# 4

# *Quantifying Vulnerability: The Household Vulnerability Index (HVI)*

One of the key outcomes of the regional study was to develop and test a statistical index that attempts to quantify the vulnerability introduced into different households by HIV and AIDS. The Household Vulnerability Index (HVI) was tested in two countries: Lesotho and South Africa. The results provide a baseline on how the index can be used to quantify the different degrees of vulnerability experienced by households. The HVI presented in this section proposes a basis for further research on a common yard-stick for measuring household vulnerability.

Vulnerability is conceptualised as the presence of factors that place households at risk of becoming food insecure or malnourished. The factors also affect household ability to cope. Vulnerability is described as having two components: "external vulnerability", which refers to exposure to external shocks or hazards; and "internal vulnerability", which refers to the capacity to cope with or withstand those shocks (resilience). Household vulnerability is the extent to which HIV and AIDS and other factors affect a household's food security status and asset endowments, and the household's ability or inability to withstand the shock caused by these factors. All of these factors determine the livelihood strategies that people pursue, and ultimately their livelihood outcomes.

How can the 'most vulnerable' be identified and assisted? How can the impact of the epidemic on household food security be monitored and evaluated over time? The HVI, when fully developed, will be used as a yardstick to answer these questions, and when longitudinal data is available, the HVI will also keep track of progress towards food security.

## Introduction

The Household Vulnerability Index (HVI) is a composite statistical index that was designed to quantify the vulnerability introduced into a given household by combining the various impacts from a multiplicity of variables. The nature, extent and depth of the various impacts identified are used to award vulnerability scores and weights – which are then used to compute the index for each household. The index is used to categorise households according to their varying degrees of vulnerability in order to ensure better planning and targeting of interventions for mitigating impact. Previously, vulnerability assessments have not been quantitative and therefore made effective targeting of interventions difficult.

Categorising household vulnerability is important because households affected by HIV and AIDS are not at the same level of need, neither is that need synonymous with vulnerability. Empirical evidence to date shows that not all AIDS-affected households are food insecure, and that many unaffected households are actually food insecure. Therefore a generalised labelling of AIDS-affected households as vulnerable and in need of food security assistance is not accurate. A well developed composite HVI is expected to improve targeting of food aid and other development interventions.

## Constructing HVI For the Study Data

The Household Vulnerability Index was calculated by applying the theory discussed in section 2 to the data collected by the household questionnaires. A number of steps were observed:

1. Selecting appropriate dimensions of impact. All 17 impact dimensions identified in Section 2 were used. These were clustered into five groups or assets: human, physical, social, financial, and natural.
2. Selecting appropriate variables from collected data to describe each of the five assets above.
3. Calculating or setting the lower and upper limits, or goal posts, for each variable i.e. maximum and minimum possible values.
4. Developing a matrix of weights for the asset classes. Each variable was given an appropriate weight within its asset cluster using predetermined weights. The total weight of the five asset clusters was 100, and within asset clusters the cluster's weight was appropriately distributed among the variables used to describe it.
5 Next, the individual variable indices were calculated as an index between 0 and 100 by using an appropriate transformation.
6. The Household Vulnerability Index (HVI) was then computed for each asset class as well as for each household. The household index was a weighted average of the asset cluster indices.

From the HVI indices established it was then possible to categorise the households according to three different degrees of vulnerability:

1) **Vulnerability level 1 = Coping level Households (CLH)** – a household in a vulnerable situation but still able to cope;
2) **Vulnerability level 2 = Acute level households (ALH)** – a household that has been hit so hard that it badly needs assistance to the degree of an acute health care unit in a hospital. With some rapid-response type of assistance the household may be resuscitated;
3) **Vulnerability level 3 = Emergency level Households (ELH)** – the equivalent of an intensive care situation – almost a point of no return – but could be resuscitated with the best possible expertise and to long term support.

The three vulnerability levels were set on the basis of a predetermined '**coping'** household, based on the 17 impact areas and the specified socio-economic context of

the study area. Practically, this was achieved by computing the HVI of a simulated household that exhibited coping characteristics in each of the tracked asset clusters.

## Analytical Space for the Dimensions

The study proposed three levels or spaces within which each asset could be assessed:

- Nature (short, medium, long term)
- Extent (ripple effects) and
- Severity (depth of morbidity)

The nature, extent and magnitude or severity of the impact was made available from the preliminary and other advanced analysis, as well as literature review.

