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Research Article

Livelihood Diversification and Household Food Security in South Africa

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Abstract

The study examined the relationship between livelihood diversification and food security in South Africa. We used a longitudinal quantitative design, analysing panel data from four waves (2020–2023) of the country's annual nationally representative General Household Survey. The sample comprised 13,310 agricultural households, selected through random sampling across South Africa's nine provinces. The Simpson Diversity Index, income diversity count, and agricultural diversification were indicators of livelihood diversification; the Household Food Insecurity Access Scale measured food insecurity; and fixed-effects OLS was used for analysis. All three diversification measures significantly reduced food insecurity, with the Simpson Diversity Index showing the largest effect (β = −1.433) and agricultural activities (β = −0.172) the smallest. Household expenditure and asset ownership were the most protective. Food security worsened, with the proportion of food-secure rural households declining from 68.7% to 62.2%, while severe food insecurity increased from 16.2% to 19.1%. Diversification remained more prevalent in urban areas. Livelihood diversification alone is insufficient to

ensure household food security. The government, in partnership with NGOs, local municipalities, and other development stakeholders, should prioritise targeted rural development initiatives, expand non-farm employment opportunities, and strengthen adaptive social protection programmes.

Introduction

The 2023 report by the Food and Agriculture Organisation (FAO), African Union Commission (AUC), Economic Commission for Africa (ECA), and World Food Programme (WFP) highlighted the severe food crisis facing Africa, worsened by the war in Ukraine, climate change, economic downturns, and the COVID-19 pandemic. It further noted that Africa is not on track to meet the United Nations 2030 goal of ending hunger. The report also indicated that in 2022, approximately 282 million people (20% of Africa's population) were undernourished, reflecting a significant increase since the onset of the COVID-19 pandemic, while about 868 million people experienced varying levels of food insecurity, with 342 million severely affected. These findings emphasised the urgent need for African nations to intensify efforts towards achieving Zero Hunger by 2030. Hussain et al. (2025) emphasised that food security is a highly complex issue, closely interconnected with population growth, economic stability, and environmental sustainability.

The Department of Agriculture, Land Reform and Rural Development (DALRRD) Strategic Plan 2020–2025 noted that South Africa, despite being one of Africa's largest economies, has experienced slow economic growth, resulting in limited job opportunities and constrained household incomes. This has prompted many households to diversify their livelihoods, often into low-paying or insecure activities that do not significantly improve food security. With 40% of the population (21.9 million people) living below the lower-bound poverty line (R647/month, approximately USD 34.00/month) and 55.5% (30.4 million) below the upper-bound line (R992/month, approximately USD 52.00/month), many households remain financially vulnerable despite efforts to diversify income sources (DALRRD, 2020). Statistics South Africa (Stats SA, 2022) highlighted key factors influencing food insecurity, including income levels, employment opportunities, and food production capacity. Between 2017 and 2020, reliance on salaried income declined by 8%, while dependence on government grants increased, indicating growing reliance on social support. Household participation in agricultural activities remained low, with over 80% not engaging in food production. Despite a slight increase of just over 2% in 2020, overall participation has remained stable, emphasising the potential benefits of expanding agricultural engagement to improve food availability in South Africa (Stats SA, 2022).

South Africa continues to face persistent socioeconomic challenges, including poverty, unemployment, and inequality, which create cycles of disadvantage that limit sustainable livelihoods, exacerbate food insecurity, and hinder equitable development (Sikhunyana et al., 2020). Livelihood diversification, defined as the process by which households engage in various activities to enhance survival and quality of life, is particularly critical for rural households in developing countries in managing economic and environmental shocks (Kassegn & Endris, 2021; Habib et al., 2023). Households in South Africa and elsewhere often combine farming with other income-generating activities, such as small businesses, casual labour, or non-agricultural work (Damtie et al., 2022; Belonwu et al., 2024). Food security and livelihoods are closely interconnected. In the face of persistent economic and agricultural uncertainties,

households often adopt livelihood diversification strategies involving both farm and non-farm activities to enhance resilience, stabilize income, and improve access to food and nutrition (Kassegn & Endris, 2021; Damtie et al., 2022). Supporting this argument, Yakubu et al. (2022) found that rural households perceived non-farm enterprises as a crucial means of achieving food security. Similarly, Olayeriju and Akinnagbe (2025) reported that livelihood diversification contributes positively to income levels, living conditions, household resilience, and food security outcomes.

The extent of livelihood diversification varies across households and is strongly influenced by socioeconomic status, geographic location, and access to economic opportunities (Mahama & Nkegbe, 2021). Empirical studies on rural livelihoods in South Africa have paid substantial attention to income diversification strategies and their role in household welfare outcomes, particularly regarding poverty reduction and resilience (Sikhunyana et al., 2020; Mamabolo et al., 2021). However, while income diversification has been widely examined, evidence remains fragmented on how diversification operates across rural–urban space and over time, particularly when linked to multidimensional food security outcomes using nationally representative longitudinal data. South Africa's nine provinces show severe socioeconomic disparities that influence livelihood strategies, diversification, and food security outcomes. Gauteng, the wealthiest and most urbanised province, contributes approximately one-third of national GDP through finance, manufacturing, and transport (Stats SA, 2023; Department of Trade, Industry and Competition [DTIC], 2023). Conversely, provinces like the Eastern Cape, Limpopo, and KwaZulu-Natal, despite rich natural resources and agricultural potential, rank among the poorest, with high poverty and food insecurity (Alexander, 2023; Stats SA, 2024). In poorer provinces, limited economic opportunities, subsistence agriculture, and social grants shape livelihood activities.

These regional variations also affect the effectiveness of diversification as a food security strategy. Wealthier provinces offer diverse opportunities that enhance resilience, while poorer regions remain trapped in cycles of poverty and food insecurity because of systemic barriers (Alexander, 2023; Stats SA, 2024). Addressing these disparities requires targeted interventions to expand economic opportunities, improve infrastructure, and support sustainable agriculture in disadvantaged provinces. In response, this study focuses on livelihood diversification and food security among sub-national households (rural and urban households across various regions) in South Africa, using data from the General Household Survey (GHS) 2020–2023. Specifically, the study:

i. assessed the level of livelihood diversification of rural and urban South African households;
ii. ascertained the extent of food insecurity among households in urban and rural South Africa; and
iii. investigated the effect of livelihood diversification on household food insecurity.

