

*Full Length Research Paper*

## Diversification and poverty upward mobility in isolated areas of Zambia: An agricultural assets transfer perspective

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Provision of agricultural production assets to the rural poor in Zambia represents a coordinated push that should dramatically move their asset base towards the threshold necessary to take the first step out of poverty. Some beneficiaries of production assets have however, often remained the same or even relapsed into worse poverty. Understanding households' diversification behavior according to stages in the domestic life cycle, and having a better insight into the structure of poverty dimensions that show a positive change when assets are availed is indispensable in deciding what type of interventions may be effective in reducing poverty. This study aimed at clarifying factors that influence household diversification within the domestic life cycle stages, and determine the structure of poverty dimensions involved in positive experiences following acquisition of agricultural production assets. Data for the analysis were collected from 150 randomly selected households using semi-structured interviews. Participatory profiling was used to identify poverty experiences. Logistic regression and factor analysis were used to respectively identify potential determinants of diversification and determine the structure of poverty dimensions which showed positive changes following assets transfer. Results indicate that ownership of animal draft power (ADP), fishing and brewing of local opaque beer were potential determinants of diversification within the domestic life cycle stages. There was a bifurcation into capital accumulation and domestic consumption smoothing within the structure of poverty dimensions that show positive experiences following assets acquisition.

**Key words:** Diversification, domestic life cycle, participatory profiling, poverty upward mobility, Zambia.

### INTRODUCTION

Poverty is characterized by the failure of individuals, households or entire communities to command sufficient resources to satisfy their basic needs (Alejandro, 2001). Poverty in Zambia is often characterized by the rural prominence, where it affects 78% of the population, compared with 28% in urban areas (CSO, 2010). In the

analysis of levels, patterns and trends in the incidence of poverty in Zambia, Kapungwe (2004) noted variations in poverty according to employment status and sector, as well as by district, gender, marital status, education and stratum of head of the household. Poverty mitigation programmes based on agricultural production assets

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transfer have been implemented in Zambia to help the poor transform their social economic relationships. The effect of these programmes in realizing substantial poverty upward mobility has been hindered by a myriad of factors including failure to understand the poor's poverty situation, and a lack of understanding with regards to the poor's asset accumulation dynamics when there are availed production assets. Individuals and households have been receiving nearly free agricultural crop production inputs such as seed and fertilizer, or small livestock such as goats, pigs or chickens as starter production stock, but have only marginally improved or relapsed into worse poverty over the years. Further, agricultural production assets transfer programmes have always been supervised at community level by public agricultural extension workers whose major preoccupation has been under the technology transfer paradigm.

Agricultural production assets transfers help the poor conserve and accumulate assets so they can improve their livelihoods and productivity. In studies on empowerment of rural households in Zambia, Mungalaba (2007) alludes to the important role played by asset building and rebuilding in improving the overall welfare of rural communities. There exists an asset poverty line and a dynamic asset threshold which can help distinguish households that have a current asset base that predicts a non-poor future standard of living from those whose current circumstances predict a standard of living below the poverty line (Carter and Barrett, 2006). Provision of agricultural production assets represents a coordinated push that should dramatically increase the poor's productive capital and move the asset base towards the threshold necessary to take the first step out of poverty. Assets lead to future orientation, which in turn leads to household stability, personal efficacy, social influence, civic participation and community involvement, and child well-being (Shobe and Page-Adams, 2001).

For the poor, the process of asset accumulation also involves self-insurance through diversification into other asset and activity portfolios that are perceived to have low or negative income correlations (Alderman and Paxson, 1992). Diversification patterns reflect individual households' voluntary exchange of assets and their allocation of assets across various activities so as to achieve an optimum balance between expected returns and risk exposure (Barrett et al., 2012). According to the World Development Report of 2008, many households in rural areas get their income from non-farm activities although they are also involved in farming. Kimhi (2000) further noted that between one third and two thirds of farmers in developing countries are involved in non-farm activities, and income from non-farm activities has been found to be essential for the welfare of rural households (Rosenzweig, 1998). In studies on rural livelihood diversification and agricultural household welfare in Ghana, Asmah (2011) observed that diversified

households and less diversified households differ significantly in terms of variables related to household assets, noting that ownership of such household assets as land, education and financial capital had a positive influence on welfare because of increased livelihood diversification. Asmah (2011) further noted that both household welfare and rural non-farm diversification decisions are mostly driven by household assets. In Zambia, non-farm diversification includes handicraft production, carpentry and bricklaying, trading of agricultural produce, fishing, etc. Olale (2011) recollects some of the factors that influence income diversification, especially in developing countries as: 1) individual and household characteristics, including age, gender, education, marital status and household size, 2) farm characteristics, including amount of land cultivated, number of crops grown, value of farm implements, membership in a farm organization and access to agricultural extension, 3) locational factors, including the nature of the roads, availability of electricity and distance from towns, 4) barriers to income diversification, including inaccessibility to credit and market information, which may discourage non-farm income diversification, and 5) risk factors, including the impact of the variability of returns from various activities.

