

***Ex Ante and Ex Post Risk Coping Strategies:***  
**How Do Subsistence Farmers in Southern and Eastern Province of Zambia Cope?**

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**Abstract**

Subsistence rain-fed small holders in the semi-arid of Zambia are confronted with numerous idiosyncratic and climate-related common risks. Such has resulted in high variations in household income. In response, the farmers cope by utilizing a complex set of strategies to smooth income and/or asset. A field survey of 1,000 households was conducted in the eastern and southern province of Zambia to examine the farmers' experiences with various shocks and measures they took to reduce risk ex ante and to lessen and insulate from shock impacts ex post. It is found that drought, malaria, livestock diseases, heavy rainfall, flood and death to the bread winner or household members are the top six most common shocks. Drought is by far the most damaging hazards the majority of sampled households had experienced. Self-sufficiency in food production is the most fundamental form of ex ante risk reduction. This may be due perhaps to imperfect agriculture market. Specialization on low risk and low return crop production appears to be a limited practice. At the other end of the spectrum, diversification is widely practiced in both provinces. However, diversification patterns differ. While small holders in the southern province tend to diversify across various production and income generating activities, the easterners tend to center around cash crop production. Ex post responses of farmers in the two provinces are also different. The easterners utilize income smoothing strategies by engaging in the alternative income generating activities and the informal insurance mechanisms to cope with crisis. The southerners tend to engage in the increased austerity and informal insurance mechanism to survive. Differentials in behavioral response may have reflected differences in resource endowment at the household and community level.

**1. Introduction**

Zambia is a country in a semi-arid area which is an intermediate climatic region between desert and humid climates. The region can be characterized by variable and low annual rainfall of approximately 250-500 mm. Since 1990, Zambian farmers have experienced six agricultural droughts in addition to occasional floods. Climatic variation is a significant common risk that threatens the livelihood of the subsistence, rain-fed agriculturalists. Besides, individual small farming households face many idiosyncratic risks that are constantly lurking in the backgrounds. Examples of the idiosyncratic risks are pests, damage from animals, fire, livestock diseases, illnesses, etc. High risks facing the small holders result in high income variation. In response, farmers adapt by developing a complex set of strategies to cope with risks.

The goal of this paper is to explore risks the households face and to describe how households

cope with risks. Our study area includes Southern and Eastern province. Since Southern province is a drought prone area and the Eastern province is not, behavioral differences between households in these two provinces may shed light on drought-induced strategic responses.

It is important to distinguish between strategies to cope with risk versus shock. While the former refers to strategies to deal with the prospect of being affected by an uncertain event, the latter refers to measures taken in response to a realized uncertainty. Ex ante and ex post risk coping strategies can be literally defined as measures taken before and after experiencing shocks respectively. Although this chronological definition is useful in conceptualizing behavioral response to shocks, it can be misleading. Some measures adopted after experiencing the shock such as migration can later become a permanent measure to reduce exposure to potential shock in the future. Similarly, some ex post shock response will not be available to the household unless it was done ex ante. For example, selling livestock during emergency requires efforts in planning, caring and raising the livestock before the occurrence of the risky event. To avoid this potential confusion, chronology and its functional objective are combined to define ex ante and ex post risk coping strategies. Measures that are taken before the risky event occurs to avoid, transfer or reduce risks or exposure to risk are considered ex ante risk coping strategies. On the other hand, measures taken after the shocks to mitigate or insulate welfare impacts of the shocks are called ex post shock coping strategies. The ex ante and ex post risk/shock coping strategies may be distinguished by their behavioral objectives. While the ex ante risk coping strategies are for long-term survival, the ex post shock coping strategies are merely for short-term survival adjustment.

## **2. Ex ante Risk Coping Strategies**

The primary goal of the ex ante risk coping strategies is to smooth income. The income smoothing strategies are ways in which households use to protect themselves against income shock before it actually happens. This is often achieved by adopting conservative production choices and diversifying economic activities. The income smoothing strategies may be grouped into three main categories, i.e.:

- risk avoidance,
- risk transfer,
- risk reduction,

Moving to a new location that is less prone to the risk is an example of risk avoidance. Relocation is not only a costly but also risky process. The expected return must be sufficiently high to justify the move. The second category of risk coping strategies is risk transfer to a third party via an insurance market or publicly provided safety net. Agricultural insurance is a form of risk pooling and risk sharing that works particularly well with covariate shocks which fail other less formal forms of small-base risk sharing. However, an absence of insurance market or an imperfection of insurance market makes this option unlikely to be available to the rural poor. Social safety net is also not likely to be put in place when the government, for example, Zambia's, is in serious fiscal distress and has high external debt. Alternatively, other less formal forms of risk

transfer that can be readily employed by the impoverished agricultural households are risk-sharing and self-insurance. While risk-sharing is a cross-sectional transfer of risk to a group in a social network, self-insurance is a risk transfer to oneself across time via saving. The most common and universal form of risk sharing across social network is within household.

Thirdly, risk reduction is the most common strategies. There are three main methods of risk reduction, i.e. diversification, self-sufficiency and specialization. Diversification reduces risk exposure by spreading it over a portfolio of income generating activities whose returns are not perfectly correlated with respect to the risk of concern. Diversification strategies can be done horizontally or vertically. Horizontal diversification is a portfolio of income generating activities that diversifies between same-types activities. Crop diversification is an example of a horizontal diversification strategy. Vertical diversification is a portfolio that diversifies over different-type activities. Livelihood diversification by simultaneously employing on-farm, off-farm income generating activities is a case in point. Plot diversification may be considered a mixture of horizontal diversification and diversification over geography. This is similar in spirit to diversification across industry in financial investment.

