

A Comparative Study of the Income and Food Security Status of Households Resettled under Phase I and Phase II of the Land Resettlement Programme. The Case of Gwanda District

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Abstract

At independence in 1980, Zimbabwe inherited a racially skewed land ownership system with the white minority owning more prime land than the majority black population. The subsequent post independence land reform was implemented in two distinct phases. Phase I was implemented gradually, spanning September 1980 to 1999, while Phase II was implemented at an accelerated pace, hence the name Fast Track Land Reform Programme (FTLRP), from year 2000 on-wards. Most researchers have criticized Phase II resettlement for the ad-hoc and seemingly haphazard manner in which it was implemented, which seemed to negatively affect the income and food security status of the newly resettled households. This research sought to examine the differences if any, in incomes, productivity and food security status between households in Phase I resettlement and those in Phase II resettlement. Data was collected from villages in Gwanda North District, from households resettled under the two different phases. The study revealed that households under Phase I were more food secure and resource endowed than households in Phase II. Government was recommended to provide more support to households in Phase II resettlement in the form of subsidized inputs, road infrastructure, agricultural extension and functional marketing arrangements in order to boost productivity, incomes and food security in this sector.

Keywords: Land reform, Phase I, Phase II (FTLRP), resettlement, food security, Gwanda North, Zimbabwe.

1. Introduction

At independence in 1980, Zimbabwe inherited a racially skewed land ownership system (Chitsike, 2003). About 6000 white commercial farmers owned 15.5 million hectares of land whilst 700 000 indigenous communal farming households subsisted on 16.4 million hectares which were mostly in the marginal agro ecological regions IV and V (Moyo and Amanor, 2008). The white commercial farmers occupied large portions of high potential lands in agro ecological regions I, II and III, which receive high annual rainfall (> 650mm), are fertile and more suitable for agriculture, while the majority black indigenous Zimbabweans, subsisted in areas of low and unreliable annual rainfall (< 450mm), with poor sandy soils and experienced frequent crop failure (Moyo and Yeros, 2005).

With independence in 1980, the land redistribution issue was high on the list of priorities for the new government (Marongwe, 2010). The new government embarked on its first land reform programme (Phase I) from September 1980 (Moyo and Amanor, 2008). This land resettlement programme was termed the Intensive Resettlement Programme (IRP) whose main objective was to address the equity concerns between the white commercial farmers, who were the minority and the indigenous population who were the majority and the original land owners (Kinsey, 1999). Other objectives driving the program included relieving population pressure in overcrowded communal areas which were accommodating some 219 000 households in excess of their carrying capacity, and the expansion and improvement of the base for productive agriculture, thus improving food security and livelihoods of the indigenous people (Scoones et al, 2011). The land redistribution also sought to bring into full production war-abandoned or under-utilized farm lands (Weiner, 1988). Government's view on resettlement schemes was that they had to be agriculturally, economically and socially viable from the onset. Rates of return on capital invested, increases in yields per unit area of land/labour, increases in marketed output, incomes per family etc. were to be counterpoised with improvements in diet, health, life expectancy, literacy, skills etc. of the new communities. (Geza, 1984).

Phase II of the land resettlement programme was implemented at an accelerated pace, code named "Fast Track". This followed the disgruntlement of the population with the slow pace of Phase I resettlement, and the increasing reluctance by white land-owners to release more land for resettlement under the willing-buyer willing-seller principle (Katema, 1998). The objective of the Fast Track Land Reform Programme (FTLRP) was to acquire 5 million hectares of land by December 2001, but the target was shifted upwards to 9 million hectares to cover 160 000 households. The beneficiaries of the Fast Track Land Reform Programme (FTLRP) were classified into two categories, the A1 model and the A2 model. The A1 model was intended to decongest communal lands and the A2 model was aimed at creating a cadre of indigenous commercial farmers (Scoones et al, 2011).

The change from Phase I to FTLRP or Phase II, seemed to affect the performance of the land reform

programme, especially its ability to reduce poverty amongst the people who benefited from the exercise (Marongwe, 2010). Phase II of the resettlement exercise was done at an accelerated pace, with no sufficient budgets, equipment or personnel to achieve its targets. Farmers were resettled on land without proper infrastructure such as roads, and important services such as credit and extension (Sukume et al, 2003; Moyo and Amanor, 2008). Food insecurity and poverty seemed to worsen in the aftermath of Phase II resettlement.

