

## Article

# Addressing Food Insecurity in South Sudan: Insights and Solutions from Young Entrepreneurs

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**Abstract:** This study explores food insecurity in South Sudan through the lens of young entrepreneurs, revealing insights into understanding the causes, coping strategies, and innovative solutions. Analyzing survey responses reveals a complicated problem linked to poverty, conflict, climate change, and economic instability. We surveyed 19 standout candidates selected from 325 South Sudanese participants from the United Nations Institute for Training and Research (UNITAR's) hybrid training on entrepreneurship and agribusiness, who successfully passed the assessment criteria to attend a workshop in Hiroshima, Japan, in February 2024. These participants clearly depicted the dire circumstances, with widespread food insecurity, heavy reliance on humanitarian aid, and prevalent malnutrition, especially in conflict-affected regions like Yambio. Conflict, climate shocks, economic instability, and inadequate infrastructure emerged as primary drivers of food insecurity. Despite these challenges, young entrepreneurs express a keen desire to contribute to solutions, advocating for sustainable agriculture, entrepreneurship, and education initiatives. During conflict, coping strategies vary from reducing meal frequency to diversifying diets and engaging in subsistence farming. The innovative solutions proposed include sustainable agricultural practices, value chain development, and technology adoption. The study underscores the urgent need for comprehensive strategies addressing the root causes of food insecurity while empowering communities and young entrepreneurs to foster resilience. Sustained support in youth agri-business capacity building and entrepreneurial skills development, increased agricultural investment, infrastructure enhancement, and targeted youth empowerment initiatives are emphasized. Through collaborative efforts, South Sudan can progress towards achieving resilience and improving food security.

**Keywords:** food security; food insecurity; entrepreneurship; agri-business; conflict; South Sudan



**Citation:** Shams, S.H.; Sokout, S.; Nakajima, H.; Kumamoto, M.; Khan, G.D. Addressing Food Insecurity in South Sudan: Insights and Solutions from Young Entrepreneurs. *Sustainability* **2024**, *16*, 5197. <https://doi.org/10.3390/su16125197>

Academic Editor: Hossein Azadi

Received: 24 April 2024

Revised: 6 June 2024

Accepted: 11 June 2024

Published: 19 June 2024



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## 1. Introduction

Food insecurity in South Sudan persists as a significant challenge, exacerbated by conflict, economic instability, and environmental factors [1–3]. The literature indicates the importance of understanding the nuanced dynamics of food insecurity in conflict-affected regions like South Sudan [4–6]. Armed conflicts disrupt food production and distribution, exacerbating food insecurity [3]. Additionally, studies on household coping mechanisms and cash-based assistance programs provide valuable insights into addressing food insecurity in such contexts [4–6]. Given the critical role of entrepreneurship and innovative solutions in addressing food insecurity [1,7], for instance sustainable agricultural practices, community education and awareness programs, value chain development, and the adoption of smart technologies, in this paper, we explore the perspectives of young entrepreneurs in South Sudan. By directly engaging with these individuals, we try to

uncover their understanding of food insecurity, the challenges they face, and the innovative solutions they propose. Through qualitative analysis of the perspectives and experiences of young entrepreneurs, and by amplifying their voices, this paper serves as evidence for informing policies, programs, and interventions that prioritize food security and sustainable development in South Sudan.

Despite ongoing humanitarian efforts and interventions, food insecurity remains a pervasive issue in South Sudan, affecting millions of individuals and exacerbating existing vulnerabilities. The protracted conflict in the region has disrupted agricultural activities, displaced populations, and strained already limited resources, further worsening food insecurity [4,6]. The impact of food insecurity is particularly acute among vulnerable groups, including those persons who are women, children, and internally displaced [3]. Strategic responses by organizations like the United Nations World Food Programme (WFP) are vital in enhancing food assistance delivery and performance, particularly in challenging contexts like South Sudan [8]. NGOs contribute significantly to economic empowerment efforts, with interventions by organizations such as World Vision proving effective through microcredit, training, self-help groups, and cash transfers [9].

