

Understanding Food Security Through Digital Innovation: A Quantile Regression Approach

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Summary

This study emphasizes the relevance of the internet as a vehicle for innovation and digitalization in overcoming the hunger problem. The independent variable is the percentage of the population that uses the internet. Calorie per capita is a dependent variable, while food production and GDP are control factors. This study focuses on the G20 countries, which make up two-thirds of the world's population and represent a diverse range of governments in terms of population size, poverty levels, and food security issues. Quantile regression is used in the study to analyze data. The results show that the internet has a significant impact on food security at the lower and intermediate quantiles, but not at the upper quantiles. The internet promotes circularity in food systems by enabling digital platforms for food redistribution, precision agriculture, and enhanced supply chain management, hence reducing environmental impact and enhancing sustainability.

Keywords: Internet, innovation, hunger, food security, G20

Track- Innovation

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1. INTRODUCTION

As technological advancements accelerate, the role of digital tools and platforms in enhancing efficiency, accessibility, and connectivity is becoming increasingly prominent. (Arranz *et al.*, 2023). Using digital resources can be a good solution for problems arising in different sectors like banking, tourism, transportation, agriculture, hospitality, and health. Food security is one of the sectors that is largely impacted by digital technologies and innovation (Liu and Ren, 2023). Digital technologies, such as the internet, play a crucial role in achieving food security and circular economy goals by optimizing resource utilization, reducing food waste, and enhancing supply chain efficiency. They enable real-time data sharing, precision agriculture, and digital marketplaces, ensuring equitable food distribution while minimizing environmental impact. By integrating digital tools with physical systems, these technologies foster sustainable practices and support the transition to a circular food economy. The world is facing the problem of hunger at a higher level, as one in every nine people goes to bed hungry every day. Approximately 842 million people were hungry in 2022, as per the Food and Agriculture Organization (FAO). Food security is ensured when all four dimensions are achieved. These dimensions are food availability, food accessibility, food utilization, and food stability (Subramaniam, Masron, and Naseem, 2023). Food availability means increasing production in a way that everyone, everywhere, and at every time can have food (Spence *et al.*, 2016). Food accessibility is to enhance physical and monetary access to food (Marin-Murillo *et al.*, 2020). Food utilization depicts getting all the nutrition from the food, which is important for a healthy body (Magrini and Vigani, 2016). Lastly, food stabilization means ensuring the above three dimensions for a sustainable and longer period. The Internet is one of the reasons that makes digitalization even more impactful in achieving these four dimensions of food security and overcoming the problem of hunger. (Ardianti *et al.*, 2023a). It supports real-time data exchange, remote monitoring, and augmented interactions, allowing users to operate physical equipment and access services via digital platforms. From e-commerce and digital payments to telemedicine and IoT, the Internet offers a seamless blend of ease, efficiency, and accessibility in both realms (Lin *et al.*, 2022). To increase food availability, the internet promotes better agricultural practices by disseminating information about crop management, weather forecasts, precision agriculture, real-time monitoring, supply chain optimization, and smart farming techniques that boost production efficiency (Bahoo *et al.*, 2023). Farmers may use real-time data and technology to boost output, cut losses, and improve food supply (Tambo *et al.*, 2023). Simultaneously, it minimizes waste through circular economy practices by enabling digital platforms for food redistribution, improving supply chain transparency, and facilitating better resource management, ensuring surplus food is utilized instead of being discarded. The Internet improves food access by bringing farmers, producers, and consumers together directly via e-commerce and online markets. This minimizes intermediaries, making food more affordable, particularly in remote or underprivileged areas. Financial inclusion through digital banking and mobile payments allows consumers to buy more food, increasing economic access (Lin *et al.*, 2022). The Internet ensures food utilization by providing easy access to information about nutrition, food safety, and correct food use. Consumers are guided on healthy diets, food storage, and cooking techniques through educational campaigns, online resources, and mobile apps, resulting in enhanced food usage and health outcomes (Coates, 2013). This contributes to reducing the risk of food insecurity caused by economic, environmental, or political disasters.