Knowledge about combinations of poverty dimensions in which the poor show positive changes in experiences of poverty when availed agricultural production assets can provide important insight into what type of interventions may be effective in reducing poverty. Understanding poor households' diversification behaviour with regards to revealed preferences among feasible sets of livelihood strategies can provide further insight into the type of interventions that may be effective in reducing poverty and vulnerability. In addition, a household's capacity to function in the face of poverty varies with a number of factors including its stage in the domestic life cycle (Alejandro, 2001). The domestic life cycle is made of three main stages, respectively: 1) the reproductive, representing the initial family formation, 2) the intermediate, representing maturing family development, and 3) the dispersion, when parents are aging and children graduate into independent households (Alejandro, 2001). According to the Zambia Central Statistics Office (CSO), citizens from 18 years of age and above are considered as adults. Adults up to the age of 35 years are referred to as youths (Kaunda, 1974), and represent the reproductive stage. Fifty five (55) years is the mandatory retirement age for public service workers (GRZ, 1996), and represents the upper limit of the intermediate stage. Adults above 55 years are considered to be elderly and therefore in the dispersion stage. Each stage therefore represents a particular age group. Understanding poverty according to stages in the domestic life cycle can provide a better insight into the dynamic responses to development interventions among households as they evolve overtime. This is because

each of the stages in the developmental process of households is conducive to particular social arrangements that influence their ability to utilize available resources. In studies on rural livelihood diversification and agricultural household welfare in Ghana, Asmah (2011) noted that the age structure of the household which attempts to capture the life-cycle effects was found to be a significant correlate of household welfare. This is supported by Lister (2004) who alludes to the impact and experience of poverty based on the position in the life course structure.

Therefore, the objective of this study is to clarify factors that influence household diversification within the domestic life cycle stages, and determine the structure of poverty dimensions involved in positive experiences following acquisition of agricultural production assets. This study provides a cornerstone for reference in the design and implementation of micro level interventions aimed at eliminating poverty.

The paper is structured as follows: First is an impressionistic view of poverty in Zambia that narrows emphatically to its alleviation using agricultural production assets given defining characteristics of asset beneficiary households. Next is the participatory poverty profiling that was used to elicit the local poverty perceptions and experiences, and mentions the Rapid Appraisal used to solicit opinions regarding attributes that are perceived to have potential influence on household livelihood choices and effective utilization of granted agricultural production assets. Thereafter, there is a three-part discussion covering the domestic life cycle and varied responses to assets Transfer, the domestic life cycle and diversification behavior, and the structural bifurcation of upward mobility poverty dimensions. The study is then concluded with some suggestions on the type of management of assets transfer programmes needed to facilitate asset accumulation.

## METHODOLOGY

### Scope

Information rich cases were selected from Shangombo district (16° 05' S and 23° 75' E) of the Western Province (16° 3' 22" S and, 23° 45' 8" E) of Zambia. According to the 2006 Living Conditions Monitoring Survey of Zambia, the Western Province is the most stricken by poverty out of the country's 10 provinces, and Shangombo district is the poorest district in the Western Province.

The district is quite uniform in terms of cultural practices, ethnicity, marriage patterns, and access to social amenities. It has common features such as poor road networks, subsistent farming being a major livelihood source, and less development interventions by non-governmental organizations and donor agencies. Its remoteness from main service centres has partly led to an autarkic local economy bordering on household self-sufficiency. Any external development interventions in the district are therefore likely to make tangible differences in poverty experiences among intervention beneficiaries compared to non-beneficiaries. Due to the unavailability of panel data to use as base line, villages without development interventions were selected as proxies for pre-

development intervention villages, and are referred to as non-agricultural asset transfer (AAT), while those with development interventions are referred to as agricultural asset transfer (AAT) villages.

### Sample selection

The domestic life cycle is made of three main stages, respectively:

- 1) the reproductive, representing the initial family formation;
- 2) the intermediate, representing maturing family development, and
- 3) the dispersion, when parents are aging and children graduate into independent households - (Alejandro, 2001).

According to the Zambia CSO, citizens from 18 years of age and above are considered as adults. Adults up to the age of 35 years are referred to as youths (Kaunda, 1974) and represent the reproductive stage. Fifty five (55) years is the mandatory retirement age for public service workers (GRZ, 1996) and represents the upper limit of the intermediate stage. Adults above 55 years are considered to be elderly and therefore in the dispersion stage.

