**Global Information and Early Warning System
(GIEWS)**

GUIDELINES FOR CROP AND FOOD SUPPLY ASSESSMENT MISSIONS

FOREWORD

FAO's Global Information and Early Warning System has undertaken periodic reviews of its methodology for Crop and Food Supply Assessment Missions (CFSAMs). This report is primarily designed for staff and consultants undertaking the missions and for readers of GIEWS' reports who are curious to know how estimates have been derived. These Guidelines are not intended to be the last word on the subject. As the new science of vulnerability assessment develops and our understanding of the processes which lead to food scarcity and famine becomes more refined, further revisions will no doubt be necessary.

The "Guidelines" are written in a climate of declining world food aid supplies and a growing concern that scarce food aid resources are allocated in the most equitable and efficient manner. While some of the methodological approaches are in keeping with past practice, there have been some notable revisions. The Guidelines move beyond the national level approach to food security and the "food balance sheet" in an attempt to explore food security at the sub-national level and interventions for vulnerable population groups. The report recognizes that in many low-income food-deficit countries, the public sector no longer dominates food marketing. Methods have to be adapted accordingly. The importance of sound qualitative judgements and of explicit quantitative assumptions is stressed, when, as is often the case, accurate quantitative data is simply not available. With the advent of powerful portable computers, missions are able to perform speedy calculations and to analyze geo-referenced data, including satellite imagery. The Guidelines seek to exploit the possibilities offered by recent hardware developments and ever more specialized software, including GIEWS' own Workstation and Risk Mapping projects.

Under the supervision of Dr. Abdur Rashid, Chief of GIEWS, the Guidelines were compiled by Ben Watkins, an economist and consultant with the Service. Invaluable comments were received on earlier drafts both from within FAO and from the international community at large. On the FAO side, special thanks are due to our colleagues in the Commodities and Trade Division for their insights relating to all aspects of the CFSAMs. Staff of ESN (Nutrition Division) and ESA (Agriculture and Economic Development Analysis Division) also provided pertinent comments. Numerous external reviewers have offered both official and unofficial views, including staff from WFP, the ODA (UK), the World Bank and the University of Wales. USAID/FEWS undertook a frank, comprehensive and astute review on the basis of which there have been substantial revisions to the Guidelines. Needless to say, responsibility for any errors and inconsistencies rests firmly with FAO/GIEWS.

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Rome, January 1996

LIST OF ACRONYMS

AFSR	Abnormal Food Stress Response
BMR	Basal Metabolic Rate
CCBS	Country Cereal Balance Sheet
CCD	Cold Cloud Duration
CFSAM	Crop and Food Supply Assessment Mission
CIF	Cost Insurance Freight
CPI	Consumer Price Index
CSO	Central Statistical Office
CSSWBM	Crop Specific Soil Water Balance Model
CWSI	Crop Water Satisfaction Index
DES	Dietary Energy Supply
DHA	Department of Humanitarian Affairs
DSM	Dried Skimmed Milk
EDP	Extended Delivery Point
EFA	Emergency Food Assistance
EMOP	Emergency Operation (WFP)
ETA	Estimated Time of Arrival
EU	European Union
EWFIS	Early Warning and Food Information System
FAO	Food and Agriculture Organization of the UN
FAR	Food Assistance Requirement
FEWS	Famine Early Warning System (USAID)
FSR	Food Security Reserve
FX	Foreign Exchange
GIEWS	Global Information and Early Warning System
IDP	Internally Displaced Persons
IFAR	International Food Assistance Requirement
IMF	International Monetary Fund
INTERFAIS	International Food Aid Information System
LIFDC	Low-Income Food Deficit Country
LSMS	Living Standards Measurement Survey
MoA	Ministry of Agriculture
NDVI	Normalized Difference Vegetation Index
NFBS	National Food Balance Sheet
NGO	Non-Governmental Organization
OLS	Ordinary Least Squares
OSRO	Office of Special Relief Operations
RRA	Rapid Rural Appraisal
RMP	Risk Mapping Project

SCF	Save the Children Fund
SGR	Strategic Grain Reserve
SQE	Status Quo Estimate
TER	Total Energy Requirement
TFA	Targeted Food Assistance
TOR	Terms of Reference
TOT	Terms of Trade
UCBT	Unofficial Cross-Border Trade
UMR	Usual Marketing Requirement
UNDRO	United Nations Disaster Relief Organization
UNFPA	United Nations Family Planning Agency
UNHCR	United Nations High Commission for Refugees
USAID	United States Agency for International Development
USDA	United States Department of Agriculture
WFP	World Food Programme

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1 INTRODUCTION

1.1 The Purpose of Crop and Food Supply Assessment Missions

Crop and Food Supply Assessment Missions (CFSAMs) are a key element of the information gathering activities of FAO's Global Information and Early Warning System on Food and Agriculture (FAO/GIEWS). They are designed to provide warnings of imminent food problems, using the most recent and accurate information available, so that timely and appropriate government, donor and NGO action can be taken to minimize the impact of man-made and natural disasters on the afflicted populations. The main objective of the mission will be the analysis of the food supply situation in the new or forthcoming marketing year at the national level with a view to estimating food deficits and the assistance required to meet them. Often, joint FAO/WFP missions will also be required to evaluate the food situation at the sub-national level, to identify local surpluses which can be mobilized to meet the requirement of the deficit areas and to ascertain which zones or population groups will require targeted food assistance, when, and for how long. Given the lengthy process of mobilizing international food assistance, the mission's findings must be communicated to the international community as quickly as possible. This means that CFSAMs work under very tight deadlines - and must use rapid assessment methods.

1.2 CFSAMs in the Context of Existing Monitoring Activities

The role of the CFSAMs should be understood in the context of ongoing local, national early warning and food information systems and the continuous monitoring of FAO/GIEWS. They are no substitute for developing local information generation, database and interpretation activities. Indeed, it is rare that a CFSAM will be undertaken in a country with an effective domestic information system.

At all stages in the mission cycle, CFSAMs work in close cooperation with local statistical, agricultural and early warning and food information systems (EWFISs), but have to undertake an independent and critical assessment of the locally generated information, and when this is weak, incomplete or subject to political influences, generate their own estimates.

1.3 The Background to the Current "Guidelines"

In 1985 FAO produced "Guidelines for Use by FAO Crop Assessment Missions to Africa", explicitly to provide: "a methodological framework for FAO missions making pre-harvest forecasts of production of main crops in African countries" (pi). This was followed in 1987 by FAO/GIEWS' "Methodology for the Assessment of Food Supply Situation and Requirements for Exceptional Assistance Arising from Crop Failure or Unusual Crop Surpluses". Since the release of these documents there have been profound changes in the demands on the System, in the practical challenges facing missions and in the theory and practice of early warning. A wider range of countries are now visited by CFSAMs, implying a flexible approach to assessment which can be adapted to very different agricultural systems, food markets and food problems.

The advent of the UN Department of Humanitarian Affairs (DHA) has expanded GIEWS' reporting responsibilities - CFSAM reports are often a key background document in DHA Inter-Agency Consolidated Appeals. Indeed, CFSAMs have recently formed a part of broader DHA led inter-agency missions to identify relief needs in the wake of natural or man-made disasters. The increasingly high profile of CFSAMs in the donor pledging process calls for periodic re-appraisals of the techniques used. There have been changes in the thinking on many aspects of early warning methodology and on the role of food assistance.

Finally, a new generation of portable computers and software applications (some of which are now being integrated into GIEWS's Rome based activities), has greatly increased the potential for the collation and interpretation of information. Increased data processing capacity has coincided with significant advances in food information database construction and coordination in many of the GIEWS member countries. The Guidelines have been compiled to reflect these new possibilities, and should be reassessed regularly in the light of future technical and database innovations.

1.4 The Basic Approach

Each section of the Guidelines begins with an overview, explaining the purpose of the proposed inquiry. Notes are provided on definitions of the key concepts and information types. Likely data sources are suggested. Usually, the main priority will be to collect and evaluate the quality of local information. Where no appropriate data exist, advice is provided for data generating, including rapid survey and forecasting techniques. Methods for interpreting and presenting data are explained, and problems are highlighted. Detailed technical explanations are provided in appendices. Suggested developments of computerized methods for data generation and interpretation are outlined in a separate document.

Many of the countries to which missions are sent have scarce or poor quality data sources. CFSAM activities may also be constrained by security problems and travel restrictions. There is rarely the opportunity for detailed analysis or modeling of variables. The "Guidelines", therefore, avoid the use of sophisticated quantitative techniques. Rather, they seek to provide a series of simple "rule of thumb" methods for data collection and analysis, which are sometimes far from being precise or theoretically sound - but have the advantage of being practical under the time and data constraints which CFSAMs typically face.

It is assumed that at least one team member will have a basic knowledge of algebra, elementary statistical techniques and econometrics. Ideally, all missions should be computer literate. The suggested computer applications are, however, user-friendly and require a knowledge of standard software packages but no programming ability.

Missions are encouraged to use a variety of estimation methods, and not to rely too heavily on any one measure. Sound qualitative explanations must be given for all significant changes in production and socioeconomic variables, and reports should clearly signal the assumptions on which estimates are based. Teams are urged to explain the data constraints which have necessitated the use of small samples or "rule of thumb" methods. Glossing over these issues is likely to undermine the credibility of the report.

1.5 The Structure of the Guidelines

Missions can scarcely be expected to have time to explore all the elements of the national and sub-national food situation in detail. CFSAMs are therefore encouraged to carefully define mission objectives and the level of detail required in consultation with the GIEWS country officer, prior to leaving Rome (section 2.1). Once in-country, the information gathering activities priorities can be refined further, when the quantity and quality of existing data has been fully ascertained. The team will have to plan field trips to reflect these objectives (section 2.2.1).

Most missions will be expected to conduct a comprehensive examination of food availability in the new marketing year, including domestic production (section 3) and opening stocks (section 4.1). By calculating utilization (human consumption, feed use, other uses and closing stocks) in the forthcoming marketing year (sections 4.2 - 5) and subtracting this from total domestic availability, the mission can estimate total import requirements or availability for export, following the familiar National Food Balance Sheet (NFBS) approach.

The mission will then have to examine external commercial trade, both imports and exports (section 6). Low Income Food Deficit Countries (LIFDCs) often lack the capacity to import the total food import requirement on commercial terms. The food assistance requirement is the component of the total import requirement which cannot be met commercially, explored in section 7.

Food assistance is broken down by type: targeted food assistance for emergency interventions and ongoing programmes and projects, and food assistance for market sale. Donors may also assist in the purchase of exceptional local surpluses and their distribution to the deficit areas.

Section 8 discusses the estimation of emergency food assistance needs, examining techniques for estimating beneficiary numbers, for determining ration rates and for deciding upon the duration of interventions. If there is a large rise in the likely quantities of food imports, or in the scale of emergency operations, it may be necessary to investigate the country's logistic capacity. This is discussed in section 9, which also provides notes on the scheduling of food imports.

2 THE CYCLE OF CFSAMS

2.1 Planning CFSAMs

2.1.1 Timing

It is recommended that missions be timed to fit neatly into the schedule of local assessment activities, especially those of the sub-national, national and regional early warning and food information systems (EWFISs). CFSAMs are usually planned to be in country towards the end of the main cropping season, when quantitative production estimates can be made with more reliability. If, however, the lag between main crop maturity and the onset of the lean season is less than the donor lead-time, and local information sources are weak, there is good reason to send a mission in prior to crop maturity. Donor lead-time is the time it takes to mobilize donor food assistance from the dispatch of the CFSAM report to the arrival of the first deliveries in-country.

Where information sources or communications are particularly weak and an EWFIS is not operational, a local consultant may be identified to undertake pre-mission preliminary information gathering activities, which will save the full mission a great deal of time.

Occasionally teams or individuals are also sent to assess secondary crops or the off-season food supply situation. The Guidelines are also of relevance to such missions.

2.1.2 Mission Composition

Missions are generally comprised of an agronomist and agricultural economist provided by FAO/GIEWS, and experts from other participating agency(ies) but the composition of CFSAMs should be extremely flexible, reflecting the general nature of the activity and the wide variety of possible mission objectives and technical challenges. All team members will have to be prepared for some cross-disciplinary work.

2.2 Briefing in Rome

Before embarking for its destination, the team will usually be expected to stop over in Rome for a few days, to collect background information from the FAO/GIEWS country officer and to clarify the objectives of the mission and its basic work programme. The team will also be briefed by other relevant FAO Units. The GIEWS country officer will be a reference point throughout the mission.

2.2.1 Defining Mission Objectives

The assessment of the food supply situation facing a country is a complex and potentially endless task. The CFSAM manual outlines a range of possible mission activities, but it is most unlikely that any one mission will have time to engage in all of them. It is therefore of the utmost importance that teams have defined the mission objectives before leaving Rome. This entails identifying the main priorities, and coming to an agreement on the best way to achieve them, in the very short time available.

The following questions should be clarified before leaving Rome:

- Which food commodities should be included in the analysis?

- How far should data be dis-aggregated? (national? regional? district?)

- Should the mission's main focus be on national supply and demand parameters, or on early warning of localized food security issues and targeted food interventions

- What data are already available, and how much will the mission have to generate itself? Are there any socio-political considerations which need to be kept in view in the individual countries to be visited by the mission?

When one or more other multilateral agency or donor is participating in the mission, all team members must come to a clear understanding of the respective roles and responsibilities of the agencies.[1]

To assist the mission in defining its objectives, a work-plan will be provided by the GIEWS country officer. The country officer will indicate those aspects which are of essential, and those of lesser importance. While in the field, the mission should regularly refer back to the work-plan to ensure that its work is on schedule. Notes on designing a work-plan are provided in appendix 1.

2.2.2 Essential Pre-Mission Information Gathering

The briefing period in Rome should also be used for preliminary information gathering. The GIEWS country officer will have assembled an initial work pack, and the team should acquaint itself with recent GIEWS reports on the country in question.

Teams carrying their own portable computers should ensure that soft-ware has been installed and that the latest database information has been loaded on the portable. The mission is referred to the separate document "Computer Applications for CFSAMs". Make sure that a recent virus scan and shield are installed: needless to say, all floppy disks should be virus-scanned before use.

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[1] For a description of the respective roles of FAO and WFP on CFSAMs, readers are referred to UNDRO (1991)

The following is a list of essential information to be collected in Rome:

- recent FAO/GIEWS reports and reports from the EWFISs
- National Food Balance Sheet (NFBS), CBSTAT data
- FAO official crop and livestock production time series / AGROSTAT, non-cereals balances
- official population data
- satellite images
- names of in-country contacts/essential information sources
- previous CFSAM reports
- fertilizer and seed production and trade data
- crop calendars and country maps

For certain countries, the following information should also be gathered:

- cropping, soil, altitude maps
- update on the migratory pest situation
- vulnerability maps - from RMP or elsewhere
- information on food supply/demand situation in neighbouring countries
- USAID/FEWS or USDA country reports
- DHA Inter-Agency Consolidated Appeal documents
- WFP Situation Reports, EMOPs (Emergency Operations)
- supporting documentation on soft-ware applications, conversion factors, ration rates and general methodology

General macroeconomics and sectoral economic information from the World Bank (Economic/Sector Memorandum, LSMS), from the Economist Intelligence Unit (Country Briefs) and from other non FAO sources may also be collected from the country officer and FAO's David Lubin Memorial Library. Headquarters may also have appropriate press-cuttings and recent country abstracts.

As far as possible, teams should be acquainted with the political background to the country, especially when civil strife has implications for food production and vulnerability. CFSAMs should be well aware of recent developments in food marketing, pricing and trade policies prior to departure. Reuter telexes and BBC's Monitoring Reports may provide useful information on politics and policies.

If time permits, pre-mission briefing meetings should be arranged with other relevant FAO divisions and services. The team may also be interested to meet FAO staff or consultants who have recently visited the country in question and are in Rome at the same time as the briefing.

2.3 In the Capital: Cooperation and Secondary Data

The mission's arrival in country will be followed immediately by a consultation with the representative of FAO and other participating agencies. Reflecting the objectives and priorities of the mission, a number of capital city interviews will be arranged, with representatives from UN Agencies, donor organizations, relevant ministries, crop parastatals and private traders. These interviews will be used to locate secondary information sources and to solicit the informal impressions of officials on crop prospects, factors influencing current season production and food security.

Given the time constraints, CFSAMs will be heavily reliant on secondary data. In fact, the mission can be conceived as a "back-stopping" exercise, to corroborate and substantiate the findings of the national institutions, and to summarize a wide range of data sources in a concise and rigorous way. The types of secondary data and where to find them are described in the subject specific sections 3 to 6 below, on the various elements of the CFSAM. Whatever the scope of the mission, however, the key consultations will be with the EWFIS, if one exists. While in the capital city, it is often worthwhile to look at recent newspaper articles for an unofficial, but often informative perspective.

In general, CFSAMs should attempt to complement the existing information services, ensure that local officials are involved in the mission's activities, disagreements are fully ironed out, and that the findings are broadly agreed. However, all secondary information should be examined critically. The team should check that:

- data is consistent and free of calculation errors

- the methods used for data collection and interpretation are sound

- the data does not contain gaps in its coverage of geographical area or population group

- the reasons for significant changes in food production and food security variables are sufficiently clear

If methodological weaknesses are identified, or data is incomplete, the team may have to gather primary data. All missions should confirm that the official explanations for significant changes in variables are justified. The principal tool for primary data collection and cross-checking secondary data is the field trips.

2.3.1 Planning Field Trips

Field trips will be scheduled in cooperation with the FAO representation and team members from other participating agencies and the EWFIS. Clearly, the field trip schedule should reflect the CFSAM's specific objectives and emphasis. However, it is worthwhile to make some general observations on field trips and sampling at this stage.

Typically, a CFSAM will not have the time or resources to make a comprehensive crop survey. Besides, over a necessarily small sample, such a survey would be susceptible to bias. For this reason, rather than devising a national sampling frame, the team should locate *typical* agricultural zones and should schedule the trips so as to bisect them. To do so the team will have to study initial briefing materials carefully, to get some idea of the geographical structure of national agriculture. Zones may be classified according to one or more of the following agricultural characteristics:

- main agricultural activity (arable, pastoral, mixed)

- main crops

- farming system: mechanized, subsistence, plantation, rainfed, irrigated

- productive potential: high yield, low yield, variable

- meteorological zone: high rainfall, low rainfall

- physical characteristics: altitude, soil types Particular attention should be paid to zones:

- which are subject to high yield variability

- which are reported to have had exceptionally poor/good yields. Satellite images will give an initial indication of major deviations from norms in rainfed agriculture. The team may also hear reports or see evidence of pest damage or some other localized factor affecting yields

- where civil strife has affected plantings and crop husbandry

- which have been excluded from the national crop sample frame

If the mission's Terms of Reference (TOR) includes identification of vulnerable groups for target interventions the team should attempt to visit areas where major problems are known to have arisen, in which targeted programmes are under way or which have a historical record of vulnerability[2], as a full coverage of representative socio-economic zones will not be feasible. It will usually be more practical to divide the team according to the expertise of its members, rather than attempting to combine crop and vulnerability assessments. Mission field schedules should focus on those areas in which there has been: civil strife or a sudden change in an agricultural or socio-economic variable, a crop failure or a dramatic price rise, for example.

The far-reaching implications of civil strife for food production, markets, stocks and access to food call for a particular emphasis on conflict affected zones, where travel permits and escorts can be obtained.

Initial reading (and previous experience) will also help to identify vulnerable group categories and their location. In countries covered by the Risk Mapping Project (RMP) or by USAID/FEWS, these sources should provide some initial suggestions on the appropriate survey structure.

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[2] The method is sometimes called "purposive sampling". It will rarely provide a sound statistical basis for population inference, but has been widely employed for Rapid Rural Appraisal (RRA) for its speed and simplicity (Maxwell and Frankenberger 1992),

The mission should also bear in mind the geographical spread of the following socio-economic characteristics:

- labour market: owner occupiers, share-croppers, landless labourers, unemployed, off-farm labourers, cash croppers

- civil strife, refugees, population displacement, market disruption

- food market structure: surplus/deficit markets, market integration and distance from supply sources

- poverty: expenditure surveys can give an initial indication of the geographical distribution of poverty

- extent of existing relief or welfare activities: public sector, NGOs, agencies or local community support structures

- malnutrition: using recent anthropometric surveys

To maximize the area covered team members will often have to travel independently. This means that subject specialists will frequently collect information for one another. Teams will thus have to share methodological approaches and opinions before departure.

Once the field trip schedule has been finalized, the mission should agree on guidelines for farm household selection and classification. Questionnaires or checklists for structured interviews should be designed by the team. Some notes on questionnaire design are provided in appendix 2 and examples may be available from previous missions. In zones which are mainly of interest for yield information, too much focus on any one crop, farming system or agro-ecological feature may be avoided. Farm interviews will form the core of the mission's field activities (crop inspections should be undertaken in the presence of the farmer). It will generally not be possible to be very selective in the choice of farmer: there will be little time to identify key informants or to arrange appointments. However, as CFSAMs often coincide with harvesting there should be no shortage of farmers in the fields.

In vulnerable areas, mission members should try to classify interviewees by a minimum of three wealth groups. Informal methods for identifying wealth groups will be highly location-specific: classification may be according to income, land holdings, animal stock, or a number of proxy indicators, such as the building structure of the home, quality of clothing, possession of consumer durables and so on..[3] Care should be taken not to allow the household head to dominate interviews; other family members should be involved. Whenever it is feasible to do so, women should be encouraged to participate in all group discussions. Further, female-headed households are often among the most vulnerable, and the team should try to locate such households. In countries where supplementary feeding programmes are proposed or on-going, particular attention should be paid to the vulnerable population sub-groups in target zones, that is, to young children, pregnant and lactating women, the elderly and the disabled.

As a general rule on field trips, teams should try to get away from the road as much as possible as both vulnerable populations and crops benefit from proximity to transport networks - and may therefore give a biased impression. In countries with a sizeable vulnerable urban population a series of targeted rapid urban household interviews is recommended.

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[3] Wealth ranking techniques for RRA are described in "RRA Notes, Number 15, Special Issue on Applications of Wealth Ranking", IIED, Sustainable Agriculture Programme, May 1992. See also, section 812.

2.4 De-Briefing

The team will normally have a brief stay in the capital after the field trips. This is an opportunity to gather any outstanding secondary information and to prepare a draft report. Data should be fully compiled and interpreted within this period.

The team will often be expected to give a preliminary de-briefing to government officials and local donor representatives and NGOs. The team may be under some pressure to disclose final figures for food production and food assistance requirements. It would be advisable to give an idea of the order of magnitudes of the estimates, *"significantly down on last year's/the average level"* for example, but not to reveal exact figures. The data will be re-examined in Rome and if corrections/changes are made it may cause confusion if local donor representations have already communicated the earlier estimates to their headquarters or if the media have reported them. Unless specifically authorized by FAO Headquarters, contact with the press should be avoided.

It is essential that the mission returns to Rome with a working draft report and fully cross-checked and tabulated data, as the turn-around time for CFSAM reports in Rome is very short. Missions will usually be expected to have prepared an edited summary of their findings (a maximum of fifteen pages). Often a fuller report will also be required, with more detailed explanations of data and calculation methods. The team will be expected to defend their findings in Rome de-briefings with FAO/GIEWS and, for joint missions, with WFP.

All text should be in WordPerfect, Word or a compatible form of generic text file. It may save time to send mission reports back to headquarters using electronic mail where possible. All mission hard data should be in a Lotus/Quattro/Excel or a common IBM compatible spreadsheet form. The missions should always carry hard copies of both text and data, in case there is a disk or hardware malfunction. Draft reports will be edited and graphical, tabular and cartographic data presentations will be prepared in Rome, but there will be little time for detailed discussions of data and methods.

The CFSAM report will be communicated to the Government and international community one week to ten days after the mission's return to Rome. Inter-agency teams should arrive at a full agreement on the data and text, before leaving the country. This will speed up the joint FAO/WFP clearance procedures.

If the team feels strongly that a follow-up mission should be launched, the Rome de-briefing provides an opportunity to express this view. The mission may also wish to comment on any specific weaknesses of the EWFIS which it has identified, or on any areas in which FAO back-stopping of local information services could be improved.

3 FOOD PRODUCTION

Most CFSAMs will be expected to make an estimate of national production of staple food commodities for consumption in the forthcoming marketing year, henceforth referred to as the new year. The purpose of the analysis is to provide a quantitative indication of the national food supply situation, and to identify regions which have experienced particularly poor harvests. Detailed explanations must be provided for significant changes in national or sub-national production, as they may provide part of the justification for an increase or decrease in total or targeted food assistance requirements.

The mission's production estimates include all crops that are likely to be consumed or held in stock during the new marketing year, which will generally mean those crops harvested shortly before or during the new marketing year. The mission should ascertain which short rains, recession and irrigated crops should be included in the production estimates and should clearly understand how the crop seasons are defined (planting and harvesting times). In the mission's final report all crops should be referred to by their official name, and the duration of the marketing year in question should be specified. The convention is to refer *to "the 1991/92 marketing year (July/June)"* for a marketing year begining on 1 July 1991 and ending on 30 June 1992.

A full crop-by-crop analysis of cereal production is necessary and, in countries where pulses,

> **Example**.
> In Ethiopia the *belg* (secondary season crop) is officially harvested up to mid-September, and crops harvested thereafter are included in *meher* (main season) crop estimates. The main season crop is largely available for consumption in the new marketing year, starting in January. Hence, the December 1995 CFSAMs to Ethiopia estimates 1996 production for consumption in the 1996 marketing year (January/December) comprising an estimate of the 1995 *meher* crop and a forecast of the 1996 *belg* crop.

roots, tubers or livestock products form a significant part of the national diet, data should also be collected on non-cereals food commodities. The more dis-aggregated the data set, the more useful the time series will be in assessing the current and forecast crops. Where possible, therefore, new year production estimates and time series data should be dis-aggregated by zone, by cropping season, by sector (peasant or commercial, rainfed or irrigated) as well as by commodity type. Production data should also be divided into area (hectares) and yield (kilogrammes per hectare), which will help the team to make more accurate new year production estimates and to identify the reasons for changes from past years.

Food production estimation should begin with a thorough analysis of the quality and range of data which is available in-country on new year crops. If there are severe methodological problems with the official new year statistics, or major omissions (regions or commodities) the mission may have to generate primary data. In any case, all official data should be checked for consistency and for calculation errors.

A series of capital city interviews and field visits will be used to verify the accuracy of official data, and to revise them where necessary. The mission must then ensure that the final estimates are fully explained: this means describing the methods used to derive them and the factors which have led to any significant changes in planted area and yield.