Despite studies, new ideas and contributions by various researchers on the benefits of land reform in Zimbabwe (Rukuni et al 2006; Moyo and Amanor, 2008) the question of incomes and food security impact on farmers in the two different resettlement phases remain unanswered. Whether the new resettlement (Phase II) is a better model than the first (Phase I) in terms of addressing the major land reform and resettlement objectives remains debatable. Concrete objectives of land reform programmes relate to yield improvements by farmers, improvements in the food security status of farmers, and increased farm incomes. This study sought to answer these, and related questions using data collected from farmers resettled under the two phases in Gwanda North district, to provide evidence and insights that would assist policy makers in making appropriate policies on land reform and support packages if any, for resettled farmers in order to raise their productivity, incomes and reduce rural poverty as initially envisaged.

2. Methods and Materials

Data was collected from a sample of 123 households with 66 of them selected from Phase I areas, and the other 57 from Phase II areas of Gwanda North district. Stratified random sampling was employed to select the study sample. A household questionnaire was used to collect relevant data, which included demographic characteristics, crops cultivated by households, yields achieved, harvest levels, household asset holding and income sources. Supplementary primary information was also gathered via interviews with key informants from relevant government departments and community leaders concerning the two types of resettlement. Data was fed into Microsoft Excel and processed to produce results.

2.1 The independent samples t- test

The independent samples t- test is used to measure the significance of the differences between the means of two independent samples (Minium and Clarke 1982). In relation to this study, the t-test was used to analyse the significance of the differences between mean yields, food security indices and incomes of the households from the two groups. Yield represents factor productivity, and in this case related mainly to the land resource being utilised by farmers under the two different resettlement arrangements, *ceteris paribus*. Household food security is regarded as a key component defining the success of a land reform programme that redistributes land among different segments of a nation's population (Atwood, 1990; Place & Hazel, 1993, Maxwell et al 1998). Incomes earned are dependent on productive assets held and yield levels achieved, and together determine the social status of households (Siziba, 2008; Tatwangire, 2011; Canning, 2012).

The study was guided by three specific objectives, that is to establish the significance if any, in differences in (a) crop yield for key crops, (b) Gross Food Security Indexes (GFSI), and (c) Incomes, between Phase I and Phase II resettled households.

Results from the tests for each of the three respective hypotheses formulations affirming equality of means for the null hypotheses formulations, and non-equality for the alternative formulations, will allow conclusions to be drawn on whether resettlement type is, or is not an important factor explaining the social status of households with respect to productivity, food security status and income level respectively for the two groups. Useful policy implications can be drawn to help improve decisions on future resettlement choices and improving farmer performance and the social status of households in the existing resettlement models.

2.1.1 Crop yield per hectare

Crop yield represents the output of a crop harvested per area of land put under cultivation, usually one hectare. This metric gives a good indication of land productivity subject to specified levels of other resources utilised in the production process (OECD-FAO, 2014). It also measures the efficiency of resource use and that of the production processes employed in creating an output. Crop yield realised can be compared with the potential/standard yield for that particular crop to gauge if the farmers are doing well or badly. The farmer as an economic agent seeking to maximize utility from productive endeavour is assumed to seek to maximize resource productivity, and in this case will seek to raise the crop yield per hectare to its potential, and *ipso facto*, increase his income subject to prevailing prices, and other constraints. In this study, the average yield figures for the

major crops grown by the households in the different groups were established and used as indicators of productivity.

2.1.2 Household Food Security Situation (Gross Food Security Index)

Dhlamini and Guveya (1995), approximated household food security using the Gross Food Security Index (GFSI) based on staple grain, whose formula is shown below.

$$\text{GFSI} = \frac{TGP}{TGR}$$

where: GFSI= Gross Food Security Index,

TGP = Total Grain Produced

TGR = Total Grain Required

GFSI = 1 implies that grain produced by household is equal to household requirement. This means that the household is sufficient but does not have excess to sell or give to relatives. GFSI < 1 means that the grain produced by the household is less than household requirement, meaning that the household is not food sufficient. GFSI > 1 shows that grain produced by the household is more than the requirement of the household, meaning that the household can afford to sell or give away the surplus. This is the basic requirement for food security when assessment is based on production coupled entitlement.