While diversification aims at minimizing risk associated with income generation, self-sufficiency aims at minimizing risk associated with expenditure. Being self-sufficient in food production is to achieve food security by reducing risk associated with imperfect market or market variability. Self-sufficiency is not limited to food production. In an area where labor is a limiting factor, it is observed that self-sufficiency manifests in a form of labor hoarding by having a large number of children. Reducing risk via diversification is costly. Poor agricultural households may opt for specialization instead. Specialization reduces risk by focusing resources on income generating activity that has low risk at a cost of low return. Dercon (2000) terms this type of specialization an income-skewing strategy. Specialization does not necessarily indicate risk taking behavior (Dercon 2000).

### **3. Ex Post Shock Coping Strategies**

Consumption smoothing and asset smoothing are two main methods of ex post shock coping strategies. The consumption smoothing refers to shock coping strategies that aims at defending consumption level by either involving in alternative income generating activities or drawing down either buffer or productive assets. The asset smoothing refers to shock coping strategies aims at defending a threshold level of asset that may be called “Micawber threshold” (Lipton 1994) below which the household will fall into a poverty trap and will not be able to recover unassisted. Asset smoothing is generally accomplished by cutting down consumption level. While the wealthy households tend to use consumption smoothing as their primary strategy to cope with shock, poorer household tend to use a combination of consumption and asset smoothing. The impoverished adopt consumption smoothing at first by drawing down asset until the productive assets approach the Micawber threshold at which point the households tend to switch to asset smoothing (Zimmerman and Carter 1999). It is possible that the poor household may revert back from asset smoothing to consumption smoothing strategy when their immediate survival is at risk

(Dercon 2000). When the productive asset of the household is already at the Micawber threshold level prior to the shock, poor farmers is found to respond to crisis in the following sequence: asset preserving, asset depletion and destitution (Drèze 1990).

Post shock behavioral responses to mitigate impacts of the shock may be categorized into five types by their salient characteristics (Takasaki, Barham, and Coomes 2002):

- alternative income generating activities (natural resource collection, fishing, making charcoal, theft, prostitution),
- dissavings (drawing down food stock or selling off assets),
- informal insurance mechanism (mutual insurance, gift exchange, remittance, borrowing, relief food),
- labor adjustment (taking children out of school, increased child and female labor market participation)
- increased austerity (meal substitution, meal reduction, reducing household items, postponing health care expenditure).

The first four categories share one common goal, i.e. raising additional income and consumption to compensate for the shortfall as a result of shocks, which is consumption smoothing. The austerity measures, on the contrary, allow consumption to fall further to, perhaps, preserve productive asset, which is asset smoothing.

#### **4. The Data**

The data used in this paper is from the Research Institute for Humanity and Nature's Agricultural Household Survey (RAHS) conducted in March-April of 2007. The RAHS of 2005/2006 agricultural season is conducted to supplement Post Harvest Survey (PHS) conducted annually by the Central Statistical Office of Zambia. The primary purpose of this survey is to assess vulnerability and resilience of subsistence small holders to climatic variations.

Sampling method of RAHS is based on PHS's stratified random sampling. The population is first stratified into standard enumeration area (SEA) with probability of being selected being proportional to its size in the first step. In the next step, a number of small farming households living in selected SEA, which cultivates on more than 0 hectare to no more than 15 hectare of land, will be selected. The sampling frame of SEAs is based on Census of Population and Housing in 2000. In total, 410 SEAs were sampled for PHS.

The RAHS 2005/2006 covers 59 SEAs previously selected in PHS 2004/2005 in Eastern and Southern Provinces. The 59 SEAs were randomly chosen with 32 and 27 SEAs for Eastern province and Southern province respectively. The distributions of SEAs by district are shown in the table below:

**Table 1: Numbers of Selected SEAs by District**

District	No. SEA
<b>Eastern Province</b>	
Katete	11
Mambwe	3
Nyimba	4
Petauke	14
Sunb-total	32
<b>Southern Province</b>	
Choma	8
Gwembe	2
Kalomo	7
Monze	7
Sinazongwe	3
Sunb-total	27

The selection of the SEAs is not designed to represent provincial situations. This is not necessary a drawback because the focus of this survey is to examine behavior at household level and not to obtain provincial estimates as it is usually done in the PHS.

A total of 20 households that were previously interviewed in the PHS 2003/2004 and 2004/2005 are chosen from each SEA. The expected sample size is 1,180 households. However, CSO actually attempted to conduct an interview on 1,156 households of which 1,011

households completed the interview. This constitutes an attrition rate of 12.5 percent. Important reasons for failure to get complete response are (i) moving out of SEA, (ii) non contact, and (iii) households dissolved.

## 5. Results

The paper presents the results by proceeding from what can be loosely characterized as ex ante risk coping strategies, types of shocks and ex post shock coping strategies. The ex ante risk coping strategies focuses primarily on examining various methods of diversification the farmers employed.

### *Ex Ante Risk Coping Strategies*

#### *Livelihood Strategies*

Table 2 shows some household characteristics. On average, the small holders maintain relatively large household size around 7-8 person per household. Household in Southern province is slightly larger than that in the Eastern province, i.e. 7.8 vs. 6.7. The larger household size of the southerners is due partly to more prevalence of polygamous households. Larger household size allows the households flexibility to pool resources and share risks by taking advantage of household return to scale and labor supply they need during peaked demand season.