Household resilience is fundamental to mitigating food insecurity risks in South Sudan. Lokosang et al. [5,6] highlight the significance of household characteristics and livelihood strategies in building resilience and addressing food insecurity challenges. Furthermore, understanding household coping mechanisms is essential for designing effective interventions. Tappis et al. [3] shed light on the coping strategies adopted by households, including reducing meal sizes, skipping meals, and engaging in income-generating activities. Cash-based assistance programs offer potential solutions to address food insecurity in South Sudan. Doocy et al. [4] evaluate the impact of cash transfers on food security outcomes, highlighting the need for larger transfer sizes to achieve substantial improvements. Additionally, Sassi [7] investigates coping strategies of households who are food-insecure in conflict-affected areas, emphasizing the urgent need for holistic approaches to food security that address livelihood strategies, opportunities, and institutional frameworks in such contexts.

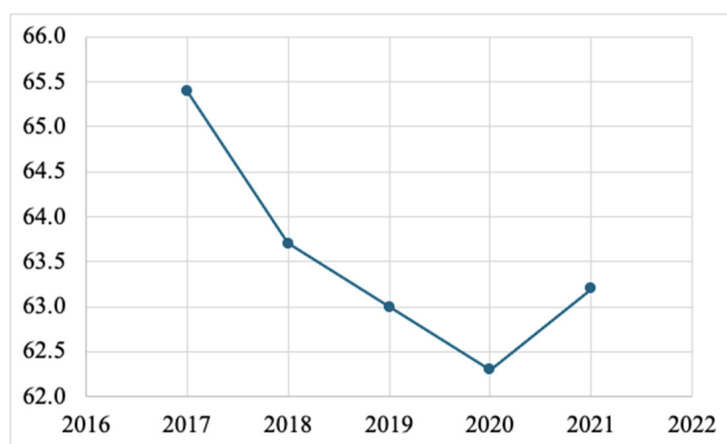
Entrepreneurship emerges as a pivotal force in addressing food security challenges across Africa, contributing significantly to poverty alleviation, economic development within agricultural communities, and post-COVID-19 recovery. It serves as a crucial mechanism for driving growth in agricultural communities [10–13]. Additionally, the agility of marketing strategies in Sub-Saharan Africa underscores the adaptability of entrepreneurial endeavors, particularly in post-conflict scenarios, where seizing business opportunities becomes imperative [14]. In Tanzania, agripreneurship emerges as a key driver for ensuring food security, contributing significantly to improving food availability, accessibility, and affordability [13]. Similarly, in Malawi, the exploration of agricultural cooperatives reveals their pivotal role in fostering entrepreneurship, thereby enhancing food security and income in rural areas [11]. These insights underscore the importance of entrepreneurial initiatives and innovative approaches in combating food insecurity across Africa, offering valuable guidance for policymakers, organizations, and practitioners engaged in food security programming and development efforts. African nations can achieve food security by building more resilient and sustainable food systems by harnessing the potential of entrepreneurship and building the capacity of youth through training and mentorship.

Drawing from responses provided by a diverse group of young entrepreneurs in South Sudan, this study explores their detailed reflections on various facets of food insecurity, including their understanding of the issue, the prevailing food situation in their communities, the root causes, their roles in addressing the problem, their involvement in food security initiatives, their coping mechanisms during conflict or post-conflict periods, and their innovative solutions to enhance food access and availability. Synthesizing and analyzing these insights, we shed light on the lived experiences of youth of South Sudan, offering valuable perspectives to inform policymaking, programing, and advocacy endeavors aimed at mitigating food insecurity and fostering sustainable development within the nation.

By fostering collaborative action and meaningful engagement with youth, governments, non-governmental organizations (NGOs), and international partners can collectively strive towards a future where every individual in South Sudan has equitable access to nutritious food and can flourish in a food-secure environment.

## 2. Persistent Food Insecurity and Current Food Situation in South Sudan

The enduring challenge of food insecurity in South Sudan is starkly evident from recent data, which indicate that approximately 6.3 million people faced food insecurity in 2021, as depicted in Figure 1. This prevalence has remained consistently high at around 63% over the past few years, emphasizing the chronic nature of the issue and the daily struggle for many in South Sudan. In comparison, the regional average of severe food insecurity in Sub-Saharan Africa (excluding high-income countries) stands at approximately 25%, underscoring the acute situation within South Sudan. Market and trade activities vary across the country, with disruptions due to conflict and flooding affecting certain areas. Economic conditions have worsened, characterized by high inflation rates and real gross domestic product (GDP), the total monetary value of all goods and services produced within the country in a specific time period, experiencing negative growth rates in recent years [15]. However, in 2024, GDP is projected to grow by 5.6%, according to the World Economic Outlook [15].