## Quantifying the Dimensional Impacts

After the 17 impact areas (dimensions) were clustered according to the five livelihood assets, a scoring system was used to ensure that the impacts are comparable. The dimension impacts were given a score on a scale from -3 to +1. A zero score signifies no impact. A score of -1 represents an impact that is short term, limited extent and not severe. A score of -2 represents medium term impact, medium extent and medium severity. A -3 score was given to dimensions that represented long term and large-scale impact, such as the dissolution of a household, or deep or permanent severity. A score of +1 represented a positive impact that HIV and AIDS might cause. Only one positive score was used because positive impacts are rare at the household level in the case of HIV and AIDS.

According to Save the Children (UK), 2004, while it is common to see broad references to "the impact of HIV and AIDS", in reality there are three main ways in which a household can be affected by AIDS, and each has different sets of impacts that should be examined separately:

1. Chronic Illness
2. Death
3. Support of Orphans

From preliminary analysis (graphs and charts) we can establish how the variables relate to the dimensions or impact area.

### The Lesotho Case

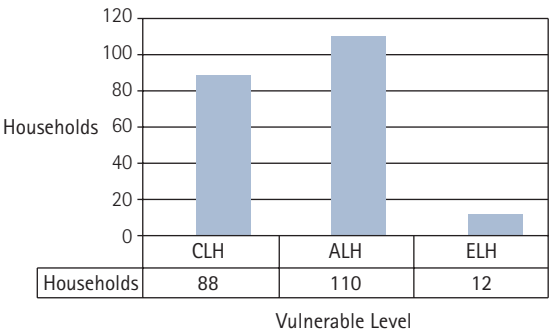
Using the HVI computations, different degrees of vulnerability were assigned values of the computed HVI in a given interval as follows:

- Vulnerability Level 1, CLH is assigned HVI values within an interval [0, 40]
- Vulnerability Level 2, ALH is assigned HVI values within an interval [41, 69]
- Vulnerability Level 3, ELH is assigned HVI values within an interval [70, 100]

## Households Vulnerability Index for Human Assets

The vulnerability levels, for human capital are shown in Figure 4.2. Most of the households (52%) were in vulnerability level 2, an acute level. HIV and AIDS has affected these households so hard that they need some immediate assistance with relief food and some agricultural development package to resuscitate them.

Figure 4.1 Number of households in each vulnerability level, Lesotho



42% of households were in vulnerable level 1, a coping level. These are households that were in a vulnerable situation but able to cope with the presence of infected members or losing a member due to AIDS. They need social support from government and society at large, to help them cope and eventually overcome the impact. These families do not require relief food supplies – but may require psychosocial support.

Households that were in an emergency level, made up the lowest proportion, 6%. Though the proportion was relatively smaller, these households require demanding and expensive interventions. Their situation is beyond their capacity, hence a need for immediate intervention.

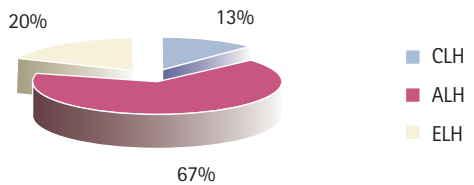
For those households whose vulnerability levels call for public intervention, such intervention should address:

- The higher dependency ratio within these households
- Households headed by children and old people without ways and means of producing crops and livestock
- Households with higher transport expenses due to having multiple sick members
- Households with higher female-male ratios due to loss of male adults.

By probing the data for those households in the emergency level, a number of conclusions were reached. Higher dependency ratios within households and child-headed households had an adverse effect on households' financial resources that could be used to purchase food, farm inputs and implements, hence the low crop and livestock production within households. Higher transportation expenses resulted in a reduction of expenditure on food and other goods and services.

Interventions by government through relevant ministries as well as NGOs, the private sector and the society at large need to understand the levels of vulnerability and factors related to such levels for them to intervene in a meaningful manner. Planners and policy makers should be on board so that the country's planning and social policy formulation for HIV and AIDS related vulnerability on human capital would be guided by and focus on identified impact areas within the society.

Figure 4.2 Households Vulnerability Levels for Financial Capital Dimension




## Households Vulnerability Index for Financial Assets

Household vulnerability levels for the financial capital dimension had a slightly different pattern from human capital in that, though households in vulnerability level 2 - the acute level, were still in the lead with 67%, those in the emergency level were the second highest with 20% (Figure 4.3).

