A Market Analysis and Decision Tree Tool for Response Analysis:

Cash, Local Purchase and/or Imported Food Aid?

The Decision Tree Tool

May 2007

Food and Resource Coordination Team

By: Christopher B. Barrett, Erin C. Lentz and Daniel G. Maxwell
Cornell University, Cornell University and Tufts University, respectively. Authors are listed in alphabetical order, but seniority of authorship is shared among all three. The first two are the contact authors at CBB2@cornell.edu and ECL4@cornell.edu.

Tell us what you think
All comments on this report are welcome.
Is this information useful?
Is this a subject you are interested in?
Is there anything else you would like to read?

Please email comments to:
Robert Bell
CARE
bellr@care.org

THE DECISION TREE TOOL

This document provides the Decision Tree Tool itself for the analysis of response options – cash, local purchase or imported food aid. The framework is kept simple for ease of communication: a sequence of specific questions to be answered, each matched with data needs and diagnostic tools commonly useful for effectively answering the question at hand. Maxwell, Lentz and Barrett (2007) explain the rationale for the Tool and its constituent questions. Users will want to consult that document for essential background information and for supplemental considerations that fall outside the scope of this tool. The extensive appendices to this document enumerate common secondary data sources (Appendix 1), primary data collection methods (Appendix 2), and offer more detail (and appropriate technical references) on the specifics of individual diagnostic tools (Appendix 3).   Users will want to consult the appendices in detail before trying to implement the tool.

The tool disaggregates the two core questions of the Decision Tree into subsidiary questions that collectively inform how to answer the overall question and, more importantly, identifies the appropriate response and its likely limits. For each subsidiary question, we identify the data needs and diagnostic tools typically employed and some basic rules of thumb as to how to answer the question. Typically, a mix of qualitative and quantitative is both feasible within the context of typical response analysis and typically best-suited to provide the sort of holistic market analysis that is needed. To keep the tool compact, Maxwell et al. (2007) and the appendices provide background discussion and references on the rationale for the methods.

1. **Are local markets functioning well?**
    1a. **Are food insecure households well connected to local markets?**
    Issue: If households are not actively engaged in markets – or if they face restricted product access or discriminatory pricing – because of social exclusion, physical distance, noncompetitive trader behavior or some other factor(s), then cash for market purchases may not be especially useful for them in improving food access.
    Data needs*:* household survey data or household interviews, focus group discussions or key informant interviews
    Diagnostic tools: Quantitative: If representative household survey data already exist, regression (probit) analysis to establish correlates of who does and does not access local markets. Qualitative: critically identify patterns of exclusion from or self-selection out of markets through focus group and key informant discussions among a range of different groups.
    Rule(s) of thumb: First, establish whether market participation is broad-based. If so, proceed with consideration of cash. Typically there are at least some households that are effectively excluded from markets. Identify their characteristics (e.g., female-headed, remotely located, low caste, etc.) and, where possible, use those characteristics to target direct distributions.
    Key references: Donovan et al. (2005)

1b.   How much additional food can traders supply at or near current costs?

Issue: In a local market perfectly integrated into the global economy with no logistical or financing constraints, supply should be almost perfectly elastic, meaning cash injected into the local market to stimulate demand should elicit a corresponding supply response at the pre-existing price.

Such textbook conditions rarely exist, however. So the key question is how much added supply can local commercial traders provide and at what price. This effectively requires estimating the prevailing local supply curve, that is, the amount of foodstuffs that local markets can deliver at different price levels. One needs to establish the total local cost (procurement cost in some distant market plus transport costs, credit, insurance, etc.) for additional supplies. The greater traders' capacity is to increase delivery volumes at the pre-existing price or a level near it, the greater the scope for cash-based response.

Data needs: historical market food price series, information on government domestic or cross-border trade restrictions, trader/transporter/bank interviews, letters of credit, focus group discussions or key informant interviews

Diagnostic tools: Quantitative: estimation of import parity price, statistical market integration analysis, marketing margins analysis, and supply analysis including survey/interview-based construction of supply curves (i.e., cost of procurement and delivery) (see companion spreadsheet named "Marginal Costs"). Qualitative: market mapping to identify where traders might procure additional food (i.e., to define the "marketshed" for a destination market) and market supply chain mapping by intermediary function.