Limiting the sample to only villages with 75 or more households, five assets benefiting villages and another five non-assets benefiting villages were randomly selected. Households in the selected villages of both categories were stratified by age of household heads (male spouses) to satisfy stages of the domestic life cycle. Five households from each stage of the domestic life cycle in each village of the two categories were randomly selected and interviews were conducted with both the male and female spouse. A total of 300 individuals were thus interviewed from the two sets of 75 households. The non-assets and assets transfer households, respectively represented pre-asset and post-asset transfer households. Assets disbursed during intervention included brooder chickens to individual households and animal draft power (ADP) packages (oxen and accompanying equipment) kept communally at village level. Only households participating in the agricultural production asset transfer programme for 5 to 7 years up to December, 2011 were targeted.

### Participatory poverty profiling

Participatory measures of poverty deploy indicators of living standards and incorporate perspectives of those with the experience of poverty into the theorization, thereby providing better insights into what poverty means and feels for those actually experiencing it (Lister, 2004). Participatory poverty profiles can help to disaggregate poverty into several types and local definitions of poverty can help construct a more nuanced picture of the obstacles facing different groups of the poor (CPRC, 2008).

Participatory poverty profiling was undertaken and used uniquely with the brainstorming tool to enlist the perceptions and experiences of poverty among village members in the target district. Five households from each stage of the domestic life cycle in each village of the two categories were randomly selected using a table of random numbers.

Spouses from the selected households (both asset and non-asset benefiting) converged into small group discussions at local chiefs' grounds group brainstorming exercises were conducted based on the perceived needs approach (Mark and Lansby, 1985), which aims at "...identifying minimum acceptable way of life not by reference to observed living standards, but by reference to the views of society as a whole".

The brainstorming exercise defined the local meaning of poverty and determined the key areas of perceived poverty. Arising from this, eight poverty dimensions were consensually identified

**Table 1.** Participatory poverty profile matrix: perceived dimensions and experienced depth of poverty.

Perceived dimension of poverty	Experienced depth of poverty			
	Light		Serious	
Clothes	New from the shop	Second hands	From piecework	From good will
Dietary carbohydrate	Breakfast, lunch, supper and others	Two meals per day	Only one meal per day	Sometimes sleep without a meal in a day
Dietary protein	Big fish breams or meat	Small fish	Exotic vegetables or cow milk	Traditional vegetables
Education to children	Below college	Below 10 <sup>th</sup> grade	Below 8 <sup>th</sup> grade	Below 1 <sup>st</sup> grade
Farm power	Oxen and implements	Oxen only	Implements only	Manual labor
Housing	Corrugated roof with clay walls	Grass thatched roof with clay walls	Grass thatched roof with grass walls	Improvised
Income	Annual from farm produce and other sources	Seasonal from farm produce	Part from piecework part from farm produce	Always from piecework
Transport to hospital	Motor transport	Bicycle	Ox-cart	Traditional folded bed

Source: Field survey data (2011, 2012). "Piece work" refers to agreed manual labour jobs performed on other peoples' farms and paid for in cash or in kind (second hand clothes or package of farm produce for food).

(Table 1). Each poverty dimension was then characterised by specific indicators of living conditions describing experienced depths of poverty.

The generated poverty profile in Table 1 represents a consensual perception by the local people, and it was also in line with fundamental human basic needs. The inclusion of farm power as a poverty dimension appears to reflect the hardship of producing enough food for household food security as well as managing a surplus for sale to realise income for purchase of other domestic essentials. A lack of assets such as livestock and tools in rural areas not only exposes the chronically poor to risks, but also excludes them from employment opportunities and the growth process. The separation of food into carbohydrate and protein components was premised on the local understanding that a complete meal should have a fair share of respectable relish (protein), and that the carbohydrate and protein represented different types of strategies to secure. This assertion seems to confirm Chowdhury's (1995) observations in his studies on nutrition in Bangladesh that protein-energy malnutrition (PEM) remains one of the most important public health problems afflicting a large proportion of people in under developed countries.

The semi structured questionnaire used to collect data on perceptions and experiences of poverty among non-asset and asset beneficiary households was generated based on perceptions captured through participatory poverty profiling.

#### Rapid appraisal for potential factors influencing household choices and effective utilization of production assets

Poor households that can steadily accumulate assets will grow their way out of poverty and this growth could take some time depending on household intrinsic characteristics that condition their desired level of accumulation and ultimate equilibrium level of well-being (Carter and Barrett, 2006). A rapid appraisal was conducted with local key informants including contact and lead farmers, government extension workers and other managers of asset based anti-poverty programmes to solicit opinions regarding attributes which they perceived to have potential influence on household livelihood choices and effective utilization of granted agricultural production assets. Table 2 shows summary of the attributes.

#### Data analysis

Descriptive statistics were used to accurately characterize the changes in poverty experiences among households in asset transfer villages and non asset transfer villages. Binary logistic regression was used to predict the probability of household diversification into given activity portfolios. Factor analysis was used to determine the structure of poverty dimensions that showed positive changes in poverty experiences.

