Global Scientific JOURNALS

GSJ: Volume 10, Issue 4, April 2022, Online: ISSN 2320-9186

www.globalscientificjournal.com

IMPACT OF CONDITIONAL CASH TRANSFER ON HOUSEHOLD FOOD SECURITY IN SUMBAWANGA MUNICIPALITY, TANZANIA

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1.1 Abstract

In Tanzania, poor households are served with Conditional Cash Transfers (CCT) to increase their incomes and opportunities while improving their food and non-food consumption. The study aimed at assessing the impact of conditional cash transfer on poverty reduction on household food security in the Sumbawanga Municipality, Tanzania. The study adopted a cross-sectional research design. This study used quantitative data generated from the household survey with a sample of 450 households. Data were analyzed by using propensity score matching with the aid of STATA 14. The study findings show that on average conditional cash transfer programmes have a significant effect on improving a household's food security by increasing food consumption by 47 percent and reducing adverse coping strategies by 59 percent. Cash given used to purchase food and reduce adverse coping strategies that make households have food

security and reduced vulnerability. The study recommends that the Ministry under the President's Office Public Services Management and Good Governance through the conditional cash transfer programme to increase the amount of cash given to poor households and the Government, Non-Government Organizations (NGOs) and other stakeholders should work together with the conditional cash transfer programmes to continue to improve food security. Moreover, the programme is recommended to increase beneficiaries to help more households to graduate from extreme poverty.

Keywords: Conditional cash transfer, Poverty, Food security, Propensity score matching

1.2 Introduction

Food security is the state or condition whereby all people are physically, socially and economically well off all the time and have sufficient preferable, nutritious and safe food for a healthy life (FAO, 2012; Fraanje and Lee-Gammage, 2018). It is based on all four components of food security. The first component is food availability which means the physical supply of safe and nutritious food at a given time and place, which is generally concerned with food production at the national and local levels (Burchi and De Muro, 2016). The second component is food access which means the ability to acquire food or purchase food (Burchi, *et al.*, 2018). It is based on economic aspects whereby people and households can obtain food from the market or production and the major instrument used in this component of food security among others is income. The third component is food utilization which is the ability to change or transform food into the needed nutritious food. In totality, it is based on dietary choices which include high quality and varied diets with hygienic and health practices (Burchi *et al.*, 2018). The fourth component is food stability which is concerned with food stability throughout the year (Fraanje

and Lee-Gammage, 2018). From the definition of food security households are viewed as food secure if their members have access to sufficient, safe and nutritious food at a given time and place. For the household to be food insecure is when its members do not get sufficient, safe and nutritious food in a given time and place.

Food insecurity is among the problems that face many poor households in developing countries like Tanzania. That is why there are attempts to initiate programme that will resolve the problem. This is also noted by FAO (2012) that 870 million people who were estimated to be 12.5 percent of the world population were undernourished and about 852 million people (98%) were from developing countries. Among others, the inability of poor households to purchase food while it is available at their markets is the main cause of food insecurity (FAO, 2012). The introduction of cash transfers was one of the solutions to resolving food insecurity among poor households in many developing countries. Cash transfers are used as social assistance to poor households to increase their access to goods and services like food, health and education (Owuso-Addo *et al*., 2018; Afzal *et al*., 2019). There are two forms: non-conditional and conditional cash transfer. Non-conditional cash transfer is cash directed to targeted poor households without any conditions and aimed at assisting them with their basic needs, while conditional cash transfer is cash directed to poor households with the condition of spending on food, health services and education of their children (Parker and Todd, 2017).

Conditional cash transfer in Tanzania is the programme that is objectively used to reduce poverty at the household level and is implemented by the government social fund agency known as the Tanzania Social Action Fund phase III (TASAF III) (URT, 2013). The programme aimed at poverty reduction also focused on improving basic services such as poor households' food

security. From the perspective of this study, poverty reduction was considered to improve poor households' food security.

To reduce poverty the government of Tanzania with aid from the World Bank established the Tanzania Social Action Fund (TASAF) in 1999 as a basic mechanism for poverty alleviation. TASAF aims to support poor households and communities to improve their living standards by accessing services such as health, education, food, clean and safe water and being involved in other income-generating activities. Targeted poor households were assisted in graduating from poverty by having sustainable social and economic development. TASAF has been implemented in three consecutive phases (TASAF I, TASAF II and TASAF III).