According to the Food and Agriculture Organization (FAO), half of the starving population lives in G20 countries (G20, 2021). This study aims to examine the relationship between using the Internet as a tool of innovation and food security in these countries. Many developing

countries, including G20 members, struggle with both excess and undernutrition (Clapp and Murphy, 2013). G20 countries represent around 80 percent of the world's Gross Domestic Product (GDP), 75 percent of world trade, and two-thirds of the world's population. G20 members consist of nineteen countries and two regional unions. G20 member countries include Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Mexico, Republic of Korea, Russia, Saudi Arabia, South Africa, Turkey, United Kingdom, United States of America (USA), European Union, and African Union. G20 countries are a group of moderately food-secure and highly food-insecure countries. For instance, Japan and Canada are the top countries in the Global Food Security Index (GFSI) and Global Hunger Index (GHI), but countries like India are very far behind in these rankings. The examination of food security across G20 countries presents a compelling opportunity for researchers to investigate hunger conditions within this influential group. Given the economic prominence and diversity of the G20 nations, studying their food security status offers valuable insights into varying degrees of hunger and nutritional challenges, which have not been analyzed by the previous studies. The group's mix of advanced economies and emerging markets provides a unique context for exploring how different socio-economic and policy environments impact food security. This diversity, coupled with the G20's global influence, makes it a particularly interesting subject for research on hunger alleviation and food security strategies. However, digital progress has been unequal in these nations, with an estimated 2.7 billion people still lacking internet access, according to the International Telecommunication Union's (ITU) most recent State of Broadband report. But there are also many challenges faced by phygital economies, such as one of the key concerns is data privacy and security, as the integration of digital and physical systems raises cyberattack risks and complicates compliance with global data rules. Businesses have challenges with technological integration, as they struggle to create seamless experiences across incompatible technologies and inconsistent user interactions. Consumers may be hesitant to adopt new technology, resulting in distrust and conflicting expectations, making reconciling digital convenience with physical customer service difficult. Furthermore, the cost of adopting physical solutions is considerable, requiring significant infrastructure investments as well as hidden costs such as employee training. Moreover, the environmental footprint of internet-driven technology, from data centers to increased electronic waste, further complicates the sustainability of this model.

As the world is moving from physical sources to digital sources, this study aims to analyze the impact of innovation on hunger. The study takes the internet as the variable of the innovation, which is represented by the percentage of the population using the internet as the independent variable, as it serves to enhance and support physical activities. To analyze the impact of the internet on food security, the research considers calories per capita as a variable of food security, that is, the dependent variable. Cereal production and Gross Domestic Product (GDP) are the control variables as they also have a direct impact on food security. The research is conducted on fifteen years of data from 2007-2021. To examine the relationship between the internet and food security, the study utilizes the quantile regression method. The results depict that at the lower and middle quantiles internet has a significant impact on food security. But at the upper quantile, the internet has an insignificant impact on food security. These differences in impact provide insights into how structural factors such as technology access, food security, and economic growth influence consumption patterns across income levels. Furthermore, the research also depicts that increasing cereal production and economic growth positively impact food security in G20 countries. The implications of the research entail the importance of increasing food production by improving the supply chain and using technology for food production and marketing. The study implies that using digital resources also boosts the

economic growth of the country, which will help in achieving food security that fulfills Sustainable Development Goal 2 (SDG2).

This paper is divided into seven sections. The second section is a literature review followed by data and research methodology. The next section is about the analysis and results of the methodology that shows the relationship between the Internet and food security. The fifth section discusses the findings and the results. The sixth section discusses the policy implications, followed by the conclusion.

