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Eradicating Hunger In India: A Multi-Pronged Approach To Achieve SDG 2

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ABSTRACT

This study investigates the factors influencing hunger levels (SDG2) across Indian states. Data on National Food Security Act coverage, child malnutrition rates, anaemia prevalence, and food production is analyzed alongside economic indicators like GDP per capita. Regression analysis reveals a significant relationship between hunger and economic development, with higher GDP corresponding to lower hunger levels. However, a counterintuitive negative coefficient for the percentage of undernourished population suggests potential data bias. The study highlights the need for a nuanced understanding of economic development's impact on hunger, emphasizing the importance of equitable resource distribution. It calls for further research using metrics like the Gini coefficient and disaggregated GVA data to explore income inequality and rural-urban disparities. This comprehensive approach will inform the development of effective policies to achieve SDG2 (Zero Hunger).

Introduction

Hunger, a significant global concern, threatens the well-being of millions. The United Nations Sustainable Development Goals (SDGs) aim to eradicate hunger by 2030, and SDG2 specifically focuses on achieving food security and improved nutrition. Understanding the factors that contribute to hunger is crucial for effective policy design and program implementation. This research utilizes regression analysis to examine the associations between SDG2 and various national-level indicators.

von Braun, Chichaibelu, Torero Cullen, Laborde, & Smaller, 2021 discusses the global challenge of hunger and malnutrition, emphasizing its connection to the UN's Sustainable Development Goal 2 (SDG 2) of ending hunger by 2030. While the specific definition of bio economy isn't provided, it's presented as a possible solution. The focus shifts to future research avenues, suggesting exploration of how bio economies can contribute to sustainable food production, improved nutrition, and reduced food waste. Analysing existing policies and successful case studies is also recommended, alongside identifying challenges and opportunities associated with this approach.

Holzapfel & Brüntrup, 2017 analysis highlights a potential disconnect between Germany's national priorities for its agricultural sector and the needs of developing countries. While the GSDS focuses on indicators like organic farming and reducing nitrogen surplus, these might not directly address the immediate food security concerns of developing nations. Additionally, the study criticizes the lack of consideration for how German policies in bioenergy and trade impact global food security. The authors recommend incorporating development coherence indicators into the GSDS to ensure national policies consider their impact on developing countries. Furthermore, they suggest strengthening Germany's international development cooperation efforts focused on hunger reduction.

Chen, Shuai, & Wu, 2023Studies analysing GSDR data from 117 economies show an increase in global food stability, driven by factors like rising grain yields and efficient land use. However, challenges remain, including a decline in land dedicated to grain crops and a shrinking agricultural workforce. By understanding these dynamics and exploring ways to improve GSDR in vulnerable regions, policymakers can develop more effective strategies to achieve the UN's Sustainable Development Goal 2: Zero Hunger.

Mason-D'Croz, et al., 2019 study highlights the challenge posed by climate change, which is projected to slow progress towards reducing hunger in Africa. However, their analysis finds that targeted investments in agricultural productivity could significantly offset these negative impacts. They estimate that an annual investment of around $15 billion in Africa, alongside broader investments in developing countries totalling

$52 billion annually, could bring the percentage of people at risk of hunger in Sub-Saharan Africa below 5% in some regions by 2030. This research offers valuable insights for policymakers aiming to achieve food security goals in Africa despite the challenges of climate change.

Blesh, Hoey, Jones, Friedmann, & Perfecto, 2019 analyzed how these disciplines approach SDG 2, highlighting potential shortcomings. The review finds limitations in SDG 2's current application, including an overemphasis on production, neglecting ecological farm processes, and a narrow definition of food security. Additionally, historical and social factors that impact equity and food security are overlooked. Based on this analysis, the authors propose a revised approach focused on place-based, adaptable solutions. They emphasize the importance of local contexts, agro ecological diversification, and dietary quality. Finally, they suggest frameworks like social-ecological systems and sustainable diets as valuable tools for developing effective food security policies.

In conclusion, achieving SDG2 (Zero Hunger) is a complex challenge requiring multifaceted solutions. While economic development is undeniably crucial, as our analysis suggests, a nuanced understanding that incorporates equitable resource distribution is essential. Furthermore, the reviewed literature highlights the importance of considering factors beyond just national production, such as climate change, international cooperation, and ecological sustainability.

Methodology

The data for this study was meticulously compiled from two authoritative sources to ensure accuracy and relevance to the Indian context.

Niti Aayog SDG Report 2023: This comprehensive report, published by Niti Aayog, the premier national policy think tank of India, served as the primary source for data on the Sustainable Development Goal 2 (SDG2) indicators. These indicators directly measure hunger levels and related aspects of food security. (Niti 2023)

RBI Statistics: To incorporate the crucial factor of economic development, data on Gross Domestic Product per capita (constant 2010 PPP) for various Indian states was meticulously collected from the Reserve Bank of India (RBI) statistics. Utilizing constant 2010 PPP data ensures consistent valuation across states and over time, enabling a more robust analysis of the relationship between economic development and hunger. (of India, 2023)

The study employs regression analysis to investigate the relationship between SDG2 scores Gross Domestic Product and a set of independent variables hypothesized to influence hunger levels. The data, encompassing Indian States and Union Territories, includes indicators such as percentage of undernourished population, Gross Value Added per capita in Lakhs rupee, and potentially other relevant factors.