TASAF I was implemented between 2000 and 2005 in 40 districts of Tanzania Mainland and Zanzibar and was based on infrastructure development such as the construction of simple bridges, schools, health centers and roads (URT, 2005). The aim was to improve social and economic service delivery in health, education, food security and water to poor communities. Furthermore, TASAF II was implemented in all District Councils, Municipalities and Town councils in the country from 2005 to 2009 and it was based on resolving the lack of social services, income poverty in rural and urban areas and enhancement of beneficiaries and institutions supporting targeted communities and households (URT, 2005). However, the government noted that both TASAF I and II did not do enough in alleviating poverty because the programmes did not provide adequate coverage as they concentrated only on community social development instead of the individual poor people's livelihood. The incapability of TASAF I and TASAF II led to some households being left in extreme poverty. This prompted the government to come up with TASAF III.

The TASAF III was introduced in Tanzania in 2012 to reduce and break the intergenerational transmission of poverty and is based on integrated interventions: productive social safety net, enhancement of livelihoods and increasing income, targeted infrastructure development and capacity building (URT, 2013). The productive social safety net integrates conditional cash transfers and public work programmes. The transfers intend to safeguard poor households from the severe consequences of poverty by assisting them with their food security (URT, 2013). The main objective of the programme was to enable poor households to increase their incomes and opportunities while improving their food and non-food consumption through CCT (URT, 2013). Through conditional cash transfers, it is expected that poor households will have the ability to access sufficient, nutritious and safe food at a given time and place. Furthermore, there is clear evidence that conditional cash transfers used half of it intended for food, one-third for household expenses and the remainder for health, education or other investments (Mohammdi, 2019). Furthermore, it is argued that the use of conditional cash transfers on poor households improves food security in the long term as it invests in young children's nutrition which in the future will help to have stronger, smarter and healthier adults (Brenyah and Domfe, 2019). The government of Tanzania is committed to supporting households to graduate out of both food and basic-needs poverty.

Apart from the CCT programme implemented to reduce poverty in Tanzania poverty is still relatively high. The proportion of people living below the national basic needs poverty line of TZS 49 320 per adult per month was 26.4 percent as per the 2017/2018 Household Budget Survey (HBS) (URT, 2019). Moreover, the occurrence of poverty was higher in rural areas (31.3%) than in urban areas (15.8%) while it was highest in the Rukwa Region (45.0%) and lowest in Dar es Salaam Region (8.0%) (URT, 2019). Furthermore, URT (2019) shows that 8 percent of Tanzania's population falls below the food poverty line (extremely poor). At the

regional level, the Rukwa Region has the highest food poverty of 19.8 percent (URT, 2019a). In addition, at the regional level, the Rukwa Region has the highest poverty gap of 12.9 percent and the severity of poverty of 4.8 percent, while at the national level, the poverty gap is 6 percent and the severity of poverty was 2 percent (URT, 2019).

Despite all the efforts of the government to reduce poverty in the country, Rukwa Region remains the poorest region with a 45 percent poverty level and the food poverty level of 19.8 percent. Although there are some studies noted in Tanzania conditional cash transfers improve poor households' food security (Jacobus, 2020; Mzingula, 2020). However, there is scant information about the impact of the CCT programme in the Sumbawanga Municipality which is in the region with the highest poverty level of 45 percent and the food poverty level of 19.8 percent while CCT has been in operation since 2015. This study intends to assess the impact of conditional cash transfers on poor households' food security in the Sumbawanga Municipality, Tanzania.