2. LITERATURE REVIEW

This section critically reviews the existing literature on the relationship between innovation and food security, with a particular emphasis on the role of internet technologies in influencing various dimensions of food security, including agricultural production and undernourishment. The literature review synthesizes existing theoretical, conceptual, and empirical studies to provide comprehensive insights into the research domain. To better understand how technological innovations such as the internet are adopted and utilized within food systems, this study draws upon the Technology Acceptance Model (TAM), a widely recognized framework for explaining user behavior toward technology adoption. According to TAM, the perceived usefulness and ease of use of a technology significantly influence its adoption (Davis 1989). This theoretical framework has been effectively applied in agricultural contexts, smallholder farmers viewed mobile phone technologies as a suitable tool for accessing agricultural marketing information, with factors like electricity reliability, relevance, timeliness, perceived ease of use, and perceived usefulness influencing their access levels thereby enhancing productivity and reducing costs (Nyagango *et al.*, 2023; Sasmita *et al.*, 2025). Anser *et al.*, (2021) highlight that artificial intelligence and innovation play an important role in enhancing food security. It helps not only to increase production but also to ensure proper distribution. This study also identifies the challenges in the way of achieving food security that can be faced through technology and innovation, such as climate change, food accessibility, and food nutrition. Furthermore, Malec *et al.*, (2024) depict that investments in agricultural innovation significantly improve food security by increasing food productivity. Investing in agricultural research and development is crucial for introducing new crop kinds, improving existing crops, and developing climate-compatible systems, along with getting economies of scale. Tesfaye and Tirivayi, (2018) imply that enhanced storage technologies can help with risk coping and food security, playing a crucial role in addressing the challenge of feeding a growing population under climate change. Ganushchak *et al.*, (2024) describe that innovation helps in enhancing food security by contributing to food availability, accessibility, utilization, and stability. Mobile apps for farmer-to-consumer exchanges, nutrition education platforms, and e-support systems for vulnerable populations are examples of digital tools. The need to increase the intensity of food production under stable agricultural production conditions is growing (Bogoviz *et al.*, 2023; Glushchenko *et al.*, 2020). In this context, agrarians seek new innovative solutions to the problem of increasing production quantities without significantly increasing the final product price. Furthermore, a study on SAARC countries found that internet and mobile phone usage significantly enhance grain food production across all quantiles, with internet use showing a bidirectional causal relationship with key agricultural inputs. The findings highlight the need for improved rural ICT infrastructure to boost productivity and farmer income (Chandio *et al.*, 2024). Ardianti, Hartono, and Widyastaman (2023), using data from agricultural households in Indonesia employing two-stage least squares estimation, find that internet use significantly reduces food insecurity, both directly and indirectly through increased per capita income. The findings underscore the critical role of rural

internet infrastructure in enhancing food security among agricultural populations. In addition, a panel data study from rural China finds that internet access significantly improves dietary quality and food consumption, particularly through increased intake of animal-based products. The study identifies rising household income and food expenditure as key pathways, highlighting internet access as a catalyst for enhancing rural nutritional outcomes (Cui *et al.*, 2024). Moreover, research across 45 African countries using the STIRPAT model found that internet and mobile phone penetration significantly reduce undernourishment, both directly and through improved income, education, health, and water access. The results highlight ICT as a key tool for addressing malnutrition (Domguia *et al.*, 2023).

While the present study investigates the impact of innovation on food security by examining internet usage and the prevalence of undernourishment in G20 economies, prior research has predominantly focused on agricultural production and supply-side aspects, often using conceptual approaches or standard panel regression methods. In contrast, fewer studies have addressed undernourishment, a critical component of food security. This study contributes to the literature by analyzing panel data from 2007 to 2021 for G20 countries and employing the Method of Moments Quantile Regression (MMQR) to provide a more detailed assessment of this relationship.

3. DATA AND METHODS

3.1.Data

The primary objective of the study is to investigate the impact of innovation on food security and to understand the impact of the increasing role of the phygital economy. For checking the impact of innovation, this study considers % of the population using the internet (Domguia *et al.*, 2023) as an independent variable. Calorie per capita (CPC) (Maitra and Prasada Rao, 2018) is taken as a dependent variable as a measure of food security. Cereal production (Mughal and Fontan Sers, 2020) and Gross Domestic Product (GDP) per capita (Miladinov, 2023; Yaseen, 2019) are control variables. The study is conducted on G20 countries; due to incomplete data from the EU, the research is conducted on nineteen countries. The research chooses the G20 countries due to their diverse characteristics. It has countries with low to high populations, low food insecurity to high food insecurity countries, and underdeveloped countries to developed countries.

Table 1- Description of variables

Variable	Measured by	Code	Source	Unit of measurement
Food security	Calorie per capita	CPC	https://databank.worldbank.org/source/world-development-indicators	per person
Innovation	% of the population using the internet	INT	https://databank.worldbank.org/source/world-development-indicators	% of population
Food production	Cereal production	FDP	https://databank.worldbank.org/source/world-development-indicators	Metric tons
Gross Domestic Product per capita	Gross Domestic Product per capita	GDP	https://databank.worldbank.org/source/world-development-indicators	PPP, current international dollars

3.2. Methodology

The study uses a quantile regression technique to analyze the impact of innovation on food security because quantile regression minimizes a weighted sum of absolute residuals, with weights depending on the quantile being estimated. The study uses quantile regression for analyses developed by Koenker and Bassett Jr, (1978) as it is less affected by outliers that explain variables at different quantiles. Quantile regression allows us to know the impact of predictors' effect on different points of the distribution, such as 0.25, 0.50, and 0.75, or from lower points to higher points (Smith *et al.*, 2015). For instance, this study investigates the differential impact of innovation on individuals experiencing varying degrees of food security, from low to high levels of calorie intake.