Rule(s) of thumb: Establish through interviews with traders currently serving the market and key informants (e.g., transporters, bankers, government officials, importers) how much untapped capacity exists to deliver more food at current costs (of credit, transport, staffing, and food procurement in source markets), taking into consideration the possibility of new market entrants if there is added cash demand. The greater that untapped capacity, the greater the space for cash-based response. If local market price series are strongly, positively correlated (historically and recently) with global market and import parity price series, the lower the likelihood that increased local demand will bid up prices significantly.

Key references: Fackler and Goodwin (1999), Scott (1995), especially chapter 11 by Mendoza, "A Primer on Marketing Channels and Margins," and Timmer et al. (1983), especially chapter 4, "Marketing Functions, Markets, and Food Price Formation".

1c. How will local demand respond to transfers?

Issue: If 1b finds that the marginal costs of increased food supplies are increasing, then the food price increases likely to be induced by cash transfers will depend in part on the demand stimulus created by transfers. The relative size of the transfer, the form of the transfer, and the ability to target effectively will all shift the demand curve.

Bigger increases in demand will stimulate greater price increases, which will tend to hurt food insecure households, especially those not receiving transfers. Thus some basic demand analysis is required. How much local demand responds depends on the relevant income elasticity of demand and on the resulting size of the shift in the demand curve.

Data needs: If available, household survey data on food consumption and expenditure patterns and prices. Typically, such data will not be available in the relevant period and for the appropriate population, so use best guess estimates of the relevant elasticities, drawing on the literature (e.g., Timmer et al. 1983). Typically, use a higher income elasticity of demand for (a) in kind transfers (e.g., food aid) than cash transfers, (b) poorer households, and (c) lean, pre-harvest seasons.

As a crude approximation of the income elasticity of demand, use household survey data to compute the ratio of weekly expenditures on food for an average household (including the market value of food produced at home) divided by the weekly earnings for the household (including the value of home-produced goods it consumes). The ratio of food expenditure to earnings also provides an exact short-term approximation of the effect of a price change on household welfare. This is useful if one wants to identify those households most likely to be harmed by any induced price rises.

Diagnostic tools: Quantitative: estimation of demand elasticities, estimation of induced price effects. Using income elasticities of demand, analysts can compute how a transfer of given value will increase staple demand (see companion spreadsheet named "Elasticities").

Rule(s) of thumb: Cash transfers stimulate demand more when distributed to poorer people in lean seasons. Transfers in kind (i.e., as food) stimulate food demand more than cash but because of Engel's Law (i.e., the income elasticity of food is less than one), transfers in kind typically lower market demand. Generally speaking use a range of elasticity estimates to compute high and low estimates of induced demand changes. If these induced market demand changes are high, and supply is inelastic, then distribution of cash may harm non-beneficiaries. Effective targeting will also disrupt local markets less than poor targeting will. If non-poor households receive food, they may sell more of it, potentially further depressing local food prices. As the ratio of food expenditures to income increases, price increases more negatively affect poor non-recipients in local markets and in source LRP markets (see section 2b).

Key references: Timmer et al. (1983), Donovan et al. (2005).

1d. Do local food traders behave competitively?

Issue: If traders compete, food prices for food insecure households should increase only as much as costs for traders increase. If traders can exercise market power, however, then they can extract added profits from increased demand by boosting prices faster than costs increase.

Data needs: trader/transporter/household and key informant interviews, focus group discussions

Diagnostic tools: Quantitative: market share estimates used to compute market concentration ratios (especially CR4, the market share of the four largest suppliers … see Appendix 3 for details). Qualitative: key informant, trader and household assessments of market share and collusive or competitive behavior among marketing channel actors, identification of credible barriers to entry that create and preserve market power.

Rule(s) of thumb: As a crude rule of thumb, CR4>75% often signals opportunities for collusion among suppliers and should trigger more careful investigation of the competitiveness of food marketing channels.

