Are there patterns between food prices and health outcomes ? (This investigates the correlation between food affordability and health, suggesting that lower food prices may improve health metrics.)
5. What role does vaccination coverage play in improving health outcomes across different regions? (It examines how vaccinations impact health outcomes, particularly in areas with high food insecurity, emphasizing the need for integrated health strategies.)

**Individual Task Division and Contribution:**

**1. Data Preparation:**

1. Jayani:
   * Variables Prepared: Food Insecurity and Nourishment Indicators
   * Tasks: Cleaning and transforming food insecurity-related variables (handling missing values, normalizing data if needed).
2. Kanchi:
   * Variables Prepared: Food Prices for Nutrition
   * Tasks: Cleaning food prices data variables (handling missing values, normalizing data if needed).
3. Ritham:
   * Variables Prepared: Health-Related Indicators
   * Tasks: Cleaning health-related variables variables (handling missing values, normalizing data if needed).

**2. Exploratory Data Analysis (EDA):**

1. Jayani:
   * Countries Explored: 5 countries (Albania,Armenia,Australia,Austria,Bangladesh).
   * Variables Explored: Relationship between food insecurity, nourishment and health indicators.
2. Kanchi:
   * Countries Explored: 5 countries (Israel,Chile,Honduras,Costa Rica,Botswana).
   * Variables Explored: Relationship between food insecurity, nourishment and health indicators.
3. Ritham:
   * Countries Explored: 5 countries (Brazil,Cameroon,Canada,Burkina Faso,Fiji).
   * Variables Explored Relationship between food insecurity, nourishment and health indicators.