**Figure 1.** Prevalence of food insecurity in South Sudan (%). Source: World Bank Open Data (<https://data.worldbank.org/indicator/SN.ITK.SVFI.ZS?locations=ZF>, accessed on 19 April 2024).

Rooted in socio-economic and political factors, the causes of food insecurity in South Sudan are multi-dimensional. Major among these is the persistent conflict that has plagued the country since its independence. Conflict not only leads to widespread displacement and infrastructure destruction, but also disrupts food production and distribution networks, making it challenging for communities to access nutritious food. Economic instability makes it increasingly difficult for individuals to afford food even when it is available. Additionally, South Sudan's vulnerability to climate shocks, including droughts, floods, and extreme temperatures, further compounds food insecurity by devastating crops, livestock, and water sources [16,17].

Conflict incidents have been on the rise, particularly in Greater Bahr el Ghazal and Jonglei, triggering new displacements and disrupting trade and humanitarian assistance delivery [18]. Additionally, flooding persists in parts of Jonglei and the southern Upper Nile, further straining livelihoods [19]. The influx of returnees and refugees from Sudan has compounded the strain on already limited resources in host communities. Despite localized improvements in crop production, conflicts and floods have led to declines in yields in several regions, contributing to food stock depletion and an early start to the lean season in many areas [20].

Malnutrition is another major concern in South Sudan, particularly among children, women who are pregnant, and people who are elderly, with about 0.7 million children under five in the country suffering from stunting, a form of malnutrition that can have long-term effects on their health and development [21]. Malnutrition rates are even higher in conflict-affected areas like Yambio, Northern Bahr el Ghazal, Warrap, Unity, Western Equatoria, Jonglei, and Upper Nile, where access to nutritious food is limited [22]. Therefore, addressing food insecurity in South Sudan requires a comprehensive approach and coordinated mechanism among humanitarian organization in providing immediate relief and to tackle the root causes for a long-term, sustainable solution. In this context, multiple agencies and donors are striving to help overcome the food insecurity alongside other UN agencies, such as UNITAR, under funding from the government of Japan, which is providing entrepreneurship and agribusiness training to hundreds of youths in South Sudan to build their capacity and help improve the food insecurity situation.

### 3. Materials and Methods

#### 3.1. Sample and Context

The participants for this study were selected from a pool of individuals who completed an online entrepreneurship training program facilitated by the United Nations Institute for Training and Research (UNITAR). Initially, 325 individuals aged 19–45 from various regions of South Sudan were enrolled in the program. Out of those enrolled, 142 participants successfully fulfilled the course completion criteria, and thus became eligible to apply for a 10-day in-person workshop on entrepreneurship and agribusiness (also known as the VentureLab workshop) held in Tokyo and Hiroshima, Japan, in February 2024.

From the cohort of 109 participants who applied for the VentureLab workshop, UNITAR selected the top 19 candidates based on their performance and potential to contribute innovative solutions towards addressing food security challenges in South Sudan. These 19 individuals were then invited to attend the workshop in Japan. For the purpose of this study, an online survey was conducted with all 19 participants using Qualtrics during their attendance at the workshop. While we acknowledge that this final number is not representative of the entire population, it is important to note that these 19 individuals were chosen for their exceptional abilities and potential social impact. Additionally, the presentations of participants showcasing their innovative solutions are closely observed, analyzed, and summarized in the later section of this paper. Table 1 presents the description of the sample.

The interviews aimed to understand participants' perceptions of food insecurity, its underlying causes in South Sudan, the role of youth in addressing this issue, coping strategies during conflict or post-conflict periods, and innovative solutions to enhance food access and availability.

Throughout the workshop, participants engaged in various activities aimed at enhancing their entrepreneurial skills and fostering innovative thinking. Drawing on their learnings and experiences, participants further developed and refined their innovative solutions to address food insecurity in South Sudan, which were subsequently presented at the conclusion of the workshop.

