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New Perspectives on Food Security Measurement Tools: A Critical Analysis of Contemporary Methods and Global Trends

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New Perspectives on Food Security Measurement Tools: A Critical Analysis of Contemporary Methods and Global Trends

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Abstract: This article examines the contemporary methodologies and effectiveness of food security measurement tools developed by the Food and Agriculture Organization of the United Nations, with particular emphasis on the Food Insecurity Experience Scale, Global Food Security Index, and Integrated Food Security Phase Classification. Through analysis of global trends and measurement approaches, the research reveals that whilst global undernourishment decreased from 12% to 9.2% between 2004-06 and 2020-22, moderate to severe food insecurity increased from 21.9% to 29.5%. The study demonstrates significant regional variations, with Africa experiencing the highest prevalence of food insecurity (58.9%) and Europe maintaining the lowest levels (<2.5%). In India, despite a reduction in undernourishment from 21.4% to 16.6%, severe food insecurity increased markedly from 15.4% to 22.72%. The analysis identifies strengths and limitations of current measurement tools, noting FIES's cost-effectiveness but potential cultural bias, GFSI's comprehensive scope but reliance on secondary data, and IPC's multi-dimensional approach but resource-intensive implementation. The research concludes by proposing methodological improvements, including the integration of qualitative and quantitative data, enhanced localised assessments, and the incorporation of remote sensing technologies to strengthen the precision and reliability of food security measurements globally.

Keywords: food insecurity food security measurement; nutritional assessment; food security indicators; global food security index; regional food security disparities

Introduction

Food security, which encompasses the availability, consumption, and accessibility of food to ensure that everyone has access to enough wholesome food to live a healthy life, is one of the most significant concerns facing the globe today. Addressing this complex issue requires robust and precise measurement tools to identify areas of need, track progress, and guide policy interventions. The   Food and Agriculture Organization of the United Nations (FAO) has played a leading role in creating and improving ways to measure food security, providing critical data and insights for governments, organizations, and researchers worldwide. Each of the tools offers a unique approach to measuring food security, with specific strengths and limitations. Most commonly used tools developed by the FAO are the following:

(1) Food Insecurity Experience Scale (FIES): This scale, developed by the Voices of the Hungry (VoH) project of the FAO aims to assess food insecurity directly by gathering information about people's personal experiences. This scale uses survey data to assess the extent to which people have experienced food insecurity, ranging from mild to severe levels. The simplicity and cost-effectiveness of the FIES have contributed to its widespread adoption, allowing for comparable data across different contexts and populations. However, the use of self-reported data may introduce biases, such as a tendency to answer in a socially acceptable way or variations in how people from different cultures describe their experiences of food insecurity.

(2) Integrated Food Security Phase Classification (IPC): This scale is another critical tool in the FAO's arsenal, providing a standardized approach to assess and compare the severity and scale of food insecurity across different regions. The IPC incorporates various indicators, including food consumption patterns, livelihood changes, and nutritional status, offering a multi-dimensional perspective on food security. While the IPC's comprehensive nature is one of its strengths, its complexity and resource-intensive implementation can pose challenges, particularly in resource-limited settings.

 (3) Global Food Security Index (GFSI): With the support from the FAO, this scale was produced by the Economist Intelligence Unit. It offers a comprehensive measure of food security by integrating data on food affordability, availability, quality, and safety. This index provides valuable insights into the underlying factors affecting food security and highlights areas where interventions are needed. Despite its broad scope, the GFSI has faced criticism for its reliance on secondary data sources, which may not always be current or accurately reflect local realities. Furthermore, the index's focus on national-level data may overlook significant intra-country disparities and localized food insecurity issues

This article analyses the current evidence and methodologies used in the FAO context to measure food security, identifying areas for improvement and enhancement. By examining the theoretical foundations, assessment methods, data gathering techniques, and real-world uses of these tools, the analysis seeks to fully understand their effectiveness and potential for improvement. The findings highlight the need for combining qualitative and quantitative data, improving the timeliness and accuracy of data collection, and incorporating more localized assessments to strengthen these tools. Additionally, leveraging new technologies such as remote sensing and mobile data collection can enhance the precision and efficiency of food security measurements.