Methodology

South Africa is located at the southernmost tip of the African continent, extending latitudinally from 22°07'35"S to 34°50'00"S and longitudinally from 16°30'00"E to 32°53'00" E (Government of South Africa, 2026). The country covers a surface area of about 1.22 million km² (Government of South Africa, 2023/24. The population was estimated at 63.02 million in 2024, with Black African comprising 81.4%, Coloured

8.2%, White 7.3%, and Indian/Asian 2.7% (Government of South Africa, 2023/24). The study used a longitudinal quantitative panel research design, drawing on four annual waves (2020–2023) of the General Household Survey (GHS), a nationally representative household survey conducted annually by Statistics South Africa. The GHS sampling frame is based on a master sample of 3,324 primary sampling units (PSUs), constructed from South Africa's 103,576 census enumeration areas (Statistics South Africa, 2023), and stratified explicitly by province and, within province, by metro/non-metro status and geographic type (urban, tribal, and farm areas) to ensure national and provincial representativeness. Within each selected PSU, dwelling units were systematically sampled, with all resident households enumerated, yielding an expected national sample of 33,000 dwelling units per survey round (Statistics South Africa, 2023). The survey's official metadata and technical documentation provide full technical details of the GHS sampling design (Statistics South Africa, 2023). From the pooled 2020–2023 GHS waves, the analytical sample comprised 13,310 households that reported engagement in agricultural activities, drawn from the broader GHS sample of agricultural households across South Africa's nine provinces, after applying listwise deletion for missing values on the study's key variables.

This study utilised secondary, de-identified data from the General Household Survey (GHS), collected and publicly disseminated by Statistics South Africa (Stats SA). The research did not involve recruiting participants, direct interaction with human participants, administering questionnaires or interviews, or collecting new primary data. The data were publicly available and de-identified, and the researchers did not have access to information that would enable the direct identification of individual respondents.

The Community Engagement and Development Directorate at Mangosuthu University of Technology, Durban, South Africa, confirmed the nature of the research and that the researchers did not collect or access any new human-participant data. The Directorate's confirmation clarifies that the study was undertaken solely through the secondary analysis of publicly available, de-identified data. Statistics South Africa conducted and disseminated the original GHS under its applicable statutory, confidentiality, and data-protection framework.

Livelihood diversification was measured using three complementary indicators: the Simpson Diversity Index (capturing both the number and distribution of income sources on a 0–1 scale), income diversity count (number of distinct income sources ranging from 0–7), and total agricultural activities (count of farming enterprises from 0–9). These indicators are grounded in the foundational livelihood diversification framework of Barrett et al. (2001) and Ellis (2000), which continues to inform contemporary empirical and review work in this area (Habib et al., 2023; Roscher et al., 2022).

Food security, the dependent variable, was operationalised using a continuous score derived from the Household Food Insecurity Access Scale (HFIAS). The score was constructed from six food-insecurity-related items, each capturing the frequency of occurrence of a specific food access problem (adult hunger, child hunger, limited food variety, skipped meals, reduced food intake, and running out of food) over the preceding 30 days, coded on a 0–3 frequency scale (0 = never/none, 1 = rarely, 2 = sometimes, 3 = often) except for the food-variety item, which was coded 0–2. It should be noted that this represents a six-item adaptation of the standard nine-item HFIAS

instrument developed by Coates et al. (2007). The HFIAS has been widely used as a tool for assessing food security globally in many studies (Berhe et al., 2026; Olutegbe, et al., 2026; Tamrat et al., 2026). Consequently, the composite score ranges from 0 to 17 rather than the 0–27 range associated with the instrument. For descriptive purposes, households were additionally classified into four ordinal food security categories based on the score as Food Secure (score = 0), Mildly Food Insecure (score = 1–2), Moderately Food Insecure (score = 3–7), and Severely Food Insecure (score = 8–15). This categorization was used only for descriptive analysis. Meanwhile, the original score was retained as the dependent variable in all regression models to preserve statistical power and avoid information loss from categorization.

Control variables included household demographics (head's gender, age entered with a quadratic specification – both linear and squared terms – to capture the non-linear inverted-U relationship), household size, economic status (expenditure and asset ownership), location (urban/rural), social protection (grant receipt indicator and log-transferred grant amount), and agricultural engagement (poultry, livestock, grain farming). To address distributional concerns, we entered household expenditure and grant amount in natural logarithms, applying $\log(\beta + 1)$ to zero grant values. The dataset captured detailed information on all these indicators. This is consistent with standard practice in household welfare analysis, where income and expenditure variables are typically right-skewed, and log transformation compresses the skew, stabilises variance, and yields proportional rather than absolute coefficient interpretations. Meaning the estimated effects represent the food security impact of a percentage change in expenditure or grant income rather than an arbitrary absolute unit increase (Gebre & Ashebir, 2023; Karakaplan et al., 2020). The quadratic form also enables identification of the age at which food insecurity peaks in the sample (Ogutu & Qaim, 2019). The study employed ordinary least squares (OLS) regression to examine the effects of livelihood diversification on food security. To account for unobserved heterogeneity across South Africa's diverse provincial contexts, the study included province fixed effects for all nine provinces, which control for time-invariant differences in economic opportunities, agricultural conditions, infrastructure, and provincial policies (Cunningham, 2021). Wave fixed effects capture temporal trends and common shocks across the four survey waves. Because the three diversification indicators (Simpson index, income diversification, and agricultural diversification) are conceptually correlated, entering them together would create multicollinearity, inflate standard errors, and obscure each indicator's independent contribution. Therefore, each indicator is entered in a separate model specification. This follows standard econometric practice and aligns with recent diversification studies that take the same precaution (Gabre & Rahut, 2023). The model specification addresses potential endogeneity concerns by controlling for household characteristics (head's gender, age, household size), economic status (expenditure, assets), location (urban/rural), social protection (grant receipt and amount), and agricultural engagement (poultry, livestock, and grain farming). The social protection variables are decomposed into a binary receipt indicator and a log-transformed amount variable to separately identify the selection effect, whereby grant-receiving households tend to be systematically more vulnerable, from the dose effect of grant income on food security, following the approach of Osabohien et al. (2022).

The general form of the estimated model is:

$$HFIAS_i = \beta_0 + \beta_1 D_i + \beta_2 Male_i + \beta_3 Age_i + \beta_4 Age^2_i + \beta_5 HHsize_i + \beta_6 lnExpenditure_i + \beta_7 Asset_i + \beta_8 Urban_i + \beta_9 Grant_i + \beta_{10} lnGrantAmount_i + \beta_{11} Poultry_i + \beta_{12} Livestock_i + \beta_{13} Grain_i + \Sigma\gamma_p Province_p + \Sigma\delta_w Wave_w + \varepsilon_i$$

where subscript i indexes households, and *D_i* represents the diversification indicator specific to each model:

Model 1: D_i = Simpson Diversity Index (continuous, 0–1); Model 2: D_i = Income Diversity Count (discrete, 0–7); and Model 3: D_i = Total Agricultural Activities (discrete, 0–9)

The control variables are common to all three models:

- Household head's sex (male = 1);
- Household head's age (linear and squared terms, to capture a non-linear relationship between age and food insecurity);
- Household size; Log household expenditure; Asset ownership score; Urban/rural location (urban = 1);
- Social grant receipt (binary indicator);
- Log grant amount;
- Agricultural activity indicators: poultry farming, livestock farming, grain farming (binary);
- Province fixed effects (γ_p), with Free State as the reference category;
- Survey wave fixed effects (δ_w), with Wave 1 as the reference category;
- ε_i: the idiosyncratic error term, with robust standard errors used throughout to correct for heteroskedasticity.

