USAID

FEWS Project

Early Warning Primer:

An Overview of Monitoring and Reporting

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TABLE OF CONTENTS

Page

Page

LIST OF FIGURES

Page

ACRONYMS

ESAP	Economic Structural Adjustment Programme
FANR	Food, Agriculture and Natural Resources
FEWS	Famine Early Warning System (USAID/ARD)
FSTAU	Food Security Technical and Administrative Unit (SADC)
GIEWS	Global Information and Early Warning System (FAO)
GIS	Geographical Information Systems
MIS	Market Information System
NEWU	National Early Warning Unit
NEWS	National Early Warning System
NMS	National Meteorological Service
NASA	National Atmospheric and Space Administration
NOAA	National Oceanographic and Atmospheric Administration
REWU	Regional Early Warning Unit (SADC)
REWS	Regional Early Warning System
RRSU	Regional Remote Sensing Unit (SADC)
SADC	Southern Africa Development Community
USAID	United States Agency for International Development
USGS	United States Geological Service

CHAPTER 1

INTRODUCTION

1.1 Purpose of the manual[1]

This manual is intended to build on the large volume of technical expertise and reference materials that have been developed by FEWS and other early warning and food security professionals. The range of the reference materials in most countries includes a country-specific documentation of activities and contacts and documents on specific tools or methods (see Appendix 1 for a complete set of available technical materials that are available for National Early Warning Units in southern Africa). A newly hired member of FEWS or a NEWS should seek existing materials **first** and review them as the appropriate starting point for their work.

The purpose of this manual, therefore, is to build upon these experiences to provide guidance to FEWS or NEWS professionals on a broader set of tools and methods for early warning monitoring and reporting. Currently, when new staff are hired into an early warning office (whether a NEWS or the Famine Early Warning System (FEWS)) there are not sufficient reference materials on how to do early warning monitoring and reporting. Those materials that are available are often not necessarily organized in an accessible way to guide a new analyst. This is a particularly significant issue given the multidisciplinary nature of early warning.

This manual will assist early warning analysts to understand:

- Key early warning concepts, tools and methods
- Data and information collection and management activities
- How to do the routine monitoring and assessment activities
- Some fundamentals on how to do reporting
- Useful reporting formats

1.2 Challenges of early warning

Although it is clear that there are many challenges involved in doing early warning monitoring and reporting, it is a very interesting and rewarding field. The main challenge to early warning professionals is to provide as accurate and credible information as early as possible about the food security situation facing households in a particular country. This is a complex task for many reasons:

First, early warning is by definition a multidisciplinary activity. This means that the early warning professional must have at least a general understanding of relevant concepts from

[1] Note: This manual was originally written for National Early Warning Unit's in southern Africa (SADC member states) and therefore contains numerous references to NEWUs and SADC Food, Agriculture and Natural Resource (FANR) office in Harare.

economics, agronomy, climatology, remote sensing, demography, nutrition, and geography. This requires that the FEWS or NEWS staff understand—or have access to others that understand—the basic issues, methods, and analytical tools used in these disciplines, and know where to get additional information and assistance. Although this challenge seems difficult, there are usually resource persons that can answer questions on a particular topic.

Second, the procedures and outputs to monitor early warning data and information must be consistent with available resources (both human and financial) and decision-maker needs. Early warning professionals tend to be over-extended in the demands for their time and often have limited resources. This manual recognizes this balance and provides practical suggestions that address these constraints. One positive point is that many of the data that are required for early warning monitoring and reporting are already available.

Third, effective early warning reporting requires a thorough understanding of the context within which households function. Understanding the patterns of agricultural production and consumption, price and market behavior, domestic and international trade, and the policy environment are critical. Again, this is a potentially difficult challenge. Fortunately, in most countries there have been many studies and data collection efforts that can be used to gain these insights. Also, the technical knowledge that the NEWS staff gains when traveling will help fill in some of the gaps of information that currently exist.

Fourth, the quality of the early warning is only as good as the data and information that goes into the analysis. This is an important issue since many of the data and information collection and processing activities are outside of the control of the early warning unit. Also, there are many important data and information that are either not collected or are not available in a timely manner. Again, although the above is true in many circumstances, there are still many data and information types that are available on a regular basis.

Finally, another challenge is to be able to perform all activities to report in a useful (actionable) and timely manner. These activities include the establishment of a data management system (from collection to processing to archiving), routine monitoring and assessment procedures, and presentation formats. Trying to complete all of the tasks assigned to FEWS or the NEWS, as well as internal *ad hoc* requests, can be very difficult. One step that this manual takes to address this challenge is to articulate what should be done by a NEWS to do a broader early warning monitoring and reporting.

All of the above factors make providing an early warning to avoid a food insecurity problem very difficult. This document does not address the many structural issues that are restricting the performance of the NEWS (e.g., clear mandate, staffing problems, and poor resource availability—especially funding) in many countries since there is an ongoing activity to explore these issues. As a result many aspects of the information systems that supply data and information to FEWS or the NEWS require review and improvement. The development of the capacity of the early warning staff in many countries to perform all task required to monitor and report on food security problems is also required. This manual provides the conceptual approach and procedures to do effective early warning reporting given the recognition of these constraints.

1.3 Organization of the manual

This manual is divided into 6 chapters, with each chapter describing and guiding the reader to effectively perform all necessary activities for timely early warning reporting.

Chapter 2: Early warning and food security concepts, tools and methods: Topics include a review of definitions, approaches, concepts, tools and methods that are required for effective early warning reporting.

Chapter 3: Data collection and management: Topics include data/file management and verification, a discussion of key data sets, and a review of important software.

Chapter 4: Routine monitoring and assessment activities*:* Topics include a discussion of the cycle of monitoring and assessments, and suggestions on what and how to do routine monitoring and assessment activities.

Chapter 5: Reporting fundamentals*:* Topics include suggestions on how to write reports that are as effective and informative as possible.

Chapter 6: Reporting formats: Topics include how to report in useful formats such as monthly food security bulletins, memos, oral briefing, responding to media reports, assessments, and documentation early warning procedures.

Appendices: The appendices are included to assist the analyst to acquire some information that complements that presented in the main body of the primer, including a selected bibliography and some key terms.

CHAPTER 2

EARLY WARNING AND FOOD SECURITY CONCEPTS, TOOLS AND METHODS

2.1 Introduction

Before beginning a discussion about the data collection, monitoring, and reporting involved in preparing an early warning, some key terms, concepts, tools and methods must first be presented. The concepts presented in this chapter are consistent with early warning and food security literature. It is important to understand these concepts to report as accurately and precisely as possible. The flow of this chapter will guide the reader through a series of key definitions, concepts and methods that will set the foundation to put the data collection, monitoring and assessments, and reporting for early warning into context.

2.2 What is food security?

The reader may be wondering why a definition of food security and some related concepts is presented at the beginning of a chapter on concepts for early warning, even before early warning is discussed. The purpose of this order is to provide the context for the early warning and answer the question: Early warning of what? There are many subjects that can—and in some countries are—the focus of an early warning monitoring system, including agricultural production deficits, nutrition problems and disasters (natural and man-made, and civil insecurity).

Although there were initially many debates about the definitions of food security (and its components), there is now a consensus. Food security can be defined as the condition in which a population has physical, social and economic access to sufficient safe and nutritious food over a given period to meet dietary needs and preferences for an active life (World Bank, 1986).

Embodied in this definition is the important concept that food security is more than just food availability. Experience has shown that even if adequate food supplies are available, a household's access to that food depends on its income-earning strategies, assets and coping behaviors. Thus, a population's food security goes beyond aggregate food availability to include an assessment of how much food people can acquire directly through their own production or indirectly through market and other transactions. A population's food security also depends on its ability to properly utilize food. Individual health and nutritional conditions, as well as food care practices, determine whether food can provide sufficient nutritional value to the individuals consuming it.

The generally accepted definition[2] of the three components of food security are:

- **Food Availability** is a measure of the food that is, and will be, physically available in the relevant vicinity of a population during the given consumption period through a combination of domestic (national) production, stocks, trade and transfers.

- **Food Access** is a measure of the population's ability to acquire available food during the given consumption period through a combination of its own production and stocks, market transactions, and transfers.

- **Food Utilization** is a measure of whether a population will be able to derive sufficient nutrition during the given consumption period from available and accessible food to meet its dietary needs.

Some other useful definitions include:

- **Food Insecurity** is the inverse of food security: a condition in which a population does not have access to sufficient safe and nutritious food over a given period to meet dietary needs and preferences for an active life. Possible causes are insufficient food availability, insufficient food access and inadequate food utilization.

- **Current (or transitory) food insecurity** occurs when a population suffers a temporary decline in consumption. Current food insecurity can result from instability in food production, food prices, household incomes, health conditions, or civil insecurity.

- **Chronic (or long-term) food insecurity** occurs when a population has continuously inadequate consumption. Chronic food insecurity arises from conditions of poor food production, limited incomes, poor health, long term civil insecurity.

Although these definitions are complex, it is important to understand them since they form the foundation required for your early warning work.

2.3 What is early warning?

2.3.1 Historical approach (using southern Africa as an example)

The main approach to early warning work in southern Africa has been a focus on early warning to identify food availability problems. This approach was supported through FAO technical assistance from 1988 to 1996 in southern Africa. During this period the Regional Early Warning System (REWS)—the Regional Early Warning Unit (REWU), the Regional Remote Sensing Unit (RRSU) and the National Early Warning System (NEWS) were established.

The focus of early warning during this period was mainly focused on collecting data and information on crop developments, crop forecasts (crop yield and production data), consumption, trade (imports and exports), stocks (mostly publicly-held), and food assistance. The objective was to then identify as early as possible any national level food deficits that were problematic, and raise the flag for others to intervene. During this period the work of the REWS

[2] These definitions are generally accepted by early warning and food security practitioners around the world, including SADC FANR, the World Bank, FEWS, FAO, and others.

was instrumental in raising concerns following the 1991/92 El Niño agricultural season and mobilizing a regional level response.

Also, a series of effective methods and procedures were developed to monitor early warning of national-level food availability problems. Tools and methods developed include crop monitoring and forecasting methods and food balance sheets, both of which are an important part of any early warning activity.

2.3.2 Proposed broadened approach

The activities initiated and sustained from previous early warning efforts are useful to maintain as the core early warning activities. However, it is recognized that a broader set of activities is required to adequately describe the overall food security problems in the entire country. This increase in focus from primarily food availability to food security (including food access) as the basis underpinning for early warning has some implications.

First, the broader definition of early warning activities implies a broadening in the activities that a NEWS is required to do. A focus on food security includes food availability, but also adds the food access aspects of data collection, monitoring, and reporting. The inclusion of food access is very important, but does not necessarily have to be a burden on the resources available to a NEWS (staff time and financial).

Second, there is a change from a national level coverage to one that also includes the subnational levels. In the past the main focus was on national level issues. As it is increasingly recognized that national food security does not translate into food security at the subnational levels, the focus should be on both national and subnational (provincial and district for geographic coverage and markets for point coverage) issues. Although some data collection was on provincial and district levels, more emphasis has traditionally been on the national level situation.

These factors have important implications for the mandate and resources that are available to NEWS. This document provides guidance to NEWS that assumes a minimum level of resources, but allows for expanding into broader food security coverage.

2.4 Relationship of early warning to other information systems

All information systems, including the NEWS, are composed of four components, namely data collection, processing, analysis and dissemination. Although the different types of information systems perform these functions to meet their objectives, many of the data types are relevant for the early detection of food security problems. Other existing systems in SADC member states include those that monitor prices, livestock and pasture conditions, satellite imagery, macroeconomic conditions, trade and nutrition and health.

To broaden the early warning mandate and activities of the NEWS given the current resources, the NEWS will have to be more closely linked to these information systems. To achieve this

integration the forming of strategic partnerships should be developed. Developing these linkages to other information systems can be done either informally or formally.

In many countries most of these systems exist. In those situations where these systems exist and function well, the NEWS could access the other systems' data and information for inclusion in their reporting. It would also be desirable in many cases to either ask staff from the other information systems to draft that portion of the bulletin (and get credit for it) or show the draft of the relevant section to that information system which provided the data or information for validation. This will provide mutual credibility to all related information systems.

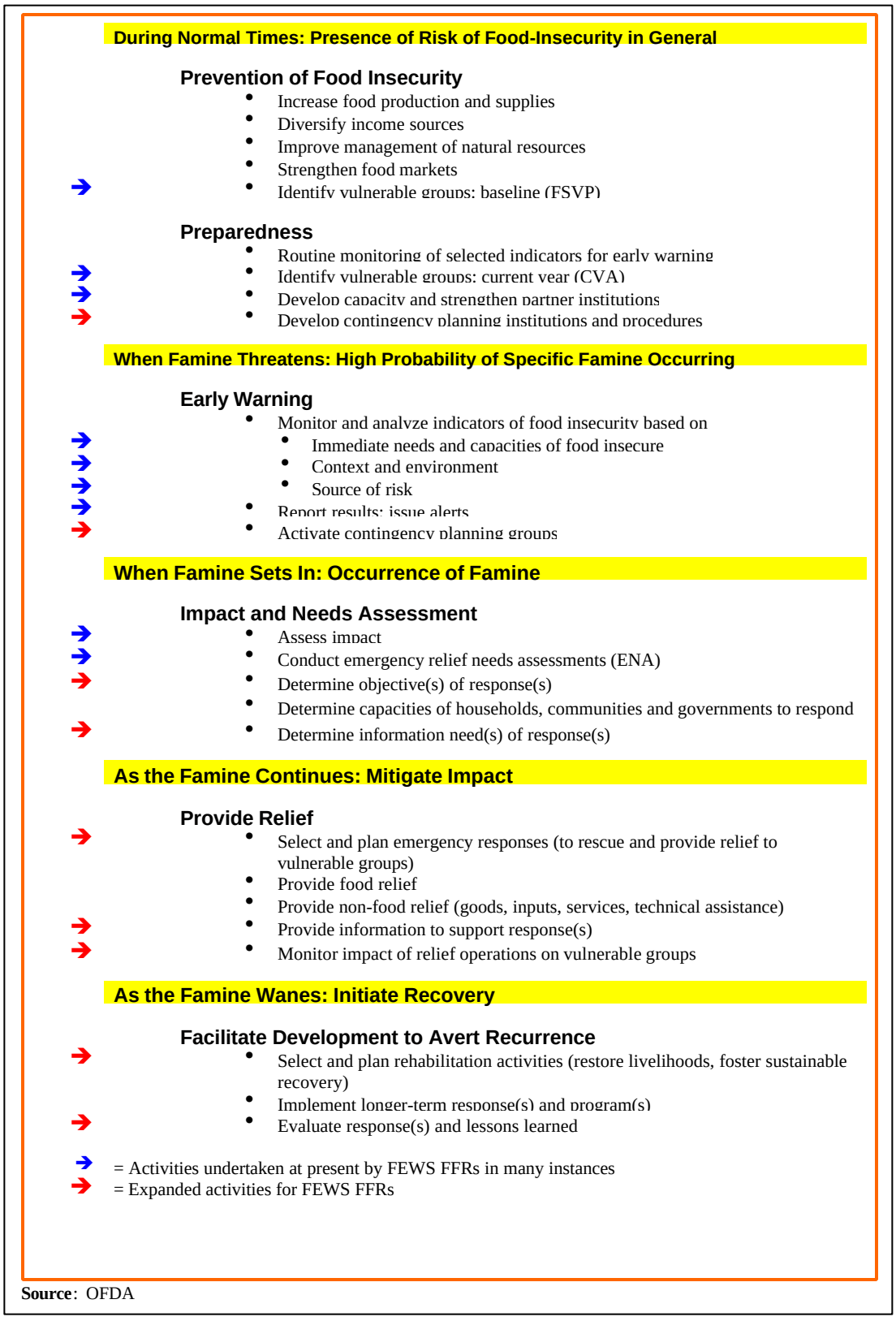
In some cases, however, the data or publications from these information systems are disseminated either late or erratically. This situation presents a larger problem. The NEWS will have to develop it's standard operating procedures without the information that is unavailable or arrives late. In addition, effort on someone's part (others in Government, the NEWS, donors, or others) is required to assist these other information systems to provide the necessary data and information for early warning in a timely and consistent manner. This is a longer-term effort and the NEWS should develop procedures without this data or information, but be flexible if they become available.

2.5 Relationship of early warning to contingency planning and crisis response

The reason to discuss the role of early warning in contingency planning and crisis response is that it is the response aspect of the process is what makes early warning information valuable. The timely dissemination of an early warning message and the subsequent identification of food insecure populations is a critical input into a contingency plan or a crisis response plan. Timely and accurate early warning information should be the "trigger" for both contingency planning and crisis response. This early warning information is important to answer the "who", "what", "where", and "why" questions required to intervene into a situation where populations are currently food insecure.

The events leading up to and after a famine situation have distinct phases from monitoring pre-famine conditions to evaluating the response to a famine. Each phase has a different role and action for those involved in early warning and response (see Figure 2.1). These phases may be distinct in concept, but they overlap in time.

Figure 2.1: The monitoring and response sequence



Source: OFDA

To understand the relationship between early warning and prevention and response to a food security crisis the eight phases of the process from preparedness to response are listed below:

- Prevention of food insecurity
- Preparedness
- Early warning
- Contingency planning
- Impact and needs assessment
- Relief to meet immediate needs
- Development for longer-term rehabilitation and recovery
- Evaluation

It is easy to see two implications from the above list. First, early warning is an important step in determining that there is (or is not) a problem, and to provide some initial indication of what should be done (what response). Second, for an early warning to be "successful"—meaning that it was reviewed and appropriately acted upon—active participation from governmental, non-governmental, and international organizations must occur. An early warning not linked to a structure designed to take action is unlikely to have a useful impact at addressing the food insecurity situation.

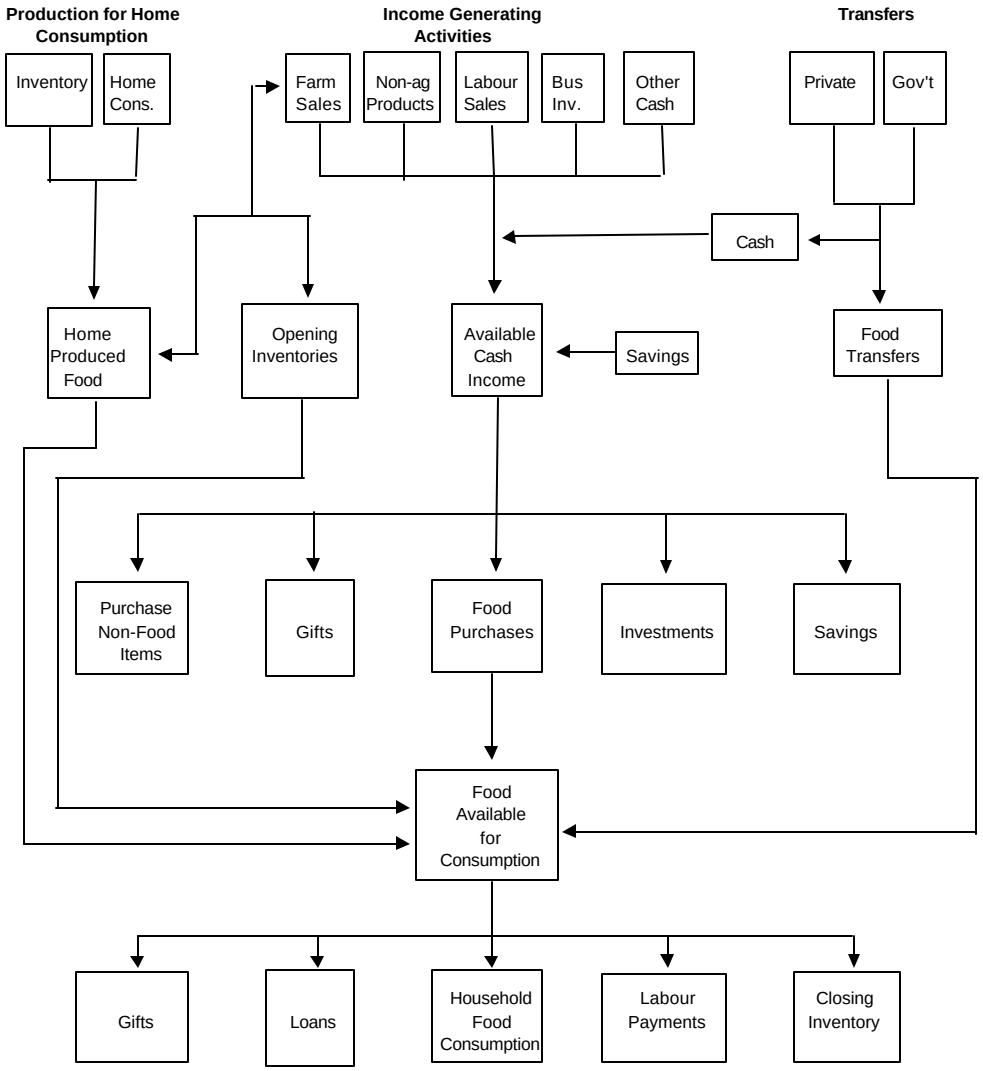
2.6 Early warning concepts

There are many important early warning concepts that are important to understand to be able to do effective early warning monitoring and reporting. This section provides an introduction to some of the most important of these concepts, including the relationship between incomes, expenditures and consumption; chronic versus current issues; risk factors; types of disasters; coping strategies; outcome measures of food security; public and private sector roles; and the convergence of evidence. Although this list is not exhaustive it provides a useful starting point for early warning monitoring and reporting.