1.3 Research Methodology

1.4 Study area Description

The study was conducted in Sumbawanga District in Sumbawanga Municipal Council, Rukwa. The Sumbawanga District is one of the three districts of the Rukwa Region. It is located at 7° 58' 0" South, 31° 37' 0" East in Tanzania's South-West highlands (URT, 2016). The District borders Zambia in the South, the Songwe Region in the South-east, Lake Tanganyika in the South-West and the Nkasi District to the North (URT, 2016)**.** The Sumbawanga Municipal Council is located in the Western part of Tanzania and is the administrative center of the Rukwa Region. The Council has a dry sub-humid climate and is located at an average altitude of 1700 m above sea level. It has an average rainfall of 900 mm-1000 mm per year with an average annual

temperature of 27 ^{0}C (SMC, 2018). The main economic activities of people from the Council are agriculture, business and waged work from the Government and non-government organizations. Various crops such as maize, beans, wheat, sunflower, groundnuts, potatoes, sugarcane and horticultural crops are produced in the area and are involved in livestock keeping like cattle, goats, pigs, sheep and poultry (SMC, 2018). The Council was selected because it is among the councils in which CCT is operated. Moreover, is among the Councils within the region with the highest basic needs poverty of 45 percent and the food poverty level of 19.8 percent relative to Tanzania's average level of basic needs poverty of 31.3 percent and food poverty of 8 percent.

1.5 Research Design

The study employed a cross-sectional research design. The design allowed the collection of similar data from respondents in different areas and data collected at one point in time (Setia, 2016). The purpose of using a cross-sectional design was to obtain consistent data that makes robust conclusions and creates new assumptions that can be examined with new research (Zangirolami-Raimundo *et al.*, 2018). Moreover, a cross-sectional research design is most useful for descriptive purposes and for determining the association among variables at a specific point in time (Setia, 2016). In addition, the study used a quantitative research approach as the method was appropriate to answer the research question.

1.6 Sampling Design and Data Collection

The study used multi-stage sampling to achieve the appropriate sample from the study population. The first step involved the purposive selection of the Sumbawanga District, then the second step was the selection of Itwelele and Lwiche divisions, the third step was Milanzi and Katandala Wards and the last step was the selection of Milanzi and Katandala Streets. Purposive sampling is used to focus on specific features of the population that facilitate the answering of

the research questions (Etikan *et al*., 2016). The wards have been selected due to the availability of beneficiaries in the area, Katandala Ward has 193 and Milanzi Ward has 459 (SMC, 2019). Multistage sampling was used due to its flexibility as it was simple to break down the population to the appropriate sample population (Sabo and Lekan, 2019). Simple random sampling was conducted to select the sample of 450 households for research. The sampling was conducted by having the list of respondents in the selected area then followed by assigning numbers in the chits of paper and being put into a box that was properly mixed manually. Then, chits were randomly picked out of the box to select the sample. The method ensures that the outcomes attained from the sample were likely to be those that would have been attained if the whole population had been measured (West, 2016). Quantitative data used in the study were obtained from a household surveys where a structured questionnaire was administered to the respondents in the study area. Quantitative analysis was adopted to address the research objective.

1.7 Sample Size

Effective reduction of bias in propensity score matching is achieved when the sample size is higher with a minimum of 200 samples (Howarter *et al.,* 2015), thus from that justification, the study used 450 samples of which 171 were the treated group and 279 were the control group. The main condition in the propensity score matching is the balancing covariates (characteristics of participants) between the treated group and the control group (Howarter *et al*., 2015; Benedetto *et al*., 2018). The sample was selected to comply with the condition of balancing covariates. Treated groups or beneficiaries are households that receive cash from the programme (URT, 2013). The control group or non-beneficiaries are the ones without cash transfers.

1.8 Data Processing and Analysis

Descriptive and inferential statistics were utilized in the analysis of data using STATA 14, descriptive statistics tools include mean and percentage while the inferential statistics logit regression model was used. To evaluate the intervention's impact the study used propensity score matching. Propensity score matching is the non-experimental method used to estimate the causal effect of the programme when participation in the programme is non-random (Forbes and Dahabreh, 2020). The method was useful for this objective as it was used to evaluate how cash transfer has an impact on household food security during the identification of beneficiaries randomization was not involved instead conditionals were applied (URT, 2013). The programme identified poor households by using pre-determined criteria such as households that are below the poverty line, households with a large number of dependents and those that are unable to fulfill their basic needs, households that are unable to eat three meals, households with school-going children but those who are not enrolled in school due to lack of income to acquire school requirements and households with under five-year-old children who do not attend clinics due to lack of funds for health services (URT, 2014).