3.1 Data Sources and Data Conventions

The sources of new year production estimates and time series data vary from country to country. In general the official government estimates will be provided by the Central Statistical Office (CSO), Ministry of Agriculture (MoA) and, in some cases, the grain parastatals. Large private grain traders/commercial farmers may also have collected data. National level time series data is available from FAO, either from AGROSTAT/CBSTAT or in hard copy form.

Missions often face the problem of deciding which data set to use and it is advisable to discuss the problem with the GIEWS country officer before leaving Rome. Sometimes the MoA and CSO have conflicting time series. In general, FAO time series data are derived from CSO sources, which should therefore be used by the mission. It is often the case, however, that the MoA figures are released before those of the CSO - and are the only data available at the time of the CFSAM. If this situation arises, the mission should check the relationship between CSO and MoA data in previous years. If there are only minor inconsistencies, the MoA figures can be used after careful review. If they are large but follow a well defined pattern this could be a result of different underlying assumptions or sample weights. Using the same assumptions/ sample weights as have been used by the CSO in the preparation of historic data, it may be possible to adjust the new year crop estimate accordingly, to preserve consistency with the time-series.

Sometimes official data from the previous year will have been updated in the light of final production estimates, but the FAO series may not yet reflect these changes. Having discovered the reasons for the changes, the mission should adjust the FAO time series accordingly. Any revisions to the FAO time series data should be clearly indicated and explained.

Dis-aggregated time series data will contain a large number of observations, and data collation, manipulation and interpretation will be much easier if computer spreadsheets are used. Country specific production spreadsheets for dis-aggregated data should be provided by the country officer in Rome.

It is important that data conventions are used consistently and conform to FAO practice. Otherwise confusion can arise. Guidelines on weights and measures, data rounding and numerical formats are provided in appendix 3.

3.2 Planted Area

For the purposes of CFSAMs planted area is defined as the total seeded area. The mission should concentrate on actual or forecast seeded area for new year crops, rather than on planned, ploughed or harvested area. To avoid confusion and double-counting, only the final seedings of an area should be considered. When crops have been replanted as a result of early failures, do not include previous plantings in the estimates. In the event of double cropping or ratoon crops the area should be counted twice and the yields for each crop estimated separately. Total crop failures which occur after the final planting should be reflected in yield estimates - i.e. zero yields[4]. In countries where inter-cropping is common the usual convention is to convert mixed stand into pure stand equivalents, using information on respective plant densities to calculate the proportion of fields planted to each crop. In practice, the CSO will usually use a standard percentage and the mission may follow suit.

It is virtually impossible for a brief mission to make independent estimates of cultivated area. Hence, the official data will be the basis of the mission's statistics. However, careful cross-checking of new year estimates with time series data helps to identify weaknesses and errors in the data set. It may be erroneous to assume that sample weights have been calculated and applied correctly. This should be verified. If the area planted to one particular crop has risen/fallen sharply, the mission should seek a plausible explanation from the relevant ministry. The explanation should then be corroborated through discussions with farmers in the areas in question. If a current year estimate appears to be erroneous, it may be advisable to replace it with a trend-adjusted or average value.

A delayed season may mean that the official area estimates were made before planting had been completed and are therefore underestimates. The mission should therefore determine when the official area estimates were made in relation to the actual planting time.

If no area data is available for the current season for a particular zone, or under-estimation is suspected for the reason stated above, a trend-adjusted or average value should be used. This may then be modified on the basis of the field trips, after consultation with farmers and extension officers. In such areas, evidence should be found of abnormal expanses of newly ploughed virgin land, or idled cultivable land. Aerial surveys may be of use for the latter, particularly in areas where civil strife prevents ground assessments and may have caused population displacement and idling of land. Landsat, Spot and similar satellite images are available in very few countries and, provided they are calibrated and interpreted correctly, can be used to assess changes in planted area (see section 3).

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[4] In FAO/GIEWS 1987 the distinction is made between planted and harvested area; as missions are likely to be in the field before harvesting, it is generally more practical to reflect total crop failures in the yield rather than the area figures. If the mission has data on harvested area, assume zero yields on the difference between planted and harvested areas, and re-calculate the average yields per planted hectare accordingly.

Sometimes estimates of seed distribution or sales, and tractor rentals may also give an indication of changes in planted area. In Botswana, for instance, communal sector tractor ploughing has been heavily subsidized by the Government and detailed records or ploughed hectarages are kept. In countries which depend entirely on hybrid seeds, distributed through official marketing channels, information on total allocated quantities and on average seeding rates may be used to calculate a rough bench mark on planted area. But comprehensive state intervention in input supply markets is becoming increasingly rare.

For details of forecasting planted area for future crops, refer to section 3.4 and appendix 5.

3.2.1 Analysis of Area Data

When a complete set of new year cropping season area data has been obtained, this may be compared to the time-series data, using average or trend values, to identify significant changes. It is then necessary to provide an explanation of these changes. If the data exist, it may be useful to examine the difference between actual seeded area and planting intentions, targets and/or ploughed area when analyzing the factors which have affected planted area. If seeded area is well below ploughed area, for example, it may be inferred that the availability of traction power has not been a key constraint, but that seed supplies or early season weather conditions have been influential. Only factors that have been particularly important in the current season should be highlighted.

Underlying constraints to cultivation should not be emphasized. The mission's Terms of Reference are unlikely to include making recommendations on agricultural production policies, although the capital city and Rome de-briefings will provide an informal forum for any opinion the team may wish to express on the subject.

The following factors should be considered:

- weather conditions at planting time: were rains delayed? insufficient? excessive?

- did output and input prices en/dis-courage farmers?

- were there any significant changes in the availability of tractors or draught animals?

- were supplies of seeds, fuel and agricultural labour a constraint?

- was planting affected by population displacement or abnormal migration as a result of civil strife or food shortages?

3.2.1.1 Weather Factors

Climate and satellite data should be examined, to assess the likely effects of early season weather conditions on area planted. Farmers' weather expectations may also influence planting decisions - although these expectations are sometimes based on superstition. Remember that an unfavourable or late start to the season may result in shifts between crops and/or a fall in total seeded area.

If rains are delayed, there may be a shift towards cultivation of shorter-cycle cultivars. The yield implication of shifts between cultivars should also be considered (see section 3.3.2.1).

Excessive or inadequate pre-seeding rainfall may have different implications for different farming sectors, depending on the predominant type of land preparation. In a peasant sector, for example, in which hand and animal draft is widely used, low soil moisture during the ploughing period is likely to be of more consequence than for a more mechanized commercial sector. False starts to the season may lead to plantings which then fail. If seed supplies for re-planting are limited a false start may lead to a reduction in area. Excessive early season rains, resulting in flooding and water-logging can also act as a major constraint to planting and transplanting.

Area under irrigated crops will also be affected by water availability. Irrigation water availability can be examined by comparing lake, river or dam levels with those of previous years. The mission should take note of significant changes in irrigation technology; the construction of new dams or exploitation of new water sources, for example.

3.2.1.2 Price Factors

In countries where input and/or output prices and marketing have been partially or totally liberalized, farmers' planting intentions are likely to be influenced by changes in expected profits. While price responsiveness will vary between countries, sector, commodity and agricultural zone, changes in the relationship between farm-gate input and output prices can rarely be ignored. For a given farm-gate output price, planting intentions will be affected by changes in: the rental cost of land, farm traction, fuel prices, hybrid seed, fertilizer and pesticide/ herbicide prices, the cost of agricultural labour and interest rates.

If available, current and time-series data on farm-gate input and output prices should be collected, usually from the MoA or CSO. The mission should avoid using wholesale market price data; sometimes these prices are not transmitted to the farm-gate, when the private trade is weak or uncompetitive. If no farm-gate data is available, and wholesale price data is considered to be unreliable, farmers should be consulted directly on the prices paid for farm inputs and the prices at which they expected to sell their produce when they planted - although farmers are well known for complaining about prices. Where prices are not market-determined assessment should be made of pre-planting official input and output prices and, where appropriate, of the parallel (informal) market prices.

It will not be feasible to conduct a full quantitative examination of area responses to input and output price changes in the context of a CFSAM, as this is time consuming and depends on abundant data. A simple semi-quantitative approach is therefore recommended. Examine current and time-series price data to detect marked changes in the ratio of prices of a specified quantity of a farm input and farm output. If, for example, hired tractors are commonly used, calculate the ratio of the cost of one hour's tractor rental at ploughing time, to the prevailing output price of a ton of crop. Compare this ratio with the historic price ratio (at the same point in the crop year).

If a major rise or fall is detected, try to get an opinion on price responsiveness. Supply elasticity estimates, for example, may be available from national or international research institutions. If supply response parameters are strong, planted area has fallen and an increase in the input/output price ratio has been identified, the mission may conclude that rising/falling input/output prices has affected planted area.

Farmers' planting decisions are based on their expectations of prices after harvesting. For some food crops this may mean prices six months after planting. If some exogenous factor has increased the uncertainty of farm gate prices, a recent policy change or civil strife for example, commercial production may become more risky, and risk-averse farmers may reduce their cropped area accordingly.

> **Note**
> Under no circumstances should missions consider changes in input prices without considering output prices or vice-versa. A rise in the farm-gate input prices may be offset by increased output prices, leaving incentives unchanged, particularly if the price change is a result of general price inflation. In the absence of an official inflation estimate or Consumer Price Index (CPI), an informal opinion could be sought from a local financial institution or the World Bank representation on the inflation rate.

In countries where there is considerable substitution in production between cash and food crops or between different food crops, it is worthwhile to look for recent changes in the relative prices of cash and food crops, which may have induced farmers to shift land between crops, and to check that such shifts are reflected in the area data. If food crops are produced for export, assess the effects of changes in border prices (which may or may not reflect world market price changes).

The main causes of a price change should be identified. Pricing and marketing policies are also likely to have a marked impact on farm-gate prices, particularly when price controls are in operation. Changes in marketing policy may mean that farmers no longer have guaranteed buyers - if the private sector has not stepped in - which may have the same effect as a price fall for some farmers. Changes in world prices and food trade policy (tariffs or quotas), may also influence farm-gate prices.

It may be the absence or cost of credit, rather than farm-gate input or output prices *per se*, which act as a dis-incentive to planting. If there have been structural changes in the rural credit market, or large changes in borrowing rates, the team should make a qualitative judgment of the impact on planting decisions.

3.2.1.3 Input Distribution

In countries with heavy government intervention in input or output markets, or in areas where input distribution schemes are operational, certain non-price supply-side factors may affect planting intentions. In such cases missions should consider the quantity and timing of seed distribution programmes, where they constitute a significant proportion of farm input supplies. Public and relief sector tractor and draft animal distribution schemes should also be examined for evidence of major expansions or contractions.

In countries or zones where animal draft predominates, the mission should look for significant changes in animal stocks, caused, for example, by civil strife, drought or animal diseases.

3.2.1.4 Migration

Population displacement or exceptional demographic change may lead to significant changes in planted area. Prolonged migration can affect total area, but short term migration (as a result of civil strife or employment opportunities off-farm) may delay plantings and affect the intensity of crop husbandry. The mission should decide whether population displacement is reflected in yield or area estimates - or a combination of the two.

Example

In the case of Rwanda in 1995 no official area data was available for the first cropping season. Using data on the regional level rural population, adjusted to reflect mortalities and (huge) out-migration, average household sizes and average area per household under specific crops, the CFSAM was able to make a rough estimate of the influence of the large demographic changes on cropped areas.

3.3 Yield

Once the evaluation of area data is complete, the mission can turn its attention to yields. A full set of yield information should be collected by zone, sector, season and commodity, which, when multiplied by the area estimates, will provide the basis for new marketing year production estimates. Comparison of current or forecast season yield estimates with historic averages or trends will serve to identify major changes. The reasons for these changes must then be examined.

Yield refers to the actual whole grain yield obtained at harvest, accounting for losses during harvesting and due to lodging and shattering. The mission should not use data on "*economic yields*", net of post harvest losses (threshing, drying, storage, transit), seed and feed uses, as these elements will be calculated independently of the yield estimate. Yields are calculated in kilogrammes per hectare.

Where comprehensive yield surveys have been undertaken, the mission will have to check the accuracy of and reasoning for the expected harvested yields. Where appropriate, update estimates in the light of more recent weather or pest conditions, for example. In some cases it will be necessary to generate yield estimates, where official data refers to target yields or genetic potential yields, or where data is regarded as unreliable.

Before deciding upon an approach, the mission should make a critical examination of the timing, geographical coverage and methods of the official sample. The mission should check that the survey has been undertaken in accordance with the official sampling frame and that the sampling frame is well stratified and includes a statistically representative number of observations.

While in most cases the mission is unlikely to be able to challenge the official area data, yield data can be adjusted according to the perceptions of the mission members. Adjustments may be called for if: a) yields are likely to have been affected by events which have occurred since the last official estimation exercise; b) if there are clear weaknesses and/or gaps in the methods used. Only in exceptional circumstances (severe time constraints, civil strife) should the mission not attempt a field verification exercise. In this case as many alternative capital city sources on agriculture should be consulted as possible. Ideally, the mission should carry the official yield estimates on field visits and check their validity against its own observations. Nevertheless, yield estimates should not be disputed without good reason - and all changes should be discussed with the relevant officials, at the capital city and local level. The mission should try to arrange discussions and farm visits with the local officials who have been responsible for compiling yield estimates, often extension staff.

Detailed qualitative reasoning should be provided to explain all significant deviations in yield estimates - wherever possible backed up by data e.g.: "*yields in region B are down by 5 percent mainly as a result of a 15 percent drop in fertilizer usage during the season*". The relative importance of different factors in terms of yield outcomes should be reflected in the structure and emphasis of the report text. Yields should always be compared to an average or trend and to the previous year's outcome. In explaining changes in yield, emphasis should be placed on the particular factors affecting the current crop - rather than on underlying constraints to productivity.

3.3.1 Generating Primary Data and Verifying Secondary Data on Yields

Where official data is weak or partial, a number of methods can be used to generate or check yield data. The choice of method will depend on the time and data available. As no one method is perfect, whenever possible, several methods should be applied and the results used to define a range of plausible yield outcomes, cross-checked against historic yields. A spreadsheet can be used to enter and process yield data. If it is not possible to arrive at a single plausible value for each region, the team is referred to section 3.5 on crop production scenarios.

3.3.1.1 Using Satellite Images

Satellite images have two main functions for CFSAMs. Firstly they serve to identify areas which are likely to have suffered from drought - so that the mission can schedule its field trips accordingly. Secondly, they serve to corroborate other sources of agrometeorological information on yields. They are a partial substitute for meteorological data in countries where this is weak or incomplete Only in exceptional circumstances should they be used directly for yield estimation.

Two sources of regular satellite data are available to missions to Africa; the ARTEMIS (African Real Time Environmental Monitoring System) receives METEOSAT data which is processed to create images of Cold Cloud Duration in hours (CCD). This can then be converted into Number of Rainfall Days (NRFD). The U.S. National Oceanographic and Atmospheric Administration (NOAA), by means of Advanced Very High Resolution Radiometry (AVHRR), provides Normalized Difference Vegetation Index (NDVI) images which are also available for Asia.

Both sets of data can be carried by CFSAMs as print-outs from Rome or on a 486 portable computer, with colour screen. IDA for Windows provides missions with the opportunity to make instant comparisons of the current season with a reference year, or average of several years, by means of difference images or graphs. Both sets of images are decadal (covering a ten day period). CCD images provide a proxy for actual rainfall for an area of approximately 50 km^2, while NDVI measures seasonal photosynthetically active green leaf biomass (at 4km^2 or 1km^2), which is potentially an indicator of crop condition. They are both, therefore, of some relevance to CFSAMs.

CCD images are only estimates of actual rainfall and, although the calibration of the model is gradually being refined, it is unwise to try to extrapolate too much information from them. However, in areas where five to ten days of rainfall are estimated to have been received, it is usually safe to conclude that significant precipitation has occurred. Areas of no CCD can usually be taken to mean no actual rainfall. Hence, for tropical rainfed agriculture, the CCD can be used to locate drought areas, and can be used in conjunction with other meteorological data (including NDVI), to verify where and when rainfall has or has not been received.

NDVI is also only a rough measure of crop growth and condition. It is not able to differentiate between cereal and other food crops, grasses and weeds. A high vegetation response at the beginning of the rains, therefore, does not necessarily reflect food crop plantings. NDVIs are also unable to determine which crops have reached maturity or have been harvested. A sharp reduction in NDVI towards the end of the season could reflect crop maturity/harvesting or wilting as a result of drought. To interpret NDVI it is therefore essential to know actual planting times and the phenology of local cultivars. A rapid NDVI response shortly after planting time can indicate that water has not been a major limiting factor to germination. Similarly low or zero NDVI measurements between germination and maturation are likely to indicate that crops have suffered water stress.

If there is no other information on current crop prospects in a particular area, the mission should compare CCD and NDVI images for a sample of at least five years' seasons, by making difference images, bearing in mind actual yield outcomes in those years. Advice should be solicited from FAO/GIEWS in Rome on the appropriate choice of years for comparison.

It is also useful to graph the current year values against a long term average or representative years[5]. If there appears to be no clear correlation between yield and CCD/NDVI values in past years, a trend or average value should be applied for the current yield estimate. If there is a clear correlation and current crop values exhibit a marked variation for the norm, then it would be advisable to define a range of possible values and to construct production scenarios rather than a unique yield value. When satellite images are used, the imprecise nature of yield estimates derived in this manner should be emphasized in the mission's report.

CCD and NDVI images are potentially useful for assessing pasture conditions in semi arid rangelands. In countries where pastoral communities form a significant vulnerable group, or where livestock products from rangelands grazing constitute an important part of the national diet, the mission is advised to look carefully at the satellite images, compared to norms and reference years.

3.3.1.2 Using Agrometeorology and Crop Specific Soil Water Balance (CSSWB) Models

In tropical rainfed agricultural systems, where rainfall and potential evapo-transpiration are likely to be key determinants of yield, simple water balance models can be applied. The CSSWB refers to the difference between precipitation received, and water lost by the crop and soil, bearing in mind the water retention capacity of particular soil types. FAOINDEX (Version 2.1f at time of writing) is a straightforward computer application, which can be run on a portable computer, and has great advantages over hand calculation, especially in countries with large numbers of rainfall stations. While running the model is not difficult, its performance is highly dependent on the calibration of the model and the timeliness, quantity and quality of the data available.

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[5] Care must be taken to ensure that the pixels chosen for graphical display are representative of the surrounding area, otherwise the analysis will be biased.

FAOINDEX is not a black box. Missions intending to use FAOINDEX are advised to take the latest software version and user-manual with them (Gommes 1992).[6]

The decision to apply the model should be reached in consultation with the GIEWS country officer and with the FAO Agrometeorology Group (AGRT) prior to the mission's departure.

The circumstances in which a team should use FAOINDEX for yield estimation are rare. Sometimes agrometeorological yield models will already be in operation in country. Where this is not the case it may be that meteorological data is simply too poor for the model to be run. If meteorological data exists, but the mission is unable to visit key crop growing areas because of security problems or time constraints, the FAOINDEX may provide some useful parameters for "filling in the gaps" in yield data but it is a poor substitute for field visits. It can only give an indication of the percentage of crop water requirements which has been met (Crop Water Satisfaction Index - CWSI). To arrive at a yield estimate it is necessary to estimate the historic relationship between yields and CWSIs using regression analysis.

If current crop yield (Y_t) is a function of CWSI and historical yields ($y_{t-1, ..., t-j}$), time series data and current season CWSI values could be used following the specification:

$$Y_t = \alpha + \beta_1 (y_{t-1}, y_{t-2}, ..., y_{t-j}) + \beta_2 CWSI_t + u_t$$

The appropriate lag structure for the influence of historical yields, and the model's specification (log, semi-log and double-log) can be derived by trial and error.

Actual yields will obviously be influenced by a variety of non-rainfall related factors. These factors include soil fertility and fertilizer application, choice of seed variety, crop husbandry, crop protection and pests and exceptional meteorological conditions (which cannot be described by CSSWB models) such as hailstorms, very heavy rainstorms and heat-waves. Unless the trend and CWSI parameters are very strong explanatory variables, the above regression will be under-specified and prone to bias.

3.3.1.3 Using Crop Inspections and Interviews

Aerial inspections have the advantage of a large geographical coverage, and are particularly useful for examining germination and vegetative crop conditions. For maturing crops, aerial inspections are of less value: extreme cases of pest, hail and drought damage will be evident, but poor grain filling and plant diseases can not be spotted and much of the difference in crop appearance from an aerial perspective may reflect differences in cultivars. Clearly, for roots and tubers, aerial surveys can only indicate vegetative conditions - which may or may not be a good indicator of yields.

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[6] The reader is also referred to FAO/PPP 73 (1986) & Reddy (1993)

Windscreen surveys, from a slow moving or stationary vehicle will give a better indication of crop conditions for cereals. The number and size of ears/cobs should be evident, but the team would be advised to stop regularly to assess the grain size.Remember that areas along roads are often better served by extension and input supplies. Easier access to output markets may also encourage crop husbandry - so crop conditions may be better than elsewhere. For this reason, the mission is advised to use a suitable four wheel drive vehicle and to make off-road diversions as regularly as possible.

There is no substitute for farm interviews, combined with a physical examination of crops. Guidelines on preparing field questionnaires are provided in appendix 2. Note that it may be difficult to come to conclusions about zonal or regional crop yields from a small sample of farmers. The team should therefore try to stop for interviews in as wide a range of zones as possible, selected using the basic classifications suggested above in section 2.3.1.

The team should walk through the crop stand, as the borders may give a biased impression of the total yields. Assess plant density, cob and ear numbers and size per plant, plant damage from disease, pests, storms and hail. Individual crops should be examined more closely to gauge the average size and number of grains, roots or tubers. During the examination, the team should conduct an interview with the farmer, referring to the farm household questionnaire, and ascertain the main events during the crop cycle and when they occurred.

Bearing historic actual zonal yields in mind, the farmer should be asked to compare the current crop with a representative good, poor and normal crop year respectively. Some observations on the quality of land preparation and crop husbandry (including fertilization, weeding, application of pesticides) act as a control to determine whether the features of the particular field reflect the ability of the farmer or external factors, and hence whether the field is representative of a certain zone.

Crop cuts and cob/ear measurements may be attempted to corroborate interviews and visual observations. They are, however, extremely prone to aggregation errors when crop stands are variable within one field or when the total area of the field is not known with certainty and should therefore not be regarded as "objective".

Translating physical and visual crop examinations into yield estimates will require considerable local experience, and a knowledge of the physiology of local plant varieties. If possible, examine extension demonstration plots which will provide an indication of how well a particular local seed can perform under good husbandry conditions. Extension staff and the farmer may already have an idea of how much the field will yield in total; calculating the hectarage of the field may be problematic. Estimating a range of yield outcomes may be more instructive. Provided a zone is sufficiently homogenous, after several inspections a pattern should start to emerge and the average range may start to converge. Yield ranges provide a criterion for accepting or rejecting official estimates. If official estimates fall well within the range, they need not be adjusted. If official estimates fall outside the range or are consistently on the high or low extreme, or there is no official data available, the team will have to generate its own estimates. This will entail converting range estimates into single values.

Consider a sample of n representative farmers in zone x, each with a minimum yield of $ymin_i$ and a maximum of $ymax_i$. Assuming that the sample is representative of zone x, meaning that the farms visited share the same basic agricultural characteristics of the zone as a whole, and that the minimum and maximum values are equidistant from the mean of a normally distributed probability function:

$$(\sum_{i=1}^{n} ymax_i + \sum_{i=1}^{n} ymin_i) / (2n), \text{ where, over a large sample, } E(Yx) - Yx \rightarrow 0$$

If the time series is dis-aggregated by region, to arrive at the regional yield estimate (YR) from n zonal estimates YZ_i calculate the proportion (a_i) of total regional area (A) cropped in each zone (A_i) as:

$$a_i = A_i . (\sum_{i=1}^{n} A_i) \text{ and YR } = \sum_{i=1}^{n} (a_i . Yz_i)$$

If there is high yield variability in a major food crop producing zone, the mission sample is small or for some reason considered to be unrepresentative, it may be necessary to leave yield ranges in the analysis, rather than attempting to arrive at a single value. The issue of crop scenarios is discussed below in section 3.5 and appendix 6.

3.3.2 Analysis of Yield Data

Using the evidence derived from the various sources available to the mission, the yield estimates must be explained. The mission should be satisfied that there are clear reasons for significant deviations in yields from the historic average or trend. In the time provided it is rarely possible to arrive at a significant correlation coefficient for the effect of any particular variable on estimated yields, but strong qualitative and semi quantitative arguments should be used to substantiate the choice of yield figures. The most decisive factors should be given priority both in their position in the text and the detail of the description. The team should concentrate on the particular factors affecting crop production in the current year, rather than underlying constraints to production.

3.3.2.1 Weather Conditions

In assessing the influence of weather conditions on yields the mission should consider climatic variables from the completion of seeding to the completion of harvesting. This information will be analyzed to explain the impact of temperature, rainfall/flooding, snow and hail on actual harvested yields. Particular attention should be paid to extreme or abnormal weather conditions which have had a marked effect.

If CWSI estimates are available, from the team's estimates or from a local agrometeorology service, they can be examined to give a quantitative indicator of the effects of rainfall quantities on yields. If they are not available, data on rainfall, temperatures and other relevant climatic phenomena should still be collected - usually from the meteorological office or research institutions. The moisture-yield correlation can then be examined qualitatively, given weather conditions at the various phenological stages. Any conclusions derived in this manner should be cross-checked against farm interviews and crop inspections.

In interpreting weather data it is advisable to use actual planting times (from farm interviews) rather than the average or optimal times. If this information is not available, it may be necessary to work back from the current stage of crops to their likely stage at previous periods in the season. If satellite data or rainfall station data indicate a marked divergence from the mean, and visual crop inspections confirm that excessive or inadequate rainfall has been a key limiting factor for yields, outline the weather conditions from ploughing to harvesting, compare cumulative or monthly rainfall to norms, explain at what phenological stage the crop was affected - the extent of, for example, permanent wilting, crop recovery. If a delayed start to the season induced farmers to plant short-cycle cultivars, potential average yields may be lower than for long cycle crops: the mission should take note if this is the case.

Missions will normally be in-country at, or just before harvesting. Late season rainfall may cause lodging, shattering or rotting to mature stands of some crops - although its importance is often exaggerated. Examine the probability and likely extent of such losses to the unharvested crop after the mission's departure. Forecasts of rain may provide a basis for downward adjustments to yield estimates if much of the mature crop is still standing. The consequences of late season rainfall are likely to be more severe in the mechanized sector, where lodging will be more of a hindrance to harvesting.