Timmer et al. (1983) suggest that assessing the diversity of traders (ages, wealth, ethnic groups etc.) provides insight into ease of market entry and thus competitiveness because greater trader diversity, like greater numbers, make collusion more difficult. Note that noncompetitive behavior can originate anywhere within the channel, and is most common where the capital costs of operation are highest: in long-haul motorized transport, interseasonal storage, and wholesaling. There can be considerable competition in some segments of the marketing channel (e.g., retailing), yet highly noncompetitive behavior in other, crucial links (e.g., wholesaling). Establish through interviews with traders currently serving the market and key informants (e.g., transporters, bankers, government officials, importers) how competitive behavior is, and just ask households how many alternative suppliers they face. The more competitive the market, the more effective will cash-based response be. Identification of the barrier(s) to market entry or mobility (i.e., expansion of market share) that create and sustain market power can inform policy advocacy with government and donors to address those factors directly so as to help create more competitive markets.

Key references: Barrett (1997), Scott (1995), Timmer et al. (1983), especially chapter 4, "Marketing Functions, Markets, and Food Price Formation".

1e. Do food insecure households have a preference over the form of aid they receive?
Issue: Households often have non-food needs that are at least as acute as their need for food. Moreover, they often have a better appreciation for their own access to fairly priced food via local markets, even if they do not have good access to information on broader market conditions. Further, giving recipients some voice over the form of assistance they receive reinforces their rights and dignity at a time when both are commonly under assault.
Data needs: Household surveys and key informant interviews, focus group discussions
Diagnostic tools: Qualitative and quantitative analysis of household preferences between food (including different food commodities) and cash
Rule(s) of thumb: If households have a strong preference for cash over food and the costs and risks of cash distribution are equivalent and the analyses in 1b and 1c do not yield compelling evidence that cash distribution will likely bid up prices due to inelastic supply or noncompetitive markets, provide at least some cash.
Key references: Barrett and Clay (2003), Harvey (2005).

If the analysis of questions 1a-1e suggests a need for at least some food deliveries to at least some identifiable subpopulations in some markets, then response analysis needs to continue to Decision Tree question 2 and its subsidiary questions:

2. **Is There Sufficient Food Available Nearby To Fill The Gap?** If the analysis under question 1 concludes that cash transfers will not suffice to meet all assessed needs, then commodities must be imported to the target delivery market by noncommercial means. The historical default has been transoceanic shipment from donor countries. Local or regional purchases[1] are increasingly an option with some donor or private resources, however. In order to establish whether local or regional purchases are a

---

[1] "Local purchases" refer to purchases made in another region within the same country as the target delivery market. "Regional purchases" refer to purchases made in a neighboring or nearby country.

viable and desirable alternative to transoceanic food aid shipments, several subsidiary questions need to be answered: (i) what are candidate markets for procuring the desired commodities, taking into consideration the cost and timeliness of deliveries to the target delivery market, (ii) the possibility of adverse food price effects on food insecure households in the prospective source market(s), and (iii) the possibility of adverse producer price effects on farmers in the destination market.

2a. Where Are Viable Prospective Source Markets?

Issue: Given needs assessments that identify the appropriate commodity(ies) and volumes required and the response analysis in question 1 to establish how much of that volume can be met commercially in response to cash transfers, the next task is to establish where to source commodities for noncommercial importation into the target delivery market. The objective here is to identify a small number of candidate markets for further analysis under questions 2b and 2c. Candidate markets will have demonstrable surpluses of the target commodity, sufficient transport capacity at reasonable rates to move food purchases from the source market to delivery locations in a timely and cost-effective manner, and no government-imposed or other barriers to export. Because most nations have import requirements (e.g., sanitary certificates, quality control) that can slow the regional (inter-country) delivery process compared to local (in-country) purchases, it is typically wise to examine availability of supply in other markets within the same country (i.e., local purchases), and then consider regional supplies.