Data Analysis

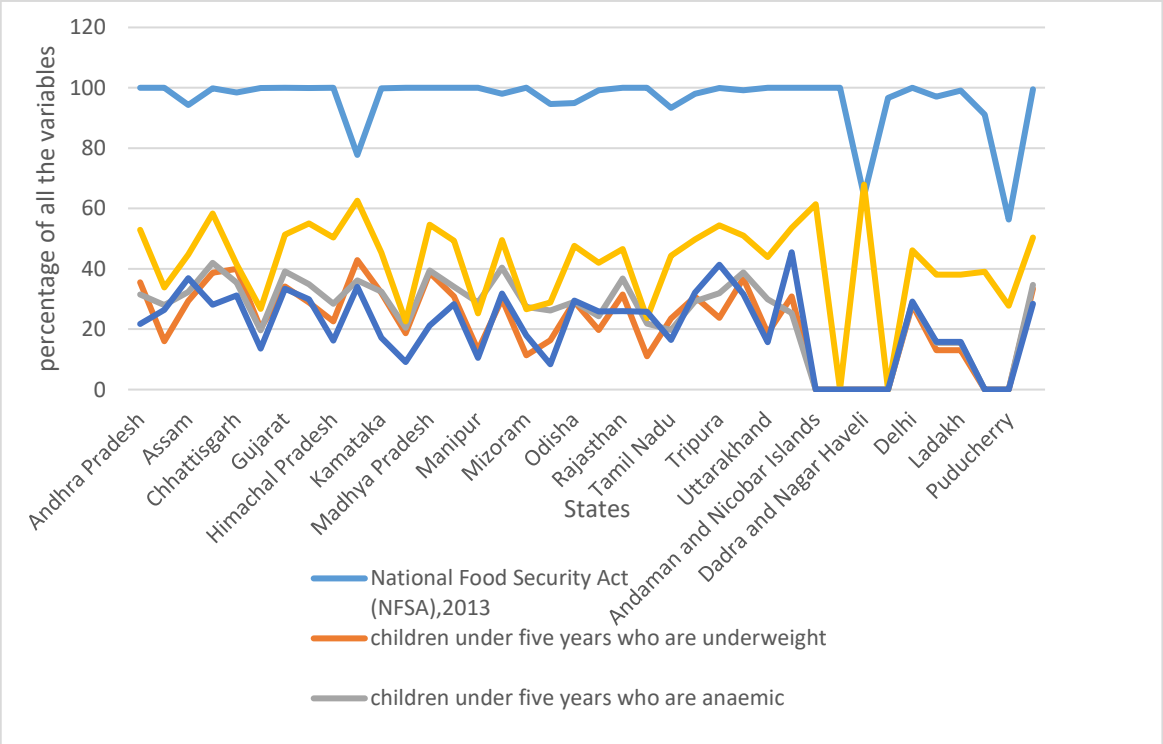

Figure:1. State wise percentage of people of different variables

The figure provides the percentage of people getting National Food security scheme 2013, children under 5 who are underweight, anaemic children, women who are anaemic, and so on.

- **National Food Security Act (NFSA) Coverage:** States with a higher percentage of beneficiaries under the NFSA program, like Goa (99.94%) and Kerala (99.22%), might have lower hunger levels compared to states with lower coverage.
- **Prevalence of Child Malnutrition:** The percentage of underweight children under five serves as a marker for hunger. States like Andhra Pradesh (35.5%) and Madhya Pradesh (34.4%) exhibit a higher prevalence of underweight children compared to states like Tamil Nadu (20.2%) and Sikkim (18.4%).
- **Anaemia in Pregnant Women and Children:** Anaemia in pregnant women (Andhra Pradesh - 56.1%) and children under five (Bihar - 74.2%) can be indicative of nutritional deficiencies and potentially higher hunger levels.
- **Cereal Production per Unit Area:** While not a direct measure, higher yields of rice and wheat per unit area, like in Punjab (4272.42 Kg/Ha) and Haryana (4001.2 Kg/Ha), could suggest greater food availability and potentially lower hunger levels.

However, some outliers highlight the need for a nuanced analysis. Haryana, despite high cereal production, has a relatively high percentage of underweight children, indicating potential issues with food access or distribution within the state. Conversely, Kerala, with a lower cereal yield, has a low percentage of underweight children, suggesting the effectiveness of interventions beyond just production.