In addition, the proportion of households (13%) who were in the coping level was the lowest. In this case, affected households became highly vulnerable because of higher medical and funeral expenditure. Household income was

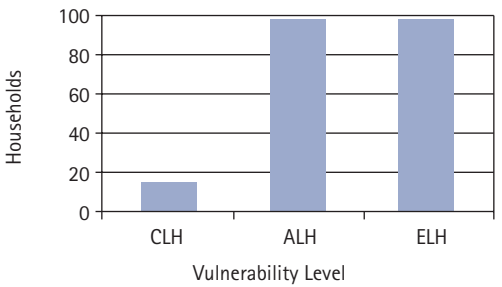
diverted to medical and funeral expenses and this resulted in a decrease in food and other goods expenditure.

To provide assistance and resuscitation to highly vulnerable households effectively, programmes need to be directed at improving household food security. In addition there is a need for Basotho as a nation to reconsider their cultural practice of spending large amounts of money on funerals, particularly when death was due to AIDS or was preceded by long illness. Funeral expenditure normally eats up into the already depleted household income and leaves orphans with little or nothing to spend on food and other basic needs.

## Household Vulnerability Index for Social Assets

In the case of social capital, most of the households (90.5%) had an index that indicated the coping level. Though the households were coping they still needed assistance that would help them to improve their status, or at least maintain that level. Acute level households made up 9% and emergency level households made up 0.5% (Table 4.1). Support networks such as the extended family, government interventions, and non-governmental institutions, community associations and other safety nets, contributed to this situation, and this should be strengthened. The support networks play an important role in taking care of sick and orphaned children, and giving financial and emotional support. On probing the data, it was seen that often, this support was adhoc and not always reliable.

Figure 4.3 Households Vulnerability Index for Physical Capital




## Household Vulnerability Index for Physical Assets

The majority of households presented with higher vulnerability levels under physical assets. Acute level households with 47% and emergency level households with 47% (Figure 4.4) were the majority. The smaller percentage of households (6%) was in a coping level (Figure 5.3). This indicates two things: 1) Most households do not have physical assets, and 2) Intervations to alleviate impacts have not addressed the need for phyisical assets.

Factors that also rendered the households vulnerable in the case of physical assets are small sizes of fields for households, low revenue from crop production,

Table 4.1: Households Vulnerability Index for Social Assets

| Vulnerability Level | Households | Percentage |
|---|---|---|
| Coping Level Households (CLH) | 190 | 90.5 |
| Acute Level Households (ALH) | 19 | 9.0 |
| Emergency Level Households (ELH) | 1 | 0.5 |
| Total | 210 | 100 |

households not owning livestock and sale of field implements to raise cash.

Households who lost male adults and are child-headed, female-headed or have higher female-male ratios were observed to be more vulnerable. The death of household heads and spouses adversely affected the value of total crop output per acre. In Lesotho, most of the households lost their livestock due to the rampant livestock theft that exists in the country. This was observed to be higher for households without male adults.

## Household Vulnerability for Natural Capital Assets

In the case of natural capital, most households were at the emergency level households were the highest with 45.2%. The acute level households followed with 41.0% (Table 4.2). The smallest group was of coping level households with 13.8%. This indicated that the bulk of households were neither endowed with natural resources including forest produce, nor managing their environment (pastures etc) appropriately.

Programmes directed to empowering and equipping children who are decision-makers, with the skills necessary for managing the environment should be put in place. In addition factors that contributed to affected households cultivating smaller proportions of their total arable land should be identified and addressed so that crop production would be increased.

## Food Production Vulnerability Index

The HVI approach as used to develop a similar index for food production. The purpose was to probe the impacts associated with food production. Most of the households (58%) were in the category of acute level households, followed by those in the coping level (27%) and then emergency level with 15% (Figure 4.5). Under this dimension, households that were most vulnerable were of these characteristics:

- Having at least one member infected with HIV.
- Having female member(s) infected with AIDS. Females normally assume the responsibility of taking care of every member including ill members.
- Experienced a negative change in cultivated areas.
- Living with infected member(s) at home.
- Experienced a negative change (reduced diversity) in types of food consumed.

