

Contribution of Heifer In-Trust schemes to smallholder households' well-being in Highland area of Njombe Region, Tanzania

M L Msangya, J K Urassa¹ and C P Mahonge²

Sokoine University of Agriculture (SUA), Development Studies Institute (DSI),

P.O. Box 3024, Morogoro, Tanzania. Email: mlamsangya@yahoo.co.uk

¹ *Development Studies Institute (DSI), P.O. Box 3024, Morogoro, Tanzania*

² *SUA Centre for Sustainable Rural Development (SCSRD), P.O. Box 3035*

Morogoro, Tanzania

Abstract

Food insecurity and poor income is a big challenge in Njombe Region. The Heifer in-Trust Schemes (HIS) in this region aimed at reducing food and income insecurity. The study's main objective was to determine the contribution of the HIS farming households' well-being in the highland areas of Njombe, Tanzania. Specifically, the study aimed at determining the contribution of the HIS to food security measured by number of meals and composition of these meals and at exploring the contribution of sales of milk, calves and pastures to household income. The study adopted a cross-sectional design and using HIS registers books, data were collected from 200 randomly selected HIS beneficiary households using a structured questionnaire. In addition 4 Focus Group Discussion (FDGs) were conducted to supplement information collected through the questionnaires.

Results from the study show that dairy farming was the major source of food and income. Despite the variations in seasonality in this highland agro-ecological zone, HIS has enormously contributed to the improvement of smallholder farmers' well-being. Generally, smallholder households' food was secured; an average of three meals daily with diversified nutrients was taken and income has increased.

Key words: *agro-ecology, dairy farming, food and income security*

Introduction

Tanzania is one of Africa's most politically stable countries (WEP 2010). It is now more than five decades since Tanzania gained independence from British rule in 1961. However, it is still categorized as a low income developing country, with some 80% of the country's population primarily dependent on subsistence farming for their livelihood. Generally, agriculture in Tanzania forms the mainstay of the economy; it contributes almost 24 percent of the country's GDP (URT 2011; World Bank 2012). Tanzania's agricultural sector accounts for 95% of the food consumed and for more than two-thirds (70%) of rural household's total income - 53 percent from crop production, 13 percent from livestock, and four percent from agricultural wages (Katia et al 2012). About 90% of Tanzania's poor people live in rural areas (IFAD 2011) and poverty remains widespread and is greater in rural parts of the country. More than a quarter (WB 2010) of the Tanzania population falls below the basic needs poverty line and 9.7% fall below the food poverty line (NBS 2011/12). Under these circumstances, the well-being of the people in the country's rural areas is severely compromised. In this study well-being means smallholder farmers having increased food access and reduction of income poverty.

The Heifer In-trust Schemes (HIS) which is one of the livestock credit investment strategies introduced by Heifer International (HI) in the country aim at reduce rural poverty and promote well-being of poor households. The HIS targets poor resource households, which are given a young female cow (heifer) based on an agreement that the household would pay the credit back through the first and second offspring, which are normally passed on to another poor household. Globally, the HIS idea was initiated by Dan West (1893-1971) who was a Midwestern farmer in Spain. West was ladling out rations of milk to orphans and refugees during the Spanish Civil War

when the idea of reducing dependency and relief came to his mind. He founded the Heifer Project International (HPI) and HIS for Relief in 1944, which is dedicated to ending hunger and poverty.

In Africa, HIS was launched in 1974 whereby Tanzania was one of the very first countries on the continent to undertake the scheme. The HIS was first introduced at Kitulo dairy farm in Makete District in Njombe Region under Dairy Farming Company (DAFCO) with the purpose of establishing the foundation herd farms to produce improved dairy heifers for distribution to communal villages known as Ujamaa. In Njombe Region, the HIS was introduced in 1998. Since its initiation in Tanzania, HIS has been a popular credit model for poverty reduction for about 40 years. The scheme has been adopted by many dairy development actors and donors including; the Tanga Smallholder Dairy and Extension programme (SDEP) that was sponsored by The Netherlands Development Organization (SNV), The Heifer Project International (HPI) that funded the HIS; and the District Agriculture Development Investment programme (DADIPS) under the sponsorship of the United Republic of Tanzania (Urassa 2005 and HITz 2011).