**Table 1.** Description of the study sample.

Variable	Frequency
Gender	
Female	6
Male	13

**Table 1.** *Cont.*

Variable	Frequency
Age	
18–25 years old	3
26–35 years old	12
36–45 years old	4
Education	
Highschool	5
Bachelor's	12
Master's	2
Occupation	
Business owner	6
Employment	13
Region/City	
Bahr el Ghazal	1
Torit	1
Juba	13
Nyumanzi Refugee Camp, Uganda	1
Yambio	2
Yei	1

### 3.2. Methodology

This study adopts a qualitative research approach to explore the perspectives of young entrepreneurs on food insecurity and innovative solutions in South Sudan. Thematic analysis was employed to analyze the survey responses and the innovative solutions presented by the participants. This involved identifying recurring patterns, themes, and insights within the data related to food insecurity and innovative approaches.

Thematic analysis is a systematic method of organizing qualitative data into coherent themes or patterns. In our study, it enabled us to categorize the responses obtained from our interviews, grouping together similar ideas and concepts. This process facilitated the identification of recurring themes that emerged across the dataset. For example, prevalent themes included discussions on the root causes of food insecurity such as economic factors, conflict, and climate shocks.

Thematic analysis revealed participants' perspectives on the perceived impact of food insecurity, community responses, and innovative solutions. Through this method, we extracted crucial insights from the qualitative data, offering a structured framework to understand the complexities of food insecurity and develop innovative strategies to address it.

Table 2 provides a thorough breakdown of the themes and sub-themes derived from the responses of the 19 participants. It encompasses the main themes and areas of inquiry covered in our questions, alongside the detected themes found within respondents' answers. These themes serve as the foundation for the subsequent detailed discussions in the following sections of the study.

**Table 2.** Themes and sub-themes extracted from respondents' interviews.

Themes	Sub-Themes
Root Causes of Food Insecurity	Economic Factors Conflict Climate Shocks Poor Infrastructure Governance Issues Dependence on Humanitarian Assistance
Impact of Food Insecurity	Lack of Food/Food Shortage Access and Availability Challenges Malnutrition Economic Instability Social Displacement Negative Coping Strategies
Community Responses and Coping Mechanisms	Reducing Meal Frequency Diversifying Diets Engagement in Subsistence Farming Rationing and Prioritizing Food Seeking Casual Employment for Food Social Enterprises/Cooperatives Formation
Youth Engagement and Empowerment	Advocacy and Policy Engagement Sustainable Agriculture Practices Education and Skill Development Entrepreneurship and Business Start-ups Nonprofit and Community Initiatives Youth Empowerment and Education
Innovative Solutions and Interventions	Agricultural Innovation and Entrepreneurship Technology Adoption Value Chain Development Urban Farming and Kitchen Gardening Investment in Infrastructure Peacebuilding and Conflict Resolution
Support and Collaboration Initiatives	Government and International Support NGO and Government Agency Partnerships Training and Capacity Building Support for Vulnerable Communities Awareness Campaigns and Advocacy Involvement in Sustainable Agriculture Practices

Note: Apart from demographic questions, we asked the following open-ended questions from respondents: What is your understanding of food insecurity? How would you describe the current food situation in your community? What do you think are the main causes of food insecurity in your country? In your opinion, what roles can youth play in addressing food insecurity within your country/Community? Have you been involved in any initiatives or projects related to food security? If yes, please describe. How individuals and communities cope with food insecurity during conflict or post-conflict periods? What are the survival strategies they use? What innovative solutions do you think could improve food access and availability in your country/community?

#### 4. Causes of Food Insecurity in South Sudan

The causes of food insecurity in South Sudan are multifaceted and interconnected, driven by a combination of socio-economic, political, environmental, and humanitarian factors. As presented in Table 2, respondents considered conflict, economic and environmental challenges, and poor governance to be the main causes of food insecurity in South Sudan.

Conflict has been a pervasive issue in South Sudan since its independence, leading to widespread displacement, destruction of infrastructure, and disruption of food production and distribution. Ongoing civil wars, intercommunity conflicts, and political instability have hindered agricultural activities, displaced populations, and disrupted markets, exacerbating food insecurity across the country. South Sudan's economy is fragile, marked by

high inflation rates, limited job opportunities, and economic instability. Unemployment and poverty contribute to food insecurity, as many people cannot afford to purchase food or invest in agricultural activities. Additionally, economic crises and dependence on imports further strain food availability and accessibility.

