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ZIMBABWE

Vulnerability Analysis, Monitoring and Evaluation Unit

Zimbabwe: Results of exploratory food and nutrition security analysis

Report Dated: 20 October 2014

vam food security analysis

Executive summary

This report provides a summary of recent exploratory analysis of secondary data undertaken by the VAME Unit from March-June 2014 to start a structured process of answering the 5Ws (*who, what, when, where* and *why*) of hunger and under-nutrition using a combination of descriptive and factor analysis as well as integrated mapping of hunger and under-nutrition in Zimbabwe. This analysis is used to generate the evidence needed to support the Country Office shift from food aid to food assistance as well as multi-sectoral programming approach towards resilience building.

The process started with an extensive overview of agro-climatic and livelihood situation and trends of food and nutrition indicators. Data of food and nutrition security indicators were collated, mapped and integrated for exploratory analysis using principal component analysis (PCA) to identify the key drivers of food and nutrition security.

In general, food and nutrition insecurity is persistent. Chronic malnutrition has remained relatively unchanged in the last decade at over 30 percent. Similarly food security situation has remained fragile and highly subject to wide range of recurrent natural and economic shocks over the years.

Trend data incorporating good, bad and typical years estimate about 1 million food insecure people (about 9% of the rural population). Of these number 46 percent are estimated as chronically food secure and 54 percent transitorily food insecure. Spatial trend analysis based on the ZimVAC data shows that 84 percent of the food insecure are in the communal areas. Food insecurity is prevalent in the northern, western border areas of the country which also occur in natural regions IV and V.

Analysis of nutrition data shows that chronic malnutrition is prevalent even in high potential/maize surplus, which brings focus micro-nutrient deficiency related to low dietary diversity rather than food quantity. The patterns of malnutrition closely follow that of poverty and morbidity which are somewhat inter-related and mutually reinforcing.

Results of exploratory analysis of food and nutrition security indicators identify three main components of food insecurity: 1) rainfall variability and food production, 2) food access, poverty and dietary diversity 3) morbidity which is a proxy for access to health, WASH and child care. While this finding is unsurprising, it confirms the need to consider an integrated, multi-sectoral/dimensional approach to build resilience to recurrent shocks and stressors.

A collaborative approach is needed to address the effect of recurrent erratic weather patterns with emphasis on nutrition-sensitive programmes that are integrated with WASH as well as income and market support.

The next step is to incorporate missing data such as livestock ownership, HIV/AIDS which were not available at the time of the analysis and start in-depth analysis using micro-data at household level to understand the dynamics of household food and nutrition security at household level.

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Acknowledgements

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1. Introduction

This analysis has been undertaken as part of the implementation of Pillar One of the VAME strategy on Analysis and Knowledgebase Development[1]. In this pillar we take a *back-to-basics* approach to understand the dynamics of food and nutrition security in Zimbabwe using secondary data.

This analysis takes advantage of the rich national datasets to provide initial answers to the 5Ws (*who, what, when, where* and *why*) of hunger and under-nutrition using a combination of the descriptive and factor analysis as well as integrated mapping. Trends in food and nutrition analysis are also presented and together provide the groundwork for in-depth analysis that would support Country Office shift from food aid to food assistance as well as multi-sectoral programming approach towards resilience building.

This analysis follows a three-stage approach process:

1) Review of existing literature, data collation and mapping of candidate food and nutrition security indicators, including an overview livelihood context and macro-economic environment.
2) Trend analysis of ZimVAC data and past WFP programming information.
3) Exploratory data analysis using principal components analysis to identify the key drivers of food and nutrition security.

2. Overview of livelihoods in Zimbabwe

Zimbabwe is a land locked country and relies mainly on agriculture and mining. Agriculture is considered the back bone of Zimbabwe's economy as it provides more than 70 percent of employment. However 2013-14 estimates indicate that it contributes about 13%[2] of the national Gross Domestic Product annually.

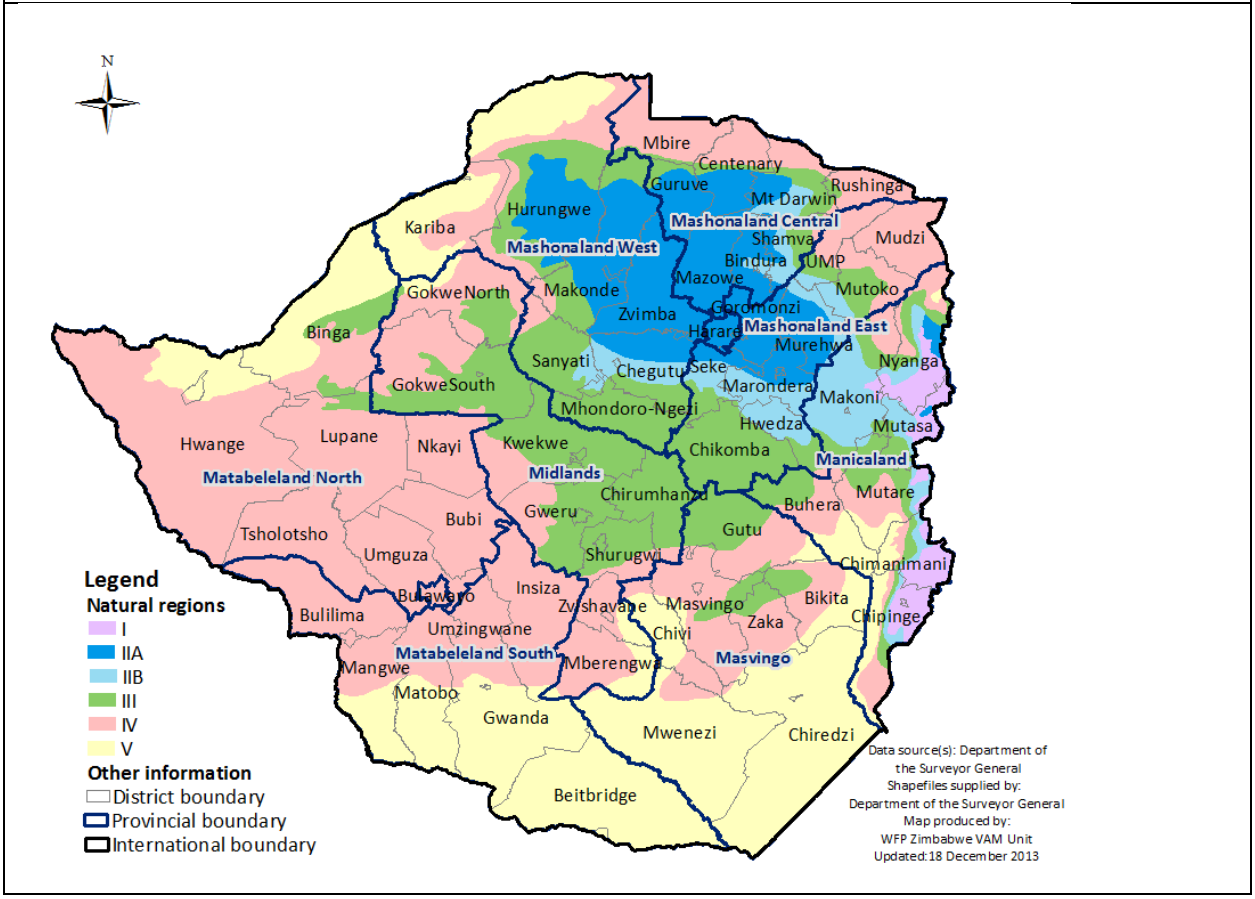
Zimbabwe has a total land area of over 39 million hectares[3]. The total area under cultivation was 6 percent in the 2012/13 cropping season and increased to 7.4 percent in 2013/14[4]. A total of 1,721,028 ha of land was under maize production in the 2013-14 cropping season compared to 1,265,236 ha of maize in the previous season. Of the current maize hectares, 859, 080 ha are in Communal Areas. 262,685 for small grains, 201,678ha for cotton and 107,371ha for tobacco[5]. Other crops utilize 484,796ha. Livestock production is dominant in the Lowveld, which is characterized by hot and dry weather with erratic rainfalls. About 40% of rural households own at least one cattle[6].

The livelihood activities in Zimbabwe are closely linked to the agro-ecological regions, known as Natural Regions (NR) (**Figure 1**). These regions are identified on the basis of the rainfall regime, soil quality and vegetation, among other factors. The quality of the land resource declines from NR*I* through to NR*V* in

[1] For more information see the WFP (2014). Vulnerability Analysis, Monitoring and Evaluation Strategy 2014-2015.
[2] World Bank (2014). Zimbabwe Economic Briefing June, 2014.
[3] Government of Zimbabwe Official website. http://www.zim.gov.zw/
[4] Calculations based on 2nd Round Crop and Livestock Assessment reports 2013 & 2014.
[5] Ministry of Agriculture (2014). First Round report on Crop and Livestock Assessment.
[6] Zimbabwe Vulnerability Assessment Committee (ZIMVAC), 2013, Rural Livelihoods Assessment Report, ZIMVAC, Harare

southern and northern parts of Zimbabwe. Natural Region 1 with high rainfalls, Natural Region IIA and IIB with moderate

Figure 1: Natural regions of Zimbabwe



rainfall, with IIB subjected to severe dry spells during the rainy season, Natural Region III with moderate rainfall and Natural Region IV and V with very low and erratic rainfalls and poor soils.

2.1 Description of natural regions

Region I: Receives more than 1 000 mm per annum of generally well distributed rains and temperatures are relatively low. The region is suitable for dairy farming, forestry, tea, coffee, fruit, beef and maize production.

Region IIA: Rainfall confined to summer and is moderately high, ranging from 700-1050 mm per annum. Suitable for intensive farming, such as maize, tobacco, cotton and livestock.

Region IIB: Rainfall confined to summer and is moderately high, ranging from 700-1050 mm per annum. However, the region experiences short rainy seasons with severe dry spells during the rainy season. Suitable for intensive farming based on maize, tobacco, cotton and livestock.

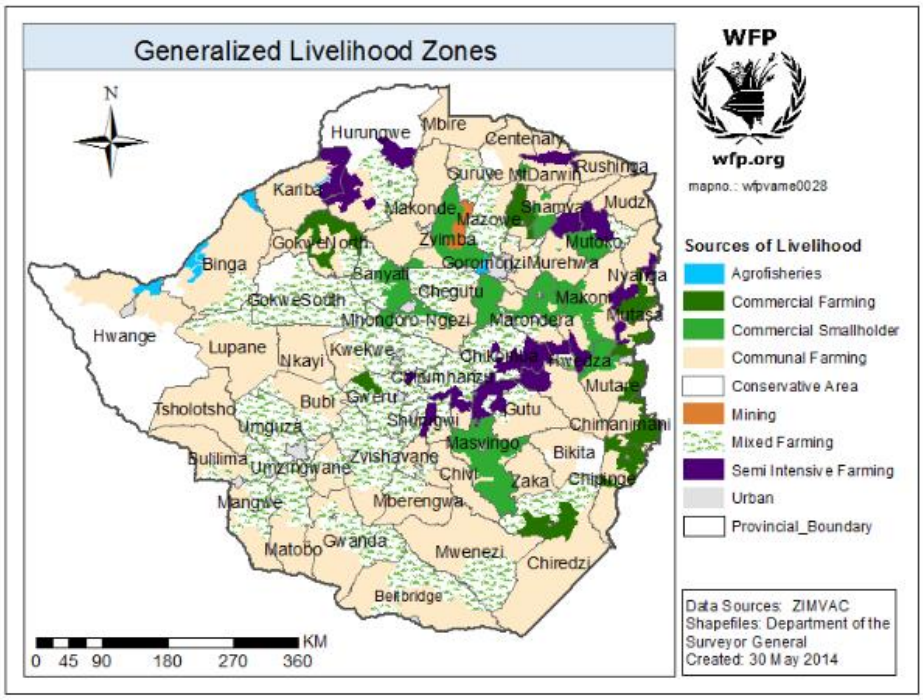
Region III: Rainfall is moderate, ranging from 500 – 800 mm per annum. In addition, the region experiences are relatively high temperatures and infrequent heavy rainfalls. Subject to seasonal droughts and severe mid-season dry spells. This region is a semi-intensive farming region suitable for livestock production, fodder crops and cash crops under good farming management.
Region IV: The region experiences fairly low rainfall in the ranges of 450 – 650 mm per annum. Seasonal droughts severe dry spells during the rainy season are frequent in this region. Suitable for semi - extensive farming systems based on livestock, resistant fodder crops, forestry, wildlife and tourism.

Region V: Receive low and highly erratic rainfall below 450 mm per annum. The topography and soils of the region are poor. The region is suitable for extensive cattle ranching, forestry, wildlife and tourism. Zambezi Valley was infested with tsetse fly, which is largely eradicated.