The study's main objective was to determine the contribution of the HIS to smallholder households' well-being indicators in highland areas of Njombe Region in Tanzania. Specifically, the study aimed at determining the contribution of the HIS to food security measured by number of meals and meals' composition and at exploring the contribution of milk, calves and pastures to household income. This study is in line with the Millennium Development Goals (MDGs) 1 and 3 that addresses issues of extreme income poverty and hunger and gender equity by 2015; Tanzania Vision 2025, National Strategy for Growth and Poverty Reduction Strategy II; and the National Livestock Policy vision 2025 that state *“By year 2025, there should be a livestock sector, which to a large extent shall be commercially run, modern and sustainable, using improved and*

highly productive livestock to ensure food security, improved income for the household and the nation while conserving the environment” (URT 2006). The study fills the gap in the existing literature on the contributions of dairy farming to smallholder household’s wellbeing. Furthermore, the findings will enhance knowledge to academicians on how the factors like lack of credit, agro-ecology and culture influence the well-being of the rural people. Lastly, the findings also would sharpen insights of the government and other development actors including HITz (Heifer International Tanzania) on how HIS alleviates poverty and enhances well-being among smallholder farmers. HITz has phased-out supporting beneficiaries in this area for the last 15 years so it would be a proper time to study the impacts made by the scheme.

Methodology

Description of study area

Njombe is among 30 Tanzania’s administrative regions. It is situated in the southern highlands of Tanzania forming part of Southern Agricultural Growth Corridor (SAGCOT) supporting “*Kilimo Kwanza*” (Agriculture First). According to the national population and housing census, the region had a population of 702,097 (URT 2013). Njombe Region has a size of 21,347 square kilometres (URT 2011). It lies between longitudes 34° 56’ 0” and 36° 06’ 07 and between latitudes 9° 20’ 0’ and 11° 0’ 0’. Njombe Region is at 1,581 meters above the sea level with an average annual rainfall of 1500 mm (NRCO 2011). Major ethnic groups in the region are the Bena and Hehe. This study was conducted in eight villages.

Study approach

This study was guided by a question: ‘how has HIS contributed to smallholder household’s well-being indicators in highland areas of Njombe region in Tanzania? The study used a cross-sectional

design. This is observational in nature and is good for descriptive research using characteristics that exist in a population to make inference about relationships (Farzin 2011). Through a cross-sectional design, data are collected once (Bailey 1998). Using HIS beneficiaries' registers books, the sample size (n) was determined. HIS beneficiaries households were randomly selected basing on 5% of total number of beneficiaries households in the study areas. Data collection was done in December 2012. Data were collected from 200 randomly selected HIS beneficiaries households using a structured questionnaire. A checklist of items concerning the milk production and sales, pastures establishment and calves was also used to guide the making of personal observations. In addition 4 FGDs were conducted to supplement information collected through the questionnaires.

Data analysis

For the quantitative information, the T-test was used to determine the significant level of milk production, consumption and sales during the wet and dry season. In addition, Chi-square was used to determine associations in net income, crops production and milk before and after the introduction of HIS. The *Wilcoxon Signed Ranks Test*' was used for determining *non-parametric* variables such as proxy indicator for macronutrient consumption and dietary diversity proxy indicator. Wilcoxon signed Rank Test was used to determine the values of meals and meals diversification/composition and significant level of the meals taken by HIS household's beneficiaries. The qualitative information obtained from the FGDs and KIs was analyzed using content analysis following the flow of logic and comparison of the logic.

Results and discussion

Respondents' major characteristics

This study involved 200 household respondents of which 53.0% were females and 52.7% were in the productive age of between 28 and 58 years. Results show that 91.5% of respondents were household heads of which 53% were Female Household Heads (FHHs). All had lived in the area for a period of more than 20 years. All 200 respondents lived in their own constructed houses. Most houses were of good quality; 96.5% roofed with corrugated iron sheets, 87.5% with floors made of cement and 78.5% with walls made of either concrete blocks or burnt bricks. All respondents reported to own land ranging between 1.5 and 10 acres. HIS beneficiaries reported not to have owned dairy cattle before their involvement in the HIS. It was also reported by 65% of FHHs respondents that more women were involved in the HIS intervention due to either being widows or poor or caring for orphans before the introduction of HIS. The main focus of HI globally is to empower women who have been disadvantaged from accessing the benefits of their work. Thus the HIS has helped most poor women to come-out of income poverty and food insecurity.