Incidence of Hunger

The global imperative of food security, encompassing consistent access to adequate nutrition, faces mounting challenges as demographic projections indicate a requisite 70% expansion in food production by 2050 to sustain an anticipated population of 9 billion. Contemporary data reveal concerning trends: the global undernourishment rate in 2022 stood at 9.2%, marking a significant deterioration from pre-pandemic levels of 7.9% in 2019. Projections indicate that by 2030, asmany as six hundred million individuals may face chronic undernourishment, with this figure exacerbated by recent geopolitical tensions, particularly the Ukraine conflict. The burden of food insecurity demonstrates notable demographic and geographic inequalities: rural poor experience higher level of food insecurity compared to their urban counterparts, though the gender disparity in food insecurity witnessed a reduction from 3.8 to 2.4 percentage points between 2021 and 2022. Nutritional challenges among children under five remain particularly pressing, with 2022 data indicating 22.3% suffered from stunting, 6.8% from wasting, and 5.6% from overweight conditions, with rural areas disproportionately affected by malnutrition indicators, excepting the prevalence of overweight status in urban settings.

According to National Family Health Survey conducted in India to collect data on health, population, and nutrition (2019-2021), child stunting is prevalent at 35.5%. The country's undernourishment rate is 16.6% and child wasting rate is a worrying 18.7%. The mortality rate for children under five is 3.1%. The The Household Food Security Survey aims to assess how often adults and children experience food insecurity, with each question directly related to the quality and quantity of their diet, considering their limited financial circumstances. The Module includes 18 questions, with 8 focused on households with children. This tool assesses four dimensions of household food insecurity: (1) feelings of uncertainty and worry, (2) lack of quality food, (3) insufficient food for adults, and (4) insufficient food for children. It is available in both 18-item and 6-item formats and helps classify households into different levels of food security: high, marginal, low, and very low, based on the proposed methodology. When using a food insecurity measure in a global monitoring framework, it's crucial to guarantee that the estimated prevalence rates stay

consistent over time and between nations. This involves defining severity thresholds consistently on a standardized scale and maintaining their stability throughout the monitoring period. This is done by mapping national metrics onto a global scale or vice versa, standardising severity measures and thresholds on a single metric to determine prevalence rates. A linear transformation that modifies the mean and standard deviation of severity ratings for similar items in both scales is used to accomplish this standardisation, using these items as reference points. The FIES is based on two commonly used scales for assessing food security through personal experiences, one in the US and the other in Latin America and Caribbean (LAC). In 2013, the FAO started the VOH project to provide up-to-date, policy-focused, and practical information about food insecurity. The research developed a technique to measure the degree of food insecurity that households or individuals experience, ensuring comparability across different countries. The FIES, coupled with inventive analytical techniques, seeks to establish a fresh global benchmark for assessing food insecurity (access) that holds international validation, endorsement, and applicability for both global and national surveillance. A panel of experts and National Statistics Offices evaluated the methodology in 2015 and found it to be scientifically sound. The FIES, implemented through the VoH Project, represents a methodologically rigorous approach to measurement across diverse cultural contexts. The scale's integration with the Gallup World Poll®, which has conducted nationally representative surveys across more than 140 countries since 2005, facilitates comprehensive data collection on food insecurity prevalence. The FIES methodology employs eight dichotomous questions examining behaviours and experiences related to food access, ranging from psychological concerns to tangible reductions in food consumption. This instrument shares conceptual foundations with several established food security scales whilst introducing innovative statistical approaches through Item Response Theory (IRT). The application of IRT, specifically the Rasch model, enables the generation of probabilistic measures of food insecurity severity, thereby producing comparable metrics across different national contexts. The scale's methodological robustness and cross-cultural validity have led to its adoption as an official indicator for Sustainable Development Goals target 2.1, establishing it as a preferred instrument for large-scale survey implementation in both developing and developed nations. To maintain consistency across countries, food insecurity classification thresholds and prevalence rates are standardized by aligning measures obtained from individual datasets, which are estimated using the Rasch model, with a universal global reference scale.

Questionnaire:
1. You felt concerned about not having adequate food?
2. You couldn't afford to consume nutritious and healthy meals?
3. You were limited to eating only few types of food?
4. You had to miss a meal due to lack of resources?
5. You consumed less food than you believed was necessary?
6. Your household depleted its food supply?
7. You experienced hunger but chose not to eat?
8. You went an entire day without eating?

Research Methodology

There are various methods adopted by FAO for determining food security.

Prevalence of undernourishment: percentage of people whose usual diet does not provide them with the energy levels they need to maintain an active, healthy, and normal lifestyle. By calculating the proportion of a nation's population whose Dietary Energy Consumption (DEC) is less than their Dietary Energy Requirements (DER), we may assess the prevalence of undernourishment. This measure serves as a widely used indicator for tracking changes in hunger trends over time. Other undernourishment measurement like Coefficient of Variance (CV) and Minimum Dietary Energy Requirement (MDER)

Coping strategies-Households coping with food insecurity employed strategies such as consuming cheaper food, foraging wild fruits, cutting back on non-essential expenses, prioritizing

children's meals, purchasing food on credit, taking out loans for food purchases, and occasionally skipping meals. This suggests the implementation of initiatives to enhance the food security of rural farmers. To achieve this, farmers should consider forming or joining cooperative societies, allowing them to pool resources for fruitful activities.

