THE EFFECTIVENESS OF TANZANIA SOCIAL ACTION FUND INTERVENTION IN FOOD SECURITY OF VULNERABLE COMMUNITIES

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Abstract

Development intervention is increasingly reported as a means of improving the livelihoods of the vulnerable rural people. However, little information based on appropriate methodological approaches is available on diverse outcomes. This study was conducted to assess the livelihood impact of Tanzania Social Action Fund intervention in Agriculture for vulnerable communities in Makete and Rungwe districts. This research examined the effectiveness of intervention in food security of recipients in both districts. A quasi-experimental design was used to collect a sample of 192 and 108 recipient and non-recipient households including triangulation approaches, respectively. Heckman selection model two-stage estimation approach was employed to analyze cross-sectional data. Results show that there were no difference in food security between recipients and non recipients. Based on these findings, it is concluded that participation had no positive effect on food security. Therefore, it is recommended that intervention should be on prevention basis rather than coping strategies.

Key words: TASAF, Food security, intervention and vulnerability.

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1.0 Introduction

Food security is achieved when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life (World Food Summit, 1996 cited by Clay, 2002). However, food security is built in three pillars: (a) food availability in which sufficient quantities of food are available to people on a consistent basis, (b) food accessibility whereby people have sufficient resources to obtain appropriate foods for a nutritious diet, and (c) food utilization means people have sufficient knowledge of nutrition and care practices and access to adequate water and sanitation to derive sustenance food (Nazir *et al.*, 2010; New Partnership for Africa's development, 2004).

Agriculture constitutes the backbone of most African economies and their improvements in agricultural performance have potential to improve rural livelihoods for vulnerable people by lifting them out of poverty trap (Ludi, 2009). However, women who account for 70 to 80% of household food production in Sub-Saharan Africa are more vulnerable to nutritional problems because of their lower social and economic status (Downer, 2004). Thus far, poverty is a major cause of food insecurity and sustainable progress in poverty eradication and is critical to improve access to food (World Food Summit, 1996). Consequently, food security is a sensitive indicator or change in prices of food grains and that wage earners, are food insecure compared to self-employed in agricultural sector (Faridi and Wadood, 2010).

3.0 Problem statement

Low labour productivity, poor coordination and limited capacity, underdeveloped supporting facilities, dependency on rainfall agriculture, inappropriate technology and impediments to food

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market access are threats that face agriculture in Tanzania (United Republic of Tanzania, 2001). Rural households face labour shortage due to rural-urban migration because of non-farm employment opportunities, HIV and AIDS, orphanage, and elderly as a result agricultural labour force grows at less than 2.8% per annual (United Republic of Tanzania, 2006; 2001). Moreover, drought is the most shock experienced by the majority of food insecure households followed by high food prices and serious illness in Tanzania (Ehrhart and Twena, 2006). However, food insecurity and vulnerability varies greatly by group and location. Hitherto, poor income, wage labourers, small farmers, remittance, and natural resource dependants all have 39-47% households that are food insecure or highly vulnerable (Mckinney, 2006). Although, higher food volatility exposes both primary producers and consumers at a higher risk of becoming poor (Kiratu *et al.,* 2011)

Consequently, poverty is still a challenge in rural areas where 38% of the population lives below the basic needs poverty line compared with 24% in urban areas (United Republic of Tanzania, 2010; Food and Agricultural organization, 2008). Thus, poverty contributes to food insecurity, which contributes to poor nutrition, health, and cognitive development then again contributes to poverty (Nazir *et al.,* 2010). The National Strategy for Growth and Reduction of Poverty (NSGRP I and II) aims at enhancing growth and reduction of income poverty by improving food availability and accessibility, hence reducing income poverty of the vulnerable needy groups through various intervention programmes (United Republic of Tanzania, 2010; 2005; 2000). As a result, in the year 2000 Tanzania Social Action Fund (TASAF) was introduced to address the imbalance by empowering communities for effective and efficient utilization of the productive assets created (World Bank, 2006), such as rural roads, basic health services, dairy cattle,

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environmental conservation, poultry, water, and carpentry were established to serve vulnerable groups. However, little information based on appropriate methodological approaches is available on diverse outcomes of intervention depending on the nature of beneficiaries.