2.6.1 Relationship of incomes, expenditure and consumption

From the above definition of food security—and the broader new definition of early warning—the relationship of incomes, expenditure, and consumption for early warning monitoring is clear. Although we already have tools and methods to monitor food availability, we must have a conceptual understanding of the food access side of the equation before we can discuss a broadened approach to early warning. This relationship is presented in Figure 2.2.

Figure 2.The realtionship between incomes, expenditures, and household food consumption



Source: Chopak (1991)

2.6.2 Chronic versus current issues

Although the spatial nature of food security is important, temporal (time) aspects of early warning are equally as important. It is important to understand the temporal aspects of food security situation assists in all early warning monitoring and reporting activities for two reasons. First, the temporal aspects of a food security issue are important when determining how the situation will be monitored, which has an implication for the types of tools and methods that are used. Second, the temporal aspects of a issue will also guide the types of interventions that are appropriate to address food security problems. For example a chronic food security issue is better remedied by longer term development initiatives, and not food aid (for example).

It is important to recall the definitions presented earlier for current and chronic food security. ***Current (or transitory) food insecurity*** occurs when a population suffers a temporary decline in consumption. Current food insecurity can result from instability in food production, food prices, household incomes, or health conditions. In contrast, ***chronic (or long-term) food insecurity*** occurs when a population has continuously inadequate consumption. Chronic food insecurity arises from conditions of poor food production, limited incomes, and poor health.

From these definitions it is easier to understand that the temporal dimension of the food security has an implication of what is monitored and the type of responses that are appropriate. The monitoring of current food insecurity looks at those areas or populations that are temporarily falling below some minimum standard, but are used to meeting or exceeding that standard. Households that are currently food insecure, but normally are food secure, may require emergency food assistance if the situation is very severe. Responses of this nature—to assist normally food secure households that are currently food insecure—are less likely to have long term negative disincentives (e.g., production disincentives) than providing assistance to chronically food insecure households. The reason this has been observed to be true is that the conditions by which households in these areas are likely to return to normal the following year.

Conversely, a household that is chronically food insecure is one that has had difficulty in meeting its basic requirements over a period of time. The monitoring of this situation can not be the same, for example a measurement of production below a minimum consumption threshold would most likely be inappropriate since that household is unlikely to even produce that amount even in a good year. As well the responses to chronically vulnerable households are more in terms of changing fundamental aspects of their livelihoods (e.g., changes in policies, improving market access and infrastructure development).

It should be noted that to have a good understanding of a current problem the chronic (or baseline) situation is important. It is the baseline situation that provides the context to understand what is (and what is not) normal or average.

2.6.3 Risk factors

It is important to understand what factors can affect the livelihoods of households. Household exposure to different conditions that can be understood by examining past behavior—defined as risk factors—that could change the food balance or a household's food security over the given consumption period should be noted, including:

- natural calamities, such as floods, droughts, or cyclones that might affect secondary harvests, pasture conditions or food marketing,
- food prices relative to trading partners, which would change the terms of trade and thus relative imports and exports;
- trade policies (domestic and international);
- budgetary or foreign exchange restrictions that would affect import capacity; and
- wars and conflicts.

Every country has different exposure to these various risk factors that needs to be understood when monitoring and reporting on early warning issues. The nature of these risk factors should be examined and understood to provide context of what is currently happening.

2.6.4 Types of disasters

There are various kinds of disasters that could result in a food emergency, including those that ultimately lead to famine. Some types of disasters are more appropriate for early warning system to monitor and assess given the inherent characteristics of famines as a condition as well as a process.

First, early warning units typically monitor and assess "slow-onset" crises, rather than "sudden-onset" crises. The combination of skills and resources that has been developed and strengthened, within the NEWS relates to successive phases of early warning activities, to monitor, assess, report conditions that could lead to famines. The term early warning assumes that there is a long lead period before a famine would occur.

Second, early warning units focus more on natural (geo-physical, hydro-meteorological) phenomena that have a significant direct or indirect influence on food security status, rather than certain man-made (socio-economic) threats to food security, especially conflict. Early warning units monitor a range of factors that affect food availability (primarily related to agricultural production) and to food access (primarily through income earning opportunities and distribution of food through the market). In turn, these units assess the conditions of particularly food insecure groups and classify them according to their degree of vulnerability to food insecurity. Early warning units do not have a comparative advantage in assessing food insecurity resulting from sudden shifts in political regimes or conflict.

The NEWS capability to offer early warnings and issue alerts is premised on sufficient lead time (within which warnings and alerts can be acted upon) and on predictable, seasonal rhythms of rainfall-production-marketing as well as abundant-scarce availability and access to food. Both sudden-onset and conflict-related disasters break these predictable seasonal routines and call into question the value of early warnings.

While the strength of the NEWS lies in monitoring and detecting slow-onset, natural factors that can lead to a famine, a NEWS often finds itself required to respond to all kinds of food crises.

2.6.5 Coping strategies

A coping strategy is the process by which households adjust their livelihood and consumption strategies when faced with different obstacles (e.g., a price increase, less agricultural production or less labor opportunities). The different strategies used by households depend on many factors, including their physical environment (soil, rainfall, and natural resources), household resources (financial and skill), policy environment, economic conditions and duration of the shock (see Figure 2.3). The issue to understand is how

households in different parts of the country earn incomes (both generally and seasonally). This establishes the baseline (or normal behavior) for understanding an abnormal behavior.

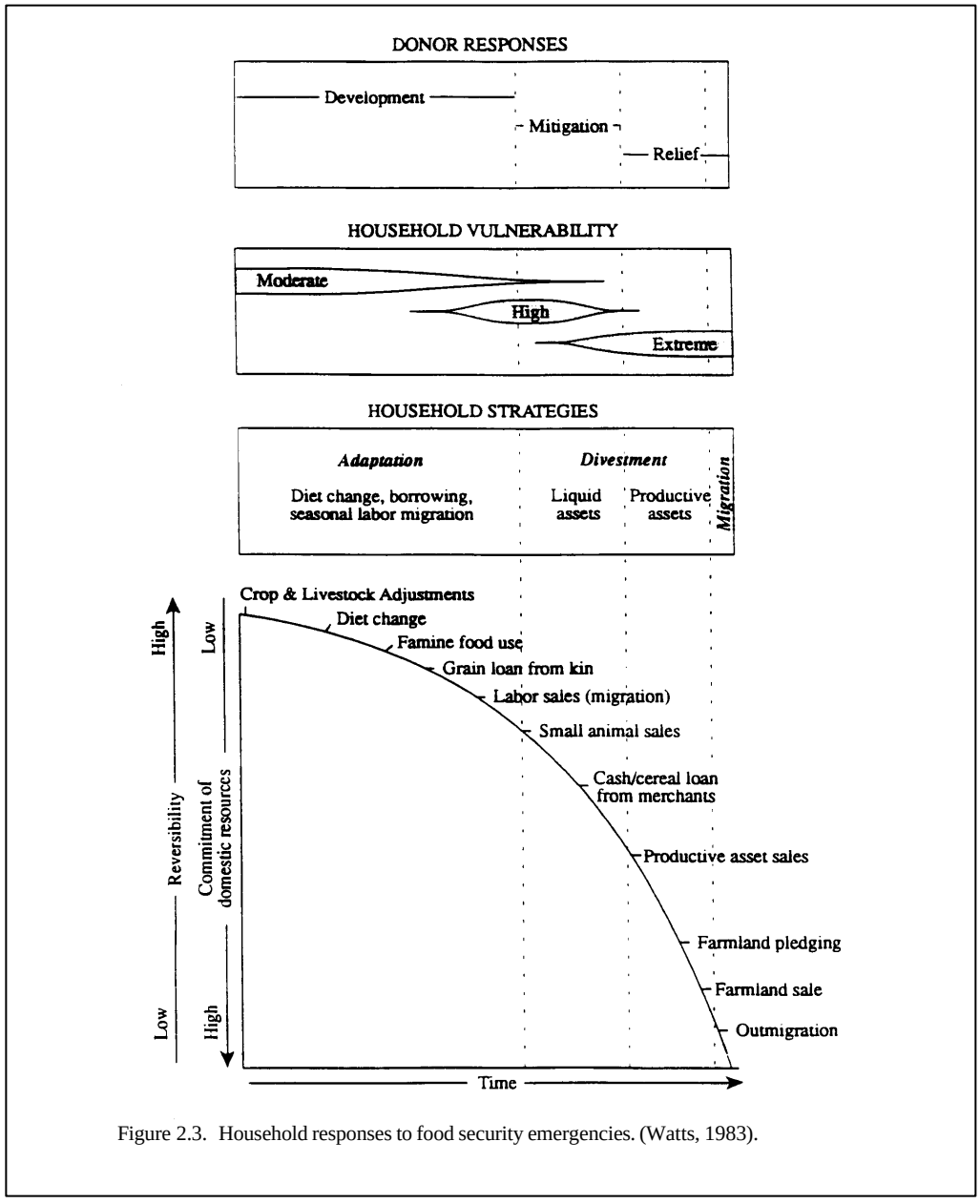


Figure 2.3. Household responses to food security emergencies. (Watts, 1983).

There are several *caveats* to interpreting coping strategies. First, many coping activities are used routinely in non-emergency situations. If a household is relatively poor, it may be obliged to resort to some form of coping during expected seasonal variations (i.e., the "hungry season," that period before harvest when reserves are at their low point). Second, coping may not proceed sequentially; any single household might pursue several strategies in parallel. Third, specific strategies will vary among groups and regions as a function of the options available. Fourth, strategies will vary from year to year and change over time as new opportunities for gainful activities arise. Ultimately, though, it is assumed that the primary objective of the

household is to survive and conserve resources. Thus, there is a general progression of types of activities that adopts as a food security problem worsens, which can be portrayed as a continuum a broad pattern that can be generalized:

- Adaptation. This class of activities might be called, "making do with what is available." It involves changing preferred patterns of consumption (e.g., skipping meals and ultimately changing diet by shifting to foods that are more readily available), and reallocating available resources of land, labor, and capital (e.g., changing herd composition; replanting to more appropriate crops; producing charcoal locally; or migrating to labor opportunities). At this stage, the market might reflect an increase in cereal prices and a decrease in labor prices.

- Divestment of liquid assets. After, or often before, options for adaptation are exhausted, the household begins to dip into those resources that can be more easily sold (e.g., sale of small animals), accumulated wealth (e.g., sale of jewelry), or to tap the resources of extended family (e.g., informal loans from kin). Markets may reflect a decline in the prices of small animals, an increase in the number offered for sale, a continued rise in cereal prices, and thus perhaps an accelerating decline in terms of trade (the amount of cereal that can be purchased per unit of animal).

- Divestment of productive assets. The decision to sell productive assets is perhaps the most significant threshold in this continuum. It might involve the consumption of seed, incurring significant formal debt, and ultimately the sale of capital items required for production (e.g., plows or draft animals in agricultural households; cows in pastoral households). Once crossed it is difficult -- if not impossible -- for a household to return to previous levels of productivity and food security. Typically, markets would show increasing cereal prices, declines in prices for farm implements and land, and a decline in price for large animals. Rises in malnutrition rates should be expected.

- Outmigration. Once local options are exhausted, there may be a general movement to urban centers, or refugee camps if they have been established. There would be accompanying dramatic increases in malnutrition, morbidity and mortality.

As suggested above, resiliency, or the ability of any group or household to recover from adverse change is a function of several factors. First is the range of options available to exploit. For example, if a group is near a major urban center or agricultural region, there will be more opportunities for outside employment. Or, the group may be situated near a road that would facilitate movement to distant areas where more alternatives exist for generating income. Moreover, some groups in environments that are especially risky for agricultural production, may have a wide array of options (income portfolio) on which to draw because of their experience in dealing with risk; those in less risky environments (e.g. northern Mozambique) may have a more restricted array of coping strategies and thus, paradoxically, may be more vulnerable to extreme events. A second factor that conditions the ability of a group to cope is, not surprisingly, the level of resources upon which the group or household can draw.

Several points are worth making at this time. First, households with different initial resource

levels will experience critical thresholds at different times. Second, is that some well-positioned households may actually increase their resource base during emergencies by acquiring assets at depressed prices and thus may be in a position to exploit members of lower economic classes. Third, different households may be parts of different "social economies" and thus have access to a network of other resources. This might include membership in an extended family, clan or tribal group that provides support to its members during times of stress. Fourth, the use of specific coping strategies may have vastly different meanings, depending on the nature of the household. For example, the sale of small animals will have no impact on a rich household, but the loss of household resources may substantially increase the vulnerability to food insecurity of a poorer household. Finally, and not surprisingly, some groups may enjoy access to greater political power or class/caste positions than others, which permits them to tap other resources at a higher level of political or economic organization.

The household model of response can also be used to determine when and to what degree household economic conditions might be expected to improve. Although the examples here show responses to negative events (e.g., crop failures), they can also be used to infer what might happen during upturns (e.g., potentially good harvests). During favorable conditions, households may replenish or add to their stocks and liquid assets, thus increasing their resiliency, or ability to cope with future downturns. However, if households have lost control of their most valuable and productive assets (e.g., seed; tools; cows), they will not be positioned to take full advantage of opportunities as they arise.

- For more information please see:

1. FEWS. 1999. Current Vulnerability Assessment Guidelines.
2. Hutchinson, C. 1992. Early Warning and Vulnerability Assessments for Famine Mitigation. Strategy Paper for OFDA.
3. Downing, T. 1990. Assessing Socioeconomic Vulnerability to Famine: Frameworks, Concepts and Applications. FEWS II Working Paper.
4. Corbett, J. 1998. Famine and Household Coping Strategies. World Development 16 (9): 1099-1112.

2.6.6 Outcome measures of food security

Although it may seem odd to be discussing outcome measures of food security in an early warning document, these indicators do have a role. Normally outcome indicators are more of a measure of chronic food security, but some are relevant for NEWS to include in their analyses, especially measures of nutrition such as arm measurements (MUAC) and the combination of weight to other growth factors (e.g., height and age).

These indicators are especially useful to provide the context within which to report an improvement or deterioration in a particular population. These measures are also useful to compare results from current assessments against a pre-established baseline.

2.6.7 Public versus private sector roles

Across southern Africa structural adjustment (known in the region as Economic Structural Adjustment Programmes) has fundamentally changed the way in which early warning professionals monitor the supply and demand for food. In the past monitoring food production and trade was relatively easy since the Governments in most of the region had marketing boards that performed most trade functions (marketing and trade—importing and exporting). Since the NEWS are part of Government, collecting import and export data (both previous trading and planned trading) was relatively easy.

After structural adjustment of the region's economies, collecting information on imports and exports (and sometimes even identifying the flow of food supplies) in the liberalized markets has been much more difficult. The private sector considers this information important to conceal, as it would compromise their perceived competitive advantage. Getting access to the private sector's future plans has been virtually impossible for NEWS.

This has made generating food balance sheets and including information about how deficits will be met more challenging. For example, a country like Botswana is unlikely to ever produce enough cereals to meet national consumption requirements. Does this deficit mean that there is a food security problem? No! The cereal deficit each year, in this case, is met primarily by the private sector imports. In those cases where there is a food access problem the Government will intervene to provide a focused response to those populations considered vulnerable. It is important in the future to look at the different roles the private sector and public sector have been playing to better understand whether there is a food availability problem. Understanding these relative roles, especially the ability and willingness of the private sector, is important to assess whether there will or will not be a food supply problem.

2.6.8 Convergence of evidence

Convergence of evidence (sometimes referred to in southern Africa as triangulation) refers to the use of multiple indicators wherever possible to mutually confirm (or corroborate) the food security situation in a particular area. When all of the early warning indicators are signaling a particular condition, then one can be comfortable in making a statement that there is or is not a problem. For example, if one observes that some indicators (e.g., remotely-sensed satellite imagery, rainfall data, and field reports) are all indicating that the season is progressing poorly, then one can be more confident in stating that there is or is not a food security problem developing. Conversely, if some indicators are indicating a normal situation while others a poor one, then one needs to visit the area to assess the real situation.

The reason why this concept is fundamental to early warning monitoring and reporting is that most of the data that are used to assess if there is a deterioration in the food security status of a population are flawed. As a result it is not wise to place too much confidence in only one data type. The process of assessing whether all data are indicating the same occurrence should always be used.

2.7 Early warning tools and methods

Although early warning is a relatively new multidisciplinary activity, there are quite a number of useful tools and methods that have been developed. Significant effort by international (FAO/GIEWS, FEWS, and others), regional (SADC, CILSS and IGADD), and national (NEWS) early warning and food security professionals have contributed to the development of these tools and methods. Although these tools and methods are in different phases of development, they are certainly sufficient for early warning monitoring and reporting. Still, efforts are required to continually evolve these tools and methods to make them more accurate. Tools and methods that will be presented in this section are crop estimations, food balance sheets, satellite imagery analyses, price analyses, current vulnerability assessments, rural rapid appraisal and thematic mapping.

2.7.1 Crop assessment methods

The National Early Warning System was established to monitor the food supply and demand situation in the different countries in SADC. One key component in monitoring is estimating the size of the agricultural production. Although these data have many uses, they have been primarily used as an input to the food balance sheets (discussed in the next section). An estimate of cereal production for a cropping season is needed as earlier as possible so that any significant deficit or surplus can be determined and signaled. In addition to the food balance sheet, these data are important for all early warning analyses given their important contribution to rural incomes.

There is a distinction that should be made between the two main crop assessment methods, namely crop production forecasts and crops production estimates. A crop production forecast is an assessment that is made before the harvest; while a crop production estimate is an assessment that is made after the harvest.

For early warning analyses, crop production forecasts and estimates are both important, but for different reasons. Although these ***crop production forecasts*** are made before the harvest and therefore the data are not always statistically reliable, they provide a useful first look at what the likely agricultural harvest will be. These forecasts can be put (with proper caution) into pre-harvest assessment to begin to understand the food security implications the current situation continues. In situations where the data obtained from the crop production forecasts is very unreliable high/low scenarios can be constructed based on historical crop forecast data and expert knowledge to provide a useful picture of the potential food security situation. The crop production estimates on the other hand should be used in analyses that require more accurate data, for example the post harvest analyses and the current vulnerability assessments. In these cases more precise data are required to allow for a more accurate assessment of the food security implications of the cropping season.

Both the crop production forecasts and estimates require two main components, namely area and yields. The calculation of crop production is the product of area times yield. Some caution should be paid to know if the area refers to area planted or area harvested. As was the case with area, one should know whether the measure of yields refers to yield per unit area planted or yield per unit of area harvested. The production of a crop can be calculated using either areas and yields of plantings or the harvest.

Crop production forecast and estimate methods are well-documented and understood by NEWS staff. In fact, in most cases the NEWS staff is responsible to either implement or assist in the implementation of the crop forecasting exercises. In all SADC member states there are established measurement procedures, either subjective or objective, to estimate crop production and productivity. Although the REWS has made significant effort to make crop estimates using objective methods (much effort at annual training sessions have been devoted to this activity), many countries continue to use subjective methods to generate crop production estimates. In most cases these data are reliable at the national level, and sometimes at lower administrative levels.

In the past NEWS in most SADC member states undertook at least one crop forecast and a crop estimate (sometimes referred to as a post harvest survey). With the budget crunch of the past few years the crop forecasts in many countries are becoming more difficult to implement. One development that might prove to be useful is agro-meteorological model that use remote sensing data from satellites. Various have been initiated both in the region and internationally to provide a tool to "measure" yields earlier. These tools are in the process of being refined and validated for operational use within the REWS and NEWS.

- For more information please see:

1. REWU. 1994. "Crop Surveys Volume 1: Design, data collection, and processing", Technical Handbook written for the SADC Regional Early Warning System.
2. REWU. 1994. "Crop Surveys Volume 2: Interpretation and reporting", Technical Handbook written for the SADC Regional Early Warning System.