2.1.3 Earned income from farm and off-farm activities

Farm income represents the earnings of a rural household whose main economic activity for sustenance is farming. Ideally it is income realised from selling proceeds from farming activities, although it is now accepted that income earned from other non-farm sources but accruing to a farm family is part of farm income (Reardon et al 2001; Davis 2004). In this study farm income was taken to include off farm income earned by farm households.

Absolute farm income measures include the Gross Cash Income which represents the sum of all receipts from the sale of crops, livestock and farm related goods and services, as well as any direct payments from government; the **Gross Farm Income**, which is the same as gross cash income with the addition of non-money income, such as the value of home consumption of self-produced food; and the **Net Cash Income which is** the gross cash income less all cash expenses, such as feed, seed, fertilizer, property taxes, interest on debt, labour costs and rent to non-operator landlords. These income measures are contingent on the existence and consistent use of robust data capture systems by farmers. This is a very weak element in most African farming systems and such data capturing capabilities are still underdeveloped and mostly absent. It remains an onerous task to make farmers understand, appreciate and take up the keeping and maintenance of reliable records pertaining to their farming activities. For this study, crude estimates of the Gross Farm Income figure and its derivatives were attempted based on crop yield figures, average area under cultivation and prices. Using the entitlement concept of food security, this is deemed a good food security proxy if assessment is coupled to trade or exchange (Sen, 1984).

3. Results and Discussion

3.1. Demographic characteristics of the households

Sample analysis revealed that most of the households in both schemes were headed by males, 71.2% in Phase I, and 82.5% in Phase II. The high percentage of households headed by males in both groups shows that Zimbabwean societies are patriarchal, with males dominating over women. In Phase II resettlement, there is a relatively high percentage of married household heads (70.2%) than in Phase I resettlement (63.6%).

Table 1: Demographic characteristics of households

	Phase I (N=66)	FTLRP (Phase II) (N=57)	Diff
Gender of the HH (%)			
<i>Male</i>	71.2	82.5	
<i>Female</i>	28.8	17.5	
Age of the HH (mean years)	53.3 (9.908)	44.1 (8.9)	SS
Marital status of HH (%)			
<i>Married</i>	63.6	70.2	
<i>Widowed</i>	19.7	12.3	
<i>Divorced</i>	7.5	1.8	
<i>Single</i>	9.2	15.7	
Household size (mean persons)	7.2 (3.33)	5.51 (2.036)	SS
Household structure			
<i>Males (mean)</i>	3.4 (1.9)	2.72 (1.065)	SS
<i>Females (mean)</i>	3.6 (1.875)	2.81 (1.517)	SS
<i>Children < 18 years (mean)</i>	2.8 (1.72)	2.56 (1.427)	NS
Education level of HH (%)			
<i>No formal education</i>	3	0	
<i>Primary education</i>	12.1	1.8	
<i>Secondary education</i>	47	90.4	
<i>Certificate and above</i>	37.9	7.8	
Employment status of HH (%)			
<i>Not employed</i>	27.3	33.3	
<i>Self employed</i>	21.2	33.3	
<i>Full time employed</i>	36.4	14	
<i>Part time employed</i>	15.1	19.4	

Notes: HH= Household head; In parenthesis are standard deviations for continuous variables; Diff= Statistical difference; (ns)ss= (not) statistically significant at 5% level using T-test for continuous variables and Chi-square test for categorical data; (N)= number of households in the sample

The mean age of the household heads were significantly different at 53.3 years in Phase I and 44.1 years in FTLRP resettlement, meaning that household heads in Phase I resettlement are generally older than household heads in Phase II. The average household size in Phase I resettlement was significantly different from that of Phase II (7.2 persons in Phase I and 5.5 in Phase II). The difference in the household sizes can be partially explained by the fact that household heads in Phase I resettlement are generally older than those in FTLRP resettlement, and it is logical that older household heads will have bigger families. This has implications on available family labour.

A higher percentage of household heads in Phase II resettlement are self-employed (33.3% as compared to 21.2% in Phase I). This can be attributed to the fact that household heads in Phase II resettlement are generally younger than those in Phase I resettlement, hence can engage in piece jobs such as firewood collection and selling.

3.2 Household economic characteristics

3.2.1 Household land holding

Siziba (2008) affirms that the quantity and quality of productive resources are the important factors that affect the farmer's productive capacity and efficiency. The total size of land that the household owns determines the household cropping patterns and agricultural output. Table 2 below shows the amount of agricultural land that is held by households in Phase I and Phase II resettlements.