3.1 Conceptual focus on the community context

A modified DFID (1999) sustainable livelihood (SL) conceptual framework, Figure 1, was adopted for intervention livelihood analysis in this study. Hitherto, different international agencies including UNDP, CARE and DFID use it as a strategy towards poverty alleviation. However, DFID approach is more realistic for SL analysis (Krantz, 2001; Frankenberger *et al.,* 2000). According to Scoones (1998) livelihood comprises the capabilities, assets and activities required as a means of living by the vulnerable poor people. Similarly, Chambers and Conway (1991) argue that capabilities are both an end and means of livelihood. The framework shows multiple interactions between various factors which affect livelihoods (Scoones, 2009). These include; vulnerability context, livelihood assets, transforming structures, livelihood strategies, and outcomes. The vulnerability context indicates a scheme within which project participants and non-participants operate. This comprises shocks, trends, and seasonality which are beyond their control (DFID, 1999). However, it has an external influence on livelihoods that impact on peoples' asset base. For instance, illness shock caused by fatal HIV /AIDS endemic disease and seasonality shifts in prices, production, food availability, and employment opportunities could be most long-standing sources of hardship for the poor people (Ahmed, 2009; Haidar, 2009; Erenstein *et al*., 2007).

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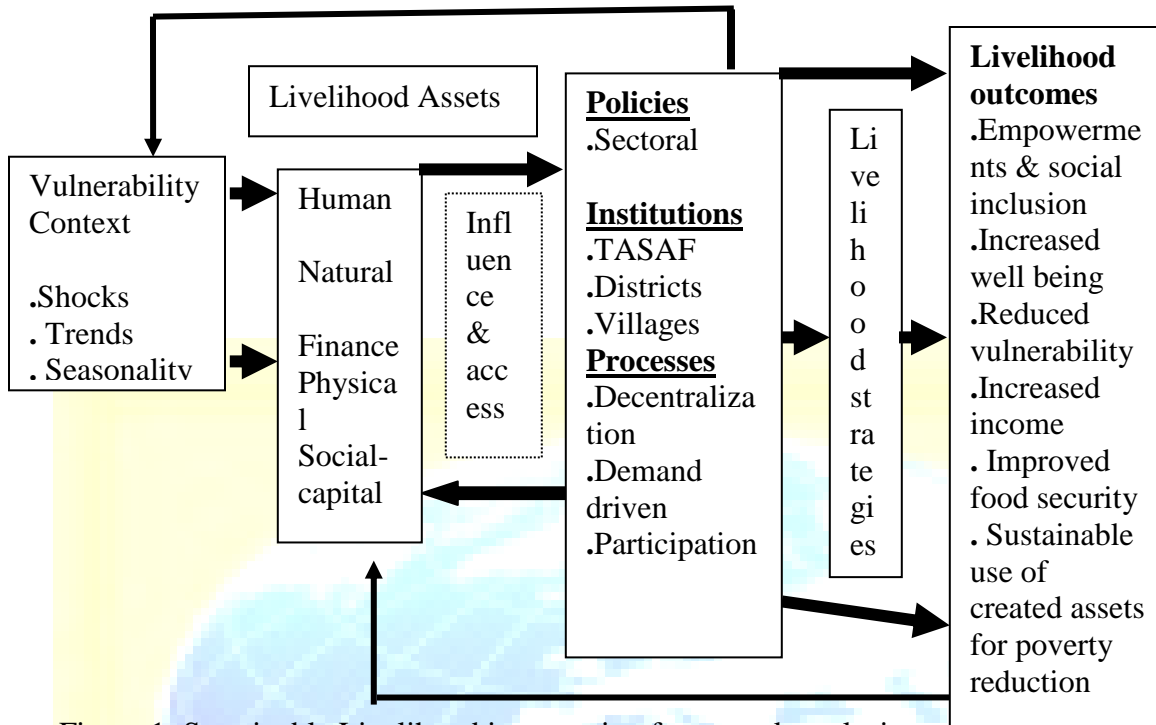**http://www.ijmra.us**

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Figure 1: Sustainable Livelihood intervention framework analysis

Source: Modified DFID sustainable livelihood framework (1999)

Moreover, assets accessibility (dairy cattle, poultry, rural roads, dispensary, water, and carpentry works) could be influenced by policies, institutions and processes of intervention (Kollmair and Juli, 2002). Yet, issues of decentralization are of critical relevance. This determines the way individuals operate and interact at community level as incentives to make choices in their prioritized projects under community management committee (Norton and Foster, 2001). These occupy the central position in the intervention framework and directly the feedback to the vulnerability context. Furthermore, livelihood strategies adopted by participants comprise a series of activities prioritized to achieve their livelihood goals (DFID, 1999). As a result, changing asset status affects positively or negatively participants' strategies depending on the nature of asset created for mitigation and coping (Norton and Foster, 2001). Consequently,

people compete for resources, job opportunities (cash-for-work) and markets. These make it difficult for everyone to achieve simultaneous improvements in their livelihoods.