For any underlying latent factor (Y), the linear model equation will apply:

$$Y_i = b_1X_1 + b_2X_2 + \dots + b_nX_n + \epsilon_i$$

Where:  $Y_i$  = Latent factor;  $X_i$  is the  $i^{\text{th}}$  variable for the latent factor;  $b_i$  is the factor loading for the  $i^{\text{th}}$  variable;  $n$  = Number of variables for latent factor Y  
In the case of factor analysis, the equation has no intercept because the lines intersect at zero.

## RESULTS AND DISCUSSION

### The domestic life cycle and varied responses to assets transfer

Positive change in poverty experiences can be said to have occurred if there is an outward mobility (reduction) of the poor from deeper levels of experienced poverty, or an upward mobility of the poor into lighter levels of experienced poverty. Table 3 is a comparison of the percent of households in the most desired (lighter) level of experienced poverty between none-asset transfer

**Table 2.** Household attributes perceived to potentially influence choices and effective asset utilization.

<b>Attribute</b>	<b>Associated logic</b>
Level of education	Education helps better management
Number of own children Number of young dependents Number of adult dependents	They determine family size and composition
How many years one lived in the village Period of employment	Understanding the local environment gives more flexibility It could suggest level of pension earnings
How long the visit by friends took How long the visits to friends took	The longer the visits, the higher the chances of exchanging progressive ideas
How long one lived outside the province	Prolonged exposure to other peoples' ways of life can help change attitudes
Experience in managing cattle Experience in managing chickens	Previous experience in managing an asset gives good lessons
Main on-farm income source Whether employed formally before	A person involved in a familiar on-farm activity can be more committed Once formally employed individuals are more organized.
Kind of employment	Permanent employment has the benefit of assured pension compared to casual work
If one visits friends If one is visited by friends	Peer interaction helps exchange of good ideas
Participation in communal activities Village leadership responsibilities Vying for political elected office	It cultivates responsibility into an individual Leaders would want to set good examples Villagers with political ambitions have no time and lack commitment
Belief in traditional taboos Belief in religious taboos	Traditional and Religious beliefs can hinder commitment and effective management of assets
Type of assets once owned by parents	They could help as support to offspring in their early adult life.
Main off farm income source	On-farm activities will be disadvantaged if main livelihood is from off-farm income sources
If one ever lived outside the Western Province	Exposure to other peoples' ways of life can help change attitudes

Source: Field survey data (2011, 2012).

(pre-transfer) villages and asset transfer (post-transfer) villages.

According to Table 3, and limiting to average differences, there were overall increments in the number of households that migrated into lighter poverty levels (upward mobility) in asset transfer villages. Clothes and dietary carbohydrate poverty showed the highest positive change at 23% point's average difference, and the least

positive change was in transport to hospital at 1% point's average difference. The contribution to the average percent point's difference differed between the domestic life cycles stages, as in the case for dietary carbohydrate poverty where the 23% points average difference consisted of 34, 28 and 8% from, respectively the reproductive, intermediate and dispersion domestic life cycle stages. The greatest difference between asset

**Table 3.** Varying responses to agricultural production assets transfer.

Assets transfer	Domestic life cycle stage	Households experiencing lighter poverty (%)							
		Clothes	Dietary carbohydrate	Dietary protein	Education to children	Farm power	Housing	Income	Transport to hospital
Pre-transfer	Reproductive	20	14	8	10	30	8	38	0
	Intermediate	24	16	8	20	36	12	44	0
	Dispersion	0	8	0	12	26	16	32	0
Post-transfer	Reproductive	60	48	10	28	46	32	44	0
	Intermediate	36	44	8	40	50	32	58	0
	Dispersion	16	16	8	24	36	14	52	4
Percent point's difference	Reproductive	40	34	2	18	16	24	6	0
	Intermediate	12	28	0	20	14	20	14	0
	Dispersion	16	8	8	12	10	-2	20	4
Average difference		23	23	3	17	13	14	13	1
Rank		1	1	5	2	4	3	4	6

Source: Field survey data (2011, 2012).

transfer and non-asset transfer villages was for those experiencing lighter poverty in terms of the relative income poverty of villagers in the dispersion stage (32 to 52% points).