To account for the unbalanced panel structure arising from repeated household observations across the 2020–2023 GHS waves (6,963 unique households across 13,310 household-wave observations), standard errors were clustered at the household level in all regression models.

In this study, artificial intelligence was limited to ChatGPT, used solely as a language and editorial support tool to refine the manuscript's clarity, grammar, and readability. It was not used to develop the research methodology, conduct or analyse the data, generate results, interpret findings, or make substantive scholarly decisions. All methodological decisions, data analyses, interpretations, and conclusions were undertaken and verified by the authors.

Results and Discussion

Socioeconomic Profile of Urban and Rural Farming Households from 2020 to 2023

Table 1 reveals key differences in the socioeconomic profiles of urban and rural farming households in South Africa between 2020 and 2023. One consistent observation is the age disparity between household heads across the two geographic categories. Rural household heads tend to be older on average compared to their urban counterparts throughout the study period (2020–2023), with rural household heads recording mean ages of approximately 54 years (2020), 56 years (2021), and 53 years (2022 & 2023), compared to urban household heads at approximately 50 years (2020 & 2021), 49 years (2022), and 48 years (2023), respectively. This trend

likely reflects ongoing urban migration of younger individuals seeking employment opportunities, leaving older generations to manage agricultural livelihoods in rural areas. The sex of the household head also shows a geographical divide across the study period (2020–2023), with urban households being predominantly male-headed (59.2% in 2020, 57.4% in 2021, 60.1% in 2022, and 59.6% in 2023), while rural households display a more balanced distribution, with female-headed households slightly higher or comparable to male-headed households in some years (female-headed households: 53.8% in 2020, 52.5% in 2021, 50.0% in 2022, and 49.6% in 2023). This may indicate that rural men are migrating to urban areas for work, leaving women to manage households and engage in subsistence farming.

In terms of household size, rural households consistently reported larger family units compared to their urban counterparts. This finding aligns with traditional extended-family living arrangements commonly observed in rural areas, which often require a larger labour force for agricultural activities. Agricultural participation itself shows a marked rural–urban divide. While only a small percentage of urban households engaged in agricultural activities- less than 10% across all years- between 44% and 48% of rural households reported being involved in farming, highlighting the central role of agriculture in rural livelihoods. Asset ownership patterns further reflect disparities in living standards and access to infrastructure. Urban households report significantly higher ownership of motor vehicles, televisions, refrigerators, and computers. In particular, computer ownership remained low in rural areas, at just above 10%, compared to around 27–28% in urban households, emphasising the persistent digital divide and potential barriers to accessing information, education, and market services. Refrigerator and television ownership was high in both rural and urban areas but showed a slight downward trend over time, with the decline more pronounced in rural communities. These differences in asset profiles highlight the structural inequalities that shape households' adaptive capacities, with urban households better positioned to diversify their livelihoods and access the information and services critical to enhancing food security.

Table 1 further provides a detailed breakdown of the types of agricultural activities undertaken by households in urban and rural areas between 2020 and 2023. The data show that rural households engage far more extensively in a wide range of agricultural practices than their urban counterparts, affirming agriculture's centrality to rural livelihood strategies. Poultry production is among the most prevalent activities in rural areas, with participation rates ranging from 48% to 51% over the four years, whereas urban participation fluctuated at much lower levels (11%–15%). Similarly, livestock production is significantly more common among rural households (approximately 38%–41%), while urban engagement remained below 12%, suggesting that rural environments provide the spatial and ecological conditions necessary for rearing animals, conditions that are largely absent or restricted in urban spaces. A clear trend emerges in grain and food crop production. More than 60% of rural households cultivated staple crops such as maize and beans, underscoring the subsistence nature of rural agriculture. In contrast, urban households displayed limited engagement in this activity, with participation ranging from 16% to 24%, possibly reflecting space constraints and a shift towards non-agricultural livelihoods.

However, the data reveal a surprising finding regarding fruit and vegetable production. Urban households consistently reported higher participation in this activity, between 78% and 83%, compared with rural households, where participation ranged from 50%

to 58%. This trend may reflect the growing popularity of home gardens, rooftop farming, and community-based food gardens in urban areas, particularly in response to rising food prices and concerns about food security. Given the spatial constraints of cities, urban horticulture, rooftop gardening, hydroponics, and vertical farming present viable alternatives for sustainable food production and food security (Khan et al., 2020; Devi et al., 2022; Deka & Choudhury, 2024). The ease of growing vegetables and fruits in small containers or plots likely makes this form of agriculture more accessible in urban contexts. By contrast, rural households exhibit greater agricultural diversity. Rural households lacking off-farm income are especially at risk (Endalew & Sen, 2021) and often lack the adaptive capacity to manage these challenges effectively (Yusriadi & Kaslin, 2025).

Table1: Socioeconomic profile of urban and rural farming households from 2020 to 2023

Variable	2020			2021			2022		
	Urban: n=5,205	Rural: n=3,691	Overall n=8,896	Urban n=5,553	Rural n=4,076	Overall n=9,629	Urban n=12,399	Rural n=6,952	Overall n=19,351
Age (x̄)	49.9	54.2	51.7	50.1	53.5	51.5	48.5	52.8	50
Household head: Male	59.2	46.2	53.8	57.4	47.5	53.2	60.1	50	56.5
Household head: Female	40.8	53.8	46.2	42.6	52.5	46.8	39.9	50	43.5
Household size (x̄)	3.5	4.3	3.9	3.4	4	3.7	3.2	3.8	3.4
Agricultural activities	9.5	48.3	25.6	9.1	46.2	24.8	7.6	44.3	20.8
Ownership of motor vehicle	34.4	16.2	26.9	34.7	14.2	26	33.9	15	27.1
Ownership of TV	89.9	84.8	87.8	88	81.7	85.3	84.7	77.2	82
Ownership of computer	27.9	11.9	21.3	28.5	10.3	20.8	27.3	11.2	21.5
Ownership of refrigerator	88.7	83.3	86.4	88.3	81.9	85.6	85.4	78.4	82.8
Agricultural activities									
Poultry production	11.5	48.0	40.1	13.1	48.7	41.2	15.0	51.4	42.9
Livestock production	7.5	40.9	33.7	9.9	37.7	31.8	11.7	41.5	34.5
Grains & food crops	18.8	65.0	54.9	23.8	66.0	57.1	15.9	59.5	49.3
Industrial crops	0.6	0.8	0.8	0.2	0.5	0.5	0.1	0.4	0.3
Fruit & vegetable production	83.0	58.0	63.5	81.2	55.3	60.8	78.8	50.0	56.7
Fodder grazing/pasture	0.6	0.2	0.3	0.8	0.2	0.3	0.3	0.2	0.2
Forestry	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Fish farming	0.0	0.1	0.0	0.2	0.1	0.1	0.1	0.1	0.1
Game farming	0.0	0.1	0.0	0.0	0.0	0.0	0.2	0.2	0.2