Livelihood assets created are of particular interest in this study in order to ascertain if recipients are able to escape from poverty compared to non recipients. However, indicators for assessing sustainable livelihoods, poverty reduction through created assets, well being and capabilities, livelihoods adaptation and vulnerability flexibility, and resource base sustainability (Scoones, 1998) are significant in this study.

However, little information on intervention effectiveness based on appropriate methodological approach is available. Hence, this research examined the effectiveness of TASAF intervention in food security of the vulnerable communities in Makete and Rungwe districts to provide feedback to policymakers and recipients at large.

4.0 Research methods

In estimating *ex-post* intervention impact, experimental and quasi-experimental designs were considered. The first design could be applied within a subset of equally eligible beneficiaries while reaching the most eligible and denying the least eligible (Baker, 2000). However, this could be unethical owing to the denial of benefits to other eligible members and difficult to ensure that assignment could be truly random (Baker, 2000; 1999). Therefore, quasi-experiment approach was employed in which a control group that resemble the treatment at least in observed characteristics through econometric methods was constructed. These techniques generate comparison groups which resemble the treatment group through methodologies such as matching

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methods, difference-in-difference methods, instrumental variables and reflexive comparisons. However, the principle disadvantage of quasi experimental techniques is the problem of selection bias. This problem relates to the extent to which a program is participated in differentially by sub-groups of a target population, thus affecting the sample and ultimately the results (Baker, 1999).

Moreover, observable bias includes the selection criteria through which an individual was targeted such as geographical location of recipients and non-recipients. Hitherto, unobservable characteristics that can bias program outcomes include individual ability, family connections and the subjective selection of individuals into a project. Both type of biases can yield in-accurate results such as under and over-estimates of actual program impacts. However, it could be possible to control for bias through the mentioned techniques, yet it is difficult to remove them and this remains a challenge of impact analysis. Therefore, the problem could be controlled through statistical methods such as Instrumental variables (IVs) and Heckman estimation models (Baker, 2000). For this reason, Heckman's (1979) two-stage estimation model with inverse mill's ratio as a correction factor for selection bias was used over IVs instead of the mentioned techniques.

Furthermore, a modified DFID (1999) sustainable livelihood (SL) conceptual framework was adopted for intervention of livelihood analysis. The study employed a quasi-experimental approach (Grossman, 2005; Spath, 2004; Hulme, 2000; Baker, 2000; 1999; Power and Riddell, 1998) in which cross-sectional data were collected once at a given point of time (Baker, 2003; Stock and Watson, 2003; Wooldridge, 2001). The sample based on precision of 5% and

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confidence level of 95% for infinite population was determined using the traditional formula (Power and Riddell, 1998):

$$n = \frac{1.96^2 \, p(1-p)}{SE^2} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (2)$$

was applied, whereas "n" is a sample size of 300 households calculated and 54 key informants, SE is the tolerable standard error (0.05), and p = (0.64) and (1-p) = (0.36) were the proportion of projects participants and non-participants, respectively. Since all districts in Tanzania adopted intervention programme for various target groups, thus multistage and non random stratified sampling techniques were employed to obtain a representative sample.

 Stratified list of participants: Food Insecure (FI), Community Development Investment (CDI), Vulnerable Groups (VGs), and Service Poor (SP) projects were used as the sampling frame. However, selection bias could have been associated with projects whose participants were self–selected because of them being many than the required number of respondents basing on the intervention criterion such as in food-insecure, environmental conservation and water projects. Also, the same problem could have been associated with selection of geographical location of non recipients. Thus, the sample consisted of able-bodied, chronic diseases, elders, widowers, and HIV-infected with different strata size depending on the nature of the sub-project. Thus far, 192 recipients, 108 non recipients and key informants were surveyed. Also, information was triangulated by using focus group discussions and Statistical Package for Social Sciences (SPSS) and STATA versions were used for data analysis.