Heifer In-trust Schemes (HIS) and household food security

In this study, food security is defined as the situation of the smallholder household relative to food availability, accessibility and utilization for making a healthy life. Food security considered the proxy indicators for macronutrients consumption measured by the number of meals eaten/day (must be ≥ 3) and the dietary diversity proxy indicator for adequacy of nutrients consumed measured by type or food groups eaten in a day (must be ≥ 6). The definition is congruent with that of FAO (2003) that defined food security as the situation when all people, at all time, have physical, social and economic access to sufficient, safe and nutritious food which meet the dietary

needs and food preferences for active and healthy life. The definition is also in line with that of the World Bank (2003) which defines food security as access by all people at all times to enough food for an active and health life. In the present study, food security was measured by the number of meals, meal composition, and litres of milk and crop yields produced and consumed at the household level. The 95% of respondents reported that, being beneficiaries of HIS has enabled their households to be food secure as they were now accessing milk which they could consume since it is a complete diet. The smallholder farmers also reported that they sell the surplus milk to earn income which could be spent to buy extra food, animal feeds and supplements. Findings in Table 1 provide evidence that HIS contributes vitally to the access to milk mainly used as food and hence addresses problems of malnutrition including stuntedness which have been reported especially among pre-school children (Odhiambo “et al” 2004). In addition, smallholder farmers in the present study reported that cow dung manure was used to increase fertility of their farms hence more crop harvest through increased yields that provided them, with enough food almost year round. They, furthermore, reported that some beneficiaries had surplus cow dung manure that were also sold and added into their households’ income. This is in agreement with Haan and Zoomers (2003) who explained that dairy farming is an important agricultural activity in many parts of the developing world, producing valuable products.

Table 1: Households milk production in the surveyed area after the HIS

Region	Variable compare	T-test compare difference			
		n	Mean	t-value	p-value
Njombe	Production of milk during dry season, liters	200	18.2	-45.6	<0.001
	Production of milk during rainy season, liters	200	24.6		

Mean milk production in Njombe Region was less during dry season than during the rainy season. However, milk production during the wet and dry seasons are significant at $p < 0.001$

(Table 1). Furthermore, Table 1 show that difference in milk production between dry and wet seasons was mainly due to seasonality effects that influence availability of pastures and fodders. It was also reported by FGD participants that milk production was less during the dry season due poor efforts and commitments of beneficiaries to establish or conserve pastures. In expressing her views on how HIS has contributed to her household’s food security, one woman beneficiary of Nyombo village on 13th December, 2012 said; *“I had not enough food at all in my home as I inherited nothing from my parents, thanks to HITz, for dairy cow, my family now eats as those who have farms”*.

Table 2: Household milk consumption by season and gender before and after HIS (n = 200)

Season	Gender household head	0 litres	0.25-0.50	>0.50
	Male (n = 94)	85 (21)	9 (2.2)	0 (0)
Dry & wet	Female (n =106)	98 (24.3)	8 (2.0)	0 (0)
	Total	183 (91.5)	17 (8.5)	0 (0)
Milk consumed per household per day after the scheme				
		2- 4 litres	5 -7 litres	9-10 litres
Dry season	Male (n = 94)	70 (17.3)	24 (6.0)	0 (0)
	Female (n =106)	73 (18.0)	33 (8.1)	0 (0)
	Total	143 (71.5)	57 (28.5)	0 (0.0)
Milk consumed per household per day after the scheme				
		3 -4 litres	5 -7 litres	8 -9 litres
Wet season	Male (n =94)	11(3.0)	69 (17.0)	14 (3.3)
	Female (n =106)	19 (5.0)	72 (18.0)	15 (3.3)
	Total	30 (15.0)	141 (70.5)	29 (14.5)

Very few HIS respondents consumed milk before the scheme intervention (Table 2). By contrast, all households consumed milk after the introduction of HIS. Mpila (2006) explained that dairy

farming increases milk consumption among smallholder households. A study by Kisusu et al (2002) also showed that dairy farming increased food security in Mvumi village, Dodoma Tanzania. However, the respondents reported that during the dry season less milk was consumed because most of the milk was sold based on the high demand.