South Sudan is highly vulnerable to climate shocks such as droughts, floods, and extreme temperatures. These environmental challenges disrupt agricultural activities, destroy crops and livestock, and compromise food production [23]. Poor infrastructure, limited access to water resources, and inadequate irrigation systems exacerbate the impact of climate change on food security. Issues related to governance, corruption, and mismanagement further exacerbate food insecurity in South Sudan. A lack of effective governance structures, weak institutions, and limited accountability contribute to the misallocation of resources, hindering efforts to address food insecurity [24,25]. Corruption undermines food distribution systems, diverts resources, and exacerbates inequalities, perpetuating the cycle of poverty and hunger.

### 5. Roles of Youth in Addressing Food Insecurity

Youth play a crucial role in addressing food insecurity in South Sudan, offering innovative solutions and contributing to sustainable development. As shown in Table 2, respondents highlighted various roles that youth can undertake to mitigate food insecurity; for instance, youth can drive agricultural innovation by adopting modern farming techniques, utilizing technology, and developing sustainable agricultural practices. Respondent No. 6 underscored the importance of engaging youth in agribusiness ventures, stating, “Youth should invest in agri-businesses and be supported with knowledge and skills development.” Youth can play a vital role in food distribution efforts, including distributing food aid during crises and establishing community gardens and food banks. Additionally, youth-led initiatives can promote community engagement in agriculture and food security projects, as highlighted by respondent No. 11’s involvement in farmer training and tool distribution. Youth have the potential to advocate for policies that promote food security, investment in agriculture, and infrastructure development [26]. By engaging with local and national governments, youth can influence decision-making processes and hold policymakers accountable for addressing food insecurity issues [26]. Respondent No. 15 emphasized the importance of advocacy, stating, “Youth can advocate for ways to reduce food wastage”.

Youth can contribute to food security through education and awareness initiatives, raising awareness about the importance of nutrition, healthy eating habits, and sustainable food production. By empowering communities with knowledge and skills, youth can help address underlying causes of food insecurity and promote resilience. Respondent No. 7 highlighted the role of education in empowering youth, stating, “train them on practical skills and vocational skills to create their own jobs and fight poverty”. Youth entrepreneurship plays a crucial role in improving food access and availability, with opportunities for value addition, market linkage, and income generation. Initiatives such as organic farming, agribusiness enterprises, and value chain development can create employment opportunities and enhance food security. Respondent No. 11 described his/her initiative in organic farming and agribusiness enterprise, highlighting the potential for youth-led ventures to contribute to food security.

### 6. Coping Strategies during Conflict or Post-Conflict Periods

During times of conflict or in the aftermath of conflict, individuals and communities in South Sudan employ various coping strategies to mitigate food insecurity and ensure survival. Respondents shared insights into these strategies, shedding light on the challenges faced and the resilience demonstrated by affected populations. Reducing the number of meals per day and minimizing food intake are common coping strategies during food crises. Respondents highlighted the practice of reducing meal frequency and portion sizes to stretch limited food resources. For instance, respondent No. 3 mentioned, “People

normally adapt negative coping strategy such as reducing the number and size of meals". Communities often diversify their diets by incorporating alternative food sources such as wild fruits, vegetables, and insects [27,28]. This strategy helps supplement nutritional intake and provides essential vitamins and minerals. Respondents emphasized the importance of adapting to alternative food sources to meet dietary needs, as described by respondent No. 3, "apart from reducing the meals per day they also opt for wild food such as wild fruits, yams, fishing, and poaching".

In times of crisis, communities come together to support each other and share resources. Initiatives such as community gardens, seed and tool sharing, and cooperative efforts contribute to collective resilience [29]. Respondent No. 11 highlighted the importance of communal support, stating, "communities may also engage in collective efforts to improve food security, including setting up community gardens, sharing resources like seeds and tools". Engaging in informal economies, such as casual labor or trading, provides opportunities to earn income and access food resources. Respondents mentioned strategies such as hustling for casual jobs and engaging in small-scale trading as a means of securing food for survival. As respondent No. 9 described, "hustle for casual jobs to afford a meal for a family in a day".

Reliance on humanitarian aid and external support is common during periods of conflict or crisis [30]. Respondents acknowledged the role of humanitarian organizations in providing food assistance and relief efforts. However, challenges such as limited access to aid and distribution gaps were also noted. Respondent No. 3 highlighted the dependence on humanitarian support, stating, "some communities are depending on humanitarian supports, while some are farming". Communities adapt their livelihood strategies to cope with food insecurity, including livestock sales, migration, and livelihood diversification [31]. Respondents discussed strategies such as selling livestock for income or engaging in alternative livelihood activities to sustain themselves during crises. As respondent No. 14 mentioned, "families prioritize food over other paid services such as education for children".