2.7.2 Food balance sheets

The general perception of famine and substantial food insecurity has been one of demand being larger than existing food supplies (not enough production to meet consumption requirements). Thus, it is not surprising that the initial attempts to devise an early warning system was based on a fairly strict arithmetic model, in which the objective was simply to establish the adequacy of supply to meet demand.

The *food balance sheet* approach was first employed in 1975 by the Global Information and Early Warning System (GIEWS) of the Food and Agriculture Organization (FAO) to determine the relationship between demand and supply, or the sum of agricultural production, stocks, and imports (the supply side) compared to food utilization (consumption and other food

Figure 2.4: Layout of the elements of a cereal balance sheet

A. Total supply (A.1 + A.2)

A.1 Domestic avalability (A.1.1 + A.1.2)
A.1.1 Opening stocks (a + b)
a Monitored*
b Unmonitored*
A.1.2 Gross harvest*
A.2 Imports (A.2.1 + A.2.2)
A.2.1 Commercial imports*
A.2.2 Emergency assistance (including food aid)*

B. Total untilisation (B.1 + B.2 + B.3)

B.1 Domestic utilsation (B.1.1 + B.1.2 + B.1.3)
B.1.1 Human consumption*
B.1.2 Animal feed*
B.1.3 Other uses and losses*
B.2 Exports*
B.3 Closing stocks (B.3.1 + B.3.2)
B.3.1 Monitored*
B.3.2 Unmonitored*

C. Unbalanced residual

Notes:
* = data required
( ) = calaculations

Source: REWU (1995)

uses). In SADC this tool is widely used by the Regional Early Warning System (in this case the REWU and the NEWUs) (Figure 2.4).

The advantages of the food balance sheet approach include:

It is a practical approach, in that the relationship between supply and demand is transparent, and data that describe it are routinely gathered and reported by a number of national ministries and international agencies.

- The food balance sheet provides a more objective method to assess national food availability on a quantitative, not qualitative, basis.
- More importantly, the outcome of the analysis, the difference between demand and supply, results in an estimate of the amount of food that might be required to mitigate the effects of an emergency.
- It provides an estimate of food aid need that can be done quickly and early in the process, and thus permits action to be planned and undertaken early.
- If sufficient data are available at a disaggregated level (e.g., by district), this tool allows a subnational view of food availability.

Because of its simplicity and because so much emergency assistance involves provision of food aid, the food balance sheet is still a common tool.

In the REWS, food balance sheets are constructed at the national level for the consumption year (annual food balance sheet) and monthly (after the harvest). Although it is technically possible to construct a food balance sheet for any administrative level, there are some practical difficulties (data availability problems) in doing so below the national level. The food crops covered in most food balance sheets are cereals (maize, millet, sorghum, rice and wheat), although increasingly other staple crops such as cassava and sweet potatoes are being included. The REWS has developed over time guidance on developing a food balance sheet, as well as software[3] prepared in 1995 to assist the NEWS in data entry and presentation.

Despite its advantages, the food balance approach has limitations, particularly as a tool for an assessment of food security. First, and foremost, it assumes that the simple supply and demand model reflects reality in terms of how individuals or groups might access food. As described below, this assumption is flawed in that food availability does not necessarily translate into food access for all groups in the population. Second, it relies largely on data that may vary in their availability and reliability for a host of reasons. Third, because it is typically performed at the national level and deals only with food, the food balance can tell us little about the nature of the importance of food production to total household income in a country, and much less about its constituent parts and how these vary and change through time. Finally, aside from the insight of the analyst, there is no explicit attention paid to the differences that might exist between areas and groups and how these differences vary and evolve with time. Still, the food balance sheet remains a useful and often necessary tool in providing an initial sense of the magnitude of a national food deficit or surplus.

As with a single piece of early warning information or data, caution should be used when interpreting a food balance sheet. Some things to keep in mind include:

[3] This software was developed to use Lotus 123, but the REWU is discussing ways to convert to EXCEL.

- ***What are the biases in the data?*** Most of the data that are used in early warning monitoring and analyses are flawed (a large error). As a result
- ***What context is contained in the historical food balance sheet?*** An examination of the historical food balance sheet will provide insights to put the current annual food balance sheet into context. For example, a quick examination of the Botswana historical food balance sheet would show that the country only produces a small percentage of their national consumption requirements. Without this knowledge one might report that they are concerned because Botswana only produced three-fourths of their consumption requirements, which would in actuality be a bumper harvest.
- ***What role does the private sector play in importation?*** Without an understanding of the historical role of the private sector it is difficult to interpret the national food balance sheet. In some countries (e.g., Botswana and Namibia), sometimes large national food deficits are of little concern given the vitality of the private sector. In some circumstances (e.g., Zambia) the nature of the uncovered deficit is only a concern when the capacity (or willingness) of the private sector to import is surpassed.

As discussed earlier, the changing macroeconomic environment and data availability have made the construction of food balance sheets more difficult in the last five years.

➢ For more information please see:

1. Rook, J. 1994. "Food balance sheets Volume 1: General guidelines", Technical Handbook written for the SADC Regional Early Warning System.
2. Rook, J. and N. Freeland. 1994. "Food balance sheets Volume 2: The monthly food balance model", Technical Handbook written for the SADC Regional Early Warning System.
3. Racionzer, P. 1995. "Food balance sheets Volume 3: The annual food balance model", Technical Handbook written for the SADC Regional Early Warning System.

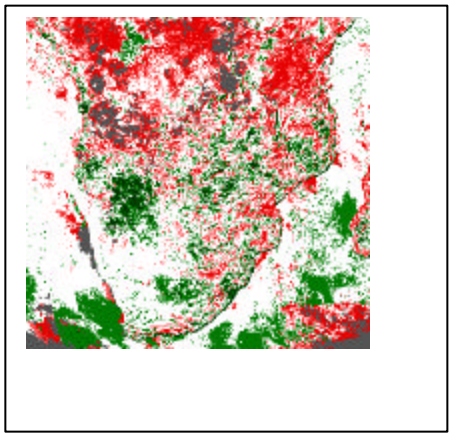
2.7.3 Satellite imagery analysis

Satellite imagery is one of the most important tools available to early warning analysts. This bold statement is based on the fact that it is the only data source that is received with sufficient regularity (every ten days) and covers the entire country. Given resources that are available to NEWS, these images should be thoroughly exploited in their routine monitoring and assessments.

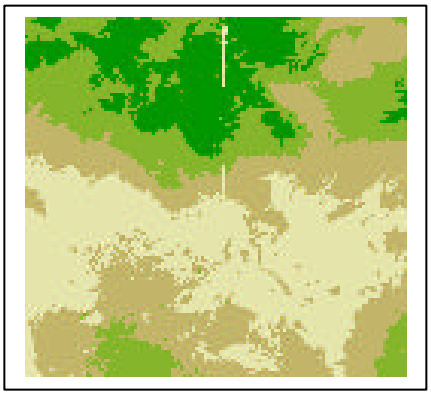
There are three main types of satellite imagery, namely NDVI, CCD, and RFE[4]. This section will briefly describe these different types of imagery. It is important to state clearly that although these imagery could be trained to use these imagery, the analysis and interpretation of

[4] There are other imagery that are being developed and tested by both the SADC RRSU (Agromet and Crop Monitoring Project) and FEWS (Crop Water Satisfaction), but these are still in the validation process. In both cases the imagery that are being developed is moving towards estimating yields to earlier estimate potential crop production.

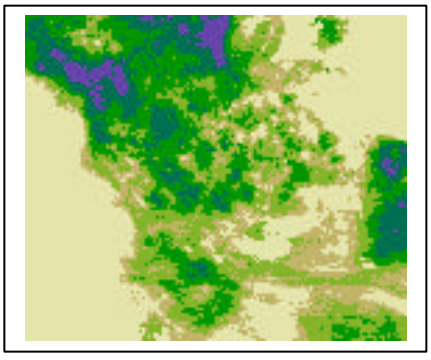
these data should be done in collaboration with the National Meteorological Service (NMS) in your country (especially if an Agro-meteorologist is not attached to your NEWU). The routine dialogue between the NEWU and the NMS is critical to maximize early warning resources.



NDVI—Normalized Difference Vegetation Index—imagery is comprised of data captured from a satellite that provide an indication of changes in vegetation in response to bio-physical conditions (including plant type, weather and soil). These data—captured using a NOAA satellite and processed by NASA—are represented as pixels (cells), with each pixel representing 7.6 km^2. The data are a difference of measurements from two sensors on the satellite, which are then normalized and put into an index. These data are sometimes referred to as greeness maps since they are a representation of the vegetative vigor of plants. These images are provided to your NMS from the SADC Regional Remote Sensing Unit (Harare), who receives them from the Famine Early Warning System Project (FEWS). The main use of these images is to compare the current state of vegetation with previous time periods, for example the same time in an average year or a reference year (a particularly good or bad year).



CCD—Cold Cloud Duration—imagery is comprised of data captured from a satellite that are a proxy for rainfall. These data are represented as pixels (cells), with each pixel representing 5 km^2. These data are actually in units of the number of hours that the temperature at the top of the clouds was colder than a particular threshold (in this case -40 ºC). There is a relationship between this temperature and the amount of rainfall that is actually received on the ground. These imagery do not measure all types of rainfall (they only measure convective rainfall). The NMS using a receiver at their offices captures these images. The main use of these images is to compare the current state of rainfall (using a proxy indicator) with previous time periods, for example the same time in an average year or a reference year (a particularly good or bad year).



RFE—Rainfall Estimate—imagery is an automated (computer-generated) product which uses Meteosat data, GTS rain gauge reports, model analyses of wind, topography and relative humidity and an algorithm which takes into account geography and seasonality. The result is a spatial estimate of rainfall. The reason these imagery are developed because CCD estimates are very poor standing alone but are typically improved by using complex lookup tables that produce different rainfall estimates depending upon the geographic

location and season. The main use of these images is to compare the current state of rainfall with previous time periods, for example the same time in an average or a reference year (a particularly good or bad year).

A couple of comments (caveats) about using remotely sensed imagery are important. First, this imagery—as with any data type—must be interpreted with care. If a NEWU staff member would like to incorporate these data into their routine monitoring they should work closely with your NMS or Agro-meteorologist on the NEWU staff before including the results in your reporting. Second, although this imagery is a useful resource, it has some limitations. Finally, the individual imagery by themselves is of limited value, but is useful when compared against average or previous periods. They are extremely useful to indicate where a problem may be developing or where further investigation is required.

- For more information please see:

1. SADC RRSU. 1997. Vector files in BNA format. RRSU Working Paper No. 3.
2. SADC RRSU. 1998. RRSP CD-ROM (version 1.0). RRSU Working Paper No. 6.
3. FEWS. 1998. Summary of satellite crop assessment tools – NDVI. Mimeo.
4. FEWS. 1998. Summary of satellite crop assessment tools – RFE. Mimeo. (includes CCD)
5. Pfirman, E. 1995. Using NDVI for Famine Early Warning.

2.7.4 Price analyses

As recently as the early 1990s (with the implementation of Economic Structural Adjustment Programmes) in southern Africa, the close monitoring and reporting of prices for early warning was relatively less important. The reason for this is that prices were set by governments (called administered pricing), and therefore did not indicate any change in food security at the national or household levels.

The reason that early warning analysts are concerned with prices can serve as signals of both food availability and food access. In summarizing the interactions between supply and demand prices provide a snapshot of current and expected supply of a commodity. Prices also affect food access of both producers and consumers. The influence on the income of producers is that prices determine the value of the commodities that farm households sell. The impact of prices on consumers is that they determine the amount of a commodity a household can buy. This is especially true for poorer households that have a substantial portion of their expenditures used to purchase food.

Prices are signals sent between two (or more) participants in the food system. The participants in the food system include input producers and suppliers, farmers, marketing agents (rural assemblers, transporters, millers, packagers, wholesalers, and retailers), and consumers. Prices, in the purest sense, indicate value that has been added to a particular commodity. This value added can be changes in the form (e.g., production or milling), place (e.g., transportation), or time (e.g., storage) of a commodity. Price signals can be complex to understand as they carry information about cost of production, transportation, storage,

perceptions, desires, and distortions. For the purpose of early warning monitoring and analysis, prices primarily perform the following functions:

- *Prices express the market value of commodities*. The determination of the price is made through the interaction between producers (the supply side) and consumers (the demand side).

- *Prices inform us of the level of the supply of commodities in a market*. As the amount of a commodity decreases in a market, the price of that commodity tends to increase (if it is allowed to fluctuate without intervention). A large increase in a price can be a signal that indicates that there is a decline in the amount of food for sale in that market.
- *Prices inform us about perceptions of how people involved in trading these commodities perceive future supply and demand*. Although prices do contain information about the volume traded, cost of production, storage, and transport of commodities, expectations by market participants can also influence the level of prices (up if there is a perceived future shortfall and down if there is a perceived surplus).

- *Prices act as either an incentive or disincentive for trade*. Prices, and more specifically relative prices, provide encouragement (or not) for people to enter into the market for trade.

- *Prices act as incentive or disincentive for production*. It is important to monitor prices at planting time to assess whether prevailing prices will act as incentives or disincentives to producers.

Prices are influenced by many factors, including supply and demand for specific commodities, the structure of the food system, government policy, and the macroeconomic environment. The classic relationship between supply and demand for agricultural products is generally observed for most staple commodities. When there is an increase in supply of a commodity (and the amount of that good that is demanded remains the same or decreases), the price tends to decrease. When there is an increase in the amount of the demand for a commodity (and the amount supply remains the same or decreases), the price tends to increase.

Factors that affect the supply of a particular commodity in the food system include production variability due to weather, technology, availability and access to productive resources (land and inputs), stock levels, net imports, food assistance, and government regulations. Factors that affect the demand for a particular commodity include income, tastes and preferences, and population issues (level, growth rate, and rate of urbanization).

Markets are where buyers and sellers come together to trade. Although most markets have a physical location (e.g., Soweto Market in Lusaka), this is not always the case. In some countries, markets even include the *Internet*. In the absence of government set prices (administered prices), markets are where prices are determined. Markets also coordinate transactions between the original producer through to the final consumer. It is the structure and behavior of the different participants in the marketing system that will determine the efficiency of movement of commodities through the system, and the level of distortion that is incorporated in a price.

Markets are organized in a variety of ways, all of which have an impact on the resulting price signal that is generated. The structure of a market or subsector[5] (how it is organized) strongly influences the behavior of participants in the marketing aspects of that subsector, which in turn strongly influences the performance of that subsector. Knowing how the marketing of a particular commodity is structured will help in understanding and interpreting prices. The structure of a subsector includes the number and size of buyers and sellers, the ease (or difficulty) that buyers and sellers can enter the market, the size of the market, the degree of specialization required for the specific subsector, and the degree of coordination between the different levels of the marketing system. A market is competitive when there are numerous buyers and sellers, there are few impediments to market entry, there is a high degree of coordination between different levels of the marketing system, and the degree of product specialization is low. In this situation prices are relatively free of distortions.

When there is active competition in markets and few distortions, it is easier to understand the signal being sent through prices. In this situation the simple forces of supply and demand tend to apply.

The normal price behavior of a commodity within a marketing season follows a fairly predictable pattern. At harvest time prices fall to a seasonal low. There are two reasons for this that mutually support each other. First, at harvest more of the commodity is sold on the market. Even households without surpluses tend to sell during this period to meet their cash needs (e.g., to repay a debt or pay a bill such as school fees). Also, it is at this time of the year that some rural assemblers of commodities are particularly active in more remote areas, providing an easy market outlet. Second, prices are depressed at harvest time since the amount that is demanded decreases. At this time almost all households (even households that do not produce enough to meet their food needs for the entire year) have enough food, and therefore do not demand the same amount in the market as other times of the year.

As time passes after the harvest, the price of a commodity tends to rise. During this period the amount of a commodity offered on the market (supply) tends to decrease; and the amount of a commodity demanded (from deficit producing households) tends to increase. During this period, the price that the commodity is traded reflects the original cost of the commodity, the cost of storage, and some profit margin. This pattern continues until the harvest prospects of the current agricultural season become increasingly known. At one point (the peak price) the harvest prospects are known with sufficient certainty (in this example that it will be a normal year) the price begins to fall in expectation of the coming harvest. Sellers with a surplus will begin selling their stocks, depressing the price. When the harvest begins and more of the commodity is sold in the market, the price begins a rapid decline. This predictability of price patterns makes it easier to monitor prices to assess their impact on food security conditions.

[5] A subsector in this context is all aspects of the production through to consumer of a particular commodity.

- For more information please see:

1. Chopak, C. 1998. Price analysis for early warning monitoring and reporting. SADC Regional Early Warning Unit technical publication.
2. May, C. 1992. Price data in a famine early warning system, FEWS Working Paper No. 2.7.
3. Steffen, P. and S. Addou. "Markets and Marketing Systems", training materials developed for a FSAU training workshop in Hargeisa, Somalia, May 9 – 16, 1998.
4. Goetz, S. and M. Weber. 1986. Fundamentals of price analysis in developing countries' food systems. Michigan State University Working Paper No. 29.

2.7.5 Current vulnerability assessments

The immediate purpose of the current[6] vulnerability assessment (CVA) is to identify regions and groups most likely to experience episodic food shortages and problems of inadequate food access in order to prevent severe malnutrition and starvation. The groups identified should be either experiencing or likely to experience high levels of food consumption related problems largely attributable to the lack of food availability and/or food access. These assessments are descriptive and analytical information is derived from key vulnerability indicators associated with low levels/frequency of food consumption, high proportions of budgets spent on food, and excessive dependence upon one food consumption source (e.g., home production, markets). Indicators are a key means by which to identify food insecurity, but special attention should be paid to food pathways, or the links between agricultural production, markets, and food consumption that specifically contribute to famine vulnerability. Finally these analyses should include an examination of the particular vulnerability of children and women as well as those spending inordinately high shares of total income upon food.

Vulnerability analysis of current food security conditions can help users in several different ways. First, it provides background information against which current monitoring data can be interpreted by the analyst and conveyed to the decision-maker. Without it, it is more difficult to determine if an event (e.g., drought) might precipitate an emergency. Second, the exercise of analyzing food security helps the analyst consider and describe the nature of subnational food economies of the nation, the types of households that constitute them, and how they are linked together. From this understanding, it is possible to understand how disruption among any of the links or pathways that connect the total food economy might affect indicators of food consumption. Third, some of the factors that determine food insecurity can change fairly quickly (e.g., civil unrest), and others do not, or only slowly (e.g., agricultural production potential). Thus, it is necessary to perform the analysis often enough to establish trends and the significance of current departures from norms. Fourth, it also provides a picture of the spatial component or geography of food security and how it might be expected to change under different circumstances.

By providing a picture of food security in the country, the current vulnerability analysis

[6] This section refers to assessing the **current—as opposed to chronic—**food security as these tools are relatively better developed for use in early warning.

provides a starting point from which everyone concerned with a particular place can develop a common understanding of the nature of the food economy, how it changes, what should or should not be attempted to deal with immediate problems, and what might be done over the long term to address underlying causes.

The audience for the CVA results has grown with time. These assessments are typically carried out in conjunction with other institutions that form a Vulnerability Assessment Group, and the analyses and conclusions are jointly developed, to be used in each institution's planning activities. There is also a large, and increasing, audience that includes donors, NGOs, , and multilateral organizations. FEWS and WFP/VAM have been a catalyst in developing the methods and institutionalizing the structures in selected countries in southern Africa. It is important to note that a Vulnerability Assessment Committee was established in the SADC Food, Agriculture and Natural Resources in 1999 to coordinate the development of methods in southern Africa.

Although vulnerability assessments may contribute to a number of different activities, they cannot and should not be "all things to all people." They do not include assessments of food needs, nor are they the blueprint for development activities, but they can be an important source of information and analysis in the support of these activities. Because of its comprehensiveness in terms of the range of information considered and its spatial and historical perspective, the VA should be seen as an essential input into any relief or development effort.

The objective of a CVA is straightforward conceptually, but in practice can prove difficult to implement. Ultimately, the focus of a CVA is on food consumption because of the direct linkages to malnutrition, morbidity, and starvation. Clearly, the analyst is not expected to measure consumption. Instead of direct observation, other aggregate measures are monitored which can describe the likelihood of food shortages, or failures in food access, from which changes in consumption patterns might be inferred, particularly as they might affect different segments of the population. These might include inferences about the proportion of budgets spent on food in the face of a crop failure, rising prices, or declining income.