Since, statistical analysis based on non-randomly selected samples could lead to erroneous conclusion of project intervention; Heckman's (1979) two-stage estimation model was used to

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analyze a stratified non-random sample. This was applied to discern primarily a particular subset of with and without intervention sample (Wooldridge, 2001). The first stage in the process was to estimate the selection equation so as to determine the probability of participation ($p*$) so as to ascertain between beneficiaries and non-beneficiaries whereas the dependent qualitative variable equal to one when participated or otherwise:

$p* = w_i\gamma + u_i$, given that;

$$P_i = \begin{cases} 1 & if \quad p_i* > 0 \\ \\ 0 & if \quad p_i* \leq 0 \end{cases} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots \quad (3)$$

Where; w_i is a vector of factors known to influence participation, γ is a vector of coefficients and u_i is a disturbance term of unobserved factors that influence participation in the project.

However, the second stage estimated the outcome equation of intervention variables:

$$y_i = \begin{cases} \beta_j x_i + \varepsilon_i & if \quad p_i* > 0 \\ \\ 0 & if \quad p_i* \leq 0 \end{cases} \quad \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.. \quad (4)$$

Where; β_j is a vector of coefficients, thus $\beta_j > 0$ presents the likelihood of positive impact (Hoetker, 2007) and x_i is a vector of observable factors that influence intervention outcome such as participation, location, beneficiary age, gender, marital status, education level, income, proximity to the market, foods market prices, projects created and target groups.

On the other hand, a sample selection bias variable, the inverse Mill's ratio (IMR) was derived by incorporating both selection and outcome equations to yield:

$Y = \beta x_i + \rho \sigma_\varepsilon \lambda_i (w_u \bar{\ }) + \varepsilon_i$ $\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots$ (5)

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Where: Y= Food security (dummy variable); x_i = vector of observed variables; $\rho\sigma_\varepsilon$ = selection bias (lambda); $\lambda_i \left(\frac{}{u} \right)$ = selection bias correction factor (an IMR), ε_i = disturbance term. The Heckman's correction factor, a two-stage statistical approach offered a means of correcting for non-random selection bias. The correction factor provided a test for sample selection bias in food security and the research employed the following variables shown in Table 1.

These variables were defined to distinguish between two or more groups. According to the rule of thumb, for each qualitative regressor the number of dummy variables introduced was one less than the categories of that variable to avoid perfect collinearity problems (Gujarati, 2004). Therefore, the analytical model for estimating outcome on food security (Y_{fs}) based on the Heckman's procedures was specified as:

$$Y_{fs} = \beta_0 + \beta_1 Partic + \beta_2 Locat + \beta_3 Femhhd + \beta_4 Benage + \beta_5 Mstatus + \beta_6 Educ +$$

$$\beta_7 Hhsize + \beta_8 Hhassets + \beta_9 Benincom + \beta_{10} Frinputs + \beta_{11} Mktprice + \beta_{12} Mktdist +$$

$$\sum_{i=1}^{5} \beta_i \, projects + \sum_{j=1}^{4} \beta_j \, \mathrm{Re}\, cipients + \lambda\alpha_u + e_{fs} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots(6)$$

Expectation of the variables included: ($\beta_1 > 0$) participation has influence on food security; ($\beta_{2,3,5} > 0$) dummy variables have influence on food security; ($\beta_{4,6-10} > 0$) factors under consideration had positive influence on food security; ($\beta_{11,12} < 0$) factors were inversely related to food security; ($\beta_i > 0$) project(s) enhances recipients' food security positively; and that ($\beta_j > 0$) target group(s) benefited through participation.

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Table 1: Variables specified in the analytical model