The method was effective in reducing biases caused by confounding variables by estimating the effect of intervention by considering covariates of the treated group and control group (Rosenboum and Rubin, 1983; Benedetto *et al*., 2018; Johnson *et al*., 2018). The beneficiaries' households were compared and matched with non-beneficiary households in all similar observable social-economic characteristics except the treatment (Schulte and Mascha, 2018; Forbes and Dahabreh, 2020). The propensity score matching had two assumptions; the first is the unconfoundedness or conditional independent assumption, which needs all variables that influence treatment assignment and potential outcomes to be observed by the researcher and the second is common support or overlap, which explains why people with the same observable

covariates have a positive probability of being assigned to treatment or not (Lin, 2015; Morgan, 2018).

The study used six steps in propensity score matching. The first step was covariates identification. Covariates are characteristics of the participants in the study except for the treatment and are used to serve as the predictor of involvement in the programme (Harris and Horst, 2016). Covariates used were the age of household head, education of the head of household, household size, marital status of head of household, household's gender, land ownership, main occupation and main source of income. The second step was the propensity score estimation. The propensity score is used as a device to balance the observed distribution of covariates between the treated (CCT beneficiaries) and the comparison group (non-beneficiaries) (Hotmaida and Purba, 2018).

$$e(x) = pr(Z = 1|x) \quad \text{.....(1)}$$

Where e(x) = was the propensity score, Z was the binary dependent variable for being beneficiary (Z=1 if CCT beneficiary, and Z=0 non-beneficiary) and X were observable covariates that may influence to be CCT beneficiary. When calculating the impact of a CCT intervention propensity score e(x) generates appropriate matches if and only if all relevant information about programme participation and outcomes of interest is available (Onyango, 2017). The propensity score was estimated by the logit regression model as follows:

$$e(x) = Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \cdots \beta_n X_n + \varepsilon_i \quad \text{.....(2)}$$

e(x) = Propensity score, Z = Treatment (1 = received cash, 0 = otherwise), β_o = Intercept of regression equation, β_1-β_n = Estimated regression coefficient, X_1-X_n = Observed covariates and ε_i = Error term.

The next step was the balancing procedure conducted to estimate the common support. Each propensity score of the treated group was matched with one control group (Hotmaida and Purba, 2018). Common support is the section that represents the similarity of characteristics between the two groups based on their similarities in the distribution of their propensity scores (Hotmaida and Purba, 2018). The aim of matching households that receive conditional cash transfers with households that have the same observable covariates but do not receive the conditional cash transfers was to avoid comparing incomparable groups.

The fourth step was to select the matching algorithm that was used to ensure the consistency and efficiency of the matching (Harris and Host, 2016). According to Lin (2015), there are several matching algorithms used such as the Nearest Neighbour Matching algorithm (NNM), Kernel Matching (KM), Radius or Caliper Matching (CM), Stratification Matching (SM) and Mahalanobis Metric Matching (MMM). The study used the nearest neighbour matching algorithm, radius matching and kernel matching as the algorithm ensures quality matching between treated and control groups (Lin, 2015; Harris and Host, 2016).

1.8.1 Estimating the Average Treatment on Treated (ATT)

The fifth step was to estimate the effect of the conditional cash transfer on the food security of beneficiaries. Let T_{1i} = 1 represent the CCT beneficiaries, T_{0i} represent the non-beneficiaries, Y_{1i} represent the potential outcome of beneficiaries and Y_{0i} represents the potential outcome of non-beneficiaries. Treatment effect Z was calculated as follows:

$$Z = Y_{1i}(T_{1i} = 1) - Y_{0i}(T_{0i} = 1) \quad \text{.....(3)}$$

Evaluating the impact of treatment in observational studies needs counterfactuals as the outcomes of beneficiaries and non-beneficiaries cannot be observed at the same time. Therefore, the estimate of ATT was calculated as follows:

$$ATT = E(Y_{1i}/T = 1) - E(Y_{0i}/T = 0) \quad \text{... ... ... (4)}$$

ATT was the average treatment of the treated group, $E(Y_{1i}/T = 1)$ was the outcome of the treated group or beneficiary and $E(Y_{0i}/T = 0)$ was the outcome of the control group or non-beneficiary.