A picture that emerges from Table 2 is that the small holders in Southern province appear to be relatively more diversified in their livelihood strategies than their counterpart in the Eastern province. While between one-sixths and one-fifth of the Southern households engaged in off-farm income activities, only one-eighth of the Eastern households did so. While 3 percent of Eastern households engage in giving/receiving remittance, nearly 10 percent of the Southern households involved in an informal insurance of risk sharing. Against this background, it is interesting to note

that household head with no education and female headed households<sup>1</sup> are clearly higher in the Eastern than in the Southern province. Both suggest lower investment in human capital among the easterners.

**Table 2: Household Characteristics**

<b>Household</b>	<b>Eastern</b>	<b>Southern</b>	<b>All</b>
Size	6.7	7.8	7.2
Polygamous household (%)	12.1	28.6	19.6
Female HH head (%)	21.1	18.2	20.1
HH head w/o education (%)	33.7	8.4	22.2
HH involved in wage employment (%)	12.5	18.2	15.1
HH involved in business (%)	12.9	22.1	17.0
HH give/receive remittance (%)	2.7	9.8	5.9
No. of sampled HH	552	459	1,011

Table 3 provides details on the type of wage income employment available in both provinces. The pattern is similar in both provinces. Their primary employment source is from their small farm neighbors. It is interesting to observe that the second largest source of wage income for the Southern households is civil servants.

Table 4 shed light on the type of formal and informal business activities. Both provinces are quite different in their business livelihood strategies. While charcoal production, shop-owner, livestock trading and builder are four most important businesses in the south, shop-owner, vender, agricultural trading and local brewing are for the east. The differences may reflect different resource endowment between the two regions in our study areas. The Southern area in our study sample is relatively richer with forest and other natural resources; and that may explain the greater prevalence of charcoal production, builder and livestock trading. On the other hand, our samples in the Eastern province are located in relatively flat land and have better access to roads. That probably explains why a high percentage of the farmers in the Eastern province engaged in retailing, market vending, agricultural trading and brewing. The business activities appear to be vertically more diverse (by industry) in the east than in the south.

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<sup>1</sup> Death to the male household head and dissolved marriage are two likely causes leading to female headed household. Premature death to the male household head is an indicator of household health. Income of female headed farming households is generally lower than that of the male counterpart; and the lower income can potentially have adverse impact on child nutritional and health status.

**Table 3: Type of Wage Employment by Province**

ACTIVITY	Eastern		Southern		All	
	No.	%	No.	%	No.	%
On smallholder farm	55	67.1	57	49.6	112	56.9
On commercial farm	0	0.0	3	2.6	3	1.5
In a factory	-	-	-	-	-	-
In a mine	1	1.2	0	0.0	1	0.5
Other industrial work	3	3.7	1	0.9	4	2.0
Teacher	2	2.4	19	16.5	21	10.7
Other civil servant	1	1.2	9	7.8	10	5.1
Clerk	0	0.0	1	0.9	1	0.5
Shop attendant	-	-	-	-	-	-
Non-agricultural piece	8	9.8	5	4.3	13	6.6
Other	12	14.6	20	17.4	32	16.2

Note: No. represents frequency and not the number of households. Some households reportedly engage in multiple wage income activities.

**Table 4: Type of Formal and Informal Business Activity by Province**

Business Activity	Eastern		Southern		All	
	No.	%	No.	%	No.	%
Agricultural trading	9	11.7	4	3.3	13	6.6
Livestock trading	1	1.3	10	8.3	11	5.6
Retailer /shopowner	16	20.8	15	12.4	31	15.7
Marketer/hawker/vendor	9	11.7	9	7.4	18	9.1
Firewood/charcoal production	1	1.3	16	13.2	17	8.6
Carpentry	3	3.9	1	0.8	4	2.0
Builder	1	1.3	9	7.4	10	5.1
Local brewing	9	11.7	3	2.5	12	6.1
Butchery	2	2.6	0	0.0	2	1.0
Agriculture services	-	-	-	-	-	-
Milling	4	5.2	3	2.5	7	3.5
Oil processing	1	1.3	0	0.0	1	0.5
Agro processing	-	-	-	-	-	-
Tailor	0	0.0	1	0.8	1	0.5
Bicycle repair	2	2.6	0	0.0	2	1.0
Weaving	5	6.5	8	6.6	13	6.6
Blacksmithing	2	2.6	3	2.5	5	2.5
Traditional doctor	-	-	-	-	-	-
Fishing & selling	0	0.0	11	9.1	11	5.6
Precious stone mining	0	0.0	1	0.8	1	0.5
Other	12	15.6	27	22.3	39	19.7

Note: No. represents frequency and not the number of households. Some households reportedly engage in multiple business income activities.

### ***Crop Strategies***

Table 5 provides details of farmers' crop choices. Nearly every household in both provinces grow maize which is Zambia's staple crop. Other cereal crops such as millet and sorghum that are relatively more drought resistant are not well practiced in both provinces. The second most common crop in both provinces is groundnuts. Around 50% and 60% of households in Eastern and Southern province respectively grow groundnuts. The striking difference is the prevalence of