Data needs: Information on government policies – especially formal and informal trade restrictions – in both recipient country and source market(s). Such policies can slow and/or add to the costs of deliveries. Import parity price estimates in recipient country. Estimated procurement prices in prospective source market(s). Food Balance Sheets, and FAO/GIEWS crop and food supply assessments and harvest estimates data to establish where market surpluses are likely available, trader (including importer/exporter) interviews (in both destination and prospective source markets). Market intelligence on trader and transporter reliability – will costs and delivery lags be as promised or are there commonly significant post-contractual complications? Trader interviews regarding transportation time, cost, and import requirements.

Diagnostic tools: Market mapping (explained in Appendix 3). Assess supply availability from several locations, factoring in potential delivery dates, costs (tariff duties and transport), and import requirements. Import parity price analysis: given procurement prices in the prospective source market and transport costs and tariffs, would it be cheaper to bring food from this market than to import it commercially? Key informant interviews with traders, transporters and government officials (see Appendix 2) can identify how long and costly transporting from different regions to the local area takes, how time-consuming import controls are, and how reliable different commodity or freight vendors are.

Rule(s) of thumb: Only consider markets from which one could get delivery in less than five months (roughly the mean delivery lag for transoceanic shipments), and at a delivered cost at or below import parity price.

Key references: FAO (1996), especially sections 3, 4 and 6, and Appendices 5 and 6, Tschirley (2006), Dorosh and Haggblade (2006), Lynch (2006).

2b. Will Agency Purchases Drive Up Food Prices Excessively In Source Markets?

Issue: If local or regional purchases will significantly bid up food prices in source markets, these actions can harm food insecure households within the source market. Agencies will want to avoid local or regional purchases in such markets. The task in this question is therefore exactly as in questions 1b-1d, but now applied to prospective source markets, rather than the target delivery market. The objective is to winnow the list of prospective source markets identified in 2a.

One needs to trace out the local supply curve – i.e., identify how much food can be procured from existing vendors without driving up their costs – and establish how competitively suppliers behave. The data needs, diagnostic tools and rules(s) of thumb are exactly as in 1b,1c and 1d, so we do not repeat that material here. The one difference is that in prospective source markets there will not be transfers to households, so response analysis does not need to consider the income elasticity of demand and the likely effects of transfers in augmenting demand. The demand augmentation would be purely from the local or regional purchase activity.

2c. Will Local or Regional Purchases Affect Producer Prices Differently Than Transoceanic Shipments?

Issue: Any food aid delivery – whether a transoceanic shipment or a local or regional purchase – augments local food supply and thereby creates downward pressure on local food prices. But if there are differences between local or regional purchases and transoceanic shipments – in the commodity or in the timing of deliveries – then there may be differential effects on producer prices in the target delivery market. Given that agencies typically want to minimize any producer disincentive effects associated with food aid, this is a potentially important consideration.

Data needs: Information on government policies – especially formal and informal trade restrictions – in both recipient country and source market(s). Such policies can slow and/or add to the costs of deliveries. Import parity price estimates in recipient country. Estimated procurement prices in prospective source market(s). Food Balance Sheets, and FAO/GIEWS crop and food supply assessments and harvest estimates data to establish where market surpluses are likely available, trader (including importer/exporter) interviews (in both destination and prospective source markets). Market intelligence on trader and transporter reliability – will costs and delivery lags be as promised or are there commonly significant post-contractual complications? Trader interviews regarding transportation time, cost, and import requirements.

Diagnostic tools: Estimates of seasonality in income elasticity of demand, of cross-price elasticities of demand, and of inverse price elasticities of demand. These estimates provide the basis for estimating whether differences in commodity or delivery timing due to mode of procurement (transoceanic shipment or local or regional purchase) should have any differential effect on producer prices in the target delivery market.

Rule(s) of thumb: If there is pronounced seasonality in demand patterns – typically reflected in higher income elasticity of demand and lower inverse price elasticity of demand for food commodities in hungry seasons, then timeliness in delivery can have a pronounced impact on the producer price effects of food aid delivery.