The higher number of households that experienced lower levels of poverty (upward mobility) in asset transfer villages suggests that agricultural assets had a positive impact in changing experienced poverty for the better. However, the reflected changes in experienced poverty were not shared equally between the domestic life cycle stages, with some stages showing larger differences in some poverty dimensions than others, suggesting that the upward mobility steps out of poverty did not spontaneously cover all poverty dimensions at the same time when assets were availed. Further, the increments were not uniformly distributed as seen with carbohydrate poverty upward mobility which was more pronounced in the reproductive stage, and income poverty upward mobility which was more noticeable among the dispersion stage. This pointed to the possibility that different domestic life cycle stages would move up different experienced poverty dimensions at a time. It also suggests that the agricultural assets provided could have different impacts on different poverty dimensions. This is related to similar findings from studies on non-farm incomes for poverty alleviation among small households in rural Bangladesh where Malek et al. (2010) noted that overall non-farm income significantly mattered for reducing income poverty but could be still low to be realized in reducing education poverty. According to Alejandro (2001), household capacity to adapt and ward off vulnerability can vary depending on the domestic life cycle stage. This is because vulnerability levels vary

among households as they evolve overtime, and each of the stages in the developmental process of households is conducive to particular social arrangements that influence their ability to mobilize their resources in the face of change.

### The domestic life cycle and diversification behaviour

Beneficiaries of agricultural production assets commonly invested returns in order to boost their respective asset portfolios. Differentiating households based on investment patterns could provide some insight into possible diversification behaviour.

Limiting to only households which showed movement into the lighter levels of poverty experience in at least 50% of the dimensions, five main areas of investment were identified among the households and are summarized in Table 4 with actual proportions of households involved in each area of investment. The limit to only households which showed movement into lighter poverty in at least 50% of the poverty dimensions assumes that such households could possess the desired characteristics that influence positive livelihood choices.

According to Table 4, more than 80% of all households in all domestic life cycle stages used part of their returns from benefitted assets to expand their existing crop fields. Households in the reproductive and dispersion stages followed their crop field expansion with substantial investment into savings (respectively 73 and 60%). The intermediate domestic life cycle stage investment into expanded crop field was followed by almost equal

**Table 4.** Investment patterns.

Domestic life cycle stage	Expanded field (%)	Market middle men (%)	Cattle rearing (%)	Craftsmanship (%)	Savings (%)
Reproductive (N = 24)	87	33	13	0	73
Intermediate (N = 19)	87	53	13	13	47
Dispersion (N = 11)	80	20	20	0	60

Source: Field survey data (2011, 2012). Indicated percentages according to domestic life cycle stages or investment areas do not add up to 100% because individuals invested in more than one activity at a time. N is the number of households on which percentages are based.

**Table 5.** General predictors of diversification outcomes.

Area of diversification	Predictive variable	Roa's efficient score statistic	Significance	Nagelkerke's R <sup>2</sup>
Crop production	Selective traditional taboo	3.97	0.046	0.23
	Fishing	3.97	0.046	0.173
Marketing middle manship	Selective traditional taboos	4.297	0.039	0.126
	Non-belief in traditional taboos	3.887	0.049	0.134
	Years lived in village	6.22	0.013	0.195
	Number of biological children	6.983	0.008	0.226
Cattle rearing	Prior formal permanent employment	4.728	0.030	0.151
Craftsmanship	Number of biological children	4.692	0.030	0.142

Source: Field survey data (2011, 2012). Only predictor variables with a 5% significance level were included in the table. Total number of observations included in regression was 54.

investment into market middleman-ship (53%), and savings (47%). The dispersion life cycle stage had the least number of households (20%) investing into market middleman-ship, and so was the reproductive life cycle stage (13%) with investment into cattle rearing. Households in the intermediate domestic life cycle stage invested least but equally into cattle restocking and craftsmanship.

Diversification patterns reflect individual households' voluntary exchange of assets and their allocation of assets across various activities (Barrett et al., 2012). According to Table 4, the diversification behaviour does not follow a similar pattern across the domestic life cycle stages. The common investment in expanded crop field by nearly all households generally could point to the need to achieve household food security particularly in the staple maize crop. Other than that, the diversification preferences are varied. While both the reproductive and dispersion domestic life cycle stages favour investment in savings after field expansion, this investment is more prevalent among reproductive domestic life cycle stage members. Similarly, though all the three domestic life cycle stages place cattle rearing as the least area of investment, it is more favoured among the dispersion domestic life cycle stage. Between the domestic life cycle stages, the intermediate stage represents broader

diversification as it is the only one seen to have diversified into craftsman-ship. The differing emphasis in areas of investment between life cycle stages suggests that there may be differences in considerations and mitigating circumstances. This seems to confirm Wright's (2000) observation that the poor usually have a better understanding of the issues and social economic circumstances surrounding them, and would put elements of any support to the most rational use. Further, Iiyama (2006) observed that even where households have similar endowments, production techniques, preferences, constraints and incentives attached to particular livelihood activities may be different.

Binary logistic regression analysis is a way of predicting two categorical outcomes from predictor variables (Field, 2009), and can be used to predict the probability of whether a household would diversify into particular activity portfolios or not, given its intrinsic characteristics. In this study, binary logistic regression analysis is used to try to understand what factors may explain how households decide what to invest in. Table 5 shows a logit regression summary indicating predictors (out of those in Table 2) which were general for all areas of diversification.