Variable	Definition	Expected sign
Partic (Participation =1, or otherwise)	Taking part in the intervention activities	+/-
Locat (Location; Makete =1 or otherwise)	The site or position where an intervention is established to serve needy communities	+/-
Benage (Beneficiary age) (Years)	The amount of money received by a recipients over a period of time as payment for participation, goods or services or a profit from investment	+/-
Mstatus (Marital status =1 or otherwise)	The fact of somebody's being unmarried, married, or formerly married	+/-
Benincome(Beneficiary income in Tshs)	The amount of money received by a recipients over a period of time as payment for participation, goods or services or a profit from investment	+
Hhsize (Household size) (Discrete)	Number of people living together in a single home	+/-
Educ(Education level, number of years)	Degree of knowledge or abilities gained through teaching learning especially at a school or similar institution	+
Femhhd (Female household head =1 or otherwise)	A woman family head	+/-
Hhassets (House hold assets)	Valuable owned items by a family that are useful and contributes in the livelihood success	+
Frminputs (Farm inputs; 1=TASAF or otherwise)	Efforts needed to achieve agricultural productivity	+
Mktprice (Food market price in Tshs)	The price at which goods or services are currently bought by the majority of participants and their counterparts	+/-
Mktdist (Market distance in kilometre)	The interval between households and the place where goods or foods of a particular type are regularly held for selling or exchange purpose	+/-
Vulnerable groups		
Able-bodied (1 =Yes, 0 = No)	A person who is healthy and physically strong who can perform economic activities in a community	+
Chronic diseased (1=Yes, 0= No)	Persistent pain of unknown/known cause with medical condition characterized by long-term painnot attributable to known pathological process or organic disease	+/-
Elder (1=Yes, 0=No)	Senior member of community who is advanced in years and has an influence, authority and needy person	+/-
HIV infected (1=Yes, 0=No)	A person who is adversely affected by HIV disease.	+/-
Orphans (1=Yes, 0 =No)	A child whose parents are both dead or who has been abandoned by his or her parents, especially a child not adopted by another family	+/-
Widowers =1 or otherwise	A group of men whose wives has died especially when he has not re-married.	+
Projects created		
Carpentry works project(1= Yes, 0= No)	An organized work of building houses and making furniture for the objective of employment creation among vulnerable groups	+
Dairy cattle project (1= Yes, 0= No)	An organized unit of cattle bred and raised for milk production	+
Environmental conservation project (1= Yes, 0= No)	A planned activity related to the conservation and maintenance of the natural world	+/-
Poultry project (1=Yes, 0=No)	An organized unit of chickens raised for meat and eggs production	+/-
Public works projects (1 = Yes, 0= No)	Extensive public works undertakings	+/-

| Water project (1= Yes, 0=No) | An organized work for water supply service to a community | + |
| **Fs (Food security =1 or otherwise** | Ability to acquire the food needed by household members (Pinstrup –Anderson, 2009) | +/- |

5.0 Results and Discussion

In order to ascertain specification error and variance of estimates, model specification and heteroskedasticity were tested. Results show that Breusch-Pagan/Cook-Weisberg test and regression specification error test (RAMSEY RESET) were both insignificant, meaning that the model has homogeneous variance with no specification error, respectively. Whereas, the coefficient of the correction factor for selection bias, the inverse mill's ratio (IMR) was statistically significant ($p<0.05$) in food security, suggesting that the model was appropriate and there was no selection bias.

Projects in Makete district had a significant negative ($p<0.01$) correlation with food security (Table 2). Meaning that projects established have had no influence on food security of recipients. This proposes that beneficiaries in Makete district were food insecure than their counterparts in Rungwe district. Probably, variation between locations was attributed by differences in resources endowment and benefits accrued to participants caused by agro-ecological variation. Also, variation could be attributed by more time spent in project participation by beneficiaries in Makete district than in family productive activities. Findings comply with the argument made by (World Food Summit, 1996; Miah *et al*., 2010, Funk and Brown, 2009).

Also, female household head had an inverse significant ($p<0.05$) relationship with food security. Meaning that female heads were food insecure than their counterparts male household heads. Results propose that female heads had binding prioritized projects and family responsibilities which kept them away from accessing other food resources for family consumption. This

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observation concur with observations made by Ahmad and Talib (2010), Lecy (2010), Nord *et al.*(2010), Fermandez-Covnejo *et al.* (2007), Downer (2004) accordingly that female household heads are less endowed with resources for production. However, survey results contradict with findings obtained by Wetengere (2009) who found that the probability of female farmers to adopt fish farming is higher than male farmers. This contradiction could be attributed to the nature of projects and its benefits accrued to both male and female household heads.