Table 2: Household land holding in hectares

	Phase I (N=66)				FTLRP (Phase II) (N=57)				t-test
	Mean	Max	Min	Std	Mean	max	min	Std	
Household land size (Ha)	4.2	9	1	2.01	3.4	4.5	1	0.78	SS

(ns)ss= (not) statistical significant at 5% level; std= standard deviation; (N)= number of households in the sample

The mean household land size in Phase I resettlement is significantly bigger than the mean household land size in Phase II resettlement (4.2 hectares in Phase I and 3.4 in Phase II). This means that households in Phase I resettlement generally own bigger fields than households in Phase II resettlement.

3.2.2 Financing Agricultural Production

Agricultural inputs such as seeds, fertilizers and chemicals are the major determinants of the quantity of agricultural output that is eventually produced. Figure 1 below shows the various sources of agricultural inputs.

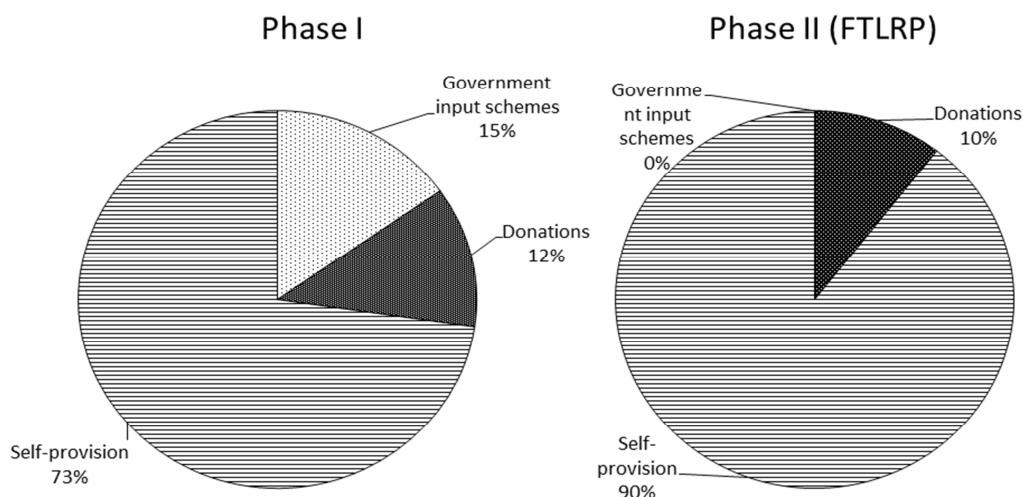


Figure 1: Sources of agricultural inputs

Most households used personal funds to purchase agricultural inputs (89.5% in Phase II and 72.7% in Phase I). A significant number of households in Phase I (12.1%) benefited from input donations than in Phase II (10.5%). Households in Phase I resettlement also benefited from the government input schemes (15.2%) while no government inputs were advanced to Phase II.

3.2.3 Farm equipment owned

Siziba (2008), contends that the ox-drawn plough is the typical farm implement used by most smallholder farmers for land preparation. All the households in both resettlement phases owned and used ox-drawn ploughs to prepare their land. Households in the two resettlements also used other ox-drawn implements for their agricultural activities, these were cultivators (81.8% in Phase I and 33% in Phase II), and the ox-cart (81.8% in Phase I and 52.6% in Phase II). Notably the use and ownership of ox-drawn implements was significantly higher in Phase I than in Phase II, with the exception of the ox plough which was owned and used by all households in both resettlements. The other equipment used was the wheel-barrow (51.5% in Phase I and 28.1% in Phase II). A small percentage of farmers in Phase I resettlement owned tractors (3% in Phase I and non in Phase II).

Table 2: Farm equipment ownership

	Phase I (N=66) % owning	Phase II (N=57) % owning	Diff (Chi-square test)
Ox drawn equipment			
Plough	100	100	NS
Cultivator	81.8	33.3	SS
Scotch carts	81.8	52.6	SS
Other implements			
Wheel barrow	51.5	28.1	SS
Tractor	3	0	NS

(ns)ss= (not) statistically significant at 5% level; (N)= number of households in the sample

3.2.4 Crop Production

Households in both resettlements cultivated a variety of crops for food purposes and also as a source of income. Maize was the most popular cereal crop cultivated by all households in both groups, being the staple crop in Zimbabwe. Other cereal crops such as sorghum were not popular in both phases. Households in both schemes also cultivated pulses such as cowpeas, groundnuts and beans. Groundnut was cultivated by 60.1% of the households in Phase I and 75.4% of households in Phase II, making it the second most important crop.