3.3.2.2 Fertilizer

The team should assess the influence of changes in fertilizer supply/demand on new year crop yields. This is of particular importance in countries with liberalized fertilizer and output markets, as there tends to be much more variability in prices. A marked change in the ratio of fertilizer/output prices may lead to an increase or decrease in application rates and hence yields. Fertilizer refers both to organic and inorganic applications, although information on the former is likely to be very scarce.

Some fertilizer trade and utilization data is available from Rome. There will usually be one or more fertilizer specialists within the MoA. Trade data may be available from the Ministry of Trade and Commerce or from customs and excise sources. A meeting with one or more of the major private sector suppliers is also recommended. Farm interviews will help to clarify the main factors influencing fertilizer use, in total and by crop.

If current and historic fertilizer price data is available, the team should try to identify major changes or trends in the ratio of fertilizer to output prices. The reader is referred back to section 3.2.1.2 which describes the basic principles for interpreting output and input prices. Unless current and time series national sales data is available, which is unlikely in a liberalized market, it will be difficult to arrive at quantitative conclusions on the influence of price changes on demand. If a marked change in the price ratio is identified, farm interviews can be used to provide a qualitative indication of the effect on demand. Estimating yield responses to fertilizer is notoriously complex. However, if a marked change in demand is noted, and trial plots from various locations within the country have shown significant yield responses to fertilizer, it may be inferred that changes in yield have been brought about by changes in fertilizer or output prices.

Pure price effects are by no means the only factor affecting input demand in a liberalized input market. Shortages may arise as a result of market imperfections, like foreign exchange shortages or inefficiencies in the input market. Demand for farm inputs may be determined by shortages of on-farm liquidity (credit) and high interest rates for farmers, or by uncertainty over the weather. Interviews with the MoA, fertilizer traders or distributors and with farmers should be used to confirm whether any of these factors have been influential.

In countries where the Government or NGOs intervene in fertilizer distribution, it is worthwhile to compare the quantities distributed (and timing) with those of previous years and with targets. In the case of seeds, the team should also ascertain whether distributed tyoes have been appropriate from an agro-ecological and farming-systems point of view.

If a marked change in chemical fertilizer application is suspected at the national level, and sales data is incomplete or non-existent, it may be useful to construct a chemical fertilizer balance sheet, analogous to the NFBS, to estimate the magnitudes of changes in supply. An example of a fertilizer balance sheet is provided in appendix 4.

3.3.2.3 Labour Supply

Post-planting disruption to the agricultural labour force, through civil strife, for example, will clearly be detrimental to crop husbandry and, hence, yields. Owner-occupiers may be forced to flee during critical husbandry periods, or may only be able to work at night. In food systems with a substantial labour rental market, civil strife may prevent seasonal labourers from migrating to find work in the commercial farming sector. Once-off changes in the labour market in the current season are also of interest to CFSAMs. If the returns to labour elsewhere in the economy (or in a neighbouring country) suddenly change in relation to the returns to food production, this can result in labour migration and affect the intensity of crop husbandry and harvesting, and hence yields.

In assessing the extent of exceptional demographic events, NGOs, UNFPA, UNHCR, WFP and UNICEF should be consulted. Government and media sources may also provide useful information.

It should not be assumed that yields have automatically been affected. Crops like bananas and roots crops do not require continuous husbandry and are less likely to be affected by civil strife. If security conditions permit, the team should visit the problem areas and make a first hand assessment of crop husbandry, as compared to usual practice in peaceful circumstances.

An informal impression of the agricultural labour market can be gained from interviews with commercial farmers, and a sample of labourers under various forms of contractual agreement. Rarely will it be possible to quantify changes in labour supply for food crop production. However, significant increases or decreases in the agricultural labour supply will normally have an identifiable cause, for example: the demobilization of soldiers or major redundancies in the urban sector. If such a cause is noted, and field trips confirm a significant change in the intensity of crop husbandry, it may be surmised that changes in the labour will influence harvested yields.

3.3.2.4 Pests and Pesticides

The mission should attempt to assess the influence of pests (including weeds, insects, bacterial/viral/fungal diseases, mammals and birds) on changes in expected yields. Attention should be focused on those pests which have been particularly prevalent in the current season - endemic pest problems are of less relevance to CFSAMs.

The influence of pests on crop yields is often exaggerated. The team should discover the extent to which official area or yield estimates have been adjusted downwards to reflect pests. Reports of infestations should thus be examined critically in the light of crop inspections and farm interviews. While a full quantitative assessment of pest damage will often be impossible, the team should try to judge the duration and geographical extent (hectares) of infestations, in which crop zones they have taken place and at what stage in the crop cycle.

The team should take note if pesticides or spraying equipment have been in short supply, or if some political or economic factor has constrained control measures. If a serious migratory pest outbreak is discussed, which has not been previously recognized by the authorities, the team should gather as much information as possible, collect samples and ensure that the pest is correctly identified.

Certain migrant pests may have a rapid and devastating effect on standing crops after the mission has left the country. As neither the probability nor the likely density of an infestation (eg Desert Locust) can be known with any certainty before the event, yield estimates should not be adjusted, but it should be made absolutely clear in the text that the threat exists and that yield estimates are conditional on the infestation <u>not</u> occurring. Where a major infestation in underway at the time of the mission, but its full consequences are unknown, refer to section 3.5 below on production scenarios.

3.4 Crop Forecasting

In many of the countries visited by CFSAMs there is more than one rainy season, or recession and irrigated crops. The mission's TOR is likely to include the preparation of an annual food balance sheet - requiring an estimate of total production for availability in the new marketing year. Missions may therefore have to include forecasts of upcoming crops in their analysis.

In the context of CFSAMs a crop forecast is defined as an estimate which relies entirely on statistical extrapolation, and no area or yield sampling has taken place. Estimates of new year production which include both extrapolated and sample data are referred to as provisional estimates.

Sometimes crop forecasts will be available from the MoA, CSO, research institutions, parastatals or large private grain traders. Often, however, this will not be the case, and the team will have to generate its own estimates. The time series information required for crop forecasting, if it is available, will already have been collected for current crop estimates. Data manipulation will be greatly facilitated if the team is equipped with a portable computer and a standard statistical software package such as SPSS or SAS although some recent versions of IBM compatible spreadsheet software are also capable of performing regressions.

The method used for forecasting will differ from country to country, depending on the quantity and quality of time-series data available, the time of planting and the type of agricultural system. Some information may already be available - weather forecasts, farm-gate planting prices, input prices and availability, but the mission will have to rely heavily on time series production data, through regressed trends. Whenever possible, it is recommended that area and yield be estimated separately; it helps to clarify the reasoning behind the forecast and may also improve the efficiency of the estimators. Appendix 5 describes possible forecasting methods. Development of country and crop-specific forecasting methods is a priority for GIEWS headquarters work.

Where forecast crops represent a substantial proportion of annual production, little information is available and there is high inter-annual crop variability, production scenarios may be advisable. This procedure should be used only if absolutely necessary (see section 3.5) when, for example, regression coefficients have been used and the overall fit is not significant according to an F-test at a pre-determined confidence interval or the model R^2 is low. Otherwise, yield uncertainty should be reflected in the text of the report. The words "tentative" or "provisional" should be used for pure trend based forecasts. The knowns and unknowns of the forecast should be made clear, for example: "*production of x is provisionally forecast at y, based on historical production trends and input and output prices at planting time. The eventual outcome, however, will depend on weather conditions etc...between January and March.*" Data on planting intentions, farm-gate prices, input supplies and weather forecasts may be weak and extrapolating quantitative changes in production variables from such information is hazardous. Only if the team is sure that a particular factor will influence area yields (high factor variability and high factor-output correlation), should it attempt to use dummy variables or proxies in forecast specifications. In all cases, crop forecasts should be discussed with relevant officials at both national and sub-national level.

3.5 Crop Production Scenarios

In the following circumstances, the team may have to resort to high and low scenarios for estimating annual production:

- highly unreliable current season data, as a result of dysfunctional statistical services, security restrictions to field trips, severe time constraints on the mission, necessitating the use of regression coefficients for current crop estimates, based on an insignificant overall fit or a low R^2

- the presence of a forecast of a large and variable crop, which is based on an insignificant regression model

- if the mission has been sent well before crop maturity to make a preliminary supply assessment

For simplicity, it is best to envisage two scenarios representing upper and lower probability limits, equidistant from the mean of a normal probability distribution function. If, for instance, a yield has been forecast using regression, $y_t = f (y_{t-1}, y_{t-2}, \dots, y_{t-n}, u_{t-1}, u_{t-2}, \dots, u_{t-n})$ on the assumption that the residuals (u_t) fulfill the conditions:

$$u_t \sim (N, \sigma^2), \ E [Cov (u_{t-i}, u_{t-j})] = 0$$

$ymin_t$ and $ymax_t$ can be estimated as:

$$[\, y^{\wedge}_t \ \pm \ \sqrt{\sum_{t-1}^{t-n} (\varepsilon_{t-i}^2)} \,] / [\, n - (k - 1) \,] \ \text{ where } \ \varepsilon_{t-i} = y^{\wedge}_{t-i} - y_{t-i}$$

and $y^{\wedge}_t$ is an estimate based on a regression of n-1 years and k independent variables. Try to keep the range as small as possible, by carefully examining the likelihood of the upper and lower outcomes and imposing further restrictions, if possible.

Aggregating regional or zonal scenario estimates to make national estimates is not straightforward, as it depends on the correlation of the yield variation between each region. If yields are un-correlated, the probability of all regions yielding a maximum or minimum tends towards zero over a large sample. The aggregation problem is addressed in appendix 6.

If a large proportion of a current or forecast crop is threatened by a migrant pest infestation or exceptional climatic or political event which may or may not occur, a rather different approach is merited. Scenarios should be constructed by considering yields with and without the event occurring. The without case represents expected yields under current conditions (Y). With the occurrence of the event, the yield estimate represents the without case, less the maximum likely damage (Δ). If the probability of the event occurring (π) can be estimated, it may be possible to calculate a single (certainty equivalent) yield value (Ψ):

$$\Psi = Y - (\pi . \Delta)$$

The problem of geographical aggregation does not apply to the case of once-off yield events. If the pest problem arises, it can only do harm. Thus, if n zones face probabilities π_i of crop damage Δ_i for a without damage production estimate of q_i, aggregate national production (Q) can be written as:

$$Q = \sum_{n}^{1} [\, q_i - (\pi_i . \Delta_i)\,]$$

3.6 Presentation and Manipulation of Production Data

Once the production estimates have been fully assembled and verified, and the mission is satisfied with them, summary tables can be created automatically and integrated into text files, giving production by commodity, year, season, region and sector as appropriate. These procedures are greatly facilitated by the use of spreadsheet packages which can also be used to download national estimates into the NFBS.

CFSAMs will be expected to compare their estimates with those of previous crop years at the national and sub-national level. Sub-national comparisons are particularly important in vulnerable zones where food interventions are ongoing or desirable. Comparing current year/crop estimates with previous years' data requires some care. In some cases, comparison with a 5-year average will be misleading, as long term cycles in seasonal rainfall could lead to a run of three or more exceptionally good (or bad) harvests in succession. In countries where annual food production is highly variable, a crop which is 10 percent below average is less notable than a similar fall in a country enjoying low annual variability. With this proviso in mind the following crop classification convention is suggested:

Table 1: Conventions for Crop Classifications

Classification	Calculation	Worked Example
very poor	$q < Q - V$	$q < 26.4$
poor	$(Q - V/2) > q \geq Q - V$	$28.6 > q \geq 26.4$
below normal	$Q > q \geq (Q - V/2)$	$30.9 > q \geq 28.6$
normal	$q = Q$	$q = 32.5 \pm 1.6$
above normal	$Q < q \leq (Q + V/2)$	$34.1 < q \leq 36.4$
good	$Q + V/2 < q \leq Q + V$	$36.4 < q \leq 38.6$
excellent	$q > Q + V$	$q > 38.6$

where q is a new year or specific crop season production estimate, Q is the average production for the n years prior to the current year, $\pm$ 5 percent, and V is the average historic variance defined as:

$$[\sum_{t-n}^{t-1} \sqrt{(Q - q_t)^2}] / (n - 1)$$

Consider, for example six year production series: 39, 30, 35, 37, 25, 29. Q is calculated 32.5 $\pm$ 1.6, and the average variation at 4.5. The descriptive ranges of q (the current year estimate) are defined in column 3 of the above table. This exercise should be performed at the regional and the aggregate national level for total food crop production.

Where figures are cited both in the report text and in tabular form, ensure that they are fully cross-checked and that the numerical and rounding conventions outlined in appendix 3 are observed meticulously.

4 OPENING AND CLOSING STOCKS

Part of the assessment of supply prospects for the new marketing year will entail a detailed analysis of the national food stock position, including potential for stock draw-down or the need for stock build up. The estimation of stocks should include all cereals and, in countries where they form an important part of the diet, pulses, roots and tubers.

4.1 Opening Stocks

Opening stocks are defined as all food stocks (including stocks of open pollinated cereal varieties for seed use) which will be available for domestic utilization as of the first day of the new marketing year, excluding supplies from crops which will be included in the new year production estimates, if some are already in store. Opening stocks may include: public sector working stocks, buffer stocks, food security reserves (FSR) and relief sector stocks or private stocks including on-farm and miller/trader stocks. All stocks, including flours and meals are calculated in whole grain equivalents. Opening stocks also include all imported foods in store, at port or in domestic transit at the beginning of the new year.

The mission should try to break stock information down by sector and commodity type, although data constraints often make this difficult. The main sources for opening stock information are, typically, the grain parastatal, the EWFIS, food relief agencies and interviews with private traders and farmers.

> **Note**
> CFSAMs are often in-country before the beginning of the new marketing year: all opening stock estimates will therefore have to reflect expected stock changes between the time of the mission and the beginning of the new year.

4.1.1 On-Farm Opening Stocks

Very rarely will strong data be available for on-farm stocks. Missions will often have to arrive at their own assessment. Firstly consider the average level of opening stocks for previous years, by commodity. This average will reflect stock behaviour under "normal" conditions. The average size of on-farm opening stocks will depend on when the beginning of the marketing year falls in relation to the harvesting of the main crops.

> **Example**
>
> In the case of Kenya, farmers may harvest three months into the marketing year - so subsistence and semi-subsistence households may carry-over in excess of three months' consumption supply. In contrast, in Ethiopia low levels of old crop carry-overs will be expected, as part of the new main crop has already been harvested at the beginning of the new marketing year.

Note that in countries with diversified food production, early maturing pulse and vegetable crops may reduce the need for farm carry-overs. Human consumption of green maize may also obviate the need for high carry-over stocks.

The mission should examine whether "normal" conditions apply, and therefore whether the average should be adjusted. Typically, a significant increase in farm opening stocks could be motivated by: expectations or sharp price rises in the new year/poor crop expectation, a bumper crop in the previous year or marketing problems which have led to limited sales opportunities. Conversely, below-normal farm stocks could be motivated by low price expectations/good harvest prospects, a poor crop in the previous year or factors such as civil strife, which can make stock-holding risky.

If any of these factors are suspected, the mission should seek corroboration from farm interviews. Farmers should be asked not only how much they are holding in relation to previous years, but also why. Beware of drawing conclusions from a small sample - but if there is clear evidence of higher or lower than expected stock holdings, it may be necessary to adjust the average national stock estimate upwards or downwards.

Note that the probability of zero national level on-farm carry-overs is very low. If the team's opening stock estimate is significantly different from average make sure that the reasons behind the deviation are clear.

4.1.2 Private Trade Stocks

Where some or all marketing activities of a commodity are performed by the private sector (officially or unofficially), the CFSAM will have to consider private trade stocks, which include those held by wholesalers, retailers, millers and large commercial farmers. Information on private sector stocks is generally scarce. It would be worth interviewing a sample of small-, medium- and large-scale traders, to see if there is likely to be any exceptional change in stock holdings, but the mission's estimates will generally rely on time-series data extrapolation.

The likelihood of high private sector carry-overs is small.[7] Prices at the beginning of the new marketing year are likely to fall, reflecting the arrival of the new crop, and hence incentives to store from one marketing year to another are weak.

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[7] For a detailed discussion see Newbery and Stiglitz, (1981, p196ff).

Unless there has been an exceptionally good/poor harvest in the previous year, or there are exceptionally good/poor prospects for the current crop or there have been major changes in marketing and price policy, the mission should use an average private trade carry-over stock estimate (the average should be calculated excluding freak years). This estimate can be regarded as a usual working stock level.

4.1.3 Public Opening Stocks

In a liberalized or largely liberalized food market, public opening stocks may include any of the following: buffer stocks for price/supply stabilization policy; working stocks for supplying the civil service or military, a food security reserve (FSR) / strategic grain reserve (SGR) to address unforeseen supply problems and working stocks for ongoing dry ration and feeding programmes.

Public stock quantities are generally well documented and food parastatals and / or relief agencies should have data on current stocks and expected opening stocks (if different). If there is no available forecast of opening stocks, the relevant officials should be questioned on their intentions for the interval between the mission's visit and the beginning of the new year. The likely net drawn down (sales less purchases in the interval) should be calculated and subtracted from the current stock estimate. Care should be taken not to include any of the current crop that might already be in store in the new year opening stock figures as this would result in double counting. Stock which is unfit for human consumption should not be included in the estimate, unless it is to be used as livestock feed in the coming year.

Occasionally, as a result of political pressures, official stock figures may be biased. If the mission suspects this to be the case, a few discrete questions may be posed to store keepers and auditors. For a sample store it may be possible to make a rapid visual assessment of the quantity in stock, to see whether it tallies with the official stock records. If the mission is convinced that there are major discrepancies in the official estimates, with implications for national food supplies, the FAO/GIEWS country officer should be contacted.

4.1.4 Stocks in Port and Transit

Official opening stock figures will often refer only to stocks in store. In countries with significant food imports, commercial and relief sector stocks may also be at port or in transit at the beginning of the new year. These should be included in the opening stock estimate. To assess stocks in port and transit, use expected time of arrivals (ETAs) and actual delivery data. Consult with WFP or commercial importers to find the average lead time between the arrival of shipments in harbour and delivery to their final consumer (including milling time). All ETAs and actual deliveries which arrive before the new year, but are not in time to be consumed in the current year, should be regarded as new year opening stocks.

The mission should make sure that these ETAs/deliveries have not already been accounted for in official opening stock estimates, to avoid double counting.

4.1.5 Cross-Checking Total Opening Stock Estimates

When the team is satisfied that it has a complete set of opening stock data, it should be aggregated by commodity and imported into the National Food Balance Sheet (NFBS). This may mean that there is a significant change in the previous year's food use item (as the new year's opening stocks are the previous years closing stocks and food use is the residual item for previous year balances). If the opening stock estimate is weak or based on unsound assumptions, but implies a major change in per caput consumption, it may need to be reconsidered. Total food consumption is less likely to be prone to major inter-annual fluctuations than carryover stock levels.

Note that with a nearly complete set of production and import/export data (including orders and ETAs) for the previous marketing year, a monthly supply model can be run which will give an approximation of total national carry-overs (see appendix 10).

4.2 Forecasting Closing Stocks

Closing stocks are defined as all in-country stocks on the last day of the marketing year. The methods for forecasting public and private sector closing stocks are very different - and the team should calculate them separately. Private sector (including on-farm and trade) stocks should be estimated using the long term average or regressed trend, perhaps including domestic production as an explanatory variable in countries which are not significant importers.

Estimating public closing stocks (including jointly administered FSR/SGRs) for LIFDCs requires a calculation of desirable closing stock levels. Donors are usually unwilling to provide food assistance for excessive stock build up. In cases where donor food assistance is used to support stocking policies, guidelines on closing stock levels will usually already be agreed bilaterally or multilaterally - and the mission's estimates should reflect these guidelines. If, however, the government proposes a significant increase in closing stock levels to be made up of food assistance, and donors are not in general agreement on the target closing levels, the mission will have to listen closely to both sides of the argument and to form its own opinion, which should then be discussed with the relevant officials.

In the increasingly rare event of a fully state controlled domestic food market, the government's objective is likely to be national food supply/price stabilization. The minimum closing stock level of a food commodity will be sufficient to cover average monthly government sales or ration distributions from the beginning of the following marketing year until the next main crop reaches the retail market, allowing for food imports during that period.

If the beginning of the marketing year coincides with the retail availability of the main domestic harvest, closing stocks should be kept to a minimum working level as they incur costs and occupy valuable storage space. If there is a lag between the beginning of the marketing year and the domestic harvest, the desirable closing stock level will depend on the reliability of imports during the lean season and the variability of crop production.

If ports and internal transport facilities are good, and crop production reasonably reliable (not subject to delays) closing stock calculations should take into account likely monthly imports in the pre-harvest period at the beginning of the next year, based on historical data on the timing and scale of monthly imports, production, and sales. If both imports and domestic production are unreliable, higher levels of lean season carry-overs will be required to ensure that average sales volumes are met.

A monthly supply model, such as that described in appendix 10, provides an approximate basis for such calculations. In countries where the public sector is both a major food trader and stock holder, carefully planned trade schedules can compensate for domestic supply fluctuations, meaning that stock holdings, including carry-over stocks can be kept at a minimum - close to the working stock level.

Public stock and relief sector stock policies are more likely to exist in conjunction with private sector marketing activities. The state's role may be to maintain food supplies for specific continuous food interventions, public servants or the military, or it may be an occasional buyer/seller, to guard against extreme supply/price fluctuations or for once-off emergency interventions. The mission should make a distinction between the two. The former is basically a working stock, the level of which should be fairly stable and predictable. The estimate should be based on current (new year) opening levels, adjusted to reflect significant changes in the scale of targeted programmes, or logistic changes that will influence stock turn-around time. Improved internal distribution mechanisms, for example, will speed up stock movements, allowing the desirable level to fall.

Calculating desirable FSRs/SGRs and buffer stocks is complex - there are many economic and non-economic variables to consider - and the mission is unlikely to have either the time or the data to arrive at an independent estimate. The team may, however, assess the validity of government or donor opinions based on the following considerations:[8]

- how variable is domestic production? In rainfed agriculture, high levels of yield variability and the possibility of long delays to harvesting may be an argument in favour of high closing stock levels.

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[8] See Santorum & Gray 1993 who consider 26 factors to be of relevance to formulating public stock policy - they do not mention public sector risk preferences - which are also a key variable (van der Geest 1991). Newbery & Stiglitz (1981), and Bigman & Reutlinger (1979) also provide detailed discussions of desirable stock policies.

- how responsive is the private food trade to sudden price changes? If there are severe structural problems in the private market, once-off interventions may be needed to respond to sudden supply fluctuations

- the reliability of imports, including donor food assistance. Land-locked countries, or countries with poor port facilities will have to hold higher reserve stocks as there will be a higher risk of delays to food imports. If possible, assess the variability of monthly food imports in recent years. High variability usually makes the holding of significant reserve stock more desirable.

- fluctuations in food security: is the population vulnerable to unexpected food supply crises, necessitating quick interventions?

- internal infrastructure - are there long delays in shifting food in response to crises, necessitating some pre-positioning? Is internal food distribution hampered by civil strife?

- what role do NGOs play in the relief sector? Active NGOs may already have widespread safety net schemes in place at the local level, reducing the need for government held food stocks at the national level.

- what is the public sector's capacity for covered storage and management of food stocks?

Note that there may already be a target level for build up of FSRs or SGRs. This may represent a target for peak stocks, pre-positioned at the beginning of the lean season. The desirable closing stock level will probably be well below this level, as the beginning of the marketing year is often close to the peak domestic supply period.

5 DOMESTIC UTILIZATION

Domestic utilization comprises all new year human consumption, feed, seed and industrial uses of food commodities, post harvest losses and closing stocks. This section discusses the estimation of these elements, with the exception of closing stocks (see above section 4.2), which are essential for the calculation of total import and food assistance requirements.

5.1 Food Consumption

Food consumption is defined as human consumption of food stuffs. The analysis should be limited to cereals consumption and the most important non-cereals foods, in terms of average dietary intake.

The main purpose of the analysis of food consumption is to estimate the "*status quo*" (SQE) per caput food consumption to date, and to use this, multiplied by the total population, as an estimate of national food consumption during the new marketing year.

5.1.1 Population Estimates

The new year food consumption is based on the mid-marketing year national population, adjusted to reflect exceptional demographic change.

Missions will use the most recent official population series. The CFSAM will be provided with the latest national level UN series in Rome. It is advisable to discuss population estimates with the CSO or Census Office (if appropriate) and to obtain data which is dis-aggregated by region and age group, particularly if the mission intends to assess numbers of vulnerable people. Check that dis-aggregated data is consistent with the national level estimates. In some cases the UN series may be out of date, where more recent census figures have been published, or where there has been a change in national boundaries. In this case the team should contact the country officer in Rome for guidance. If the series for several years has been updated, the mission should ensure that the NFBS time series is consistent with the official figures, and that past data is revised accordingly.

If the mission has strong grounds for questioning the official figures, when for example, the official growth rate assumptions appear to be too high/low, adjustments may be made after consultation with the country officer, provided the method and reasoning are clearly indicated in the report text.

It is also important to ensure that population figures reflect exceptional demographic change: from disease, war or natural disaster related mortality or abnormal cross-border migration. UNHCR and WFP offices may be able to provide data on such occurrences. In the case of out-migration, estimate the total number of persons likely to be absent from the country (and completely independent of in-country food supplies) for the entire marketing year and subtract the number from the national population estimate. So, if 300 000 persons are expected to be abroad for 6 months, subtract 150 000 from the total. In the case of in-migration, include the total number of people residing for the entire marketing year, and totally dependent on domestic food supplies. If, however, programmes are underway or planned for comprehensive refugee feeding throughout the marketing year, in-migrants should not be included in the domestic population estimate, and refugee food assistance needs should be kept separate from the estimates of national food assistance requirements.

Population estimates should be calculated at mid-marketing year - to give an annual average number of consumers. If estimates do not exist, they may be calculated as follows:

take the population estimates from the two most recent censuses (CEN_{1980} & CEN_{1990}) and calculate inter-census annual growth rate (g_a) as:

$$g_a = \sqrt[n]{(CEN_{1980} / CEN_{1990})} - 1$$

where n is the interval in years between the censuses. Use g_a to make a projection for the new year ($t + 1$). The mid-year population is closely approximated by:

$$(POP_t + POP_{t+1}) / 2$$

5.1.2 Deriving Status Quo Estimates (SQEs)

Having estimated the mid-marketing year population, and adjusted the historic population series where appropriate, it is necessary to estimate the status quo food use. The data for the calculation is available from the NFBS. The SQEs represent, commodity by commodity, the average or trend estimate of recent years' food use. Food use is a "derived" measure. In previous years' balances food consumption is the residual in the NFBS once data on annual production, actual imports and actual closing stocks is known. It is the difference between total supply (opening stocks, imports and production) and total non-food utilization (feed, other uses, exports and closing stocks). The forthcoming year's SQE is a rough estimator of actual food consumption, but its primary function is to allow the calculation of the total import requirement - or food gap. It provides a measure of the total volume of imports required to maintain per caput food availability at historic levels, hence "status quo". For an additional explanation of why the SQE is used consult section 7.1.