2.2 Livelihood zones

Zimbabwe has 24 livelihood zones which can be broadly categorized into 8 broad categories (Figure 2):

Figure 2: Livelihood zones broad categories



Zimbabwe has 24 livelihood zones which can be broadly categorized into 8 broad categories (Figure 2):

1) Agro fisheries – these communities predominantly depend on fishing for their livelihood. These can either be individuals or groups with tools and skills that enable them to harvest substantial fish to sustain their livelihoods. These are mainly communities along Lake Kariba (Kariba and Binga districts and also in Zvimba district near Lake Chivero and Darwendale dam.

2) Commercial large-scale farming – these comprise of former large scale commercial farms as well as the newly formed A2[7] farms. These are relatively large farms of varying sizes where production of both livestock and crops is primarily for the market. In this sector there is a large pool of households dependent

[7] A2 – is the large scale farming resettlement scheme. Land sizes range from a tens of hectares to thousands of hectares. Production is commercial-based. For more information see: Scoones, I. *et al*, (2010). *Zimbabwe's Land Reform: Myths and Realities*, Weaver Press, Harare

on providing labour to commercial farms, either on casual basis or long term contracts. This also includes a sub-category specialized on timber, tea, coffee, fruit, and horticulture estates in the Eastern Highlands.

3) Commercial small holder - these are private properties which are relatively smaller compared to the large scale commercial farms. Their main source of livelihood is income from mixed farming.

4) Communal Farming – about 65% of communal areas lie in agro-ecological or natural regions III, IV and V where the dominant form of livelihoods is small-holder mixed farming, i.e. cropping and livestock. The relative importance of livestock is greater in the south than it is in the northern part of the country. Remittances mainly from South Africa are an important source of household income in the southern districts.

5) Mining – These are communities involved in small scale mining mainly of chrome along the Great Dyke and in other mining centres across the country.

6) Mixed Farming – this a farming method that is practiced in all the livelihood zones but they are communities where this is used as a copying strategy to diversify income sources and risk reduction.

7) Old resettlement and A1[8] farming sector- comprise of farmers that benefited relatively small pieces of land (4 – 6 hectares) from land resettlement programmes before the year 2000 and after the year 2000 respectively. In terms of livelihoods and farming practices they are very similar to communal farms but they tend to have better agricultural land.

[8] A1 – is the small holder farming resettlement scheme. Usually on 5-6 hectares of crop land with access to communal grazing. This is characterized by low capital investment and focused more on subsistence production. The schemes are either villagised or self-contained. This scheme accommodated the majority of resettled farmers.

3. Overview of food and nutrition security context

3.1 Food security

According to the International Food Policy Research Institute (IFPRI) Hunger Index[9] computed in 2013, Zimbabwe is ranked 46 out of the 78 listed developing countries. This hunger index ranking falls under the "Serious" category with undernourishment being the major driving force for this ranking.

Food insecurity is persistent in Zimbabwe with at least 12 percent of the rural population experiencing food insecurity over the last five years. The evolution of the food security over the last 10 years shows peaks occurring 4-5 years (**Figure 3**). Within the year as well there are also seasonal patterns whereby households experience distinct changes in food security in terms of food stocks, terms of trade, incomes and food prices.

Based on ZimVAC five-year trend analysis the potential chronic food insecurity is estimated at about 3-8 percent while the transitory food insecurity varies between 9-16 percent[10] (**Figure 4**).

The trends shows both a seasonal and cyclical pattern of food insecurity.

From 2011/12 the country has witnessed a steady increase in food insecurity which seems to be closely related to the economic growth (**Figure 5**). This suggests that structural factors under-pinning the hunger problem could be linked somehow to economic factors associated with high

Figure 3: Food security trends 2003 to 2014

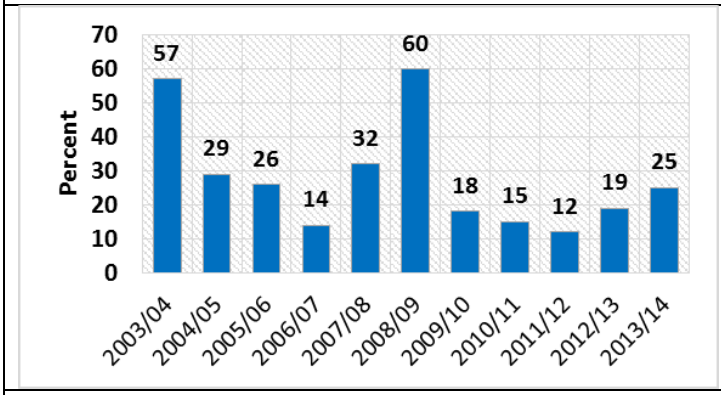


Figure 4: Estimate of chronically and transitorily food insecure rural population

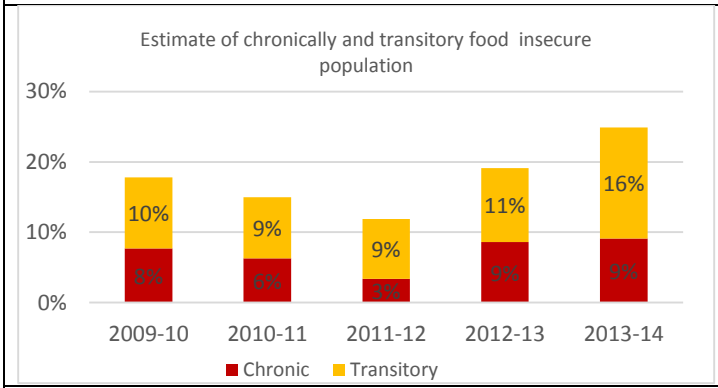
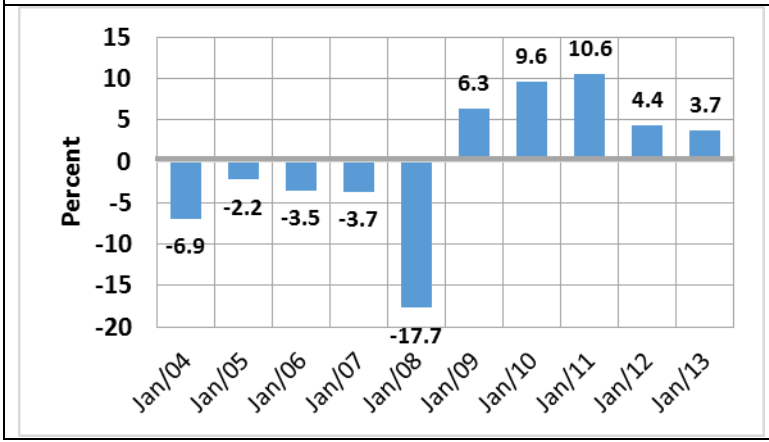


Figure5: Zimbabwe GDP growth rate (Percent)

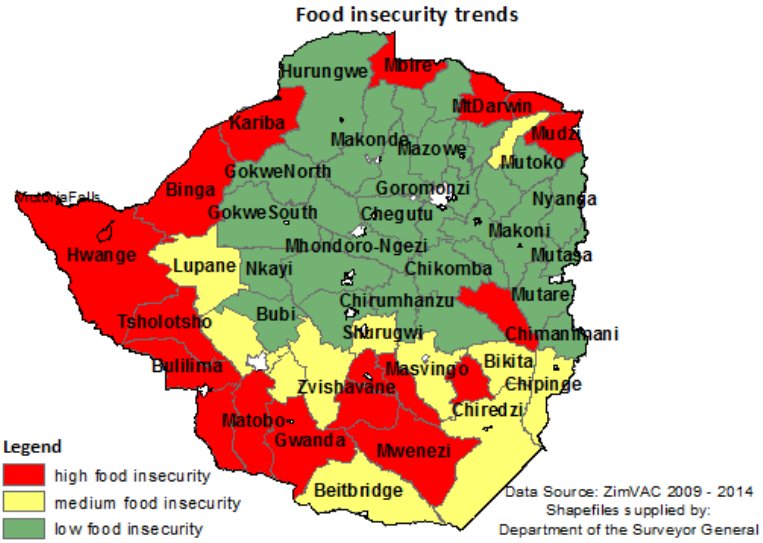


[9] See details at www.ifpri.org. IFPRI (2013). 2013 Global Hunger Index. *The challenge of hunger: Building resilience to achieve food and nutrition security*. Washington DC, USA.

[10] See Glossary for a detailed explanation of Chronic and Transitory food insecurity.

levels of poverty, unemployment, HIV prevalence and access to social services. However, more work is needed to understand these linkages and explain the causal pathways.

Figure 6: Spatial distribution of food security based 2009-2014[11]



Spatial trend analysis based on ZimVAC data shows that food insecurity is prevalent in the southern parts, and border areas to the west and south and the extreme northern parts of the country. These areas are marginal areas predominantly in natural regions IV and V where rainfall is erratic and have low agricultural potential (**Figure 6**).

The 2012/13 Poverty, Income, Consumption and Expenditure report observed that 62.6% of Zimbabwean households are poor and of these 16.2% face extreme poverty (or are food poor). The report also states that poverty is more widespread in rural areas compared to urban households with 76% of rural households being poor.

[11] Districts with "**high** food insecurity" had **both** (a) their 5-year average food insecurity at peak at 20% or above **and** (b) 3 or more times out of 5 years of 20%+ food insecurity at peak;

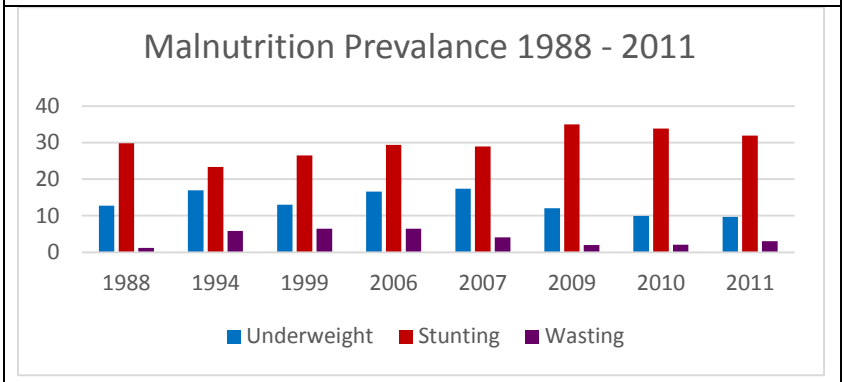
Districts with "**moderate** food insecurity" had **either** their 5-year average (at peak) at 20%+ food insecurity **or** 3 or more times out of 5 years at 20%+ food insecurity;

Districts with "**low** food insecurity" had **both** their 5 year average food insecurity at peak at <20% **and** less than 3 times out of 5 years of food insecurity at 20%+.

3.2 Nutritional Trends

Malnutrition in Zimbabwe is typified by chronic malnutrition rather than acute malnutrition[12]. National stunting rates over the last 10 years has remained relatively unchanged even though the downward trend over the last few years is encouraging (**Figure 7**). However, the current stunting rate of about 30 percent is a concern. Unpublished findings of nutrition surveys carried out between 2011 and 2014 show a persistence of high stunting (above 30 percent) with some districts located in the Eastern Highlands having the highest rates of over 40%.

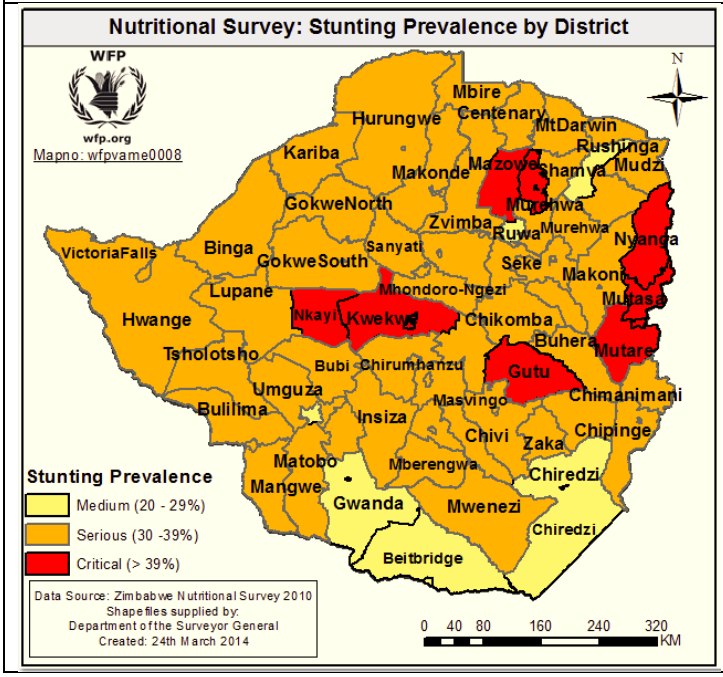
Figure 7: Trends of malnutrition prevalence, 1998-2014



Source:

Stunting in Zimbabwe is mainly driven by poor young child care practices, morbidity associated with limited access to health services and micro-nutrient deficiency associated with less diverse diets[13]. This is evident from the fact that stunting is high even in high potential/surplus cereal producing areas such as Mazowe District (**Figure 8**). This means access to adequate cereals does not necessarily translate to food security. The preliminary findings of the Nutrition Survey of 2014 showed that while frequency of meals seemed adequate, dietary diversity remained a challenge as only 26 percent of children 6 to 59 months consumed four food groups. Generally the diet of the majority of children was composed of grains and cereal with little of protein-giving foods.

