Food Insecurity South Africa- Insights (2021-2023)

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1. INTRODUCTION

Food insecurity is a critical issue that affects millions of people worldwide, with significant implications for health, economic stability, and social welfare. In South Africa, food insecurity is particularly prevalent, exacerbated by various factors such as economic inequality, unemployment, and environmental challenges. To address this issue, a comprehensive analysis was conducted, focusing on the nine provinces of South Africa over the years 2021, 2022, and 2023.

Power BI, a powerful business analytics tool, was employed to manage and visualize the extensive data collected. The tool was used for data extraction, transformation, loading, and publishing, allowing for a thorough and efficient analysis of the complex data involved. The visualizations created in Power BI provided clear insights into the trends and factors contributing to food insecurity across different regions, enabling the identification of key areas for intervention.

A significant aspect of the project was the development and implementation of strategies to mitigate food insecurity. Another plan of action involved the calculation of Key Performance Indicators (KPIs) to measure the total food supply and assess the risk of food insecurity. This quantitative approach provided a clear framework for monitoring progress and making data-driven decisions.

The use of value streams played a crucial role in guiding the project's development. Value stream mapping allowed for the identification of key processes and areas for improvement, enabling a step-by-step approach to project completion.

2. DATA COLLECTION AND VARIABLES

Food Insecurity in South Africa (2021-2023)

2.1 Variables

-Unemployment Rate, GDP Per Capita, Crop Yield, Arable Land, Income Inequality, Malnutrition Rate, Government Assistance, Health Care Access

2.2 Data Sources

-Statistics South Africa, Relevant research reports, South Africa Reserve Bank

3. DEPARTMENT OVERVIEW

3.1 Department of Agriculture, Land Reform and Rural Development.

The Department of Agriculture, Land Reform and Rural Development is responsible for promoting sustainable agriculture and ensuring food security in South Africa.

3.2 Reason for Selection

This department plays a critical role in addressing food insecurity through various programs and initiatives.

4. PROJECT OVERVIEW

This project examines the state of food insecurity in South Africa from 2021 to 2023, focusing on the Nation (All SA Provinces).

-Objectives: The objective is to analyse key variables affecting food security such as Unemployment Rate, Malnutrition Rate, Arable Land, Crop yield, Health Care Access, Income Inequality, GDP per Capita, Government Assistance and Population and propose data-driven strategies to mitigate these risks.

5. PROBLEM STATEMENT

The SA Provinces faces high levels of food insecurity due to factors like high unemployment rates, low crop yields, and inadequate government assistance programs.

The Dashboard highlights the imbalance in the key indicators such as Economic Indicators, Agricultural Productivity, Health Indicators, Social Policies and Programs.

1. Environmental vulnerability
2. Insufficient infrastructure associated with rural areas
3. Low education levels
4. Economic Vulnerability
5. Lack of Technology Innovations

Provinces such as Eastern Cape, Limpopo and Mpumalanga exhibit high unemployment rates, lower healthcare access, and high malnutrition rates, contributing to increased food insecurity. Additionally, there is a noticeable variation in crop yield, arable land availability, and the amount of food produced among the provinces, which further complicate the issue.

The challenge is to address these inequalities by implementing targeted interventions that improve healthcare access, reduce unemployment, and enhance agricultural productivity in the most affected regions.