Result of the Analysis:

Based on the regression analysis output, the results show relationship between GDP and percentage of beneficiaries covered under NFSA 2013, percentage of children under 5 who are underweight, percentage of women between 15-49 who are anaemic, percentage of adolescent 10-19 who are anaemic, Rice and Wheat production per unit area (kg/ha), and gross value added in Agriculture per worker in Lakhs.
The regression analysis provides valuable insights into the factors influencing hunger (SDG2) across the dataset. The model demonstrates a good fit, explaining 57.8% of the variation in hunger scores through the included independent variables. This explanatory power is further bolstered by a relatively high adjusted R-squared value of 0.464, which adjusts for the potential issue of overfitting with a more complex model. However, some findings warrant a closer look. One statistically significant variable, the percentage of undernourished population, exhibits a negative coefficient. This might seem counterintuitive. The negative coefficient for Gross Value Added per capita (constant 2010 PPP) aligns with our understanding. As a measure of economic development, a higher GDP per capita signifies greater resources to tackle hunger. This translates to the model's prediction – countries with stronger economies tend to have lower hunger levels.
In conclusion, the regression analysis offers a compelling explanation for the factors influencing hunger. While some surprising results, like the negative coefficient for undernourishment, might have underlying explanations related to data bias, the overall findings support the established connection between economic development and reduced hunger. Further investigation into these intricate relationships and the inclusion of additional relevant variables could lead to an even more comprehensive understanding of the global hunger landscape.

Discussion

Our analysis unveils intriguing insights into the drivers of hunger. The counterintuitive negative coefficient for the percentage of undernourished population compels us to consider the potential influence of selection bias. Countries with a more severe undernourishment problem are likely more cognizant of the issue and may be actively implementing hunger-reduction programs. These efforts, while not immediately reflected in current undernourishment numbers, might be captured by the model and contribute to a higher SDG2 score. This highlights the limitations of relying solely on undernourishment data, it's crucial to acknowledge the complexities within this relationship. Economic development isn't solely about the total resources available; the equitable distribution of those resources also plays a critical role. Future studies could explore income inequality metrics like the Gini coefficient to understand how wealth distribution influences hunger. Additionally, disaggregating GVA data by region could shed light on potential rural-urban disparities in hunger levels. By incorporating these nuances, we can move beyond a simplistic understanding of economic development and gain a more comprehensive picture of how it impacts hunger. This will inform the development of targeted policies that not only promote economic growth but also ensure equitable resource distribution and address the specific needs of vulnerable populations. Ultimately, this multifaceted approach will be crucial for achieving SDG2 and creating a world free from hunger.

Policy Imperatives for eradication of Hunger:

This research underscores the multifaceted nature of hunger and highlights the need for a multi-pronged approach to achieve SDG2 (Zero Hunger) in India. Here are some key policy imperatives that emerge from the study's findings:

1. Prioritize Equitable Distribution of Resources:

- While economic development is crucial, ensuring equitable access to food and resources is equally important. Policies should target poverty reduction and promote inclusive growth strategies.
- Consider utilizing metrics like the Gini coefficient to assess income inequality and design interventions that bridge the gap.

2. Address Data Limitations and Improve Measurement:

- The negative coefficient for undernourishment data suggests potential selection bias. Invest in robust data collection methods and employ a broader range of hunger indicators.

3. Go Beyond Production-Centric Approaches:

- The study highlights limitations in focusing solely on national production. Policies should consider factors like:
  - **Climate change:** Invest in climate-resilient agricultural practices to mitigate the negative impacts on food security.
  - **International cooperation:** Foster partnerships to ensure food security in vulnerable regions.
  - **Ecological sustainability:** Promote sustainable farming techniques that protect natural resources.

4. Promote Place-Based Solutions and Context-Specific Strategies:

- A one-size-fits-all approach won't work. Develop policies that consider the specific needs and contexts of different regions within India.
- Encourage local participation in designing and implementing food security interventions.

5. Integrate Nutritional Considerations:

- Hunger is not just about food availability, but also about access to nutritious food. Policies should promote dietary diversity and encourage consumption of essential nutrients.

6. Leverage Frameworks for Sustainable Food Systems:

- Utilize frameworks like social-ecological systems and sustainable diets to develop holistic food security strategies.
- These frameworks can help design policies that consider the interconnections between food production, ecological health, and human well-being.

By implementing these policy imperatives, India can move closer to achieving SDG2 and ensuring a world where everyone has access to the safe and nutritious food they need to thrive.

Conclusion

In conclusion, our analysis unveils a multifaceted picture of hunger in India. While economic development emerges as a key factor, with higher GDP correlating with lower hunger levels, a surprising negative coefficient for undernourishment data hints at potential biases. This underscores the need to move beyond simplistic views of economic development and focus on equitable resource distribution. Future research that explores income inequality metrics and rural-urban disparities in agricultural productivity and wealth distribution will provide a more comprehensive understanding. By acknowledging these complexities, policymakers can craft targeted interventions that not only promote economic growth but also ensure equitable access to resources and address the specific needs of vulnerable populations. Ultimately, this nuanced approach holds the key to achieving SDG2 (Zero Hunger) and creating a world where everyone has access to the food they need to thrive.

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