Figure 8: Stunting prevalence (National Nutrition Survey, 2010)



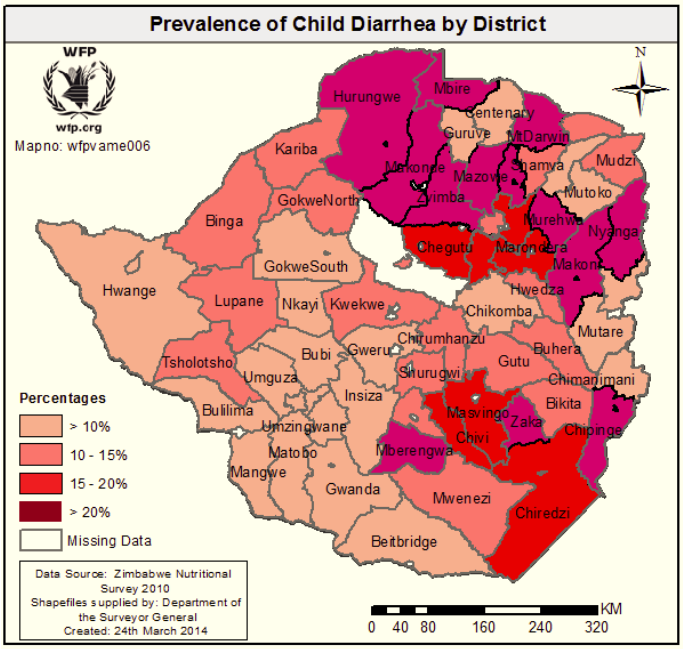
[12] See glossary for definitions.

[13] See Zimbabwe Demographic Health and Nutrition Surveys 1994, 1999, 2006, 2011.

The patterns of malnutrition closely follow that of poverty and morbidity and access to appropriate complementary foods which are somewhat inter-related and mutually reinforcing (**Figures 9, 10**).

The prevalence of cough, fever and diarrhea are also high in Hurungwe, Makonde, Zvimba, Mbire and Mt Darwin (greater than 20%), which are northern parts of the country. This is a clear indication that cereal surplus are necessary but not sufficient to address chronic malnutrition in Zimbabwe and a multi-dimensional approach is required to address the problem. The nutrition survey showed that the most common illness was cough followed by fever. The prevalence of coughs was high in Mbire with 60% of children having had a cough within the past 2 weeks. Chipinge district had the highest prevalence of children with diarrhoea followed by Mt Darwin and Mbire. Fever was found to be more prominent in malaria prone districts such as Chipinge, Mbire and Chiredzi.

Figure 9: Diarrhea prevalence in children under Five (Zimbabwe Nutrition Survey 2010)



3.2 Poverty trends

Nationally, 62.6 percent of Zimbabwean households are poor, with 16.2 percent considered to be in extreme poverty[14]. Poverty is more widespread and prevalent in rural areas than in urban areas with 76.0 percent of the rural households being poor compared to 38.2 percent in urban areas. Some 30.4 percent of rural people in Zimbabwe were reported to be extremely poor compared to only 5.6 percent in urban areas.

Figures 10 and **11** show the distribution of poor and extremely poor households respectively by province and district. Matebeleland North Province has the highest proportion of households in poverty (over 80% in most districts) and extreme poverty (over 30% in most districts). Mashonaland West Province also recorded high prevalence of poverty and extreme poverty with districts such as Kariba, Hurungwe, Makonde and Zvimba being the most affected. This is despite that, apart from Kariba, these districts are high crop production areas.

Rushinga district (Mashonaland Central Province), Mudzi and Mutoko districts (Mashonaland East Province) and Buhera and Chimanimani districts (Manicaland Province) are also high poverty districts.

Relatively lower poverty prevalence rates are in parts of Mashonaland East (Chikomba and Marondera districts) and Masvingo district (Masvingo province). Prevalence of extreme poverty is lower in parts of Mashonaland Central and East Provinces, and parts of Manicaland and Masvingo Provinces.

Figure 10: Prevalence of poverty (PICES, 2012)

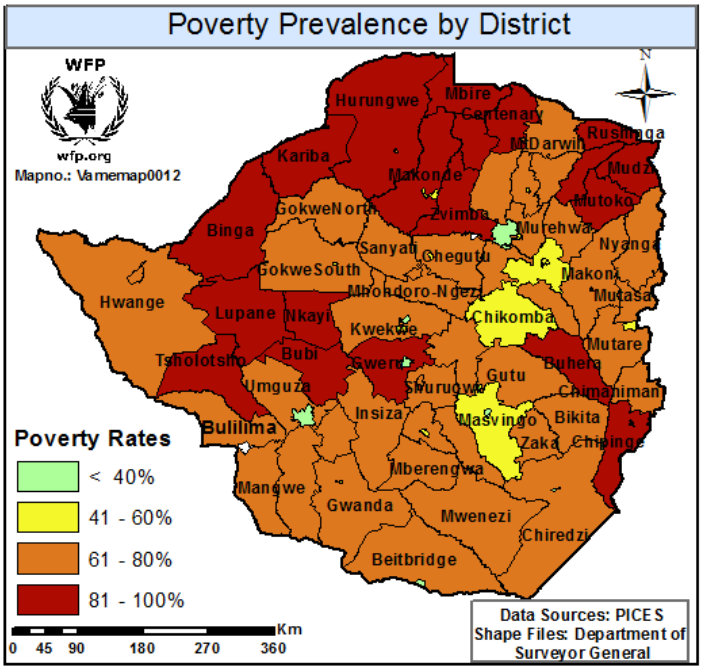
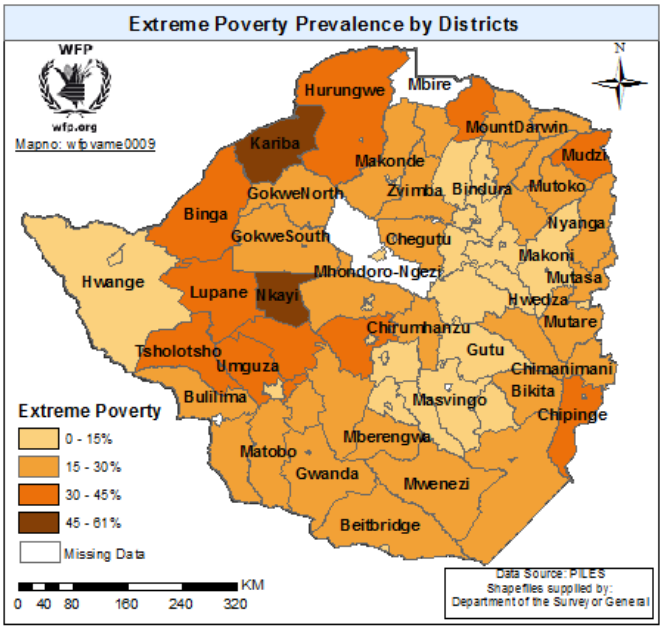


Figure 11: Prevalence of extreme poverty (PICES, 2012)



This pattern of poverty distribution calls for in-depth analyses that explain the root causes and complexity of poverty in various parts of the country. It is with this background that tailor-made resilience building and other activities can be designed to match the inherent situations in different areas.

[14] ZIMSTAT, April 2013, *Poverty, Income, Consumption and Expenditure Survey 2011/12 Report,* Harare

3.3 Cereal production and market access

Maize production in Zimbabwe mainly in the smallholder farmers represent high productivity gaps compared to regional average. The national average maize yield is estimated at 0.79t/ha. Maize market is guided by a producer price set by the Government. However, due to lack of adequate market support, most farmers end up selling to private traders in parallel markets at unfavourable prices. The lack of a consistent market is a general disincentive for production. Therefore, farmers are shifting to other more lucrative enterprises such as tobacco. The registered farmers for this crop increased from 65,000 in 2012-13 to 85,000 in 2013/14.

Figure 12 shows that the cereal surplus areas are located in Natural Regions I, II and III. The rest of the country which is agro-climatically marginal and generally is unable, under-rainfed conditions, to produce enough cereals to meet its cereal requirements.

There is a steep price gradient from the northern surplus producing areas of the country to the deficit southern parts. The price differentials are as much as 30 percent during the harvest season increasing up to 40 percent during the lean season (**Figure 13**). Therefore, the southern parts of the country depend more on markets to meet their food needs and are therefore more prone to shocks that affect cereal prices.

The price differentials, accounted in part by relative scarcity in the marginal areas, present an opportunity for private sector participation to transfer maize from the surplus areas to southern parts of the country. There is a preference for maize meal in the southern parts of the country rather than maize grain due to relative pricing of the commodities. Due to scarcity of maize grain and constantly higher prices than other areas, households find economy in buying maize meal instead of maize grain to avoid the extra cost of milling. Due to close proximity to South Africa, cheaper imported maize meal brands are preferred as compared to highly priced local brands.

Figure 12: Potential maize surplus areas

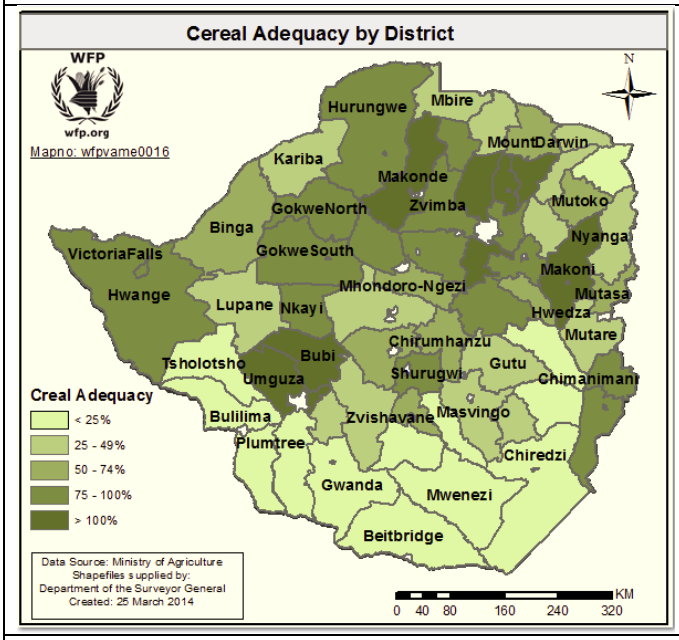
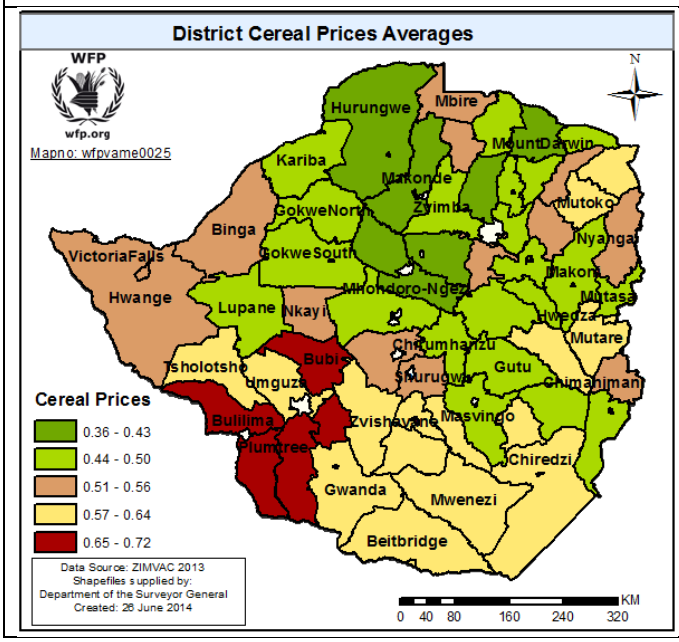


Figure 13: Maize price differentials in May 2013



4. Exploring the structural drivers of food and nutrition security in Zimbabwe.

From literature review the key structural drivers of hunger and under-nutrition in Zimbabwe are:

- Persistent national net cereal deficit and low productivity[15] as a result of high input costs, fragmented and ineffective markets, limited extension services and high post-harvest losses, among other factors[16].
- Widespread poverty, especially in rural areas compounded by limited livelihood and employment opportunities and high food prices.
- Poor infant and young child care practices.
- Micronutrient deficiency associated with low dietary diversity.
- Macro-economic decline[17] that inhibits investment and infrastructural development as well as delivery of social services.

These are exacerbated by recurrent multiple and sometimes unpredictable shocks including erratic rainfall patterns, localized flooding and volatile market prices. Evidence to gauge the relative contributions of known drivers of food security and under-nutrition is lacking. Therefore, this paper helps to provide an initial more nuanced understanding of the contributions of different factors to food and nutrition insecurity which is useful in designing context specific programmes to address the food insecurity and under-nutrition.