Table 3: Types of crops cultivated

	Phase I (N=66) % growers	FTLRP (Phase II) (N=57) % growers	Diff (Chi-square)
Cereals			
Maize	100	100	
Sorghum	3	1.7	NS
Pulses			
Cowpea	9.1	8.8	NS
Ground nuts	60.1	75.4	SS
Beans	28.8	1.8	SS
Other crops			
Sunflower	7.6	0	NS

(ns)ss= (not) statistical significant at 5% level, (N)= number of households in the sample

The study revealed that on average, households allocated 2.74 hectares of the cropping land to maize in Phase I and 2.38 hectares in Phase II. Considering all crops cultivated by households in both phases the highest proportion of cropping land was allocated to maize, followed by groundnuts (15.5%), beans (6.1%), cowpeas (1.7%), sunflower (1%) and sorghum (0.6%).

3. 3 Yield of major crops

Yields of important crops are presented in table 5 below. The cropping area in hectares allocated to a particular crop and the total output for that crop were the figures used to determine yield per hectare.

Table 5: Yields of major crops (Kgs/ha)

	Phase I (N=66)				FTLRP (Phase II) (N=57)				Diff
	Mean	Max	Min	Stddev	Mean	Max	Min	Stddev	
Maize	158.45	300	10.00	70.5	94.25	1000.00	6.7	146.4	SS
Ground nuts	58.25	200	25	30.02	62.23	200	12	41.95	NS
Cowpeas	43.2	50	30	8.73	68	120	40	33.5	NS
Sorghum	110	120	100	14.14	150	150	150	-	NS

(ns)ss= (not) statistically significant at 5% level; (N)= number of households in the sample

On average, households in Phase I achieve higher maize yields(158.45kgs/ha) than households in Phase II (94.25kgs/ha). The difference in maize yield is significant ($p=0.02$). However, there was a greater variation in maize yield from household to household in Phase II (Std deviation 146.4) than in Phase I (std deviation 70.5), this probably attributable to differences in resource endowments and farm management abilities among households, with Phase I householders better resourced in terms of productive assets possessed, multiple and more diverse financing sources.

Groundnut, the second most commonly grown crop exhibited varying yield between the two groups. Yield by households in Phase I (58kgs/ha) is less than that by households in Phase II resettlement (62.3kgs/ha) although the difference is not statistically significant ($p=0.62$). The insignificant differences can be attributed to the fact that since both sets of households (Phase I and Phase II) cultivate groundnuts on a relatively small proportion of land (0.9ha in Phase I and 0.6ha in Phase II), it is easy for both sets of households to properly manage groundnut cultivation thus minimizing the difference in yield realized. Yields for cowpeas and sorghum are also higher in Phase II than in phase I indicating the generally higher yields obtainable from virgin lands for the two crops in the absence of inorganic fertilisers. The differences in yield between the two phases for the two crops are also insignificant indicating the relatively low level of production in both schemes.

It is noteworthy that the highest mean yield figures for the prominent crops grown for both Phases together (0.158ton/ha for maize in Phase I; 0.063,5ton/ha for groundnut in phase II; 0.068ton/ha for cowpeas in Phase II; and 0.15ton/ha for sorghum in Phase II, all fall short of national average yield figures for the respective crops (0.3ton/ha for maize, between 2.5 and 7 tonnes /ha for groundnuts, 0,5 to 3 ton/ha for cowpeas, and up to 5 ton/ha for sorghum), indicating resource underutilisation and huge productivity gaps in resettlement areas.

3. 4 Comparative household food security status

Number of meals consumed per day by household can serve as an indicator of household food availability, which is a major pillar of food security. According to Mudefi (2011), a normal food secure household in rural Zimbabwe consumes at least three meals per day. Table 6 shows the number of meals per day consumed by households in the study sample.