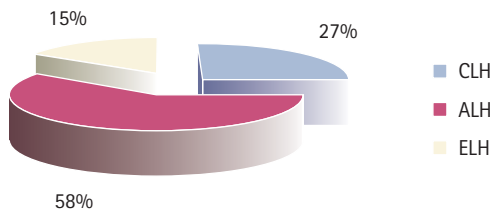



Figure 4.4 Vulnerability Levels for Household Production for Food Capital Dimension

Table 4.2: Households' Vulnerability Levels for Natural Capital

| Vulnerability Level | Households | Percentage |
|---|---|---|
| Coping Level Households (CLH) | 29 | 13.8 |
| Acute Level Households (ALH) | 86 | 41.0 |
| Emergency Level Households (ELH) | 95 | 45.2 |
| Total | 210 | 100 |

Living with members with AIDS-related illnesses consumed household income and productive assets.

## The Combined Household Vulnerability Index

Figure 4.6 illustrates the three household vulnerability levels for the combined five assets. 85% of households were in the acute level, while 15% were in the coping level. An important observation that demonstrates resilience of households is that although some fell in the emergency levels when considering specific assets, none were in this category in the overall index.

A number of discussion points were raised by the analysis for Lesotho:

1) Households are not affected in the same way across the five asset categories. For example, some hoseholds may not have social assets, but make up for that if they have physical assets.
2) Child-headed households tended to be affected in all asset categories, raising their plight.
3) Most households have access to social networks, but these networks do not seem to be having an impact on the other asset needs. What this means is that support through social networks, including the interventions by governmant, NGOs and the extended families is not adequate to raise the livelihood status of a household.
4) The HIV epidemic has increased food insecurity by reducing food productin and by increasing insecurity of livestock.

For policy makers, it is important to note that HIV interventions that do not improve the livelihood status of the household in the five asset areas will not be adequate. From the study, it seems that interventions should introduce sustainable means for raising incomes for the households as the main activities, followed by those that will result in sustained food production. These two could easily improve coping levels of households.

For programme implementers, it is not adequate to introduce vertical interventions or those that address one impact without looking at the other factors systematically. There is evidence that households are affected diffrently, even by the same factor, and their needs are therefore different. Thus a programme providing, say, agriculture inputs, need to to be flexible to include aspects of quantity, type and duration for every targeted household.

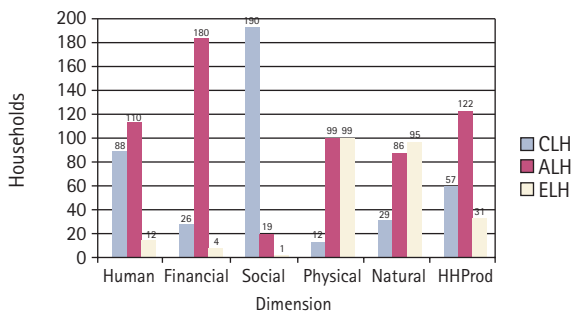



Figure 4.5 Comparison of Households Vulnerability Levels for Different Dimensions

Table 4.3: Overall Households Vulnerability Index

| Vulnerability Level | Households | Percentage |
|---|---|---|
| Coping Level Households (CLH) | 30 | 14.3 |
| Acute Level Households (ALH) | 180 | 85.7 |
| Emergency Level Households (ELH) | 0 | 0 |
| Total | 210 | 100 |

### The South Africa Case

In line with the regional methodology framework for computing the HVI, the South African team grouped the various variables from the survey data into clusters corresponding to the impact areas. The impact areas consisted of the different asset groups where HIV and AIDS and other related factors affect the household, including (i) human capital, (ii) financial capital, (iii) social capital, (iv) natural capital and (v) physical capital. These were further tracked by variables that describe the impacts. The following section presents the results of the HVI for each of the assets, and the index calculated for the households. The natural capital dimension was not considered because there were very few variables under this category and they had all been used in the other categories as well.

## Household Vulnerability Index for Human Capital

The human capital HVI was computed using such variables as the education levels of the household members, the sex of the household, the household size and the dependency ratios. The incidence of HIV and AIDS in the household renders the most productive household members unable to engage in productive activities, either due to illness or the time that they devote looking after the sick. Figure 4.13 shows that most of the households in the study area fell under acute level households (58%), whilst about 18% of the households fell under vulnerability level one of coping households, with 24% of households in the emergency level household category.