4.1 Method used to identify key drivers and factors

A total of 26 continuous indicators/variables related to food and nutrition were collected from various national datasets and surveys (**See Annex 2 for details**) which captured factors affecting food production and supply, access and use of food in a household. These data were classified into 4-5 point-scale in which the scale point 1 denoted a desirable outcome while 4-5 represented the least desired state[18].

An iterative analysis was done using principal components analysis (PCA) to reduce the initial set of indicators to a smaller set of less inter-correlated factors or components (See **Annex 3**). The oblique oblimin method[19] was used to extract 3 factors comprised with a reduced set of 12 indicators. In the analysis, the Monte Carlo PCA for parallel analysis[20] was used to determine the number of components to

[15] For example, the average maize productivity in small scale farming areas averaged 0.79 mt/hectare between 2009 and 2012 (FAO/MOAMID, 2012). The productivity gap is very high compared 2.54 mt/hectare in Zambia, 2.21 mt in Malawi and 4.16 mt in South Africa. Source: http://data.worldbank.org/indicator/AG.YLD.CREL.KG/

[16] Low agricultural productivity is also linked to institutional and governance issues related to a) undercapitalization of the agricultural sector b) poor infrastructure, c) land and agricultural policies.

[17] There is a strong inverse relationship between GDP growth rate and food insecurity level.

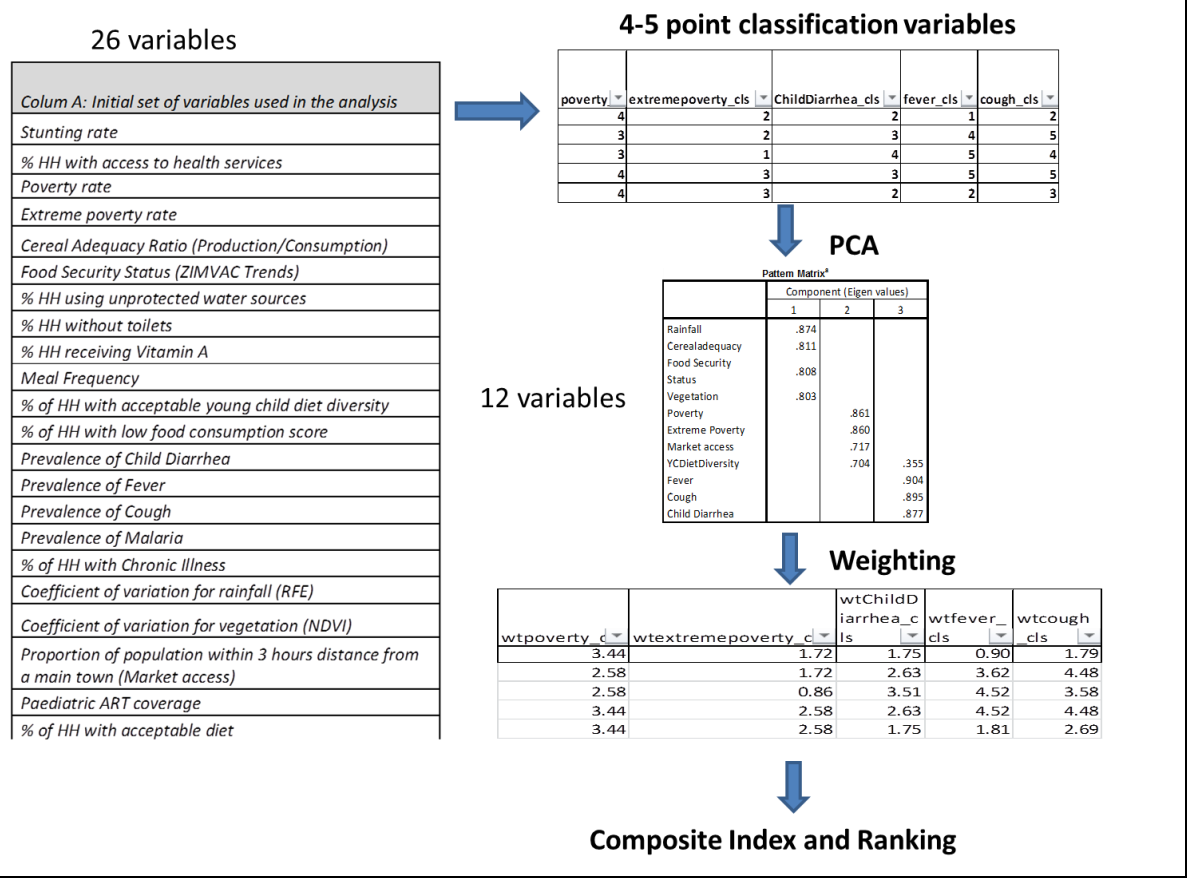
[18] Example: percentages for children with fever, lower than 20% is desirable hence 1 above 50% is undesirable and assigned a scale of 5.

[19] Oblimin rotation method groups variables that are correlated together and produce more accurate results for data involving human behaviours

[20] http://www.softpedia.com/progDownload/Monte-Carlo-PCA-for-Parallel-Analysis-Download-56312.html

extract. Indicators with communalities less than 0.4 were excluded. The Eigen values/loadings from the rotated solution were used to construct weighted indicators by multiplying the loading with its corresponding number on the scale. These were then summed into a composite used for ranking and prioritizing districts (**Figure 13**). A glossary of the statistical terms used in the PCA are provided in **Annex 4**.

Figure 14: Process of principal components analysis



4.2 Results of principal components analysis

Table 1 shows the final result of the PCA analysis (see **Annex 5** for details). The values in the table show the loadings of each variable to a component or factor. The loadings measures the strength with which an indicator or variable attaches itself to the the component.

The results summarizes the data into 3 components. **Component 1** captures indicators that detemine food supply or production namely rainfall variability, cereal adequacy and vegetation.

Component 2 captures the indicators that determine the nutritional quality as well as affordability of food. These include: food diversity, incomes and market access.

Table 1: Results of principal component analysis (factor loading of rotated solution)

Pattern Matrix[a]

	Component		
	1	2	3
rainfallCv_cls	.874		
cerealadequacy_cls	.811		
FoodSec_Cls	.808		
vegetationCv_cls	.803		
poverty_cls		.861	
extremepoverty_cls		.860	
market.access_cls		.717	
YCDietDiversity_cls		.704	.355
fever_cls			.904
cough_cls			.895
ChildDiarrhea_cls			.877

Extraction Method: Principal Component Analysis.
Rotation Method: Oblimin with Kaiser Normalization.[a]

Rotation converged in 8 iterations.a

Component 3: Mainly captures morbidity factors which is a reliable proxy for the whole lot of issues including WASH, access to health services as well as child care.

The results clearly demonstrate the need for collaboration to address multiple dimensions of food and nutrition insecurity. It points to strong need for collaborative nutrition-sensitive programmes focussed on helping communities deal with effects of erratic rainfall, strenghtening market value chain and income generation and improved WASH. While these results are fairly obvious, they provide reasonable confidence on the factors that should be considered in the in-depth analysis phase. The analysis also recognizes some limitations and gaps in data availability. For example, the data on livestock ownership and HIV/AIDS were not available at the time of the analysis and these will be considered in subsequent analysis.

4.3 Where are the food insecure groups?

The results of the PCA were used to derive a composite index which was used to prioritize districts as shown in **Figure 15** through a ranking process. Districts were ranked into low, medium and high categories based on the natural breaks in the ranked composite index. According to the analysis, the high priority areas in terms of food and nutrition security occur in natural regions IV and V.

The composite was decomposed to give an indication of the programmatic entry points for each districts (**Figure 16**). This was assessed by contribution of each of the three components to the overall index. Component 1 was equivalent to availability, Component 2 placed importance on food access and Component 3 was equivalent to utilization.

The results show clearly that in the surplus areas the key interventions needed are to do mainly with utilization and access to a smaller extent. These will be investigated in the subsequent analysis.

In the deficit areas the problem is mainly that of food production and therefore the programmes should be focussed on surmounting production limitations associated with low and erratic rainfall.

Food access predominates both in Natural region IV and V.

Figure 15: Food and nutrition Security priority map

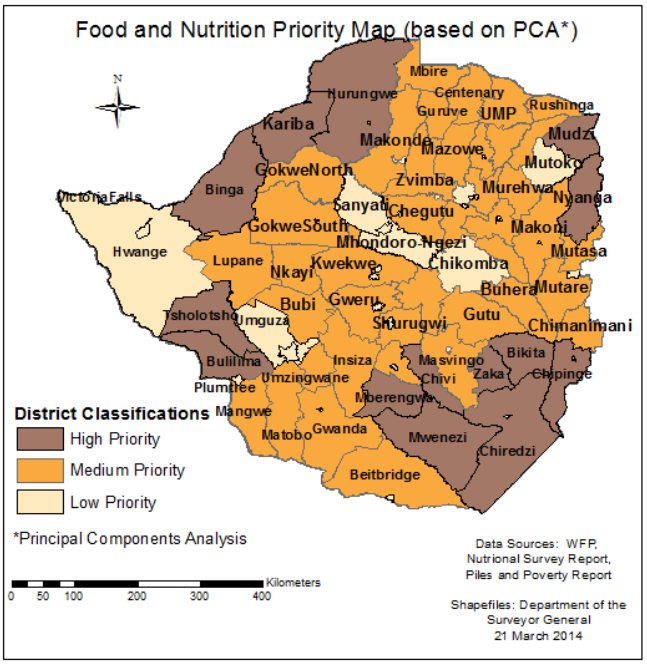
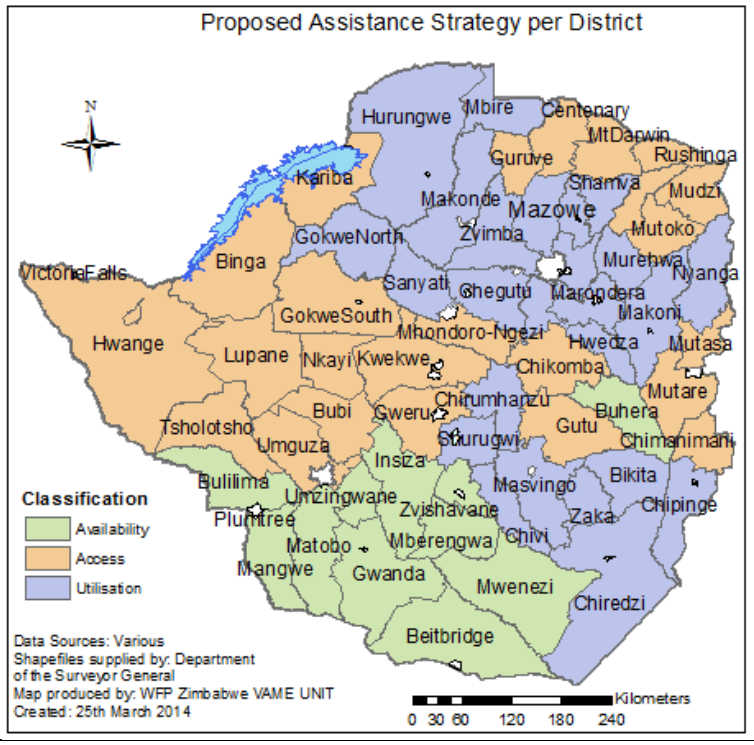


Figure16: Indicative assistance strategy based on PCA



Some further analysis was done to identify priority districts for the UN flagship programme on Scaling up Nutrition (SUN). This was done essentially by combining the results of **Figures 15** and **17**[21] with areas that have the highest number of stunted under five child and therefore stunting prevention programmes would have the highest impact.

Some 14 candidate priority areas are identified through this analysis for nutrition programmes in **Figure 18**.

Mutasa district was selected as the first convergence district for joint nutrition programming. Although it is a medium priority district in terms of overall absolute numbers of the chronically malnourished under-fives, it has the highest stunting rate and on this account it was selected for piloting stunting reduction activities prior to this analysis. These activities (both nutrition specific and nutrition sensitive) if implemented at 90% coverage will have a high impact on stunting reduction.

The selection of Mutasa as the first district for convergence will allow for modelling and scale up of stunting reduction in districts with a larger number of stunted under-five children such as Hurungwe, Gokwe South, Mutare and Makoni.