Livelihood Diversification of Households by Wave and Location

Table 2 presents livelihood diversification levels across survey waves and location groups. For both the Simpson index and Income diversity count, the proportion of highly diversified households increased modestly from 51.9% in Wave 1 to 55.7% in Wave 4, with urban households marginally more diversified than rural counterparts throughout, consistent with

South African evidence showing that settlement type is among the strongest determinants of diversification level, with urban formal households exhibiting broader income portfolios than those in rural and traditional areas (Rusere et al., 2025). Total agricultural activities revealed that rural households were predominantly highly diversified agriculturally across all waves (72.4% in Wave 1, declining to 62.5% by Wave 4), while urban households were low diversifiers (81.6% to 83.5%). Figure 1 shows this pattern more explicitly. The declining agricultural diversification among rural households over the observation period aligns with evidence from other studies that weak market linkages, limited credit access, and inadequate infrastructure have progressively weakened smallholder farming viability, pushing rural households toward non-farm income sources (Rajeev & Scherrer, 2021; Adesiyan, 2025).

Table 2: Livelihood diversification of households by wave and location

Indicator	Category	Wave 1 (N = 2,277)			Wave 2 (N = 2,388)			Wave 3 (N = 4,020)			Wave 4 (N = 4,625)		
		Overall *n=2,277*	Rural *n=1,782*	Urban *n=495*	Overall *n=2,388*	Rural *n=1,884*	Urban *n=504*	Overall *n=4,020*	Rural *n=3,078*	Urban *n=942*	Overall *n=4,625*	Rural *n=3,494*	Urban *n=1,131*
Simpson Index	**High**	51.9	51.0	55.1	52.7	52.6	53.0	54.7	54.2	56.4	55.7	55.5	56.3
	Low	48.1	49.0	44.9	47.3	47.4	47.0	45.3	45.8	43.6	44.3	44.5	43.7
Income Diversity Count	**High**	51.9	51.0	55.1	52.7	52.6	53.0	54.7	54.2	56.4	55.7	55.5	56.3
	Low	48.1	49.0	44.9	47.3	47.4	47.0	45.3	45.8	43.6	44.3	44.5	43.7
Total Agric. Activities	**High**	**60.6**	**72.4**	18.4	**60.3**	**70.0**	24.4	55.5	**66.9**	18.3	51.3	**62.5**	16.5
	Low	39.4	27.6	**81.6**	39.7	30.0	**75.6**	44.5	33.1	**81.7**	48.7	37.5	**83.5**
PCA Composite	**High**	**64.9**	59.8	**83.2**	**64.8**	**60.5**	**81.0**	**65.5**	**60.2**	**82.6**	**65.8**	**60.3**	**83.1**
	Low	35.1	40.2	16.8	35.2	39.5	19.1	34.5	39.8	17.4	34.2	39.8	16.9

Notes: Figures show the percentage of households classified as High or Low diversification within each wave and location group.
High/Low classification based on median split within each indicator. Percentages in bold indicate ≥60 classified as High.
Simpson Index and Income Diversity Count: median split applied to all 13,310 households; Total Agric. Activities: stark Rural–Urban divergence reflects differential participation in farm enterprises.
PCA Composite: single index derived from principal component analysis of all three indicators; Urban households show consistently higher PCA-High classification (~80–83) across all waves.
Source: Authors' analysis of South Africa General Household Survey (GHS), pooled waves 2020–2023.

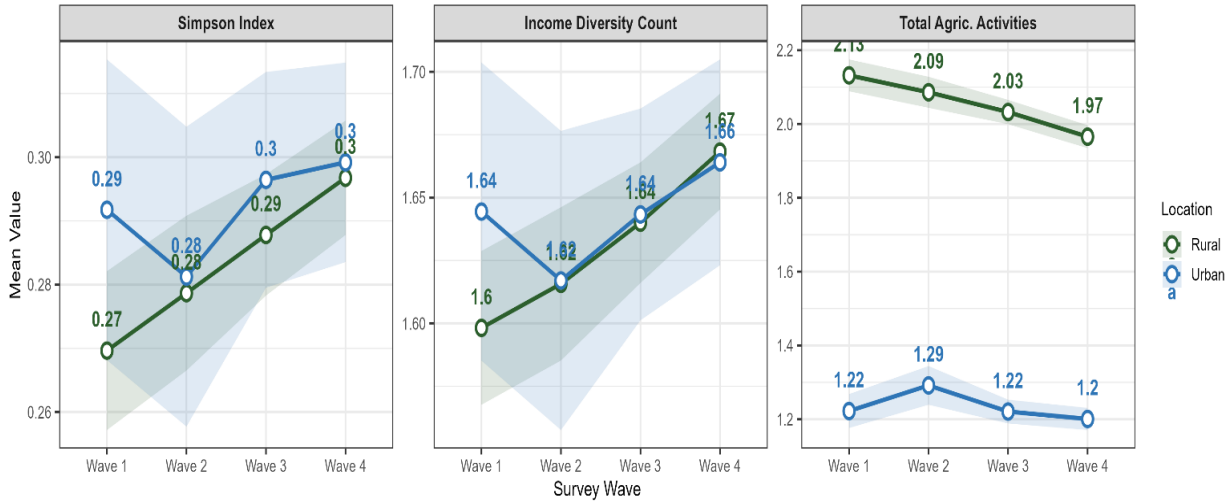

Figure 1: Livelihood diversification by wave and location

Rural Household Food Security by Wave

Table 3 reveals that the majority remained food secure throughout the study period, although a deteriorating trajectory is evident by Wave 4. Food security prevalence declined from 68.7% in Wave 1 to 62.2% in Wave 4, while severe food insecurity increased from 16.2% to 19.1% and moderate food insecurity rose from 9.9% to 11.9%. The same pattern is also observed in the urban and rural areas as presented in Figure 3. Wave 4 deterioration is particularly notable given that it occurred among agriculturally engaged households (Figure 2) who retain farm enterprises as a food security buffer, yet proved insufficient to arrest the decline. The finding therefore reinforces that by Egerson et al. (2025) that rural South African households remain trapped in cyclical food insecurity despite agricultural engagement, owing to underlying challenges including low productivity, insecure tenure arrangements, and limited livelihood diversification. The persistence of severe food insecurity at approximately 16% across the first three waves, even during relative stability, further underscores the worsening food vulnerability in rural South Africa, consistent with van den Berg and Walsh (2023), whose longitudinal GHS analysis showed that food insecurity rates rebounded after 2019 following a decade of steady decline, reversing hard-won pre-pandemic gains.

