POLICY BRIEF

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Resilience capacity, food consumption and socio-economic status in Zimbabwe

Advanced policy-focused poverty analysis in Zimbabwe

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Abstract

Development agencies and governments in developing countries are implementing resilience building interventions to improve household welfare. Despite the increased attention to resilience, the role of resilience capacity and food consumption has not been fully analysed. We used data from 2228 rural households drawn from the Agricultural Productivity Module (APM) of Zimbabwe National Statistics Agency's (ZIMSTAT's) Poverty Income Consumption and Expenditure Survey (PICES) of 2017. This study investigated the role of resilience capacity on household food consumption in the presence of shocks and associated heterogenous effects. Negative binomial regression for count data is used for analysis. Results show that drought and low rainfall reduced food consumption. Resilience capacity improved household food consumption and effects are more pronounced among poor households. Policymakers should consider promoting resilience and nutrition interventions across all socio-economic classes of households with special focus on poor households and low rainfall areas. Promote investments in climate smart agricultural practices to reduce negative effects of drought and low rainfall.

Context

Zimbabwe faces recurrent droughts which negatively affect food production and consumption patterns. Resilience, which refers to the ability of individuals, households and communities to withstand these shocks and maintain welfare (Smith & Frankenberger, 2018), has gained tremendous attention in recent literature (Ado et al., 2019; Béné et al., 2017; d'Errico et al., 2018). There is a growing body of evidence, demonstrating that resilience capacities improve household welfare in the presence of shocks (Smith & Frankenberger, 2018; d'Errico et al., 2018). Recently, a number of international organizations, Non-Governmental Organizations and donors have now started supporting resilience building interventions to improve household welfare and reduce dependency syndrome (Béné et al., 2017; d'Errico & Di Giuseppe, 2018).

Despite the increased attention to resilience, the link between resilience capacity and household food consumption has not been fully and extensively analysed in the context of Zimbabwe. Zimbabwe is an interesting case study, given that from 2015 onwards, donors have started implementing rural and urban resilience projects to improve household and community welfare (UNDP, 2019). Resilience capacities are expected to have different welfare effects depending on household socio-economic status, gender, agro-ecological region and education of main decision maker among others. Yet, the heterogeneous effects of resilience capacity on food consumption have not been fully analysed and understood. The study findings aim to provide important policy insights on how government and development partners can build household resilience capacities and how to effectively target resilience building interventions in the country.

Objectives and methods

This brief addresses the above identified research gaps and analyses the role of 'resilience capacity' on food consumption. Resilience capacity is measured through a composite index of three resilience pillars: 'adaptive capacity', 'assets', and 'access to basic services'[1]. We used data from 2228 rural households drawn from the Agricultural Productivity Module (APM) of the Poverty Income Consumption and Expenditure Survey (PICES) of 2017 conducted by the Zimbabwe National Statistics Agency's (ZIMSTAT). We also investigated the effects of resilience capacity, and the three resilience pillars, on different socio-economic classes of households.

We used the negative binomial regression estimator with household dietary diversity as the dependent variable and resilience capacity index variable (RCI) as the main independent variable. The estimated coefficients in the negative binomial regression model are interpreted as semi-elasticities, which is a coefficient estimate that states by what percentage the outcome variable changes when the explanatory variable changes by one unit.

Findings

Descriptive statistics show that female headed households had lower dietary diversification, food consumption and resilience compared to male-headed households (Table 1).