Moreover, coping strategies during conflict or post-conflict periods in South Sudan involve a combination of dietary adaptation, community support, engagement in informal economies, reliance on humanitarian aid, and adaptive livelihood strategies. Despite the challenges faced, communities demonstrate resilience and resourcefulness in ensuring food security and survival amidst adversity.

## **7. Innovative Solutions to Improve Food Access and Availability**

Addressing food insecurity in South Sudan requires innovative solutions that address the underlying causes and build resilience within communities. Respondents provided valuable insights into potential strategies and initiatives that could improve food access and availability in the country. Respondents emphasized the importance of promoting sustainable agriculture practices and strengthening the agricultural value chain to enhance food production and distribution. Initiatives such as training farmers in modern farming techniques, providing access to quality seeds and fertilizers, and improving transportation infrastructure were highlighted as crucial interventions. As respondent No. 12 stated, "sustainable agriculture and formation of farmers' associations" are essential for improving food access. Similarly, empowering youth to engage in agriculture and entrepreneurship plays a significant role in enhancing food security. Respondents emphasized the need to create opportunities for youth to participate in agribusiness and develop innovative solutions to food insecurity. Supporting youth-led initiatives, providing vocational training, and facilitating access to financial resources were identified as key strategies. As respondent No. 7 mentioned, "creating room for youth to be involved in agribusiness and supporting their ideas" is crucial for driving innovation. Furthermore, utilizing technology and improving infrastructure can streamline food production, distribution, and access. Respondents highlighted the importance of integrating new technologies into the agricultural sector, such as modern irrigation techniques and mobile-based applications for market information.

Investment in infrastructure, including roads, storage facilities, and market linkages, was also emphasized as essential for improving food availability and reducing waste. Empirical evidence such as given in [32–36] suggests that these interventions can increase crop yield and farm income. As respondent No. 7 suggested, “integrating new technologies into the agricultural sector” is critical for enhancing efficiency. Value addition to agricultural products and establishing market linkages can increase farmers’ incomes and ensure a steady food supply. Respondents emphasized the need to promote agro-processing industries and improve access to markets for small-scale farmers. Strengthening market-producers’ linkages, facilitating access to credit and financial services, and promoting entrepreneurship in agribusiness were identified as key strategies. As respondent No. 19 highlighted, “value addition to agricultural products and improved seed varieties” are essential for enhancing food availability.

Additionally, engaging communities in food production through community-based initiatives and urban farming can enhance local food access and resilience. Respondents emphasized the importance of supporting and expanding community gardens, kitchen gardening, and urban farming projects. These initiatives not only increase food availability, but also promote community cohesion and self-reliance. As respondent No. 4 suggested, “urban farming in city outskirts and kitchen gardening” are important for improving food access. Moreover, respondents also emphasized the need for peacebuilding initiatives and conflict resolution efforts to create an enabling environment for sustainable food security interventions. Promoting peace and stability can help rebuild infrastructure, restore livelihoods, and ensure equitable access to resources. As respondent No. 18 mentioned, “promoting peacebuilding initiatives and conflict resolution” is crucial for improving food access and availability, particularly in conflict-affected regions [37]. Kemmerling et al. [37] and George et al. [38] provide insights into how conflict affects food access through destruction, displacement, and control, exacerbating food insecurity. To address this, peacebuilding efforts should prioritize respecting food as a human right, fostering collaboration, leveraging local capacities, and implementing early action strategies [37].

As such, innovative solutions to improve food access and availability in South Sudan require a multifaceted approach that addresses the underlying causes of food insecurity while empowering communities and promoting sustainable agricultural practices. Technological innovations hold significant potential to transform agricultural practices and food security in South Sudan. Mobile technology, for instance, can provide real-time market information, facilitating better access to markets and fair prices for smallholder farmers. Additionally, solar-powered irrigation systems could mitigate the impacts of erratic rainfall patterns, enhancing crop yields in drought-prone areas. Promoting these technologies among young entrepreneurs and the broader farming community can accelerate the adoption of sustainable practices and improve food availability and accessibility across the country. By investing in youth empowerment, technological innovations, value addition, community-based initiatives, and peacebuilding efforts, South Sudan can work towards building a more resilient and food-secure future for its population.