Importance of milk in the diet of poor smallholder households

Most respondents reported that, even though they knew the importance of milk in the diet, prior to HIS intervention, they were unable to allocate money for buying food including milk. Delgado (2003) emphasized that consumption of livestock products rises with the rise in average income. Maltsoğlu (2007) also commented that poor households consumed less in both volume and total value of livestock products compared to the less poor ones with the poorest households allocating less than 10% of their food budget for livestock products.

Food crop production and availability

All respondents practised agriculture activities as well as keeping dairy cattle. The yield of maize after the introduction of HIS increased from 850 to 1950 kg, due to use of improved varieties and fertilization with cow manure. Rutamu (2004) in Rwanda showed that manure from dairy farming had improved soil fertility, and hence crop yield.

Household meals and composition

Before HIS intervention households on average only took one meal a day (Table 3). The recommended feeding regime for an adult is three meals per day and for children under the age of

five years is between five to six times per day (UNICEF 1985; URT 2010). However, after the intervention households were able to have three meals in a day.

Table 3: Household's meals and composition before and after HIS (n =200)

Variables Compared		Wilcoxon		Ranks Test	
		n	Mean	z-value	p-value
Number of meals taken before heifer in-trust schemes		200	1.95	-13.388	0.000
Number of meals taken after heifer in-trust schemes		200	3.12		
Meals composition before heifer in-trust schemes		200	1.36	-6.538	0.000
Meals composition after heifer in-trust schemes		200	2.12		
Wilcoxon Ranks Test					
Gender	Variables compared	n	Mean	Z-value	p-value
Male	Number of meals before heifer in-trust schemes	94	1.96	-9.144	0.000
	Number of meals after heifer in-trust schemes	94	3.12		
Female	Number of meals before heifer in-trust schemes	106	1.98	-12.741	0.000
	Number of meals after heifer in-trust schemes	106	3.11		
Males	Meals composition before heifer in-trust schemes	94	1.26	-5.713	0.000
	Meals composition after heifer in-trust schemes	94	2.02		
Female	Meals composition before heifer in-trust schemes	106	1.44	-4.725	0.000
	Food composition after heifer in-trust schemes	106	2.20		

Meal before and after schemes are different at $p < 0.001$ and meals composition before and after the scheme are different at ($p < 0.001$)

Household income

Annual household earnings

Annual net cash household earnings increased almost 8-fold after the HIS intervention and all males and females in HIS intervention are getting above TZS 4 000 000 (\$ 2 224) (Table 4).

Table 4: Household income before and after the scheme by sex of household head (n =200)

Region	Sex	Variable compared	n	Mean in TZS	t-value	p-value
Njombe	Male	Households' net income (2012)	94	4,032,600		
	Female	Annual household's net income before the scheme (1998) as expressed in year 2012 prices	94	532,980	-58.588	<0.001
	Male	Households' net income (2012)	106	4,025,500		
	Female	Annual household's net income before the scheme (1998) as expressed in year 2012 prices	106	506,710	-61.042	<0.001

The income before and after HIS are significant at $p < 0.001$. All males and females are earning above TZS 4 000 000. Exchange rate was USD = 1,650 TZS on September 2013 and Annual household's net income were adjusted using Bank of Tanzania (BoT 2000 and 2013) Economic Bulletin for the Quarter Ending December, 2000 and Economic Bulletin for the Quarter Ending March, 2013 respectively.

Income from sales of milk

HIS beneficiaries reported selling more milk during the rainy season because they had plenty of milk but low prices ranging between TZS 500 and 710 (US\$ 0.30 to 0.43) were realized during rainy season compared to TZS 810 and 1,100 (\$0.50 to 0.66) realized during dry seasons. It was further reported that during the rainy season more milk was consumed by smallholder households as they had plenty of milk but demand was very low as compared to the dry season.

Household income from sales of calves

After fulfilling a Passing-on the Gifts (POG) contract, farmers become free to sale the remaining off-spring. In the study area, most MHHs respondents reported they sold calves at an average of six and eight months and that when the age was above six months, prices increased (Table 5). These findings indicate that apart from income from milk sales, calf sales also contributed to households' income hence improved smallholder farmer household's well-being.