Table 1. Descriptive statistics for full sample and by gender

	Full sample	Male	Female	Differences
Household dietary diversity (HDDS)	5.93	6.01	5.81	-0.20***
Food consumption score (FCS)	23.41	23.86	22.93	-0.93
Resilience capacity index (RCI)	0	0.11	-0.16	-0.27***
Adaptive capacity (AC)	0	0.05	-0.07	-0.12**
Assets (AST)	0	0.09	-0.13	-0.22***
Access to basic services (ABS)	0	0.10	-0.15	-0.25***
Drought (1=yes)	39.20	38.0	41.0	3
Household size (number)	4.88	5.08	4.42	-0.66***
High rainfall area (1=yes)	50.87	54.0	46.0	-8***
Observations	2228	1388	840	

[1] Principal component analysis was used to construct indices on adaptive capacity, assets and access to basic services. 'Adaptive capacity' was constructed from education, employment, crop diversity and Tropical Livestock Units variables. 'Assets' included arable land owned by household in hectares, number of rooms, ownership of mouldboard plough, ox drawn cart and wheelbarrow. The variables used to compute 'access to basic services' included dummy variables of whether household has access to electricity, any member with a mobile phone and has a hygienic toilet facility. Using principal component analysis, the three indices - adaptive capacity, assets and access to basic services were then collapsed to compute the resilience capacity index.

Resilience capacity and household dietary diversity

The study results show that drought reduced the number of food groups consumed by 12.4% (model 1, Table 2). These results are plausible, given the widespread El Niño drought in 2014/16 and 2015/16 seasons which adversely affected agricultural productivity in Zimbabwe and the greater parts of Southern Africa. Hence, investments in climate proofing strategies, for example water harvesting and climate change mitigation measures and smart agricultural practices by government and development agencies are needed in the smallholder farming communities.

In the second model (Table 2), we included the resilience capacity index variable (RCI) in our regression analysis. Results show that the RCI is positively associated with household dietary diversity: a one-index point increase in RCI is associated with an increase in the number of food groups consumed by 7.6%. After the introduction of resilience capacity index variable, the impact of drought on household dietary diversity drops by from 12.4% to 8.2%. This result is quite interesting, and the drop in dietary diversity emphasises the crucial role of resilience capacity in smoothing household food consumption during drought periods. As shown earlier, the estimated coefficients for negative binomial regression can be interpreted as semi-elasticities (Cameron & Trivedi, 2010). Our analysis confirms the importance of promoting resilience building interventions for improving food consumption in rural areas of Zimbabwe.

Table 2. Role of resilience capacity on household dietary diversity

Explanatory variables	(1) Coef	Std. err.	(2) Coef	Std. err.
Drought	-0.124***	0.015	-0.082***	0.014
Gender	0.023	0.015	0.010	0.014
Household size	0.007**	0.003	-0.006*	0.003
Low rainfall area	-0.034**	0.014	-0.048***	0.013
Resilience capacity index (RCI)			0.076***	0.006
RCI*drought			0.007	0.010
Constant	1.813***	0.019	1.867***	0.018
Observations	2228		2228	

*, **, ***. Statistically significant at the 10%, 5%, and 1% level, respectively. Coef means the estimated proportion at which household dietary diversity changes when the explanatory variable changes by one unit.

The results also show that household with larger family size tend to experience reduced food consumption. An additional member in the household was associated with a decrease in the number of food groups consumed by 0.6%. Residence in low rainfall areas is

associated with 4.8% decrease in the number of food groups consumed by the household. Our results show that drought and residence in low rainfall areas is associated with lower food consumption. Interventions that enhance water availability and access in low rainfall areas and during drought periods are key to play a pivotal role in enhancing capacity. The government and development agencies need to invest in resilience building interventions (such as promoting crop and livestock diversification, home vegetable gardens, small livestock production, aquaculture, soil and water harvesting technologies, drought tolerant crops and livestock breeds) especially in low rainfall areas to boost agricultural production and productivity and subsequently food consumption.

Resilience capacity and household dietary diversity by socio-economic status

The relationship between the resilience capacity index (RCI) and the Household Dietary Diversity Score (HDDS) is positive and statistically significant across all the socio-economic classes (Table 3). A one-index point increase in the RCI is associated with a 12.5% and 3.5% increase in the number of food groups consumed by the poorest (quintile 1) and richest (quintile 5) households respectively. The effect size of RCI tends to be more pronounced among poorer households than better off households. The negative effects of low rainfall tend to be more pronounced among the poorest and poor households.