Household income and expenditure surveys: This approach involves conducting household interviews, during which respondents provide details regarding their expenditure on food and other essential items. Various timeframes, such as the week or month leading up to the survey, have been employed. To utilize this method effectively, some information is necessary: i) the quantity and cost of food purchased or consumed; ii) any food received by as gifts or in exchange; iii) food produced within the household for household consumption. By calculating the average daily calorie intake per household member, this method highlights the importance of having access to relevant as also accurate food composition tables.

Individuals dietary intake: Various methods employed to assess an individual's dietary intake, including: a) recalling food consumption over a 24 hour period; b) Answering frequency questions, c) maintaining food data either independently or with the assistance of an observer. Each method requires a specific time frame. Estimating portion sizes may involve aids like food models or weighing foods. These estimations are crucial for calculating food quantities and nutrient intakes, provided reliable food composition databases tailored to the cultural context are available. Establishing cut-off values for different nutrients is essential for understanding findings on nutrient intake and identifying the percentage of people at risk of deficiencies.

Anthropometry: It entails measuring the dimensions, weight, body proportions.. It helps assess the nutritional status of individuals, reflecting both food security and health conditions. National surveys typically use weight and height measurements to assess anthropometric indicators. The effectiveness of these indicators is assessed using predetermined cutoff points.

Household Food Insecurity Access: This scale is designed for cross-cultural application and consists of nine questions that inquire about the frequency of experiencing food insecurity conditions. Responses are scored from 0 for "never" to 3 for "often". Higher scores reflect greater food insecurity, with the scores generally divided into four categories: food-secure households and those facing various levels of food insecurity, based on the framework suggested by the Indicator. The scale reflects a household's encounters with challenges related to accessing food and encompasses three fundamental aspects of food insecurity that are identified as common across various cultures. This scale evaluates feelings of uncertainty or concern about the availability of food in the household, perceptions of poor food quality, and inadequate food consumption.

No. of severely food insecure people in India (2014-2016) = Estimate for Southern Asia – Estimate for Southern Asia excluding India = 241.0 – 38.2 = 202.8 million

Prevalence of severe food insecurity in India (2014-2016) = (Percentage of severely food insecure people in India) * 100 = (202.8/1310) * 100 = 15.4 %

Prevalence of severe food insecurity in India (2020-2022) = 392.8-70.8 = 322 (millions)

Prevalence of severe food insecurity in India (2020-2022) = (322/1417) * 100 = 22.72%

Proportion of moderately and severely food insecure individuals in India (2014- 2016)
= 505.5 – 141.1 = 364.4(millions)

Proportion of moderately and severely food insecure individuals in India (2014- 2016)
= (364.4/1310) * 100 = 27.81%

Proportion of moderately and severely food insecure individuals in India (2020-2022)
= 822.2-232.2 = 590 (millions)

Proportion of moderately and severely food insecure individuals in India (2020-2022) = (590/1417) * 100 = 41.63 %

Results and Discussion

The world bank data outlines trends in undernourishment and food insecurity from 2004-06 to 2020-22 across various regions. Globally, undernourishment decreased from 12% to 9.2%, Meanwhile, Moderate to severe food insecurity grew from 21.9% to 29.5%, while severe food insecurity climbedto 11.3 per cent from 7.8per cent. In Africa, undernourishment slightly declined from 19.9% to 19.3%, but severe food insecurity grew from 17.8% to 23.4%, and moderate to severe food insecurity surged from 46.6% to 58.9%. LAC saw a decrease in undernourishment from 9.3% to 6.7%, but severe food insecurity increased from 7.9% to 13%, and moderate to severe food insecurity rose from 27.6% to 39%. Europe maintained low levels of undernourishment (<2.5%), with slight increases in severe food insecurity from 1.5% to 1.7%, and a decrease in moderate to severe food insecurity from 8.7% to 7.8%. Oceania showed a slight decrease in undernourishment from 6.8% to 6.6%, with increases in severe food insecurity from 2.8% to 3.5%, and moderate to severe food insecurity from 11.1% to 12.7%.

In Asia, undernourishment decreased significantly from 13.6% to 8.6%, but severe food insecurity increased from 6.7% to 9.9%, and moderate to severe food insecurity rose from 17.7% to 24.8%. In India, undernourishment dropped from 21.4% to 16.6%, while severe food insecurity increased from 15.4% to 22.72% and moderate to severe food insecurity surged from 27.81% to 41.63%. The data shows a general trend of decreasing undernourishment across most regions, with the most significant reductions seen in Asia and LAC region, Europe maintains the lowest prevalence of undernourishment, with minimal changes over the periods observed. Africa and Oceania show smaller decreases, indicating persistent challenges in these regions.