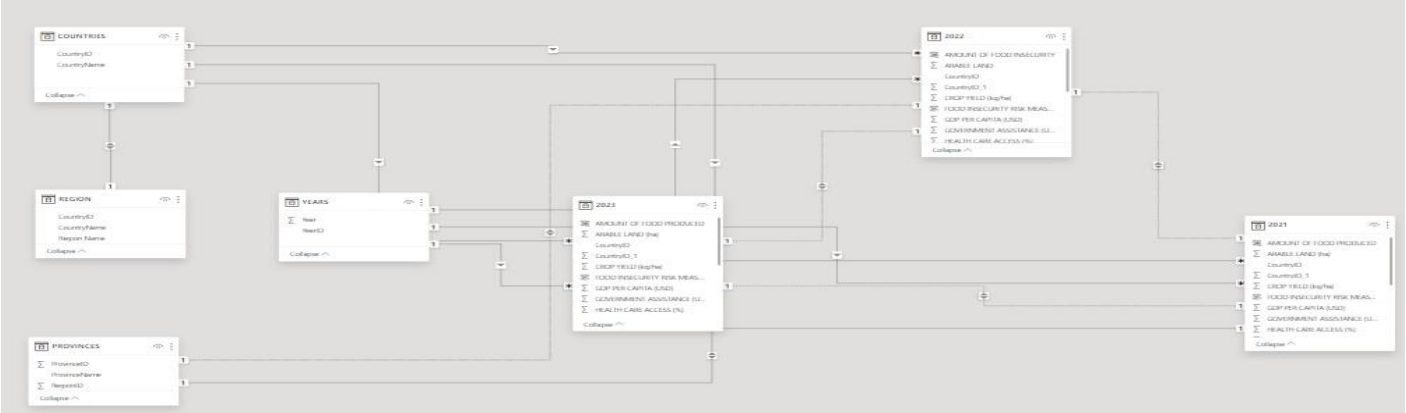
6. FINDINGS AND INSIGHTS

6.1 **Key Findings:** -High unemployment rates collate with higher malnutrition rates.

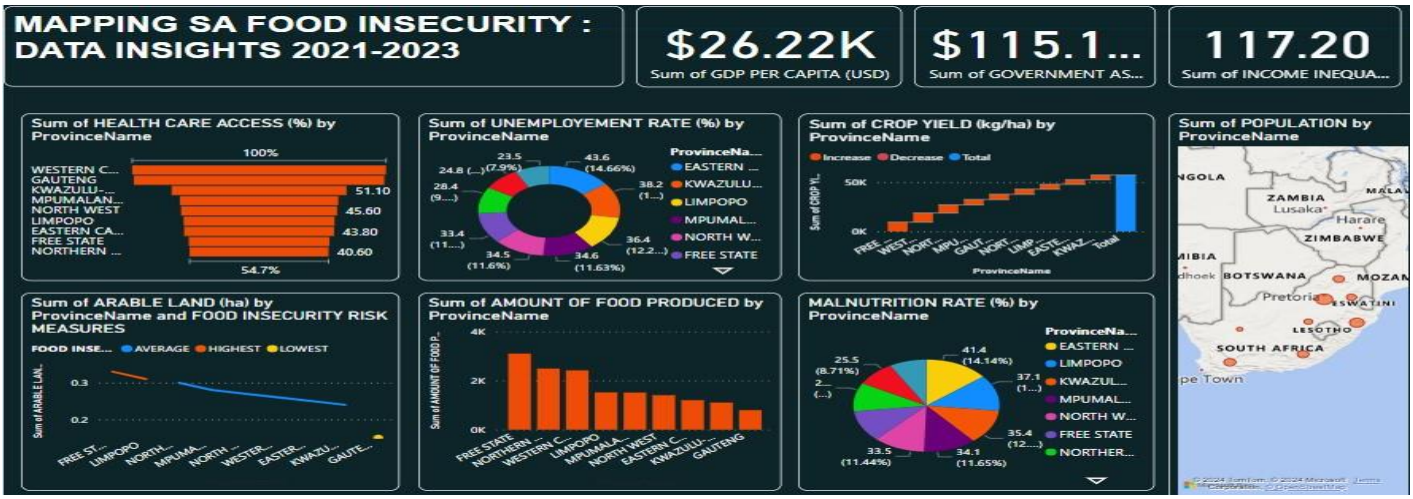
-Provinces with higher GDP per capita receive more government assistance.

-Low crops yields and limited arable land contribute to high food insecurity.