To calculate the SQE, the first step is to ensure that trade, production and opening and closing stock data are as complete as possible for all years up to the new marketing year. Make sure that a consistent population series is used. If this entails adjusting previous years' estimates, discuss the changes with the country officer on return to Rome. The mission should check with trade sources in-country (and WFP for food aid deliveries), that the NFBS trade series is correct and all data should be updated by individual cereal where necessary.

If the country has yet to enter the new marketing year, actual imports for the remainder of the current year should be forecast, based on imports to date, port off-take rates and ETAs. Production and stock figures should already have been revised. Once past year population, production, utilization, trade and stock data has been finalized, the NFBS will automatically calculate past values for derived per caput food use. The mission should check the series for the existence of a strong trend, using a variety of trend specifications. If the data does not provide statistically significant trend parameters, use the average SQE for five years prior to the current year, excluding freak high and low years.

If a trend value is used, a (qualitative) explanation of the reason for the trend must be provided. Underlying consumption trends may be driven by: shifts in relative price as a result of underlying changes in production (adoption of new production technologies, for example), shifts in relative prices as a result of domestic policy changes (price de-control, import policy), macroeconomic changes, underlying shifts in demand (tastes, average income, demography) and changes in levels of donor food assistance. The careful analysis of trends will help to ensure that new year food assistance does not distort the commodity composition of domestic markets and long-term economic adjustment processes.

Once SQEs have been entered for each individual cereal, check that the total cereal SQE is consistent with historic levels or trends. If it is significantly higher/lower, this may reflect errors in trend estimated SQEs for individual cereals which have to be adjusted downwards/upwards accordingly. Alternatively, there may be an underlying trend in total cereal consumption, which should be reflected in the total current year SQE estimate.

If there has been an exceptionally poor harvest of a non-cereal food crop there may be a case for seeking food assistance to compensate for the implied food shortfall. While it is unlikely that the mission will have sufficient data or time to construct full balances for non-cereal commodities, the annual shortfall in the non-cereal food(s) should be calculated (net of losses, feed uses, stock changes). If the commodity can be and has been provided as food assistance (vegetable oil, DSM, pulses), the size of the shortfall and donor assistance requirements may be indicated.

Note that world supplies of non-cereals food assistance commodities are only a small fraction of total food assistance - partly because they are usually of a higher world market value than cereals. They also tend to be costly and difficult to ship and distribute. Hence, at the national level, a large increase in the food assistance requirements of a particular non-cereal commodity is unlikely to met by a corresponding increase in donor commitments. However, non-cereal foods are often a very important dietary protein supply - and the consequences of a major shortfall for the nutritional status of vulnerable groups can be grave. It may therefore be recommendable to consider non-cereals food commodities only in the context of targeted food programmes, including supplementary feeding, and to estimate the targeted food assistance requirements independently from the total cereal food needs (see sections 7-8).

In cases of an exceptional decline of an important energy food commodity which is not widely traded on the world market or provided as food assistance (cassava, for example), it may be necessary to convert the net dry-weight shortfall into its cereal equivalent - and to add it to the SQE estimate for the main staple cereal as "commodity cross substitution" (CCS). In this case, cereal imports would be expected to cover an exceptional shortfall in non-cereals production.

Note that this procedure, if it results in a sizable increase in imports of a particular cereal commodity in relation to total food consumption, could distort domestic food markets and (in the long run) dietary preferences. It should therefore be used sparingly and only after consultation with the GIEWS country officer.

Using the information from the latest version of FAO Food Balance Sheet/AGROSTAT, and the new year production estimate of the non-cereal commodity (q_{nc}), calculate the total new year utilization of the commodity assuming no net stock changes. If this is less than the 5 year average less the mean variance, the difference (Δq_{nc}) may be considered as commodity cross substitution. The quantity should be converted into maize or wheat grain equivalents, depending on which is the most commonly imported cereal. Grain equivalents are calculated as the ratio of the kilo-caloric content of a unit of the cereal (CAL_c) to the kilo-caloric content[9] of a unit of the non-cereal (CAL_{nc}) giving the following equation for CCS:

$$CCS = \Delta q_{nc} \cdot (CAL_{nc} / CAL_c)$$

For root crops, the mission should ensure that all calculations are in dry weights rather than fresh weights. Add this to the new year utilization and import requirement estimates of the appropriate cereal in NFBS. If CCS is included in a cereal SQE estimate, the reasoning and methods should be clearly explained in the report. If non-cereals crops have performed particularly well in relation to cereals, then the mission may consider it necessary to include a provision for a negative commodity cross substitution, the calculation of which is exactly analogous to that presented above. Before doing so the team should ascertain that there is a real possibility that a significant number of households will shift towards non-cereals consumption. This will only occur if the non-cereal crop is marketed and if it can and does act as a substitute for cereals in consumption. Even if it is the case, actual shifts in consumption will be difficult to quantify, unless (improbably) good dis-aggregated retail price data and cross-price elasticities are available. Thus, it is necessary to stress that commodity cross substitution should be used only in exceptional circumstances.

Once a full set of SQEs are available for individual cereals, cross-checked, and adjusted to reflect CCS, the SQE is automatically multiplied by the mid-new year population estimate to give the national food use estimate for the forthcoming year in NFBS

5.2 Feed Uses

Feed uses comprise all the consumption of domestic and imported grains in the livestock sector. Note that for the purposes of the NFBS, crop residues are not included in the estimation, but whole-grain uses and milling residues should be. If the mission is intending to estimate non-cereals utilization, the analysis of feed use should also include non-cereals.

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[9] FAO's most recent Food Composition Tables can be used to estimate kilo-caloric contents

There are several possible approaches to the estimation of feed uses: the eventual choice of method(s) will largely depend on the availability of data. Rarely, data on actual production for feed may be available in-country - if for example, certain crop varieties are cultivated only for feed - in which case it should be obtained. Data on imported feedstuffs may be more readily accessible, at least for past years, when certain commodities or grain qualities are imported exclusively for the feed sector. Where there is a significant commercial livestock sector it would certainly be advisable to collect data from the main feed suppliers and mills on annual throughput. The NFBS provides information on historic levels of feed use at the national level, albeit approximate.

If the team has a good time series of livestock prices, crop prices and historic feed use, a regression model may be specified of the following form:

$$FEED_t = f (FEED_{t-1, \dots, t-j}, STOCK, P_1, P_c)$$

where $FEED_t$ is current year feed use, $FEED_{t-1, \dots, t-j}$ is a lagged variable for feed use in j - 1 previous years, STOCK is an cattle equivalent index of animal stock sizes and P_1 is the price of feed and Pc is a quantity weighted index of livestock head prices. Coefficients should be positive for P_c and STOCK and negative for P_1.

Information on total production or sales for feed provides a lower boundary for estimates.

Note that milling residues are often used in the feed sector. It is therefore necessary to make a rough calculation of the annual milling throughput, the extraction rate (available from FBSP) and the proportion of residues that are sold for feed. All milling residues which are not sold for feed should be included in the "other use" element of the NFBS.

All estimates of feed uses should be adjusted to reflect significant real changes in the price of: meat, livestock by-products including milk and eggs, imported and domestic feed and/or whole grain. Remember that a significant change in pasture, browse or fodder availability (for example, as a result of drought or exceptional rainfall) may lead livestock farmers to increase or decrease feed use. However, unless good quality supporting data are available, teams may be forced to depend on an average or trend adjusted estimates.

5.3 Other Uses: Post-Harvest Losses

Post harvest losses, in the context of CFSAMs, refer to all food losses that occur after harvesting, including threshing and storage losses.

Data is usually very scarce: calculations of post harvest losses to the domestic crop usually use a constant percentage of annual supplies (including those of imported foods and carry-over stocks), for this reason. Conventions for loss estimation by country and crop are contained in the latest version of Food Balance Sheets and Per Caput Food Supplies (FAO). CFSAMs should generally follow these conventions.

Nevertheless, try to discuss the subject with national post harvest/storage specialists, and to have a look at the quality of public and private trade storage conditions where possible.

Exceptional changes to the PHL rate may be the result of:

- introduction or eradication of a virulent storage pest

- once-off changes in supplies of storage pesticides

- major changes in storage and marketing policy, closure of government stores

- heavy post harvest rainfall in countries where uncovered storage is practiced or a substantial proportion of the crop is left in stacks in the field

Note that in countries with limited storage capacity or highly variable domestic prices (typically land-locked countries with largely tropical rainfed agriculture) storage losses of domestic produce may not be linearly related to the size of the harvest. A poor crop, implying higher prices, will act as an incentive for better storage practice. Conversely, a bumper crop and low price expectations may reduce the returns to good store management. In some countries, there is a physical capacity limit to covered stores and silos. Crops in excess of this limit may therefore be subject to open storage and higher than usual marginal loss rate.

If a country is heavily import dependent, and losses to imports (including the relief sector) in transit and store are high, a dual calculation approach is advisable. Losses to the domestic crop and carry-overs should be calculated separately from import losses - as the loss rate may be different and because imports are unlikely to be in-country for the whole marketing year. Note that high loss rates can be expected for emergency food assistance, as emergency programmes often operate under severe logistic constraints. Misappropriated rather than damaged stock should not be included in the loss estimate. To calculate losses to imported foods, the mission should first agree on a plausible average annual loss rate (Z) with traders, relief agencies and other importers, which should be divided by 12 for the monthly loss rate. Then calculate the average time that imports are likely to be in-country (T). Calculate $Z/12 \times T \times M$ as the total annual losses to the expected current year quantity of imported food (M). The monthly supply model in appendix 10 provides a more detailed and accurate approach to such calculations and to assessing PHL rates under non-linearity assumptions.

PHLs are included under "other uses" in the NFBS.

5.4 Other Uses: Seed

For the purposes of CFSAMs, the analysis of seed use should be restricted to domestically produced seeds for food crops. The mission should ensure that all imported food crop seeds are deducted from the food import estimates. If domestic hybrid or composite production for seed is included in the domestic cereals production estimates it should also be included in the seed use estimates. Conversely, if production for seed is not included in the total grain production estimates, nor should it be included in the seed use estimates. In many developing countries, open-pollinated seeds are used from on-farm production. Hence, seed and food uses are directly substitutable. All such seed use should be included in the estimate.

Note that seed use refers only to seeds planted during cropping seasons that fall within the current marketing year. To calculate total seed use of a particular commodity, use times series data to make an approximate forecast of planted area for all crops which are likely to be planted from seed stocks or production available in the new year. This will include all plantings which fall within the new year. excluding the current crop, by sector if possible. From farm interviews and discussions, the mission can estimate average per hectare seeding rates by commodity, crop season and sector. This may be cross-checked against the estimated seeding rates in <u>Food Balance Sheets and Per Caput Food Supplies</u> (FBSP), available by country and commodity. Multiply average seeding rates by area forecasts to give a total seed use estimate for each crop and sector. Subtract commercially produced or imported seeds from the total, if they have already been excluded from the crop production and trade data.

The seed use estimate can be automatically added to the "Other Use" element of the NFBS.

Note

In cases of an exceptionally poor current crop, it may be that the supply of seed for the next crop is threatened, particularly if the country's capacity for seed imports is constrained. This would apply in countries where local varieties are predominant in rainfed agriculture, where hybrid seed production is rainfed or where domestic seed production has been influenced by some non-weather related factor. If the mission perceives that such a situation may arise, it must be sure to mention it, either in the report, or during the in-country and Rome de-briefings. See appendix 11 for further details.

5.5 Other Uses: Industrial

Industrial use of food crops generally refers to brewing uses. The brewing use element should be calculated independently from the "food use" element as the resultant caloric content may be very different. In some countries, however, estimates of unit caloric contents will be available which already reflect the proportion of consumption which is in brewed form. In this case, brewing uses may be included in the food use element of the NFBS. Milling residues which are not used in the feed sector should also be included in the "other use" category. Note that processed foods are not included in this category, but under food use.

The calculation of brewing uses may be straightforward for crops which are cultivated exclusively for the industry, based on production estimates. The mission may wish to consult the main brewers on annual throughput, if there are only a few producers. Estimation problems arise when the crops are used interchangeably for brewing and direct food use, and where home-brewing is common practice. It will be difficult to arrive at an accurate figure, and the team should calculate the proportion of domestic production that has historically been brewed, and multiply it by the current year production estimate. As with feed and seed, if imports for the brewing sector have been included in the total grain import figures, they should also be included in the industrial use estimate, and otherwise should be excluded. It may be that in years of exceptionally poor/good crops or high/low cereal prices, peasants will brew less/more and so the brewing element should be adjusted.

6 EXTERNAL COMMERCIAL TRADE

This section provides guidelines on estimating commercial food imports and exports. The main concentration is on cereals, as they are the most commonly traded and donated food commodities. The mission may also consider trade in non-cereal food commodities, where they represent a significant proportion of the national diet.

For the purposes of CFSAMs commercial trade is trade which is financed exclusively by the recipient country. Donor financed exports, imports on soft credit terms, grants for food purchases, in-kind food commodity donations are discussed in Sections 7 and 8.

It is important to ensure that the team has a full set of past year import data by commodity type. The updating of import time series has already been discussed in section 5.1.2. New year import forecasts should also be dis-aggregated by commodity, whenever possible. There are numerous data sources for current year commercial imports - this is not to say that the data is always complete or reliable! If the country has already commenced its new marketing year, the mission can obtain data on arrivals, and expected time of arrival (ETAs) from customs and excise offices, WFP, the grain parastatal and possibly the Ministry of Trade/Commerce. Data on formal exports may be available from all of the above sources with the exception of WFP. Certainly, missions to countries which are heavily dependent on trade would be well advised to visit the main ports or border trading posts.

6.1 Unrecorded Cross-Border Trade

Unrecorded cross-border trade (UCBT) is defined as illegal and/or un-monitored transactions which are not officially documented and are therefore notoriously difficult to estimate. It is a common feature of countries with high tariff rates or price and movement controls, or with extensive un-monitored borders. The rough orders of magnitude of UCBT can be understood from previous mission reports, and occasionally local estimates (or opinions) will also exist. If not, one rough way to ascertain the magnitudes is to visit a sample of border crossings, assess the number and tonnage of trucks carrying cereals, and (tactfully) interview traders in the main receiving markets. If harvesting has already commenced in the supplying country, trade may already be in evidence. The volume of UCBT is likely to be highly seasonal, so no strong conclusions should be drawn from border crossings during a short sample period. It is essential that the team is aware of supply and demand conditions in the relevant neighbouring countries. The GIEWS country officer may be able to provide current year forecasts of cereal deficits or surpluses, recent harvests and crop prospects in neighbouring countries which will be useful for verifying UCBT estimates.

In freely operating grain markets in trading countries, supply and demand conditions will be key determinants of the level of UCBT. Thus, domestic, border price, and exchange rate movements may give a useful indication of trade in coming months. The mission should try to calculate the difference between the prices in markets on both sides of the border in a common currency and the cost of transporting a ton of grain from the surplus market in country A to the deficit market in country B.

If the price differential per ton significantly exceeds the transport cost there may be an incentive for trade. This is particularly likely when urban markets in country A are farther from the main growing areas than urban markets in country B. If a significant change in transport costs or the cross-border/domestic market price differential is identified, the team should adjust the historic UCBT estimate accordingly when making the new year forecast.

UCBT thrives on border and internal movement controls, and may also be influenced by pricing policies. High levels of producer price support, for example, may encourage unscrupulous traders to try to sell illegally imported food on the domestic market. Internal movement controls may provide an incentive for UCBT by distorting market prices. Sales taxes or stringent quality controls can also boost UCBT. Finally, changes in exchange rate policy and in exchange rates on the parallel (illegal) currency market, will have a significant influence on incentives, and hence on cross-border trade. The mission must therefore be aware or recent policy changes which are likely to influence UCBT.

Estimates of UCBT (exports and imports) should be added to the estimates of total commercial exports and imports by commodity. As with all mission estimates, the reasoning and assumptions behind the UCBT forecasts should be clearly explained in the report text.

6.2 Recorded Commercial Food Trade

Data on historic recorded cereal trade is available from FAO/Rome, and the local WFP office may also have data on shipments in the current marketing year. Before estimating imports and exports for the current year, the mission should be satisfied that all commercial trade data up to and including the current year has been entered and updated where necessary. Data on flour trade should be included in whole grain equivalent, using domestic extraction rates. Seed imports should be excluded from the analysis.

The Ministry of Commerce or CSO may hold data on previous years' trade. Data on intended Government imports and exports for the new marketing year may be available from the Ministry of Finance/Treasury (food imports may be specified in the breakdown of the budget). If grain parastatals control external trade, they should provide a useful source, as well as the Early Warning and Food Information System (where appropriate).

In several countries visited by CFSAMs external food trade has been fully or partly liberalized or some commodities have been liberalized and others not, meaning that the Government may not have sole responsibility for importing food. It will therefore be necessary to estimate private sector trade separately. In fact, the methods for estimating public and private sector are quite different. When the same commodity is traded by both private and public sector, an attempt should be made to break down the time series data accordingly.

6.2.1 Private Sector Trade

When trade of a particular commodity is partly or fully in the hands of the private sector, in the sense that the decisions on how much and what to import/export are made entirely by traders, the mission will have to interview a sample of the main traders, to assess their intentions for the new marketing year. The US agricultural attaché or EU representative may also be useful sources of information on external trade. Occasionally, traders will have already made plans at the time of the CFSAM, and may be able to provide details of new year exports, deliveries and ETAS. This information will provide the team with a minimum bench-mark, below which private trade is unlikely to fall. Interviews with merchants will also help to clarify which factors will be important in determining trade decisions.

International grain trade is a volatile business, making forecasting difficult, especially in data scarce countries. There is no ideal method. The mission will have to look closely for trends in the time series. Trend or average values are only likely to be good estimates when inter-annual variability is low, which is unlikely. Hence, a multiple regression model is suggested in appendix 7. The model results should not be used in isolation: several micro and macro variables which can not be modeled explicitly without extensive data and time-consuming analysis, should also be considered. The team will have to use its judgment in assessing the quantitative influence of these variables.

Macro-economic factors likely to influence private commercial trade are:

- exchange rates: note that in countries with fixed exchange rates, it is important to consider both the price and the availability of foreign exchange

- domestic interest rates - as most grain trade is on credit, high interest rates will act as a dis-incentive

- inflation rates: high/variable inflation increases the uncertainty over real returns to trade

- Traders' decisions may be influenced by the following market factors:

- border or world market commodity prices, tariff levels, taxation

- domestic wholesale/retail price expectations - domestic supply and demand prospects. Note that high price uncertainty may act as a dis-incentive to importers. Government storage, marketing, pricing or trade policy may increase or decrease this uncertainty

- storage costs: high domestic storage costs act as an incentive to export now, rather than store for domestic sale at a later date, whereas low costs encourage more storage and may therefore discourage imports later in the marketing year

There are also several "institutional" variables which should be considered:

- physical private sector storage and transport capacity - there are considerable economies of scale in international grain trading hence capacity constraints may make trade unprofitable.

- banking confidence and credit guarantee problems - importers may have difficulties raising letters of credit in the exporting country, because of domestic financial insecurity

- stringent domestic quality or quantity controls for imported goods, or in countries to which grain is exported

If the model suggested in appendix 7 fails the overall significance test or has insignificant or wrong-signed parameters, the team should consider using import scenarios, comparable to the production scenarios suggested above in section 3.5.

Food assistance requirements have traditionally been calculated on the basis of "additionality", explained in more detail in section 6.2.2 and appendix 8. Food assistance is seen as "topping up" the commercial imports. In some countries, however, the "topping up" principle may not be applicable. Swaziland, for example, has traditionally had a major maize exporter on its doorstep - the Republic of South Africa. The domestic currency is directly convertible with the Rand and import demand is responsive to changes in domestic crop production and prices. Importers are aware that imported food assistance may depress domestic demand, and they may adjust their plans downwards in expectation of food assistance. In this case the total commercial import requirement should be calculated as the total import requirement less the requirement for emergency food assistance. Calculation of food assistance requirements is discussed in section 7 below. In cases such as Swaziland, the emergency requirements should be calculated as the minimum level of externally resourced food assistance necessary to sustain those households which do not have the means to purchase on the commercial market. An external provision in excess of this quantity is likely to deter commercial imports. Clearly, in such cases, non-food transfers to vulnerable groups, whenever feasible, should be considered.

6.2.2 Public Sector Commercial Trade

To estimate grain trade in countries where the public sector decides on the quantities to be traded[10] the team will have to collect time series data, by commodity on public sector traded quantities. When the government plays a key role in external trade, the approach to estimation is somewhat different. There are also marked differences in the calculation of imports and exports. They are therefore treated separately.

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[10] even if the actual trading is sub-contracted to the private sector on a tender system, as is often the case

6.2.2.1 Public Sector Exports

In some countries, governments are responsible for grain exporting (directly, through grain parastatals or subcontracts to the private trade). If the total annual export level has already been decided, the mission should use this in its estimate. If the planned exports exceed the mission's estimated national surplus, the team should seek advice from the GIEWS country officer in Rome. Sometimes, the government will have a specific method for planning exports. If possible, apply the same method to calculate the new year exports, if sufficient data exists, and discuss findings with relevant officials. If neither an export plan nor an official method exist, the mission should calculate the total national surplus for the new year (from the NFBS) by commodity. Then find the proportion of the total exportable surplus (SURP) that has traditionally been handled by the government (GE) for a period of ten years, excluding years of zero imports, using NFBS and official data using the regression

$$GE_t = \alpha \ + \ \beta \ SURP_t + u_t.$$

Note that if the team is making forecasts of both public and private sector exports, parameters will have to be restricted to ensure that together they do not exceed the total exportable volume.

The team should adjust export forecasts to reflect any non-production factors that may affect inter-annual export levels, for example: border price expectation, domestic demand conditions and exchange rates and, perhaps most importantly, government closing stock policy.

In the case of an exceptional exportable surplus, which the private sector and government do not have the capacity to handle or to hold in stock, there may be scope for donor assisted exports (triangular transactions). These are described more fully in section 6.3.

6.2.2.2 Public Sector Imports

In estimating public sector food imports (PSFI) for the new year the distinction between planned and average or usual imports must be borne in mind. If the government has already budgeted for a certain quantity of imports, the mission should ascertain the total planned quantities by commodity. If this exceeds the estimated total food import requirement, (net of private sector imports and UCBT) the Rome country officer should be informed. In general, the planned imports should be entered into the NFBS and the closing stock figure should be re-calculated as the balancing element. If no planning figures are available, for food assistance recipient countries, public sector imports are calculated on the basis of the Usual Marketing Requirements (UMR). Donor food assistance allocations are often based on the principle of *additionality*: if the total import requirement of a commodity exceeds the UMR, the difference will be covered by food assistance.

The UMR is the quantity of food that a country can be expected to import without placing excessive burdens on foreign currency reserves and the government budget. The full official definition is provided in appendix 8. Missions may have to arrive at a <u>provisional</u> estimate of the current year UMR Ultimately, however, UMRs will be decided upon in Washington in the course of negotiations on the food assistance plans of the major exporting countries.

If the planned PSFI level exceeds the estimated UMR, this may indicate that food imports will place a strain on domestic foreign exchange supplies or on the government budget. If planned PSFIs are not sufficient to cover the total import requirement (net of private sector imports and UCBT) and they are below the UMR, this implies that, from the donors' perspective, the country should import more. The reason is that food assistance is a scarce resource, and must be strictly allocated between countries according to which are most needy - meaning unable to pay for commercial imports. The team should therefore take note if planned imports are significantly higher or lower than the agreed UMR, or (if the negotiations have yet to take place) then the mission's provisional estimate.

The starting point for calculating the new year UMR for a food commodity (which we will call UMR1) is the average level of food imports for the previous five years, excluding freak high and low years (UMR5). However, the UMR1 should take fluctuations in national income and foreign exchange earnings as well as government budgetary constraints into account. If food imports represent a significant part of total imports, a sharp drop in GDP, caused, for example, by a major decline in export earnings, may imply that the economy can absorb a smaller quantity of commercial food imports. Should this situation arise, the mission should take note of it.

The mission should ascertain whether the Government can afford to finance the UMR. If the government budget has already been prepared, and expenditure (E) on PSFIs is already agreed, find out what the total budget for food imports is. Where no budgetary allocations have been made the mission may have to estimate E. There are too many unknowns in the new year to be able to calculate this with any accuracy, especially when an unspecified part of the budget is allocated to subsidization of food imports. It will therefore be necessary to arrive at an agreed figure in discussion with relevant officials (typically Ministry of Finance, Central Bank) and the IMF /World Bank delegations. Budget allocations are likely to be influenced by:

- the size of the food deficit

- major changes in other types of government spending - a rapid increase in military expenditure, for example may lead to belt-tightening in other sectors

- political pressures: the fear of large and politically vocal urban populations may encourage governments to import food

- changes to government revenues: changes in tax levels, or revenues from sales, income or trade taxes

- total budget cuts - if a government is seeking to cut its budget deficit, or for any other reason is following a tight fiscal policy. Governments may be under pressure from the IMF to control spending.

- exchange rate uncertainties - with a floating exchange rate, a large increase in public sector imports may lead to a depreciation of the currency - crowding out private sector imports

Once a figure for E has been arrived at, the total cost of food imports is calculated thus:

$$C = M^* [(P_w - P_d) + (S + H)]$$

where M^* is the maximum quantity of imports which will not overshoot the budget. P_w the border price at which imports are purchased in local currency terms, P_d the average domestic sales price, S the domestic storage costs and H the total domestic handling and marketing costs per ton (if these are not budgeted separately). If the budget is full utilized the total import costs C are equal to the total budget (E), therefore:

$$M^* = E / [(P_w - P_d) + (S + H)]$$

If $M^* <$ UMR5 it will mean that the budget will have to be increased to finance the imports. If E is already regarded as the maximum that the government can allocate to food imports, there may be an argument for calculating UMR1 = M^*. If $M^* \geq$ UMR5 then budgetary constraints should not be regarded as a limiting factor in calculating UMR1. Note that if the domestic price exceeds the marginal cost of importing, storing and marketing the food, the government makes a profit - and food purchase will not be limited by budgetary considerations.