This study evaluates the impact of CCT on food security among household beneficiaries. Food security was measured by the Coping Strategic Index (CSI) and the Food Consumption Score (FCS). The food consumption score was calculated by multiplying the frequency of foods consumed in the last seven days with the weight of each food group (WFP, 2008). Moreover, it was measured by comparing the pre-established thresholds which are 0-21 for poor food consumption, 21.5-35 for borderline food consumption and above 35 for acceptable food consumption.

On the other hand, food security was measured by the coping strategic index which was calculated by multiplying the frequency of coping strategies by their respective severity weights (Drysadale *et al.,* 2019). The frequency of coping strategies was measured by determining how many days in the last seven days the households had relied on particular coping strategies.

According to Drysadale *et al.* (2019), the pre-established thresholds for CSI were 0 for food security, 1-30 for low food insecurity, 31-60 for moderate food insecurity, 61-90 for high food insecurity and 91-120 for severe food insecurity. The ideal model for analysis was the logit regression model.

$$\ln\left(\frac{\hat{p}}{1-\hat{p}}\right) = Y = \beta_0 + \beta_1 Z + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + \beta_8 X_8 + \beta_9 X_9 + \varepsilon_i \quad ..(5)$$

ln = Natural Logarithm, $\hat{p}$ = Probability of being food secured, $\frac{\hat{p}}{1-\hat{p}}$ = Probability of being food insecure, Y= Food security (1 food secured, 0 not food secured), Z = Treatment (1 = received cash, 0 = otherwise), β_o = Intercept of regression equation, β_1- β_8 = Estimated regression coefficient, X_2 = Age, X_3 = Sex, X_4 = Marital status, X_5 = education level, X_6 = Household size, X_7 = Main source of income, X_8 = land size, X_9 = Main occupation and ε = Error term. The description of variables used presented in Table 1.1.

Table 1.1: Description of variables used in the equation

Variable	Variable	Nature	Variable Description
Dependent variables			
	Food security	Binary	Food secured or not food secured.
Independent variables			
	Age	Continuous	The number of years of household head since born.
	Sex	Dummy	Sex of household head.
	Marital status	Categorical	Marital status of the head of household.
	Education level	Categorical	The time that the head of household spent on formal education.
	Household size	Continuous	The number of members in the household.
	The main source of income	Categorical	The main source of income of the head of household.
	Land size	Continuous	Size of land owned by the head of household.

	Main occupation	Categorical	The main occupation of the head of household.

Source: Authors' conception based on theoretical and empirical review

1.8.2 Sensitivity analysis

The Rosenbaum bounds sensitivity analysis was performed to check for the presence of hidden bias caused by unobserved covariates between the treated and control groups. The hidden biases due to unobserved covariates in the study can lead to incorrect effects evaluations (Rudolph and Stuart, 2018).

1.9 Results and Discussion

This section covers summary statistics on socio-economic characteristics of respondents, empirical estimation, interpretations and discussion.

1.9.1 Socio-Economic Characteristics of Respondents

Table 2.2 depicts in summary, the percentage of sampled households used in the study based on their socio-economic characteristics. The respondents of the study were dominated by female-headed households rather than male-headed households because female-headed households were more considered than male-headed households (URT, 2014).

Table 1.2: Socio-Economic Characteristics of Respondents

Variable	Description variable	CCT beneficiary (%)	Non-CCT beneficiary (%)	Total households (%)
Sex	Female	83	79	80
	Male	17	21	20
Marital status	Married	46	56	52
	Single	4	3	3
	Divorced	9	8	8
	Cohabiting	1	3	2
	Widow	40	30	34

Number of meals	1	0	2	1
	2	64	88	79
	3	36	10	20
Main occupation	Farming	50	47	48
	Livestock keeping			
	Small business	6	7	6
		44	46	46
Education level	Informal	47	42	44
	Primary	52	57	55
	Secondary	1	1	1

Total households (n=450)