Table 5: Household involved in calves sales and income earned from sales by sex (n = 200)

Sex	Household n (%)	Calves sold	TZS per calf	n (%)	
Male (n=94)	Yes (86.28)	83	Below 500,000	0 (0.0)	
	No (13.8)	0	501,000-600,000	43 (45.7)	
				601,000- 800,000	29 (30.8)
				801,000-1,000,000	10 (10.6)
				1,001,000-1,500,000	1 (1.2)
Female (n=106)	Yes (82.1)	87	Below 500,000	6 (5.6)	
	No (17.9)	0	501,000-600,000	40 (37.7)	
				601,000- 800,000	26 (24.5)
				801,000-1,200,000	15 (14.2)

Household income from sales of green pasture and fodders

Most respondents sold green pastures and crop residues (Table 6). These findings mean that, there were very few HIS beneficiaries who had extra pasture for sale. It also means hay making and selling is challenging perhaps due to either lack of time and or technology needed on this particular activity. The findings also imply that there is an opportunity that can be optimally tapped by smallholder farmer households to produce enough pastures for their own use and for sale to improve milk production and income.

Table 6. Household income from pasture and fodder's sale by sex of household head (n =200)

Sex of household head	Type of forages	n (%)	Sales in TZS	
			301,000 -600,000	601,000 -800,000
Males (n = 94)	Green grass	66 (70.2)		
	Hay	2 (2.1)		
	Crop residue	18 (19.1)	82	4
	None	8 (8.5)		
Females (n -106)	Green grass	91 (85.5)		
	Crop residue	3 (2.8)	88	6
	None	12 (11.3)		

Challenges to HIS beneficiaries in the study area

Most respondents in the study area reported that HIS did not replace the animals that died and that by not replacing them the burden was shifted or transferred to other farmer groups who were still poor at the initial stage of the scheme. It was widely reported that HIS did not consider the training of the Community Animal Health Workers (CAHWs) for the POG recipients. They reported that lacking this essential service jeopardized animal production and productivity. They also reported that HIS did not consider supporting the POG group's CAHWs with Veterinary First Aid Kits as was done for the original recipients in HIS. These findings mean that the POG recipients never performed better as compared to original recipients due to inadequate or lack of CAHWs and veterinary kits to support their services. The immediate achievement of HIS objectives was delayed as those households whose cattle died had to wait for some time to get replacement from other members after completing their POG cycle.

Conclusions

- Despite the seasonality variations in the highland agro-ecological zone, HIS had significantly contributed to the improvement of smallholder's household well-being.
- HIS beneficiaries' income increased, meal frequencies and meal diversity were improved.
- Training on animal husbandry to original recipients and their CAHWs and the provision of veterinary kits would have promoted HIS growth and continued food and income securities to smallholder farmers' households hence their well-being.
- The study recommends that the Government and dairy sector development partners should promote pastures and fodders establishment skills and technologies among dairy farmers to enable them to provide quality and constant feeds for sustainable animal production and productivity.
- HITz and other dairy sector supporting farmers with heifers should put in place the strategy of immediately replacing heifers that die instead of leaving the burden to original recipients.

Acknowledgement

The authors is grateful to Research on Poverty Alleviation (REPOA) for funding this study and to respondents who gave the fundamental information. Authors also thanks Heifer Project International in Little Rock, Arkansas in US for funding this paper publication.

References

Bailey D K 1998 Methods of Social Science Research. The Free Press Collier Macmillan Publishers, London. 478pp

BoT 2000 Economic Bulletin for the Quarter Ending December, 2000, Vol. XXX No. 4.

BoT 2013 Economic Bulletin for the Quarter Ending March, 2013, Vol. XLV No. 1

Delgado C L 2003 Rising Consumption of Meat and Milk in Developing Countries Has Created a New Food Revolution. The Journal of Nutrition, The American Society for nutrition. 3pp.

FAO 2003 FAO Bulletin of Statistics, Rome, Italy 144pp.