In countries with over-valued exchange rates, foreign currency may be rationed, and FX availability may be a constraint to commercial food import capacity. If there has been a major change in FX availability, as a result of a fall in the world price of a major export commodity, for example, the mission should confirm that FX allocations for food imports are sufficient to cover the UMR or planned level. The Central Bank or Ministry of Finance/Treasury will usually be able to provide information on FX allocations.

7 FOOD ASSISTANCE REQUIREMENTS

Having arrived at quantitative estimates of exports and commercial imports (or UMRs) in the new marketing year, the mission is in a position to calculate the imported food assistance requirement (IFAR).[11]

IFAR can be defined as the minimum quantity of donor assisted food imports required to preserve average national per caput food availability at historic levels, avoiding large inter-annual fluctuations caused by variability in domestic production or commercial trade. It is the residual in the new year NFBS, calculated automatically, once all the relevant data has been entered. The concept of the IFAR is based on the principle of *additionality* - that all food deficits which cannot be made up by commercial imports, should be provided with donor assistance. Imported food assistance is also a form of balance of payments support for countries where private and public sector food import capacity is inadequate to stabilize supplies.

The Total Food Assistance Requirement (TFAR), on the other hand, is calculated independently of the IFAR and may therefore may be greater, less than, or equal to the IFAR. TFAR is defined as the sum of Emergency Food Assistance Requirements (EFA) and targeted projects Food Assistance (PF), both of which may be resourced by imported food assistance, donor financed local purchases, or government financed imports or local purchases. While imported food assistance can be seen as stabilizing inter-annual food supplies, and protecting a country from external shocks, caused by large fluctuations in the costs of commercial food imports, targeted project and emergency food interventions are often regarded as a solution to food insecurity in countries (or parts of countries) where there are wide disparities in income or in access to food.

7.1 International Food Assistance Requirements

The IFAR can be calculated, commodity by commodity, using the NFBS spreadsheets. In the final mission report it would be ungainly to include all the calculations which make up the NFBS. This is especially so when five or more commodities are being considered. For this reason mission reports will normally contain a summary balance, an example of which is presented in Table 2 below. Where several commodities are being considered, the mission may aggregate them by group (cereals, pulses, roots and tubers, etc). If rice is included, both consumption and production should be calculated in milled form, using standard national norms for extraction rates provided by FAO/GIEWS in Rome.

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[11] The term FAR is used, rather than food aid (which has a number of possible definitions) to avoid confusion. Bilateral and multilateral food assistance agreements cover a wide range of financing and procurement mechanisms, of which pure food aid, (deliveries of food commodities free to the recipient country), is only one type. Commodity agreements may have a soft loan element, or may take the form of a financial grant. Indeed, food imports may be part of a broader balance of payments support scheme. FAR also includes donor assistance for local purchases and exceptional surplus disposal.

Stock draw-down (SDD) is used in the balance for simplicity. It is the difference between opening stocks and closing stocks (including on-farm, private trade, public sector and relief stocks). Stock build-up should be indicated by a bracketed minus sign. Feed, seed and industrial uses and PHLs will usually be aggregated, as will public and private sector imports and exports.

Table 2: Sample Food Balance Sheet for the 1997/98 Marketing Year (July/June) in thousands of tons

	WHEAT	RICE[\l]	TOTAL CEREALS	PULSES
Production (Q)	a1	b1	c1	d1
Stock Draw-Down (SDD)	(-) a2	(-) b2	(-) c2	(-) d2
DOMESTIC AVAILABILITY (DA)	a3=a1+a2	b3=b1+b2	c3=a3+b3	d3=d1+d2
Food Use (FU)	a4	b4	c4	d4
Feed, Seed Use & PH Losses (FU+OT)	a5	b5	c5	d5
Exports (EX)	a6	b6	c6	d6
DOMESTIC UTILIZATION (DU)	a7=a4+a5	b7=b4+b5	c7=a7+b7	d7=d4+d5
TOTAL UTILIZATION (TU)	a8=a7+a6	b8=b7+b6	c8=a8+b8	d8=d7+d6
NET TOTAL IMPORT REQMENT (NT)	a9=a8-a3	b9=b8-b3	c9=a9+b9	d9=d8-d3
Commercial Imports (CI)	a10	b10	c10=a10+b10	d10
Int. Food Assistance Requirement (IFAR)	a11=a9-a10	b11=b9-b10	c11=a11+b11	d11=d9-d10
of which: Project and Programme (PFA)	a12=a11=a13	b12=b11-b13	c12=a12+b12	d12=d11-d13
Emergency (EFA)	a13	b13	c13	d13

1/   Rice is in milled equivalent using an extraction rate of 0.65

A country has a net surplus of a commodity if:

EX = DA - DU, where DA - DU > 0

Commercial imports (CI) and imported food assistance will generally not be required. If targeted food interventions are necessary, they may be resourced by donor-financed local purchases (DFLPs). Thus, in Uganda in 1993, the country had a sizable maize surplus, but some drought-affected populations and refugees required relief assistance - this was purchased locally.

The exception to this rule is when internal distribution problems mean that it is not possible for domestically produced commodities to be transported from surplus to deficit areas. Thus, Sudan in 1992, had a net of surplus coarse grains, but populations in the south of the country required emergency food assistance, which was brought in from outside the country.

Occasionally, in countries faced with logistic constraints, private sector exports (PEX) may not account for the entire surplus DA - DU, in which case:

DA - DU = EX = PEX + TT, where TT represents triangular transactions.

As a general rule the net total import requirement is calculated as:

NT = DU - DA, where DU > DA.

However, some net deficit countries export and import in the same marketing year - the exports are generally undertaken by the private trade, often unofficially. This tends to occur when surplus producing areas are closer to urban markets in neighbouring countries than they are to domestic markets. Private traders in Zambia, for instance, regularly export maize to neighbouring Zaire, even in years when Zambia has a net deficit. This net deficit is made up of a combination of commercial imports and food assistance. Thus:

NT = TU - DA, where TU > DA .

The imported food assistance requirement for a net deficit country is calculated as:

IFAR = NT - CI.

where CI includes all commercial imports of the commodity in question. If the IFAR exceeds the sum of targeted food assistance needs, the remainder may be made up by "monetized" food assistance, for market sale - thus:

MS = IFAR - (EF + PF), where IFAR > EFA + PF

Sometimes, however:

0 < IFAR < (EFA + PF). This implies that EFA + PF = IFAR + LP

where LP represents local purchases.

If scenarios have been used in crop production and commercial import forecasts (section 61.2.2), these will be reflected in the NFBS and will emerge as a range of values for IFAR:

IFAR $\pm$ ifar = [(Q $\pm$ q + OP + CI $\pm$ ci) - (FO + FE + OU + CS)]

where Q $\pm$ q & CI $\pm$ ci represent the scenario value for production and commercial imports respectively.

Using data (generally from WFP/INTERFAIS , the WFP country office and FAO/GIEWS) on new year food assistance pledges by commodities, the mission may calculate total tonnage of new marketing year food assistance pledges and deliveries to date (by commodity), and the percentage of the IFAR and/or TFAR that is un-resourced.

In LIFDCs where domestic production or expected commercial imports for the new year fall well below average levels, food assistance requirements are likely to rise sharply. For planning purposes, it is important to estimate the exceptional IFAR, which is the extent to which the new year IFARs exceed the average level of actual imported food assistance for the previous five years, excluding freak high and low values (the structural IFAR). Note that the ratio of the exceptional to the structural IFAR provides a useful index for country rankings according to the relative size of the exceptional needs.

Total donor food assistance policy may also be motivated by the nutritional situation facing a country[12]. Although there is no perfect measure of the nutritional adequacy of food supplies at the national level, by comparing actual per caput food availability with a standard measure of minimum energy requirements, it is possible to arrive at a rough indication of the adequacy of dietary energy supplies (DES).

Per caput food availability (DES) can be compared to FAO's Total Energy Requirement (TER), both expressed as per caput kilo-calories. The former is automatically calculated by NFBS for the last five years for cereals. Non-cereals data can be derived from the latest version of FAO's Food Balance Sheets. The latter is based on the basal metabolic rate (BMR) which is a measure of the energy requirements of different age and sex groups within the population at low activity levels. The FAO software ENREQ2 (under development) gives country by country breakdowns of TERs. An explanation of the TER calculation method is provided in James & Schofield (1991).

Comparison of DES and TER is only indicative of nutritional status in countries where income and access to food are fairly evenly distributed among the population. If this is not the case, the national average DES/TER ratio will conceal wide geographical or social disparities in the energy adequacy of diets[13]. It may also conceal national shortfalls in proteins or in micro-nutrients. Given the high value and relative scarcity of non-cereals supplies for food assistance, and their high handling costs, deficiencies of non-energy nutrients should generally be considered in the context of targeted and supplementary feeding interventions.

The DES/TER ratio for the most recently completed, or soon to be completed marketing year, may then be compared to the average ratio for the previous five years. The ratio provides little more than a rough indicator of the adequacy of dietary energy supplies, adjusted to reflect the population age and sex spread. Nevertheless, it is a useful parameter in food assistance resource allocations, as it can be employed in data scarce countries and offers the possibility of inter-country comparisons. The mission should be sure to point out any sharp downward trends in the ratio.

TER is <u>not</u> used as a basis for food consumption estimates (and hence, the calculation of IFARs). In countries with very low DES/TER ratios this would imply a major increase in donor resourced food imports- and as there is little flexibility in the commodity composition of food assistance, it would almost inevitably lead to major short- and long- run distortions in the commodity composition of the domestic food market. Furthermore, donors may be most unwilling to finance a sudden (and sustained) rise in IFAR which would occur if the SQE method were replaced by a TER method. Rather, it is a useful long term parameter for both domestic and donor policy makers. If food use falls below the estimated energy requirement it may be indicative of the need to augment food consumption, through domestic supply-side policies, increases in UMRs and, above all, through economic growth, which *ceteris paribus*, will increase market demand for domestically produced and imported food[14].

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[12] see USAID 1993 pp58-63 for discussion

[13] with highly skewed income distribution it is possible that average per caput food availability will exceed the nutritional adequacy benchmark, while the average food consumption of the majority of the population falls below that level.

[14] see Cathie, in Clay and Stokke (eds.),1991.

It may be hypothesized, that for any given income distribution, as DES falls below TER the probability of energy related malnutrition increases. The team should therefore seek corroborating evidence from alternative indicators of malnutrition. Where recent national level nutritional sample survey data exists, demonstrating a significant change in anthropometric indicators for large sections of the population, this may be cited by the mission, particularly if the DES has fallen. In general, however, the mission should not draw over-hasty conclusions from such data as the relationship between average food intake and anthropometric indicators may be weak.

7.2 Targeted Food Assistance

While the status quo method and derived calculations of IFARs can be used to stabilize national level supplies, sub-national food problems caused by declines in food availability or demand (or "entitlements") cannot be resolved by national level policies.

For operational purposes, a distinction is made between Emergency Food Assistance (EFA) and longer term targeted food interventions, often referred to as "development projects" (see WFP 1993, B4.1.4). The calculation of EFA requirements may fall within the mission's terms of reference and procedures are described in detail in section 8.

In the light of discussions with local donors, NGOs, UN agencies, the team should make a calculation of imported food resources required for on-going and planned targeted project food interventions by multiplying the numbers of beneficiaries by the project duration and daily ration rate. The mission should ascertain that the proposed ration commodities are appropriate, on the basis of the comments provided in section 8.3 and WFP 1991: A6 and WFP 1993: B4.5.1-2 / B3.1.2.

If the implementing agencies seek a major increase in internationally resourced project food assistance for the current year, the team should assess the reasons critically, on the basis of the examination of the food security indicators for particular population groups. If the reasons are sound, include a justification in the mission report. The mission may choose to report any observations on such operations in the informal forum provided by the Rome de-briefing, recommending a follow-up mission if necessary. Full evaluations of the justification, methodology and implementation of non-emergency food assistance programmes are not feasible in the time-constraint context of CFSAMs and will not be part of the TOR. Appraisal methods are therefore not included in these Guidelines.

The team should calculate what proportion of the TFAR has been covered by donor pledges, deliveries or carried-over stocks, to date.

Total targeted food assistance requirements (TFAR) include both EFARs and PFARs. If the TFAR is less than the IFAR, then the difference may made up by food assistance for market sales, sometimes referred to as "programme" or "monetized" food assistance. If, on the other hand, the TFAR exceeds the IFAR, part of the requirement may be provided by donor financed local purchases or through resources provided by the government of the recipient country. These two possibilities are discussed in sections 7.3 and 7.4 below.

Estimation of TFARs will usually be the responsibility of the WFP team members on joint CFSAMs, while IFAR calculations are performed by the FAO members. It is therefore of utmost importance that the above definitions are followed meticulously and that the figures are compatible. Note that the calculation of EFARs for refugees is independent from the IFAR estimates. For this reason, if the food needs of refugee populations are met by external resources, their numbers should not be included in the national population estimates on which the IFAR calculation is based.

7.3 Food Assistance for Market Sales

This category of food assistance comprises, free commodity donations for monetized sales, commodity imports on grant or soft loan terms and commodity imports at donor-subsidized prices. For a country with a net total import requirement it is usually calculated as the residual: IFAR less TFAR.

The mission is unlikely to be able to predict the outcome of bilateral and multilateral negotiations, and hence the eventual breakdown of this residual element by type of commodity transaction, although donors and government officials may be able to give indications of progress in negotiations to date.

The importance of food assistance for market sales should not be under-emphasized. In countries facing an exceptional national IFAR, it may help to avoid major price hikes, if it is well-managed. Avoiding major price hikes may, in turn, reduce the numbers of people requiring EFA. EFA tends to be much more costly to manage than marketed food assistance. The latter also generates counterpart funds, which can be used to support the financial needs of targeted programmes. If the mission has identified a particular food insecure group in need of non-food assistance, or a pressing local currency financial need in part of the relief sector, it may suggest the use of counterpart funds for this purpose. In general, however, counterpart fund allocation will be decided at the bilateral and multilateral negotiating table.

If a country is thought to require a major increase in food assistance for market sales, the team should examine the structures in place for food marketing. Note that poorly managed market food assistance may reduce the incentive for both domestic and external private trade, by increasing price uncertainty and, possibly, depressing prices. It may be that technical assistance is required to ensure that market food injections are effective. In such cases, the mission should consider:

- physical marketing channels. Who will be marketing food assistance? Do they have sufficient storage and handling capacity?

- market analysis capacity. Are structures in place to ensure that market injections are timely, sensitive market conditions and well managed? Is price information regularly collected and analyzed for individual markets?

- market absorption capacity. How disruptive will injections be at the local market level? Which markets should be targeted for injections?

A full evaluation of the impact of programme food aid, including quantitative estimates of its effect on the market, will not be feasible in the context of a rapid CFSAM. If, however, there are evident shortcomings in the management of programme food assistance, these should be reported at the Rome de-briefings and the possibility of a specialized follow-up mission considered.

7.4 Donor-Financed Local Purchases and Triangular Transactions

If a country has a national food surplus (calculated from NFBS data) or if exceptional local surpluses have arisen due to bumper crop production, there may be scope for triangular transactions or donor-financed local purchases, for targeted food programmes in neighbouring countries or in domestic deficit areas. Such purchases may be much more cost-effective and timely than importing food assistance from donor countries, particularly if domestic border prices are lower than world commodity prices, or if countries are land-locked with high import costs. Local purchases also act to ensure that farmers in surplus areas with poor trade communications have some price guarantee in an exceptionally good crop year. Triangular transactions and local purchases may also have the advantage of providing commodities that are appropriate for the dietary habits of the recipient market avoiding major shifts in tastes. However, repeated local purchase activities at above the prevailing market prices may cause the same distortions as a long-term producer subsidy. From the recipient country's point of view there are considerable risks in local purchases as the availabilities are subject to calculation errors and exogenous market variables.[15]

If the mission considers that there is the possibility of local purchases or triangular transactions, the matter should be discussed with the relevant government officials and donor representations.

All such transactions must be extremely sensitive to local market conditions and should not disrupt the private trade. The conditions under which donor-financed local purchases may be considered are as follows:

- the existence of a national surplus as calculated from NFBS data, or of exceptional local surplus

- the lack of sufficient private sector capacity to transport the surplus across borders or within country. This usually implies a market malfunction, poor integration, security restrictions or the existence of government price or movement controls

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[15]for a fuller summary of the advantages and disadvantages, see Clay and Benson (pp 167169) in Clay and Stokke (eds.) (1991)

- the lack of domestic public sector financial capacity to purchase food for targeted interventions

The first condition for a triangular transaction, as described in section 6.2 is:

$$DA - (DU + PEX) > 0$$

and for a donor financed local purchase:

$$EFA + PFA > IFAR$$

The second condition for a TT is that a destination exists for the purchased commodity - usually a targeted food intervention in a neighbouring country. A third condition is that the cost to the donor of supplying the commodity to the destination using a TT is less than the cost of supplying the destination programme through international imports.

A similar condition applies for donor-financed local purchases. If the price of the LP commodity plus the marginal cost per ton of transporting it to the programme site exceeds the marginal cost of delivering a ton of imported commodities to that site (including the world commodity price, international and domestic transport and handling costs, insurance), an LP may not be considered desirable from the donor perspective.

Under no circumstances should a donor-financed local purchase or triangular transaction pressure farm-gate prices - that is, lead to prices which are above the *real* seasonal norms. It is therefore advisable to consider local purchases only when good inflation adjusted price data is available or when a price monitoring system can be erected. Either LPs should take place at the prevailing market wholesale price or procurement should be tendered for competitive bids.

In a country with one main harvest, the farm-gate price can, on average, be expected to follow a U shaped pattern and to dip to a minimum shortly after harvesting. The new year price, in a country with an exceptional surplus will tend to dip deeper - if public and private sector external trade is in some way constrained. Local purchases should take place up to the point where the normal seasonal price has been reached, or, if this occurs first, the point where the marginal cost of purchasing food and transporting it from the surplus to the deficit area equals the marginal cost of delivering imported food assistance to the target area. These conditions should ensure that local purchases are non-distortionary and are cost-effective from the donor perspective.

A first indication of the LP capacity of a certain area (sub-national) can be derived by subtracting the mean crop production of the previous five years from the new year crop estimate. If good local trade, production and consumption data exist (if for example, staple food marketing is undertaken by a parastatal), a local balance sheet, exactly analogous to the NFBS, can be constructed and LP capacity can be calculated as the surplus remaining after projected trade flows out of the area in the new year have been deducted from the total surplus. If the food market is operated by a few large traders, the mission may try to ascertain how much uncommitted stock they have on hand.

Total national TT capacity can be calculated from the balance sheet as:

DA - (DU + EX)

While the LP or TT estimates can be used as a rough maximum planning figure, local purchase potential as determined by seasonal price differentials and by donor opportunity costs may differ widely from these calculations as a result of unexpected private sector storage and trade decisions, or calculation errors in the quantity estimate. The mission should be sure to mention this uncertainty in its recommendations.

8 EMERGENCY FOOD ASSISTANCE REQUIREMENTS (EFARS)

Emergency food interventions play a crucial role in protecting populations from major once-off fluctuations in food consumption. If the calculation of Emergency Food Assistance Requirements (EFARs) is included in the mission's Terms of Reference, the team should assess information on proposed target populations, programme duration and ration rates and determine whether food or non-food interventions are the most appropriate form of assistance.

The EFAR for a commodity (i) is calculated as: $TPOP_j . n_j . RA_i$, where TPOP is the total target population j, n_j the duration of the programme for the population j in days, and RA_i is the proposed daily ration rate for commodity i.

Table 3: Presentation of EFAR Calculations

	requirement for current marketing year			closing stock	Total EFAR (tons)
	target population	duration (days)	ration (kgs/day)	required (tons)	
Group 1	a1	b1	c1	d1	e1:[(a1xb1xc1)/1000]+d1
Group 2	a2	b2	c2	d2	e2:[(a2xb2xc2)/1000]+d2
Group 3	a3	b3	c3	d3	e3:[(a3xb3xc3)/1000]+d3
TOTAL	a4	b4	c4	d4	e4: e1+e2+e3

All calculations should be dis-aggregated by population group and by commodity and should refer to programmes during new marketing year. The team should clearly indicate which estimates of vulnerable group numbers are provisional, and subject to subsequent review. Allowance should be made for stock losses. If the mission perceives that carryover food stocks will also be needed at the end of the new year, to ensure continuity of relief supplies in the following year, these should be added to the EFAR estimate and to the forecast national closing stock estimate as discussed in Guidelines section 4.2. Working stocks during the year should not be listed separately, as this will lead to double-counting.

Where scenarios for target population number have been included (see section 8.1 below) maximum (worst case) and minimum (best case) figures should be used and the resultant EFA quantities calculated for both cases.

Emergency Food Assistance may be provided as international imports, from triangular transactions with neighbouring countries or through local purchases. If the country has a net food import requirement, part or all of the EFA will generally be provided as imports. In countries with a net surplus, part or all of the EFAs may be met by local purchases. The conditions under which triangular transactions or local purchases may be considered are discussed in section 7.4 above. In some cases they will be the most cost-effective and timely form of intervention.

Note that food assistance needs for refugees should be calculated separately from the estimated IFAR, as refugees are not included in the NFBS import requirement estimates and the resourceing process for refugee programmes is different from that for programmes for country nationals.

The mission should try to calculate by commodity and programme, what proportion of the EFA requirement has already been covered by donor pledges (including carried over pledges from the previous marketing year and new year pledges). Estimate the total quantities of pledged food assistance in transit, stocked in-country or already distributed during the new marketing year and, hence, to the need for additional for fresh pledges and deliveries for the new year. Be sure to avoid double counting of stocks and pledges by checking all data against the source and consignment number.

Table 4: Emergency Food Aid Resourcing Position

SOURCE	total requirement	Resources to date				
		pledged (shortfall)	in transit	in stock	distributed	total delivered (shortfall)
Govt. Stocks		( )				( )
G. commercial imports		( )				( )
Govt. local purchases		( )				( )
Donor LPs & T.Ts		( )				( )
International EFA		( )				( )
TOTAL EFA		( )				( )

8.1 Estimating Target Populations

The mission's task, in cooperation with the local EWFIS, will be to assess the information on target populations. Information on target group numbers and locations will generally be available from one or more of the following sources: the Government relief, welfare or health services, NGOs, WFP, UNICEF and UNHCR and the EWFIS. The team's field trips will be planned to encompass the critical zones of the country (see section 2.2.1 on field trip scheduling and sampling methods).

The estimation of target population sizes is a continuous process, which is usually triggered by a political, economic or natural disaster. The mission could arrive in the country at any stage in this process, and its responsibilities will vary accordingly.

The first stage follows immediately from a disaster and entails locating the geographical areas affected by disaster, and the extent of disaster. Once the disaster affected areas have been identified, the most recent dis-aggregated population data should be used to estimate the total numbers of people living within affected area. This will give *absolute upper limit for target group estimates*. On the assumption that the impact of a disaster will differ according to the *household type*, populations in the affected areas should then be dis-aggregated. The differential impact of the disaster for each *population sub-group* is assessed. Certain pre-survey judgments can be made on which household types are likely to be most at risk from the disaster.

In general, a sample survey should be undertaken by the government or local implementing agencies, which is stratified to reflect the appropriate definitions of household type. The survey will provide an estimate of the probable population sub-group sizes. Surveys and any other relevant sources of local survey information will be used to ascertain whether sub-group specific indicators demonstrate *acute food insecurity*. If so, target sub-groups can be selected accordingly to give the *provisional planning figure*.

The next stage is to establish screening criteria for programme intervention. Screening may occur prior to the establishment of an emergency programme or at the moment that it becomes operational. Once screening has taken place, the "actual planning figure" should be available. Throughout the duration of the programme, the actual planning figure will be revised.

8.1.1 Pre-Survey Activities

If the CFSAM arrives shortly after the occurrence of a disaster, it may be that no estimates of target populations are available and no surveys have been undertaken. The team will have to depend on the field trips for its evaluation. In this case, the main objectives of the mission will be to:

- provide qualitative explanation of impact (geographical) of disaster outlining which zones have been affected and how.

- locate all relevant dis-aggregated population and household survey data for the affected areas

- assess the availability of existing data on indicators of acute food insecurity

- make recommendations for local surveys. This will entail: 1/ the selection of the main survey zones and estimation of appropriate sample size and sampling method; 2/ the identification of the main population sub-groups in affected areas for sample sub-group stratification; 3/ suggestions on the appropriate indicators of acute food insecurity; 4/ observations on the local capacity for coordinating and undertaking a survey and additional resource requirements if necessary

- warn if there is a strong possibility that emergency food assistance will be required

- using trend-adjusted demographic information, estimate the *maximum possible target population* (the whole population of the affected areas)

- if household survey information is available, calculate the number of households falling into population sub-groups which are considered to be most at risk.

Procedures for sample design, stratification, assessment of the impact and choice of relevant indicators are described in section 8.1.2 below.

8.1.2 Estimating Provisional Planning Figures

The team cannot be expected to perform a sample survey under the typical time constraints of a CFSAM. Rather, the objectives of the mission will be to assess the assumptions behind the design of existing surveys, the relevance of the information gathered and its quality. On the basis of this evaluation, the mission may confirm the need for EFA for specific population sub-groups in specific areas if the following conditions are met:

- the food consumption of a proportion of the population is likely to fall, unless there is an intervention

- that the fall in food consumption represents an exceptional event, rather than a stage in seasonal or cyclical process

- that food assistance, rather than non-food assistance is the appropriate form of intervention.

8.1.2.1 Sample Stratification

Missions should assess whether existing or planned sample surveys are "as representative as possible" of the total population, given the resources available for sampling. The total population in this context excludes households living in zones which are not disaster affected. The choice of the appropriate geographical stratification will depend on the type of disaster. and on the administrative possibilities of collecting data according to non-political boundaries. If total population data is only available by political boundaries then it will clearly not be possible to conduct a representative sample survey based on, say, agro-climatic zones. It is usually safest to follow the stratification of most recent population census. If political/ administrative boundaries are used, but agro-climatic zones are not homogenous within the zones, a survey undertaken in one area of the zone may be unrepresentative.

The maximum practical number of survey areas in each zone should be estimated. A grid can then be super-imposed on the zone and quadrants for sampling selected randomly (check that there is no bunching).

The total sample size (S) will usually be dictated by the resources available (human, financial, logistics, time) available for undertaking the survey. Geographical sub-sample sizes (s_i) should reflect, as closely as possible, the proportion of the total population living in the specific zones. Thus:

$$s_i = S \cdot (pop_i / POP)$$

where pop_i is the population of the zone and POP is the total population of the affected areas.

The sample size for survey areas should generally be the same within zones, unless it is evident that some areas are much more densely populated than others.

Households within the survey areas should be randomly selected. The questionnaire should record the area and zone of the household.