Food shortages occur for a number of reasons. Obviously, agricultural production is important but below average production as a consequence of drought does not necessarily result in famine. Conversely, groups may be vulnerable in the absence of significant external shocks. For example, as suggested above, households may spend a disproportionate amount of their income on food, and/or they may be totally dependent on a single source of income. In these situations, fluctuations in exchange rates, slight or modest inflation, or a labor strike could translate into a sizable population becoming more vulnerable.

Often, the situation is more complex and the analyst must consider a large number of factors to gain an accurate picture of vulnerability. The mechanisms by which different groups gain access to food (i.e., their own production; purchase; and other forms of exchange) vary in type and scale, and may fail for a whole host of reasons. The focus here is to attempt to understand the impacts these events have on household food consumption patterns so that we might determine whether response is warranted and, if so, what types of interventions might be appropriate. However, the context in which these events are translated to the household level are as important as the events themselves because it may help to guide the type of

response that is pursued.

To choose one example, market systems and even the infrastructure through which goods and services move may be configured in such a way as to place regions or groups at severe disadvantage. In many countries, seed and agricultural inputs are marketed through a single government-controlled parastatal board or company. Because of inefficiencies or intentional manipulation, inputs might not be available to farmers at the proper time during the season. Households dependent on these sources of input supply are in a highly vulnerable situation due to a flawed market rather than a stressed production system. More typically, there will be other factors at play that will complicate this simple picture of vulnerability. For example, if the transportation network of a region is poorly developed, then some geographic areas and groups will be more vulnerable simply because of the distance from roads that restricts access to markets, reduces opportunities of employment, and constrains efforts to provide direct relief.

Early warning and vulnerability analysis can also be used to design mitigation activities, but it is necessary to understand and assess the nature and determinants of food insecurity in their broadest context so that, ultimately, appropriate actions can be designed. In the case described above, a decision to open the market to multiple providers of seed and other inputs would reduce vulnerability by improving efficiency, and increasing production and thus income. In the short term, the most suitable response to a production shortfall may not be to provide food aid where most needed, because of the negative effect it would have on producers. Instead, other interventions such as food-for-work or cash-for-work as part of erosion control, reforestation, or a road-building program could meet immediate food needs and improve market efficiency far more effectively. They would also do less harm to local and regional mechanisms for exchange, while reducing geographic vulnerability through infrastructure improvement. Simply put, one of the underlying objectives of a current vulnerability analysis is to identify the causes of food insecurity so that measures might be pursued to assist the maximum number of needy households, enhance market efficiency, inflict the least damage on existing mechanisms of exchange, minimize social and economic polarization, and strengthen local institutions. In addition to identifying regions and groups at risk, the analyst needs to determine—to the degree possible—what the primary causes of that vulnerability are so that appropriate responses can be designed when and where they are needed.

- For more information please see:

1. FEWS. Draft. FEWS Current Vulnerability Assessment Guidance Manual, June 1999.
2. Riely, F. 1993. Vulnerability analysis in the FEWS Project. A paper written when the author was a FEWS staff member.
3. Downing, T. 1992. “Summary of discussions on vulnerability assessment”, Famine Early Warning Systems Workshop, Reading, England, March 29 – April 10, 1992.

2.7.6 Rapid rural appraisal

Apart from remotely sensed satellite imagery and irregularly provided data and information, early warning units primarily rely on secondary information to monitor the performance of

agricultural and pastoral production systems as well as the related socio-economic trends. Even when extension reports are available in a timely manner the coverage (both spatially and content) is usually not sufficient for early warning monitoring. In addition, satellite imagery is potentially misleading in some circumstances and needs to be ground-truthed (verified).

To complement the available secondary information, qualitative information must often be collected through a variety of rapid appraisal techniques. The need for both baseline and current data on household livelihoods and the relative importance of each for major groups and locations is important to complement other data and information to understand the food security situation. Where funds and trained personnel have not been available for normal sample surveys, rapid appraisal techniques are usually the only means available to satisfy this need.

Rapid appraisal techniques have been accepted as important data collection tools throughout the development community. Rapid rural appraisal (RRA) and participatory rural appraisal (PRA) were designed to address certain types of information needs within binding time and resource constraints. As such, they represent a source of significant potential for data collection and analysis for early warning monitoring. Since the NEWS staff has only limited time for field visits there is a need to develop a RRA tool kit to the specific needs and conditions of NEWS.

Rapid appraisal is an approach to data collection and analysis based on informal, semi-structured interviews and systematic, purposive observation. While the methodology is informal and constrained in terms of time, it is nonetheless rigorous in its design. Rapid rural appraisal (RRA) is one such rapid appraisal tool. It is essentially a problem-solving technique in the sense that the logical and operational starting point of the process is a problem (in scientific terms, the hypothesis), and this problem totally determines the design of the methodology. In early warning, the problem could be a report of hunger among herders in a given region or a general lack of knowledge about population livelihoods in some other region.

Because the RRA is subject to time and resources constraints, its capability to provide solutions is also limited by the nature of the problem. For example, it is generally not possible to identify relative frequencies of different types of livelihood systems (e.g., the percentage of herders) or households (e.g., the percentage of polygamous compounds) in a given region. It cannot usually provide accurate measures of household income by income source or differences in production levels between household types. RRA techniques can, however, be used to understand many kinds of early warning issues, such as descriptions of livelihood systems (i.e., food economy characteristics), variations in livelihood and household types, reasons underlying household vulnerability, coping strategies under varying conditions, market and trader analysis, willingness to accept specific development interventions, local community priorities, and other development-related questions.

The basic data collection tools of RRA are the semi-structured interview and purposive observation. Thus, the effectiveness of the approach is directly related to the communicative skills of the field interviewer. Semi-structured interviews do not usually involve the use of formal questionnaires and are designed to be more “comfortable” in the sense that the fieldworker attempts to elicit a nature flow of conversation around a given topic. As a rough measure of success of an RRA interview, the outside observer can simply compare the

relative lengths of time spent talking between the interviewer and the interviewee. In the successful encounter, the interviewer provides the topic and the interview flow, but does not lead or dominate the conversation (while perhaps obvious to the experienced audience, nonetheless this is still the most violated principle of informal interviewing).

Several kinds of interviews are available for fieldwork that is differentiated by the objective of the RRA activity itself. Although RRA includes some interview types that maybe used by the NEWS (focus groups, village interviews or household interviews), given the resource availability (time and money) key informant interviews are by far the most common. In the case of key informant surveys, information is acquired by talking with those individuals that have specific expertise or insights. Key informants often include farmers, extension agents, traders, and school teachers. The fieldworker selects a key informant in order to collect this specialized knowledge, recognizing that the key informant has only limited representativeness outside of his/her area of expertise.

All interviewing requires honesty, respect, and consideration for the time constraints of the interviewees. Timing of interviews should take into account the demands of the local population (e.g., seeding or weeding), the time of day, the place, and other factors that might inconvenience the interviewee. Interviews rapidly lose their effectiveness after more than two hours.

It is common practice to prepare a topic outline prior to any interview. The topic outlines serves as a guide to the conversation flow and should resemble how a logical flow might proceed. Of course, topic outlines are representations of the problem that has oriented the design of the RRA in the first place. Usually, the topic outline is memorized by the fieldworker and is used to help organize the information gathered from the interview. During the conversation itself, the interviewer takes informal notes to help record the information.

- For more information please see:

1. Finan, T. and M. Baro. 1998. “Rapid appraisal approaches for vulnerability assessment: Applications to the FEWS methodology”. Mimeo.
2. Anyaegbunam, C et al. 1998. Participatory rural communication appraisal: starting with people”, SADC Centre of Communication for Development technical publication.

2.7.8 Thematic mapping

Thematic mapping is included in this chapter since it is a useful presentational and analysis tool for both monitoring and reporting. Presenting data on a map is useful in understanding the spatial dimensions of an issue (e.g., the harvest outcome or drought conditions).

A thematic map is exactly what its name implies. It is the presentation of a particular subject or issue (theme) represented (spatially) on a map. Thematic maps are only one way to present data and information, but they are usually the best way to show spatial variation of a situation or condition. If there is no spatial aspect to the situation or condition then a thematic map is not necessarily the best format to use.

Geographic information systems (GIS) and thematic maps are very similar concepts and use the same building blocks to construct their products. To understand the similarities and differences a simple definition of each is offered:

- A ***geographical information system (GIS)*** can be defined as a database that captures the spatial relationship between data for both display and analysis. This spatial analysis can range from quite simple to very complex, and requires data that are as precise as possible. The functions of a GIS that are not included in thematic mapping software are map digitizing, database management, and a facility for spatial analysis.

- A ***thematic map*** is a map presentation that displays a simple subject (theme) to spatially illustrate a specific situation or condition. The situation or condition is represented geographically. Actually, a thematic map is a simple GIS that allows only the presentation aspects of a GIS software. In early warning, thematic mapping is used to show those situations or conditions that represent an improvement or deterioration in the food security status of households or populations.

Although thematic mapping software is a GIS software, it has a limited functionality. Since GIS software have more functionality (features), they are often more complex and more expensive to learn and use. These software packages (e.g., Microstation Intergraph and ArcInfo) are valuable if there is a need for spatial analysis beyond visual inspection. Conversely, a software package that is intended only for thematic mapping (no or limited database and analytical functions) tends to be easier to learn (and use) and much less expensive. It is with this orientation that National Early Warning Units in southern Africa have been instructed in using simpler software (MapViewer) to make thematic maps.

➢ For more information please see:

1. SADC RRSP Training Paper No 5, "RRSP GIS Workshop" (June 1997)
2. SADC RRSU Working Paper No 6, "RRSP CD-ROM (version 1.0)" (March 1998)
3. SADC RRSU Training Paper No 3, "Vector files in BNA format" (June 1997)
4. Chopak, C. 1998. Thematic mapping: A practical guide for early warning monitoring and reporting, Volume 1: Concepts and Essential Map Presentation. SADC Regional Early Warning Unit technical publication.

CHAPTER 3

DATA COLLECTION AND MANAGEMENT

3.1 Introduction

It is necessary that a data and file management system be created before undertaking a monitoring and analysis activity. The reason for this preparation is to facilitate the analysis and storage of data.

The relationship between data collection and writing an early warning report is important to understand (an example from Zambia is presented in Figure 3.1). Although the process begins with data collection, it is critical that the final goal (reporting) and how that will be achieved (tools and analysis) be kept firmly in mind. The exercise of data collection and management is the means to achieve goal of timely and well-rounded early warning reporting.

Another aspect that has to be kept in mind is the role of human judgement. The data used by early warning professions is often rough, incomplete, and statistically less accurate than would be desired. As a result, it is usually human judgement or expert opinion that is critical when determining if there is a problem, and if there is, the type of intervention that is required. Early warning is part science, but is mostly art!

3.2 Data management and verification

Data management

Although the need for safe, easy retrieval of data and information is not exclusive to any particular data type, the suggestions below are important for effective early warning monitoring and reporting. It is especially relevant to have functional data management concepts in mind when doing any monitoring and assessment activities. Although specific suggestions are provided below, the important concept is that the data management system be logical, easy to remember, and consistent. Although there are often many logical and useful ways to manage data, spending some time thinking through a functional management system can save a lot of time later. For example, in southern Africa the SADC Regional Remote Sensing Unit has developed a series of manuals to address the issues that are contained in this section.

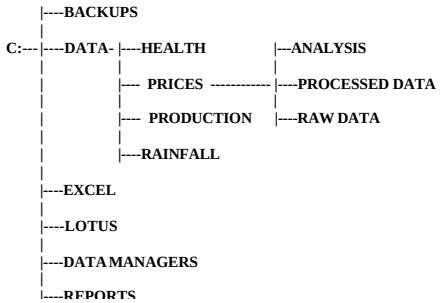
The first task is to establish ***a logical structure of subdirectories*** for data and outputs. The names of subdirectories should refer directly to the contents of the subdirectory, especially given the increased flexibility given the Windows 95 and 98 operating systems. It is important that data, analysis, reports, and computer programs not be mixed together within the same subdirectory. This will make it easier to name subdirectories, and much easier to retrieve data or document files. Never save data or documents in the same subdirectory as computer programs. The reason is that it is easy to delete what one may think is a data or document, only to find out it was a key file needed by the program. Be ready to re-install programs if you do this!

Diagram of early warning data collection to reporting in Zambia

DATA COLLECTION			TOOLS AND ANALYSIS				PRINCIPLE PRODUCTS
Sources Of Data		**Principle Data Streams**					
MAFF	----->	**1. Agricultural data** (area planted, yield, crop conditions, etc.)	o Satellite imagery and rainfall analysis (Windisp3, Rainman2)				
MET		**2. Rainfall data** (rainguage data, temperature humidity, etc.)	o Price analysis (Priceman**2**)				
MAFF FHANIS CSO	----->	**3. Socio-economic data** (market prices, household level surveys, etc.)	o Agronomic analysis (Agman**2**)				o Bulletins (monthly) o Briefings
MFEP	----->	**4. Population/Demographic data** (Census, migration, economic activities, etc.)	o Spreadsheets (Excel**1**, Lotus**1**)	+	**Human Judgement (Analyst)**	=	o Special products o Assessments
MOH	----->	**5. Health/Nutrition data** (Morbidity, mortality, weight for height, etc.)	o Statistical analysis (SPSSPC**1**)				o Data sharing
RRSP FEWS	----->	**6. Remote Sensing data** (NDVI, CCD, etc.)	o Thematic mapping/GIS (Atlas GIS**1**, MapViewer**1**)				o Participation in food security studies
RRSP MAFF FEWS	----->	**7. Map data** (Administrative boundaries, roads/towns, hydrology, land use, etc.)	o Word processing (Word**1**)				
NEWU MEDIA	----->	**8. Anecdotal information** (Trip reports, interviews, news reports, etc.)	**Source of software:** **1** Commercial **2** Developed by FEWS **3** Developed with funding from FEWS, SADC/RRSP, USGS, and US Forest Service				

Again, there are many structures that can be developed, but one easy and useful method is presented below in (see Figure 3.2).

Figure 3.2: Proposed subdirectory structure



The second task is to establish a simple, flexible, and useful set of ***file name conventions*** that facilitate the location and identification of what each file contains. As was the case with the structure of subdirectories, there are many acceptable ways to name files that make it easy to find and understand what is in each computer file. Although in the past a file name could only have eight letters or numbers permitted before the full stop and three after the full stop, we now can have longer file names with Windows 95 or 98. Still, using an example when we were

limited to eight letters is useful since it required strict discipline in naming files. One simple way to name files, using an example for price data, is to divide the file name (before the full stop) into four two letter segments. The first two letters could refer to the data type (e.g., WP for wholesale prices or RP for retail prices), the next two letters for the year (e.g., 97), the next two letters for the month (e.g., 06 for June), and the final two letters for the commodity (e.g., MZ for maize). The three letters or number permitted after the full stop usually relate to the computer program that the data are saved and stored in (e.g., XLS for an EXCEL file, DBF for a Dbase file, WK4 for a LOTUS 4 file, and so on). An example of an EXCEL file of retail maize prices for March 1997 would be written as RP9703MZ.XLS. Again, there are many ways to name files that are acceptable, the key is to be consistent and logical so that you can remember and retrieve files as easily and quickly as possible. Also, it would be useful to have a filename diary to keep a record of filenames and their descriptions for easy reference.

The next step of data management is to develop and maintain careful and comprehensive ***documentation of the data and files***. The purpose of documenting files is for easy reference and to understand how the data were collected to permit as accurate as possible interpretation of the data. This is a task that has to be done continually. The documentation needs to include who collected the data, at what level in the marketing chain the data were collected. All of these pieces of information are critical to understand during the analysis and interpretation activities of price and market monitoring.

The final data management activity that should be understood is need to establish a regular schedule to ***backup the data and information***. Although this activity may sound obvious, there are a lot of people who have lost irreplaceable files because they did not regularly back up their data. The optimal frequency is a function of how often you enter data (e.g., daily or weekly) and the amount of data that is entered each period.

A useful piece of advice is to never store (save) your data or analysis in the same location as the computer software that you are using. It is easy to accidentally delete a key file to run the software when deleting or moving data or analysis files. Also, it is often very difficult to locate data and analysis files when they are mixed in with the system files.

Data verification

The purpose of data verification is to ensure that the data are of as high a quality as possible. Although at this stage of the process the quality of data collected can not be improved, what can be done is to ensure that the data are properly checked for errors. Coding errors and some data entry errors are always possible and it is necessary to detect these to have the best possible data for monitoring and analysis.

Although this topic will be presented in more detail in Chapter 4 of this manual, procedures to verify data need to be identified early in the monitoring and analysis process. Some specific issues that will be considered are:

- need for quality control of data (error checking) during data entry and random checking of data entry
- need to visually inspect the data for obvious errors

- identification and verification of outliers using range checks
- need to check data cleaning and validation with field verification (including trips to field to substantiate, refute, or better understand findings)
- need to check data with other data and information types (agricultural production, satellite imagery, field reports) to see if there is a convergence of evidence

3.3 Key data sets

3.3.1 Agricultural data

National Early Warnings Systems are very familiar with agricultural data. Not only are they usually located in the Ministry of Agriculture but they tend to be primarily agricultural economists, agricultural statisticians and agroclimatologists. The NEWS also tend to have the responsibility to both monitor and estimate crop production.

3.3.1.1 Crop monitoring

In most countries in southern Africa the extension service provides regular updates of agricultural growing conditions and crop development (e.g., in Zimbabwe this is done every 14 days by AGRITEX). This reporting summarizes the general conditions as reported by extension agents in different parts of the country. This qualitative information is critical to compare with other data and information sources—such as satellite imagery and field observations—when doing early warning monitoring and reporting.

3.3.1.2 Crop production

As stated earlier, many NEWS in southern Africa are directly responsible for developing or assisting the process of generating estimates of area planted, production, and yields of the main crops produced in the country (cereals and some cash crops). In the region these data are mainly collected using subjective measurement methods, although some countries do use objective measurement methods.

Although this is a critical data set given it's contribution to household food security, most countries only have statistics that are statistically accurate at the national and provincial levels. There has been recent interest in re-visiting the methods used in estimating crop production and productivity to improve the accuracy and scale of these data.

3.3.1.3 Livestock and pasture conditions

The coverage and importance placed on livestock and pasture conditions varies considerably across southern Africa. In some countries livestock plays an extremely large role in the food security of rural households, for example Botswana and Nambia. In other countries the role of livestock is either concentrated geographically (e.g., southern Mozambique) or plays a lesser role to household livelihood strategies (e.g., most households only have a few small ruminants).

Understanding the spatial nature of the role of livestock is extremely important for early warning monitoring. This allows any reports of diseases or problems with pasture conditions to be put into context. Data about livestock numbers (by animal type) are usually available from the Ministry of Agriculture, although there is often a lag between when these data are collected and when they are available for use in monitoring and assessments. Often a report of a disease outbreak is known well before these data are available to document whether there is a problem or not, and if there is, the magnitude of the problem.

Regular reports of pasture conditions are rare (with the exception of Namibia and Botswana). Still, satellite imagery can be used to monitor if pasture conditions are deteriorating or improving. This has been very effective by early warning professionals in the Sahel. Using satellite imagery for this purpose requires a good understanding of where livestock is important within a country.

3.3.2 Agro-meteorological data

3.3.2.1 Remote sensing data

As mentioned earlier, there are three different data sets that are captured every dekad (ten days), namely Normalized Difference Vegetation Index images (NDVI), Cold Cloud Duration (CCD) Meteosat images, and Rainfall Estimation images (RFE). The Regional Remote Sensing Unit (RRSU) provides these data to the NMSs in the SADC region via email. The RRSU has expertise in analysis, interpretation and presentation of these data. These data are useful to monitor general vegetation and rainfall conditions throughout each country every day during the rainfall season. As stated earlier, these data are only proxies of the condition they are trying to measure and therefore should be interpreted with caution.

3.3.2.1.1 Normalized Difference Vegetation Index (NDVI)

Historically, the most important satellite crop assessment tool used by early warning specialists has been the Normalized Difference Vegetation Index (NDVI). NDVI is a measure of the state of vegetation in an area as seen by a satellite - called “greenness”. These images are received every dekad (ten days).

While NDVI is a measure of the state of general vegetation in an area, it can be used to measure the state of specific crops if they are relatively homogeneous or correlate well with surrounding vegetation and if planted areas are well known. NDVI has the following advantages as a crop assessment tool:

- It easily distinguishes vegetation from other features.
- It shows vegetative biomass and/or density that frequently correlates well with crop production.
- It can be compared to long term averages or historical images from the same or past seasons for a comparison to normal.
- It can be used to summarize the season: date of greenup, length of season, maximum greenness, and total NDVI biomass.