Table 1.2 represents that female-headed households contributed 80 percent of the sampled households and male-headed households contributed 20 percent. According to URT (2019), poverty was associated with the sex of the household head. Female-headed households have 27.4 percent of basic needs poverty and 7.9 percent of food poverty while male-headed households have 26 percent of basic needs poverty and 8.1 percent of food poverty. In addition, female-headed households were most trusted by TASAF as women were close to their children, making sure that they get food, attend school and visit health centers for checkups and vaccinations. Furthermore, the study's respondents worked in a variety of occupations, with 48 percent being farmers and 46 percent working in small businesses. The majority were farmers and farming was the main source of income of many households in the study area. In Tanzania's population, the majority relies on farming as the main source of income but unfortunately remains poor (Kinuthia and Mabaya, 2017). Moreover, most poor households were still struggling to have three meals per day as only 36 percent of beneficiaries were taking three meals per day. The education level of the head of household in the study ranged from informal to primary, whereby 55 percent had a primary level of education and 44 percent had informal education. The majority had a low level of education which narrows the opportunities in labour

markets and hence influences poverty conditions within the household. As argued by Mok and Jiang (2017), education is the determinant of personal income and a higher level of education creates a greater chance in the labour market.

Table 1.3: Household Size, Age of Household Head and Land Size

Variable	Sampled households N=450			CCT beneficiary N=171			Non-CCT beneficiary N=279		
	Mean	**Min**	**Max**	**Mean**	**Min**	**Max**	**Mean**	**Min**	**Max**
Member of household	6	1	12	5	1	12	6	2	12
Age (years)	54	20	98	56	20	98	52	20	98
Land size (acres)	0.87	0	4	0.89	0	4	0.84	0	4

Table 1.3 shows that the average household size was 6 members although the highest was 12. According to URT (2019), poverty increases with an increasing number of household members. In a household with 6 members, 10.2 percent of the members experience food poverty and 28.5 percent of the members experience basic needs poverty. The programme provides the identified poor households with a basic cash transfer of $5 or TZS 20 000 (URT, 2013). Because the programme did not take the number of household members into account it was assumed that the larger the number of household members the smaller the impact of cash given. Poor households with fewer members benefited from basic cash transfers compared to ones with more members. On the other hand, on average sampled household heads were 54 years old. In developing countries, poverty increases with the increase of age (Vera-Toscano *et al.*, 2020). As it is shown that beneficiaries are older than non-beneficiaries this implies that poverty increases with age in the study area. Moreover, most of households in the study area have land size of less than one acre.

1.9.2 Propensity Score estimation

The propensity score was used as a device to balance the observed distribution of covariates between CCT beneficiary households and non-beneficiary households. The balancing test was conducted and the common support option was selected and the region was (.23592335, .71140465). The propensity scores were strictly between 0 and 1and there was sufficient overlap in the propensity scores between treated and control groups with a large common support region. This explains that common support was satisfactory and the balance was achieved between the treated and control groups. Figure 1.1 below shows the distribution of propensity scores across the treated and control groups.

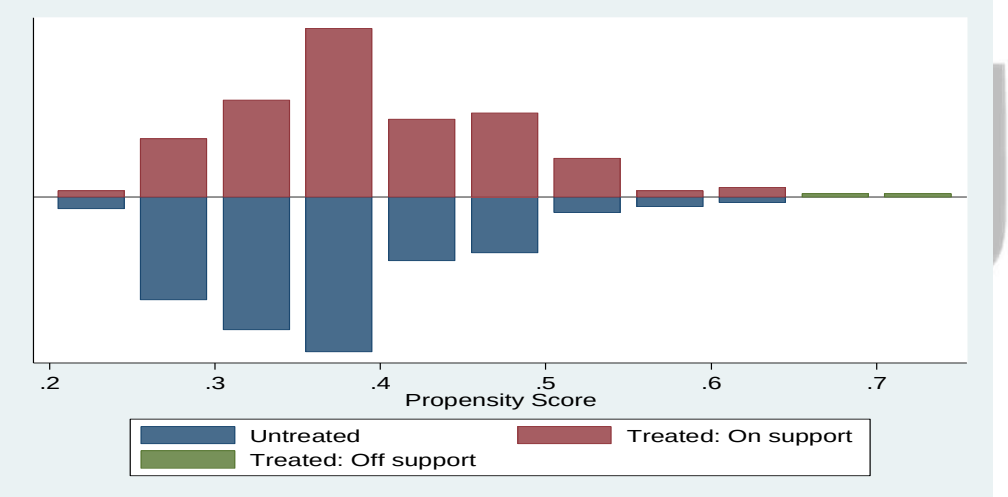

Figure 1.1: Description of the estimated propensity score in the common support region

1.9.3 Balancing of socio-economic characteristics of CCT beneficiaries and non-beneficiaries

Table 1.4 below shows the balance of conditional cash transfer beneficiaries and non-beneficiaries to meet the condition of comparing matched groups to reduce selection bias. The balancing was conducted by the use of a two-sample t-test.