As this study uses panel data including cross-sectional units at different times, the base model of the study is-

$$CPC = f(INT, FDP, GDP) \quad (1)$$

Per capita calorie is a function of internet users, production of cereals, and gross domestic product.

$$CPC_{it} = \alpha + \beta_1 INT_{it} + \beta_2 FDP_{it} + \beta_3 GDP_{it} + u_{it} \quad (2)$$

Where CPC_{it} , is the dependent variable and INT_{it} is the independent variable. FDP and GDP are control variables. An α is intercepted, β_1 is the coefficient of INT, β_2 is the coefficient of FDP, and β_3 is the coefficient of GDP, u_{it} is an error term.

The quantile regression model was first introduced by Koenker and Basset (1978)

$$Y_{it} = x'_{it}\beta_{\theta} + u_{\theta it} \quad \text{with} \quad \text{Quant}_{\theta}(y_{it}/x_{it}) = x'_{it}\beta_{\theta} \quad (3)$$

where Y_{it} is the dependent variable, x is a vector of regressors, β is the vector of parameters to be estimated, and u is a vector of residuals. $\text{Quant}_{\theta}(y_{it}/x_{it})$ denotes the θ th conditional quantile of y_{it} given x_{it} .

4. RESULTS AND FINDINGS

This study presents descriptive statistics for the key variables used in the analysis, based on 285 observations (Table 2). A mean value of 8.08 and a standard deviation of 0.12 characterize the dependent variable, CPC. The CPC across the sample varies quite little, with a minimum of 7.76 and a maximum of 8.27. The INT shows significant variation in value, ranging from 1.37 at the minimum to 4.61 at the maximum. Its mean value is 4.05, with a standard deviation of 0.63. The FDP shows a significant dispersion, with values ranging from 13.68 to 20.04, with a mean of 17.45 and a standard deviation of 1.28. The GDP variable exhibits a large variation in GDP among the countries investigated, with a mean of 10.22 and a standard deviation of 0.65; values for the variable fall between 8.16 and 11.17.

	Mean	Std. dev	Min	Max
PoU	8.082099	.117217	7.757169	8.271548

INT	4.054086	.6302854	1.373716	4.60517
FDP	17.45288	1.275927	13.68499	20.03703
GDP	10.224	.6469498	8.163646	11.17122

Table 2- Descriptive statistics

To analyze the relationship between CPC and INT, the study uses simultaneous quantile regression with control variables FDP and GDP (Table 4). This approach allows us to assess the impact of IV on DV across the different quantiles (0.25, 0.50, and 0.75). At the 0.25 quantile, the lower end of the distribution, the study finds INT has a significantly positive impact on CPC at the median. One log unit change in INT causes a 0.052 unit increase in CPC and vice versa, with the t-stat 6.52. It is suggested that where calorie intake is low, an increasing number of internet users contributes to higher calorie consumption. Additionally, due to a log unit increase in FDP, CPC increases by .031 units, which depicts a positive significant impact of FDP on CPC in the lower end of the distribution. In the case of GDP, it has a significant positive impact on CPC. One log unit increase in GDP causes a 0.11 unit increase in CPC at the lower end of the distribution. At the 0.50 quantile, INT impacts CPC positively, which shows a significant positive impact. One log unit increase in INT causes a 0.05 unit increase in CPC. In addition, in the case of FDP, it has a significant positive impact on CPC. The analyses highlight a CPC increase of 0.023 log units by a log unit increase in FDP. Moreover, GDP also impacts CPC positively in the middle of the distribution. One log unit increase in GDP leads to a 0.12 log unit increase in CPC. At the upper end of the discussion, INT has an insignificant impact on CPC; it may be due to the benefits of additional internet access may be less impactful on their already adequate caloric intake. FDP and GDP continue to impact CPC positively. One log unit change in FDP and GDP causes 0.022 and 0.11 log unit increase in CPC with t-stat 15.41 and 12.56.