8.1.2.2 Impact Evaluation and Stratification by Household Type

To estimate a provisional planning figures for target groups, survey questionnaire design must include classifications by household type, on the assumption that some sub-groups will be more adversely affected than others. If the population of a zone is homogenous, equally affected and equally needy of food assistance, such sub-divisions will not be necessary. The total population figure for the affected zone will serve as the provisional planning figure and a blanket distribution scheme may be recommended. Such homogeneity is, however, most unlikely. Blanket distribution (all the population of a zone receive food assistance) has the practical advantage that it renders costly and time consuming screening unnecessary. Further it obviates the need for choices between potential beneficiaries in the same zone which can lead to social tensions. Nevertheless, it has some notable shortcomings.

The food costs of the intervention are clearly higher for blanket geographical interventions. Second, food distribution to certain population groups (surplus producing farmers, for example) may be an extremely inefficient form of transfer, in so far as it may undermine the incentives for on-farm production. It is always worth considering the possibility of "within zone" targeting. Blanket programmes should only be considered if the mission can demonstrate that the population of the affected zone is uniformly vulnerable or that no form of targeting is feasible for logistic or sociological reasons.

Mission reports should outline the strengths, weakness, scope, and level of detail of sample surveys. If the mission finds that a vulnerable zone has been excluded from the sample survey, for reasons of insecurity or oversight, or that the survey is based on a small sample in relation to the total population of the affected zones, population sub-group estimates may be biased and missions should be sure to make note of this in the report.

Survey population groups should be classified at least by the following household categories: location (rural/urban), economic activity, socio-economic status and gender (of household head). The appropriate population subdivisions will vary from country to country. Tables 4 and 5 present (by no means exclusive) examples of possible subdivisions for rural and urban settings respectively.

Table 5: Example of Rural Population Group Stratification

wealth rank	settled, landed arable farmers						landless farmers			
	subsistence		surplus food producer		cash crop producer		landless labourer		pastoral	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1										
2										
3										
4										

Table 6: Example of Urban Population Group Stratification

wealth rank	public sector employees		informal sector employees		formal private employees		self employed		unemployed	
	Male	Female	Male	Female	Male	Female	Male	Female	Male	Female
1										
2										
3										
4										

Very rarely will it be feasible to collect household income and expenditure with which to calculate poverty rankings for households. This is an extremely costly procedure, usually requiring several follow-up visits to sample households. Only occasionally will survey data already be available giving an indication of the distribution of poverty by geographical zone, social group or occupation in the affected areas. The practical alternative to income/ expenditure surveys is to use proxy measures. These have the advantage of being feasible in the context of a rapid survey and are relatively easy to calculate and to interpret.

One such proxy method is the calculation of "possessions scores". Households are asked to list their ownership of various consumer durables (watches, working radios, beds, chairs, shoes, cars, bicycles etc). An alternative index, suitable for settled farmers and urban dwellers is based on the building materials used for house construction (roof: tiled, straw, aluminum; floor: mud, concrete, tiles etc). Each possession (x_i) is weighted (w_i) to reflect its relative market value. For each household possessions scores are calculated as:

$$\sum_{n}^{1} (x_i . w_i)$$

Household level possession scores can then be classified by quartile or quintile using a standard statistical software package.

It may be that <u>all</u> members of a specific population subgroup are considered to be in need of emergency food assistance. If not, it may be necessary to add further layers of stratification. It should be noted that the larger the number of population sub-divisions, the more complex and time consuming the eventual survey and consequent population screening will be.

There is a trade off between the time and financial resources required to undertake the survey and the number of household classifications. Always ensure that the classifications can be measured with ease in the context of a rapid sample survey or screening exercise.

Further possible types of population sub-group stratification are:

- per caput land holding size within household for arable farmers in extensive (low input) farming systems. This is applicable only in areas where the hiring out of household labour market is rare. Otherwise, farm households may compensate for small land holdings by increasing off-farm waged employment.

- current year crop production for arable farmers. This may be calculated per caput (within the household) and mean household scores can be divided into quartiles/ quintiles for sample stratification. In several crops are produced it will be necessary to calculate production in value rather than quantity terms. Surveys will therefore have to include production information by crop type and farm-gate price information for each crop.

- size, quality and gender of livestock holdings for agro-pastoralists and pastoralists per caput within the household. An index of livestock holdings can be calculated in cattle equivalents or in value terms using current market head prices and divided into quartiles/ or quintiles for sample stratification.

- distance of households from food markets. In conflict situations or when floods or other natural disasters have reduced population mobility, the distance of food deficit households from markets will influence their vulnerability.

- household food stock holdings for subsistence and semi-subsistence households. Calculated as the mean stock holding per household member (see Appendix 9).

- dependency ratio. Arable farm households with high dependency ratios may be particularly vulnerable. It is defined as the ratio of number of dependents to the total household number which ranges between 1 and 0. Dependents may be defined as household members who are not engaged in a remunerative activity or can be defined by assumption: under 15s, over 65s and disabled members may be classified dependent if child labour is rare. Thus, to calculate the dependency ratio it will be necessary to gather information on individual household members by age or employment status. Dependency ratios can be divided into quartiles or quintiles.

To define the appropriate household classifications it is necessary to ascertain the likely impact of the disaster for specific types of group. This can, to a certain extent, be adduced *a priori*. The FAO/GIEWS Risk Mapping Project, currently under development, is designed to simulate the effects of certain types of disaster for specific groups and will eventually provide missions with a systematic framework for household classifications.

With a precise idea of which groups are likely to be most affected, it will be possible to focus on those which are most in need of emergency food assistance. It is useful to trace the consequences of a disaster step by step. If the direct and indirect consequences can be carefully identified, then we may arrive at an intuitive evaluation of the impact on specific groups. the intuitive evaluation may then be corroborated by field trips to the affected areas and discussions with affected households, community representatives and religious leaders, NGOs and local authorities.

The impact of a disaster on food security may be classified under three broad headings: restriction of access to markets, price rises and falls in income. Any one circumstance or combinations of circumstances may justify emergency intervention.

8.1.2.2.1 Access to Markets

Access to markets may be limited by mobility constraints. War and extensive floods can prevent traders from transporting food and consumers from reaching retail markets. All food market dependent households will be affected. The collapse of crop marketing parastatals can lead to a temporary vacuum until the private trade intervenes.

In extreme circumstances, access to market food supplies will be completely cut and immediate emergency intervention for all groups will be justified. Missions should never assume that access to markets has been completely cut, without verification. Food traders sometimes operate where relief agencies fear to go. Partial restrictions to marketing will, ceteris paribus, lead to price hikes in deficit areas, and there could still be an argument for intervention (see below).

8.1.2.2.2 Exceptional Declines in Income

The link between the disaster and incomes is usually evident. Civil or international conflict can lead people to abandon homes, farms and jobs. All types of household could be reduced to total destitution (irrespective of their initial wealth) unless alternative employment can be found in the host zone. The assessment will usually take place with representatives from UNHCR. Aerial and road surveys can give a rapid initial impression of the extent of forced out-migration. The implications of out-migration for food security will depend in part on how much warning households have had of the impending disaster. If households have had time to organize their belongings and carry possessions with them, they may be less vulnerable (at least for a certain period) than those which have had to abandon everything. Thus an initial indication of the extent of destitution of IDPs and refugees is the quantity and types of possessions and cash which they have carried with them.

The mission should try to ascertain whether in-country and cross border migration is exceptional - that it is not a seasonal or cyclical part of the household's activities. The team should carefully question households on their motives for migration. If the team is able to visit the places of origin of the migrants, a useful indicator is the state in which properties have been left. Involuntary migration is probable if dwellings have been completely depopulated, leaving possessions unprotected.

Programmes to support communities of displaced people or refugees may give an incentive for them to prolong their stay, which delays their return to a self-sustaining livelihood and implies continuing social and economic pressures on the host community. In assessing zones in which there have been large influxes of displaced people or refugees the following characteristics of the migrant households should be considered:

- are they completely or partially separated from the economy of their place of origin? Sometimes households or individuals will migrate during the lean season, but may return periodically for crop cultivation or casual labour;

- do they possess cash, food, livestock or any another form of mobile or semi-mobile asset?

- do they have access to local labour markets, land or any other income generating activity?

- do migrant households have full access to local food markets, at prevailing prices?

- are relief activities or returnee programmes planned in the place of origin which might mitigate the need for and intervention in the host zone?

The team should consider the impact of forced migration on the "host" community (see WFP 1993 B 3.1.5-6). The host community may face increased prices of food and other basic commodities as a result of the additional local demand, if markets are poorly integrated, to the advantage of surplus producing farm households and disadvantage of market dependent households. Conversely, in-kind interventions for displaced people and refugees may depress food prices for indigenous surplus food farmers and benefit deficit households. Local labour markets and services may also be pressured. In some circumstances, therefore, there will also be a need to consider relief interventions for population sub-groups within the host community.

The vulnerability of crop income dependent households is clearly a function of both on farm production and prices. As disasters, both natural and man-made are likely to affect both, the impact of the disaster will vary between household types. Only for "pure" subsistence households, who do not market any crop or livestock product can the consequences be unambiguously negative.

A qualitative assessment of the impact of a disaster on the production side can be derived from the crop assessment part of the CFSAM's activities. In a conflict situation crop and livestock production may fall as a result of damage to standing crops, looting of crop supplies, and the theft or destruction of livestock.

Conflict may also limit the supplies of factors of production. Rates of mortality and military conscription are likely to be higher among the economically active farm population than among the non-active, increasing average dependency ratios and constraining the on-farm labour supply. Household and hired labourers may not have access to fields, or farm work may be unsafe. Further, access to factors of production (labour, fertilizer, pesticide, hand-tools, machinery, fuel, spares) may be impeded.

For livestock producing households, conflict may restrict the mobility of animals to grazing and drinking water. Further, if veterinary services, vector control and vaccination programmes collapse, there is a high chances that preventable livestock diseases will become more prevalent.

Mobility restrictions may prevent farmers from marketing, even if production itself has not been hampered. Marketing channels for export and fresh produce may collapse, making crop marketing impossible. Complete market failure is less likely for crops which do not have single "downstream" processing chains. Even if marketing is possible, mobility constraints to the trade will tend, ceteris paribus, to depress farm-gate prices and reduce the incomes of farmers. These circumstances could justify supporting non food-producing households. Food assistance is clearly inappropriate for surplus food crop farmers facing depressed farm gate prices!

In food deficit areas (dependent on food trade from other zones) restrictions to trade may lead to price hikes. Food surplus producing families within deficit zone, whose production of food has not been affected by the conflict, will, ceteris paribus, benefit from the price rises.

The impact of floods on farm households is also ambiguous. Floods may imply direct crop damage, or restrictions to input supplies (hired labour, fertilizers, etc). Extensive flooding may also restrict pasture availability for livestock dependent households for prolonged periods. They may also impede crop marketing activities. The food security implications of the flood will depend on the type of zone (net importer/ exporter of food) the type of crops produced (food, non-food) and the type of household (pure subsistence, part subsistence, pure commercial).

Severe droughts and pest infestations may have a direct impact on crop production but do not restrict marketing activities. Crop income and natural disasters - severe droughts and pest infestations can be seen from aerial surveys) - market integration - prices in affected areas may rise if markets not well integrated

The impact of drought or pests in pastoral areas will largely depend on the number, sex and quality of household animal stocks and on the market value of the stock in relation to prices of food and other essential commodities, on non-animal asset holdings and on non-herding income generating opportunities.

Livestock data usually ranges from unreliable to highly unreliable, but it is possible to assess some of the factors likely to have affected head numbers and quality. Occasionally data will be available on livestock off-take rates and unplanned mortality - and should be compared with time-series to establish non seasonal cyclical patterns - The impact of drought or pests in pastoral areas will largely depend on the number, sex and quality of household animal stocks and on the market value of the stock in relation to prices of food and other essential commodities, on non-animal asset holdings and on non-herding income generating opportunities.

Whenever possible, the mission should visit a sample of pastoral areas, make a visual examination of the quality of livestock, browse and grazing, and conduct interviews with (agro) pastoralists, bearing in mind that at the time of the mission, during or towards the end of the rains, pasture and livestock conditions may be at their best.

If travel is restricted, some indication of exceptional shortages of pasture, browse and drinking water can be derived from a careful examination of CCD and NDVI images and other reports.. Major deterioration in pasture conditions can also be detected from low flying aerial surveys. Unusual herd movements in search of pasture, or a rise in the number of disputes over grazing and water rights may be indicative of a decline in pasture availability.

A one-time fall in wages or spate of redundancies could make households which depend on employment income, either directly or indirectly through remittances, vulnerable to falls in food consumption. Reasons for changes in the labour market should be clearly identified with some indication of the likely duration of the changes. Redundancies or falling wages in the private sector may reflect temporarily, seasonally or cyclically low product prices. A sustained fall may be caused by an irreversible change in price policy. Public sector retrenchment could be a major long duration cause of unemployment. Unemployment and wage rates may be affected by large-scale in-migration. The duration of these effects will depend on the nature of the migration.

The consequences of unemployment for food consumption will depend on how quickly workers can find employment, which will, in turn, be influenced by their skills and the smooth operation of the market. The coverage and scale of social benefits, whether provided by the state, community safety-net mechanisms or relief agencies, should also be assessed. Note that a major change in urban employment and income levels will be of particular significance for the food security of vulnerable groups if it coincides with a major real increase in the prices of food or of other basic commodities, including fuel and housing.

Official data on wage and unemployment rates is often unavailable or published with such delays that it is not of use to CFSAMs. The mission should be able to get a qualitative impression from formal interviews with households, community leaders and relevant officials and the usual informal discussions with taxi drivers and hotel staff.

8.1.2.2.3 Food Price Hikes

Market food price rises may provide an argument for emergency intervention, particularly if combined with stagnating or declining incomes among non-surplus food producing households. The reasons for the rise should be identified as should its geographical extent and its probable duration. A sharp devaluation/depreciation of the currency may have marked short term consequences for food prices. A once-off devaluation in a country which imports a large proportion of its staple food on the world market will pressure domestic prices, unless consumer subsidies are in operation. The removal of consumer subsidies can cause sustained price rises as can changes in marketing, taxation or external trade policy.

The geographical extent of the price rise will depend on the homogeneity of the national food economy and the integration of sub-national markets. If local markets are well integrated, which means that the private trade is working effectively and physical and price communication between markets is strong, a major price hike will act as an incentive for inter-regional trade, and the price hike should be short-lived. If, however, markets are poorly integrated, local price hikes may be more persistent. Poor market integration could be a result of civil strife, a sudden deterioration in road or rail communications or physical, economic or legislative constraints to private trade. In certain circumstances (floods, civil strife) local price rises may combine with constraints to market integration and will probably be prolonged.

Households producing a marketed surplus of the commodity may benefit from these higher prices, but net purchasing households will loose out. The consequences will be more drastic for households at the lower end of the income scale, who tend to spend proportionally more on food purchases.

Certain types of food are likely to form a more significant part of the diet of the poor than of the rich. Price changes in these commodities are therefore likely to have more marked effects on low income groups. Such "inferior" commodities may be starchy foods such as cereals and tubers, may be lower quality grades of food, may be less preferred for some physical characteristic (for example yellow maize in many parts of Africa) or may be less processed (un-sifted flours and meals). Abnormal price changes may lead to a rapid decline in the food security of a vulnerable group, although the problems of interpreting the relationship between price changes and acute food security are well known.[16]

Where a price increase in one commodity is offset by a decline in prices of a close substitute, the effect total food consumption may be minimal (consumers shift from one commodity to another). A once-off rise in the price of a staple, without any compensating falls in other commodity prices may adversely affect consumption of both the staple and of other foods (income effect). A general rise in staple food prices which is not a result of general price and wage inflation, and is not compensated for by a fall in the prices of non-food basic commodities or wage increases is likely to affect most consumers.

In determining which groups are most likely to be affected by food price changes, the mission may consider the proportion of the group's food consumption which is usually covered by food purchases (as opposed to subsistence consumption) and the proportion of the group's total expenditure which is spent on food.

If food price time-series are available but do not include the current period, the mission may be able to collect current prices on field trips. In price analysis it is essential that like is compared with like. The mission must ensure that it uses the same definitions as are used by the official sources in relation to: measuring and weighing conventions, classification of commodities (by type and quality), type of price (farm-gate, wholesale, retail, cleaned and bagged). Note that, because of economies of scale in grain trading, the market price of a 2 kg cup of maize meal, may be greater than the price of a ton divided by 500. Take care to adjust for this when scaling up from small measures. Prices tend to follow seasonal patterns: ensure that all comparisons are between de-seasonalized data, annual data, or between price observations at the same point in the crop year.

Data on retail food prices may be available from the EWFIS, the CSO, consumer organizations, crop marketing parastatals, or private sector trade journals. Data should be analyzed at the most dis-aggregated geographical level possible. Commodities should be dis-aggregated by quality grading and type.

All quantitative price analysis should use real rather than nominal prices. Extreme caution should be exercised in selecting the appropriate price deflator. Retail price indices (RPIs) may well be calculated on the basis of commodity weights which are applicable to urban but not rural households. As urban dwellers may well have very different consumption patterns, the use of the RPI may lead to bias when applied to rural market prices. Inflation adjusted current prices can then be compared to those for the equivalent period, market and commodity in previous years. It will be necessary to adjust historic data to reflect trends. The analysis should consider both the mean and distribution of historic prices.

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[16] see de Waal, 1991, for a particularly skeptical view.

8.1.2.3 Detecting Acute Food Insecurity

One basic criteria for eligibility for emergency food assistance food is that households are facing "exceptional" food insecurity[17]. A useful distinction can be made between "chronic food insecurity", the state of those individuals, households or communities who habitually experience hunger and malnutrition as a result of problems of absolute access to food[18] and "acute food insecurity" which describes the condition of individuals or groups which have experienced or are expected to experience in the coming year, a marked change in their access to food.

Emergency food assistance is appropriate for groups which fall under the heading of acute food insecure. Longer term project interventions are generally directed to groups experiencing chronic food problems. The distinction between the two is often vague: some zones are particularly prone to natural disasters every year (droughts, floods, hurricanes), but the disaster may hit with a particular ferocity in a particular year. Note that supplementary feeding programmes, targeted to sub-groups within a vulnerable population (typically young children, pregnant and lactating mothers, the elderly) may be appropriate short term or long term responses to specific nutrient deficiencies.

There is no universal measure of either acute or chronic food insecurity. Indeed, criteria for assessing food security will be highly country- or region- specific, and will depend on the particular structure of the food economy in question and for specific types of household under consideration. There is, however, a wide set of possible *indicators* of acute food insecurity which might be appropriate to CFSAMs. An indicator may be selected if :

- it provides evidence of an actual fall or probable fall in household food consumption

- it can be used to distinguish between seasonal, cyclical and exceptional circumstances

- data on the indicator can be collected using the minimal of resources and technical expertise

Appendix 9 offers some general observations on potential indicators of acute food insecurity but the team's choice and interpretation of appropriate indicators will have to be defined in greater detail during initial Rome and in-country briefings. A full assessment of indicators for specific groups will not be feasible in the context of a CFSAM. The mission's task will be to undertake a critical examination of local information on key indicators. The following questions should be asked:

- are the indicators used appropriate for assessing acute food insecurity?

- does the indicator give a timely warning or does it change only when it is too late?

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[17] Numerous definitions are available: part 1 of Maxwell and Frankenberger 1992 provides a review.
[18] see Review of Improvements in GIEWS and FAO-Supported National and Regional Early Warning Systems, CFS: 92/5, January 1992

- are important (and practical) indicators missing from the analysis?

- have surveys been undertaken in the most at-risk areas?

- has the data been collected and analyzed in a systematic fashion for all household types?

The CFSAMs field trips can then be used to assess the accuracy of existing information, focusing on proposed areas for target interventions.

The mission report should record observations on the performance of indicators for specific population sub-groups and geographical areas. Missions are warned not to over-emphasize the importance of any one indicator.

Given the complexity of the food economy and the difficulties in collecting and interpreting indicators, no single variable can be regarded as conclusive evidence of a group's food security status. Strong evidence of acute food insecurity in target groups will provide governments and donors with a clear justification for intervention. The justification should include a brief discussion of why specific indicators have been used, how they have been collected and what problems arise in their interpretation.

8.1.2.4 Is Food the Appropriate Form of Assistance?

The mission must always bear in mind that in-kind food interventions are not necessarily the best solution to food problems. All forms of in-kind food intervention are potentially disruptive to food markets and may have negligible net economic benefits for this reason.[19] Food interventions may lead to shifts in dietary tastes, which will force structural changes on the local food economy.

For proposed targeted interventions using donor food assistance, it would be instructive to compare the relative merits of in-kind versus cash transfer interventions, from the recipient perspective, although this can require complex economic modeling and good data on household price elasticities of demand. Rather, for specific target groups or zones, the team should attempt a qualitative assessment of the following factors:

- is there a feasible alternative to in-kind interventions? Do financial resources exist for non-food interventions? Is the infrastructural capacity for non-food interventions in place?

- is there a particular dysfunction which means that market food supplies are unreliable or very high-priced? Does the target group have easy access to market supplies?

- is the food intervention large enough to result in significant changes to farm-gate prices, acting as a dis-incentive to local farmers or those in neighbouring areas?

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[19]for a fuller discussion see Cathie (1991)

- do in-kind transfers favour the most vulnerable? In countries where there are large differences between male and female marginal propensities to purchase food, targeted in-kind interventions may be more beneficial for women[20] unless the food is immediately re-marketed

- is the provision of food culturally acceptable to the recipient group? In some societies food hand-outs may be regarded as degrading.

It is widely recognized, that acute food insecurity is rarely a pure supply side or demand side phenomena[21]. Demand side factors may predominate in certain circumstances and for certain population groups however. Consider, for example, a country in which market food supplies are constant and access to those supplies is not restricted by population or food mobility constraints. A spate of redundancies in the non-farm waged sector may render a sub-group of the population vulnerable to acute food insecurity, if no form of unemployment benefits are available. Under these or similar circumstances, income transfers may be a substitute for direct food transfers.

For ongoing EFA programmes, missions are advised to assess information from food basket monitoring exercises. If there is evidence that beneficiaries are immediately re-selling a large proportion of their rations and market food prices are stable or weak, there may be an argument for considering non-food transfers.

Possible mechanisms for income transfers are:

- simple cash transfers

- coupon systems, where beneficiaries are issued coupons for subsidized or free food purchases from local suppliers, and food retailers are then reimbursed the difference between the market retail price and the subsidy price.

- emergency employment schemes (for cash incomes or a mixture of cash and in-kind food incomes).

- consumption credits (in cash form or as food loans), with a subsidized interest rate and long term loan maturity.

If food markets are operating efficiently and food security problems are predominantly income-related, the value of the food aid to the recipient approximates the local market price of the commodity. In this case, a measure of the relative benefits of cash versus food transfers can be derived from the alpha-ratio[22].

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[20] See Cook et al. (1991)
[21] see Devereux (1988) for a discussion of the interaction of supply side and demand side determinants of famine.
[22] see Reutlinger & Katona-Apte (1985) for a full description of the method

The alpha ratio can be written as:

$$Pm / (Pw + T + H + D) \geq 1 + G$$

where Pm is the local market price of the commodity and Pw is the opportunity cost to the donor of one ton of food assistance. The opportunity cost will normally be the price for which the donor country could export a ton of the commodity on the world market[23]. This is added to the full transport (T), handling (H) and distribution costs (D) per ton, from source to the ultimate beneficiary. G is the cost of transferring one dollar of cash to the beneficiary which includes all administrative costs and potential "leakages". An alpha ratio of less than (1+G) would suggest that a cash transfer would be more efficient than an in-kind transfer, from the donor perspective.

Clearly, the costs per ton of an in-kind food will depend on the scale of the emergency operation. Similarly, the larger the food assistance programme the higher the likelihood that Pm will be depressed by the intervention itself. To reflect these considerations, the following form of the alpha ratio is applicable:

$$\frac{Pm + [Q. (dPm / dQ)]}{(dC / dQ)} \geq 1 + G$$

where Q is the total quantity of food assistance provided and dc/dQ is the marginal cost to the donor the commodity. If the ratio is less than unity for some value of Q it may be that a combination of in-kind and income transfers may be advisable. Estimates of the revised alpha ratio will require price elasticity information.

If target groups have limited access to market food supplies (for reasons of civil strife, marketing restrictions, damaged infrastructure etc), income transfers cannot be regarded as a substitute for in-kind food assistance. Further, if the disaster in question has resulted in food price hikes in directly or indirectly affected areas, income transfer schemes may boost effective demand and add further pressure to prices. In these circumstances there is a strong case for EFA rather than income transfers.

8.1.3 Evaluating Screening Criteria

Beneficiary screening criteria should be consistent with the population stratification method used in the original sample survey exercises. Occasionally, governments or agencies will have the resources to conduct a national level screening exercise which obviates the need for a vulnerability survey. In Lesotho, for example, the government distributed a legally binding household questionnaire, including a set of screening criteria which was used as the basis for both the estimation of potential beneficiary numbers and for assessing the individual household eligibility for food assistance in the wake of the 1994/95 drought.

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[23] This measure of the opportunity cost of food assistance is becoming increasingly relevant as intervention prices in the main donor countries are brought in line with export prices, intervention stock holdings are reduced and protective tariffs are cut.

More frequently, however, the provisional planning figure will be derived from a sample survey and the screening activity will be conducted only in those areas which have already been identified as at risk. The screening will be used to identify actual beneficiaries. The *screened population figure* may differ from the provisional planning figure. The CFSAM should be sure to discover the reason for any major revisions in the figures. The change may reflect an incomplete or unrepresentative sample survey or a poorly implemented screening exercise. The team will therefore have to make a retrospective assessment of the quality of the sample survey followed by an analysis of the screening exercise. The team should ascertain whether:

- the screening criteria reflect acute food insecurity

- the potential target populations have been fully informed of the screening exercise

- the screening exercise includes all potentially at-risk areas and sub-groups

- the screening criteria exclude those who not facing acute food insecurity

- the screening exercise is practical given the infrastructural, personnel, cost, time and information constraints facing the country.

- that the screening criteria are consistent with population sub-group definition on which the provisional planning was based

- the selection guidelines conform with government, donor and WFP principles for EFA distribution

- the selection procedures contain adequate safeguards against selection bias on the part of the local implementing agency. Such safeguards may include: 1/ legal obligations under contractual arrangements between the organization(s) financing the EFA distribution or screening and the organization(s) conducting the screening exercise; 2/ the establishment of an independent body to monitor the implementation of the screening including random spot checks; and 3/ the establishment of an independent appeals procedure through which individuals can report mismanagement.