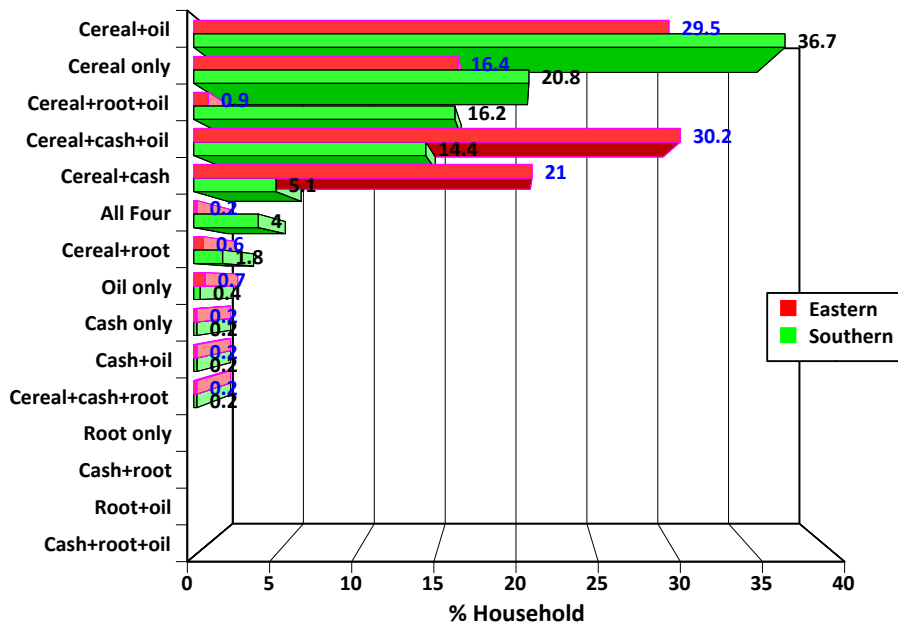
cotton which is the second most important crop for the Eastern province. While one in two Eastern households grow cotton, only one every five Southern households do so. Cotton is a relatively capital intensive crop; and production by subsistence households is usually unlikely unless they can have an access to credit via an out-grower scheme. Sunflower plays important role in the Eastern province. Approximately, two of every seven households grow sunflower which is another cash crop for oil production. A quarter of households in Southern province grow cowpeas and sweet potatoes which is a low risk low return crop. Dercon (2006) found that households with less liquid tend to grow more sweet potatoes.

Overall, self-sufficiency in food production either completely or partially appears to be a basic strategy in both provinces. Portfolio composition of the Southern province seems to contain significantly higher proportion of low risk and low return crops. The easterners' portfolio, on the other hand, contains high concentration of high return cash crops.

**Table 5: Crop Choice by Household and Province**

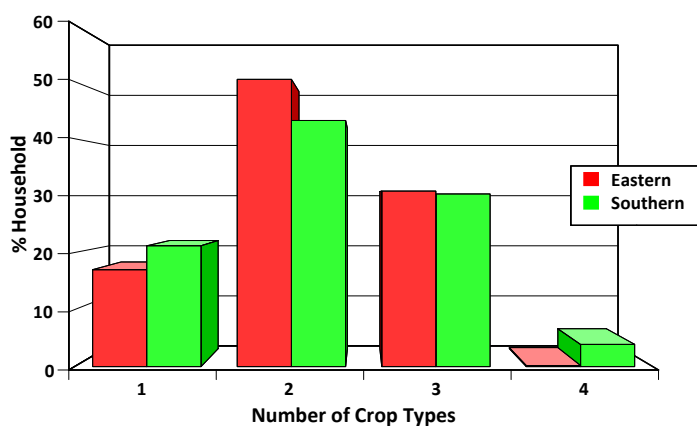
Crop	Eastern		Southern		Total	
	Household	Percent	Household	Percent	Household	Percent
Maize	535	96.9	441	96.3	976	96.6
Sorghum	19	3.4	56	12.2	75	7.4
Rice	10	1.8	3	0.7	13	1.3
Millet	0	0.0	56	12.2	56	5.5
Sunflower	162	29.3	49	10.7	211	20.9
Groundnuts	261	47.3	275	60.0	536	53.1
Soyabeans	13	2.4	5	1.1	18	1.8
Seed cotton	277	50.2	104	22.7	381	37.7
Irish potato	0	0.0	0	0.0	0	0.0
Virginia tobacco	3	0.5	4	0.9	7	0.7
Burley tobacco	6	1.1	1	0.2	7	0.7
Mixed beans	22	4.0	14	3.1	36	3.6
Bambara nuts	0	0.0	20	4.4	20	2.0
Cowpeas	3	0.5	114	24.9	117	11.6
Velvet beans	0	0.0	11	2.4	11	1.1
Coffee	0	0.0	0	0.0	0	0.0
Sweet potato	10	1.8	98	21.4	108	10.7
Casava	0	0.0	2	0.4	2	0.2
Kenaf	0	0.0	0	0.0	0	0.0
Cashew nut	0	0.0	0	0.0	0	0.0
Paprika	1	0.2	0	0.0	1	0.1
Other crops	0	0.0	0	0.0	0	0.0





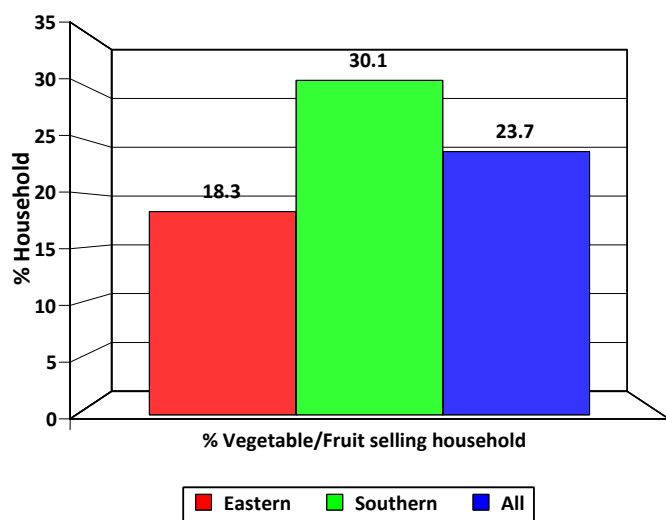
**Figure 1: Crop Portfolio by Crop Type**