Table 1.4: Balancing of socio-economic characteristics of CCT beneficiaries and non-beneficiaries

	CCT beneficiary 171	Non-CCT beneficiary 279	
Variable	**Mean/Proportional**	**Mean/Proportional**	**P- Value**
Age	56.116	52.279	0.008
Sex	1.830	1.788	0.278
Marital Status	2.847	2.512	0.060
Education level	2.432	2.261	0.235
Household size	5.596	5.716	0.524
Main occupation	1.935	1.992	0.544
Main income	1.198	1.100	0.045
Land size	0.894	0.849	0.655

Table 1.4 shows the mean of the covariates where the condition was satisfied at a p-value 0.05. It is indicated that 75 percent of social-economic characteristics were insignificant at a p-value 0.05 which implies that there is no statistical difference between the treated (beneficiary) and control group (non-beneficiary). This implies that comparisons are made on comparable groups, which reduces bias.

1.9.4 Impact of conditional cash transfer on poor household food security

1.9.4.1 Household food security by using coping strategic index

Table 1.5 presents estimates of the impact of conditional cash transfer on food security based on the use of a coping strategic index. Having a negative sign in the coping strategic index means there was minimal use of coping strategies in mitigating food shortage at the household level thus meaning the households were food secure. The overall results from the matching algorithms used are quite close to each other and show that on average the programme has a positive effect on the households' coping strategies which range from 56 percent - to 60 percent. In the nearest neighbour matching the findings show that the programme reduces coping strategies by 56 percent at $p< 0.01$ and the effect was highly significant at a 1 percent level of significance. On the other hand, in radius and kernel matching the programme reduced the coping strategies by 60

percent at p< 0.01 and the effect was highly significant at a 1 percent level of significance. On average, the programme improves food security by reducing adverse coping strategies by 59 percent.

Table 1.5: Impact of conditional cash transfer on household food security by using coping strategic index

Outcome variable	Model Specification					
	Nearest neighbour		Radius Matching		Kernel Matching	
	ATT	P	ATT	P	ATT	P
Food security CSI	-0.556	0.001***	-0.601	0.0005***	-0.602	0.0005***
Observations						
CCT beneficiary		171		171		171
Non CCT beneficiary		279		275		275

*** p< 0.01, ** p< 0.05, * p< 0.1

From Table 1.5 it was concluded that the conditional cash transfer has a positive impact on households' food security as on average it reduces the household's severity of coping strategies by 59 percent. Before the CCT programme households were using many adverse coping strategies such as depending on less preferred and less expensive foods, purchasing food on credit, limiting portion size at mealtimes, reducing the number of meals eaten in a day, restricting consumption by adults for children to eat, selling off assets and borrowing food, or relying on help from a friend or relative. Participation or being a beneficiary of the conditional cash transfer programme improves their food security by reducing the use of adverse coping strategies. This implies that cash given is used to purchase food so poor households reduce the use of adverse coping strategies since their households were food secured for a longer time and reducing their vulnerability. The results are linked with the studies of (Onyango, 2017; Kileo, 2019; Mzingula, 2020) who also found that conditional cash transfer improves beneficiary households' food security by decreasing the adverse coping strategies used by households.

1.9.4.2 Food security by using food consumption score

Table 1.6 shows food security by using food consumption score in nearest neighbour matching on average the programme improved food security by 43 percent at p< 0.01 and the result was highly significant at a 1 percent level of significance while in radius and kernel matching food security improved by 49 percent and 48 percent at p< 0.01 respectively. On average the programme improves a household's food security by increasing food consumption by an average of 47 percent.