6.2 **Entity Relationship Diagram (ERD):**



6.3 **Visualizations:**



7. KEY PERFORMANCE INDICATORS (KPIs)

7.1 Food Insecurity Risk Measures.

KPI assesses the level of food insecurity across different provinces by considering the availability of arable land. It is calculated to indicate which provinces are at higher risk of food insecurity due to limited arable land.

DAX Formula: The DAX formula used to calculate the Food Insecurity Risk Measure is as follows: Food Insecurity Risk = IF([Sum of Arable Land] <=0.15, "Highest", IF([Sum of Arable Land]>=0.30, “Highest”, “Average”))

Risk Categories

Highest Risk: Provinces with less than 0.15 ha of arable land.

Average Risk: Provinces with arable land between 0.15 ha and 0.30 ha.

Lowest Risk: Provinces with high than or equal to 0.30 ha of arable land.

Interpretation:

This KPI helps identify provinces that are most vulnerable to food insecurity due to limited arable land. Provinces classified under “Highest Risk” require targeted interventions to improve their agricultural capacity.

7.2 Amount of food produced

The Amount of Food Produced KPI measures the total agricultural output in each province. It is a key indicator of the province's ability to ensure food security by producing sufficient food to meet its population's needs.

DAX Formula: The DAX formula used to calculate the total Amount of Food Produced is as follows: Amount of Food Produced= [Arable Land] * [Crop Yield] Interpretation:

Provinces with lower food production may need assistance in improving agricultural techniques, increasing arable land, or receiving more government support.

The goal of these KPIs is to provide actionable insights that can guide government and stakeholder interventions in reducing food insecurity. By highlighting areas of concern and success, these KPIs help in developing targeted strategies to improve food security across South Africa.

8. STRATEGIES TO MITIGATE FOOD INSECURITY IN SOUTH AFRICA

30% of Government Assistance funds can be assigned to reduce risk. This percentage can be further divided in 3 variant categories to reduce Food insecurity.

Breakdown of Government funds are as follows:

Agricultural Funds-15%, Training programs/education- 9%, Public Health initiatives-6%,

8.1 Agricultural Funds

Agricultural funds can extend support in terms of improving new development for both rural and urban areas. It will build innovations for people/farmer who are interested in agricultural farming but does not have the resources to enhance their productivity and their income.

Funds can in providing access to technology. Meaning, they can be used in introducing modern technologies like drought-resistant crops, improved fertilizers, and precision agricultural techniques. The technologies can make farmers adapt to changing climatic conditions and increase yields. Hence, agricultural funds will create a more resilient and more productive agricultural sector in both rural and urban areas, fighting food insecurity and enhancing the livelihoods of farmers and their families.

8.2. Training Programs

Our solution involves implementing comprehensive training programs aimed at various stakeholders in the agricultural sector. These programs will focus on enhancing skills, improving knowledge, and empowering individuals to contribute to food security. First, we propose farmer education and skill development programs. These will teach farmers modern farming techniques,

sustainable agriculture practices, and climate-smart methods. By improving their knowledge, farmers can increase crop yields and become more resilient to environmental challenges, contributing to a more secure food supply. Next, we recommend training in technical skills for agricultural workers. This includes the use of data analytics tools, farm management software, and precision agriculture techniques.

8.3. Public Health Initiatives

Public health initiatives play a crucial role in addressing food insecurity by improving the overall health and well-being of communities Balanced Diets: Nutritional education campaigns can teach communities about the importance of a balance diet, emphasising the consumption of diverse, nutrient-rich foods. This helps reduce malnutrition and supports overall health, making communities more resilient to food insecurity. They will sustain healthy diets over the long term, even in the face of economic or environmental challenges. This contributes to the overall goal of achieving food security and improving public health outcomes. Finally, collaboration is key. We propose partnering with NGOs, international organisations, and government agencies to expand the reach and impact of these training programs. By engaging with communities through workshops, seminars, and media campaigns, we can increase awareness. By working together, we can create a sustainable impact on food security in South Africa.