Table 3: Rural household food security by wave

Food Security category	**Wave 1** *(n = 1,782)* **%**	**Wave 2** *(n = 1,884)* **%**	**Wave 3** *(n = 3,078)* **%**	**Wave 4** *(n = 3,494)* **%**
Food secure	68.7%	66.3%	67.8%	62.2%
Mildly food insecure	5.2%	6.9%	5.9%	6.8%
Moderately food Insecure	9.9%	10.9%	10.5%	11.9%
Severely food insecure	16.2%	15.9%	15.9%	19.1%

Notes: Figures show % of households in each food security category within each wave; n = frequency in parentheses. Rounded to 1 decimal place.
Source: Authors' analysis of South Africa General Household Survey (GHS), pooled waves 2020–2023

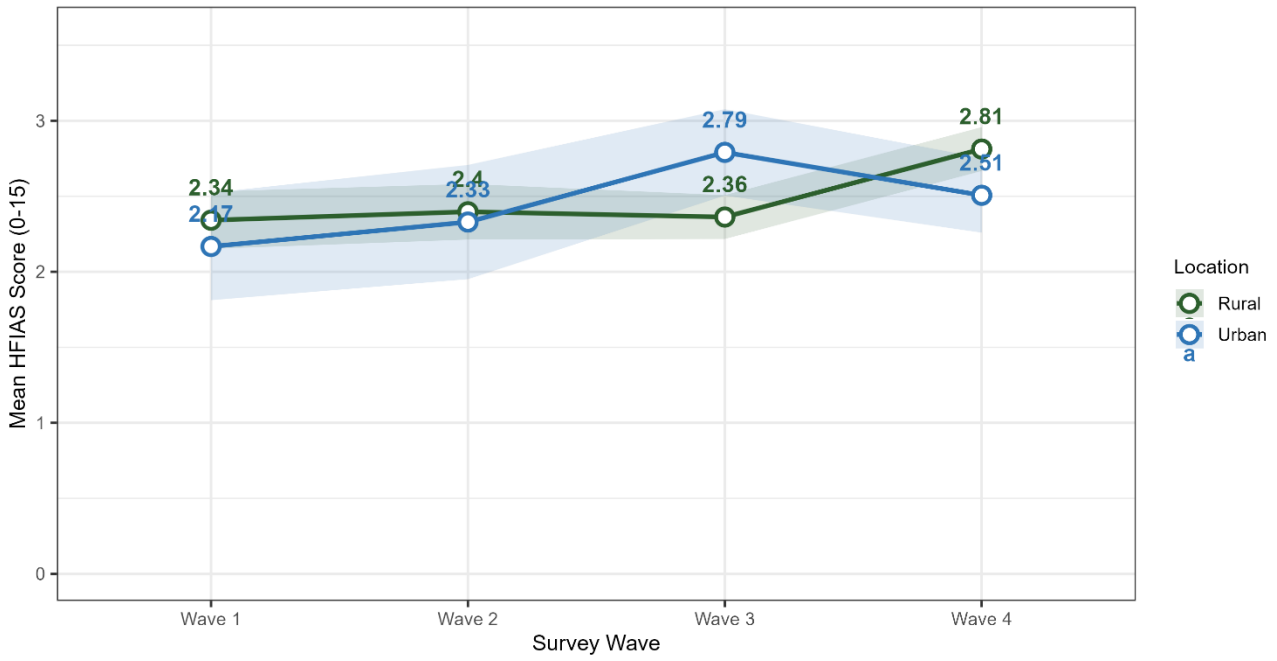

Figure 2: Trend in food insecurity by wave and location

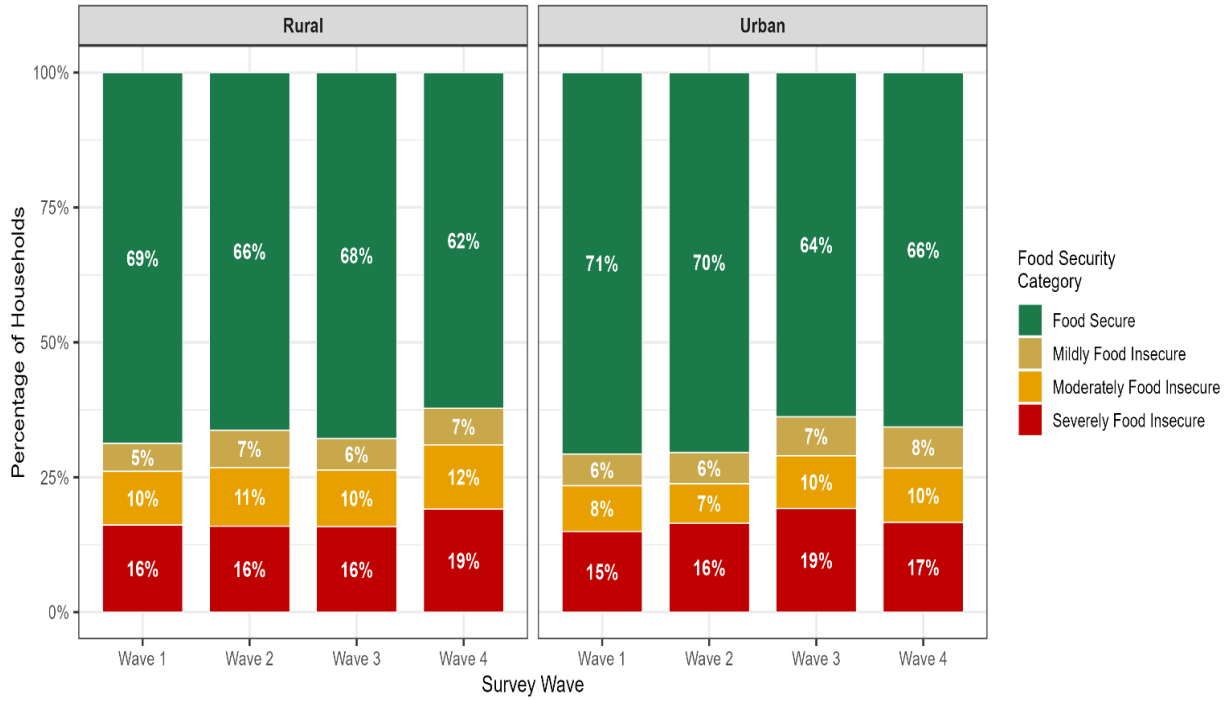

Figure 3: Food security category distribution by wave and location

Determinants of Livelihood Diversification

Table 4 shows that all three indicators of livelihood diversification are negatively associated with household food insecurity across South Africa after controlling for province and wave fixed effects. Across all three model specifications, greater livelihood diversification is associated with lower HFIAS scores. Specifically, a one-unit increase in the Simpson Diversity Index is associated with a reduction of approximately 1.4 points in the HFIAS score, indicating that a more balanced and diversified income portfolio is linked to better household food security. Similarly, each additional income source is associated with a 0.615-point reduction in the HFIAS score, while each additional agricultural activity is associated with a 0.172-point reduction. Among the control variables, higher household expenditure ($\beta = -3.008$ to -3.441) and greater asset ownership ($\beta = -0.624$ to -0.659) are associated with lower levels of household food insecurity. Grain farming ($\beta = -0.247$ to -0.248) and social grant receipt, through the interaction between grant receipt and grant amount, are also associated with lower food insecurity. In contrast, larger household size ($\beta \approx +0.25$) is associated with higher levels of household food insecurity. The province fixed effects reveal important spatial differences. Relative to the Free State, households in the Western Cape are associated with lower food insecurity ($\beta = -1.976$ to -2.017), whereas households in Mpumalanga ($\beta = +1.865$) and Limpopo ($\beta = +1.568$) are associated with higher food insecurity after accounting for household characteristics. The wave fixed effects further indicate that household food insecurity increased over the survey period relative to Wave 1.

The finding that all three livelihood diversification indicators are negatively associated with household food insecurity is consistent with the portfolio diversification hypothesis (Barrett et al., 2001), which suggests that households spread risk across multiple

income-generating activities and assets to reduce vulnerability to shocks. This proposition is further supported by recent evidence demonstrating that households actively diversify livelihoods and adjust their asset portfolios in response to income volatility and idiosyncratic shocks (Memon et al., 2020; Nguyen et al., 2022). However, the present findings differ from those of Olutegbe et al. (2021), that reported an inverse relationship between livelihood diversification and household wellbeing in Nigeria. Comparable evidence from rural Ghana showed that the Simpson Diversity Index was associated with lower food insecurity by serving as a protective buffer, while studies from Ethiopia and Tanzania similarly found that diversification into agricultural and non-agricultural activities was associated with improved household food security and dietary diversity. The larger coefficient for the Simpson Diversity Index (β = −1.433), compared with the income diversity count (β = −0.615) and total agricultural activities (β = −0.172), suggests that the quality and balance of income diversification, rather than simply the number of livelihood activities, may play a more important role in household food security in the South African context. This interpretation is consistent with evidence from Northern Ghana, where diversification beyond a certain threshold yielded diminishing returns, highlighting that the distribution of income sources is analytically distinct from merely increasing the number of livelihood activities. The comparatively smaller coefficient for total agricultural activities further suggests that on-farm diversification alone may offer less protection than broader livelihood diversification, supporting the argument that non-farm income has become increasingly important in semi-urbanised contexts (Musumba et al., 2022). Likewise, the protective associations observed for household expenditure and asset ownership corroborate findings from South Africa linking wealth accumulation to improved food access (Mazenda et al., 2024; Masuku et al., 2025), while the positive association between household size and food insecurity is consistent with the per-capita resource dilution mechanism widely documented across sub-Saharan Africa.