To gain further insight into how households' crop portfolio strategies, I look into crop combination by categorizing each crop in table 5 into cereal, root, seed or oil, or cash crop. Figure 1 shows that low diversification is untypical. Farmers tend to diversify over two or more crop types. Cereal crop appears to be the only exception with Southern province leading in growing cereal crop only. Cereal-oil crop combination is the most prevalent in the Southern province. In Eastern province, cereal-cash-oil and cereal-oil crops are equally popular practices. Since oil crop is also cash earning crop, the dominant characteristic of the easterners' portfolio is an emphasis on cash crop. The crop portfolio of the Southern province seems to emphasize cereal crop. It is interesting to note that root crop is not grown independently but in combination with cereal crop only.



**Figure 2: Household Crop Diversification by Crop Type**

Figure 2 show that Eastern province is slightly more likely to adopt diversified portfolio across crop types. Two-crop type appears to be the most common strategy. Higher level of diversification is also significant in both provinces.



**Figure 3: Vegetable/Fruit Selling Household**

However, when garden activities are examined, it is found that the small holders in Southern province are more likely to involve in selling vegetable or fruits. While 2 in every seven households in Southern provinces sell fruits or vegetables, only 1 in every six households does so in the Eastern province.

How land is allocated to each crop can be an indicator of relative significances of each crop. Table 6 shows average household land allocation by crop type. The patterns are very similar across provinces. The marked difference is the greater emphasis the southerners place on cereal crops whereas the easterners tend to have greater preference for cash crops.

**Table 6: Average Household Land Allocation by Crop**

Land Allocation	Eastern	Southern	All
% Land allocated to cereal crop	63.0	70.0	66.2
% Land allocated to cash crop	42.7	34.3	40.3
% Land allocated to oil/seed crop	24.7	26.6	25.6
% Land allocated to root crop	12.7	13.3	13.2

### ***Asset Holding Strategies***

Table 7 provides details of productive asset the households reportedly owned. Bicycles are equally common in both provinces. Approximately 60 percent of the households own bicycles. Two-thirds of the households in Southern province owned ox-drawn ploughs but only one-third owned them in the Eastern province. Scotch-cards and sprayers are equally popular assets to own in both provinces. This is where the similarity in asset holdings ends. Overall, the asset portfolio of the Eastern province's households is comprised of narrow base which is mainly the four aforementioned types. The productive asset portfolio of the Southern province's households is more diverse. There are seven and four asset types that more than 10 percent of households have in Southern and Eastern province respectively.

**Table 7: Productive Asset Holding by Type**

Asset Type	Eastern		Southern		Total	
	Number of HH	Percent	Number of HH	Percent	Number of HH	Percent
Ox-drawn ploughs	195	35.6	296	64.9	491	49.0
Disc ploughs	13	2.4	11	2.4	24	2.4
Harrows	1	0.2	102	22.5	103	10.3
Cultivators	4	0.7	108	23.7	112	11.2
Rippers	4	0.7	13	2.9	17	1.7
Tractors	0	0.0	6	1.3	6	0.6
Hand driven tractors	1	0.2	2	0.4	3	0.3
Scotch carts	120	21.9	105	23.1	225	22.5
Water pumps	2	0.4	5	1.1	7	0.7
Trucks / lorries	1	0.2	7	1.5	8	0.8
Pick-ups / vans / cars	7	1.3	8	1.8	15	1.5
Trailer truck / tractor	0	0.0	3	0.7	3	0.3
Motorcycles	8	1.5	11	2.4	19	1.9
Bicycles	325	59.4	267	58.7	592	59.1
Hammer mills	6	1.1	11	2.4	17	1.7
Hand hammer mills	1	0.2	78	17.1	79	7.9
Rump presses / oil expellers	2	0.4	2	0.4	4	0.4
Sprayers	134	24.5	101	22.2	235	23.5
Shellers	2	0.4	3	0.7	5	0.5