There are, however, some problems or caveats associated with using NDVI:

- Many non crop-related problems cause a decrease in NDVI: clouds, haze, indirect satellite viewing angles, etc., which is usually cause a reduction in the NDVI values, leading to an inherent bias toward pessimism in the data.
- Prolonged cloudy periods block the satellite's view of the crops.
- NDVI values are lowered by haze. Clouds may be an indication that an area is hazy, but there is not always a sure way to tell if the data are contaminated (the values are reduced).
- NDVI decreases as harvest nears, but this is not necessarily an indication of crop deterioration.
- NDVI does not work in areas with highly reflective soils, most frequently sand. These areas may appear falsely to be water.
- NDVI is frequently contaminated by glare from water. Near lakes and oceans, use NDVI with caution. Islands are especially tricky.
- The satellite images are not exactly matched from dekad to dekad (called "poor registration") causing high variability along lakes and coastlines.
- NDVI can be used to monitor green pastures, but once dry, you cannot tell whether a pasture has been grazed out or is still useful.

It should be obvious that this indicator, while very useful for monitoring and assessment activities, should not be used without on-site verification or cross-checked with other data and information.

3.3.2.1.2 Meteosat (CCD and RFE)

Cold Cloud Duration (CCD) temperatures are measured by sensors tuned to the thermal infrared band (TIR), which measure surface temperature, in this case the top surface of the clouds. In a convective weather system fueled by heat and sunshine, such as a summer thunderstorm, clouds become increasingly dense and build to very high elevations in the atmosphere. Because these clouds are so high, they are also very cold. Clouds with top surface temperature below a certain level (275 degrees Kelvin) typically produce rain. In convective weather systems, clouds that do not build to these heights are warmer and do not produce rain. Cold top clouds are "timed" as they pass an area, and the amount of rainfall produced is proportional to the amount of time the cloud stays over an area. This is known as Cold Cloud Duration (CCD). CCD estimates are poor at an absolute level, but having a time series allows a relative comparison of these images.

However, there are many problems or caveats associated with interpreting CCD images.

- Some clouds are high and cold but do not result in rain - cirrus clouds are an example. It is very difficult to "train" a computer to interpret the impact of these clouds, even though it can easily be done visually. This leads to estimation of rainfall in areas where none occurred. This is especially a problem after the cropping season in drier areas.

- Convective clouds lose energy after a time and, while they are still high and cold, do not produce much, if any, rain. "Cloud History" models were designed to help solve this problem as it is easy to detect these changes in the clouds visually, but again it is not easy to program a computer to make these distinctions. This leads to estimates of rainfall, which are too high and cover too large an area. The problem is minimized if ground station data is available to "correct" the estimate.
- Much rain falls from non-convective systems (spring rains, for example). These clouds do not build to great heights and hence do not achieve the necessary cold temperatures to become part of the CCD system. Again, these clouds can be easily detected visually, but it is hard to train a computer to see them. This problem leads to underestimation of rainfall. It is particularly a problem in the humid tropics and coastal areas.
- As with all satellite estimates, any storm which occurs over too short a period of time, or too limited an area will not be detected. This is a minor problem, but it is an inherent underestimation problem for satellites.

To address some of these problems NOAA is providing FEWS with satellite-derived estimates of rainfall called RFE (RainFall Estimate). This is an automated (computer-generated) product that uses Meteosat data, GTS rain gauge reports, model analyses of wind, topography and relative humidity and an algorithm that takes into account geography and seasonality.

Still, some problems remain with the RFE images:

- Cirrus clouds (long, thin, high, totally rainless clouds), because they are high and cold show up as "rain" even though they are dry. Be suspicious of any long, skinny band of rainfall especially in desert areas or during the dry season.
- Because the satellite does not look at everyplace at once but scans across large areas, and because it can only see pixels, not exact points, very tiny, isolated rainfall events may be missed.
- Large amounts of rainfall can not be included in the imagery. Small amounts of rain are distributed numerically across the 254 value categories, but amounts 255 mm or over are all grouped into the highest value category.
- The image is a ten-day summary. Just because two contiguous images show an area has had good rain does not ensure the crops are not dead due to drought: it might have rained on day 1 of the first dekad and day 10 of the second dekad meaning the crop experienced 18 dry (hot, sunny, windy) days in between!
- There is only a short historical data series for RFE, so it is difficult to make multi-year comparisons.
- Because it is available only every ten days, on day 9 the most recent information is quite old.

Still, even with all of the caveats cited above, these data are extremely valuable since they are available more frequently over the entire southern Africa than any other comparable data set.

3.3.2.2 Rainfall data

The collection, analysis, and reporting of rainfall data have also been an integral part of early warning in southern Africa. These data—collected by the NMSs—are usually presented in dekadal or monthly reporting for many years. Rainfall data are useful as an early indication of how the season is progressing and the potential quality of the harvest.

3.3.4 Price data and marketing information

In most southern African countries there is a Market Information System (MIS)—usually located in the Ministry of Agriculture—to collect, manage, and disseminate market information. The primary role of an MIS is to increase market transparency by making market information available to all market participants. As such, it is the primary source of price data for early warning. These MISs usually collect prices on the main agricultural commodities produced in a country for consumption or sale, and vary across the region. In some cases there is a component, or separate activity for livestock products and animals.

Early warning analysts are concerned with all aspects of food security, including food availability and food access. Prices serve as signals of both food availability and food access. In summarizing the interactions between supply and demand prices provide a snapshot of current and expected supply of a commodity. Prices also affect food access of both producers and consumers. The influence on the income of producers is that prices determine the value of the commodities that farm households sell. The impact of prices on consumers is that they determine the amount of a commodity a household can buy. This is especially true for poorer households that have a substantial portion of their income is used to purchase food.

3.3.5 Macroeconomic data

The main statistics office in a country is responsible for the collection and publication of macroeconomic data, including inflation, exchange, and interest rates. Although these data have not been exploited for early warning monitoring and reporting in the region, they have a large impact on the purchasing power of consumers, especially those living in urban areas. Based on changes in these data, in conjunction with other data types, inferences about changes in the food security status of households can be made.

3.3.6 Trade data

In most countries it is the Ministry of Commerce that monitors trade data, especially imports and exports of agricultural commodities. These data are used mainly in assessing food availability (they are an important input into food balance sheets). In addition, historical trade data provide a good indication of the private sector's capacity to import. This is important in years where larger than normal quantities of agricultural products required to be imported to meet national consumption requirements.

3.3.7 Map data

Map data are one of the key data sets in early warning analysis. It is combined with other data sets to form the basis of any spatial analysis or presentation.
Sources of map data depend on the type of data desired and whether one is looking at the regional, national or subnational level. In southern Africa map data are already available on a regional, national and subnational levels from the following sources:

- *Regional level*: SADC RRSU has a complete digital map database of the SADC member states that includes administrative boundaries (e.g., provinces and districts), transportation (e.g., road and rail), hydrology (e.g., rivers and lakes), and topography. Also crop zones and other land covers (e.g., parks, wetlands, …) are available for all countries except the democratic Republic of Congo and the Seychelles. The SADC Regional Remote Sensing Unit has coordinated the collection, verification and archiving of these digital maps. These digital maps can be obtained by contacting the Coordinator of the SADC Regional Remote Sensing Unit (RRSU) at the Food, Agricultural and Natural Resources (FANR) office in Harare. The RRSU has produced a CD with all of the available map data for southern Africa.

- *National level*: All of the digital maps available for a particular country at the SADC FANR should be available in that country since the RRSU has made them available to the NEWS. Suggested sources are the Department of Meteorology, the Surveyors General, and GIS units. Often there are additional maps available that could be of use in early warning in some countries. Also, there are often hardcopy maps that are available, but it is quite costly to digitize them. The RRSU-produced CD with all of the available map data for southern Africa has been delivered to all of the NEWS.

It should be emphasized that data that already exist should be exploited before deciding whether to digitize data.

3.3.8 Other data types

There are other data sets that are critical in early warning, including:

- ***Health/nutrition***: These data are used as primary outcome indicators when either monitoring or doing broader assessments, or to provide a context for monitoring.
- ***Income/expenditure data***: These data are important as context when doing both monitoring and assessments.
- ***Demographic data***: Population and other demographic data are important in calculations (e.g., converting from total to per capita terms) when doing monitoring and assessments.
- ***Consumption***: Consumption data are important for certain analyses (e.g., food balance sheets).

3.4 Important computer software

The range of software used in early warning is quite wide. Some of the characteristics of the software that is used include:

- Ease of use;
- Who developed it (commercial or early warning organization);
- Documentation;
- Range of functions; and
- Cost

This section presents the range of software that is currently used by the NEWS, or that is available in the region for future use by the NEWS. The types of software discussed in this section are word processing, spreadsheets, statistical, annual food balance model, thematic mapping, remote sensing, and data managers.

3.4.1 Word processing

Word processing is the type of software that is used more than any other software. Software programs such as Microsoft Word and WordPerfect are widely available in the NEWS and offer all of the features and functions necessary for early warning reporting. These types of programs are well-documented and reasonably easy to use.

3.4.2 Spreadsheet

Spreadsheet software programs such as *LOTUS* and *EXCEL* offer the widest range of features and functions necessary for most data collection and analysis activities. These types of programs are well-documented and reasonably easy to use. The analytical aspects of these programs can be cumbersome if repetitive tasks are required. Macros can be developed and used to facilitate this activity, but can be complicated for the novice user and may need updating each time the software is upgraded (installation of a new version). For the experienced spreadsheet user, this is an attractive option since it can be used for data entry or importation, processing, analysis, and presentation. Most of the NEWS staff are familiar with spreadsheet software as the SADC REWS has emphasized their importance since the creation of the NEWS.

3.4.3 Statistical

Software programs such as SPSS or SAS offer most of the features and functions necessary for statistical analysis required by early warning units. These programs have adequate documentation, but tend to be relatively difficult compared to spreadsheets for novice users. Unless there is a particular person in the office with experience with a statistical program, and it is within the budget of the early warning unit, this is not the best option. If there is an advanced user in the office, this is a useful way to do not only the monitoring activities but also some advanced statistical analytical procedures without having to move the data into another software

program. However, given staff turnover in many early warning units, there may be a problem in continuity if the advanced user leaves the unit.

3.4.4 Annual Food Balance Model

In the early 1990s the FAO GIEWS Annual Food Balance Model was adapted for use by the SADC Regional Early Warning System for use at the regional and national levels. The model uses Lotus 123 and has very modest computer hardware requirements (given today's computers). The model is essential a series of macros with a menu that assists the user to selection different options. NEWS staff in SADC member states has received numerous training sessions on this software. The software—as well as Lotus 123—is available in all countries. The REWU has been exploring the possibility to convert this model to be used with Microsoft EXCEL.

3.4.5 Thematic mapping

A ***thematic map*** is a map presentation that displays a simple subject (theme) to spatially illustrate a specific situation or condition. The situation or condition is represented geographically. Actually, a thematic map is a simple GIS that allows only the presentation aspects of a GIS software. In early warning, thematic mapping is used to show those situations or conditions that represent an improvement or deterioration in the food security status of households or populations.

Although thematic mapping software is a GIS software, it has a limited functionality. Since GIS software have more functionality (features), they are often more complex and more expensive to learn and use. More sophisticated GIS software packages (e.g., Microstation Intergraph and ArcInfo) are valuable if there is a need for spatial analysis beyond visual inspection. Conversely, a software package that is intended only for thematic mapping (no or limited database and analytical functions) tends to be easier to learn (and use) and much less expensive. It is with this orientation that National Early Warning Units in southern Africa have been instructed in using simpler software (MapViewer) to make thematic maps.
Numerous members from all NEWUs and NMSs in SADC countries have already been trained in using MapViewer.

3.4.6 WinDisp

WinDisp is a map and image display and analysis system that has been developed with funds from FAO (GIEWS), FEWS (funding from USAID), SADC, US Forestry Service, and US Geological Service (USGS). WinDisp was originally developed for the FAO Global Information and Early Warning System with funding from the European Union. From a technical standpoint WinDisp is essentially the windows version of a DOS-based software called IDA (Image, Display and Analysis software) that was originally developed by the FEWS Project. Staff from all NMSs has been trained in using WinDisp. WinDisp is free to any user and can be requested from either the NMS or RRSU. The RRSU has developed some training materials for those wanting to learn how to use this software.

3.4.7 IDRISI

IDRISI is grid-based geographic information and image processing system developed by Clark University (Graduate School of Geography). The core modules of IDRISI provide the basic facilities for the manipulation of raster images. The documentation is relatively easy to understand (compared to similar programs), and the SADC Regional Remote Sensing Unit (RRSU) has trained all the Agroclimatologists in all NMS's in SADC countries. The RRSU has developed some training materials (with exercises and solutions) for those wanting to learn how to use this software. The documentation that comes with the programme provides a useful explanation of the software and how to use it.

These are three categories of core modules of IDRISI:

1. ***Core modules***: This module provides the ability for the entry, storage, management and display of raster images.
2. ***Analytical modules***: This module provides the major tools for raster data image analysis, including database query, map algebra, distance operators and context operators.
3. ***Peripheral modules***: This module provides the ability for data conversation between IDRISI and other programs (using different data storage formats).

3.4.8 FEWS Data managers

Early warning requires the ability to use a variety of computer software. While much of the software used by early warning analysts has been produced by commercial firms (e.g., word processors, spreadsheets, Geographic Information Systems (GIS), and statistical packages), there are many activities that can be "automated" to quicken the completion of routine tasks. These packages often require either the establishment of these activities for users that are more advanced, or can be handled through software especially designed for this purpose.

All of the data managers discussed in this section were developed by FEWS to facilitate routine data management and analysis tasks for project staff. The objective was to simplify and expedite routine tasks so that more effort could be concentrated on interpreting and report writing. In some cases an early warning analyst may already have established a system to facilitate these repetitive tasks. In this case, it is a judgement whether a new tool is better or more efficient that the existing one.

The FEWS Project developed all four of the data managers discussed in this section—Priceman, Agman, Rainman, and Spaceman. They are all available through the FEWS Project with no cost. Included within each program is a complete documentation of the features of the software. All of the data managers require Microsoft Excel, as this is where the data and graphics are displayed.

The main features of all FEWS-developed data managers are:

1. File management features:

- *General*: These data managers have the basic features that are available with almost all windows programs, including the ability to create a new file, open an existing file, close a file, and set preferences.
- *Import/export*: This feature allows the importing and exporting using simple text formats (e.g., TXT and CVS).
- *Merge*: This feature allows two data sets to be combined into one larger data set.

2. Data management features:

- *Data entry and editing*: This feature allows the easy data entry and editing of different aspects of the data.
- *Packing database*: This feature—similar to that provided in dBase—allows for the refreshing of the data set (an essential database management activity).
- *Data browser*: This feature allows the examination of the data set while still in the data manager.
- *Data coverage*: This feature allows a summary presentation of the number of months of data for each data type.

3. Utility features:

- *Viewing toolbars*: There is an option within these data managers to turn on or off the status bar, hints (words that appear when mouse is touching an icon), or button text (expanded information buttons).
- *Wizards*: For many of the features described above, there are wizards (step by step guided instructions) available to facilitate using the feature. These are clear and easy to use.

3.4.8.1 Priceman

Priceman—the **PRICE** data **MAN**ager—is a price data management and analysis software that has been developed by FEWS. It is a very easy software program to use and is designed for use for routine analysis of price data for early warning monitoring. Although the features are only summarized in this section, most of the features are clearly documented in both the help menus and program manual. This section provides an overview of the main file management, data management, analysis, and utility features in Priceman.

Priceman has the following analytical features:

- *Market/Commodity/Time Analysis*: This feature allows the analysis of price data for any combination of commodity and market for a specified time period.
- *Terms of Trade Analysis*: This feature allows the comparison of relative prices between two commodities (e.g., between millet and sheep, between maize and wages, and so on).
- *Stacked Time Series Analysis*: This feature allows analysis of many years for a similar commodity and market combination.

- *Indexing and deflating*: This feature allows the data to be put on a common index or deflated.

3.4.8.2 Spaceman

Spaceman—the **SPACE** analysis of satellite imagery data **MAN**ager—is a very easy software program to use and is designed for use for routine spatial analysis of satellite imagery data for early warning purposes. Although the features are only summarized in this section, most of the features are clearly documented in both the help menus and program manual. This section provides an overview of the main file management, data management, analysis, and utility features in Spaceman.

Spaceman has the following analytical features:

- *Times series analysis*: This feature allows the user to graph several polygons or statistics over a time range.
- *Multi-year analysis*: This feature allows the user to graph several polygons or statistics over the same dekads over several years.
- *Image data comparison*: This feature allows the user to compare two types of image statistics over the same time range.

3.4.8.3 Rainman

Rainman—the **RAIN**fall data **MAN**ager—is a data management and analysis software that has been developed by FEWS. It is a very easy software program to use and is designed for use for routine analysis of rainfall data for early warning purposes. Although the features are only summarized in this section, most of the features are clearly documented in both the help menus and program manual. This section provides an overview of the main file management, data management, analysis, and utility features in Rainman.

Rainman has the following analytical features:

- *Multivariate analysis*: This feature allows the user to generate line graphs displaying up to five individual seasons of data as compared to up to three historical periods. The data can be graphed as either raw values or cumulative values.
- *Deviation from normal*: This feature allows the user to generate bar graphs showing how far above or below the historical average one year's worth of data falls during each dekad of the season.
- *Rainfall vs percentile*: This feature allows the user to generate a graph showing one year's raw rainfall values by dekad as compared to three percentiles based on a historical period.
- *Cumulative vs percentile*: This feature allows the user to generate a graph showing one year's cumulative rainfall values by dekad as compared to three cumulative percentiles based on a historical period.
- *Percentile envelop*: This feature allows the user to generate a graph showing one year's cumulative rainfall values by dekad up to a defined ending point. At that point

three cumulative percentiles based on a historical period will branch off to help forecast possible rainfall scenarios.

3.4.8.4 Agman

Agman—the **AG**ricultural data **MAN**ager—is a data management and analysis software that has been developed by FEWS. It is a very easy software program to use and is designed for use for routine analysis of agricultural production data for early warning purposes. Although the features are only summarized in this section, most of the features are clearly documented in both the help menus and program manual. This section provides an overview of the main file management, data management, analysis, and utility features in Agman.

Agman has the following analytical features:

- *Harvest profile:* This feature allows a visual presentation for a specific year to look at of one or more commodities at one or more locations.
- *Harvest comparison*: This feature allows the comparison of area planted, gross, harvest, net harvest, and yield for more than one harvest for one or more commodities at one or more locations.
- *Production trends*: This feature allows a visual presentation of area planted, gross, harvest, net harvest, and yield for more than one year for one or more commodities at one or more locations.
- *Production summary*: This feature allows the calculation of minimum value, maximum value, mean, standard deviation, and total production for area planted, gross, harvest, net harvest, and yield for a reference period for one or more commodities at one or more locations.

CHAPTER 4

ROUTINE MONITORING AND ASSESSMENTS

4.1 Introduction

The development of routine monitoring and assessment procedures is essential to complete all early warning monitoring and reporting is a timely and comprehensive manner. This is especially true for FEWS field staff, or if the early warning unit and system has expanded to the broader food security mandate.

In all early warning monitoring assessment activities the judgement of the analyst is critical. Although useful data and information are available, it is usually impossible to make a determination if there is a food security problem without relying on expert opinion, either yours or someone else's. That is why early warning is a difficult and complex process that involves people from many technical disciplines. The early warning analyst is required often to make their "best guess" about a situation. It is important not to avoid this responsibility, but to make sure that the proper caveats (assumptions) are included with the estimation of the food security situation.

This document makes the distinction between monitoring and assessments. Monitoring is defined as the ongoing observation of critical data and events; while assessments are done at a particular time to provide more depth of analysis of a situation or event. For example, during the cropping season regular monitoring of plant development, rainfall conditions and so on occurs continually. At critical points of the year assessments are made to evaluate the impact on the food security status of the situation or event under observation. A good example ofan assessment is the current vulnerability assessment that reviews the contribution of agricultural production to total income and provides a judgement on whether or not there are any areas that on aggregate will experience food insecurity. Monitoring and assessments are complementary. An assessment is intended to include the information generated during monitoring in the analysis, and provide a basis for future monitoring.

Another critical aspect involved in doing routine monitoring and assessments is going on field visits to the rural areas. Even in situations where the NEWS receives regular field reporting visiting the rural areas to confirm reports is important. These visits are especially important if any unusual behavior is observed to clarify what is actually happening.

This section is divided into three sections. First, a conceptual framework to guide monitoring and assessment activities is presented. Second, a discussion of the key monitoring activities is described according to the conceptual framework, especially what is being monitored, why those aspects are important at different times of the year, and what type of analysis is required to understand what is monitored. Finally, a discussion of the key assessment activities is described according to the conceptual framework, especially the type of assessment, why and when that assessment is required, and what type of analysis that is required to do that assessment.