Favor the procurement mode that is most likely to deliver during the hungry season. Similarly, if culturally and nutritionally appropriate food commodities with a low cross-price elasticity of demand relative to the local staple crop are available from only one procurement mode, that is typically the commodity that will have the least adverse effect on local producer prices in the target delivery market. We emphasize that needs assessments for food insecure households need to drive the identification of suitable commodities for procurement, not this consideration. But within the set of suitable commodities identified in needs analysis, likely cross-commodity price effects are one factor to be considered.
Key references: Timmer et al. (1983), FAO (1996), Tschirley (2006), Tschirley and del Castillo (2006), Dorosh and Haggblade (2006), Lynch 2006.

References

Adams, Leslie and Paul Harvey. 2006. "Learning from cash responses to the tsunami: Issue Paper 1 – Analysing markets." September. Humanitarian Policy Group, Overseas Development Institute, London.

Adams, Leslie and Paul Harvey. 2006. "Learning from cash responses to the tsunami: Issue Paper 5 – Livelihoods Recovery." September. Humanitarian Policy Group, Overseas Development Institute, London.

Adams, Leslie and Paul Harvey. 2006. "Learning from cash responses to the tsunami: Issue Paper 6 – Monitoring and Evaluation." September. Humanitarian Policy Group, Overseas Development Institute, London.

Barrett, Christopher B. 1997. "Food Marketing Liberalization and Trader Entry: Evidence from Madagascar," World Development, 25(5): 763–777.

Barrett, Christopher B. and Daniel C. Clay. 2003. Self-Targeting Accuracy in the Presence of Imperfect Factor Markets: Evidence from Food-for-work in Ethiopia. *Journal of Development Studies* 39(5): 152-180.

Barrett, Christopher B. and Daniel G. Maxwell. 2005. Food Aid after Fifty Years: Recasting its Role. Routledge, London.

Creti, Pantaleo and Susanne Jaspars, eds. 2006. "Cash Transfer Programming in Emergencies." February 1. Oxfam Skills and Practice, London.

Donovan, Cynthia, Megan McGlinchy, John Staatz, and David Tschirley. 2005. "Desk Review: Emergency Needs Assessments and the Impact of Food Aid on Local Markets." December. World Food Programme, Emergency Needs Assessment Branch (ODAN).

Donovan, Cynthia and Megan McGlinchy. 2006. "Market Profiles and Emergency Needs Assessments: A summary of methodological challenges." May. World Food Programme, Emergency Needs Assessment Branch (ODAN).

Dorosh, Paul A., 2001. "Trade Liberalization and National Food Security: Rice Trade between Bangladesh and India." *World Development.* Elsevier Science. Vol. 29 (4) pp. 673-689.

Dorosh, Paul A., Carlo del Ninno and Quazi Shahabuddin eds. 2004. "The 1998 Floods and Beyond: Towards comprehensive food security in Bangladesh." International Food Policy Research and University Press Limited, Dhaka.

Dorosh, Paul A., Simon Dradri, and Steven Haggblade. 2006. "Trade Policy and Food Security: Recent Evidence from Zambia." Mimeograph.

Dorosh, Paul A., and Steven Haggblade. 2006. "Incorporating Market Responses in Emergency Needs Assessments: A prototype spreadsheet model for Zambia." Preliminary Draft.

Fackler, Paul L. and Barry K. Goodwin. 2001. "Spatial Price Analysis." Handbook of Agricultural Economics, Gorden Rausser and Bruce Gardner, ed. Elsevier Science B.V., New York.

Food and Agriculture Organization. 1996. "FAO/GIEWS Guidelines for Crop and Food Supply Assessment Missions." FAO, Rome.

Food and agriculture organization. 2002. "Training in the Preparation of Food Balance Sheets: Food Balance Sheets: History, sources, concepts and definitions." May-July. No. 5. FAO, Rome.

Food and agriculture organization. 2002. "Training in the Preparation of Food Balance Sheets: Food Balance Sheets: Applications and uses." June-July. No. 6. FAO, Rome.

Gentilini, Ugo. 2005. "Mainstreaming Safety Nets in the Social Protection Policy Agenda: A new vision or the same old perspective?" *electronic Journal of Agricultural and Development Economics.* Vol. 2 (2) pp. 1333-157.