Table 6 Number of meals consumed by households per day

	Phase I (N=66)	FTLRP (Phase II) (N=57)	Chi-square test
	% consuming	% consuming	
Number of meals/day			
2	37.9	59.6	
3	56.1	31.6	
More than 3	6	8.8	SS

ss= statistically significant at 5% level; (N)= number of households in the sample

The table indicates that 37.9% of Phase I households consumed two meals per day, 56.1% consumed three meals per day and only 6% of the households consume more than three meals per day. In Phase II resettlement, the bulk of the households(59.6%) consume two meals per day 31.6% consume three meals per day and only 8.8 % consume more than three meals per day. Intuitively, by simply reducing the number of meals consumed per day by a factor of one for each of the 3 meal levels for the 2 phases (Table 6), Phase II households, has more subjects suffering immediate food deficiency indicating a higher level of household food insecurity for this

group.

3.5 Gross Food Security Index (GFSI)

Table 7 gives the Gross Food Security Indexes for households in Phase I and Phase II resettlement. The Gross Food Security Indexes were calculated based on the stated grain harvested by households and the said family grain requirements. The analysis is prone to errors since it does not cover all possible sources of income. The figures therefore must only be treated as indicative. In Phase I, 43.9% of the households produce grain that covers more than their household requirements (GFSI >1) while only 5.3% of the households in Phase II produced grain that covered their household needs. In Phase I, 7.6% of the households produced grain that covered only up to 30% of their needs (GFSI 0-0.3), 18.2% produced grain that covered up to 60% of their requirements (GFSI 0.31-0.6) and the remaining 30.3% produced grain that covered up to 99% of their needs (GFSI 0.61-0.99). In Phase II, 26.3% produced up to 30% of their grain requirement. A high percentage of households in Phase II produced grain that covered up to 60% of their requirements and the remaining 14% of the households produced grain covering up to 99% of their requirements. This means that Phase I households are relatively more food secure than Phase II households.

Table 7: Food Security Indexes for Phase I and Phase II households

	Phase I (N=66) % households	(Phase II) (N=57) % households
GFSI		
0 - 0.3	7.6	26.3
0.31 – 0.6	18.2	54.4
0.61 – 0.99	30.3	14
>1.0	43.9	5.3

(N=) =number of households in the sample

3.5.1 Comparing household food security status

Table 8 below shows the mean GFSI of households in Phase I resettlement and those in Phase II resettlement. The mean GFSI indicates how much food the household produces in proportion to its consumption demand.

Table 8: Mean household GFSI

	Phase I (N=66)				FTLRP (Phase II) (N=57)				T-test
	Mean	Max	Min	Std	Mean	max	min	Std	
GFSI	1.02	2.4	0.21	0.592	0.48	2.5	0.1	0.35	SS

ss= statistically significant at 5% level; Std=standard deviation; (N=) =number of households in the sample

From table 8 above, the mean GFSI of households in Phase I was found to be 1.02. This implies that on average a household in Phase I resettlement is able to produce food that can cover slightly more than its consumption requirement. In Phase II resettlement, the mean GFSI was found to be 0.48, meaning that on average households produced food that covered 48% of their requirements, implying food deficit. The difference in the mean GFSI Indexes in Phase I and Phase II was statistically significant (p=0.05). The differences in the GFSI in Phase I and Phase II households can be attributed to the fact that households in Phase I resettlement achieve higher maize yields than those in Phase II resettlement.

3.5.2 Livestock

According to Kassa et al (2002), livestock determines the socio economic status, food security and sustainability of rural households in developing countries. Households in developing countries use livestock to produce and access food. Table 9 presents the different types of livestock kept by households in the study area. Chickens were the most popular type of domestic livestock in both resettlements, with almost every household raising them (95.5%, Phase I and 96.5%, Phase II).

Table 9: Livestock owned

	Phase I (N=66)					FTLRP (Phase II) (N=57)					T-test
	Mean	max	min	Std	%owning	mean	max	Min	Std	%owning	
Cattle	12.1	40	0	7.68	95.5	5.1	17	0	4.6	78.9	SS
Donkey	4	11	0	2.93	80.3	2	8	0	2.22	52.6	SS
Goat	10.1	24	0	5.64	92.4	4.5	14	0	3.87	75.4	SS
Pig	0.26	14	0	1.76	3	0	0	0	0.00	0	NS
Sheep	1.5	9	0	2.86	24.2	0.04	2	0	0.27	1.8	SS
Chickenn	12.4	38	0	9.31	95.5	7.9	18	0	3.56	96.5	SS
Turkey	0.05	3	0	0.37	1.5	0	0	0	0.00	0	NS

(ns)ss=(not)statistically significant at 5% level; Std=standard deviation; (N=) = number of households in the sample

Cattle were an important livestock kept by households in both resettlements (95.5% in Phase I and 78.9% in

Phase II). On average households in Phase I kept a herd of about 12 cows, while 5 cows were kept in Phase II resettlement. The difference in the means was statistically significant ($p=0.05$). According to Siziba (2008), cattle are central in the economic and social activities of rural households. Cattle are mainly used as a source of draft power, a source of milk and meat to supplement household diet, and as a source of income.