PoU	Quantile regression		
	0.25	0.50	0.75
INT	INT		
	.0521153	.0544878	.0157306
	6.52	2.30	1.03
	P-value (p<0.05)	0.000	0.022
FDP	FDP		
	.0302647	.0234852	.0220554
	11.68	10.68	9.05
	P-value (p<0.05)	0.000	0.000
GDP	GDP		

Coefficient	.116239	.1110435	.0989995
T-stat	13.27	6.63	8.73
P-value ($p < 0.05$)	0.000	0.000	0.000

Table 4- Results of quantile regression

5. DISCUSSION

The quantile regression's results highlight the internet, cereal production, and GDP on varying per capita calorie consumption across the lower quantile, median quantile, and higher quantile. At the beginning of the distribution, the significant relation between INT and CPD suggests that the substantial association at lower quantiles is due to the significance of internet connectivity in improving food-related information and economic prospects for low-income individuals or groups. This suggests innovation has a stronger impact on vulnerable or moderately food-insecure populations (Nakasone and Torero, 2016). For example, access to online information can lead to improved knowledge of nutrition, dietary choices, and food preparation techniques, resulting in increased caloric intake. Internet technology can serve as a two-way communication tool (Kenny, 2002). It facilitates the interchange of product information between farmers and the government, as well as communication among farmers themselves, potentially reducing food insecurity (Rosegrant, Sulser, and Wiebe, 2022). Information and communication technology improves food security by providing access to information (Gu *et al.*, 2023). These differences in impact provide insights into how structural factors such as technology access, food security, and economic growth influence consumption patterns across income levels (Boratyńska and Huseynov, 2017; Gouvea *et al.*, 2022) associated with food security. Furthermore, increased internet connectivity may open up new economic prospects for low-income households, such as access to online markets, e-commerce, and digital services, immediately improving their ability to consume goods and services (Rahman *et al.*, 2023). Internet connection is likely already saturated in higher-consumption households, and its marginal influence on consumption growth is far smaller. Furthermore, at this level, major focus is on quality over quantity, which means fulfilling their nutritional needs rather than increasing the number of calories (McNally *et al.*, 2019).

In the case of cereal production, the results suggest that cereal production consistently has a substantial positive influence across all quantiles. This study implies that increased grain output has a greater proportionate influence on consumption among low food-secure people. This is because lower-income households spend a greater proportion of their income on basic foods, notably grains. Improved cereal output increases food availability, reduces prices, and improves food security, allowing these households to consume more (Minten and Barrett, 2008). Food-secure people at higher quantiles, having high calories, possibly are higher-income households, experience less impact from cereal production on consumption because they diversify their diets and devote a smaller proportion of their income to staple items like cereals (Mariwah *et al.*, 2017). Furthermore, the persistent positive link between cereal production and calorie intake emphasizes the importance of staple crops in food security. Additionally, cereal-producing regions, such as rice, wheat, and maize, tend to have higher caloric availability. Countries with strong agricultural sectors that concentrate cereal production, for example, can supply affordable staple foods that serve as the foundation of many diets, so contributing directly to increased calorie intake (Cunguara and Hanlon, 2012). This effect is very significant across all quantiles, demonstrating that cereal production is a major driver of calorie intake for individuals, regardless of their baseline consumption levels.

Statistics depict that in all G20 countries, as the cereal production rises, the calorie intake also rises. The rate can be varied from developed countries to developing countries. Similarly, GDP has the same tendency; as it increases, calorie intake also increases in the countries. GDP has a significant positive influence across all quantiles, with a somewhat greater impact on the lower and median quantiles than on the top quantile. This suggests that economic expansion disproportionately advantages low- and middle-income groups in terms of consumption (Shamah-Levy *et al.*, 2017). Lower-income households have more pronounced increases in consumption when GDP rises, most likely due to job creation, salary increases, and increased access to public services that follow economic growth (Galabada, 2022). Higher-income households are less vulnerable to overall economic volatility; therefore, GDP has a smaller impact on spending (Akinwale and Grobler, 2023).