Table 2: Heckman selection model - two-stage estimation of food security

Variables	Coef.	Std. Err	z	P>|z|	dy/dx
Outcome equation					
Participation	-0.114	0.138	-0.830	0.407	-1.243
Makete (Location)	-1.379	0.153	-8.990	0.000***	-1.386
Female household head	-0.315	0.138	-2.270	0.023**	-0.065
Beneficiary age	0.006	0.005	1.260	0.209	0.007
Marital status	0.021	0.144	0.140	0.886	-0.151
Education level	-0.066	0.078	-0.840	0.400	0.001
Household size	-0.011	0.020	-0.550	0.582	0.044
Household assets	-0.025	0.027	-0.910	0.362	-0.035
Beneficiary income	1.93e-06	1.50e-06	1.280	0.200	-3.10E-07
Farm inputs	0.231	0.062	3.700	0.000***	0.343
Market price	-0.317	0.131	-2.410	0.016**	0.107
Market distance	-0.049	0.010	5.010	0.000***	0.004
Carpentry project	1.606	0.453	3.540	0.000***	2.369
Public works	0.507	0.177	2.870	0.004***	1.251
Dairy cattle project	0.271	0.178	1.520	0.128	1.297
Environmental conservation	1.124	0.202	5.560	0.000***	2.070
Water project	0.612	0.309	1.980	0.047**	1.014
Constant	2.862	0.487	5.880	0.000	
Selection equation					
Widowers	5.188	0.222	2.87	0.004***	
Elder	-0.411	0.465	-0.880	0.378	
Able-bodied	-0.568	0.452	-1.260	0.208	
HIV-infected	-1.205	0.472	-2.550	0.011**	
Constant	0.918	0.443	2.070	0.038**	
Inverse Mills ratio					
Lambda	0.665	0.331	2.010	0.044**	

| Rho | 0.737 |
| Sigma | 0.902 |

Significance levels: *, ** and *** are P<0.1, P<0.05 and P<0.01, respectively.

Moreover, there was a positive significant (p<0.01) relation between farm inputs and food security. Meaning that, an increase in farm inputs enhances food security. This proposes that as more inputs are employed in agricultural production has a proportionate relationship with farm outputs. Also, market food prices (p<0.05) and proximity to the market (p<0.01) had a negative significant association with food security. Meaning that the decrease in market food prices and market distances tends to improve food accessibility by recipients as a result they become food secure, *ceteris paribus*. Observations made by Charles and Godfray (2010), Faridi and Wadood, (2010), Ziervogel and Ericksen (2010), and Altman *et al.*(2009) concur with patterns in food prices as indicators of trends in the food availability and extension of social grants to eligible rural households is likely to improve food security of the hungry people, respectively.

Furthermore, among six projects surveyed, poultry project was chosen as a base for comparison against other projects to avoid dummy variable trap problem. Carpentry, Environmental Conservation, Public Works (p<0.01), and Water (p<0.05) had a positive and significant association with food security than poultry project. Meaning that, one unit increase in each project has significant positive influence on food security, *ceteris paribus*. This proposes that their participation enabled them to earn their livelihoods during the project lifetime. These results conform to findings obtained by Agba *et al.* (2010), Brussard *et al.* (2010), International Development Agency (2008), and Burney *et al*. (2010) that wealth and employment creation and biodiversity conservation significantly improve the livelihoods of the rural people.

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Along with the participant groups, the chronic diseased was also chosen as a control for comparison purpose in order to avoid perfect collinearity problem. Results show that Widowers had a positive significant ($p<0.01$) association with food security (Table 2). Meaning that Widowers were more likely to be food secure than other participants. This suggests that their participation in the projects established had an influence on food security due benefits obtained from their participation. Maybe, Widowers maximized the use of projects' resources to attain and sustain their family's livelihoods. Present findings contradict with observations made by Holmes *et al*. (2009) on gender vulnerability that women often buffer the food crisis within their households than male. Also, Erhabour and Ojogho (2011) observed that low income earners in rural households spend more income on food consumption.

On the other hand, HIV infected recipients had a negative significant ($p<0.05$) relationship with food security. Meaning that their participation had negative influence on food security during the project lifetime. Probably, participation in projects established kept them away from accessing food resources so as to complement with their dietary intake compared to Chronic Diseased Group. Similarly, Wiser *et al.* (2010) and Weiser *et al.* (2009) noted that HIV-infected people experience food insecurity.

6.0 Conclusions and recommendations

Based on the findings that participants were insignificantly less food insecure than non participants, therefore it is concluded that variation in food security between recipients was attributed by differences in geographical locations due to differences in resource endowment. On the other hand, it is concluded that participation on assets created by recipients kept them away

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from other food resources thus becoming food insecure. Also, it is concluded that food security of recipients depend on the nature of the project and participants involved. Accordingly, it is recommended that the government should create assets creations which are likely to enhance food security and it should train recipients and have a regular visit on assets on prevention basis rather than coping strategies so as to strengthen recipients from adaptive capacity for increased resilience for food insecurity risk. Also, it is recommended that local government authorities should distribute and supervise assets which enhance food security based on geographical location and beneficiaries should prioritize assets that capitalize on farm inputs.

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