Gentilini, Ugo. 2007. "Cash and Food Transfers: A Primer." UN World Food Programme, Rome.

Goetz, Stephan J. 1995. "Chapter 17: Markets, Transaction Costs, and Selectivity Models" in Scott, Gregory J., ed.1995. Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries. Lynne Rienner, Boulder.

Harvey, Paul. 2005. "Cash and Vouchers in Emergencies." February. Overseas Development Institute, London.

Harvey, Paul. 2007. "Cash – based responses in emergencies." January. HPG Report No. 24. Overseas Development Institute, London.

Jaspars, Susanna. 2006. "From Food Crisis to Fair Trade: Livelihood analysis, protection and support in emergencies." (Ed.) Oxfam/ENN Special Supplement Series No. 3, Oxford.

Kumar, K. 1989. *Conducting key informant interviews in developing countries* (Washington, D.C.: USAID)

Lynch, Will. 2006. "When to Purchase Food Aid Locally?" Catholic Relief Services. Mimeo.

Maxwell, Daniel and Sue Lautze. 2006. "Why do Famines Persist in the Horn of Africa? Ethiopia 1999-2003." Chapter 9 in Stephen Devereux (Ed.), The 'New Famines': Why Famines Persist in an Era of Globalization. London: Routledge Press.

Maxwell et al 2007, "Emergency Food Security Programming: A State of the Art Review." Feinstein International Center, Medford, MA.

Mendoza, Gilberto. 1995. "Chapter 11: A Primer on Marketing Channels and Margins," in Scott, Gregory J., ed.1995. Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries. Lynne Rienner, Boulder.

ODAN Emergency Needs Assessment Service and PDPE Economic Analysis Service of World Food Programme. 2006. "Technical Meeting Report: Cash in emergencies and transitions. Addis Ababa, 3-5 October 2006." October. World Food Programme.

ODAN Emergency Needs Assessment Service and PDPE Economic Analysis Service of World Food Programme. 2007. "Technical Meeting Report: Food security and markets Subiaco, Italy, 10-12 January 2007." January. World Food Programme.

Pearson Scott, Carl Gotsch, Sjaiful Bahri (2003) Application of the Policy Analysis Matrix in Indonesian Agriculture. May. http://www.stanford.edu/group/FRI/indonesia/newregional/newbook.htm

Scott, Gregory J., ed.1995. Prices, Products, and People: Analyzing Agricultural Markets in Developing Countries. Lynne Rienner, Boulder.

Slater, Rachel, and Julie Dana. 2006. "Tracking vulnerability to hunger in Malawi through market-based options contracts: implications for humanitarian agencies." Chronic Vulnerability. March. No. 33. Pp. 13-17.

Timmer, C. Peter, Walter D. Falcon, and Scott R. Pearson. 1983. Food Policy Analysis. World Bank and Johns Hopkins University Press. Baltimore.

Tschirley, David. 2006. "Local and Regional Food Aid Procurement: An Assessment of Experience in Africa and Proposal for USAID Practice." Department of Agricultural Economics, Michigan State University. Mimeo.

Tschirley, David and Anne Marie del Castillo. 2006. "Local and Regional Food Aid Procurement: An assessment of experience in African and elements of good donor practice." *Policy synthesis for cooperating USAID offices and countries missions.* November. No. 79.

Whiteside, Martin and Lucas Amilcar. 2006. "Agricultural Marketing in Nampula Province - Constraints and Opportunities." June. CARE International in Mozambique.

World Food Programme. 2006. "Technical Guidance Sheet No. 6: Market data collection and analysis." June 30. Rome.