Table 3. Role of resilience capacity on household dietary diversity by socio-economic status

Quintiles based on per capita consumption					
	1	2	3	4	5
	Poorest Coef	Near Poorest Coef	Middle group Coef	Near richest Coef	Richest Coef
Resilience capacity index (RCI)	0.125***	0.080***	0.084***	0.045***	0.035***
Drought	-0.109***	-0.050*	-0.039	-0.110***	-0.087***
RCI*drought	-0.060*	-0.014	0.015	-0.001	0.046***
Gender	0.010	0.013	-0.023	-0.004	0.045
Household size	-0.009	-0.002	-0.007	0.014*	0.022***
Low rainfall area	-0.074**	-0.089***	-0.029	-0.064**	-0.041
Constant	1.859***	1.840***	1.875***	1.817***	1.815***
Observations	446	446	446	446	444

*, **, ***. Statistically significant at the 10%, 5%, and 1% level, respectively. Coef means the estimated proportion at which household dietary diversity changes when the explanatory variable changes by one unit. For brevity standard errors are not shown.

Resilience capacity pillars and household dietary diversity

In this subsection, we replaced the independent variable "resilience capacity index" by indices of its three pillars – 'adaptive capacity', 'assets' and 'access to basic services'. We analysed the individual roles of the three pillars of resilience capacities on household dietary diversity separately. The results are shown in Table 4. Results show that after the introduction of resilience capacity pillars in model 2, the detrimental effect of drought is reduced from 12.4% (model 1) to 7.8% in model 2, further confirming the cushioning effects of resilience capacity pillars on household dietary diversity. Adaptive capacity, assets, and access to basic services are positively associated with household dietary diversity. A one-index point increase in adaptive capacity, assets and access to basic services is associated with an increase in the number of food groups consumed by 3.4%, 2% and 6.6% respectively (Table 4, Model 2).

Table 4. Association between resilience capacity pillars and household dietary diversity

	(1) Coef	Std. err.	(2) Coef	Std. err.
Drought	-0.124***	0.015	-0.078***	0.014
Gender	0.023	0.015	0.008	0.013
Household size	0.007**	0.003	-0.005	0.003
Low rainfall area	-0.034**	0.014	-0.041***	0.013
Adaptive capacity (AC)			0.034***	0.008
Asset			0.020***	0.006
Access to basic services (ABS)			0.066***	0.008
AC*drought			0.038***	0.013
Asset*drought			-0.011	0.011
ABS*drought			-0.017	0.012
Constant	1.813***	0.019	1.857***	0.018
Observations	2228		2228	

*, **, ***. Statistically significant at the 10%, 5%, and 1% level, respectively. Coef means the estimated proportion at which household dietary diversity changes when the explanatory variable changes by one unit. Std err stands for standard error.

Overall, our results confirm that all the three resilience pillars: adaptive capacity, asset and access to basic services are important for food consumption in the country. Hence, households with higher adaptive capacity, asset endowments, and better access to basic services have improved food consumption compared to those with lower adaptive capacities, assets, and poor access to basic services in the same communities. Our findings

are supported by recent empirical evidence. For example, Smith & Frankenberger (2018) found that assets and access to services improved food security among households in Bangladesh. With regards to access to basic services, our findings are in tandem with Shively (2017) who found that health and transport infrastructure buffer the negative effects of rainfall shortages on child nutrition in Nepal and Uganda. Furthermore, the interaction between AC and drought is positive and significant in the dietary diversity model. This could suggest that AC smooth consumption during drought periods. For example, a household with higher adaptive capacity (measured by education, employed, crop and livestock diversity) is likely to be more resilient to drought shocks that threaten food security through consumption smoothing (i.e., selling livestock to maintain current level of consumption).