In Shangombo district where marriage arrangements are patriarchal with the female spouse having to move to

**Table 6.** Specific predictors of diversification outcomes within the domestic life cycle stages.

Domestic life cycle stage	Area of diversification	Predictive variable	Roa's efficient score statistic	Significance	Nagelkerke's R <sup>2</sup>
Reproductive	Savings	Animal draft power	7.422	0.006	0.255
Intermediate	Savings	Fishing	5.200	0.022	0.21
Dispersion	Expanded field	Local beer brewing	6.481	0.011	0.163

Source: Field survey data (2011, 2012). Number of observations included in the regression: Reproductive = 24, Intermediate = 19, Dispersion = 11

the male spouse's village and literally depend on his available resources, characteristics that could potentially influence household choices and effective asset management and mediate upward mobility were only considered for heads of households (male spouses).

In logit regression, a significant Rao's efficient score statistic represents a predictor's potential to contribute to an outcome. Nagelkerke's R<sup>2</sup> reaches its theoretical maximum of 1, and is a measure of how well the regression model fits the data.

According to Table 5, potential diversification into expanded crop field was significantly predicted by selective belief in traditional taboos, ( $p < 0.05$ , Nagelkerke's R<sup>2</sup> = 0.23). Potential diversification into market middleman-ship activities was significantly predicted by a number of factors including engagement in fishing ( $p < 0.05$ , Nagelkerke's R<sup>2</sup> = 0.173), selective or complete non-belief in traditional taboos (respectively  $p < 0.05$ , Nagelkerke's R<sup>2</sup> = 0.126 and 0.134), years lived in the village ( $p < 0.05$ , Nagelkerke's R<sup>2</sup> = 0.195), and number of biological children ( $p < 0.05$ , Nagelkerke's R<sup>2</sup> = 0.226). Prior formal pensionable employment significantly predicted potential to diversify into cattle rearing ( $p < 0.05$ , Nagelkerke's R<sup>2</sup> = 0.151).

Selective or complete non-belief in traditional taboos may be the escape route from the shackles of some obsolete traditional beliefs that preclude individuals from engaging in remunerative enterprises. It opens individuals to a variety of livelihood activities and practices that would otherwise be prohibited by tradition.

The link between selective or non-belief in traditional taboos with potential to expand crop field hectareage could partly lie in the locally observed prevalent norm that women cannot handle oxen, and so cannot use ox-drawn implements. Discarding this notion could mean more readily available farm labour from female spouses to accomplish tasks such as cultivation of large tracts of land, or ox-drawn planting and fertilizer application which is more efficient.

Market middleman-ship represents non-farm diversification. In the recollections about some of the factors that influence income diversification, especially in developing countries, Olale (2011) observed that locational factors, including the nature of the roads and distance from towns, as well as household characteristics including family size, play an important role in choosing the kind of diversification activity. With the isolated nature

of Shangombo district, coupled with its poor communication network, middleman-ship in long distance goods provides a credible opportunity for income generation. Like craftsmanship, market middleman-ship is closely linked to availability of family labour particularly from own (biological) children. The role of own children in marketing middleman-ship and craftsmanship may lie in the provision of unpaid labour. This is in line with Asmah's (2011) observation that households where there are members aged 5 or older have a greater probability to engage in non-farm work with the likelihood for positive dividends on welfare because participation in off-farm work is critically dependent on labour availability. Much as this may be true, however, it unfortunately implies that the helper children may have to be withdrawn from school in order to support the family income generation activities. It is no coincidence therefore that marketing middleman-ship and craftsmanship are more prevalent in the intermediate domestic life cycle stage (Table 4), as Asmah (2011) further noted that the likelihood to engage in non-farm activities decreases as the head of household grows in age.

The importance of the number of years an individual has lived in the village possibly lies in the local network ties and network holes (Kadushin, 2012) that respectively enable people to scan local felt needs for outside services, or conversely understand local activity areas of comparative advantage that can be of use to the outside. This fits well with market middleman-ship especially when goods traffic is both directions.

Prior formal permanent employment brings with it the possibility of sizable pension incomes that are soon converted into cattle as both a store of wealth and symbol of status. If this was the case then it may commonly apply to the elderly retirees, and seems to be confirmed in Table 4 where the dispersion life cycle stage tops in the diversification into cattle rearing.

The results in Table 5 show predictive variables that indicated potential to diversify into particular activities across the stages in the domestic life cycle. Some predictive variables were however specific to particular stages in the domestic life cycle, and are summarized in Table 6.