Table 4: Livelihood diversification as a determinant of household food security

Model	Simpson index (1)	Income diversity (2)	Total activities (3)
Simpson diversity index	−1.433* *(0.1635)*		
Income diversity count		−0.615* *(0.0627)*	
Total agricultural activities			−0.172* *(0.0828)*
Male household head	0.024 *(0.0836)*	0.023 *(0.0835)*	0.000 *(0.0838)*
Age of household head	0.009 *(0.0155)*	0.011 *(0.0155)*	0.009 *(0.0155)*
Age² of household head	−0.0002 *(0.0001)*	−0.0002 *(0.0001)*	−0.0002 *(0.0001)*
Household size	0.259* *(0.0214)*	0.261* *(0.0213)*	0.228* *(0.0210)*
Log household expenditure	−3.008* *(0.2361)*	−2.950* *(0.2354)*	−3.441* *(0.2319)*
Asset score	−0.629* *(0.0456)*	−0.625* *(0.0455)*	−0.659* *(0.0457)*
Urban	0.044 *(0.1231)*	0.039 *(0.1231)*	0.028 *(0.1244)*
Receives social grant	2.579* *(0.5701)*	2.629* *(0.5660)*	0.920 *(0.5423)*
Log grant amount	−0.282* *(0.0777)*	−0.287* *(0.0774)*	−0.096 *(0.0757)*
Poultry farming	−0.034 *(0.0915)*	−0.031 *(0.0914)*	0.109 *(0.1225)*
Livestock farming	−0.088 *(0.0957)*	−0.083 *(0.0956)*	0.011 *(0.1168)*
Grain farming	−0.247* *(0.0899)*	−0.248* *(0.0899)*	−0.065 *(0.1273)*
Fixed effects			
Province FE	Yes	Yes	Yes
Wave FE	Yes	Yes	Yes
Ref: Province	Free State	Free State	Free State
Ref: Wave	Wave 1	Wave 1	Wave 1
Model fit			
Observations	13,310	13,310	13,310
R^2	0.189	0.190	0.183
Within R^2	0.102	0.104	0.096

Dependent variable: HFIAS Score (0–15; lower = better food security)

*Note: Standard errors, clustered at the household level (uqnr), are reported in parentheses. * p < 0.05. Income diversity comprises seven income source categories. Total agricultural activities comprise nine farm enterprise categories.*

Conclusion and Recommendations

Livelihood diversification consistently and significantly reduces household food insecurity in rural South Africa, with the quality and spread of income portfolio diversification proving more vital relative to simple counts of farming activities alone. This finding holds across three conceptually distinct operationalisations of diversification and after controlling for province and wave fixed effects. It therefore lends credence to the livelihood diversification hypothesis as an explanatory framework for food security outcomes in the South African context. The declining food security trajectory observed across the survey waves, particularly the acceleration of severe food insecurity in the final wave (2023), signals that existing livelihood and social protection frameworks are insufficiently adaptive to cushion rural households against compound economic shocks, and that diversification alone, while necessary, is not sufficient where fundamental challenges on income portfolio expansion remain recurrent. The persistent and stable rural–urban gap in diversification levels across all waves further indicates that urbanisation-linked livelihood gains are not diffusing to rural areas, and further points to the need for spatially targeted rural development investment rather than generalist national policies. Overall, these findings call for a coordinated policy response to food insecurity in rural South Africa. The South African government, in collaboration with NGOs, local municipalities, and other development stakeholders, should lead this response by broadening rural income portfolios through the creation of non-farm employment, the development of market linkages, and investment in skills. It should also strengthen asset accumulation alongside income transfer programmes and design more responsive safety-net mechanisms capable of rapid scale-up during periods of heightened vulnerability. These measures are necessary because the determinants of food insecurity are spatially uneven, temporally dynamic, and unlikely to be resolved by any single policy intervention in isolation.