Figure 17: Estimate of under-five children with stunting

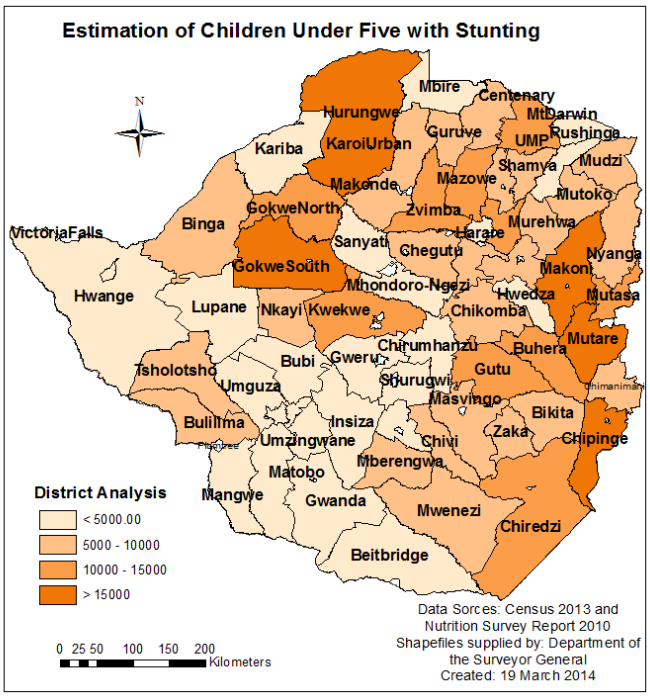
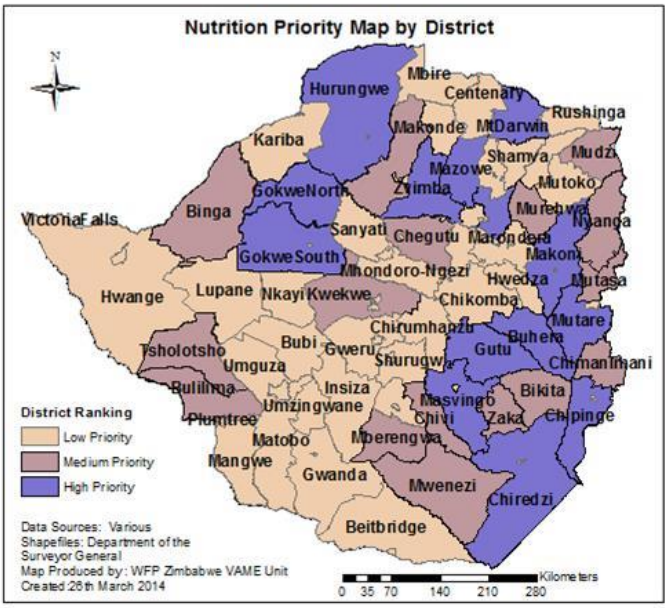


Figure 18: Nutrition priority map



[21] The under-five stunted population was classified on a scale of 1-5 with 1 being given to areas with the highest category of stunted children. This was mathematically combined with 3-point ranking of composite index of the general food and nutrition map (1 being high priority and 3 being low priority). The resulting sum of 2 and 3 were classified as high priority, 4 and 5 medium whilst everything above was assigned a low priority.

4.4 How many are food insecure and which are the chronically food insecure areas?

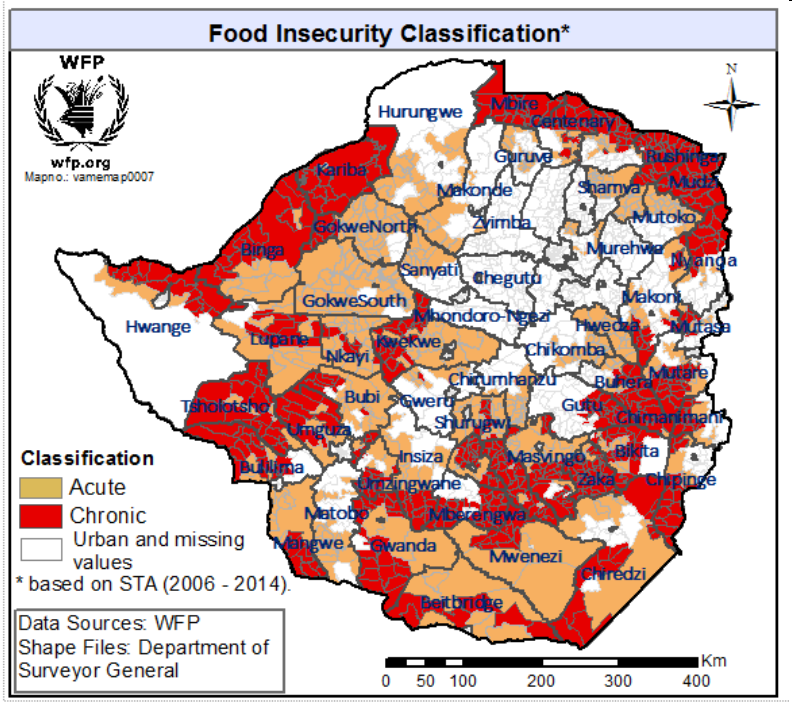
To answer this question, data from past Seasonal Targeted Assistance (STA) ward prioritization exercises were collated for the past 7 years. Every year prior to commencement of the seasonal targeted assistance (STA), the District Drought Relief Committee (DDRC) would prioritise the wards where assistance should be provide based on the ZimVAC figures. This data from the past years was used to provide a granulated map of the food insecure populations in terms of potentially chronically food insecure wards. Essentially the past five years were characterized into typical, good and bad based on the perceived performance of the agricultural season based on the results of Seasonal Livelihood Programming (SLP) consultations (**Figure 19**).

Figure 19: Seasonal performance anaysis

Analysis of years (2008 – 2014)

Production Period		Impact Period
2008 – 2009	Typical	2009 – 2010
2009 – 2010	Typical	2010 -2011
2010 – 2011	Fairly Good	2011 – 2012
2011 – 2012	Bad	2012 – 2013
2012 – 2013	Typical	2013 - 2014

Figure 20: Chronically and acute food insecure wards based on frequency of STA assistance (2006-2014)



Source: WFP STA ward prioritization data (2006-2014)

Given that the past 7 years had a mix of both typical, good and bad years, wards that had received assistance more than 5 of 7 times were considered to be chronic wards and those that were assisted less than three times were considered to belong to the acute category. The chronically food secure wards occur in northern parts of Mashonaland, Matabeleland North and South, and parts Masvingo and Manicaland provinces (**Figure 20**).

On the basis of this classification the number of chronically and acutely food insecure population was estimated using the ZimVAC data from 2009-2014. The average chronic and acute percentages[22] per district was calculated and applied to the 2012 census ward population figures for wards which have experienced food insecurity as per the trends. According to the estimates, there are a total of 1,010,000 food insecure people of which 46 percent are chronically food insecure and 54 percent are in the acutely food insecure (**Table 2**).

Spatial trend analysis based on the ZimVAC data shows that 84 percent of the food insecure are in the communal areas. Food insecurity is prevalent in the northern, western border areas of the country which also occur in natural regions IV and V.

Table 2: Population estimates of chronically and acutely food insecure populations per district

PROVINCE	Rural DISTRICT	District Code	District Population 2012	Total Population of Food Insecure wards per district	Av. Chronic rate (%)	Av. Transitory rate (%)	Chronic Pop. estimates	Transitory Pop. estimates
Manicaland	Buhera	1101	245,878	203,495	6.98%	11.42%	14,205	23,246
Manicaland	Chimanimani	1102	134,940	87,783	5.28%	6.91%	4,638	6,066
Manicaland	Chipinge	1103	298,841	225,783	6.97%	10.06%	15,734	22,725
Manicaland	Makoni	1104	272,340	166,725	4.69%	8.75%	7,817	14,595
Manicaland	Mutare	1105	262,124	213,977	5.69%	8.00%	12,185	17,120
Manicaland	Mutasa	1106	168,747	75,618	3.68%	5.25%	2,785	3,972
Manicaland	Nyanga	1107	126,599	80,658	4.08%	6.70%	3,290	5,406
Mashonaland Central	Centenary	1202	122,791	114,696	6.46%	8.87%	7,406	10,176
Mashonaland Central	Guruve	1203	124,041	88,784	4.70%	6.61%	4,175	5,869
Mashonaland Central	Mbire	1208	82,380	82,380	7.57%	9.70%	6,237	7,990
Mashonaland Central	Mount Darwin	1205	212,725	145,843	10.80%	11.14%	15,758	16,244
Mashonaland Central	Rushinga	1206	74,040	74,040	8.19%	13.37%	6,061	9,900
Mashonaland Central	Shamva	1207	123,650	76,608	2.22%	4.42%	1,700	3,383
Mashonaland East	Chikomba	1301	120,986	78,825	2.56%	4.15%	2,020	3,268

[22] The July to September food insecurity prevalence was used as the proxy for chronically food insecure. The average incremental changes between July-September & October-December and July-September & January – March was indicatively used to estimate prevalence of acute food insecurity. This is summarized in the formula below:
$([X_{Oct-Dec}-X_{Jul-Sep}] + [X_{Jan-Mar}-X_{Jul-Sep}])/2$

Mashonaland East	Goromonzi	1302	224,987	123,625	3.13%	4.17%	3,867	5,154
Mashonaland East	Hwedza	1303	70,968	70,968	2.06%	4.66%	1,463	3,304
Mashonaland East	Mudzi	1305	133,252	133,252	8.53%	10.81%	11,372	14,399
Mashonaland East	Mutoko	1307	146,127	91,021	5.08%	7.91%	4,623	7,199
Mashonaland East	UMP	1309	112,611	112,611	8.22%	8.56%	9,257	9,642
Mashonaland West	Hurungwe	1402	329,197	210,377	3.90%	5.23%	8,197	11,002
Mashonaland West	Kariba	1404	41,369	41,369	21.77%	13.67%	9,004	5,657
Mashonaland West	Makonde	1405	153,540	56,538	2.24%	2.79%	1,268	1,576
Mashonaland West	Sanyati	1428	112,897	43,723	7.86%	4.86%	3,437	2,126
Masvingo	Bikita	1801	162,356	161,262	6.10%	9.17%	9,833	14,784
Masvingo	Chiredzi	1802	275,759	189,140	13.80%	7.84%	26,100	14,821
Masvingo	Chivi	1803	166,049	166,049	8.36%	11.01%	13,875	18,280
Masvingo	Gutu	1804	203,083	86,520	6.43%	8.02%	5,559	6,938
Masvingo	Masvingo	1805	211,215	200,069	8.17%	9.96%	16,345	19,928
Masvingo	Mwenezi	1806	166,993	163,274	9.12%	11.51%	14,884	18,796
Masvingo	Zaka	1807	181,301	181,301	7.98%	11.42%	14,475	20,701
Matabeleland North	Binga	1501	139,092	139,092	15.09%	14.36%	20,987	19,976
Matabeleland North	Bubi	1502	61,883	58,080	6.17%	6.18%	3,585	3,591
Matabeleland North	Hwange	1503	62,670	61,732	12.12%	11.35%	7,483	7,010
Matabeleland North	Lupane	1504	100,161	96,115	6.77%	10.48%	6,506	10,076
Matabeleland North	Nkayi	1505	109,135	109,135	5.53%	10.05%	6,036	10,966
Matabeleland North	Tsholotsho	1506	115,119	115,119	11.46%	9.84%	13,198	11,333
Matabeleland North	Umguza	1507	89,687	89,599	7.04%	9.79%	6,310	8,771
Matabeleland South	Beitbridge	1601	80,083	80,148	6.16%	7.75%	4,935	6,209
Matabeleland South	Bulilima	1602	90,561	83,276	11.33%	10.16%	9,431	8,464
Matabeleland South	Gwanda	1604	115,778	115,415	15.80%	9.51%	18,237	10,977
Matabeleland South	Insiza	1605	100,333	83,139	9.91%	8.03%	8,236	6,678
Matabeleland South	Mangwe	1603	66,218	66,218	17.87%	12.05%	11,831	7,980

Matabeleland South	Matobo	1606	93,940	83,185	9.60%	9.26%	7,983	7,704
Matabeleland South	Umzingwane	1607	62,990	54,196	14.24%	8.25%	7,718	4,470
Midlands	Chirumhanzu	1701	80,351	51,909	5.41%	6.73%	2,808	3,492
Midlands	Gokwe North	1702	240,352	232,230	6.34%	8.96%	14,718	20,815
Midlands	Gokwe South	1703	305,982	288,985	5.42%	6.87%	15,660	19,843
Midlands	Gweru	1704	91,806	54,239	4.42%	8.57%	2,395	4,650
Midlands	Kwekwe	1705	174,727	174,727	7.82%	8.77%	13,661	15,320
Midlands	Mberengwa	1706	185,757	144,501	8.19%	10.60%	11,841	15,313
Midlands	Shurugwi	1707	77,570	77,570	8.67%	9.21%	6,724	7,141
Midlands	Zvishavane	1708	72,513	72,513	12.03%	12.29%	8,723	8,913
Total			**7,578,494**	**6,077,437**			**466,574**	**543,955**
Grand Total								**1,010,529**

5.0 Conclusions and recommendations

Food insecurity in Zimbabwe consists is both chronic and transitory estimated at 3-8 percent and 9-16 percent respectively. About 1 million people are food insecure; 46 percent being chronically food secure and 54 percent transitorily food insecure due to recurrent shocks. About 84 percent of the food insecure are found in the communal areas, mostly in natural regions IV and V.