Goats were also another important livestock in both resettlements, owned by 92.4% and 75.4% of households in Phase I and Phase II respectively. On average each household kept 10 and 4 goats in Phase I and Phase II resettlement respectively. The difference in the means was statistically significant ($p=0.05$). Goats were mainly reared by households as a source of income, meat and milk.

Households in both resettlements also kept other livestock types such as donkeys, sheep, turkey and pigs. Again, possession of all types of livestock is stronger in Phase I than in Phase II, indicating that food security status contingent on livestock possession is better in Phase I than it is in Phase II resettlement.

3.6 Comparative household incomes

3.6.1 Household sources of income

The study revealed the most important sources of income as formal employment (48.5%), self-employment (22.7%), and sale of crops(19.7%), for Phase I households, while for Phase II households, these are self-employment(75.4%), formal employment(21.1%), sale of crops and livestock, both at 14%. The major source of household income in Phase I was formal employment with 48.5% of the households earning from it, while in Phase II, the bulk of the households (75.4%) earn their income from self-employment.

3.6.2 Household income comparisons

Household incomes are compared based on measures such as, total household income (per household income), per capita income and per person income per day which are given by the following formulations:

$$\text{Total Household Income} = \sum(\text{household income from all income sources})$$

$$\text{Per Capita Income} = \frac{\text{TOTAL HOUSEHOLD INCOME}}{\text{HOUSEHOLD SIZE}}$$

$$\text{Income per person/day} = \frac{\text{per capita income/month}}{\text{number of days in a month}}$$

Table 10: Household income measures

	Phase I (N=66)				FTLRP (Phase II) (N=57)				T-test
	mean	Std d	Min	Max	Mean	Std d	min	Max	
Income measures (US\$)									
<i>Per household income</i>	264.1	213.6	0	790	198.5	152.1	10	790	SS
<i>Per capita income</i>	36.8	29.7	0	109.7	36.1	27.6	1.82	107.3	NS
<i>Per person per day</i>	1.2	0.988	0	3.66	1.1	0.934	0	3.58	NS

(ns)ss= (not) statistically significant at 5% level; (N)= number of households in the sample

3.6.3 Total per household income

Total household income was calculated by summing up income earned by a household from all sources (Gross Farm Income). From Table 10 above, households in Phase I earned an average of US\$264.1 per month as compared to US\$198.5 per month earned by households in Phase II. The difference in the incomes was statistically significant ($p=0.05$). This means that households in Phase I resettlement generally earn more income per month than those in Phase II resettlement.

3.6.4 Per capita income

Per capita income in this analysis was calculated by dividing total household income by the size of the household. The per capita income was US\$36.8 and US\$36.1 per month for household members in Phase I and Phase II respectively. The difference in per capita incomes was statistically insignificant meaning that the per capita incomes of residents of Phase I was almost equal to that of residents in Phase II resettlement.

3.6.5 Per person per day

Income per person/day is the amount of income earned by an individual in a household per day. It was calculated by dividing the per capita income by the number of days in a month. Number of days in a month was assumed to be 30 days. The income per person per day was US\$1.2 and \$US1.1 in Phase I and Phase II resettlement respectively and the difference was statistically insignificant. This means that Phase I and Phase II resettlement residents earn approximately equal amounts of income per day.

3.6.6 Assets a proxy for household income

Arthur et al, (1998), affirm that household asset holding can be used to approximate household income and

wealth. Ownership of production assets (productive assets) and consumption assets (non-productive assets) can be used as a proxy of income in various socio economic spheres(Canning et al 2012). Table 11 presents the various types of productive and non-productive assets owned by households in both the resettlement phases. Households in Phase I generally own more productive assets than those in Phase II. The most widely used productive resources in Phase I were ploughs (100% households), scotch carts (84.8%), cultivators (81.8%) and wheelbarrows (51.5%); while in Phase II, the most widely owned productive resources were ploughs(100%) and scotch carts(53%).

