

Food Security & Covid-19 in the Pacific: The Case of Samoa

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Abstract In Samoa, food represents culture, family, land, and the ocean; it is central to life. The informal system that sustains the livelihoods of 80% of the rural population remains the backbone of Samoa's economy. The COVID-19 pandemic has had significant impacts on Samoa, affecting both public health and the economy. This study focused on the impact of the COVID-19 pandemic on food security in rural communities across five surveyed districts. The results revealed that only a small percentage of rural communities were able to maintain food security during the pandemic, with just 46% having access to healthy and nutritious food. The remaining 54% faced food insecurity due to several factors, including low income, food shortages caused by panic buying, disruptions in trade, and loss of employment and business opportunities. Overall, this study highlights the challenges that rural communities have faced during the pandemic and emphasizes the need for collaborative efforts among policymakers, community leaders, and agricultural experts to promote sustainable agricultural practices and ensure food security for all.

Keywords: Accessibility, availability, Utilisation, stability, Agriculture, income, community, Samoa

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1. Introduction

COVID-19 has created a pandemic unlike any other, affecting nearly every country around the world. It has been deemed the most significant threat since World War II and the greatest global health disaster of the century [1]. The rapid spread of the virus has caused significant disruptions to the food supply chain and posed food security challenges for everyone, particularly those in rural households. Food security in these areas remains a critical global concern due to its impact on health, productivity, and overall well-being [2]. Accurate measurement of food security is essential for effective policymaking and intervention strategies. Various methods have been developed to assess food security in rural households, including household surveys, which are commonly used at the grassroots level [3]. These surveys typically employ structured questionnaires to collect data on household food consumption patterns, dietary diversity, coping strategies, and access to food resources. The Food and Agriculture Organization (FAO) [4] has developed standardized tools like the Household Food Security Access Scale (HFSAS) to measure food security at the household level [5].

On March 11, 2020, the World Health Organization (WHO) [6] officially declared the coronavirus disease of

2019 (COVID-19) outbreak a pandemic, with the potential to reach every country in the world. To date, the COVID-19 pandemic has spread rapidly worldwide, giving rise to new strains/variants that are more infectious and contagious than the original virus, complicating predictions of its end. This has triggered concerns over food security. Samoa is an archipelago comprising ten islands, of which only four are inhabited: Upolu, Savai'i, Manono, and Apolima. The country lies in the South Pacific Ocean between latitudes 13° and 14° South and longitudes 171° and 173° West, as shown in Figure 1. The islands are volcanic in origin, characterized by rugged terrain, lush tropical rainforests, and stunning beaches. Upolu is the most populous island and hosts the capital city, Apia; it houses approximately 75% of Samoa's population and serves as the hub of the nation's economic and political activities. Savai'i, the largest island, is less populated than Upolu but renowned for its rugged and pristine natural beauty, including lush rainforests, white sand beaches, and volcanic peaks. The other islands in the archipelago are significantly smaller and less populated; for instance, Manono and Apolima each support only a few hundred residents. Samoa enjoys a tropical climate with temperatures ranging from 22°C to 32°C year-round. The country undergoes two distinct seasons: a wet season from November to April and a dry season from May to October. During the wet season, Samoa is vulnerable to tropical cyclones that can cause flooding, landslides, and other damages [7].



Figure 1. Map of Samoa [Source: WorldAtlas.com]

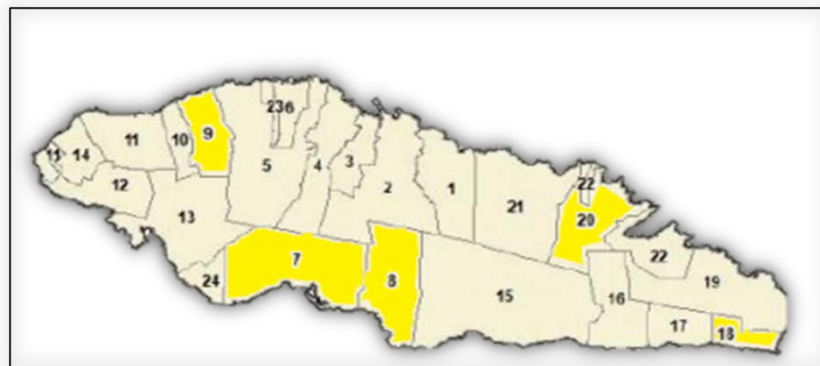


Figure 2. Study sites

Food security is a pressing concern in Samoa, which relies heavily on imported food; over 80% of its food needs are met through imports [8]. This reliance exposes Samoa to vulnerabilities in global food supply chains, as seen during the COVID-19 pandemic when the country faced a meat shortage. This shortage led to significant price hikes, particularly affecting rural households. The government responded by enforcing price controls and discouraging bulk buying to ensure equitable meat distribution. Despite these measures, panic buying resulted in depleted supplies for many communities.