The data shows an overall increasing trend in severe food insecurity across most regions. The most significant increases are observed in Africa and LAC region. Asia also shows a considerable increase, while Oceania and Europe have smaller but noticeable increases. The global rise in severe food insecurity suggests worsening conditions and challenges in achieving food security in recent years. The data shows a general trend of increasing moderate to severe food insecurity across most regions, with the most significant increases observed in Africa, LAC region Asia. Europe is the only region where there has been a slight decrease in moderate to severe food insecurity. This worldwide increase reflects deteriorating food security conditions, particularly significant challenges in Africa and India.

The data reveals trends in child stunting and overweight prevalence from 2012 to 2020. Globally, stunting in children under 5 decreased from 26.3% (173.9 million) to 22.3% (148.1 million), while overweight prevalence remained steady around 5.5-5.6% (37.0 million). In Africa, stunting also decreased from 34.4% to 30%, with a slight increase in overweight prevalence from 5% to 4.9%. LAC region saw reductions in both stunting as well as overweight prevalence. Europe experienced decreases in both stunting and overweight prevalence, with stunting dropping from 5.1% to 4% and overweight from 9.2% to 7.3%. In Asia, stunting decreased significantly from 28.2% to 22.3%, with a slight increase in overweight prevalence. India showed significant improvements in reducing stunting from 41.6% to 31.7%, with a modest increase in overweight prevalence from 2.2% to 2.8%. Based on the most recent survey conducted in India from 2019 to 2021, 35.5% of children under five years old were stunted. Stunting is a condition in which a child's height is insufficient for their age. It results from chronic malnutrition and can lead to significant long-term impacts on a child's health and development. The prevalence of stunting in India has been declining in recent years, but it remains a significant public health problem. The Indian government has launched several initiatives to enhance child nutrition, including schemes. which provide pregnant and lactating mothers and children under 6 years of age with hot cooked meals, supplementary nutrition, and health and nutrition education.

Possibility for Further Improvement

The article identifies several areas for enhancing the effectiveness of FAO's food security measurement tools. Combining qualitative and quantitative data can provide a more nuanced understanding of food insecurity. Improving the timeliness and accuracy of data collection is crucial to ensure that interventions are based on current and reliable information. Additionally, incorporating more localized assessments can help address intra-country disparities and provide targeted solutions for specific regions. Integrating new technologies such as remote sensing and mobile data collection can further improve the precision and efficiency of food security measurements. These technologies can provide real-time data and reduce the reliance on self-reported information, mitigating some of the biases associated with current methods. By leveraging advancements in technology, FAO can enhance the robustness and accuracy of its food security assessments, ultimately leading to more effective interventions and policies to combat global hunger and malnutrition.

Conclusion

The FAO's vital role in combating world hunger and malnutrition is shown by the systematic examination of its food security measurement instruments. The FIES, GFSI, and IPC each have their own strengths and weaknesses, indicating areas where they can be improved to increase their effectiveness and reliability. FIES, has been praised for its straightforwardness, cost-efficiency, and ability to produce comparable data across various contexts. Its strength lies in its direct measurement approach, capturing individuals' experiences with food insecurity. This tool's simplicity facilitates widespread adoption, allowing for more extensive monitoring of food insecurity trends globally. However, FIES is largely dependent on self-reported data, which can be affected by cultural variations and the tendency for respondents to provide socially desirable answers. This reliance on subjective data may lead to inconsistencies and inaccuracies, particularly when comparing different cultural settings. The GFSI, produced by the Economist Intelligence Unit with support from FAO, offers a comprehensive measure of food security by integrating data on affordability, availability, quality, and safety of food. This index is beneficial for its broad scope, providing insights into the underlying factors affecting food security. However, its dependence on secondary data sources, which may not always be current or accurately reflect on-the-ground realities, poses a significant limitation. Furthermore, the GFSI's national-level focus may overlook intra-country disparities and localized food insecurity issues, limiting its ability to address specific regional challenges effectively. An essential FAO scale for determining the degree and scope of food insecurity is the IPC. Its multifaceted approach, which takes into account a number of factors like food intake, changes in livelihood, and nutritional condition, offers a thorough understanding of food security circumstances. Notwithstanding its advantages, the IPC can be difficult to implement because to its complexity and resource requirements, especially in environments with restricted resources. The IPC requires a great deal of resources, knowledge, and coordination to be used consistently, which isn't always possible in every area.

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