References

Adesiyan, T. (2025). Leveraging agricultural credit and digital finance for enhancing smallholder productivity and rural economic growth. *International Journal of Research Publication and Reviews, 6*(8), 3090. https://doi.org/10.55248/gengpi.6.0825.3090

Alexander, M. (2023). *Mapping poverty in South Africa*. South Africa Gateway. https://southafrica-info.com/people/mapping-poverty-in-south-africa/.

Barrett, C. B., Reardon, T., & Webb, P. (2001). Nonfarm income diversification and household livelihood strategies in rural Africa: Concepts, dynamics, and policy implications. *Food Policy*, 26(4), 315–331. https://doi.org/10.1016/S0306-9192(01)00014-8

Belonwu, N.E., Moseri, H., Umeri, C., & Nwabeze, G.O. (2024). Livelihood diversification among rural farmworker households in Edo State, Nigeria. *Journal of Agricultural Extension*, 28(1), 12-18. https://doi.org/10.4314/jae.v28i1.2

Berhe, R., Arora, A., Ekanayake, K., & Agho, K. E. (2026). Food insecurity among migrants and refugees in high-income countries: A meta-analysis of observational studies. *Food Security*. Advance online publication. https://doi.org/10.1007/s12571-026-01653-w

Charamba, V., Kazembe, L. N., & Nickanor, N. (2023). Application of item response theory modelling to measure an aggregate food security access score. *Food Security, 15*(6), 1383–1398. https://doi.org/10.1007/s12571-023-01388-y

Coates, J., Swindale, A., & Bilinsky, P. (2007). Household Food Insecurity Access Scale (HFIAS) for measurement of household food access: Indicator guide (v. 3). Food and

Nutrition Technical Assistance (FANTA) Project, Washington, D.C. https://www.fantaproject.org/sites/default/files/resources/HFIAS_ENG_v3_Aug07.pdf
Cunningham, S. (2021). Causal inference: The mixtape. Yale University Press.
Damtie, Y. A., Berlie, A. B., & Gessese, G. M. (2022). Rural livelihoods diversification in Ethiopia: Evidence of households around Lake Tana. *Cogent Social Sciences*, 8(1), 2154545. https://doi.org/10.1080/23311886.2022.2154545
Deka, P., & Choudhury, N.P. (2024). Growing sustainably: Navigating challenges and opportunities in Urban horticulture in India. *Asian Journal of Agricultural Extension, Economics & Sociology, 42*(3), 85-91. https://doi.org/10.9734/ajaees/2024/v42i32380.
Department of Agriculture, Land Reform and Rural Development (DALRRD). (2020). *Strategic plan 2020–2025*. https://www.dalrrd.gov.za/phocadownloadpap/Strategic_Plan/Strategic%20Plan%202020-2025.pdf
Department of Trade, Industry and Competition (DTIC). (2023). *Annual report 2022/2023*. https://www.gov.za/documents/annual-reports/department-trade-industry-and-competition-annual-report-20222023-20-oct
Devi, N. S., Hatibarua, P., Devi, N. B., Jamja, T., Tagi, N., & Tabing, R. (2022). Urban horticulture for sustainable food production and food security. https://www.envirobiotechjournals.com/EEC/vol28octsuppl2022/EEC-55.pdf
Egerson, D., Kpegba-Fiaboe, E. E., & Christian, A. K. (2025). Understanding food (in)security through land and livelihoods: Evidence from longitudinal household data. *Journal of Rural Studies*, 119, 103750. https://doi.org/10.1016/j.jrurstud.2025.103750
Ellis, F. (2000). *Rural livelihoods and diversity in developing countries*. Oxford University Press. https://media.odi.org/documents/2881.pdf
Endalew, H. A., & Sen, S. (2021). Effects of climate shocks on Ethiopian rural households: An integrated livelihood vulnerability approach. *Journal of Environmental Planning and Management*, 64(3), 399–431. https://doi.org/10.1080/09640568.2020.1764840
Food and Agriculture Organization, African Union Commission, Economic Commission for Africa, & World Food Programme (FAO, AUC, ECA, & WFP). (2023). *Africa–regional overview of food security and nutrition 2023: Statistics and trends*. https://doi.org/10.4060/cc8743en
Gebre, G. G., & Ashebir, A. (2023). Impact of income diversification on rural household food security in Ethiopia. *African Journal of Science, Technology, Innovation and Development*, 15(7), 913–922. https://doi.org/10.1080/20421338.2023.2220636
Gichunge, C., Das, A., Mutiso, D., & Jepkemoi, G. (2022). Factors associated with household dietary diversity among internally displaced persons in Nakwamekwei Camp, Kenya. World Journal of Nutrition and Health, 10(1), 1–7. https://pubs.sciepub.com/jnh/10/1/1/index.html
Government of South Africa. (2023/24). South Africa at a glance. In 2023/24 Official guide to South Africa (pp. 1–3). https://www.gcis.gov.za/sites/default/files/02%20South%20Africa%20at%20a%20Glance_FIN.pdf.
Government of South Africa. (2026). Geography and climate. South African Government. https://www.gov.za/about-sa/geography-and-climate
Habib, N., Ariyawardana, A., & Aziz, A. A. (2023). The influence and impact of livelihood capitals on livelihood diversification strategies in developing countries: A systematic literature review. *Environmental Science and Pollution Research*, 30(27), 69882–69898. https://doi.org/10.1007/s11356-023-27638-2
Hussain, M. A., Li, L., Kalu, A., Wu, X., & Naumovski, N. (2025). Sustainable food security and nutritional challenges. *Sustainability, 17*(3), 874. https://doi.org/10.3390/su17030874
Karakaplan, M. U., Kutlu, L., & Tsionas, M. G. (2020). A solution to log of dependent variables with negative observations. *Journal of Productivity Analysis, 54*(2–3), 107–119. https://www.jstor.org/stable/48741145

Kassegn, A., & Endris, E. (2021). Review on livelihood diversification and food security situations in Ethiopia. *Cogent Food & Agriculture*, 7(1), 1882135. https://doi.org/10.1080/23311932.2021.1882135