Table 1. 6: Impact of conditional cash transfers on food security by using food consumption score

Outcome variable	Model Specification					
	Nearest neighbour		Radius Matching		Kernel Matching	
	ATT	P	ATT	P	ATT	P
Food security FCS	0.426	0.0005***	0.486	0.001***	0.484	0.0005***
Observations						
CCT beneficiary		171		148		171
Non CCT beneficiary		279		279		275

*** p<0.01, ** p< 0.05, * p< 0.1

From Table 1.6 the household's food consumption was improved in beneficiaries which implies that there was an improvement in the household's dietary diversity and nutrient intake. In another way, having nutritious food improves household health status. The results were correlated with the studies of (Haushofer and Shapiro, 2016; Bhalla *et al*., 2017; Kapama, 2017; Kileo, 2019; Kronebusch and Damon, 2019; Resosudarmo *et al*., 2020) who concluded that conditional cash transfer improves food security in beneficiary households as the cash provided helps them to buy food for their households. Cash transfers provide the chance for households to purchase food at the market and therefore increase the consumption of a variety of foods which directly increases the nutritional value of the households. The cash provided offers a free option to buy different types of food according to the needs of the members of the household.

Furthermore, cash provided used by beneficiaries to finance agricultural activities or in other income-generating activities that generally increase the household income which consequently increases the chance of accessing food (Raghunathan *et al.,* 2017; Burch *et al*., 2018; Mohammdi, 2019; García-guerra *et al*., 2019; Palmeira *et al*., 2019; Mzingula, 2020).

1.9.5 Sensitivity analysis of food security

The Rosenbaum bounds sensitivity analysis was performed to check for the presence of hidden bias caused by unobserved covariates between the treated and control groups.

Table 1.7: **Rosenbaum sensitivity analysis for average treatment effect on treated**

Rosenbaum bounds for coping strategic index (N= 450 matched pairs)			**Rosenbaum bounds for food consumption score (N= 450 matched pairs)**		
Gamma	**Sig+**	**Sig-**	**Gamma**	**Sig+**	**Sig-**
1	0	0	1	0	0
2	0	0	2	0	0
3	3.3e-15	0	3	0	0
4	7.6e-12	0	4	0	0
5	8.0e-10	0	5	0	0
6	1.8e-08	0	6	2.0e-15	0
7	1.7e-07	0	7	1.7e-13	0
8	9.2e-06	0	8	5.1e-12	0
9	3.4e-06	0	9	7.0e-11	0
10	9.9e-06	0	10	5.8e-10	0

***Gamma-log odds of differential assignment due to unobserved factors; Sig+ - upper bound significance level; Sig- - lower bound significance level**

Table 1.7 shows that p-critical values of all outcome variables estimated at various levels of critical gamma values are significant at $p<0.05$, indicating that the main covariates influencing conditional cash transfer participation and the outcome variables have been considered, and changes in gamma values did not change the study conclusions. Therefore, the positive effect of conditional cash transfer on household food security was not influenced by hidden bias due to unobserved covariates.

1.10 Conclusion and Recommendations

1.10.1 Conclusion

The main objective of this study was to assess the impact of conditional cash transfers on household food security. Based on the findings the study observed that the conditional cash transfer programme in the Sumbawanga Municipality has a positive impact on reducing poverty, especially on food security as the programme reduces the use of adverse coping strategies and at the same time the cash used to improve households' food consumption. This implies that a conditional cash transfer programme improves household food security by increasing food consumption while reducing adverse coping strategies. To be a beneficiary was more advantageous than non-beneficiary as many of them in the study area experience food poverty. Through the programme, poverty was reduced as the cash given to beneficiaries assists them to meet their food consumption while preventing them from falling into extreme poverty and improving their livelihood in the long term.

1.10.2 Recommendations

Therefore, based on the study findings and conclusion, it is recommended that:

i. The Ministry under the President's Office Public Services Management and Good Governance and Non-Government Organizations (NGOs) should continue to support

CCT programmes to increase the amount of cash given to poor households. Increasing the amount of money given by CCT programme can support their daily life needs and invest in income-generating activities.

ii. The Government, Non-Government Organizations and other stakeholders have to work together to ensure food prices remain stable and incentives are given to key players to ensure long-term food access.

iii. TASAF has to increase the number of beneficiaries to help more households graduate from food poverty in the study area.

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