- the selection procedures contain adequate safeguards against multiple registration of the same beneficiaries. Potential safeguards are 1/ mechanisms which encourage community self-regulation of screening; 2/ a system of non-reproducible ration cards; 3/ careful gathering and recording of beneficiary names and household sizes, preferably corroborated by official identity documents if these exist and 4/ legal measures for those who abuse the system.

The CFSAMs field trips can be used to verify information on all the above questions, through interviews with screened and un-screened households, local officials, community representatives and representatives from implementing agencies.

If major irregularities in the screening process are discovered (bearing in mind that, in emergency situations, screening is always far from perfect), the mission should highlight them in the report and assess their implications for eventual beneficiary numbers. The possibility of re-screening should be discussed with all the responsible and interested parties, and on de-briefing in Rome.

If the results of the screening exercise are rejected by one or more of the implementing partners and re-screening is proposed, the mission may have to include the provisional planning figure rather than the screened population figure in the report, and explain its reasons for doing so.

8.1.4 Evaluating Beneficiary Numbers

If emergency programmes are already underway on the basis of agreed screening criteria, the mission should assess the actual beneficiary numbers. It will be necessary to make a retrospective assessment of the screening process as outlined in above (section 8.1.3) and to evaluate the success of the programme in reaching the most needy areas and population sub-groups.

Data on beneficiary numbers should be available from individual implementing agencies and from a centralized national source. The national source will generally be the main coordinating agency (WFP, UNHCR, ICRC, a government ministry). Whenever possible, the mission should collect data which is dis-aggregated by area and population sub-groups and compare it with provisional planning figures and / or the screened population figure.

Field trips can be used to locate a sample of actual beneficiaries and non beneficiaries. The diagram below illustrates a simple way of assessing the coverage of the programme.

	do households fit the screening criteria?		
		yes	no
receiving EFA?	yes	√	×
	no	×	√

If the mission finds conclusive evidence of that the screening criteria are not being applied, the reasons for non application should be identified and potential solutions proposed. For example:

- the screening criteria may be impractical, making rapid and accurate identification impossible. In this case the possibility of re-screening should be considered.

- the screening criteria are practical, but mis-management on the part of the implementing agency has led to incomplete application. The contractual status of the executive status may be reviewed if distribution has been sub-contracted. Alternatively, the mission could assess the possibility for introducing more or more effective safeguards against mis-management

- the screening criteria are practical, the implementing agencies are well-managed but multiple registration is occurring. It may be possible to identifying multiple registration by a series of spot checks on recipient households. Food basket monitoring at household level may reveal multiple registration or over-scooping. Discrete questions may be posed to local community representatives beneficiaries and non-beneficiaries. The mission should try to identify ways of reducing multiple registration.

- logistics constraints have limited the implementing agency's ability to reach potential beneficiaries. (see section 6.4 below on logistics support for distribution)

Having compared the actual beneficiary numbers with planning and screening figures, and assessed the reasons for the discrepancies the mission will be able to determine whether the potential beneficiary number (under stricter screening conditions) is greater than or less than the actual figure.

If large discrepancies are found the mission's report should be based on the survey or screening figures, whichever are considered to be the most reliable. The reasons for rejecting the actual beneficiary figures should be explained and the team should highlight practical measures for improving the programme selection procedures.

8.2 Calculating Ration Rates

Having selected the appropriate figure for the target population and commented on the assumptions and method on which it is based, the mission will assess the actual or proposed ration rates for the programme. Ration composition and quantity norms should be in keeping with WFP principles as specified in WFP 1991 A6 & 1993 B4.5.1-2 or B3.1.2 for displaced people and refugees. The mission should ensure that the commodity composition of the ration reflects the availability of food assistance commodities - either in the form of imported food assistance or from local purchases where there is a clear possibility of resourceing through LPs.

If non-cereals commodities are included, pulses, for example, the likelihood of receiving timely international food assistance pledges is often lower than for wheat or maize. It may be necessary to calculate the non-cereals items in cereal equivalents. Thus, if pledges of the non-cereal commodity are not forthcoming, cereals may be provided in their place.

Additional considerations governing the choice of ration rates and commodities are:

- commodities have storage qualities appropriate for a distribution programme (which will inevitably entail extended periods of non-refrigerated storage). Fresh products are not, in general, to be recommended.

- specific dietary inadequacies (energy, proteins, fats, micro-nutrients etc) are addressed by the rations if they do not have access to market supplies of commodities containing these nutrients.

- ration commodities reflect the "usual" diets of the recipients. If substitutes for local foods are considered, check that they are acceptable to the recipients. Certain commodities may not be culturally acceptable, even in quite extreme circumstances. As far as possible (given the supply constraints) the commodity composition of the rations should reflect the usual commodity break-down of diets.

- recipients have the means to prepare food commodities (milling of cereals in grain form, for example)

- when infant feeding is proposed, check that commodities are appropriate for infant diets. Dried skimmed milk (DSM) should not be included if water supplies are infected or polluted or if its introduction is likely to induce a shift away from breast feeding.

- the total ration (all commodities) should approximate the pre-determined national norms for total daily caloric or protein intake. These norms may be established in consultation with the government and implementing agencies.

- the ration rates have been agreed by implementing and financing agencies

- the total quantities per person per distribution cycle should be a manageable quantity, bearing in mind the measures (metric, local) and means of measuring (types of scale, scoop, bag) which are used at distribution sites.

- that ration rates reflect the beneficiaries' access to non-EFA food sources <u>during</u> the emergency intervention. Check the assumptions (below 6.2.1.3) on which programme duration has been calculated. Ration rates may be reduced or expanded during the intervention if there are changes in beneficiaries' access to alternative food sources. Some types of population group may be entirely dependent on EFA for the programme duration (refugees and IDPs) for example. Others (drought-affected food producers for example) may have harvested some crops during the programme

8.3 Calculating Emergency Programme Duration

Careful attention should be paid to calculating the duration of emergency programmes. This means that the mission should assess when food provision should begin and when the livelihoods of needy populations can realistically be expected to improve to such an extent that the emergency food intervention is no longer necessary.

For settled arable farm households the start date should be a close as possible to the beginning of the lean period - that is the period in which household food stocks and on-farm production are likely to be close to exhaustion. An indication of the likely duration of the lean period can be derived for subsistence and semi-subsistence producers from a household food balance (see Appendix 9).

Where off-season crops are cultivated (bi-modal systems) programmes may be suspended for the period in which beneficiaries consume these crops. The end date will normally be the next major harvest. Allowance should be made for possible delays in harvesting and for the fact that different crops will reach maturity at different times, particularly if part of the cropping is irrigated. Programmes which run beyond the harvesting of main crops are likely to cause disincentives to on-farm crop marketing.

To avoid production disincentives it is essential that beneficiaries are informed of when distribution will cease as early as possible in the programme's cycle. If crop producing rural households are dependent on market food purchases, the programme should last until revenues from sales of the next harvest are expected to be realized.

The start date for IDPs and refugees will depend on the resources which they have managed to carry with them. If market food supplies in the host area are abundant and IDPs/refugees hold some cash balances, an immediate start date may not be necessary. If, on the other hand, IDPs/refugees have no means of self support, an immediate start date is essential. When market supplies are tight a large influx of people with significant purchasing power could lead to price hikes which are harmful to the market dependent households among the host population, providing an argument for rapid intervention.

Rarely will it be possible to predict the duration of IDP / refugee influxes. It is safest to plan for a long duration - the mission's estimates should extend to the end of the marketing year if there is any uncertainty. Be sure to explain which factors are likely to influence population movements during the marketing year, and their implications for likely programme duration.

If the team considers that the lag between the mission's assessment and the desirable start date is too short to allow external food resources to be mobilized, and there is no ongoing pipeline, it may be necessary to inform the Government that the programme's initial months will have to be resourced from relief sector or domestic food stocks, local purchases or, if they are likely to arrive swiftly, from commercial imports.

9 LOGISTICS

In countries facing an exceptional IFAR and/or a major rise in targeted food assistance requirements, the mission may have to assess the country's logistic capacity - the capacity to transport the required quantities of food, at the required time, from border or port to the ultimate recipient. If food imports represent a large proportion of total commodity imports and domestic haulage, and logistic constraints are identified which may threaten the timeliness or absolute quantities of food assistance delivered, urgent appeals may have to be formulated for donor-financed logistic support.

9.1 Assessing Port and Border Facilities and Import Constraints

In land-locked countries, or countries that require cross border operations for security reasons, an assessment should be made of the facilities for monitoring food traffic, including customs and excise, at the main border crossing. Also consider physical capacity for transshipment from the border, by truck, rail or boat - as appropriate. If possible, observations should be made on the efficiency of corridors and port handling in the neighbouring country or countries. Port monitoring, clearance, off-loading and handling facilities should be evaluated, including the suitability and capacity of storage and bagging facilities. Also consider off-take capacity from the port - by rail, truck or boat as appropriate. The key question is whether the additional food assistance can feasibly be handled, given existing handling constraints. This will depend on the scheduling of the imports, and on the volumes of non-food commodities being handled at a given point in the marketing year. If it is suspected that capacity may be exceeded, the team is advised to refer to appendix 10 as well as to WFP 1993 B4.6 and Annex B4-C.

9.2 Assessing Internal Transport and Handling Facilities

For countries with weak infrastructures, it may also be necessary to assess the capacity for internal distribution of food assistance, to the ultimate recipient. This means analyzing the state of road, river and rail connections, of public, private and relief sector transport fleets, and the availability of fuel, spares and maintenance services. Identify transport corridors that are impassable or erratic as a result of civil strife, floods or seasonal / poor quality roads. The team should also make a rapid evaluation of domestic logistic management capacity. Are there a sufficient number of logistics and monitoring experts in country to ensure a smooth expansion of operations?

An exceptional food assistance requirement will often place large burdens on storage infrastructure. The mission should examine both the capacity and the quality of public and relief sector storage facilities, focusing on those zones in which there has been a major rise in emergency food assistance requirements. If Extended Delivery Points (EDPs) have already been identified and storage facilities erected or acquired, take note of the full physical capacity in relation to likely food volumes in the peak period(s). Confirm that storage facilities are suitable for stocking food without avoidable losses.

Where internal distribution mechanisms are likely to be erratic or insufficient the team should take note and, if possible identify key areas for donor support, training or for follow-up specialized assessment missions.

9.3 Assessing Distribution Mechanisms

The domestic capacity for implementation of an emergency programme will depend on the prior history of interventions in a country, on the resources and manpower available to the Government, UN agencies and NGOs. CFSAMs will sometimes be required to make a rapid assessment of the structures in place or the requirements for institutional support for programme implementation. These requirements include:

- an overall task force/steering committee for coordinating the intervention

- a clear framework for the identification of beneficiaries which ensures that programme selection follows consistent and equitable criteria (see section 8.1)

- a network of implementing partners capable of handling the final distribution of the food resources

- a unified system for monitoring and reporting on food distribution, preferably linked to a Commodity Tracking System. Timely and regular reports should be provided on: actual beneficiary numbers, actual distributed quantities, stocks at distribution points and on losses.

- availability of secondary transport from EDPs to distribution sites

- sufficient storage capacity at the distribution sites

- availability of scoops, scales, sacks, tarpaulins and other equipment essential for food distribution

In addition, the mission should consider the geographical frequency of distribution sites and the frequency of food distributions. Distribution sites should generally be far enough apart to ensure that beneficiaries do not simultaneously register at more than one site but not so far apart that certain groups (particularly the disabled and those weakened by malnutrition) are not able to reach the distribution. There is a trade-off between the costs of establishing and operating more distribution sites and the risk of failing to reach the needy.

The frequency of distributions will depend on the food supplies available at the distribution point. Weekly distribution may be necessary if supplies are inadequate for monthly or bi-monthly rations. There is a trade-off between the costs of high stock holdings (including losses) for infrequent hand-outs and the management costs of distributing on a more regular basis. Distribution schedules should bear in mind the possibility that the pipeline may be cut for certain periods during the year if, for example, seasonal roads are used for food transportation.

Emergency assistance is usually provided in dry ration form. Wet (prepared food) ration distribution is much more costly and difficult to implement than dry distribution although it can act as a safeguard against resale of commodities by the beneficiaries. When deciding whether to provide whole grain or milled cereal products, the team should consider: 1/ the availability of household milling equipment at the beneficiary level; 2/ the availablility and costs of milling facilities in the proximity of distribution sites; 3/ if households cannot afford to mill rations at local mills, or have no milling facilities of their own, the cost of central milling and transportation of milled (as opposed to un-milled) products should be calculated.

Emergency food for work projects (FFW) can be an effective alternative to free distribution if economically viable activities can be identified, the programme can be established in time, and there is sufficient management capacity for the overseeing of labour and food distribution. If these conditions pertain and there is a strong likelihood that rations will be shared within the household of labourers (to those who cannot participate for reasons of age, illness or disability), FFW may be considered. If some households do not contain an active labourer they will be precluded from FFW and alternative distributions should be considered. In some countries / zones women may be culturally excluded from labour projects. In this case, it will be necessary to implement alternative mechanisms for targeting female headed households. FFW has the additional disadvantage that it may disrupt the labour market, and draw labour away from farm activities. All FFW activities should be thus be designed with safeguards against labour market distortion.

9.4 Scheduling Public Sector Trade and Food Assistance

Thus far the Guidelines have concentrated exclusively on the quantities of the food assistance requirements. The timing of public sector imports and food assistance for market sales can be as important as the annually quantity of deliveries. Poorly timed imports lead to excessive storage costs, losses, supply and price fluctuations. These undermine the private trade and can lead to severe food shortages or can flood domestic markets.

In import-dependent countries guidelines for delivery schedules may already be operational. But countries with an exceptional IFAR, or which have only recently become importers may not have any precise guidelines on scheduling. In these circumstances, donors will have to be informed not only of the quantities of the IFAR, but also when it should be in-country. Desirable delivery schedules should be derived from an assessment of intra-annual supply and demand patterns.

Delivery schedules can be determined using a quantity model, based on certain general assumptions on seasonal consumer and domestic trade behaviour, that world food prices do not have strong seasonal pattern, and that the country is a price-taker on the world market. The timing of market sales of food imports will have to follow a model with a domestic price component. As domestic food price patterns in the new year depend on many unknowns, they are almost impossible to predict. Hence the ideal timing of marketing can not be estimated with any accuracy at the time of the mission. The import scheduling model is therefore designed to ensure that imported stocks are pre-positioned for market injections - some stock holding over and above the working stock level will therefore be required in countries with large price variability.

A simple approach to monthly supply/demand modeling is outlined in appendix 10. Note that the model is based on some quite strong assumptions - and should therefore be used with caution.

10 APPENDICES

1 WORK-PLAN FOR CFSAMS

Section one of "Guidelines" stressed the need for carefully defining the CFSAM's objectives prior to departure from Rome.

The FAO/GIEWS country officer should present a detailed work-plan to the team, covering at least the subjects listed below, indicating which areas of study should receive priority attention. The work plan should act as a check-list for the team.

- food production: Should the mission make estimates for new/forthcoming marketing year? Should time series also have be updated, if so specify sources and identify multiple-source problems

- type of commodity: Which commodities should be included in the analysis? Just cereals? Roots and tubers, pulses? livestock products?

- level of dis-aggregation: Should production estimates be aggregated at the national, regional, zonal level? By peasant, commercial, rainfed, irrigated, plantation sectors?

- seasons: Will crop estimates include main, secondary, short rains harvests? (specify whether it is a past, current or forecast crop)

- area estimates: Which collection techniques will be used? Should area data be collected/checked? Which factors should be considered when analyzing area data? Forecast techniques, where necessary, price analysis

- yield estimates: Which data sources are available on the current crop? Survey techniques. Type of crop inspection. Use of satellite images, CSSWBM, price analysis, input supplies. Forecast techniques. Should scenarios be used?

- opening and closing stocks: Which level of dis-aggregation: by sector (private trade, on-farm etc) By region.

- approach for calculating minimum closing stocks. Should optimal SGRs or FSRs be calculated? If so, how?

- population estimates: What level of dis-aggregation? Are revisions necessary to the official series? Adjustments for exceptional demographic change?

- status quo estimates: For which commodities should the NFBS be constructed? should historic import and stock figures be adjusted? Should commodity cross-substitution be included?

- feed uses: What factors should be considered in feed use estimation other uses: Dis-aggregation by type of use? Estimation approaches.

- assumptions for PHL and seed use estimates

- commercial trade: Which commodities should be considered? How should trade data be dis-aggregated: UCBT/monitored? public/private? Will it be necessary to calculate UMRs? Should forecast tools be used, if so, which?

- dietary energy adequacy: Should national DES & TER parameters be estimated?

- food security analysis: Which main population sub-groups? Zones? Which indicators? Which indicator interpretation tools? Will vulnerable group numbers have to be checked? Adjusted? Should the mission make recommendations on procedures for sampling or screening affected populations? Will there be a need to assess the management, screening or efficiency of on-going food interventions or to identify the need for setting up emergency programmes?

- what ration rate should be used?

- how should programme duration be calculated?

- on-going project food assistance: Should beneficiary numbers, ration rates and programme implementation be assessed?

- marketed food assistance: Will it be necessary to check procedures and mechanisms for market sales and counterpart fund administration?

- local purchases: Should potential local purchase requirements or triangular transactions be estimated? Should the mission assess the mechanisms for local purchase?

- monthly modeling: Should the mission assess scheduling of public sector trade and FARs? If so, how?

- logistics: Will a review of border and internal logistics capacity be required? Should EDPs and distribution mechanisms be assessed?

2 HOUSEHOLD QUESTIONNAIRES

As the objectives of CFSAMs will differ from country to country, so will the type of information which is required from household interviews. It is therefore recommended that the approach to household interviews is discussed initially with the GIEWS country officer during pre-mission briefings and is then refined in-country. Team members should have agreed on a standard questionnaire format or information checklist prior to departure for field trips. Over time it may be possible to develop a series of country-specific formats, for those countries which are regularly visited by CFSAMs.

It is advisable to construct separate household information checklists or questionnaires for arable farming households, urban households and pastoral households - as the type of information required from these interviews will differ. A checklist for trader interviews could also be useful. Further, questionnaires for vulnerability assessment will clearly differ from those designed for crop assessment.

Bear in mind that both interviewers and interviewees will be pressed for time - as a rough bench-mark, expect to ask each household about 20 questions in half an hour. Clearly, if interviews are through an interpreter, some extra time allowance should be made for translation. In food-insecure zones it is always worth explaining to interviewees that the mission is not in a position to hand out food aid: farmers may consider under-estimating yield and stock figures, particularly if they recognize the WFP emblem on the team's vehicle. Team members should always explain the purpose of the interview to farmers who have given up their time.

The mission may decide either on a questionnaire or on a checklist format. The advantage of a questionnaire is that it will be easier for the team to compare findings at the end of the field trips. Checklists, on the other hand, can be used for semi-structured interviews - which can allow farmers to be more expansive and may reveal household opinions which would not be forthcoming using a formal questionnaire approach. The best approach is to use a semi-structured interview but to make sure that the replies are recorded in a strict format under pre-defined sub-headings.

The basic information checklist or questionnaire should begin with the classification of the household, according to zone, socio-economic group, farming system, land holdings - or whatever population grouping has been decided by the mission. The mission should be sure to ascertain the size and structure of the household, bearing in mind that, in many countries, the household as an economic unit may be very different from the nuclear family.

All questions relating to current year food production should be phrased in comparison to previous years. The concept of an "average" or "normal" year may not be very clear to farmers - so ask them to compare crops with a representative bad, average, and good year, using local time series information. The mission should be sensitive to local cultural practices. In some countries, farmers may be unwilling to answer direct questions on household food and animal stock holdings or on labour activities, for example.

In general, crop assessments and assessments of EFARs will be undertaken in different zones as the criteria for selecting zones for field will differ. While some overlap is possible it will usually be necessary to design separate questionnaires for the two parts of the mission.

3 NOTES ON NUMERICAL CONVENTIONS, WEIGHTS AND MEASURES

Numerical Conventions

In the final CFSAM report text and summary tables all data should be rounded at least to the nearest 1 000 metric tons. The standard textual numerical conventions are:

> 1 000 tons - 99 000 tons
>
> 100 000 tons - 999 000 tons
>
> 1.xx - 99.xx million tons (rounded to the nearest ten thousand)
>
> 100 - 999 million tons

Avoid the use of other notations - like "100,000" which can cause confusion.

Note that rounding of data should occur only in the final summary tables. To avoid rounding errors keep all dis-aggregated data unrounded (to the nearest ton). If rounding commands are used on data imported from a spreadsheet, you should check that the rounded figures add up to the totals - if they do not, table should be foot-noted *"totals computed from unrounded data"*

Measurement and Conversion Factors

In countries where the mission is not sure of the conversion of local weights and measures into the metric system, refer to "World Weight and Measures: Handbook for Statisticians" FAO (1955)

All planted area estimates should be in hectares 1 hectare = 10 z000 m^2

All yield estimates should be in kilogrammes, and refer to the whole grain. Country specific paddy/rice and grain/flour conversion rates are available from the latest version of Food Balance Sheets and Per Caput Food Supplies, FAO. Note that both milled and paddy weights are included in the NFBS for rice. Tables including rice data should always specify whether they refer to milled or paddy. Where data on grains is available on bunker and dry weights use dry weights. The absolute maximum foreign matter and water content should be 15 percent of total weight. Do not convert yield estimates into dry weights unless there is strong information on water and foreign matter and the official time-series data has been converted into dry weights. Roots and tuber data should be in dry rather than fresh weights.

When prices are quoted, the dollar value (ie at the official exchange rate at the time of the price observation should be quoted in brackets: e.g. £ 1.00 (=U.S.$ 2.20 on 14 February 1995). If prices or other values are base-year adjusted, the base year should be cited ie U.S.$ 120 (1985=100).

Crop Production Aggregation

The aggregation of production weights across food types is problematic if roots and tubers, with low carbohydrate contents are aggregated with pulses and cereals. If comparisons are made between new year and historic production of all food crops, the usual convention is to calculate total production in cereal equivalents (of the most commonly consumed cereal) and to compare total cereal equivalent production in the new year with the equivalent calculations for past years.

If the mission wishes to make general observations on trends in total crop production (including non-food crops) aggregates should be expressed in value terms, using a constant price index. Quantity weighted price indices should be calculated using a standard procedure such as the Laspreye, Paasche or Fisher index.

4 CHEMICAL FERTILIZER BALANCE SHEET

If a major fall in fertilizer availability is suspected, from capital city consultations and field trips, the team is advised to examine the national chemical fertilizer situation in some detail. At the national level, average per hectare chemical fertilizer availability can be estimated using a balance sheet comparable to the NFBS, if sufficient time-series data exist. It may be possible to construct balances by fertilizer type (top dressing/planting dressing), or by chemical composition.

Example of a Chemical Fertilizer Balance Sheet

	year 1	year 2	year 3	year 4	year 5	new year
opening stocks	a1	b1=a4	c1=b4	d1=c4	e1=d4	f1-e4
domestic production	a2	b2	c2	d2	e2	f2
net imports	a3	b3	c3	d3	e3	f3
closing stocks	a4	b4	c4	d4	e4	f4
total use	a5	b5	c5	d5	e5	f5=(f1+f2+f3)-f4
planted area	a6	b6	c6	d6	e6	f6
application per hectare	a7=a5/a6	b7=b5/b6	c7=c5/c6	d7=d5/d6	e7=e5/e6	f7=f5/f6

Compare the estimate of current year per hectare application with past years. Examine movements in fertilizer prices in relation to output prices and any recent policy changes in the fertilizer market. Try to identify the economic, agricultural or political factors which are responsible for the fall.

Great care is necessary in interpreting the aggregate fertilizer balance sheet, however, especially when there is no reliable breakdown of use for individual crops. In many instances, the bulk of fertilizer may be applied to high value cash/export crops (e.g. cotton) which basic foodcrops may account for little of the total, particularly in the small farm sector.

5 SUMMARY OF CROP FORECASTING METHODS

In some countries crop forecasts will already be available, and the mission's primary task will be to assess the validity of the assumptions on which those forecasts have been made. If no forecasts are available, or forecasts are out of date or based on untenable assumptions, the team will have to make independent forecasts. The choice of crop forecasting method will depend on the timing and time constraints of the mission, data availability, and commodity type. Thus, no one method can be universally applied. The following guidelines are provided for forecasting procedures under different conditions. Forecasting will be greatly assisted by the development of country-specific data-bases and spreadsheets at headquarters.

If missions need to forecast crops which have yet to be planted, they will have to rely largely on trend values. Forecasting models can use a number of different trend specifications, with linear, log or double log functions and different lag specifications. Unless a long time-series is available, a regressed trend parameter may not be significant, particularly if degrees of freedom are lost by the introduction of other explanatory variables. Insignificant trend parameters are therefore not sufficient evidence that there are no underlying trends. Graphing historic data is always a useful preliminary exercise.

The team should be aware of long term factors which might be influencing area or yields. The two should therefore be estimated separately. Only if the team is convinced that there are no underlying economic or technological developments, should an average value be used in forecasting area or yield.

Missions which are in-country at the time of planting may be able to use preliminary estimates of planted area. If they are realistic, planting targets can also be applied. Yields will have to be forecast using trends and, if no information on current season weather conditions is available, the assumption of "normal" weather conditions. Weather information can be introduced into the specification as a CWSI - if a CSSWBM has been used in the past. If a CWSI - yield response parameter has been estimated from previous years' data a forecast CWSI can be derived, based on assumptions on weather conditions in ensuing months. Assuming "normal" weather conditions, a long-term average CWSI value could be used for the forecast season, provided there are no underlying time trends in weather conditions.

Only if input and farm gate prices for the forecast crop are available to the mission (which may be the case in controlled food markets) can prices be modeled explicitly. If prices have to be forecast for the current season this will introduce large errors into the area/yield forecasts. Usually, teams will have neither the time nor the data to estimate supply response parameters, but such estimates may be available from government or academic sources in country.

A computer model can be designed to drop wrong signed or highly insignificant parameters, and to rank specifications according to overall significance using an ANOVA (Analysis of Variance) table. If the model with the best fit is still insignificant at a pre-determined confidence interval, it may be advisable to use crop scenarios, described in appendix 6 below. Whenever a crop forecast is used, the team should briefly describe the type of model and main assumptions used for both area and yield estimates. If target values for area or yield have to be used, this should be clearly stated.

6 CROP PRODUCTION SCENARIOS

If current crop estimates or forecasts are based on time-series analysis, and the overall specification has proved to be statistically insignificant, maximum and minimum scenarios can be constructed.

Assuming that the estimated yield $Y^\wedge$ is an unbiased estimator with an average variance of $\sigma^\wedge$, where residuals (U_i) are assumed to be normally distributed with a mean of 0, yield scenarios can be constructed as $Y^\wedge \pm \sigma^\wedge$.