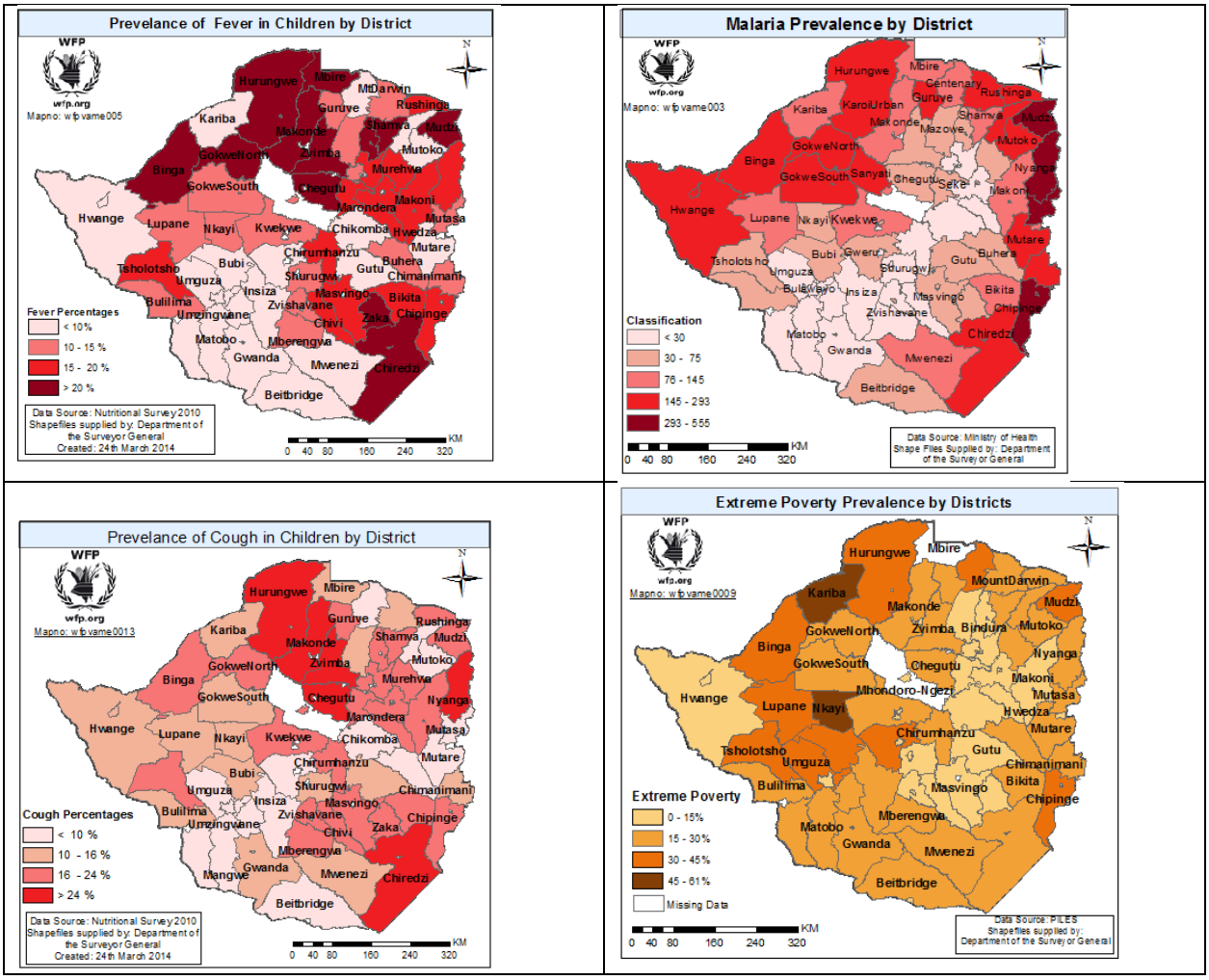
Stunting is strongly linked with poverty, morbidity and access to complementary feeding suggesting that food production is necessary but not sufficient for adequate nutrition and factors such as child care, access to healthcare and WASH, dietary quality contribute to nutrition.

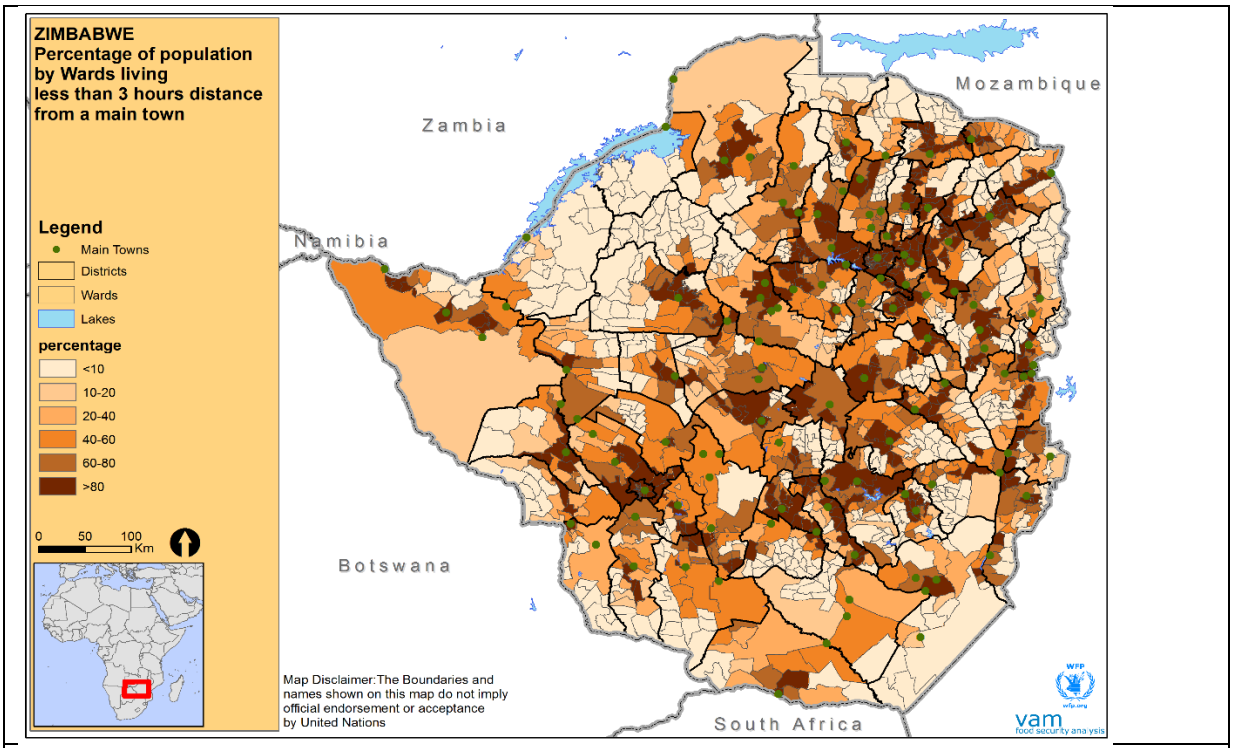
Results of exploratory analysis of food and nutrition security indicators identify three main components of food insecurity: 1) rainfall variability and food production, 2) food access, poverty and dietary diversity 3) morbidity which is a proxy for access to health, WASH and child care. While this finding is unsurprising, it confirms the need to consider an integrated, multi-sectoral/dimensional approach to build resilience to recurrent shocks and stressors.

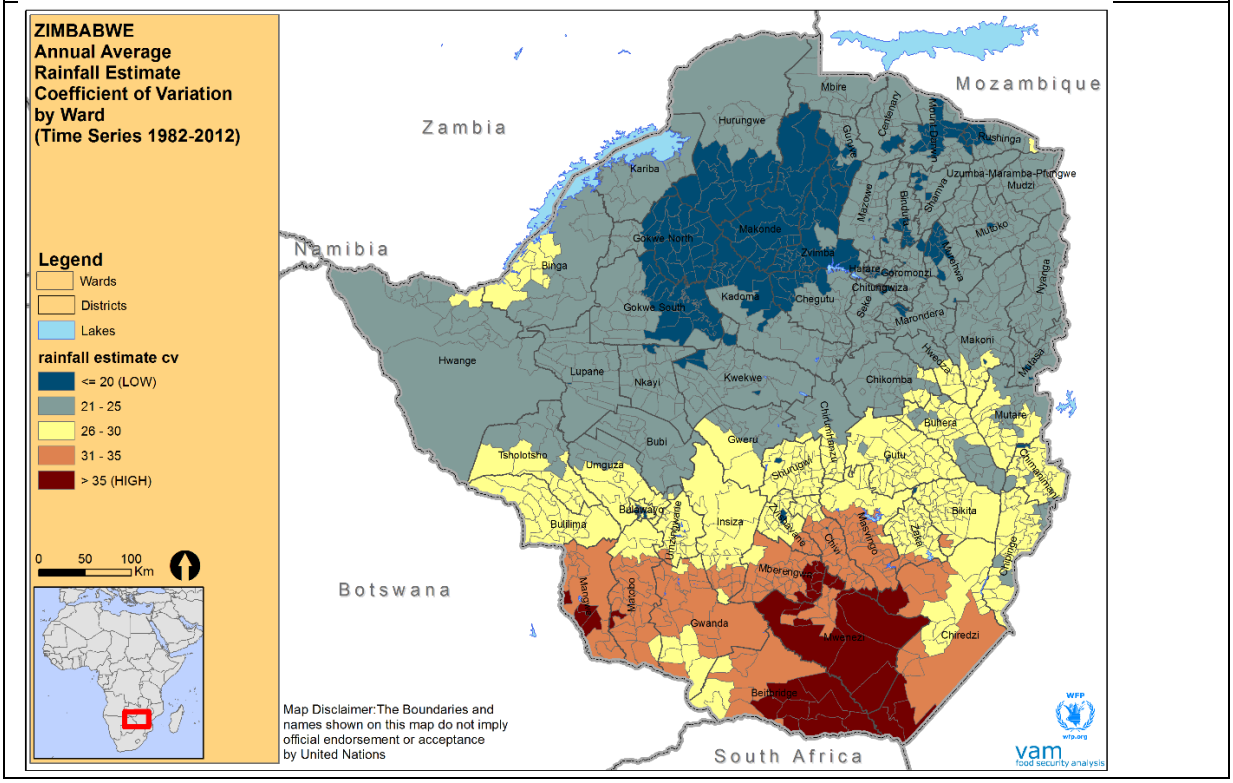
While these results are fairly obvious, they provide reasonable confidence on the drivers of food and nutrition insecurity in Zimbabwe. The analysis also recognizes some limitations and gaps in data availability. For example, the data on livestock ownership and HIV/AIDS were not available at the time of the analysis and these will be considered in subsequent analysis.

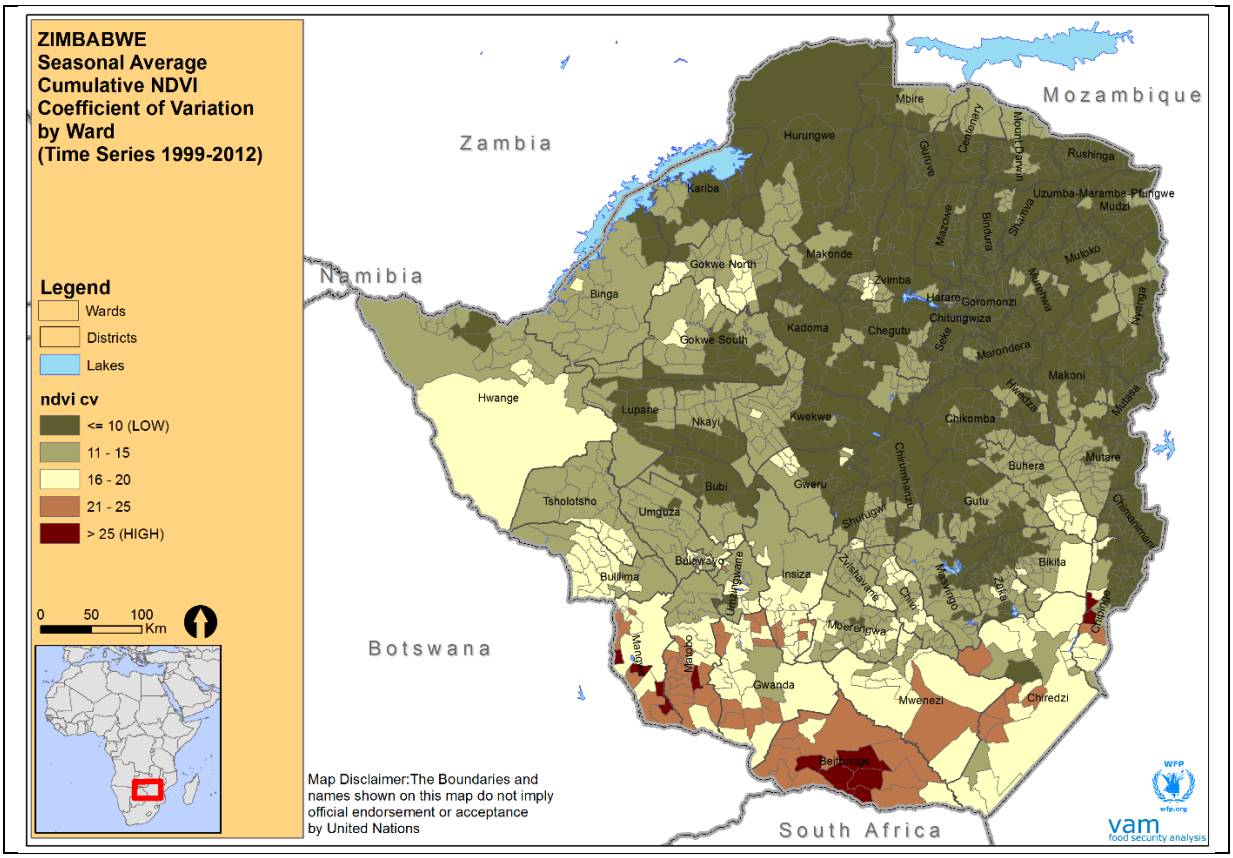
The next step is to incorporate missing data such as livestock ownership, HIV/AIDS which were not available at the time of the analysis and start in-depth analysis using micro-data at household level to understand the dynamics of household food and nutrition security at household level.