Table 11: Household productive and non-productive assets ownership

	Phase I (N=66)					FTLRP (Phase II) (N=57)					T-ts
	mean	max	Min	Std	%owning	mean	max	Min	Std	%owning	
Productive assets											
<i>Tractor</i>	0.3	1	0	0.173	3	-	-	-	-	-	
<i>Car</i>	0.26	2	0	0.474	24.2	0.12	1	0	0.331	12.3	NS
<i>Plough</i>	1.35	3	1	0.54	100	1	3	1	0.567	100	SS
<i>Cultivator</i>	0.97	2	0	0.581	81.8	0.35	2	0	0.517	35.1	SS
<i>Scotch cart</i>	0.85	2	0	0.438	84.8	0.54	2	0	0.537	52.6	SS
<i>Generator</i>	0.36	2	0	0.545	33.3	0.18	2	0	0.428	15.8	SS
<i>Wheelbarrow</i>	0.56	2	0	0.585	51.5	0.28	2	0	0.453	28.1	SS
Non-productive											
<i>Solar Panel</i>	0.8	3	0	0.588	72.7	0.65	2	0	0.582	60.7	NS
<i>Radio</i>	0.76	2	0	0.498	72.7	0.58	3	0	0.596	54.4	NS
<i>Cell phone</i>	3.05	6	1	1.451	100	1.9	4	0	0.808	98.2	SS
<i>Television</i>	0.5	2	0	0.562	44	0.23	2	0	0.501	19.3	SS

(ns)ss= (not) statistically significant at 5% level; std=standard deviation; T-ts= t-test; (N)= Number of households in the sample

The numbers of productive assets such as ploughs, cultivators, ox-drawn scotch carts, generators and wheelbarrows owned by Phase I households are statistically more than those owned by Phase II households. This signifies that households in Phase I resettlement have more wealth than those in Phase II resettlement. Most common non-productive resources used by households in Phase I were cell phones, solar panels and radios owned by 100%, 72.7% and 72.7% of households respectively. The ownership of cell phones and television in Phase I was significantly different from that of Phase II households. Households in Phase I owned more cell phones and televisions than those in Phase II resettlement. Since cell phones and televisions are considered as luxuries and associated with wealthy households especially in rural areas, this means that households in Phase I resettlement earn more income than those in Phase II resettlement.

4. Conclusion

Study results revealed that households in both resettlements cultivated a wide range of food crops which include maize, sorghum, cowpeas, groundnuts and beans. Using the independent samples t-test to test the differences in maize yields, the analysis revealed that households in Phase I realized higher maize yields than households in Phase II. The maize yield difference was significant at 5% level ($p=0.05$).The analysis also revealed that the difference in yields for other crops (Sorghum, cowpeas, groundnuts and beans) were not statistically significant between the two resettlements. The Gross Food Security Index (GFSI) was found to be 1.02 for households in Phase I and 0.48 for households in Phase II. From the GFSI analysis it can be concluded that households in Phase I are more food secure than households in Phase II. The analysis also revealed that households in Phase I resettlement owned more livestock which can be used to supplement household dietary requirements. This further suggests that households in Phase I resettlement are indeed more food secure than households in Phase II resettlement. The study also revealed that households in both the resettlements in Gwanda North District earned income from sources such as crop sales, sale of livestock, formal employment, self-employment and remittances. Using the independent samples t-test to test for the differences in the total household income for the two groups, the analysis showed that households in Phase I resettlement on average earned more income than those in Phase II resettlement, and the difference was statistically significant at 5% level ($p=0.05$). The difference in the per capita income between Phase I and Phase II resettlement was not statistically significant, meaning that residents in Phase I resettlement earned income almost equal to that in Phase II resettlement. Triangulating via the asset approach to measure household income, the analysis confirms that households in Phase I resettlement earned more income than those in Phase II resettlement. Households in Phase I resettlement owned more resources such as cultivators, wheelbarrows, generators, scotch carts, cell phones, televisions and cars than those in Phase II resettlement. More resources indicate that households in Phase I resettlement are more wealthy than those in Phase II resettlement.

The study leads to the general conclusion that the Phase I model of resettlement has more merit than the

Phase II (FTLRP) model in terms of crop yields achieved by farmers, incomes, food security status and the general welfare of resettled farmers. The Phase II model will have to be modified in many ways in order for it to be accepted as a better alternative to the slow and better planned Phase I, or the Integrated Resettlement Program.

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