Aggregating zonal scenario estimates can, however, be problematic. How zonal yield scenarios are ì aggregated will depend on the nature of crop production in the country in question. If a country has very diverse agro-ecological zones, the probability of a minimum or maximum yield being achieved in all zones will be low, whereas in a more homogenous agricultural sector there will be a higher correlation between the variability of yields between regions.

Example of Scenario Aggregation

	area	minimum yield	maximum yield	production
zone 1	a1	y1	Y1	q1=a1.y1, Q1=a1.Y1
zone 2	a2	y2	Y2	q2=a2y2, Q2=a2.Y2
Country	a3=a1+a2	y3=[{q1+q2}/a3].θ	[(Q1+Q2)]/a3]. θ	q3=(q1+q2).θ,Q3=(Q1+Q2). θ

In the extreme case of complete homogeneity between regions, the estimates of the minimum/maximum production value for the country as a whole can be arrived at by simply aggregating the total minimum and maximum production estimates respectively. In the case of a country with no correlation in yields between zones the probability of maximum or minimum values being achieved throughout the country is very low. Hence an index of covariance (θ) must be used to adjust aggregated production estimates. For n zones for which scenarios have been used, and for a time-series of s years, the total covariance in year t (COV_t) can be calculated as:

$$COV_t = \sum_{i=1}^{n} (Y_i - y_{it})\text{, where } Y_i \text{ is the historic average yield in zone i.}$$

or: $$\sum_{t-s}^{t} (y_i)$$

This must be weighted to reflect the different contribution that each zone makes to total production:

$$WCOV_t = \sum_{i=1}^{n} [(a_{it} / A_t) . (Y_i - y_{it})]$$

where a_{it} and A_t are zonal and national planted area in year t.

If zonal yields are perfectly correlated, $WCOV_t$ will equal the national annual variance ($NVAR_t$):

$$WCOV_t \ = \ NVAR_t = Y_t - \{[\ \sum_{I=1}^{n} \ (a_i.y_i) \ ] \ / \ A_t \ \}$$

The value of θ is calculated as:

$$0 \ \leq \ \sum_{t-s}^{t} (\ WCOV_t \ / \ NVAR_t \ ) \ \leq \ 1$$

7 PRIVATE SECTOR COMMERCIAL IMPORTS

In Guidelines section 6.2.1 it is noted that a large number of variables may influence private sector import demand in the new year (m_t), some of which may be difficult to model explicitly. Nevertheless, a parsimonious multiple regression can be specified, for individual commodities. What follows is a tentative general outline of such a model:

$$m_t \ = \ f \ (\ m_{t-1} \ , \ ... \ , \ m_{t-j} \ , \ P_t, \ Y_t, \ S_t \ )$$

Hence, is a function of j years of past imports. Note that a lag of j years reduces the degrees of freedom to n-k-2j, where k is the number of non-lag variables. There is thus a trade-off between the model's accuracy and overall significance if the time-series is not long. In many countries the liberalization of external trade in staple commodities is a recent occurrence. The development of such models will not, therefore, be feasible in the short run.

P_t is the border price net of tariffs and subsidies) in national currency. The spot price + basis + freight/insurance at the time of the mission should be used for the forecast period, and at the same date for time series data. Past and forecast year estimates of P_t should be in nominal local currency terms which means that exchange rate changes are captured.

Y_t is a trend or forecast estimate of GDP, in base year or deflated local prices. It is assumed to be exogenous, and is therefore estimated independently from the model - indeed a GDP forecast may be available from a number of other sources. Missions may have to consult local World Bank/IMF representations to get an opinion. The coefficient is expected to be positive for imports.

S_t is total given annual supply of the commodity (production and opening stocks) which is taken as an exogenous proxy for domestic prices - an increase in S_t will, *ceteris paribus*, reduce domestic prices and hence import demand. It can therefore be expected to have a negative coefficient for imports.

Note that, if there is another close substitute food commodity, or commodities, also imported commercially, the model may be under-specified, as it will not account for cross-price elasticities for the world market prices. An index of other world prices, weighted by import shares, might improve the model's performance.

The model should be reiterated for various lag structures and should be instructed to drop wrong signed or insignificant coefficients. Regression results should be ranked using an ANOVA table ($F_{0.xx}$ $v1= k-1$, $v2=n-k-j$). If the total explained variation proves to be insignificant at a predetermined confidence interval (0.xx) the mission may have to use a scenario of the range:

$\sqrt{\sigma^\wedge / n} \pm m_t^\wedge = m_t$, where $\sigma^\wedge$ & $m_t^\wedge$ are the sum of the residual squared and regression estimate of m_t respectively, explaining which factors are likely to result in which occurrences, for a time-series of n observations.

The results will have to be examined with extreme care and in the case of an exceptionally poor domestic harvest, may have to be adjusted to reflect physical or liquidity constraints in the private sector. Already planned or contracted commercial imports should act as a lower limit on estimates.

Note that the same basic model can be applied to estimate private sector exports:

$EXt = f(EX_{t-1}, \dots , Ex_{t-j} , P_t, S_t)$, excluding national income.

The coefficient of Pt is expected to be positive as is that of S_t.

8 COMMERCIAL IMPORTS: GUIDELINES FOR CALCULATING UMRS

The following is an extract of the relevant elements of Principles of Surplus Disposal and Consultative Obligations of Member Nations FAO (3rd ed. 1992, pp37-39) describing the agreed international guidelines for calculating UMRs:

PROCEDURES FOR THE ESTABLISHMENT OF USUAL MARKETING REQUIREMENTS

7.   The Committee reaffirmed the need for safeguarding usual commercial trade and, for this purpose, the need to establish safeguards, with the objective that the recipient country maintained at least the usual global commercial imports of the commodity concerned in addition to the imports under concessional transaction.

8.   The Committee agreed that the establishment of a UMR was a useful and necessary technique in order to ensure observance of the FAO principle of additionality. The Committee therefore recommended that any transaction undertaken by governments in categories subject to prior consultation [....] shall be subject to the establishment of a UMR, as appropriate to the specific situation, in order to ensure that the transaction [food assistance] would result in additional consumption and did not harmfully affect normal patterns of production and trade. The UMR should be defined as the specific agreement by the [food assistance] recipient country to maintain at least specified level of commercial imports in addition to any imports of the same commodities under the concessional transaction.

9.   The Committee noted that the FAO Principles of Surplus Disposal contain provisions aimed at avoiding the danger of displacement of commercial sales of closely related commodities, and it reaffirmed that any interested country should have the opportunity to be consulted in this connection. The Committee therefore agreed that the supplying country should consider whether the commercial trade in closely related commodities was likely to be harmfully affected and, if so, it should undertake consultations [...] and take appropriate measures to safeguard such trade. A third party may request consultations with a supplying party on its own initiative.

10.   In principle the UMR should reflect the traditional imports of the recipient country. The determination of a UMR should also take into account the economic and balance-of-payments position of the recipient country and their development needs, and should not constitute an undue burden to them.

11.   If the application of the principles in paragraph 10 lead to a change in UMR levels, wherever they exist, then such changes should take account of the balance of payments of the recipient country and should avoid disruptive effects on its economic development.

12.   The following steps will be taken to arrive at a UMR for a particular recipient country for a specified period.

(a)   As a point of departure, the supplying country approached will attempt to calculate the statistical figure representing the total commercial imports of the commodity concerned by the requesting country in a representative period of years, which should normally be the preceding five years. [.....].

(b)   The Committee recognized that the statistical figure of the total commercial imports of the recipient country in a representative period might need to be modified by special factors, such as the following:

(i)   substantial change in the production in relation to consumption of the commodity concerned in the recipient country;

(ii)   substantial change in the balance of payments position or general economic situation of the recipient country;

(iii)   evidence of a significant trend in the reference period in commercial imports of the recipient country;

(iv)   the level of the relevant UMR negotiated according to the procedures laid down in the present paragraph by the interested countries in the nearest previous period. However, when a UMR is negotiated for the first time under these procedures, note will be taken of the provisions of paragraph 11 above;

(v)   any exceptional features affecting the representativeness of the reference period for the recipient country;

(iv)   any other special considerations, including those which the government of the recipient country may raise in its request, or otherwise

The proposed figure, with appropriate explanation in cases where it differs from the basic statistical figures (which shall also be notified), will be the subject of bilateral consultation with those Member Nations whose normal commercial exports may be affected by the transactions; if there is a suggestion for changing the negotiated UMR, this should be discussed between the supplying and recipient countries.

[...]

15.   In the event of an unforeseen and substantial deterioration in the balance-of-payments and general economic situation of the recipient country during the life of a particular UMR, such UMR may be re-negotiated with respect to the same commodity and the same period of time.

[....]

9 FOOD SECURITY INDICATORS AND VULNERABLE GROUPS

A discussion of indicators and their interpretation is provided by Maxwell and Frankenberger 1992 pp 73 - 129, and Annex 1: "Potential Indicators of Household Food Security from the Broader Literature".

9.1 Household Food Availability Indicators

Household food availability indicators are only applicable to subsistence or largely subsistence households - that is, households which do not make significant food purchases in the market place. Modeling of annual household food availability for commercialized households would require very detailed income and expenditure data - and it would be impossible to make an estimate of purchases in the new marketing year without good ì income, farm-gate and retail price forecasts. However, if a crop has been particularly poor, and households are entirely, or largely dependent on on-farm production, it is possible to roughly calculate the total on-farm availability of food (carry-over stocks and own production). A simple household food balance[24] can be constructed on the basis of survey information on household size, food crop production, on farm stocks and net food purchases and seed use. To get a very rough measure of the stock out period (STK) in months, calculate:

$$STK = (OP + Q + NS) / [(HO . SQE) / 12]$$

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[24] note that zonal food balances can be constructed (comparable in structure to the NFBS) only if good historic annual population, inter-zonal trade, production and stock data exist. This is only likely to be the case in countries in which the state is the sole marketing agent as private inter-zonal trade is extremely difficult to monitor.

where OP is the household opening stocks, Q is on-farm production, NS household purchases net of sale, SQE the national derived per caput consumption figure and HO the number of household members. A STK figure of well below 12 may imply imminent food problems. Over a sample of households, STK estimates can provide a bench-mark for planning the duration of emergency interventions.

For agro-economic zones which are judged to be acutely food insecure, check the current year zonal production estimates and compare with those of previous years. Two or more poor crops in succession may spell disaster, but a poor crop which follows a good one may imply that households have food reserves to draw on.

Subsistence household food availability, calculated using a simple household balance, could also provide an indicator of chronic food insecurity. Using data on the height, age and sex of household members, a household DES/TER ratio could be estimated, and compared to the national norms. The total land holdings of the sample households should be ascertained. There may be a strong negative correlation between land holdings and vulnerability, and hence it can provide a useful classification for targeting.

9.2 Pathological Indicators

Anthropometry is a widely recognized tool for identifying chronic food insecurity. If recent clinical anthropometric data for the population group exist this should be analyzed. UNICEF, the Government's health services, mother and child health clinics, national nutrition or health research institutes or NGOs may be able to provide anthropometric data.

Only if time-series data exist can acute food insecurity be identified. If time series data does exist but no recent data is available and a nutritionist is present on the mission, simple anthropometric tests could also be performed on a small sample of households, with the warning that strong conclusions should not be derived from unrepresentative samples. If current period data is available, small sample anthropometric tests could be used to identify large inconsistencies in the data. Field trips can also be used to identify major increases in the number of morbidity and mortality events in the current year and the frequency of visible cases of malnutrition related-diseases such as oedema, eye xerosis, goitre and kwashikor.

Although it is an area of much debate, some anthropometric indicators (eg: height for age = stunting) are widely regarded as indicators of chronic malnutrition, while others (arm circumference, weight for height = wasting) are commonly associated with acute malnutrition. There is also considerable debate as to whether anthropometry indicators are responsive to immediate food problems. By the time there is a noticeable fall in the indicator the optimal time for an emergency intervention may have passed. Anthropometry should therefore be used with caution when assessing acute food insecurity.[25]

Note that if weight-for-age comparisons with the Harvard Standard are used they may have to be adjusted to reflect stunting (which would bias the total body weight on the low side).

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[25] Although Mock et al. 1993 and Kelly 1992 provide strong arguments for the use of anthropometry in early warning.

Sanitation conditions, the incidence of diarrhoeal disease and malnutrition are strongly interconnected. This means that anthropometry may indicate problems for which food interventions are not necessarily the best solution (false positives). If there is published evidence of a fall in a potential acute food security indicator, the mission is advised to check that there have not be marked deteriorations in household sanitation conditions, as a control measure. Bearing in mind that conditions are likely to vary with season, consider water supply (river?, lake? well?), bathing and cooking facilities.

9.3 Behavioural Indicators

There are a number of household and community behavioural responses to anticipated food crises, which may be used as indicators of acute food insecurity by the mission. These are sometime referred to as "coping strategies", but to distinguish between habitual and abnormal responses, the term "*abnormal food stress responses*" (AFSR) is used in the context of CFSAMs. By their nature, behavioural indicators are much better adapted for the assessment of acute than chronic food insecurity. Data on AFSRs may be collected by the EWFIS, local health, administrative or welfare services or donor representations (USAID/ FEWS, for example).

The types of AFSR and their sequence will be specific to the community in question. To assess the full implications of an AFSR or sequence of AFSRs would require detailed anthropological, sociological and socio-economic analysis. This is not feasible in the brief time allocated to CFSAMs. Nevertheless, using broad community classifications (pastoral, landless rural, arable small-holder) a set of typical AFSRs can be defined by group. Information for assessing AFSRs can be gathered from farm interviews, and from NGOs, local government officials or community leaders who may also be monitoring stress responses.

The CFSAM should ascertain that stress responses are "exceptional", that they do not simply reflect habitual household behaviour. While it will not be possible to assign weights to different AFSRs *a priori*, the team may be able to judge which responses indicate the highest levels of food stress. The mission should assess data on the frequency of particular responses for each population sub-group in the sample. Certain types of AFSR are unambiguously indicative of exceptional circumstances. Others may simply become more frequent in exceptional circumstances. The latter should not be used unless time series data is available.

There are two broad types of AFSRs; income responses and consumption responses. Examples of the former are:

- farm households: sale of productive assets, draught oxen, hand tools etc, sale of land and water rights (compared to time series if possible)

- all households: sale of consumer durables. Bride-wealth and certain types of possession with a high cultural value, will only be sold in times of extreme need. Sometimes a widespread AFSR, like the sale of consumer durables, farm implements or jewelry may be reflected in local market prices for those commodities.

- all households: an increased frequency of degrading occupations such as prostitution or begging (compared to historic frequencies if possible)

- all households: total household migration, leaving homesteads unoccupied. Single household member migration may be a regular feature of the household's labour allocation decisions.

Possible consumption AFSRs include:

- rural households: exceptional consumption of wild foods, particularly those with low nutritional content or toxic qualities

- all households: consumption of low quality or culturally taboo foods, scavenging

- all households: reduction in the number of meals. This may be a seasonal or cyclical response. Time series data may be needed to establish the extent to which it is exceptional

9.4 Quantitative Indicators of Household Income and Demand

The main sources of data are likely to be the CSO, Ministry of Finance (Treasury), Central Bank, food parastatals, World Bank/IMF, UNDP and UNICEF. Occasionally universities will also have published data and interpretations.

Expenditure surveys may indicate a marked deterioration in the income and hence food security of a vulnerable group but, in general, data on income, employment and wages is scarce and rarely up-to-date. If, however, wage employees represent a significant sector of the vulnerable population, any recent cross-section and time-series data which is available should be assessed. Because of the inherent delays in data collection and analysis, cross-section expenditure and labour market surveys are much more likely to be of use in assessing groups falling under the chronic food insecure classification.

With good data on current and historic prices and estimates for income and price elasticities of demand for food commodities, and cross-price elasticities for non food commodities, it may be possible to arrive at an estimate of the likely effect on a fall in incomes on the consumption of specific commodities in specific income groups.

If such an approach is proposed, teams should be sure to give a brief summary of the sources, method and assumptions of the parameter estimates and caveats in their interpretation.

9.5 Acute Food Insecurity Indicators in a Pastoral and Agro-Pastoral Context

Useful indicators of acute food insecurity among pastoralists and agro-pastoralists are:

- unusual herd movements in search of pasture exceptional changes in feed and fodder prices/supplies. Note that in an exceptionally poor crop year, livestock may benefit if part of the crop is not worth harvesting and is turned over to the animals

- livestock off-take and re-stocking rates, unplanned mortality from lack of feed/water. If historic data (adjusted to reflect total stock sizes) is available, current off-take rates can be compared with seasonal norms for previous years. High culling rates in relation to herd regeneration may reflect cyclical patterns in livestock populations, rather than an exceptional drought. Several good rains in succession may lead to re-stocking to levels which are unsustainable under normal or rather poor rainfall and pasture conditions. It is necessary to maintain a clear perspective on livestock losses.

- terms of trade (TOT). A popular indicator of food insecurity in pastoral and mixed farming systems is the ratio of the livestock head price to the price of a specified quantity of the staple grain. When the TOT declines sharply, livestock dependent households may experience a sharp fall in real income. A sharp decline in livestock prices may reflect "distress sales" of stock and indicate the expectation of severe food stress.

Before coming to such a conclusion simply from the analysis of TOT, the mission would be well advised to question farmers on their motives for livestock sales and assess the volume of livestock passing through the markets, as both staple grain and livestock price determination is complex indeed. Care must also be taken to ensure that livestock prices have been correctly calculated to reflect live-weights, quality and seasonality and cyclical stock adjustments. The TOT is only a good indicator if the reasons for changes in the volume, quality and price of livestock sales are fully understood: the best way to learn these reasons in a short time, is to ask .

10 MONTHLY SUPPLY MODELING

Introduction

Scanty data monthly supply models can be used to provide an indication of desirable trade schedules and to estimate total new year opening stock holdings. They have much broader applications for GIEWS′ continuous monitoring activities, but the model described below is relevant to CFSAMs at the beginning of or slightly before the new marketing year. This appendix provides notes on the main components of such a model and some potential specifications and restrictions. It may be applied to food assistance dependent countries which have a record of erratic import deliveries.

Basic Model Structure

Most of the model's parameters will be country-specific but the basic model structure is generalizable and is comparable to the annual balance sheet. Annual NFBS estimates are used to derive the main monthly variables, adjusted to reflect seasonality.[26]

For a single commodity, monthly production is estimated as:

$$q_t = \beta_t . Q$$

where Q is the annual production forecast and β_t a weight reflecting the average proportion of the domestic crop harvested in month t-1, allowing for an appropriate lag-time for drying, milling and internal transportation. Clearly it should be adjusted to reflect delayed plantings/harvesting. If crop production estimates for the new year are uncertain, the minimum crop scenario could be used for Q implying a maximum import requirement or the model could be re-run on various crop assumptions.

Monthly food use is estimated as:

$$c_t = \alpha + \beta_t c_t*$$

$$\beta_t = \theta . [f (p_{t1}, p_{t2 \dots} p_{tn}, \phi_t; Y_t)]$$

$$\phi_t = \phi + (1 + \Delta\phi)^{t-1/12}$$

where c_t is food use in month t; ϕ_t, ϕ, $\Delta\phi$, are population estimates for total population in the first month of the marketing year, population in month t, and population growth respectively. Subsistence consumption is assumed to be a constant (α_t) throughout the marketing year. Seasonality in market demand is introduced through the weight (β_t). Note that income effects (Y_t) can be modeled only if data on intra-annual income changes are available. If not, income will have to be assumed to be constant which is equivalent to the assumption of perfect intra-annual total expenditure smoothing.

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[26] this is the main departure from SADC/REWU (1993 &1994). A pure quantity model such as that proposed by SADC/REWU relies on the implicit assumption that consumption is constant throughout the year, which is only valid if prices are assumed to remain constant, or demand is assumed to be price inelastic.

Own price and cross price elasticities of demand are captured by f $[p_{t1},]$ and f $[p_{t2} \dots p_{tn}]$ respectively. Research institutes may be able to provide estimates of elasticities. For future months, commodity prices should be extrapolated from inflation adjusted (but not seasonally adjusted) historic data. An important simplification of the model is that prices are exogenous. If prices were endogenous, this would necessitate the use of simultaneous equations which could not be solved given the data constraints in most of the countries for which a model of this type would be applicable.

The monthly demand function is adjusted by the weight θ_t to preserve consistency with the total annual food use estimate in the NFBS (C). Thus:

$$C = \sum_{1}^{12} c_t = SQE. \phi$$

$$\therefore \theta = (\sum_{1}^{12} c^*_t) / C$$

Revealed consumption may necessitate the additional logical restriction:

$$c_t t = c_t t^{**} = (op_t + q_t) - ou_t , \text{ if } c_t \geq (op_t + q_t) - ou_t , \rightarrow cs_t = 0$$

where op_t and ou_t are opening stocks and other uses, respectively, in month t.

Monthly closing stocks in t are calculated as a residual: in t are estimated as:

$$cs_t = (cs_{t-1} + q_t + m_t) - (c_t + ou_t + x_t)$$

where: cs_{t-1} is the opening stocks in t (the logical restriction $cs_t \geq 0$ is imposed), m_t are known imports in month t-n, (allowing for a period of n months for off-take, internal distribution, marketing and milling), ou_t other uses and x_t estimated monthly exports.

If private sector imports or exports are significant, monthly private trade can be estimated as:

$$mp_t = \theta_t . f \{ E [Pm_t] , E [Pd_t]; Y_t \} \text{ or } ex_t = \theta_t . f \{ E [Pex_t] , E [Pd_t] \}$$

where E(Pmt) and E(Pdt) are expected border prices for imports and domestic wholesale prices, respectively and Pex are border export prices. All border prices are net of subsidies, tariffs and internal handling charges to or from the border. The weight ensures that the sum of monthly estimates equals the annual estimate. Non-negativity restrictions apply to both imports and exports.

It may be possible to add the further inequality restriction that, by assumption, imports only occur in months when:

$$E [Pm_t] \leq E [Pd_t] \text{ and exports when } E [Pex_t] \geq E [Pm_t]$$

Import off-take capacity may impose a monthly constraint on imports of commodity x1 (Γ_{1t}) defined as:

$$m_{1t} = mp_{1t} + IFA_{1t} \leq \Gamma_{1t} = \Gamma_t - \sum_{2}^{n} m_{it}$$

A rough calculation of total monthly imports of non-food commodities m_{it} can be derived on the basis if monthly observations of non food imports for m historic years:

$$\sum_{2}^{n} m_{it} = (\sum_{s-1}^{s-m} . \sum_{2}^{n} m_{it}) / m$$

It is particularly important to add this seasonality factor into the constraint in countries where seasonal agricultural imports (fertilizer, for example) may clash with food imports.

Monthly other uses (ou_t) comprise seed use (su_t), feed use (fu_t) and post harvest losses (phl_t) Feed use is calculated for months in which stall feeding is practised, and given the lack of data it is probably best to calculate it as a constant proportion of total annual feed use. Seed use should also be calculated in this fashion, for the same reason - for the months in which planting takes place. Post-harvest losses (phl_t) in month t can the be calculated as:

$$phl_t = \lambda d\,[q_t + cs_{t-1} - (c_t + fu_t + ou_t + x_t)] + \lambda m[m_t t],$$

where λd and λm are loss rates for domestic and imported commodities respectively. Note that monthly PHL estimates may take the general form:

$$phl_t = \{\,\alpha_1.\,[\,q_t + cs_{t-1} - (c_t + fu_t + ou_t + x_t)\,]^{\,\alpha 2 + 1}\,\} + [\,\beta_1 . (m_t)^{\,\beta 2 + 1}\,]$$

if stock losses are perceived to be non-linear.

Applications and Caveats

The model's potential applications include: 1/ estimating of new year opening stocks - using a full set of data for the previous year, the end of year closing stock figure will be an approximate estimate; 2/ interpreting seasonality in domestic supplies. In historic years the model can be used to assess inter-annual and intra-annual variability in consumption in the absence of direct estimates from income and expenditure surveys; 3/ For the new year, the model can be run to evaluate the effects of different public sector or IFA import schedules on monthly stock and consumption levels. The additional restriction, that supplies must be sufficient to meet the needs of on-going and planned target interventions, should be applied. Choice of the optimal schedule is a dynamic programming problem with port offtake, programme continuity, and possible, minimum desirable monthly stocks acting as constraints.

There is likely to be no unique solution to import scheduling, unless logistic capacity fully defines possible monthly levels. A range of possible solutions may be obtained by linear programming, or by minimizing closing stocks, subject to a desired monthly consumption level.

Running the Model

Parameters for production, consumption, import seasonality, off-take capacity, and storage loss conventions and minimum monthly carry-over bench-marks or storage capacity constraints must be country-specific, and will have to be estimated prior to the mission. All the remaining data requirements are fulfilled by annual NFBS data, which the mission will usually have to collect in any case.

The model could be run on a standard spreadsheet package and is simple to interpret, provided that seasonality parameters can be imported with ease. Note that the model is far from error free, and will be sensitive to estimation errors in all the elements of the NFBS. Errors in seasonality parameters will also influence model performance. This is a particular problem as errors in period t+1 can be compounded by those in t, (through the carry-over stock estimate) if there is any correlation between errors in seasonal parameter estimates in t+1 and t. The model's results should therefore be interpreted with extreme caution. Having said this, only if prices are controlled or price elasticities are negligible, should no seasonal demand or private external trade parameters be used.

Country-specific seasonal parameters can, however, be periodically tested if the model is run continuously over a number of years. With full trade data for a completed year, a representative bundle of sample monthly closing stock estimates, weighted to reflect the importance of the particular type of stock (public, on-farm, private trade) can be compared to the model's actual closing stock estimates, by means of a regression equation. A good linear fit would suggest that the model's parameters were well specified.

11 Estimation of non-Food Emergency Needs

The estimation of non-food emergency needs for the agricultural sector, arising from natural or man-made disasters, does not fall within the direct scope of CFSAMs and is the responsibility of FAO/TCOR (Service for Special Relief Operations). It is, however, recognized that CFSAMs can provide early warnings on the basis of which TCOR may respond. Exceptional shortages of seeds, hand-tools, pesticides and fertilizer may be considered.

Although the team should not try to calculate the quantities of specific inputs required for emergency interventions, the following information should be recorded and included in the report:

- type of inputs of which there is a shortage

- geographical location(s) of shortage

- cause of input shortages

- reason why farmers cannot purchase on the open market

- likely consequences for future crop production (qualitative judgment)

- details of any programmes which might already be underway to address the problem

- opinions of government, NGOs and other UN agencies as to whether interventions are necessary

TCOR will be invited to attend Rome de-briefings and to comment on the mission's observations.

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