4.2 A general conceptual framework for monitoring and assessment activities

Before beginning to describe what early warning professionals monitor (and assess), it is important to understand how the monitoring and assessment activities fit into a broader conceptual framework. There are many reasons for this approach. First, a food security approach to early warning requires a broader understanding of how household food security generally works before we decide on how we will attempt to monitor or assess it. Although many NEWU staff members have a lot of agricultural experience, the approach to early warning is broader than understanding cropping systems. There is a need to understand livelihood systems, how households earn income (including agriculture) and how they adjust their strategies when faced with a crisis. This requires a broader framework. Second, a conceptual framework allows us to ensure that we are monitoring all aspects of food security. This conceptual framework provides a checklist of what should be monitored and when it should be monitored.

The conceptual framework explained in this document is consistent with the main technical disciplines that are key to early warning, namely agroclimatology, agronomy, and agricultural economics. This conceptual framework was done in collaboration and consultation with professionals from each of these three technical disciplines.

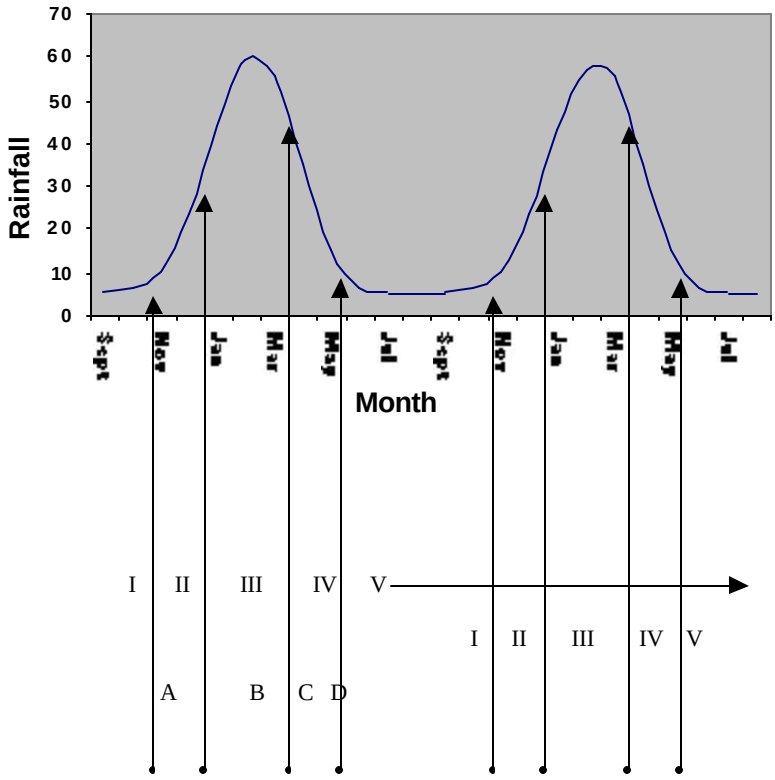
Since households that are monitored by early warning specialists are dependent on agriculture for their livelihoods, the general conceptual framework links important monitoring and assessment activities at the different stages of the rainfall season (Figure 4.1). These activities have been divided into five parts, including 1) the pre rainfall season, 2) the start of season, 3) the rainfall season, 4) the end of rainfall season, and 5) the post harvest monitoring. The division of the activities according to these five stages allows for a useful discussion of the main early warning issues by stage, and what monitoring and assessments are required to address those issues.

An examination of the general conceptual framework results in a series of useful observations, including:

- ***First, the monitoring periods are consistent with agroclimatic, agronomic and economic activities in southern Africa***. The middle three activities (the start, the main part and the end of the rainfall season) fit into the rainfall season itself, while the first and last are also important to agronomic monitoring, field preparation and crop marketing, respectively. There are economic activities going on during the entire year.

- ***Second, there is a connection between years in terms of monitoring***. Although it might be obvious, the crop production from one year will help determine the food security of households during the following year(s), and sometimes longer. If a household has a slightly below average harvest they can adjust their consumption during the next consumption year (until the next harvest). However, if there are a series of below average seasons or a total crop failure then the livelihoods and coping behaviors of households will be affected for a much longer time period.

Figure 4.1: The early warning cycle of monitoring and assessments



Monitoring periods:

- Pre rainfall season (I)
- Start of rainfall season (II)
- Rainfall season (III)
- End of rainfall season (IV)
- Post harvest monitoring (V)

Assessment activities:

Start of season assessment (A)
Preliminary crop assessment (B)
Harvest assessment (C)
Food balance sheet (D)
Vulnerability assessment (D)

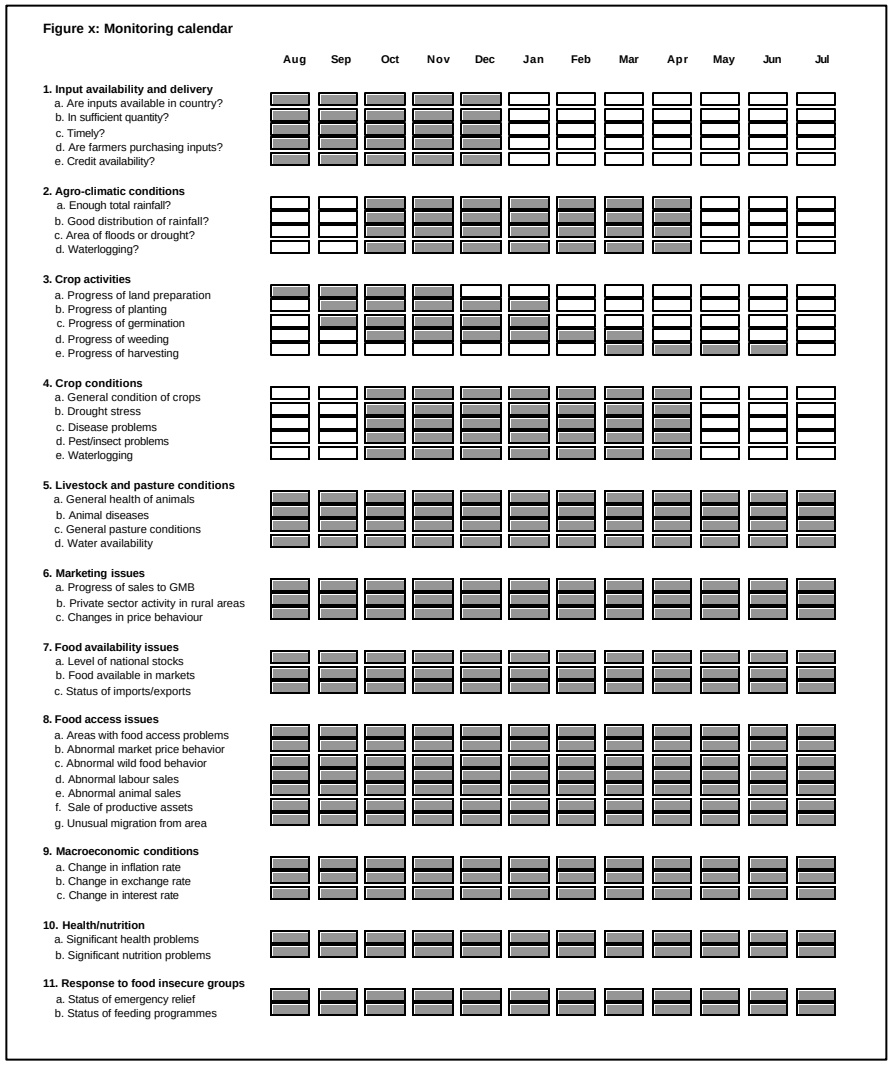
- ***Third, there is a difference between monitoring periods and assessment activities***. During a specific period there are many indicators that must be monitored to address some important food security questions, some that are specific to that period and some that are more general. These indicators are monitored during one or several of the periods. Conversely, assessments are discreet activities done at specific times to take stock of the food security situation or how it will be affected.

- ***Finally, monitoring and assessment are an activity that is done throughout the entire year***. For reasons stated above, the results of one cropping season and the following consumption season are connected. Something is always potentially having an impact on household food security.

4.3 Routine monitoring activities

Early warning of food security conditions involves monitoring some aspects that are continuous throughout the year and some aspects that are specific to certain parts of the year. Although documents were previously developed by the REWS to provide guideance on what NEWS should monitor, this section presents an expanded range of routine monitoring activities (see Figure 4.2).

This section presents a discussion of the key monitoring activities described according to the different periods identified in the conceptual framework, especially what is being monitored, why those aspects are important at different times of the year, and what type of analysis is required to understand what is monitored.



4.3.1 Pre rainfall season monitoring

The pre rainfall season includes the period when households are preparing for the upcoming cropping season. Although most of the issues that are monitored are related to preparation for the cropping season, there are a series of issues that remain from the previous year's post harvest monitoring relating to food availability, food access, livestock, macroeconomic conditions, and health/nutrition.

The main issues to be addressed while monitoring during this period are:

- How is the preparation of the season progressing (input and land preparation)?
- How is the marketing of the previous season's crop progressing?
- Are there any changes in household food security (availability and access)?
- Any livestock health/disease or pasture problems?
- Have there been any major shocks to the macroeconomic situation that will cause an improvement or deterioration of food security?
- Are there any significant health or nutrition issues?
- If appropriate, how is the response to food insecure groups?

To address these issues the following is recommended:

Figure 4.3: Routine pre rainfall season monitoring

Type	Data/information requirements	Source of data/information	Routine Analysis
Agrometeorology	Satellite imagery (NDVI, CCD, RFE) Rainfall data/information Extension information	RRSU/FEWS/W National Meteorological Service	Look for unseasonable vegetation or rainfall
Agronomic	Extent of land preparation Reports of input acquisition by farmers Availability of inputs in markets	Agriculture Extension reports Field visits Visits to markets Parastatals	Qualitative assessment of activities
Livestock	Satellite imagery Extension information	RRSU/FEWS/W Extension/Vet reports	Compare current pasture conditions and livestock health with average or reference period.
Food availability	CVA (baseline) Trade data/info Field reports Stocks	Marketing parastatal Ministry of Agriculture Ministry of Commerce	Examine if the current situation (deficit, trade flow, …) is or will be a problem before the next harvest both nationally and subnationally. Food balance sheet
Food access	CVA (baseline) Market price data Reports on coping behavior	Market Information System Field visits NGO reports	Compare market prices to average or a reference year for the same period.
Macroeconomic	Inflation rates, exchange rates, and interest rates.	Central Statistics Office	Compare changes in the macro data and speculate on how this will impact on HH purchasing power.
Health/nutrition	Health indicators Nutrition indicators	Ministry of Health/Nutrition Field reports NGO reports	Compare these data to reference values and estimate if there is problem developing.

4.3.2 Start of rainfall season monitoring

The start of the rainfall season is very important. Experience has shown that there tends to be more variability at the beginning of the rainfall season than at the end of the season. The implication of this observation is that if the rainfall season ends on time a late season start might result in yield loss. Conversely, an early season start may encourage farmers to plant longer season (and higher yielding) crop varieties. Although this relationship does not always occur (the season ending on time), it generally happens.

The main issues to be addressed while monitoring during this period are:

- How was the start of the rainfall season (early, near normal, or late)?
- How much area has been planted (with a comparison to normal)? What caused any deviation form normal (more or less area planted)?
- What is the stage (germination) and condition of crops?
- What agricultural activities are going on (early/late)?
- How is the marketing of the previous season's crop progressing?
- Are there any changes in household food security (availability and access)?
- Any livestock health/disease or pasture problems?
- Have there been any major shocks to the macroeconomic situation that will cause an improvement or deterioration of food security?
- Are there any significant health or nutrition issues?
- If appropriate, how is the response to food insecure groups?

To address these issues the following is recommended:

Figure 4.4: Routine start of rainfall season monitoring

Type	Data/information requirements	Source of data/information	Routine Analysis
Agrometeorology	Satellite imagery (NDVI, CCD, RFE) Rainfall data/information Extension information	RRSU/FEWS/W National Meteorological Service	Compare starting 5 dekads of imagery (on graph) to see difference.
Agronomic	Crop development Input availability Area planted estimates Failed plantings Drought/waterlogging	Agriculture Extension reports Field visits Visits to markets	Qualitative assessment of activities compared to previous behavior Quantitative area analysis
Livestock	Satellite imagery Extension information	RRSUFEWS/W Extension/Vet reports	Compare current pasture conditions and livestock health with average or reference period.
Food availability	CVA (baseline) Trade data/info Field reports Stocks	Marketing parastatal Ministry of Agriculture Ministry of Commerce	Examine if the current situation (deficit, trade flow, …) is or will be a problem before the next harvest both nationally and subnationally. Monthly food balance sheets
Food access	CVA (baseline) Market price data Reports on coping behavior	Market Information System Field visits NGO reports	Compare market prices to average or a reference year for the same period.
Macroeconomic	Inflation rates, exchange rates, and interest rates.	Central Statistics Office	Compare changes in the macro data and speculate on how this will impact on HH purchasing power.
Health/nutrition	Health indicators Nutrition indicators	Ministry of Health/Nutrition Field reports NGO reports	Compare these data to reference values and estimate if there is problem developing.

The outputs of the analysis done during this period feed into both the monthly reporting process and a start of season assessment.

4.3.3 Rainfall season monitoring

During this period the major issues to monitor are the adequacy of the rainfall season (amount and distribution of rainfall) and the condition of crops.

The main issues to be addressed while monitoring during this period are:

- How is the rainfall season progressing in amount and distribution (poor, near normal, or good)?
- What agricultural activities are going on (early/late)?
- What is the crop stage (vegetative to flowering) and the condition of the crops?
- Are there any changes in household food security (availability and access)?
- Any livestock health/disease or pasture problems?
- Have there been any major shocks to the macroeconomic situation that will cause an improvement or deterioration of food security?
- Are there any significant health or nutrition issues?
- If appropriate, how is the response to food insecure groups?

To address these issues the following is recommended:

Figure 4.5: Routine rainfall season monitoring

Type	Data/information requirements	Source of data/information	Routine Analysis
Agrometeorology	Satellite imagery (NDVI, CCD, RFE) Rainfall data/information Extension information	RRSU/FEWS/W National Meteorological Service Crop water satisfaction (CWS)	Compare the current dekad of imagery (on graph) with reference and average images of the same time period to see any differences.
Agronomic	Crop development Input availability Late planting Crop stress (drought/pests)	Agriculture Extension reports Field visits Visits to markets Commodity groups	Qualitative assessment of activities compared to previous behavior Quantitative assessment of imagery and planting dates
Livestock	Satellite imagery Extension information	RRSU/FEWS/W Extension/Vet reports	Compare current pasture conditions and livestock health with average or reference period.
Food availability	CVA (baseline) Trade data/info Field reports	Marketing parastatal Ministry of Agriculture Ministry of Commerce	Examine if the current situation (deficit, trade flow, …) is or will be a problem before the next harvest both nationally and subnationally. Monthly food balance sheets
Food access	CVA (baseline) Market price data Reports on coping behavior	Market Information System Field visits NGO reports	Compare market prices to average or a reference year for the same period.
Macroeconomic	Inflation rates, exchange rates, and interest rates.	Central Statistics Office	Compare changes in the macro data and speculate on how this will impact on HH purchasing power.
Health/nutrition	Health indicators Nutrition indicators	Ministry of Health/Nutrition Field reports NGO reports	Compare these data to reference values and estimate if there is problem developing.

The outputs of the analysis done during this period feed mainly into the monthly reporting process.

4.3.4 End of rainfall season monitoring

The end of the rainfall season is the time when the outcome of the harvest is known with sufficient accuracy to begin to identify whether or not there will be a large national food availability problem in the coming marketing season. It is at this time that—with the first crop forecasts—it is possible to determine with more specificity the location of crop shortfalls (in relation to past production trends). At this time the end of the rainfall season is also monitored, especially if there was a late season start.

The main issues to be addressed while monitoring during this period are:

- How is the rainfall season progressing in amount and distribution (poor, near normal, or good)?
- What agricultural activities are going on (early/late)?
- What is the crop stage (post flowering to harvest) and the condition of the crops?
- What is the early estimation of production (area planted times yields)?
- Are there any changes in household food security (availability and access)?
- Any livestock health/disease or pasture problems?
- Have there been any major shocks to the macroeconomic situation that will cause an improvement or deterioration of food security?
- Are there any significant health or nutrition issues?
- If appropriate, how is the response to food insecure groups?

To address these issues the following is recommended:

Figure 4.6: Routine end of rainfall season monitoring

Type	Data/information requirements	Source of data/information	Routine Analysis
Agrometeorology	Satellite imagery (NDVI, CCD, RFE) Rainfall data/information Extension information	RRSU/FEWS/W National Meteorological Service	Compare the current dekad imagery (on graph) with re and average images of the s time period to see any diffe
Agronomic	Crop development Preliminary crop forecast Crop water satisfaction, models	Agriculture Extension reports Field visits Visits to markets Preliminary crop forecast report Commodity groups	Qualitative assessment of activities compared to prev behavior Quantitative analysis (CWS models)
Livestock	Satellite imagery Extension information	RRSU/FEWS/W Extension/Vet reports	Compare current pasture conditions and livestock he with average or reference p
Food availability	CVA (baseline) Trade data/info Field reports	Marketing parastatal Ministry of Agriculture Ministry of Commerce	Examine if the current situa (deficit, trade flow, ...) is o be a problem before the nex harvest both nationally and subnationally. Monthly food balance shee
Food access	Market price data Reports on coping behavior	Market Information System Field visits NGO reports	Compare market prices to a or a reference year for the period.
Macroeconomic	Inflation rates, exchange rates, and interest rates.	Central Statistics Office	Compare changes in the ma data and speculate on how will impact on HH purchas power.

The outputs of the analysis done during this period feed into both the monthly reporting process and a preliminary crop assessment.

4.3.5 Post harvest monitoring

Post harvesting monitoring involves the assessment of the harvest (crop production) and how that, plus other factors (and income), will impact on household food security is important.

The main issues to be addressed while monitoring during this period are:

- How was the rainfall season and what was its impact on the harvest?
- What was the harvest outcome (by crop, by region)?
- What is the projected food availability situation for the coming marketing season (harvest and vulnerability assessments)?
- What is the projected food access situation for the coming marketing season (vulnerability assessment)?
- What marketing activities are taking place and how do they compare with previous years?
- Any livestock health/disease or pasture problems?
- Have there been any major shocks to the macroeconomic situation that will cause an improvement or deterioration of food security?
- Are there any significant health or nutrition issues?

To address these issues the following is recommended:

Figure 4.7: Routine post harvest monitoring

Type	Data/information requirements	Source of data/information	Routine Analysis
Agrometeorology	Satellite imagery (NDVI, CCD, RFE) Rainfall data/information Extension information	RRSU/FEWS/W National Meteorological Service	Look at the entire season and compare to average and/or reference seasons/years.
Agronomic	Production estimates Yield estimates Area planted/harvested	Crop forecast report Agriculture Extension reports Field visits Visits to markets Commodity groups	Analysis of harvest from total output and productivity aspects (compare to past trends/average) Explanations for why
Livestock	Satellite imagery Extension information	RRSU/FEWS/W Extension/Vet reports	Compare current pasture conditions and livestock health with average or reference period.
Food availability	Trade data/info Field reports Crop production Stocks	Marketing parastatal Ministry of Agriculture Ministry of Commerce	CVA analyses Examine if the current situation (deficit, trade flow, …) is or will be a problem before the next harvest both nationally and subnationally. Annual food balance sheet
Food access	Market price data Reports on coping behavior	Market Information System Field visits NGO reports	Compare market prices to average or a reference year for the same period.
Macroeconomic	Inflation rates, exchange rates, and interest rates.	Central Statistics Office	Compare changes in the macro data and speculate on how this will impact on HH purchasing power.
Health/nutrition	Health indicators Nutrition indicators	Ministry of Health/Nutrition Field reports NGO reports	Compare these data to reference values and estimate if there is problem developing.

The outputs of the analysis done during this period feed into both the monthly reporting process, a harvest assessment, and a current vulnerability assessment.

4.4 Assessment activities

As stated at the beginning of this chapter, assessments are a way to understand a situation or event in more depth by looking backward in time for the purpose of making a judgement on whether the food security of a population will improve or deteriorate. The four assessment activities discussed in this section—start of season assessment, preliminary crop forecast, harvest assessment and current vulnerability assessment—are all important events for food security. These activities are important to document the current and future food security status of different populations in the country. They all provide both a national and subnational picture. With the exception of the current vulnerability assessment, all of the assessment documents that are prepared should exceed ten pages. The objective in each case is to provide the best estimation of the situation (sometimes quantitatively and sometimes qualitatively), why the situation is the way it is, and what is the best estimation of the likely impact on food security.