## 8. Analysis of the Solutions Presented by the Participants

The participants in this study offered a diverse array of innovative solutions to address food insecurity and promote sustainable development in South Sudan. These solutions span various sectors, including education, agriculture, environmental conservation, and entrepreneurship, reflecting the participants’ creativity, ingenuity, and commitment to addressing complex challenges. One prevalent theme among the proposed solutions is the emphasis on education as a key driver of social and economic development. Several participants highlighted the importance of educational initiatives aimed at empowering marginalized communities and fostering long-term self-sufficiency. These initiatives include scholarships, vocational training programs, and holistic support systems designed to improve access to education and enhance socio-economic opportunities for vulnerable populations.

Another common theme is the promotion of sustainable agricultural practices to enhance food security and economic resilience. Participants proposed a range of agribusiness models focused on local food production, value addition, and market linkages. These models leverage modern farming techniques, such as organic farming, integrated fish farming, and mushroom cultivation, to increase agricultural productivity, improve livelihoods, and reduce dependency on external food aid.

Furthermore, environmental conservation emerged as a significant priority among the proposed solutions, with participants advocating for tree-planting initiatives, renewable energy technologies, and plastic waste management programs. These initiatives aim to mitigate the impacts of climate change, combat deforestation, and promote environmental sustainability while also addressing food security challenges through improved resource management and ecosystem preservation. Entrepreneurship and technological innovation play a crucial role in many of the proposed solutions, with participants leveraging mobile applications, solar drying technology, and recycling enterprises to enhance agricultural productivity, create market opportunities, and empower local communities. These initiatives not only foster economic growth, but also promote social inclusion, community empowerment, and environmental stewardship.

Moreover, community engagement and collaboration are fundamental aspects of several proposed solutions, with participants advocating for partnerships between government agencies, NGOs, and local communities to implement sustainable development projects. These community-based initiatives, such as community gardens, seed banks, and farmer cooperatives, empower communities to take ownership of food security initiatives, build resilience against future challenges, and promote social cohesion and self-reliance. The innovative solutions proposed by the participants reflect a holistic and multifaceted approach to addressing food insecurity in South Sudan. By leveraging education, sustainable agriculture, environmental conservation, entrepreneurship, and community engagement, these solutions have the potential to create lasting impacts and contribute to building a more resilient and food-secure future for the country.

## 9. Discussion and Conclusions

The diverse range of innovative solutions proposed by the participants underscores the potential for addressing food insecurity in South Sudan through holistic and community-driven approaches. By emphasizing education, sustainable agriculture, environmental conservation, entrepreneurship, and community engagement, these solutions offer promising avenues for building resilience, improving livelihoods, and fostering long-term food security in the country. Collaboration between stakeholders, investment in local capacity-building initiatives, and ongoing support for innovative projects will be essential in translating these ideas into impactful interventions on the ground.

The findings of this study shed light on the multifaceted nature of food insecurity in South Sudan, echoing existing literature on the subject. Conflict, economic instability, and environmental challenges have been identified as significant drivers of food insecurity in South Sudan, aligning with the research by [1,3]. These studies emphasize the complex interplay of factors contributing to food insecurity, underscoring the need for comprehensive interventions to address the underlying causes. However, recent studies suggest that cash transfer and remittances can overcome food insecurity. For example, Bari et al. [39] emphasize the impact of cash assistance programs in alleviating food insecurity, particularly in crisis situations exacerbated by the COVID-19 pandemic. Additionally, Mora-Rivera and van Gasteren [40] highlight the significance of remittances in addressing food insecurity in rural areas, emphasizing the need for complementary measures. In contrast, Long et al. [41] consider economic inequality and neoliberalism as significant drivers of food insecurity in advanced capitalist nations, highlighting the broader context of this issue. It is important to note, however, that, while short-term cash transfer programs can offer immediate assistance, they may not provide a permanent solution. Therefore, we emphasize the necessity of government and private sector intervention to address the underlying causes of food

insecurity effectively. Similarly, Avgoustaki and Xydis [42] suggest that indoor vertical farming is one of the innovations that may contribute to overcoming food insecurity and ensuring sustainability.