Annex 1: Maps of other dataset used in the PCA analysis




ZIMBABWE
Percentage of population by Wards living less than 3 hours distance from a main town
Legend
Main Towns
Districts
Wards
Lakes
percentage
<10
10-20
20-40
40-60
60-80
>80
0 50 100 Km
Zambia
Mozambique
Namibia
Botswana
South Africa
Map Disclaimer:The Boundaries and names shown on this map do not imply official endorsement or acceptance by United Nations
vam
food security analysis


ZIMBABWE
Annual Average Rainfall Estimate Coefficient of Variation by Ward (Time Series 1982-2012)
Legend
Wards
Districts
Lakes
rainfall estimate cv
<= 20 (LOW)
21 - 25
26 - 30
31 - 35
> 35 (HIGH)
0 50 100 Km
Zambia
Mozambique
Namibia
Botswana
South Africa
Mbire
Hurungwe
Kariba
Makonde
Zvimba
Binga
Gokwe North
Gokwe South
Kadoma
Chegutu
Hwange
Lupane
Nkayi
Kwekwe
Chikomba
Makoni
Mutare
Buhera
Bubi
Gweru
Tsholotsho
Umguza
Bulilima
Insiza
Gwanda
Mberengwa
Chiredzi
Beitbridge
Bikita
Gutu
Zaka
Chivi
Masvingo
Shurugwi
Mazowe
Bindura
Shamva
Mudzi
Uzumba-Maramba-Pfungwe
Mutoko
Murehwa
Marondera
Goromonzi
Chitungwiza
Seke
Nyanga
Mutasa
Rushinga
Guruve
Centenary
Mount Darwin
Map Disclaimer:The Boundaries and names shown on this map do not imply official endorsement or acceptance by United Nations
vam
food security analysis


ZIMBABWE
Seasonal Average
Cumulative NDVI
Coefficient of Variation
by Ward
(Time Series 1999-2012)
Legend
Wards
Districts
Lakes
ndvi cv
<= 10 (LOW)
11 - 15
16 - 20
21 - 25
> 25 (HIGH)
0 50 100
Km
Zambia
Mozambique
Namibia
Botswana
South Africa
Mbire
Hurungwe
Kariba
Centenary
Mount Darwin
Rushinga
Guruve
Mazowe
Bindura
Shamva
Uzumba-Maramba-Pfungwe
Mudzi
Makonde
Mutoko
Gokwe North
Binga
Zvimba
Harare
Goromonzi
Murehwa
Mutoko
Kadoma
Chegutu
Chitungwiza
Seke
Gokwe South
Maromdera
Makoni
Hwange
Lupane
Nkayi
Kwekwe
Hwesza
Mutasa
Chikomba
Buhera
Mutare
Bubi
Gweru
Tsholotsho
Umguza
Shurugwi
Gutu
Chimanimani
Bulilima
Bulawayo
Insiza
Zvishavane
Mberengwa
Chivi
Mwenezi
Zaka
Bikita
Chiredzi
Beitbridge
Gwanda
Map Disclaimer:The Boundaries and names shown on this map do not imply official endorsement or acceptance by United Nations
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vam
food security analysis

Annex 2: Datasets used for the PCA exploratory analysis

No	Dataset	Source
1	Nutrition Wasting	Demographic and Health Survey 2010
2	Nutrition Underweight	Demographic and Health Survey 2010
3	Nutrition Stunting	Demographic and Health Survey 2010
4	Cereal Adequacy	ZIMVAC 2013
5	Vitamin A supplement for children under 5	Zimbabwe National Nutrition Survey - 2010
6	Under Fives Meal Frequency	Zimbabwe National Nutrition Survey - 2010
7	Young Child Dietary Diversity	Zimbabwe National Nutrition Survey - 2010
8	Young Child Acceptable Diet	Zimbabwe National Nutrition Survey - 2010
9	Food Consumption Score	Zimbabwe National Nutrition Survey - 2010
10	Access to Health facilities	Demographic and Health Survey 2010
11	Poor Population Percentages	PICES 2012
12	Extremely Poor Percentages	PICES 2012
13	Access to safe water	Demographic and Health Survey 2010
14	Access to Toilet facilities	Demographic and Health Survey 2010

No	Dataset	Source
15	Malaria Prevalence	Demographics and Health Survey
16	Child Diarrhea Prevalence	Zimbabwe National Nutrition Survey 2010
17	Prevalence of Fever	Zimbabwe National Nutrition Survey 2010
18	Prevalence of Cough	Zimbabwe National Nutrition Survey 2010
19	Prevalence of Chronic Illness	Zimbabwe National Nutrition Survey 2010
20	Pediatric ART Coverage	Zimbabwe National Nutrition Survey 2010
21	Rainfall	FEWSNET
22	Vegetation	FEWSNET
23	Market Access	FEWSNET
24	U5 Stunting Population	Demographics and Health Survey 2010
25	Prevalence of Food Security	ZIMVAC (5 yr averages)

Annex 3: Syntax for principal component analysis

First Run: Analysis of all variables using PCA based on eigen values >1

```
FACTOR

/VARIABLES stunting_cls cerealadequacy_cls VitA_cls Minmealfreq_cls CDietDiversity_cls
PoorFCScores_cls FoodSec_Cls Healthaccess_cls UnprotectedWater_cls Notoilet_cls
poverty_cls extremepoverty_cls malaria_cls ChildDiarrhea_cls fever_cls cough_cls
ChronicIllness_cls paedARTcoverage_cls rainfallCv_cls vegetationCv_cls market.access_cls
U_5_cls
/MISSING PAIRWISE
/ANALYSIS stunting_cls cerealadequacy_cls VitA_cls Minmealfreq_cls YCDietDiversity_cls
PoorFCScores_cls FoodSec_Cls Healthaccess_cls UnprotectedWater_cls Notoilet_cls
poverty_cls extremepoverty_cls malaria_cls ChildDiarrhea_cls fever_cls cough_cls
ChronicIllness_cls paedARTcoverage_cls rainfallCv_cls vegetationCv_cls market.access_cls
U_5_cls
/PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION
/FORMAT SORT BLANK(.30)
/PLOT EIGEN
/CRITERIA MINEIGEN(1) ITERATE(25)
/EXTRACTION PC
/CRITERIA ITERATE(25) DELTA(0)
/ROTATION OBLIMIN
/METHOD=CORRELATION.
```

Second Run: Specify number of components=4 four components based on Monte Carlo PCA for Parallel Analysis

```
FACTOR
/VARIABLES stunting_cls cerealadequacy_cls VitA_cls Minmealfreq_cls YCDietDiversity_cls
PoorFCScores_cls FoodSec_Cls Healthaccess_cls UnprotectedWater_cls Notoilet_cls
poverty_cls extremepoverty_cls malaria_cls ChildDiarrhea_cls fever_cls cough_cls U_5_cls
ChronicIllness_cls paedARTcoverage_cls rainfallCv_cls vegetationCv_cls market.access_cls
/MISSING PAIRWISE
/ANALYSIS stunting_cls cerealadequacy_cls VitA_cls Minmealfreq_cls YCDietDiversity_cls
PoorFCScores_cls FoodSec_Cls Healthaccess_cls UnprotectedWater_cls Notoilet_cls
poverty_cls extremepoverty_cls malaria_cls ChildDiarrhea_cls fever_cls cough_cls U_5_cls
ChronicIllness_cls paedARTcoverage_cls rainfallCv_cls vegetationCv_cls market.access_cls
/PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION
/FORMAT SORT BLANK(.30)
/PLOT EIGEN
  /CRITERIA FACTORS(4) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
```

/METHOD=CORRELATION.

Third Run: Specify number of components=4 and remove MinMealFrequency, Unprotected water, notoilet access, malaria, chronicillness, PaedriaticARTCoverage as they have communality below 0.4

```
FACTOR
/VARIABLES stunting_cls cerealadequacy_cls VitA_cls YCDietDiversity_cls U_5_cls PoorFCScores_cls FoodSec_Cls Healthaccess_cls poverty_cls extremepoverty_cls ChildDiarrhea_cls fever_cls cough_cls rainfallCv_cls vegetationCv_cls market.access_cls
  /MISSING PAIRWISE
/ANALYSIS stunting_cls cerealadequacy_cls VitA_cls YCDietDiversity_cls PoorFCScores_cls FoodSec_Cls Healthaccess_cls poverty_cls extremepoverty_cls ChildDiarrhea_cls fever_cls cough_cls rainfallCv_cls vegetationCv_cls market.access_cls U_5_cls
  /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION
  /FORMAT SORT BLANK(.30)
  /PLOT EIGEN
  /CRITERIA FACTORS(4) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
  /METHOD=CORRELATION.
```

Third Run: Specify the new number of components=3 components based on MonteCarlo PCA for parallel analysis with the reduced number of indicators

```
FACTOR
/VARIABLES stunting_cls cerealadequacy_cls VitA_cls YCDietDiversity_cls U_5_cls PoorFCScores_cls FoodSec_Cls Healthaccess_cls poverty_cls extremepoverty_cls ChildDiarrhea_cls fever_cls cough_cls rainfallCv_cls vegetationCv_cls market.access_cls
/MISSING PAIRWISE
/ANALYSIS stunting_cls cerealadequacy_cls VitA_cls YCDietDiversity_cls PoorFCScores_cls
  FoodSec_Cls Healthaccess_cls poverty_cls extremepoverty_cls ChildDiarrhea_cls fever_cls cough_cls rainfallCv_cls vegetationCv_cls market.access_cls U_5_cls
  /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION
  /FORMAT SORT BLANK(.30)
  /PLOT EIGEN
  /CRITERIA FACTORS(3) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
  /METHOD=CORRELATION.
```

Take 4: Specify No of components=3 and remove stunting, Healthaccess, VitA, PoorFCScores, U_5_cls with communality less than 0.4

```
FACTOR
/VARIABLES cerealadequacy_cls YCDietDiversity_cls FoodSec_Cls poverty_cls extremepoverty_cls ChildDiarrhea_cls fever_cls cough_cls rainfallCv_cls vegetationCv_cls market.access_cls
/MISSING PAIRWISE
/ANALYSIS cerealadequacy_cls YCDietDiversity_cls FoodSec_Cls poverty_cls extremepoverty_cls ChildDiarrhea_cls fever_cls cough_cls rainfallCv_cls vegetationCv_cls market.access_cls
  /PRINT INITIAL CORRELATION KMO EXTRACTION ROTATION
  /FORMAT SORT BLANK(.30)
  /PLOT EIGEN
  /CRITERIA FACTORS(3) ITERATE(25)
  /EXTRACTION PC
  /CRITERIA ITERATE(25) DELTA(0)
  /ROTATION OBLIMIN
  /METHOD=CORRELATION.
```

Computation of Final weights

The final variable weights were computed by multiplying the variable classification (scale of 1 to 5) by the corresponding PCA weights which are between 0.5 and 1 for the remaining 11 variables as indicated in the pattern matrix.

Annex 4: Glossary of key terms and definitions

Communalities - Any given variable will have some variance that it shares with the factors and this is called its communality, and this value is between 0 and 1. Very low communality i.e. below 0.3 indicates that the variable has so little in common with the other variables in the dataset, that it is not worth having it in the analysis and should be removed.

Correlation matrix- A matrix that lists the correlations between each pair of variables in the analysis and gives the degree to which each variable is associated with every other variable.