4.4.1 Start of season assessment

The start of season analysis provides insights to the beginning of the rainfall and agricultural seasons. Experience has shown that there tends to be more variability at the beginning of the rainfall season than at the end of the season. The implication of this observation is that if the rainfall season ends on time a late season start might result in yield loss, and therefore below normal crop production. Conversely, an early season start may encourage farmers to plant longer season (and higher yielding) crop varieties. Although this relationship does not always occur (the season ending on time), it generally happens.

The start of season report (see box) should document how the season began compared to previous years (both average and specific reference years), and should provide a very preliminary indication of what the impact could be for the harvest outcome. This assessment will primarily use remotely sensed satellite imagery, preliminary area planted estimates (if available), extension reports and field visits.

Start of season assessment

1. **Summary**

2. **Description of the season start**
   - Description of the rainfall season to date
   - Area planting information (if available)
   - Identification of any areas with early or late season start (imagery graphic)

3. **Potential harvest prospects (brief)**
   - Overall assessment
   - Areas with reduced potential
   - Areas with enhanced potential

4. **Potential impact on food security (brief)**
   - Impact (national) on food availability
   - Impact (subnational) on income from crop production

The analysis of the start of season begins with a comparison of the start of season this year (as seen in the satellite imagery) with average. This comparison to average will provide an indication if the season started early, on time, or late. Once this is done the next step is to

identify those areas with an early start and those areas with a late start. In both cases inferences can be made about the potential impact of this type of start if the season ends on time. This analysis should be put within the context of normal production.

4.4.2 Preliminary crop forecast

The preliminary crop forecast (see box) should present an early indication of the crop production situation and impact on food security during the previous season. This assessment should include 1) preliminary production estimates at the national and subnational levels, 2) an explanation of which factors have affected the agricultural season (both positively and negatively) and 3) a preliminary assessment of the food security implications of the harvest outcome. The concept of this report is not new, as most NEWS write a report that provides a summary of how the rainfall season developed and the preliminary crop forecast information. In addition, the NEWS produce preliminary annual food balance sheets based on the crop forecasts as a tool to estimate if there will be any food available problems in the consumption season[7]. What is new is the incorporation the preliminary assessment of the food security implications of the harvest outcome.

Preliminary crop forecast report (5 – 10 pages)

- **Summary**
- **Factors that have affected the agricultural season**
  - Rainfall (combined with satellite imagery)
  - Areas of droughts, floods or waterlogging
  - Pest problems
  - Other unusual occurrences
- **Preliminary crop forecast estimates**
  - National estimate compared to past trends (graph)
  - Subnational estimates administrative level 2 or three by province; a map of this year compared to average to a reference year by province)
- **Potential impact on food security**
  1. Impact (national) on food availability
  2. Impact (subnational) on income from crop productio

This assessment will provide the first picture of the crop prospects and their implication for food security. Still, since the crops are still "in the ground" the report has to be written carefully. The analysis that is required to do this assessment is comparison of the crop forecast figures—both at the national and subnational levels—to average and references years (a particularly good or bad harvest). At this point inferences need to be made about what the impact of this level of production will be on the national food balance and on income from crop production.

4.4.3 Annual food balance sheet

The annual food balance sheet (AFBS) assessment should be done at two times during the year. After the crop production forecast figures are available, an AFBS should be produced to give a preliminary view about the potential surplus/deficit situation in a country. This should be included in the preliminary crop forecast assessment described earlier.

When the crop production estimates are available the AFBS should be updated with the actual estimates. These crop estimates will replace the high/low scenario figures that were used in the AFBS for the preliminary crop forecast assessment. This assessment should not be longer than 2 pages (front/back of one page). It should contain the presentation of the AFBS and an

[7] The REWU takes these preliminary annual food balance sheets and looks to see if a regional problem is developing using high and low production scenarios.

assessment of this year's AFBS with the historical AFBSs. This comparison will put the data from the AFBS into context. Also, this assessment should make inferences about whether there will be a national food availability problem during the consumption year (from the completed harvest until the next harvest).

4.4.4 Harvest assessment

The harvest assessment should clearly illustrate all aspects of the crop production during the previous season (see box). This assessment should include 1) production and productivity (e.g., yield) estimates at the national and subnational levels, 2) an explanation of which factors have affected the agricultural season (both positively and negatively), 3) the national food balance sheet, and 4) a preliminary assessment of the food security implications of the harvest outcome.

This assessment will provide a more complete picture of the crop prospects and their implication. The analysis that is required to do this assessment is comparison of the crop production figures—both at the national and subnational levels—to average and references years (a particularly good or bad harvest). At this point inferences need to be made about what the impact of this level of production will be on the national food balance and on income from crop production. This only has to indicate what this impact is likely to be since a more detailed report that integrates crop production and other income sources together (current vulnerability assessment).

Harvest assessment report (5 – 10 pages)

- **Summary**
- **Factors that affected the agricultural season**
  - Rainfall (combined with satellite imagery)
  - Areas of droughts, floods or waterlogging
  - Pest problems
  - Other unusual occurrences
- **Crop production estimates**
  - National estimate compared to past trends (graph)
  - Subnational estimates administrative level 2 or three (table of production by crop by province; a map of this year compared to average; map of this year compared to a reference year by province)
- **Potential impact on food security**
  1. Impact (national) on food availability
  2. Impact (subnational) on income from crop production

4.4.5 Current vulnerability assessment (CVA)

A current vulnerability analysis is designed to identify regions and groups most likely to experience episodic food shortages and problems of inadequate food access in order to prevent severe malnutrition and starvation (see box). This analysis should provide an assessment current of food security conditions (food availability and access) at the lowest administrative level for which data are available.

For more information on this assessment see Chapter 2 (Section 2.7.3) and documents listed in Appendix 1. The theoretical concepts and procedures to do a current vulnerability assessment are well documented in the available documents.

Current vulnerability assessment (5 – 10 pages)

1. **Summary**

2. **National food security**
- Food availability
  - Domestic food production trends
  - National consumption requirements
- Trade (net imports)
  - National food balance

3. **Subnational food security**
   1. Food production trends
- Food access
  - Coping behaviors (responding to crises)

4. **Conclusions and recommended actions**

CHAPTER 5

REPORTING FUNDAMENTALS

Although reporting is the final step in the process, it is important that early warning information be presented in an accurate, timely, and accessible format to users. Good early warning analysis can only be useful if it is well written, well presented, and timely. Reporting is the final activity in a process that involves winnowing lots of data (which sometimes give conflicting signals) and turning it into information that is actionable by decision-makers. It is this distillation process that determines the effectiveness of the reporting. This chapter provides suggestions for writing early warning reports.

5.1 Know your target audience/user group

The most important preparation tp prepare for the report writing stage is an understanding of the target audience (or user group). The target audience will help in determining the products that should be developed. It takes as much time to produce an unused product or output as it does to produce a good product or output, so understanding what your users want is a good investment of time.

To better understand the needs of your target audience, one should recognize the kinds of decisions that must be made with this information, the frequency and timing of these decisions, the level of detail required in the products, and the preferred presentational format (if possible). This information can be obtained from a user survey. This survey could take the form of a brief questionnaire or informal meeting. Whether the user survey is done formally or informally, it requires careful planning (e.g., determining the appropriate questions) done ahead of time.

Follow up meetings should be held with decision-makers to pre-test products (whether the entire product or parts of it). Decision-makers do not always know what they want, but they usually can identify what they will use if they see it. Demonstrating new products before their introduction in reports is a good way to identify if they will be used. One suggestion is to have a meeting with two or three potential aggressive users of the NEWUs information. This will initiate a more dynamic process that will better guide the development of appropriate products and provide feedback on reporting.

5.2 Report information not data

There is a difference between data and information. Data are numbers and facts, while information is data that are processed, analyzed, and interpreted. Too often data are confused as information and are included in reports without the proper interpretation or context. For example, an early warning report that states that “this years maize production is 1.78 million MT” is incomplete. It does not provide the proper interpretation and context. The report should state that “this years maize production is 1.78 million MT, which is 37 percent below the

recent five year average". This extra information transforms the maize production numbers (data) into useful information.

Although there is a need to process data and information to be able to do effective early warning analysis, you must report information. Decision-makers who read your reports are not analysts. Do not expect them to become analysts (even if they had once been analysts in the past) since they have a limited amount of time. Given their busy schedules they require information (not data) upon which to base their decisions.

5.3 Always compare changes in observed behavior to reference values

One way that data becomes information is to put current data into the proper historical perspective. By comparing current data to specific reference periods (e.g., last year or a particularly or bad year) or averages provides the proper context to illustrate the current situation and its impact on household food security.

For example reporting prices in Zambia increased ten percent in February or that this year's maize production is 50,000MT tells the reader little. The necessary context would be to compare the change in price (or maize production) with last year or an average of the last five years. This context would put the observed patterns into the proper perspective.

5.4 So what?: Assessing the impact of unusual data patterns

In addition to putting the current data into the proper perspective, the effective analyst always tries (to the degree possible) to determine the possible causes and potential impacts of the price changes. Decision-makers need to know "so what?". If you can not answer that question for almost every statement that you have in the report, you need either to do more analysis or collect more information (or clarification about the data/information already collected) from key informants. This is especially true if the expected impact will be negative and affect a large number of people.

A critical aspect in identifying and understanding data anomalies is the comparison of a type of data with other data and information, especially field reports. This n important concept called "convergence of evidence" (or "triangulation") is used to see if all available data sources are indicating the same thing. If they are, then one has more confidence that the signal being sent is correct. If not, the contradiction in data has to be investigated.

The verification of unusual behavior can be done sequentially, meaning that there are progressively more costly (mostly time) ways to understand the situation. It is not necessary each time there is an apparent unusual behavior (e.g., a large price movement) that you jump in the vehicle to see what is going on. This is unrealistic from a resources standpoint, and more importantly, often not necessary.

The sequence of verifying unusual data patterns is (from less expensive and quickest to more expensive and time consuming):

- *Go back to the institution that provided the data (or information) to verify that the unusual behavior is not just the result of a data entry error or poor reporting from the field*. This is an important service to provide to the suppliers of the data. As an active analyst, you may identify problems in data collection or processing routines that need to be corrected. If the unusual behavior reflect real economic conditions, your feedback might draw the attention of the data provider to an interesting situation they might want to report on. Telephoning the person responsible for collecting that data may result in getting an explanation very quickly.

- *Talk to other public and private sector key informants in the capital city.* In any capital city there are many people that can be contacted who understand the food security situation and the behavior of households in the country. Key informants in government (e.g., Ministries of Agriculture and Commerce), universities, private sector, donor agencies, and NGOs should be visited to see if they can provide any insights into the unusual behavior you have identified. Also, over time you should develop a network of contacts that will assist you to understand unusual behaviors.

- *Talk to other public and private sector key informants in the area where the unusual behavior is located*. This can be done via telephone in many cases. Also, over time you should develop a network of contacts that will assist you to understand unusual behavior. Face-to-face contacts when you are on field trips will facilitate future telephone conversations.

- *Actually visit the area that has the unusual behavior that you have identified through your analysis.* Although this is a relatively expensive approach (both time and money) to resolve a problem, it will provide useful insights to what is happening in that area. This is for those more complicated issues that seem to baffle everybody. After doing this kind of visit you should do a trip report and inform all of your contacts (both in the rural areas and capital city) what the cause of the behavior was. This feedback to others will improve coordination between all relevant early warning players.

The bottom line is that you have to be able to explain anomalies in the behavior of data. Your job is to identify and explain the reason (and hopefully the potential impact) of an unusual behavior.

5.5 Analyze more than you report

Analysis is the process of understanding patterns in a particular data set or data sets. To feel confident that the reporting about food security is accurate, it is necessary to monitor and analyze more data than are included in your reporting. If all output from analyses were included in your report, a decision-maker would have to decide what weight or value should be attached to the statements and conclusions included in your early warning publications. As stated earlier, this is not reasonable. The decision-makers choice in this situation is usually to ignore the report.

The additional analyses that you do but that is not presented is not a waste of time. It is the result of a thorough analysis that you are confident that what you include in a report is an

accurate picture of the situation. The additional analysis that you do is not presented but can be drawn upon if a decision-maker would like greater depth than is possible in an early warning publication. Also, additional analyses leads to insights and understandings that can be used the next time a similar situation is faced.

5.6 The 5 C's of reporting

When reporting there are five concepts that must be kept in mind:

- **Comprehensive**: A report is most useful when all of the details are presented. This does not mean that the report is long, but that it is complete in explaining the issue, what is happening, and what is the potential impact on food security.
- **Clarity**: Although it is obvious that a report has to be clear, it is not always easy to write clearly, especially when one is trying to be concise. Decision-makers have a limited time to read reports, so the writing has to be clear.
- **Concise**: As already mentioned, decision-makers have little time to read reports. It is therefore important that the situation is completely explained in a clear, but focused manner. There should be an economy of words.
- **Context**: The context of an issue is critical to understand the current situation. This has been discussed previously in this chapter.
- **Continuity**: If a problem was discussed in an earlier report, it must be followed through in later reports.

5.7 Selecting the correct presentation format

There are five different formats that can be used to present data and information: text, tables, graphs (figures), maps, or a combination of the previous four. The selection of which format to use at which time depends on the type, specificity, temporal, and spatial nature of the data or information to be presented.

Text is used to present and describe data and information in words (and numbers). This is the format that is most often used in early warning reporting. Although a useful format, it is not always the most effective. Other formats such as tables, graphs, and maps are more visually appealing and can draw the attention of a decision-maker to understand the condition/situation being highlighted.

Tables are a useful way of presenting data, especially compared to other reference data. For example, rainfall data are often presented in tabular form to allow the raw station data to be compared against previous years or a thirty-year average. Tables by themselves, though, only present data and the reader is forced to interpret the data on their own.

Graphs can show temporal trends (e.g., national agricultural production for the past ten years) or allow a comparison across space (e.g., 1997/98 maize surpluses/deficits in SADC countries).

A **map** can show spatial patterns of a given condition, for example the harvest outcome or pest infestations.

Finally, a **combination of various formats** can integrate several of these temporal and spatial concepts.

Graphs and maps can be particularly powerful ways of presenting information. The impact of this should not be minimized. If either of these formats are appropriate, then they should be included.

When developing a table, graph, or map presentation great care needs to be made to ensure that the presentation is complete. One way to describe what a complete table, graph or map presentation looks like is the following:

> Imagine that you are walking down the hall in the Ministry of Agriculture with an arm full of papers and documents. Although you do not realize it, a page of your report (table, graph, or map presentation) falls to the ground. A few steps behind you is the Minister of Agriculture. He sees the page and picks it up. He should be able to look at the presentation and understand everything about the situation that is described in the presentation, including what is the issue, where is the problem, what is the severity of the problem, and so on. If he can not, then the presentation is not complete.

If your presentation passes this test then it is complete.

5.8 Other fundamental reporting concepts

Some other important reporting concepts are:

- *Assumptions that went into the analyses should be clearly stated*. Only if your assumptions are clearly stated can your readers understand your interpretation of behavior.

- *The degree of confidence in the analyses and results should also be clearly stated*. Given the quality of data that are usually available, you need to clearly state your impression of the accuracy of you results. This honesty and transparency will make you a more reliable analyst.

- *Collaborators and data providers should be clearly identified*. Often our work is a team effort, and our collaborators (both that provide data and assist with the analysis) need to be acknowledged.

- *The degree of specificity in reporting numbers is important to consider*. It is important that the level of specificity reflect both the quality and significance of the data. For example, including decimals for data that are not accurate or variables that are calculated using relatively poor data would be inappropriate. If you were trying to make a point about the percent change of prices from one month to the next, it would be better to report 20% as opposed to 20.23%. The decimals would imply better quality data and more specificity than is possible.

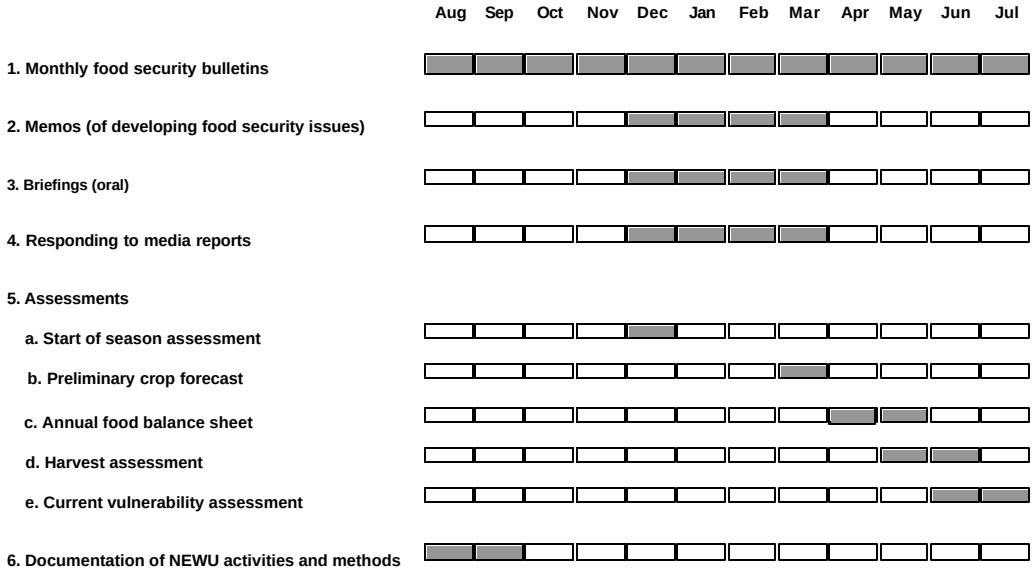
CHAPTER 6

REPORTING FORMATS

Although this could be said of all of the chapters in this document, this chapter is the most important one. In most cases the quality of your Unit's reporting will have a large influence on whether the users believe, have enough time or are willing to make decisions based on your analyses. Your readers will primarily base their opinions of your work on the basis of the quality of your reporting (both content and visual quality).

The different reporting formats listed below should be thought of as a toolbox to select from in different situations. Each reporting format is structured and intended to provide a specific information for different times of the year (see Figure 6.1). The reporting begins with the routine monthly food security bulletins. During an agricultural season there are additional issues that arise that could require a memo, an oral briefing, or a response to a media report. At critical times during the agriculture and rainfall season—namely after the beginning of the season (the start of season assessment), when the early indications of the crop outcome is available (the preliminary crop forecast), and when the crop harvest outcome is known (both the harvest assessment and the current vulnerability assessment—different assessments are required to review available data and information to make an assessment on food security situation of households. Finally, there is a need during a relatively "free" time to document the standard operating procedures of the National Early Warning System. All of these different reporting formats are discussed in this section.

Figure 6.1: Timing of reporting



Still, even though there are different objectives of the various reporting formats, there are a series of common objectives that are important.

- ***First, the reports have to be timely.*** It does not matter how well written or complete a report is if it is too late for action to be taken.
- ***Second, the report needs to be targeted to a specific issue or related issues***. For example, the focus of an early warning needs to be continually on whether or not there is a food security problem, and if it is where and what is the magnitude of the problem. We can not always be specific, but we should sequentially be able to provide greater insight to the nature of a developing food security issue.
- ***Third, the structure of the report has to be logical and guide the reader.*** The audience of a report does not have the time to find the early warning message contained in a report. The structure should guide their thinking.
- ***Fourth, the main point or "bottom line" needs to be clear.*** Similar to the previous point, the audience of a report does not have the time to piece together what the early warning message contained in a report. The message should be clear. For example the main message(s) should be in the summary and at the beginning of the relevant section.
- ***Fifth, the visual presentation needs to guide the reader.*** As discussed in the previous chapter, the selection of which presentational format to use at which time depends on the type, specificity, temporal, and spatial nature of the data or information to be presented.
- ***Finally, the report has to be complete.*** The report should include data and information that puts the current information into the proper context, as well as identify what the potential impact (with as much specificity as possible).

Most of the reporting presented in this chapter is already done by some of the NEWS in southern Africa. The focus of this document is to make these reporting formats available to those NEWS that do not do these reporting. In some cases where the NEWS does do one of the above reporting types, this document has suggested ways to broaden the focus of the report without significantly increasing the level of effort. This is an important point since there is a demand for the food access aspects of the reporting (essentially the innovation provided in this document for NEWS). Meeting this demand for broader reporting does not have to involve a substantial increase in effort.