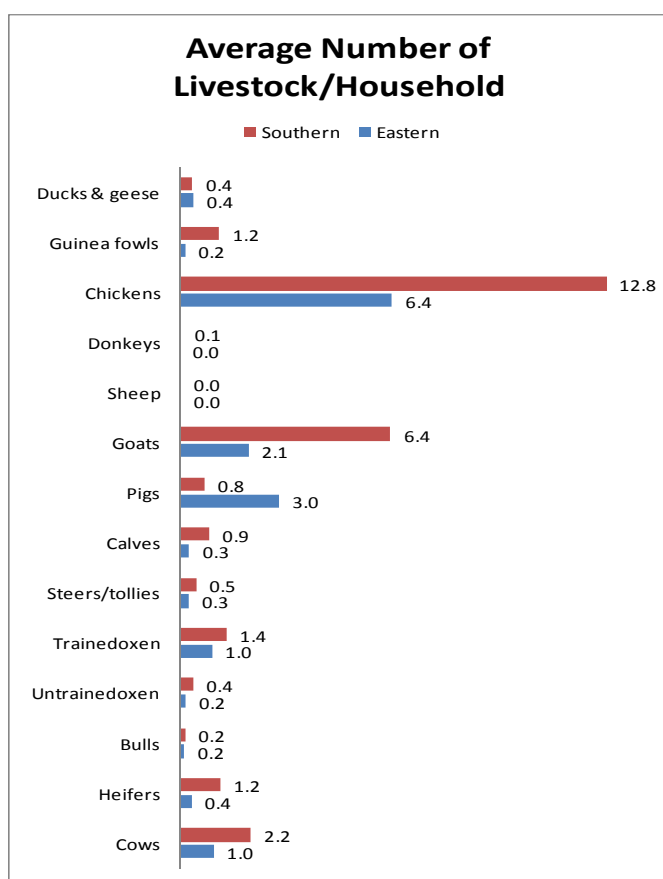
***Livestock Holding Strategies***

Figure 4 shows average holding of livestock by types. It is apparent that the southerners are holding equal or more livestock, on average, in nearly every category. An exception is pig. The Southern province farmers show strong preference for high value animals, i.e. cattle. For cattle, the ratios of the average holding between the two provinces are approximately 2:1 or higher. Goats and chickens are also significantly higher in the Southern province. This is due, perhaps, to greater availability of community forest in the Southern province.

When livestock ownership is examined by household, it is found that approximately 10 percent of households owned no animal. Eastern province has higher proportion of livestockless households than the Southern province by 5 percentage points. The proportions of households owning livestock in Southern province are higher than those in the Eastern province in every category of livestock.

**Table 8: Livestock Holding by Household**

Livestock	Eastern	Southern	All
None	13.8	8.5	11.4
Cattle	46.0	56.6	50.8
Pig/Goat/Sheep	63.8	65.9	64.8
Poultry	69.9	87.1	77.7
Donkey	0.5	2.0	1.2



**Figure 4: Livestock Holding Per Household**

Table 9 summarizes animal holding strategies. The patterns are quite similar between the two provinces. Farmers simultaneously hold cattle, pig/goat/sheep and poultry in their livestock portfolio. The second most popular portfolio is to hold pig/goat/sheep and poultry.

**Table 9: Livestock Diversification**

Livestock	Eastern	Southern	All
None	13.77	8.52	11.39
Cattle only	3.44	0.87	2.28
PGS only	7.43	1.53	4.75
Poultry only	11.96	14.63	13.17
Donkey only	-	-	-
Cattle & PGS	5.07	1.97	3.66
Cattle & poultry	6.88	9.39	8.02
Cattle & donkey	-	-	-
PGS & poultry	20.29	18.56	19.5
PGS & donkey	0.36	-	0.2
Poultry & donkey	0.18	-	0.1
Cattle, PGS & poultry	30.62	42.58	36.04
Cattle, PGS & poultry	-	-	-
Cattle, poultry & donkey	-	0.66	0.3
PGS, poultry & donkey	-	0.22	0.1
Cattle, PGS, poultry & donkey	-	1.09	0.5

### *Type of Shocks*

Figure 5 displays types of shocks households had experienced in the past six years between 2001 and 2006. Farmers in both provinces experienced similar kinds of shocks. Drought, malaria,

livestock diseases, loss of employment, heavy rainfall and death to household members are top five types of shocks the households in Southern province reported to having experienced. In Eastern province, drought, malaria, livestock diseases, heavy rain and floods were five most familiar shocks to households. Although drought is the most common type of shock in both provinces, the scope was much wider in the Southern than in the Eastern province counterpart. Three quarter of households reported to experience drought in the Southern province whereas about one-half of the Eastern province's households reported so. Flooding seems to be more common in the Eastern than in the Southern.

When respondents were asked to provide subjective evaluation of each type of shocks, drought is clearly the most severe shock to the subsistence farmers of both provinces. And it is more severe in the Southern than in the Eastern province (see Figure 6). Heavy rainfall, nevertheless, is rated more severe in the south than in the east. This is due probably to Southern province's topographical condition that is on a plateau and sloppy. Heavy rain may quickly wash away farmers' crops. On the other hand, floods are reported to cause relatively more damage in the east than in the south. The pattern of shock severity closely resembles the pattern observed in the prevalence rates as mentioned above. In all, climatic related shock is the principal risks threatening the small holders' livelihoods.