According to Table 6, between the life cycle stages, ownership of ADP (oxen and accompanying equipment) significantly predicted potential investment into savings in the reproductive domestic life cycle stage ( $p < 0.05$ ,



Nagelkerke's  $R^2 = 0.255$ ); engagement in fishing significantly predicted potential investment into savings in the intermediate domestic life cycle stage ( $p < 0.05$ , Nagelkerke's  $R^2 = 0.21$ ), and brewing of local opaque beer significantly predicted potential investment into expansion of the crop field in the dispersion stage ( $p < 0.05$ , Nagelkerke's  $R^2 = 0.163$ )

In Shangombo district, cattle are both wealth and status symbol. Oxen can be used within the household for field cultivation and farm produce transport, or hired out for several purposes. In studies on integrated poverty assessment of livestock promotion in Vietnam, Otte et al. (2005) observed that livestock especially cattle are used for ploughing and provide non-human power to poor farmers who cannot afford modern means of ploughing their fields. Selloane and Philip (2012) further alludes to the importance of livestock utilization in planting vegetables, fruit and other food products, for own consumption or exchange in the market place for household income in Lesotho. Young energetic oxen owners could be in better position to hire out and operate ADP which so much depends on physical strength. It is therefore no coincidence that potential to save income among the reproductive domestic life cycle stage is significantly predicted by ownership of animal drought power.

Fishing in the study area is commonly done in natural water ways when rain-fed crop production is off-season. The fish ban comes into effect just when the staple crop production season starts. The fishing practice commonly involves the practice of barter trading system through which fish mongers may trade their fish for household durables which they later sell back at their home villages. This coincidence seems to favour generation of extra income that could go into savings.

Brewing and selling local opaque beer is a common phenomenon in the study area. However, the uniqueness of beer brewing as a potential predictor for expansion of crop fields in the dispersion domestic life cycle stage alludes to its possible convenience considering the advanced age of the dispersion life cycle stage. The beer brewing and selling is often done within the household perimeters where the ingredients are also kept, and thus less labour consuming.

Savings can be seen as that part of disposable income which is not spent on consumption and can be used as a catalyst for capital formation (Bime and Mbanasor, 2011). In their theoretical specification of asset effects on well-being, Shobe and Page-Adams (2001), suggests that savings first provide people with otherwise unattainable opportunities to hope, plan, and dream about the future for themselves and their children

### **Structural bifurcation of upward mobility poverty dimensions**

Factor analysis is a technique used to understand the structure of sets of variables and helps to know whether

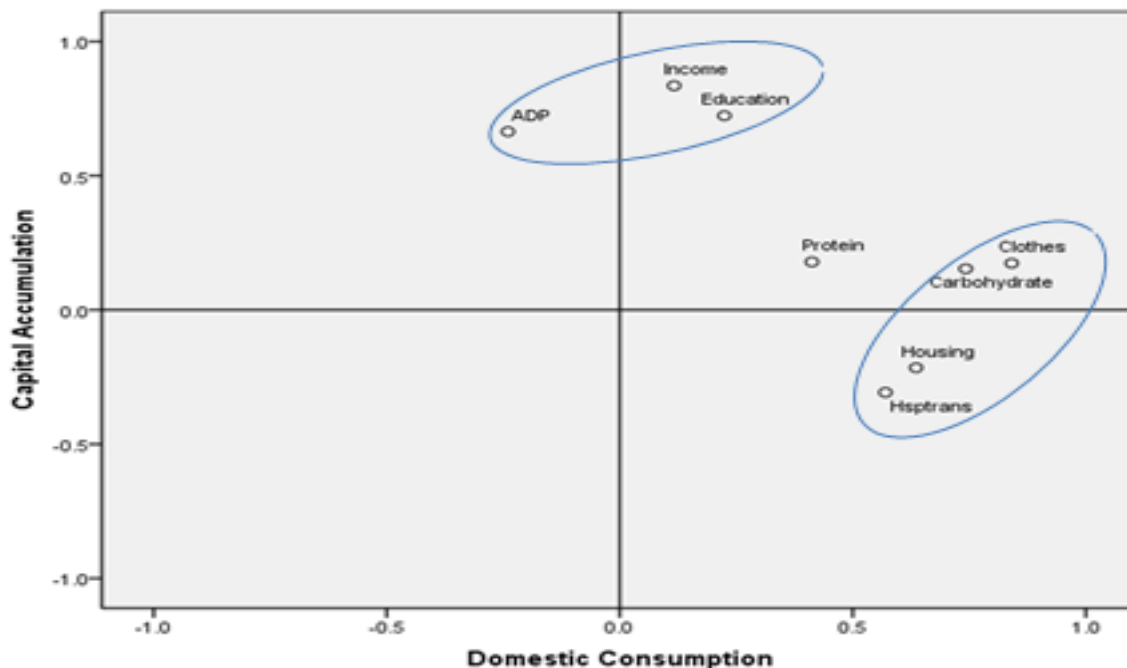
different variables are driven by the same underlying latent factor (Field, 2009). Arising from Table 3, different domestic life cycle stages moved up different experienced poverty dimensions at a time: limiting to only households that showed positive experiences in at least 50% of the poverty dimensions, Figure 1 is a factor plot representing factor loadings from the factor analysis, and shows the structure of the poverty dimensions involved in lighter poverty experience:

According to Figure 1, and at a glance, improved ADP, improved income, and improved education support to children appeared to represent the same underlying latent factor, which was now designated as "capital accumulation". On the other hand positive changes in clothes, housing, dietary carbohydrate and transport to hospital (Hsptrans) poverty appear to represent a separate underlying latent factor, which was now designated as "domestic consumption".