Factor - A latent variable that analysis (using SPSS) has identified as describing a significant proportion of the variance in the data. A large number of variables may contribute to the effectiveness of a particular factor in describing this variance. Therefore a factor can be a combination of many variables.

Factor loadings - A factor loading is the degree to which every variable correlates with a factor. If a factor loading is high (above 0.3) or very high (above 0.6), then the relevant variable helps to describe that factor quite well. Factor loadings below 0.3 may be ignored. The cut off for loadings can be increased so as to ensure a simple solution with few factors/components is achieved e.g. up to 0.5 or higher as the minimum, especially with datasets that have many correlated variables like human behaviour.

The Factor Matrix -represents information from initial unrotated solution. The weights show the correlations of the variable to the respective factor.

The Pattern Matrix - shows the factor loadings for the rotated solution. The goal of rotation is to attain an optimal simple structure which attempts to have each variable load on as few factors as possible, but maximizes the number of high loadings on each variable. Factor loadings indicate the strength of the association between the variables and the factors. The solution is rotated to achieve an interpretable structure. When the factors are uncorrelated the Pattern Matrix and the Structure Matrix should be the same.

The Structure Matrix - shows the correlations between the factors and the items for the rotated solution.

Food and Nutrition Security

Chronic malnutrition[23]: Growth failure in a child that occurs over a slow cumulative process as a result of inadequate nutrition and/or repeated infections. It is measured by the height for age index. Stunted children are short for their age and may look younger than their actual age and the condition is irreversible.

Acute malnutrition: Growth failure as a result of recent rapid weight loss or failure to gain weight. Wasting is measured by the weigh for height index. Wasted children are extremely thin, but the condition is readily reversible once the condition improves.

Food Security

"Food security, at the individual, household, national, regional and global levels [is achieved] when all people, at all times, have physical and economic access to sufficient, safe and nutritious food to meet their dietary needs and food preferences for an active and healthy life". FAO. 1996. *Rome Declaration on World Food Security and World Food Summit Plan of Action.* World Food Summit 13-17 November 1996. Rome

"Food security [is] a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life". FAO. 2002. *The State of Food Insecurity in the World 2001.* Rome.

Food insecurity exists when people do not have adequate physical, social or economic access to food as defined above

1.1 Definitions and causes of chronic and transitory food insecurity

Both ***chronic*** and ***transitory*** food insecurity refer to the ***time dimension*** of food insecurity. Table 1 provides definitions, causes and other characteristics of both.

Table 1: Definitions and Causes of Chronic and Transitory Food Insecurity[24],[25]

	Chronic Food Insecurity	Transitory food insecurity	Cyclical food insecurity
Definitions	- A ***long-term*** or ***persistent*** inability to meet minimum food consumption requirements. - "Chronic food insecurity occurs when people are unable to meet their minimum food requirements ***over a sustained period of time***"[26].	- A ***short-term*** or ***temporary*** inability to meet minimum food consumption requirements, indicating a capacity to recover. - May involve a sudden and "often precipitous" decline in the ability to meet subsistence needs – a sudden collapse from adequate to inadequate.	- Occurs when there are habitual seasonal variations of the food security situation. Is more predictable, follows a sequence of known events.

[23] For more information see CDC and WFP (2005). *A manual: Measuring and interpreting malnutrition and mortality.* World Food Programme, Rome Italy.

[24] World Food Programme, 2009, Emergency Food Security Assessments (EFSAs) Technical Guidance Sheet No. 5, *Distinguishing between chronic and transitory food insecurity in emergency food security assessments* (EFSA)

[25] World Food Programme, 2006, *Distinguishing between chronic and transitory food insecurity in emergency needs assessments*, Rome, p xi, (prepared by Institute of Development Studies)

[26] DFID, 2004, *Scoping Study Towards DFIFSA's Hunger and Vulnerability Programme,* prepared by Southern Africa Regional Poverty Network,

Durations	- As a rule of thumb, food insecurity lasting for at least six months of the year can be considered chronic.	- As a rule of thumb, short periods of food insecurity related to sporadic crises** can be considered transitory. - Is relatively unpredictable and can emerge suddenly and it makes planning and programming more difficult[27].	- If seasonal food insecurity is present for at least 6 months in a year, it can be considered chronic; if it lasts less than 6 months, it can be considered transitory.
Causes	- Is explained in terms of "structural deficiencies" in the local economy or food system. Also explained in terms of "poverty", "lack of assets", and/or "inadequate access to resources". - "Is usually the result of persistent structural vulnerability"[28]. - It results from extended periods of poverty, lack of assets and inadequate access to productive or financial resources.[29]	- Caused by short-term shocks and fluctuations (e.g. drought, floods, civil unrest) in food availability and access. - Major sources of transitory food insecurity are year-to-year variations in international food prices, foreign exchange earnings, domestic food production and household incomes. These are often related.[30]	- Seasonal events e.g. floods - An intermediate category mostly due to seasonality.
Interventions	- Typically, chronic food insecurity calls for ***interventions that address underlying and basic causes of food insecurity and that last for several years***. - It can only be overcome with ***long-term development measures to address poverty and productivity***.[31]	- May require ***shorter-term interventions that address immediate and underlying causes, but interventions tackling basic causes of food insecurity may also be important*** to prevent repeated transitory food insecurity, which may lead to chronic food insecurity. - Requires ***early warning systems[32] to predict likelihood and severity as well as impacts of shocks***.	-
Changes	- Repeated transitory shocks can lead to chronic poverty and food insecurity – e.g. asset disposal below minimum "asset threshold". - Households in chronic food insecurity are more vulnerable to impacts of crisis than those under transitory food insecurity.	- Repeated crises can lead a vulnerable population to become chronically food insecure. - Temporary sharp reductions in a population's ability to produce or purchase food and other essentials undermine long term development and cause loss of human capital from which it takes years to recover.[33]	

***e.g. climate shocks, natural disasters, economic crises, conflict*

Note: Where no specific footnote is indicated within the table, footnotes 2 and 3 apply.

[27] http://www.ricebowlindex.com/Pages/Concept.aspx

[28] FIVIMS, 2002, *Understanding Food Insecurity and Vulnerability: Tools and Tips,*

[29] http://www.ricebowlindex.com/Pages/Concept.aspx

[30] World Bank. 1986. *Poverty and Hunger: Issues and Options for Food Security in Developing Countries.* Washington DC.

[31] http://www.ricebowlindex.com/Pages/Concept.aspx

[32] http://www.ricebowlindex.com/Pages/Concept.aspx

[33] World Bank. 1986. *Poverty and Hunger: Issues and Options for Food Security in Developing Countries.* Washington DC.

Annex 5: Results of principal component analysis

Correlation Matrix

	cerealadequacy_cls	YCDietDiversity_cls	FoodSec_Cls	poverty_cls	extremepoverty_cls	ChildDiarrhea_cls	fever_cls	cough_cls	rainfallCv_cls	vegetationCv_cls	market.access_cls
cerealadequacy_cls	1	0.33	0.646	0.175	0.127	-0.121	-0.174	-0.094	0.588	0.52	0.349
YCDietDiversity_cls	0.33	1	0.14	0.482	0.394	0.167	0.281	0.251	-0.139	-0.14	0.451
FoodSec_Cls	0.646	0.14	1	0.09	0.164	-0.024	-0.08	-0.027	0.51	0.534	0.306
poverty_cls	0.175	0.482	0.09	1	0.726	-0.289	-0.07	-0.004	-0.008	0.096	0.478
extremepoverty_cls	0.127	0.394	0.164	0.726	1	-0.333	-0.096	-0.07	-0.094	0.122	0.52
ChildDiarrhea_cls	-0.121	0.167	-0.024	-0.289	-0.333	1	0.721	0.672	-0.092	-0.263	-0.153
fever_cls	-0.174	0.281	-0.08	-0.07	-0.096	0.721	1	0.846	-0.344	-0.378	0.061
cough_cls	-0.094	0.251	-0.027	-0.004	-0.07	0.672	0.846	1	-0.158	-0.25	0.143
rainfallCv_cls	0.588	-0.139	0.51	-0.008	-0.094	-0.092	-0.344	-0.158	1	0.752	0.098
vegetationCv_cls	0.52	-0.14	0.534	0.096	0.122	-0.263	-0.378	-0.25	0.752	1	0.196
market.access_cls	0.349	0.451	0.306	0.478	0.52	-0.153	0.061	0.143	0.098	0.196	1

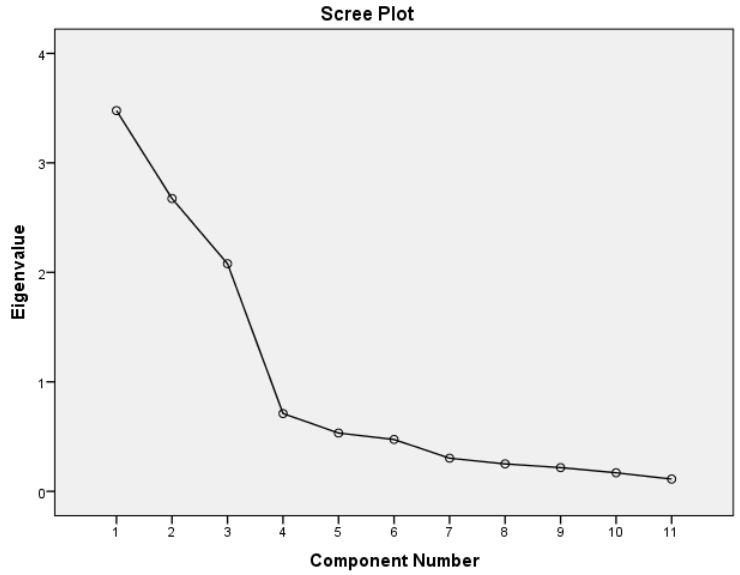
KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.711
Bartlett's Test of Sphericity	Approx. Chi-Square	310.593
	df	55
	Sig.	.000

Communalities

	Initial	Extraction
cerealadequacy_cls	1.000	.729
YCDietDiversity_cls	1.000	.639
FoodSec_Cls	1.000	.678
poverty_cls	1.000	.749
extremepoverty_cls	1.000	.765
ChildDiarrhea_cls	1.000	.814
fever_cls	1.000	.883
cough_cls	1.000	.815
rainfallCv_cls	1.000	.793
vegetationCv_cls	1.000	.743
market.access_cls	1.000	.622

a. Rotation converged in 8 iterations.



Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings[a]
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total
1	3.478	31.617	31.617	3.478	31.617	31.617	2.972
2	2.674	24.313	55.93	2.674	24.313	55.93	2.729
3	2.079	18.901	74.83	2.079	18.901	74.83	2.781
4	0.711	6.46	81.291				
5	0.532	4.839	86.13				
6	0.474	4.305	90.434				
7	0.303	2.752	93.187				
8	0.251	2.281	95.468				
9	0.217	1.97	97.438				
10	0.17	1.543	98.981				
11	0.112	1.019	100				

Extraction Method: Principal Component Analysis.

a. When components are correlated, sums of squared loadings cannot be added to obtain a total variance.

Component Matrix[a]			
	Component		
	1	2	3
vegetationCv_cls	.756		.380
cerealadequacy_cls	.702		.434
rainfallCv_cls	.657		.566
fever_cls	-.623	.609	.353
FoodSec_Cls	.621		.505
ChildDiarrhea_cls	-.592	.342	.589
YCDietDiversity_cls		.784	
market.access_cls	.454	.637	
cough_cls	-.499	.622	.424
poverty_cls	.430	.580	-.477
extremepoverty_cls	.448	.539	-.522

Extraction Method: Principal Component Analysis.

a. 3 components extracted.

Component Correlation Matrix

Component	1	2	3
1	1.000	.129	-.129
2	.129	1.000	.028
3	-.129	.028	1.000

Extraction Method: Principal Component Analysis.

Rotation Method: Oblimin with Kaiser Normalization.

Pattern Matrix[a]			
	Component		
	1	2	3
rainfallCv_cls	0.874		
cerealadequacy_cls	0.811		
FoodSec_Cls	0.808		
vegetationCv_cls	0.803		
poverty_cls		0.861	
extremepoverty_cls		0.86	
market.access_cls		0.717	
YCDietDiversity_cls		0.704	0.355
fever_cls			0.904
cough_cls			0.895
ChildDiarrhea_cls			0.877

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization.[a]

Structure Matrix			
	Component		
	1	2	3
rainfallCv_cls	.858		
cerealadequacy_cls	.829	.303	
vegetationCv_cls	.827		-.343
FoodSec_Cls	.806		
poverty_cls		.849	
extremepoverty_cls		.843	
market.access_cls	.320	.750	
YCDietDiversity_cls		.717	.371
fever_cls			.926
cough_cls			.899
ChildDiarrhea_cls			.865

Extraction Method: Principal Component Analysis.Rotation Method: Oblimin with Kaiser Normalization