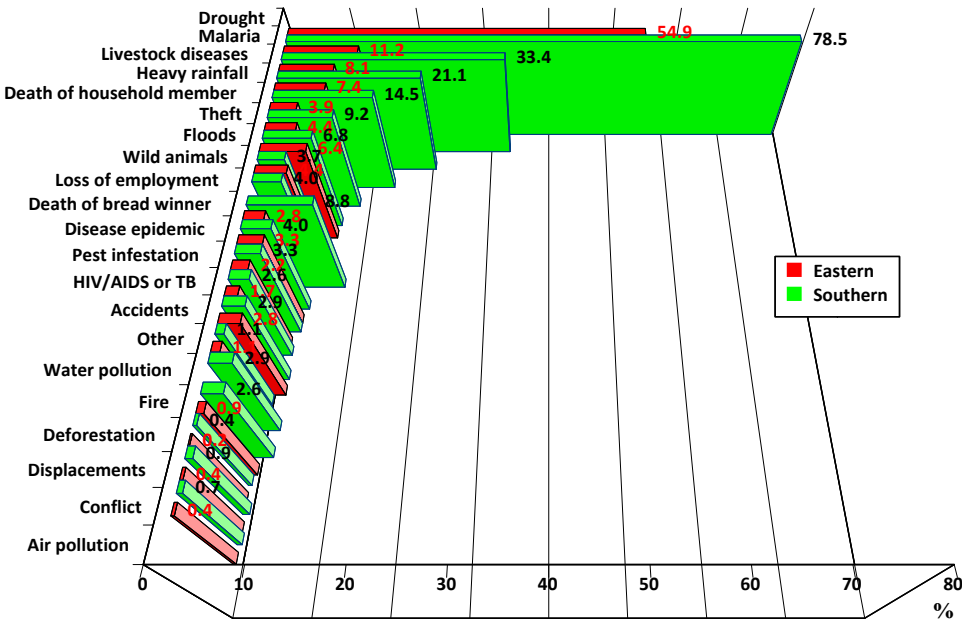
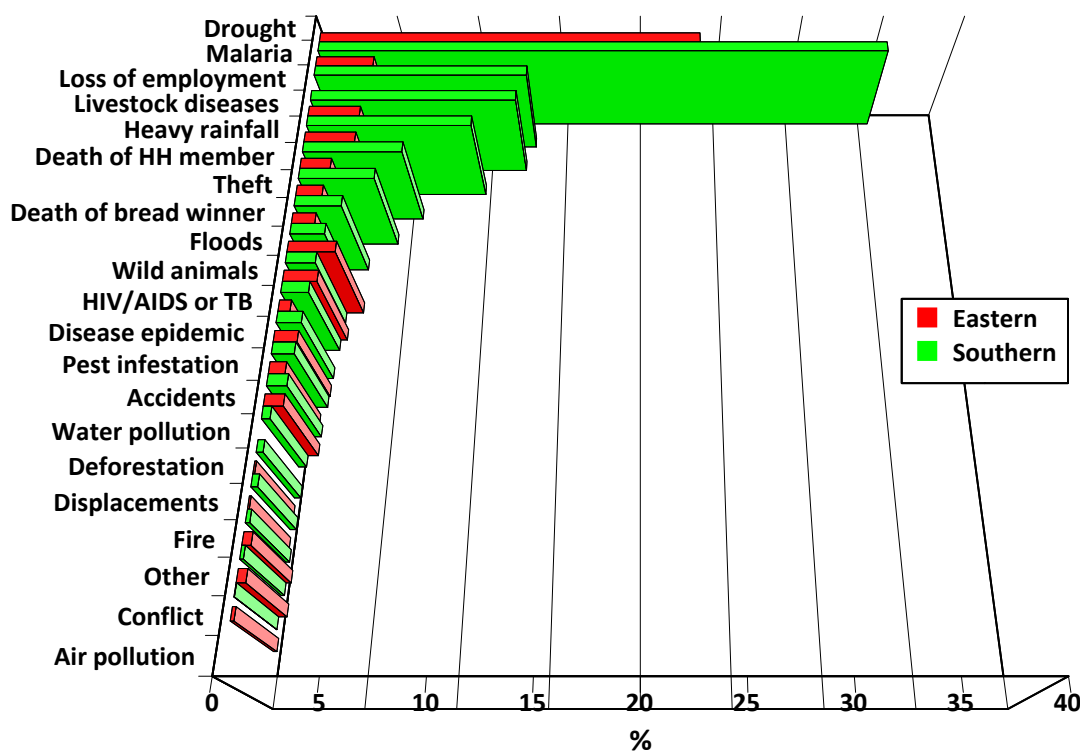


Figure 5: Shocks to Households in the Past 6 Years, 2001-2006



**Figure 6: Subjective Evaluation of Severity of Shocks Weighted by Prevalence Rate**

Table 10 shows an aggregation of hazards into two categories, i.e. idiosyncratic and covariate shock. It reveals an interesting pattern. Idiosyncrasy is the primary shocker to the Eastern province’s households whereas the southerners largely suffer a mixture of idiosyncratic and common shocks. Interestingly, one-third of Eastern households failed to report any shock experienced during the past 6 years. The proportion of no shock reported or failing to report any shock in Southern province is only one-tenth.

**Table 10: Household Experiencing Shocks in the Past 6 years, 2001-2006**

Shock	Eastern	Southern	Total
None/No report	32.1	11.6	22.8
Idiosyncratic only	32.2	36.5	34.2
Covariate only	8.5	5.9	7.3
Idiosyncratic & covariate	27.2	46.1	35.7

***Ex Post Shock Coping Strategies***

Figure 7 displays how farmers cope at time of drought. Patterns are markedly different between the two provinces. While easterners turn to piece work as their chief solution, the southerners cut down their meals and relying on relief food. This may reflect different job opportunities in the two provinces. Selling assets to smooth consumption is almost equally popular in both Eastern and Southern province.

When each of every coping strategy is characterized into five major strategic groups, it is evident that approach to deal with shocks of the two provinces is distinctly different (see Table 11).

The households in Eastern province employ alternative income generating activities to compensate for the income shortfall. If successful, such strategy can help to smooth both income and asset. The southerners, on the other hand, adapt to hazards by increasing austerity and relying on informal insurance mechanisms. Labor adjustment at time of crises is not a likely practice in both provinces.