All individuals who showed positive changes in at least 50% of the poverty dimensions indicated that they had invested returns from the use of transferred agricultural assets. This suggests that income from these diversified activities could have played a part in their reduced poverty experiences. Patterns of poverty dimensions that showed positive experiences can be used to determine the structure of poverty dimensions which underlie positive changes in experienced poverty. This can be used in turn to tell whether the dimensionality structures could sustainably catapult concerned households out of poverty traps over time.

According to Figure 1, two clusters distinguish the underlying structure of poverty dimensions involved in improved poverty experiences. In one cluster, improvements in the poverty of housing, starch (dietary carbohydrate), clothes and hospital transport suggest that immediate domestic consumption is being smoothed. The other cluster shows households with positive poverty changes involving ADP, income and education support. Animal drought power is a productive asset and represents physical capital, and the draft power packages can be used for land cultivation, farm produce transport and provision of manure for crop production. Income is as much as financial asset and represents financial capital, and improvements in household income levels entail a reduction in liquidity constraints. Support to children's education is a pointer to human development and hence enhanced human capital. This cluster therefore seems to underlie accumulation of capital.

The underlying structure of the poverty dimensions in Figure 1 therefore suggests a bifurcation in terms of use to which returns to assets are put. If asset creation and accumulation are the precondition for moving out of poverty (Barrett et al., 2012; Carter and Barrett, 2006; Lister, 2004; Shobe and Page-Adams, 2001), then the category of beneficiaries that take the route of consumption smoothing may be less likely to make it out of the poverty trap than those who are represented by asset creation and accumulation. The bifurcation demonstrated could be



**Figure 1.** Factor plot indicating structure of lighter poverty dimensions. Values of the Y and X axis are factor loadings representing the extent to which the lighter poverty dimension is related to the particular factor.

important in understanding why beneficiaries of agricultural production assets transfer do not all eventually move out of poverty, with some actually becoming worse than before asset transfer. This is because some asset benefiting households do not invest returns to their assets into activity portfolios that favor more asset accumulation.

In Zambia where agricultural assets based programmes are generally supervised by public extension workers whose major preoccupation is crops technology transfer, effective supervision of transferred assets in order to enable beneficiaries move closer to the desirable asset threshold represents a possible paradigm shift in extension services delivery. Extension services provision will have to operate more under the human development pillar (Coutts, 1994) and less under technology transfer in order to facilitate bias towards domestic expenditure that supports asset accumulation, and dissuade asset beneficiaries from drifting much towards smoothing domestic consumption.

This could be supported by Schuring's (2014) observation that while individuals in rural Zambia could pursue genuine anti-poverty strategies, they often act selfishly if not restrained.

## Conclusion

Changes in experienced poverty between the domestic life cycle stages are not shared equally and not uniformly

distributed, suggesting that the upward mobility steps out of poverty do not spontaneously cover all poverty dimensions at the same time when production assets are availed.

While beneficiaries of agricultural production assets commonly invested returns into various activity portfolios, the diversification does not follow a similar pattern across the domestic life cycle stages, and some areas of diversification have potential predictors which are unique to particular domestic life cycle stages.

Beneficiaries of agricultural assets transfer don't all use returns from diversified income portfolios to achieve positive experiences in poverty dimensions that favour asset creation and accumulation, and there is a bifurcation into those who do and others who commit to smoothing domestic consumption. This bifurcation in the use of returns to diversified income portfolios is important in understanding why beneficiaries of agricultural production assets transfer don't all eventually move out of poverty.

The bifurcation suggests the need for facilitated bias towards domestic expenditure that supports asset accumulation, and dissuades asset beneficiaries from drifting much towards smoothing domestic consumption. In Zambia where extension services currently operate mainly under the technology transfer pillar, there is need to re-orient extension providers towards the little understood human development extension pillar if agricultural production assets transfers have to contribute more effectively towards poverty alleviation.

Households were defined using the criteria of those “eating from the same pot”, sleep under the same roof and have been living together for more than 6 months. Although multiple marriages are not uncommon in the study site, no polygamous households were included in the survey.

### Conflict of Interest

The author(s) have not declared any conflict of interest.

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