6.1 Monthly food security bulletins

The monthly report or bulletin is an extremely important report for many reasons. *First*, this is the bulletin that all of your users will see. Some of the other reporting formats described in this document are internal or made available to a limited audience (maybe the Permanent Secretary requested some information). The monthly food security bulletin is sent to the NEWS entire distribution list. *Second*, this report has the greatest frequency of being produced (monthly). Since the bulletin is produced so often that users become more familiar with it and their expectations increase over time. *Third*, because of the frequency the timing of the production of the bulletin is critical. Since the bulletin is produced on a regular schedule any deviations from that timing are immediately known. *Finally*, if the bulletin provides timely and useful information others will learn to appreciate and count on.

The structure of the monthly food security bulletin is consistent with the National Early Warning System's (NEWS) early warning mandate. The mandate of the NEWS is to provide early warning of evolving food security problems, both food availability and food access. The reporting structure in this document (see Figure 6.2) takes account of the traditional early warning topics such as agroclimatic conditions and food availability. The proposed structure also takes into account food access and responding to food insecure populations (the reasons to include these have been discussed in earlier chapters).

Figure 6.2: Monthly food security bulletins: A proposed format

1. **Summary**
2. **Agroclimatic conditions**
3. **Food availability**
   - ❑ Crop production
   - ❑ Pasture and livestock conditions
   - ❑ Food stocks (SGRs and private)
   - ❑ Trade (in market, imports/exports)
4. **Food access**
   - ❑ Market conditions
   - ❑ Macroeconomic situation
   - ❑ Coping strategies
   - ❑ Health/nutrition
5. **Response to food insecure groups**
   - ❑ Changes in status of food insecure groups
   - ❑ Status of ongoing programmes
   - ❑ New programmes

There are some useful written materials on how to write effective monthly food security bulletins. REWS has publications (three volumes) on food security reporting that provide many useful suggestions. The FEWS Project has also developed some internal guidance on reporting writing (titled "FEWS Guidance for Monthly Report Writing") that is also available.

6.2 Memos (of developing food security issues)

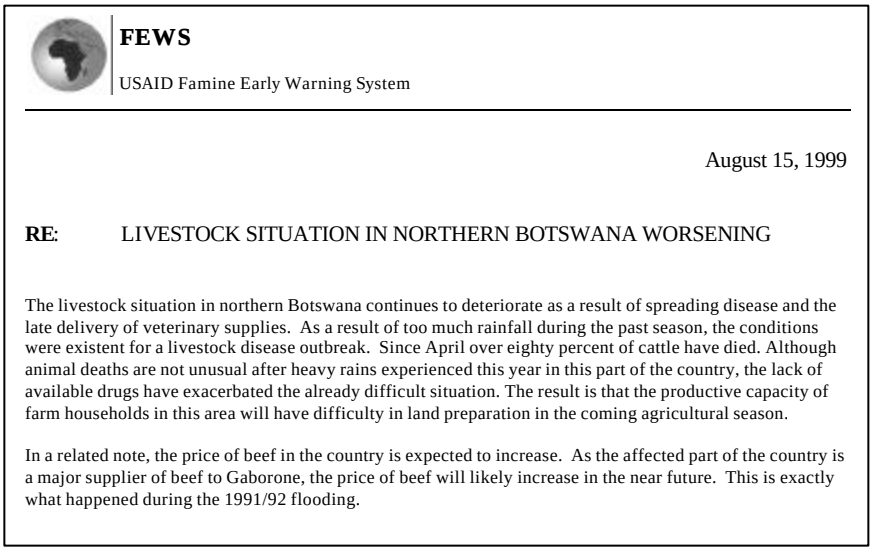
Although most NEWS staff is requested to provide information periodically as a memo, this format can be useful to disseminate an early warning message of a developing food security problem. When a NEWS learns of a developing problem and is able to confirm that the problem exists and is of sufficient concern, a memo is a good way to spread the message quickly. Because of the time sensitivity of some information is often not appropriate to wait for the monthly food security bulletin to "get the message out".

A memo could be written in either hardcopy or email format. Although the structure discussed in this section applies to both formats, the example presented here will be the hardcopy format (see Figure 6.3). There are a few basic components of a memo that are worth exploring further.

- ❑ ***First, the memo should clearly identify that it was produced by the*** NEWS. Ways to do this are to have a header that includes a logo that is specific to the NEWS. Most NEWS have already developed these headers and logos.
- ❑ ***Second, the memo should have the current date. In early warning a particular food security situation can change quickly***. Putting the date fixes the content of a message to a particular time period.

- ***Third, the subject line should clearly summarize the early message behind the memo***. The subject of the memo should express the problem, which is affected, the location and the appropriate level of concern.
- ***Fourth, the first paragraph should provide the main message and supporting data and information***. The first sentence should provide a restatement of the main early warning message contained in the memo. Other sentences should provide the appropriate data and information upon which that message is based. Also important is to include the context to put the discussion into perspective.
- ***Fifth, other paragraphs should provide useful related information that either supports the content of the first paragraph (the main message) or presents other important related points.***
- ***Finally, the appropriate presentation format should be used***. Although text will always be used, the mix of tables, graphs or maps depends on the early warning message being expressed.

Figure 6.3: Sample early warning memo of an evolving food security crisis



FEWS

USAID Famine Early Warning System

August 15, 1999

RE: LIVESTOCK SITUATION IN NORTHERN BOTSWANA WORSENING

The livestock situation in northern Botswana continues to deteriorate as a result of spreading disease and the late delivery of veterinary supplies. As a result of too much rainfall during the past season, the conditions were existent for a livestock disease outbreak. Since April over eighty percent of cattle have died. Although animal deaths are not unusual after heavy rains experienced this year in this part of the country, the lack of available drugs have exacerbated the already difficult situation. The result is that the productive capacity of farm households in this area will have difficulty in land preparation in the coming agricultural season.

In a related note, the price of beef in the country is expected to increase. As the affected part of the country is a major supplier of beef to Gaborone, the price of beef will likely increase in the near future. This is exactly what happened during the 1991/92 flooding.

6.3 Briefings

An oral briefing requires a similar approach to developing a memo. The main difference is that the topic is usually broader and requires more visual aids. The initial part of the presentation should be a slide (overheads) that explains the topic, date, presenter (or presenting organization) and main message of the presentation. This will focus the meeting on what will be discussed during the presentation. The next part of the presentation should be on the nature of the problem, the coverage of the problem (location and magnitude), and how the problem evolved. This is the main section of the briefing and should be supported by data and information that convincingly articulates the main early warning message. Finally, the potential impact on food security should be presented. The level of detail that

should be included in a briefing will depend on the nature of the situation. For example, early in the evolution of a situation the level of specificity is not as important as raising the concern of the agencies that will be required to take action to address a significant food security problem. Later in the development of a problem more detail of the nature and impact of an issue is required to take specific measures to remedy any significant food security problems.

There are many opportunities and potential pitfalls of an oral briefing. Some suggestions include:

1. ***Be brief***. As the title implies, the point is to concisely explain the problem, the coverage of the problem (location and magnitude), how the problem evolved and the level of concern.
2. ***Be visual***. Since the dissemination of the message is face-to-face (unlike a memo), using graphics is strongly advised. One should be careful to have graphics that are attractive, but not too flashy (it would conceal the message).
3. ***Be focused***. Although there are always many topics to discuss. Keep bringing the presentation—and any discussion—back to the main issue of concern. If it is worth a briefing then it is worth keeping the focus on the topic.
4. ***Be thorough***. One should have done sufficient analysis and verification to preclude any surprising questions.
5. ***Be prepared***. Practice the presentation until it can be given perfectly and the presenter appears relaxed.

6.4 Mass media

It is better to be proactive—than reactive—when dealing with the mass media. It is recommended that regular reporting be distributed to the relevant mass media outlets to try to ensure that the correct message will get published. Although this will not necessarily occur if they have the reports, but if they do not potentially more misleading information can be published. This was the hard lesson that was learned during the 1997/98 el Niño event.

When a completed report is sent to the mass media a letter that expresses the interest of the NEWS to discuss the issues contained in the report should accompany it. A further conversation with the publisher of part of a NEWS -generated report can clarify certain points that are explained in the report. This would be a time to reinforce the proper message and level of concern.

6.5 Assessments

Although these assessments—the start of season assessment, the preliminary crop forecast, the harvest assessment and the vulnerability assessment—have all been described in various ways and detail, it is important to include them in this chapter. They are an integral part of the reporting cycle. Each of them documents a key period in the monitoring cycle and provides an indication if a food security problem will evolve.

6.6 Documentation of NEWS activities and methods

Although the purpose of this documentation is strictly internal, it is still very important. The documentation of how it does it's early warning business is important given the high staff turnover in NEWS. Experience has shown the difficulties new NEWS staff has had when taking up their job without proper overlap with the outgoing staff member.

In most of the NEWS there already is a document that describes the NEWS structure, activities, and data holdings. In those cases where there is no documentation it needs to be developed quickly as this provides the context for new staff to understand the basic information about the workings of the NEWS. Where the documentation already exists it needs to be reviewed and updated.

A proposed structure for this documentation is presented in Figure 6.4.

Figure 6.4: Proposed structure for NEWS documentation of procedures and methods

1. History of Early Warning
2. Current NEWU Activities
    a. Institutional Structure
    b. Reporting and Use of Information
    c. Interaction with other early warning/food security groups
3. Other relevant food security institutions

4. Data holdings (Sources, Status, Use, How/Where Stored)
    a. Physical Data
    b. Socioeconomic Data
    c. Health/Nutrition Data
    d. Consumption Data and Calculations
    e. Map data

5. Methodologies/Procedures
    a. Monitoring
    b. Assessments
    c. Food Balance
    d. Population Projections
    e. Rapid Assessments

6. Administrative Methods/Procedures

APPENDIX 1

SELECTED BIBLIOGRAPHY

This appendix contains a rich source of materials for early warning professionals. All of the sources below are available at SADC FSTAU.

Databases and database management

SADC Regional Remote Sensing Unit Working Paper No 4., "Filename convention" (June 1997)

SADC Regional Remote Sensing Unit Working Paper No 6., "RRSP CD-ROM (version 1.0)" (March 1998)

SADC Regional Remote Sensing Unit Working Paper No 5., "The database of the SADC Regional Remote Sensing Unit, Version 1.0" (March 1998)

SADC Regional Remote Sensing Unit Training Paper No 3, "Vector files in BNA format" (June 1997)

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APPENDIX 2

KEY EARLY WARNING TERMINOLOGY

Administered pricing: Prices set by government. Examples are pan-territorial and pan-seasonal pricing.

Administrative levels: The different political or government geographic division of a country. Convention has the entire country as the administrative level 1, the next lower division of the country as administrative level 2 (e.g., in Zambia it is provinces), the next lower division of the country as administrative level 3 (e.g., in Zambia districts), and so on.

Agro-ecological zone: This is a geographic division of the country that is similar in both climate and soil. Maps of these are usually available in southern Africa.

Barriers to entry: Factors that prevent or place new entrants to trade at a cost disadvantage relative to established firms within an industry.

Barter: A method of exchanging goods and services directly for other goods and services without using a separate unit of account or medium of exchanges. A successful barter transaction requires a double coincidence of wants.

Buffer stocks: Stocks of a commodity held in an attempt to even out price fluctuations in primary commodities. The operators use the stock to mitigate fluctuations in prices by selling from the stock when prices are high (as a result of shortage in the market) and by buying the commodity when prices are low (as a result of surplus in the market).

Buyers' market: A market characterized by excess supply in which sellers consequently experience difficulty in selling all their output at anticipated prices to the advantage of buyers.

CIF (Cost, Insurance, Freight): A term which describes pricing or valuation of a good to include all of the costs (known as transfer costs) of delivering a good to the point of consumption. It may be contrasted with the FOB (or free on board) where the transfer costs are excluded. Imports are often valued at CIF prices and exports at FOB prices.

CPI (consumer price index): The cost of a given basket of goods used by classes of consumers, with different commodities given different weights.

Cash crops: Crops grown by peasant farmers mostly for sale in the market as opposed to crops directly consumed for subsistence purposes. Some food crops can become cash crops when a surplus is produced (e.g., maize in southern Africa).

Chronic (or long-term) food insecurity: See Food insecurity—Chronic (or long-term).

Cold cloud duration (CCD) imagery: These imagery—which measure the temperature of the tops of clouds—is comprised of data captured from a satellite that are a proxy for rainfall.

Competitive markets: A market in which a very large number of buyers and sellers trade independently, and no one trader can control significant quantities to be able to substantially influence prices.

Consumer: Any economic agent involved in the consuming of final goods and services. Households, not individuals, make many consumption decisions. This is important since households may take decisions based on some compromise of individual wants within the household.

Contestable markets: Markets in which firms can exit or enter without incurring significant costs. The threat of entry causes existing firms to maintain prices close to the level that would prevail if the number of firms were very large.

Coping strategies: The process by which households adjust their livelihood and consumption strategies when faced with a crisis.

Currency devaluation: A fall in the value of one currency in terms of other currencies, i.e., a decline in its exchange rate, under a system of floating exchange rates. It is similar in its effects to a devaluation that denotes a lowering of the exchange rate under an adjustable peg system.

Current (or transitory) food insecurity: See Food insecurity—Current (or transitory).

Demand: The quantity of a good or service which an individual or group desires at the ruling price. The total demand in an economy is referred to as aggregate demand. (see effective demand)

Derived demand: Demand for a factor of production is sometimes called a derived demand. This means that it is derived from the demand for the final good that the factor co-operates in producing.

Devaluation: A fall in the fixed (official) exchange rate between one currency and others. When the relative values of two currencies have been fixed at an officially agreed level, and reduction in the value of one currency against the agreed fixed level is a devaluation. Devaluation is used to correct a balance of payments deficit but only as a last resort as it has major repercussions on the domestic economy. For example, the price of a country's exportable goods will fall after devaluation. However, domestic consumers will pay higher prices for imports.

Disposable income: Income less tax payments or other "fixed" expenditures.

Economies of scale: Reductions in the average cost of a product in the long run, resulting from being able to produce at an optimal level (volume) of production..

Effective demand: Demand for goods and services which is backed up with the resources to acquire them. This is to be distinguished from notional demand which refers to a desire for goods and services, which is unsupported by the ability to pay and thus cannot be communicated to suppliers through the price mechanism. Lack of effective demand implies lack of adequate income to purchase food in the marketplace

Exchange rate: The price of one currency in terms of another currency.

Famine: an extreme case of food insecurity which has resulted from a series of underlying processes or events that eroded the ability of households to cope in the future (e.g., productive assets have been consumed or destroyed).

Farm gate price: The price a farmer receives for his product at the boundary of the farm - that is, the price without any transport to a market or other marketing service.

Food access: This is a measure of the population's ability to acquire available food during the given consumption period through a combination of its own production and stocks, market transactions, and transfers.

Food Availability: This is a measure of the food that is, and will be, physically available in the relevant vicinity of a population during the given consumption period through a combination of domestic production, stocks, trade and transfers.

Food balance sheet: A national accounting of the food availability situation in a country, which includes annual food production, food stocks, net imports (imports minus exports) compared to food uses in a country (consumption, animal feed, and other commercial uses).

Food economy zones: Parts of a country that similar patterns of livelihood opportunities and strategies.

Food Insecurity: This is the inverse of food security: a condition in which a population does not have access to sufficient safe and nutritious food over a given period to meet dietary needs and preferences for an active life. Possible causes are insufficient food availability, insufficient food access and inadequate food utilization.

Food insecurity—Chronic (or long-term): This occurs when a population has continuously inadequate consumption. Chronic food insecurity arises from conditions of poor food production, limited incomes, and poor health.

Food insecurity—Current (or transitory): This occurs when a population suffers a temporary decline in consumption. Current food insecurity can result from instability in food production, food prices, household incomes, or health conditions.

Food security: This is the condition in which a population has physical, social and economic access to sufficient safe and nutritious food over a given period to meet dietary needs and preferences for an active life.

Food shortfall: A shortfall, or deficit, in national food production and publicly-held stocks compared against national food uses (consumption, animal feed, and other commercial uses).

A food shortfall does not necessarily mean that there is a food availability problem as shortfalls in many countries are "covered' through public and private sector imports.

Food Utilization: This is a measure of whether a population will be able to derive sufficient nutrition during the given consumption period from available and accessible food to meet its dietary needs.

Geographic Information Systems (GIS): A GIS is a database that captures the spatial relationship between data for both display and analysis. The functions of a GIS are map digitizing, database management, presentation and a facility for spatial analyses.

Gross marketing margin: The difference between the price received by producers and that paid by consumers.

Imperfect market: (Note: market imperfection is not synonymous with market failure. See market failure for a distinction) One in which the following conditions, necessary for a perfect market, do not hold: (1) a homogeneous product, (2) a large number of buyers and sellers, (3) there is freedom of entry and exit for buyers and sellers, (4) all buyers and sellers have perfect information and foresight with respect to the current and future array of prices; (5) in relation to the aggregate volume of transactions, the sales or purchase of each market agent are insignificant, (6) there is no collusion amongst buyers and sellers, (7) consumers maximize total utility and sellers maximize total profits, (8) the commodity is transferable. If any one of conditions (1) to (8) are not fulfilled a market is to some degree imperfect.

Import substitution: Establishing domestic industries behind tariff and quota barriers. The objective is to replace imports by domestic production.

Income : The amount of funds, goods, or services received by an individual, corporation, or economy in a given time period.

Index: A composite measure of two or more indicators or measures.

Indicator: This a proxy of something that—although not measured—is important to monitor to understand the food security situation. For example, agricultural prices are an indicator of household food access and purchasing power.

Inferior good: This a good or service on which less money is spent as ones level of income increases. An example is small grains (millets and sorghums) in urban areas. As the income of a household increases less money is spent on small grains for consumption and more money is spent on rice or maize.

Inflation: The general increase in the price level of all goods and services in an economy from one period to another.

Information system: This a system that does all aspects of gathering, processing and analyzing data and information, and then packages this into information that is targeted at assisting specific decision-making processes.

Law of demand: The widely accepted view that, other things being equal, more of a good will be bought the lower is its price, and the less will be bought the higher is its price.

Market- Any context in which the sale and purchase of goods and services takes place. There need be no physical entity corresponding to a market. See section 2.3 for more information about what a market is and what activities they perform.

Market distortions : These are government policies or practices by marketing agents that result in an unclear signal between the producers and consumers.

Market failure: The inability of a system of private markets to provide certain goods either at all or at the most 'optimal' level. In general, market failure arises because of (1) non-excludability and/or (2) non-rival consumption of a good. Non-excludability means that individuals who have not paid for a good cannot be prevented from enjoying its benefits because the cost of doing so would be too high. If a good is non-rival, its consumption by one person does not preclude its enjoyment by anyone else. Clean air is an example of a good that has both non-rival and non-excludable characteristics.

Marketing board (marketing parastatal): Semi-private government office that manages commercial and usually security stocks.

Market integration: Describes how efficiently the market functions in moving goods and services through the different stages in the production process to the final destination - the consumer of the end product (see spatial integration).

Market structure: the number of buyers and sellers, their size distribution, the degree of product differentiation, and the ease of entry of new firms into an industry.

NDVI: Normalized Difference Vegetative Index are imagery comprised of data captured from a satellite that provide an indication of changes in vegetation in response to weather conditions.

Nominal: An adjective which describes the measurement of an economic magnitude in current (not adjusted for inflation) terms.

Normal good: This is a good or service on which more money is spent on as one's level of income increases.

Price: The price of a good or service shows what has to be given up in order to obtain a good or service. Prices act as signals that coordinate the actions of market participants. Supply and demand conditions are thus reflected in market prices. When market supply is large compared to demand prices are low. When demand is great relative to supply, prices are high.

Resource base: This is the environment (biophysical, political, and economic) within which households operate. The resource base is an important determinant in a household's ability to generate income and wealth, as well as cope to shocks and negative events.

Security stock: Government-managed food reserves also referred to as "strategic grain reserves - SGR."

Shocks: These are biophysical, political, and economic events that have an impact (either positively or negatively) on households and their food security status.

Spatial average: Average across space.

Temporal average: Average through time.

Thematic mapping: This is a map presentation that displays a simple subject (theme) to spatially illustrate a specific situation or condition that is represented geographically.

Thin market: Markets that do not have large volumes of trade. The implication is that there can be large swings in prices (up or down) as a result of increases in supply or demand. Prices obtained from thin markets are less reliable or informative about market conditions.

Transactions costs: Those costs other than price which are incurred in trading goods and services, for example the cost of information and the cost of legalizing transactions. These costs can be substantial.

Unit of analysis: This is the level of aggregation at which the analyses take places. In early warning this is usually at the district, province, or national level.