8.4 Climate Smart Agriculture

In agriculture, the most crucial factor is the climate because different crops and species grow exceptionally in different weather conditions. Which makes agriculture very reliant on consistent temperature levels and water availability, which is what the climate usually goes go against.

It would be wise to follow the climate of that certain region by planting crops that thrive well under its weather conditions, e.g. planting crops that strive in dry areas in provinces like the Northern Cape and the Eastern Cape; as well as planting crops that strive in wet areas in provinces like the Western Cape and Kwazulu-Natal.

8.5 Net Zero

Implementing NetZero and Artificial Intelligence (AI) practices can play a big role in addressing food insecurity by enhancing data analysis, predicting food shortages, and optimizing resource allocation. AI algorithms can analyse vast amounts of data to identify trends, predict crop yields, and assess the impact of various factors on food security. This can lead to more informed decisionmaking and the development of targeted interventions. AI can also facilitate the

management of the supply chain, ensuring that food reaches the areas where it is needed most efficiently.

NetZero practices involve reducing greenhouse gas emissions to as close to zero as possible. It can significantly contribute to mitigating climate changes, which is a major driver of food insecurity. By adopting sustainable farming techniques, such as precision agriculture, crop rotation, and the use of renewable energy, emissions can be minimised while maintaining or even increasing food production. By reducing emissions, these practices help stabilize weather patterns, reduce the frequency of extreme weather events, and ensure that agricultural activities remain viable in the long term. In the context of this project, the integration of AI and NetZero practices offers a promising pathway to achieving sustainable food security in South Africa.

8.6 Technology Utilization

Our website, 'Building a Secure Future, Empowering South Africa: Data-Driven Solutions to Combat Food Insecurity" is a comprehensive platform that provides data insights, training programs, government services, community forums, partnership opportunities, weather updates, and resources to support agricultural development and food security.

Centralised Information Hub: Provide detailed data insights of challenges and strategies, our site becomes a central repository of valuable information for all stakeholders involved in combating food insecurity which can inform decision-making and strategy development.

Educational Resources: Offering information about universities, TVET colleges, vocational training providers, and online course providers helps farmers and communities' access essential training and certification programs that can improve their skills and productivity.

Government Services: Facilitating access to subsidies and grants through our website helps ensure that farmers and communities can apply for financial assistance and access support, which can be crucial in managing and mitigating food insecurity.

Community Engagement: The Community Forum allows users to share experiences and strategies, fostering a collaborative environment where best practices and support mechanisms can be exchanged.

Partnership Opportunities: The "Partner with Us" section encourages collaboration among various entities, such as organisations, individuals, and government agencies, to work together towards common goals in agricultural development and food security.

Real-Time Weather Updates: Provide localised weather forecasts helps farmers plan their activities better, which can directly impact crop yield and agricultural productivity.

Feedback and Donations: The "Make a Difference" section enables users to provide feedback, make donations, and get involved, thereby increasing engagement and support for the initiatives aimed at alleviating food insecurity.

9. Conclusion

The research on food insecurity in South Africa analyses factors influencing to Food Insecurity. Using Power BI, the study visualizes data to reveal food insecurity patterns and severity. Strategic solutions were made. A user-friendly website for managing inquiries highlights the food insecurity and community engagement. The research's comprehensive approach and KPIs aim to address food insecurity's root causes and develop sustainable solutions. The research demonstrated a holistic approach to addressing food insecurity, paving the way for sustainable solutions.

11. References

-Prolific (Net Zero Research) (2024). About Us. Available at: https://www.prolific.co/about

-Statistics South Africa (2023). Quarterly Labour Force Survey. Available at: https://www.statssa.gov.za/publications/P0211/P02114thQuarter2023.pdf

-World Bank (2023). World Development Indicators. Available at: https://data.worldbank.org/indicator