Farzin M 2010 Non-experimental Research Design; Pepperdine University,

Haan D L and Zoomers A 2003 Development geography at the cross roads of livelihoods and globalization. Tijdschrift Voor Economische en sociale Geografie 94 3): 349- 361

HI 2011 Heifer International, http://www.heifer.org/gift_catalogue site visited on 17/2/2014

HITz 2011 Annual Country Program Report. pp 5

IFAD 2011 United Republic of Tanzania, Rural Poverty Report. 16pp

Kavishe F P 1993 Nutrition Relevance Actions in Tanzania: Country Case Study Supported by UNICEF. XV Congress of International Union of Nutritional Sciences. Adelaide. 209pp

Kisusu R W, Mdoe N, Turuka F and Mlambiti M E 2002 Contribution of Smallholder dairy production to food security, household income and poverty alleviation: The case of Mvumi Dairy Development Project Dodoma. Tanzania Veterinary Journal 21(2): 155-157

Knips V 2006 Developing Countries and the Global Dairy Sector: Part II: Country Case Studies: PPLPI Working Paper no. 31. Rome, Pro-Poor Livestock Policy Initiative, FAO.

Maltsoglou I 2007 Household Expenditure on Food of Animal Origin: A Comparison of Uganda, Vietnam and Peru. PPLPI Working Paper no. 43. Rome, Pro-Poor Livestock Policy Initiative, FAO. pp 19

Mpila E 2006 Contributions of HIT to Poverty Reduction in Temeke Municipal, A REPOA Research Report 10/4 techniques working group. Ministry of Planning Economic and *The Masters Dissertation presented to SUA*.63pp.

Mselle L, Kinabo J and Nyaruhucha C N 2013 Evidence of Climate Change-related, weather Patterns and their effects on Food Production and Nutrition Status of Women and Children in Kilosa District, JCEE (2013) Volume 4 Issue number 2 pp 405

NBS 2011/12 National Bureau of Statistic, Key Findings Report. 12pp

NRCO 2013 Njombe Region Socio-Economic Profile. Njombe Administrative Secretary. Njombe. 12pp

Odhiambo M O, Mbagaya G M and Oning'o R K 2004 Dairy production: A nutrition intervention in a sugarcane growing area in Western Kenya. African Journal of Food Agriculture Nutrition and Development 4(1): 203-227

Rutamu I 2004 Investment Opportunity in the Dairy Sub-Sector of Rwanda. Final Report http://www.snvworld.org/download/publications/investment_opportunities_dairy_sub-sector_of_rwanda.pdf site visited on 21/5/2014

Seireg M, Zeitlin L, Montagne M and Morales J C 1992 Field Validation of the Tallstick in Marginal Communities in Nicaragua. Journal of Tropic Pediatrics 38: 213-221

UNICEF 1985 Programme for Child Survival and Development in Morogoro Region. University of Dar es Salaam, Tanzania. 46pp

URT 2002 Poverty and Human Development Report. The Research and Analysis Working Group. Mkuki na Nyota Publishing, Dar es Salaam, Tanzania. http://www.povertymonitoring.go.tz/researchreport/poverty_comparisons_regionally_Luvanda_et_al.pdf site visited on 25/5/2014

URT 2006 Ministry of Livestock Development. National Livestock Policy. 6pp

URT 2010 Children and women in Tanzania. URT/UNICEF, Government Printers, Dar es Salaam. pp 63-72 http://www.unicef.org/tanzania/SITAN_Mainland_report.pdf/ site visited on 24/6/2014

URT 2013 Population and Housing Census, Tanzania National Bureau of Statistics, Ministry of Finance. 11pp

URT 2011 Poverty and Human Development Report, Tanzania National Bureau of Statistics, Ministry of Finance. 14pp

Urassa J K 2005 Heifer In-trust Schemes and Poverty Reduction in Rural Areas: A case study of Arumeru District: Research paper submitted in partial fulfillment of the requirement for a Postgraduate Diploma in Poverty Policy Analysis, ISS/REPOA/ESRF. 63p.

WB 2003 Agricultural change and food security: World Development Kluwer. Academic Publishers, Washington DC. 145pp.

WB 2010 <http://data.worldbank.org/country/tanzania/> site visited on 12.6.2014

WFP 2010 Regional Bureau for East, Central and Southern Africa (OMJ)
http://one.wfp.org/appeals/projected_needs/documents/2010/OMJ.pdf site visited on 05.5.2014

Received 18 July 2014; Accepted 30 October 2014; Published 1 December 2014