Factors which contribute to the emergency level of vulnerability include high dependency ratio, increased incidence of female and elderly headed households, as well as low educational levels and high unemployment

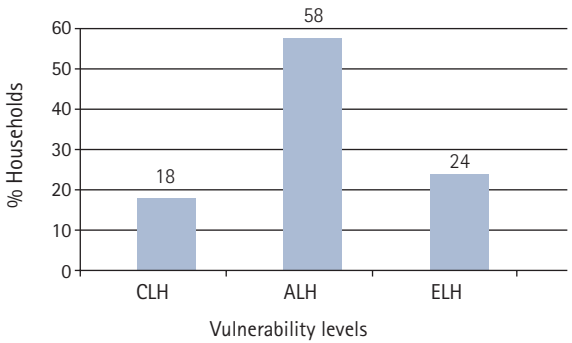



Figure 4.6 Household vulnerability levels for the Human Capital Dimension

levels in the area studied. Further, most of the households affected by HIV and AIDS reported having to divert household labour from productive activities to care for sick members.

## Household Vulnerability index for Financial Capital

Literature shows that the impacts of HIV and AIDS on the household's financial capital can include changes in the household expenditure mix, with some households spending more on medication and less on food and capital assets. In some cases households even have to sell capital assets. This study found that at most funerals, households had slaughtered a cow which resulted in a reduction of a household's physical and financial assets. Figure 4.14 shows that most of the households (59%) in the survey fell under the acute level households category, whilst 14% of the households fell under the coping category and 27% of the households were in the emergency level category. These results are similar to those found under the human capital index. The most common sources of household income in the area were

social grants from government as well as remittances from non-resident household members. In the presence of illness, particularly illness of the breadwinner, these remittances dwindle and the household becomes vulnerable to food insecurity. Further the increased expenditure on medical expenses and funerals might also increase household vulnerability levels.

Rural development projects and other employment creation programmes can resucitate households in the acute level category. Other measures could include extensive campaigns by government to publicise the existence of the disability grants and the foster care grants to mitigate the effects of the HIV and AIDS epidemic and reduce food insecurity in affected households.

The emergency level households need such measures as food parcels and, income injections apart from medium term income generating activities. For the long term, programmes aimed at improving agricultural productivity could also assist households.

## Household Vulnerability Index for Physical Capital

The physical capital dimension considered the existence of such assets as livestock, agricultural equipment, land ownership and household furniture. Considering the vulnerability levels of households in this dimension presents a worse picture than under the human and financial capital dimensions. About 43% of the households fall under the emergency level of vulnerability. Fewer of the households (20%) fall under the acute level category (see figure 4.15).

The study found that few of the households possessed livestock and farming implements. The implications of this for agricultural growth are grave. Physical capital remains a constraint to improved agriculture

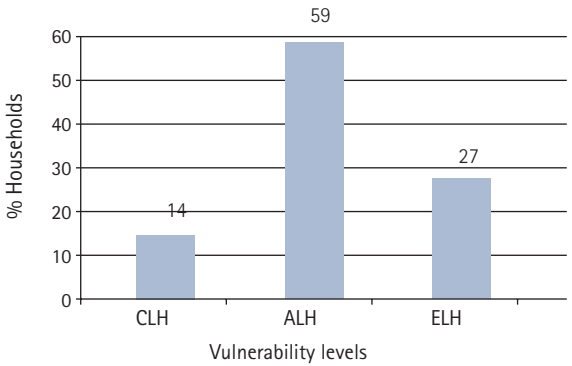



Figure 4.7 Household Vulnerability Levels under the Financial Capital Dimension

productivity, which impacts on a household's food security status, as well as the household's ability to cope with the incidence of HIV and AIDS. One way of counteracting this problem is for government to implement credit programmes that are specifically aimed at assisting farmers to acquire agriculture implements. Whilst most of the households possess either a TV set or radio in the area, the same cannot be said for agricultural implements.

## Household Vulnerability Index - Social Capital

The social grants that the government of South Africa provides play an important role in poverty alleviation and food security. Apart from the grants, the study also found that the Social Welfare Department provides food parcels to those households that are vulnerable to food insecurity. However, an insignificant number of households sampled were recieving these grants. The results of the household vulnerability analysis under the social capital dimension suggest that more needs to be done to assist rural households, particularly in the face of the HIV and AIDS pandemic.