The pandemic has significantly impacted Samoa's public health and economy. Due to its isolation, Samoa maintained low COVID-19 case numbers. The first case was reported on November 7, 2020, involving a citizen returning from New Zealand. The government's swift containment efforts included strict quarantine measures and international travel restrictions. On March 15 [9], Samoa took preventative actions such as suspending flights from affected countries, closing schools, and banning large gatherings. The country remained COVID-19-free until March 17, 2022 [10], when the first community infection was confirmed. Samoa's rural communities depend on agriculture and traditional farming for sustenance and income [11]. The pandemic disrupted these systems, posing threats to food security. Lockdowns and travel restrictions hindered the movement of goods and people, affecting farmers' ability to transport produce to markets and leading to shortages and price

increases [13]. Prior to the pandemic, rural households in Samoa were already vulnerable due to limited resource access. The COVID-19 crisis necessitated new research to understand its effects on rural food security. With no empirical data available on this impact, this study provides baseline data to comprehend the status of food security during the pandemic in Samoa's rural districts. It assesses COVID-19's effects across five districts concerning socioeconomic factors like income levels, employment status, and resource access. Using a mixed-method approach that combines quantitative data and qualitative interviews from household surveys, the study captures the complex challenges these communities face in Aana Alofi 1, Aleipata Itupa I Luga, Anoamaa East, Safata, and Siumu. Insights from this research could lead to solutions that enhance food security for rural households in Upolu's future."

2. Methodology

This cross-sectional study was conducted between July and August 2022, focusing on five rural districts within Upolu due to time and resource constraints. These districts, depicted in Figure 2, are Aana Alofi 1 (9), Aleipata Itupa i Luga (18), Anoamaa East (20), Safata (7), and Siumu (8). They were selected to represent different rural areas of Upolu and provide a representative sample of rural households in Samoa, considering variations in

geographical location, land size, and local food security practices. The selection criteria for these districts were threefold: they had to be located in rural areas; they needed to represent all corners of Upolu, reflecting variations in geography, land size, and local practices; and they were chosen based on the presence of farms listed in the Ministry of Agriculture and Fisheries (MAF) [14] database that supports village food security. This methodology ensures a comprehensive understanding of each district's current situation, taking into account land size variations and the presence of industrial zones that may offer additional opportunities for food security compared to other rural areas."

The study included 50 households from the rural districts of Aana Alofi 1, Aleipata Itupa i Luga, Anoamaa East, Safata, and Siumu. The selection of these households involved a two-step process: stratified sampling to choose five rural districts from different geographic regions and cluster sampling to select 10 households from each district. As noted in [15], the research prioritized timely data collection and analysis due to the focus on food security issues exacerbated by COVID-19. This approach aimed to understand the immediate effects of the pandemic on household access to food, income, and livelihoods. Data analysis was conducted using SPSS version 27 software, employing descriptive statistics such as frequency, mean, and standard deviation. For inferential statistics, methods including Pearson's correlation, paired sample t-tests, chi-square tests, multinomial regression, and chi-square tests were utilized.

3. Results and Discussion

Table 1 presents the income earned before and after COVID-19 across the five districts. The average income before COVID-19 was \$760.00, with a high standard deviation of \$514.682, indicating considerable variability among farmers or entities in the dataset. This variability suggests a broad range of income levels prior to COVID-19, with some earning significantly more or less than the average. Post-COVID-19, the mean income dropped to \$198.00, and the standard deviation decreased to \$147.759. This lower standard deviation post-COVID-19 suggests that incomes are now more closely grouped around the new mean, indicating reduced variability compared to the pre-pandemic period. The decline in average income and standard deviation points to the economic impacts of COVID-19, which likely led to decreased income levels for rural households. The statistical summary indicates that the pandemic significantly affected incomes; approximately 73.42% of rural households experienced a reduction in income levels due to COVID-19.