Khan, M. M., Akram, M. T., Janke, R., Qadri, R. W. K., Al-Sadi, A. M., & Farooque, A. A. (2020). Urban horticulture for food secure cities through and beyond COVID-19. *Sustainability*, 12(22), 9592. https://doi.org/10.3390/su12229592

Lolaso, T., Assefa, E., & Woldeamanuel, T. (2024). Status of food insecurity and its determinants by smallholder farmers in Shashogo district, Hadiya zone, Central Ethiopia. *Cogent Food & Agriculture, 10*(1), Article 2360765. https://doi.org/10.1080/23311932.2024.2360765

Mahama, T. A. K., & Nkegbe, P. K. (2021). Impact of household livelihood diversification on welfare in Ghana. *Scientific African*, 13, e00858. https://doi.org/10.1016/j.sciaf.2021.e00858

Mamabolo, M., Chaminuka, P., & Machethe, C. (2022). Temporal and spatial variation of income diversification strategies among rural households in South Africa. *Development Southern Africa, 39*(3), 372–387. https://doi.org/10.1080/0376835X.2020.1870935.

Masuku, M. M., Mafongoya, P., & Lottering, S. (2025). Understanding food (in)security through land and livelihoods: Evidence from longitudinal household data. *Journal of Rural Studies*. https://doi.org/10.1016/j.jrurstud.2025.103765

Mazenda, A., Molepo, L., & Nhede, N. T. (2024). Food insecurity and coping strategies of low-income households in Tshwane, South Africa. *Poverty & Public Policy*, 16(4), 417–435. https://doi.org/10.1002/pop4.417.

Memon, M. H., Ali, M., & Khalil, S. (2020). Determinants of income diversification in flood-prone rural Pakistan. *International Journal of Disaster Risk Reduction, 50*, 101914. https://doi.org/10.1016/j.ijdrr.2020.101914.

Musumba, M., Palm, C. A., Komarek, A. M., Mutuo, P. K., & Kaya, B. (2022). Household livelihood diversification in rural Africa. *Agricultural Economics*, 53(2), 246–256. https://doi.org/10.1111/agec.12694.

Nguyen, D. L., Nguyen, T. T., & Grote, U. (2023). Shocks, household consumption, and livelihood diversification: Comparative evidence from panel data in rural Thailand and Vietnam. *Economic Change and Restructuring, 56*(5), 3223–3255. https://doi.org/10.1007/s10644-022-09400-9.

Ogutu, S. O., & Qaim, M. (2019). Commercialization of the small farm sector and multidimensional poverty. *World Development, 114*, 281–293. https://dx.doi.org/10.1016/j.worlddev.2018.10.012

Olayeriju, B.O., & Akinnagbe, O.M. (2025). Perceived effects of diversification on cocoa farmers' livelihood in Ondo State, Nigeria. *Journal of Agricultural Extension, 29*(4), 11-19. https://dx.doi.org/10.4314/jae.v29i4.2.

Olutegbe, N. (2021). Livelihood and well-being of rural households around Oyan Dam, Nigeria: The sustainable livelihood approach. *Journal of Sustainable Development*, *19*(1), 69-83.

Olutegbe, N. S., Shaibu, U. M., Akuwa, P. O., Akano, O. I., Ogunbayo, I. E., Oyelami, B. O., Oyegoke, O. Y., Olorunkoya, O. A., Adediran, M. O., Aburime, P. I., & Adeagbo, I. E. (2026). Resilience to shocks and food insecurity: Evidence from chicken-rearing households in Nigeria. *Discover Agriculture, 4*(1), 90. https://dx.doi.org/10.21203/rs.3.rs-6148794/v1.

Osabohien, R., Adeleye, N., & De Alwis, T. (2022). Social protection and food security nexus in the Global South: Empirical evidence from West Africa. *Contemporary Social Science, 17*(2), 129–145. https://dx.doi.org/10.1080/21582041.2021.2005125.

Rajeev, M., & Scherrer, C. (2021). Smallholders' challenges: Realizing peri-urban opportunities in Bengaluru. *Sustainability, 13*(18), 10160. https://doi.org/10.3390/su131810160.

Republic of South Africa. (1999). Statistics Act, No. 6 of 1999. Government Gazette, Pretoria. https://www.gov.za/sites/default/files/gcis_document/201409/a6-99.pdf

Rusere, F., Samimi, C., Mkuhlani, S., Hunter, L., & Twine, W. (2025). Livelihood transitions and determinants in rural South Africa: Insights from a longitudinal analysis of households in

Bushbuckridge, Mpumalanga Province. *Society & Natural Resources*, 1–26. https://doi.org/10.1080/08941920.2025.2589898.

Sikhunyana, Z., Mishi, S., Ngonyama, N., & Sibanda, K. (2020). Livelihood strategies and diversification amongst the poor: Evidence from South African household surveys. *TD: The Journal for Transdisciplinary Research in Southern Africa*, 16(1), 1–13. https://doi.org/10.4102/td.v16i1.726.

Statistics South Africa. (2022). *Measuring food security in South Africa: Applying the Food Insecurity Experience Scale* (Report 03-00-19). https://www.statssa.gov.za/publications/Report-03-00-19/Report-03-00-192020.pdf.

Statistics South Africa. (2023). *Stats SA releases new provincial GDP figures*. https://www.statssa.gov.za/?p=16650.

Statistics South Africa. (2024). *Subjective poverty in South Africa: Findings from General Household Survey, 2019 & 2022* (Report 03-10-25). https://www.statssa.gov.za/publications/03-10-25/03-10-252022.pdf.

van den Berg, L., & Walsh, C. M. (2023). Household food insecurity in South Africa from 1999 to 2021: A metrics perspective. *Public Health Nutrition*, 26(11), 2183–2199. https://doi.org/10.1017/S1368980023001878.

Yusriadi, Y., & Kaslin, A. (2025). Resilience of rural communities facing global challenges. Journal of Indonesian Scholars for Social Research, 5(1), 65–72. https://doi.org/10.59065/jissr.v5i1.174.

Habib, N., Ariyawardana, A., & Aziz, A. A. (2023). The influence and impact of livelihood capitals on livelihood diversification strategies in developing countries: A systematic literature review. *Environmental Science and Pollution Research, 30*(27), 69882–69898. https://doi.org/10.1007/s11356-023-27638-2

Roscher, M. B., Allison, E. H., Mills, D. J., Eriksson, H., Hellebrandt, D., & Andrew, N. L. (2022). Sustainable development outcomes of livelihood diversification in small-scale fisheries. *Fish and Fisheries*. Advance online publication. https://doi.org/10.1111/faf.12662