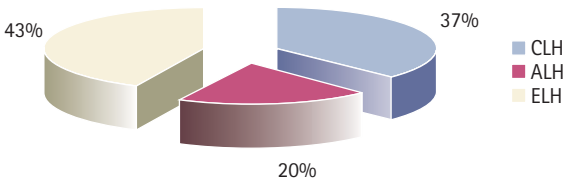



Figure 4.8 Household Vulnerability Levels under the Physical Capital Dimension

Figure 4.16 shows that about 38% of the households fall under the emergency level category of vulnerability. The majority of the households (47%) fall under the acute level category. Strategies for reducing household vulnerability under this dimension include measures to encourage the creation and strengthening of community based support organisations. Further NGO activity should also be fostered, to provide support for orphans and sick persons. Even in cases where the household is not affected by HIV, NGO activity through promotion of rural development projects will also contribute towards household food security and poverty alleviation.

## Household Vulnerability Index for Food Production

This dimension considered such variables as the maize yield, use of inputs in agricultural production and household access to productive inputs. The changes in household agriculture production patterns were also considered in computing the HVI under this dimension. About 46% of the households in this category were in the coping category, and only 10% in the emergency level category (figure 4.17). The remaining 44% of the households were coping. This result contradicts the low levels of agriculture

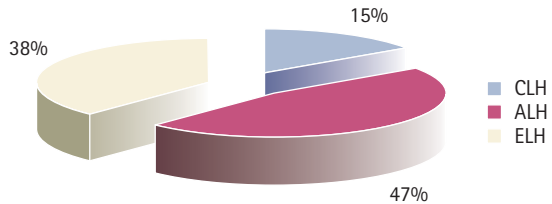



Figure 4.9 Household Vulnerability Levels under the Social Capital Dimension

production in the area, particularly in the 2004/05 seasons where the rains were bad. The result points to the significance of other good procurement sources of food security other than production.

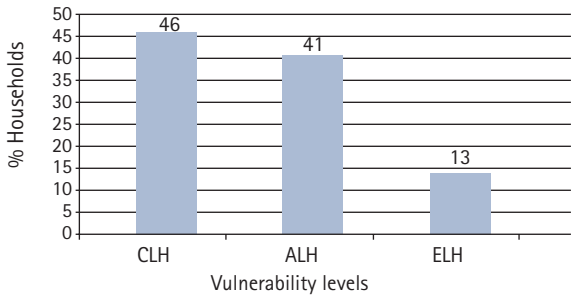



Figure 4.10 Household Vulnerability Index for Financial Capital

## Overall Household Vulnerability Index

The overall vulnerability index is computed on the basis of the different dimensions. The results of this computation are shown in Table 4.4.

The table shows that about 83% of the households surveyed are in an acute situation, whilst 11% of the households are classified as coping. The emergency level category is the smallest with about 6% of the households.

It was rather surprising that despite the existence of social grants the majority of the households fall under the acute levels of vulnerability, where they have been badly hit and are suffering from food insecurity. Possible explanations for this are that the study area is one of the poorest areas in Limpopo, and despite agriculture being practiced in the area, maize yields are extremely low and farmers are only practicing dryland agriculture. Unemployment levels in the area and Limpopo Province in general, are also high. Further, as the study found out, few of these households have cattle. These factors alone contribute towards transitory and chronic household food insecurity, and the HIV and AIDS pandemic further exacerbates a household's vulnerability and food insecurity.

Since households exhibit different levels of vulnerability it means that there is a need for differentiated policy responses according to different types of households. Current efforts by government, community groups and other civil society organisations may improve the situation for the majority of the households in the area who fall in the acute level of vulnerability.

## Summary

From the results in Lesotho and South Africa, it was possible to use the HVI to determine the percentage of households falling under each category. It was also be possible to determine the level of vulnerability of any specific household from the data collected.

When fully developed, the Household Vulnerability Index will serve as a useful tool for developing social response measures, as well as government social protection policy for vulnerable households under different categories of vulnerability. Vulnerability interventions can then be developed based on clear criteria to support and resuscitate affected households.

Table 4.4 Household Vulnerability Index (HVI)

| HVI level | HVI Range | Situation of Household | Frequency | Percentage |
|---|---|---|---|---|
| Vulnerability Level 1 | 0.0 – 33.3% | Coping Households (CHH) | 24 | 11.0 |
| Vulnerability Level 2 | 33.4 – 66.7% | Acute Level households (ALH) | 181 | 83.0 |
| Vulnerability Level 3 | 66.8 –100% | Emergency Level Households (ELH) | 13 | 6.0 |
| Total | | | 218 | 100.0 |

Source: Survey data, 2005