Table 1. Standard deviation and Standard Error of Mean

	District	Income earn [Before]	Income earn [After]
N	50	50	50
Valid			
Missing	0	0	0
Mean		760.00	198.00
Std. Error of Mean		72.787	20.896
Std. Deviation		514.682	147.759

The study reveals that prior to COVID-19, none of the pairwise comparisons between districts indicated significant differences in income levels, with all p -values exceeding 0.05. This suggests that there were no statistically significant disparities in income between any pairs of districts analyzed. However, post-COVID-19, several pairwise comparisons revealed significant differences in income levels (p -values < 0.05). Notably, a highly significant disparity exists between 'Safata' and 'Siumu' after COVID-19 (p -value of 0.000), with Safata reporting a higher average income. A similar significant difference is observed between 'Safata' and 'Aana Alofi 1' (p -value of 0.000), again with Safata having a higher mean income.

District-specific observations include:

Aana Alofi 1: No significant differences in income levels with other districts were found, suggesting minimal impact from COVID-19 on income.

Aleipata Itupa i Luga: This district also showed no significant income disparities with others, indicating a likely negligible effect from COVID-19 on earnings.

Anoamaa East: Significant income differences were noted with Safata and Siumu, though not as pronounced as the most affected districts.

Siumu: A significant difference in income levels was found with Safata, but the impact appears less severe than in the most affected district.

Safata: This district emerges as the most impacted in terms of post-COVID-19 income, showing significant differences with all other districts.

Correlations

Table 2. Correlation coefficients

	District	Income earn [After]	Income earn [Before]
District	Pearson Correlation	1	-.638**
	Sig. (2-tailed)	.000	.002
	N	50	50
Income earn [After]	Pearson Correlation	-.638**	1
	Sig. (2-tailed)	.000	.000
	N	50	50
Income earn [Before]	Pearson Correlation	-.430**	.501**
	Sig. (2-tailed)	.002	.000
	N	50	50

**. Correlation is significant at the 0.01 level (2-tailed).

Table 2 presents the Pearson correlation coefficients for the three variables. The Pearson correlation assesses the strength and direction of a linear relationship between two continuous variables, ranging from -1 (perfect negative correlation) to 1 (perfect positive correlation), with 0 indicating no linear correlation. The coefficient between income earned before and after COVID-19 is -0.638, signifying a moderately strong inverse relationship. This

means that households with higher pre-pandemic incomes generally saw larger income reductions post-pandemic, while those with lower pre-pandemic incomes experienced smaller decreases. This correlation is statistically significant at the 0.01 level (2-tailed), providing strong evidence of this observed relationship.

The negative correlation of -0.638 between pre- and post-COVID income levels suggests that the pandemic's financial impact was uneven across rural households. Higher-income households prior to COVID-19 were more susceptible to larger income declines following the pandemic's onset. Conversely, lower-income households were somewhat insulated from severe income drops. The statistically significant p-value at the 0.01 level indicates a very low likelihood that this correlation is due to chance, confirming a genuine relationship in the data.

This finding underscores how COVID-19 exacerbated income inequalities among rural households, with pre-existing financial standings influencing the extent of impact experienced. The data suggests that support measures should be tailored based on pre-COVID income levels, with a greater focus on aiding households that were initially better off but faced more significant economic shocks during the pandemic. The negative correlation contributes to our understanding of COVID-19's impacts as being disparate rather than uniform across rural households, highlighting the need for targeted support informed by data-driven insights.

4. Conclusion

The study identified a significant decline in income levels among rural households following the COVID-19 pandemic's onset, with the average income falling sharply and affecting approximately 73.42% of households. This reduction in income severely undermined economic stability, exacerbating difficulties in affording food. The study also highlighted several common impacts of COVID-19 on food security in rural households:

- (i) **Limited meat availability:** Across the five districts, meat scarcity was a prevalent issue. Some households faced challenges accessing meat due to a lack of local livestock farms and dependence on imported meat.
- (ii) **Affordability of nutritious food:** Many households encountered obstacles in purchasing nutritious food, exacerbated by reduced incomes and increased food prices during the pandemic.
- (iii) **Perception of food security issues:** A considerable number of respondents from each district perceived widespread food security problems

within their communities, reflecting a collective consciousness of these challenges.

Consequently, the effects of COVID-19 on food security in these rural districts were varied but commonly included issues such as limited meat availability, the affordability of nutritious food, and a shared awareness of food security challenges. Recognizing these vulnerabilities is essential for devising targeted interventions and fostering community-driven initiatives that bolster food security and resilience against future adversities.

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