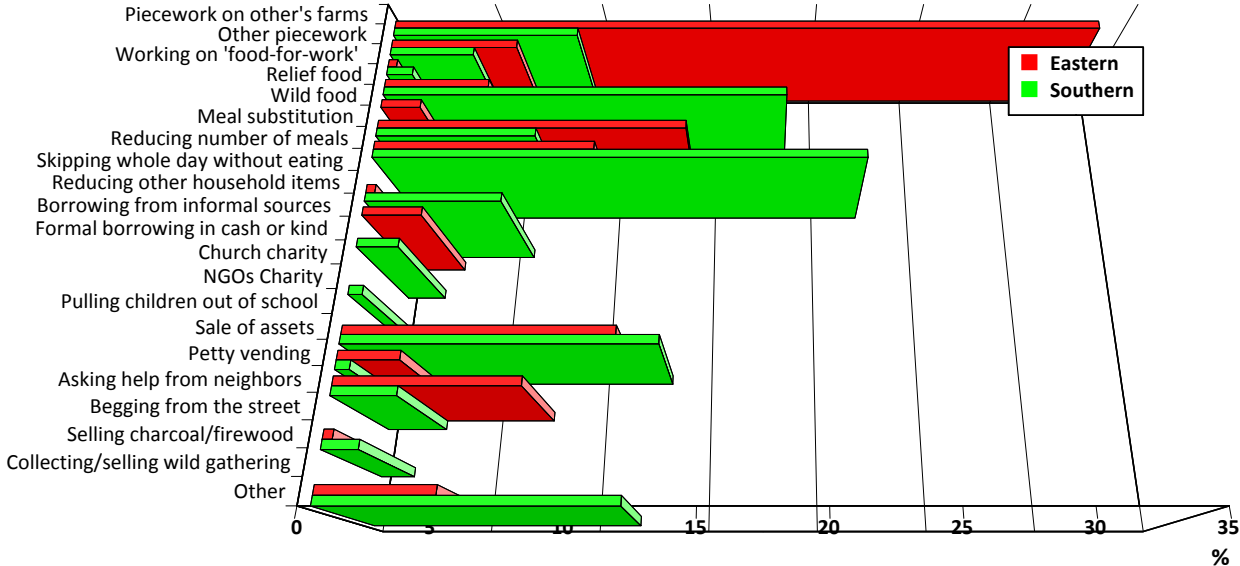


Figure 7: Drought Coping Strategies

Table 11: Ex Post Shock Coping Strategies by Selected Hazard

Coping Strategies	Drought	Malaria	Livestock diseases	Heavy rainfall	Floods	Theft	Death of bread winner	Average
Eastern								
Alternative income generating activities	42.3	42.1	35.7	17.1	33.3	21.4	41.7	33.4
Dissavings	11.4	5.3	3.6	2.9	10.0	7.1	0.0	5.7
Informal insurance mechanisms	15.1	26.3	32.1	51.4	20.0	35.7	8.3	27.0
Labor adjustment	0.4	5.3	0.0	0.0	0.0	0.0	8.3	2.0
Increased austerity	26.1	10.5	10.7	28.6	20.0	21.4	25.0	20.3
Others/unknown	4.8	10.5	17.9	0.0	16.7	14.3	16.7	11.5
Southern								
Alternative income generating activities	14.7	9.2	6.5	8.5	26.7	14.3	5.9	12.2
Dissavings	13.2	0.0	8.7	8.5	13.3	3.6	5.9	7.6
Informal insurance mechanisms	23.7	14.3	7.6	8.5	20.0	7.1	11.8	13.3
Labor adjustment	1.2	1.0	0.0	2.1	0.0	0.0	0.0	0.6
Increased austerity	35.3	9.2	22.8	29.8	40.0	10.7	5.9	22.0
Others/unknown	12.0	66.3	54.3	42.6	0.0	64.3	70.6	44.3

6. Conclusion and Discussion

In Southern and Eastern province of Zambia, small scale farmers are facing substantial livelihood risks that result in high variability of their living standard. In response, they develop a complex set of risk coping strategies to avoid, transfer, or reduce risks before crises and to mitigate or insulate welfare impact after experiencing shocks. Drought, malaria, livestock diseases, heavy rainfall, flood and dead to the bread winner are the top six hazards the small holders reportedly experienced in the past six years between 2001 and 2006. Drought is by far the most damaging

hazards the majority of sampled households had experienced.

There are several ways for households to cope with risk before it occurs. Risk avoidance, risk transfer and risk reduction are three main strategies. This study focuses attention on risk reduction because it is the most commonly practiced form of risk coping. Risk reduction can be achieved by diversification, self-sufficiency and specialization. Among the three, specialization in a low risk low return livelihood system seems to be limitedly practiced. Self-sufficiency in food production, on the other hand, is the fundamental and most common strategies. An absence or imperfect market system may have contributed to the prevalence of self-sufficient strategies. In addition, farmers in both provinces engage in various diversification strategies which include livelihood diversification, crop diversification, plot diversification, asset diversification, and livestock diversification.

The small holders in Southern and Eastern provinces approach diversification strategies differently. In comparison to households in Eastern province, farmers in Southern province are more likely to have larger household size, engage in wage and business income activities, give and receive remittance which is a form of informal risk sharing, sell vegetables/fruits, hold more diverse type of assets, hold more diverse type of livestock. Crop portfolio of the southerners is relatively more defensive by giving greater emphasis on cereal crops which has low market risk while the easterners put a great deal of importance to cash crops that are more susceptible to downside risk. If one looks at diversification as a spectrum where the vertical diversification is at one end and the horizontal diversification is at the other end, the risk coping behavior of the southerners is likely to locate closer toward the complete vertical diversification; and the easterners' behavior is located closer to the complete horizontal diversification by emphasizing diversification by cash crop choice that will yield the highest possible return.

Ex post shock coping strategies of the two provinces are also apparently different. The easterners utilize income smoothing strategies by engaging in the alternative income generating activities and the informal insurance mechanisms to cope with crisis. The southerners tend to engage in the increased austerity and informal insurance mechanism to survive. It is uncertain whether the adoption of austerity measures might indicate asset smoothing strategy. More study is needed to better understand motives of their behaviors. It should be cautioned that the ex post crisis coping strategies of the small holders in Southern province are quantified with relatively less degree of precision than those of the Eastern province. The significant proportions of other/unknown category of the shock coping strategies in Southern province may indicate misreported errors.



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