Resilience pillars and household dietary diversity by socio-economic status

Table 5 show the influence of resilience pillars on household dietary diversity differentiated by household socio-economic status. Adaptive capacity increases dietary diversity by 6.4% and 6% among poor (Quintile 2) and moderate (Quintile 3) households respectively. Assets positively increased household dietary diversity among the poorest households only. A one-index point increase in assets is associated with 6.1% increase in the number of food groups by poorest households. This may indicate that poorer households rely on assets for smoothing consumption during drought periods. However, as drought intensifies the effect of asset for consumption smoothing tends to disappear as shown by the negative interaction term between asset and drought. Therefore, interventions that prevent distress sale of assets by poorer households during drought are needed. Building the resilience of the poor and those in vulnerable situations and reduce their exposure and vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters.

Table 5. Role of resilience pillars on household dietary diversity by socio-economic status

	Poorest Coef	Near poorest Coef	Moderate Coef	Near richest Coef	Richest Coef
Adaptive capacity (AC)	0.033	0.064***	0.060***	0.020	0.009
Asset	0.061***	0.006	0.012	0.017	0.000
Access to basic services (ABS)	0.080***	0.055***	0.057***	0.037**	0.064***
Drought	-0.113***	-0.053*	-0.028	-0.109***	-0.067**
AC*drought	0.030	0.031	0.006	0.037	0.036
Asset*drought	-0.061**	-0.003	-0.003	-0.024	0.021
ABS*drought	-0.039	-0.046*	0.024	-0.002	-0.008
Gender	0.012	0.011	-0.028	-0.005	0.036
Household size	-0.008	0.003	-0.005	0.013	0.020***
Low rainfall area	-0.066**	-0.083***	-0.036	-0.060**	-0.028
Constant	1.852***	1.805***	1.867***	1.818***	1.803***
Observations	446	446	446	446	444

*, **, ***. Statistically significant at the 10%, 5%, and 1% level, respectively. Coef means the estimated proportion at which household dietary diversity changes when the explanatory variable changes by one unit. AC and ABS mean adaptive capacity and access to basic services respectively. For brevity standard errors are not shown.

The relationship between access to basic services and household dietary diversity is positive and statistically significant across all the socio-economic classes. For example, a one-index point increase in ABS is associated with an increase in the number of food groups consumed by 8% and 6.4% among the poorest (quintile 1) and richest (quintile 5) households respectively. Overall results show that the three resilience capacity pillars are important for household dietary diversity, but the effects vary depending on socio-economic class. The magnitude of the coefficients tends to be higher among poorer households compared to the non-poor.

Policy Implications

Four important policy implications emerge from the findings of this analysis. First, study results highlighted that female headed households had lower resilience capacity and food consumption compared to male headed households. It is well acknowledged that female headed households in developing countries, face huge constraints in terms of access and control of land, productive and financial resources that are crucial for nutrition security

(Malapit et al., 2015). Therefore, interventions that deliberately focus on building resilience capacities and improving women empowerment and inclusiveness with regards to access to and control over productive resources should be promoted as they have the potential to improve household nutrition security (Malapit et al., 2015).

Second, drought reduced food consumption. In addition, households residing in low rainfall areas have lower food consumption. Hence, government, policymakers, program implementers, and international development partners need to promote investments in climate smart agricultural practices to cushion household food consumption from negative effects of drought and low rainfall. Examples of climate smart agricultural practices include drought tolerant crops and varieties, drought tolerant livestock breeds, soil, and water conservation technologies.

Third, resilience building interventions (such as promoting crop and livestock diversification, home vegetable gardens, small livestock production, and aquaculture) are particularly important and should be promoted to boost food consumption. Ruel et al. (2018) also highlight that these interventions are quite promising in addressing underlying determinants of malnutrition. The government and development agencies should ensure promotion of sustainable food production systems and implement resilient agricultural practices that increase productivity and production, that help maintain ecosystems, that strengthen capacity for adaptation to extreme weather, drought and other disasters. These should be complemented with interventions that improve human capital development, extension, road, and telecommunication infrastructure.

Fourth, resilience building interventions should be promoted across all socio-economic classes of households. The effects of resilience capacity on food consumption tend to be higher among poorer households relative to the non-poor. Hence, government and development agencies should deliberately target poorer households and those residing in low rainfall areas and focus on improving their resilience capacities and food consumption.

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