6. POLICY IMPLICATIONS

The results of this analysis suggest that internet penetration, agricultural productivity, and GDP growth are crucial drivers of consumption, but their impact varies across consumption levels. Policymakers should prioritize developing internet infrastructure and digital literacy programs for low-income and rural communities, as these have the most potential to improve the consumption of nutritious food through digital inclusion while promoting circular economy practices like reducing food waste and optimizing resource use. Internet connection may lead to increased economic engagement and better livelihoods for these people. Expand affordable internet access, particularly in rural and underdeveloped areas, and fund digital literacy programs for low-income households (Ferris *et al.*, 2022). This can assist these groups in taking advantage of economic opportunities on the Internet, increasing their purchasing power. Better internet access helps people to enhance their skills and acquire employment opportunities. It helps them to educate well about nutrition and diet. Furthermore, Efforts to increase agricultural productivity, particularly grain output, can have a substantial impact on food security and consumption among low-income communities (Balana *et al.*, 2020). Policies aiming at increasing agricultural efficiency, and providing access to better farming technologies, using and maintaining stable cereal prices, can boost consumption in these disadvantaged groups. Additionally, there is a need for policies that integrate circular economy principles with internet connectivity to ensure equitable resource distribution, reduce environmental impact, and enhance food security, particularly in vulnerable regions. Policies should focus on educating farmers on the efficient use of technology and the Internet to enhance agricultural production in a cost-effective, nutritious, and profitable manner. Additionally, investments in agricultural infrastructure, modern farming practices, and improved market access are vital for increasing food supply and alleviating hunger (Kassie, Shiferaw, and Muricho, 2011). Expanding e-commerce and e-marketing platforms can help distribute nutritious food, such as millet and organic products, from surplus regions to areas in need, ensuring equitable access. Moreover, ensure that economic growth is inclusive by prioritizing job creation, social safety nets, and income redistribution measures that help low- and middle-income households (Ravallion, 2013). This can help transform GDP growth into actual consumption gains for all parts of society. By focusing on these areas, governments can address structural inequalities and ensure that the benefits of economic development reach all segments of society, particularly the most vulnerable. As leading global economies, G20 countries are responsible for addressing consumption disparity both internally and internationally. They can lead the globe by implementing policies that eliminate income inequality and promote sustainable development (Clapp, 2012). Furthermore, through initiatives such as the G20's development agenda, these countries can help low- and middle-income countries enhance food security, internet access, and inclusive growth. Additionally, to face the challenges arise by use

of internet policymakers should have some policies. For instance, to protect consumer data and prevent cyber risks, governments must enact comprehensive, harmonized legislation, such as worldwide norms similar to the GDPR. Policies should also encourage the interoperability of digital platforms, guaranteeing smooth integration across systems. This includes promoting the development of open, interoperable technology solutions capable of bridging the gap between legacy physical systems and emerging digital technologies. To increase consumer trust and acceptance, governments might develop transparency criteria for AI and automation, ensuring ethical use and minimizing bias in decision-making systems.

These policy measures not only help in increasing food security but also economic growth via increasing production, education, creating job opportunities, better market access, and improved standard of living while helping in attaining SDG2 and promoting sustainability. These are crucial for developing and underdeveloped countries, as the number of starving people is high in these countries.

7. CONCLUSION

The study This analysis shows that internet penetration, grain output, and GDP growth are all important determinants in determining per capita consumption across income levels. The impact of internet connection and agricultural output is especially strong for low-income households, highlighting their importance in expanding economic opportunities and guaranteeing food security. GDP growth, while beneficial to all consumer groups, has a greater impact on lower- and middle-income sectors, emphasizing the need for growth methods that help the most vulnerable. These findings have important consequences for G20 member countries. As global leaders, G20 countries should pursue digital inclusion to bridge the technological divide, especially among underprivileged people. Expanding internet access can increase economic involvement and creativity. Similarly, increasing agricultural productivity through sustainable techniques can directly enhance food security. This study provides implications regarding increasing production using technologies in production, supply chain, and market access. Furthermore, ensuring good connectivity to the internet can aware people about their diet and food habits, increase their source of income, enhance market access, and many more. Furthermore, the internet promotes circular economy activities such as reducing food waste, enhancing resource efficiency, and developing sustainable food production and distribution networks. The internet promotes circularity in food systems by providing digital platforms for food redistribution, precision agriculture, and enhanced supply chain management, hence reducing environmental impact and enhancing sustainability. Therefore, the study's finding implies that using digital resources such as the internet has the potential to enhance economic growth by solving the problems of production, poverty, and hunger, helping in achieving SDG2.

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