Furthermore, the role of youth in addressing food insecurity in South Sudan, as highlighted by the respondents, resonates with discussions in the literature. While youth face numerous challenges in conflict-affected environments, their energy and creativity can be harnessed to catalyze positive change, as suggested by Muras et al. [9]. Additionally, the coping strategies employed by individuals and communities during periods of conflict align with the findings by Sassi [7], emphasizing the importance of understanding local contexts in designing effective interventions.

The proposed innovative solutions for improving food access and availability, including sustainable agriculture practices and technology adoption, are consistent with recommendations from previous studies [1,8]. These studies advocate for holistic approaches that address both immediate needs and underlying systemic issues to achieve sustainable food security outcomes.

The findings from this study highlighted the multifaceted nature of food insecurity in South Sudan and the diverse perspectives of young entrepreneurs regarding this pressing issue. Through thematic analysis of survey responses, several key themes emerged, offering insights into the understanding of food insecurity, current food situations, the causes of food insecurity, the roles of youth, coping strategies during conflict, and innovative solutions for improving food access and availability. The respondents demonstrated a nuanced understanding of food insecurity, recognizing it as a complex problem rooted in factors such as poverty, unemployment, political instability, and climate change. While some emphasized the lack of food and inadequate access to nutritious meals, others highlighted broader systemic issues that perpetuate food insecurity in the country.

The prevailing food situations described by the respondents painted a grim picture of widespread food insecurity, particularly in conflict-affected regions like Yambio. Limited access to food, dependence on humanitarian assistance, and the prevalence of malnutrition underscored the severity of the situation and the urgent need for intervention. Conflict, climate shocks, economic instability, and poor infrastructure were identified as the main drivers of food insecurity in South Sudan. The protracted civil war, in particular, has exacerbated food shortages, disrupted food production and distribution, and undermined livelihoods, leaving many communities vulnerable to hunger and malnutrition.

Despite facing significant challenges, youth expressed a strong desire to contribute to addressing food insecurity in their communities. Their proposed roles ranged from agricultural innovation and entrepreneurship to advocacy and education. By harnessing the energy and creativity of youth, there is potential to catalyze positive change and build resilience against food insecurity. Individuals and communities employ various coping strategies to survive during conflict or post-conflict periods, including reducing meal frequency, diversifying diets, and engaging in subsistence farming. These strategies, while essential for immediate survival, highlight the dire circumstances faced by vulnerable populations and the need for sustainable solutions.

Respondents identified several innovative solutions to improve food access and availability, such as sustainable agriculture practices, value chain development, technology adoption, and nutrition education. These solutions hold promise for addressing underlying causes of food insecurity and promoting long-term resilience. The complex nature of food insecurity in South Sudan demands a thorough examination of its underlying causes and potential solutions.

Based on the findings of this study, we propose the following recommendations that might help address food insecurity in South Sudan:

- Governments and international organizations should prioritize investments in agriculture, including infrastructure development, access to inputs, and extension services.

- Efforts should be made to empower youth through training, education, and access to resources, enabling them to become active participants in agriculture and entrepreneurship.
- Sustainable peacebuilding efforts are essential for creating an enabling environment for food security interventions. Conflict resolution and reconciliation efforts should be prioritized at local, national, and regional levels.
- Leveraging technology, such as mobile applications and remote sensing, can enhance agricultural productivity, market access, and resilience to climate change.

One limitation of our study is that it focuses solely on collecting the opinions of young entrepreneurs regarding their understanding and solutions to food insecurity in South Sudan, thereby excluding an in-depth analysis of public policies, costs, sustainable agricultural practices, and youth training, which could be addressed in future research work.

**Author Contributions:** Conceptualization, S.H.S., S.S., H.N. and G.D.K.; methodology, S.H.S., S.S. and G.D.K.; formal analysis, S.H.S., S.S. and G.D.K.; investigation, S.H.S., S.S. and G.D.K.; resources, S.H.S. and G.D.K.; data curation, S.H.S. and G.D.K.; writing—original draft preparation, S.H.S., S.S., H.N. and G.D.K.; writing—review and editing, M.K.; project administration, S.H.S., S.S. and G.D.K. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** The data used in this study are not publicly available due to ethical reasons.

**Conflicts of Interest:** The authors declare no conflicts of interest.

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