Appendix 1: Secondary data sources

Where possible, exploit pre-existing secondary data so as to reduce time and resources needed to get information with which to undertake necessary response analysis. Be careful to check with knowledgeable sources as to the quality of secondary data and consider context of the crisis in deciding which secondary data likely remain useful for the situation at hand. Useful secondary data are often available from one or more of the following sources, on which we offer some brief comments:

1. **National Government**
   a. Food balance sheets (FBS) include expected local production estimates, demand, imports, and shortfalls. FBS are not linked to prices, and are generally static and available only with a significant lag (typically at least one year). FBS estimate local production and imports and can point to surpluses within a country or regionally. FBS are occasionally created for different agro-ecological zones within a country. Donovan et al. (2005) reports that governments may use FBS estimates to advocate for aid, and often there can be a large gap between FBS estimates and other methods of estimating supply. Generally, FBS do not include informal trading. They also do not examine what happens to the staple food gap when the staple price changes. Dorosh et al. (2006) argue that if estimates of staple supply do not adjust in the face of increased staple prices, the FBS will overstate food gaps by not recognizing that consumers will switch from the more expensive staple to substitutes. Due to these shortcomings, ODAN - WFP recommends using FBS to examine changes, but not levels (2007).
   b. National statistical services and central banks commonly report (i) national consumer price indices, often including disaggregated data on elements of the market basket (e.g., staple foods) and fuel prices (important to establishing the costs of commerce between spatially distinct markets), and (ii) price series across different, spatially-distinct markets over time. Ministries of Agriculture often have the latter data on food prices. Statistical agencies often have relatively recent household survey data that can also be used for quickly assessing household market access, etc.
   c. Trade ministries have data on tariff and non-tariff barriers to importing foods.

2. **FAO: Crop and Food Supply Assessment Missions**
   a. FAO regularly assesses 20-25 countries with the intent of providing information on imminent food security problems. CFSAM assessments are commonly the most up-to-date and reliable source for food supply information, which is especially important for assessing question 2a but also helpful with 1b.
   b. Macro-economic context that can impact supply and demand
      i. Agricultural sector in national economy
         1. Size/share of the sector
         2. Employment and livelihood dependence on the sector
         3. Export contributions of agriculture
         4. Agricultural and economic policy changes
   c. Crop production and food supply assessment

d. Global Information and Early Warning System on food and agriculture (GIEWS: http://www.fao.org/GIEWS/english/index.htm) provides a variety of early warning indicators by region. Not all indicators are available for all regions. This data can help identify regional supply availability in answering questions 2a and 2c and in some cases question 1a.
   i. Satellite imagery of vegetation for all regions
   ii. Cereal supply and demand balances
   iii. Crop prospects and food situation (regular publication)
   iv. Food outlook (regular publication)
   v. List of low-income food deficit countries

3. **WFP:**
   a. Vulnerability and Food Needs Assessments (VAM)
   b. Markets Assessments from ODAN
   c. Forthcoming online markets assessment toolkit (MARKIT) from PDPE (Economic Analysis Unit) and ODAN (Emergency Needs Assessment Unit).   This tool helps understand whether private sector imports are likely to take place when domestic prices rise to levels approximating import parity prices. A good assessment of import supply is critical for accurate estimates of food aid needs.

4. **US Embassy**
   a. Agricultural attaché reports for price and market data
   b. USAID for general economic and georeferenced data and, especially for past Bellmon analyses under Title II programs. Data collected for Bellmon analyses are often rich historical sources. The total staple consumption measure can provide a comparison value to government Food Balance Sheet production estimates. Further, Bellmon analyses often include summary price data tables, including data on local and imported prices and sometimes identify how competitive local markets are and whether adequate storage facilities exist for local and regional purchases.

5. **World Bank/IMF**
   a. Global commodity market price series (e.g., World Bank "pink sheet" and IMF's International Financial Statistics).
   b. Recent studies of market performance and competitiveness policy

6. **Other sources: News reports, early warning systems, and satellite imagery**
   a. Some localities will not have accurate or recent estimates of how a crisis has impacted supply. Data on percentage yield losses can be multiplied by pre-crisis estimates to determine potential quantity decreases for particular localities. Further, news reports can provide data on regional production and prices changes.

Appendix 2: Primary data collection methods

Useful secondary data are often unavailable, necessitating primary data collection. Typically, resources are insufficient to mount a major, statistically valid survey effort, so we neglect discussion of large scale sample surveys here.

Focus group discussions. These are typically with either groups of household decisions makers (to understand household behavior in the market) or with group of traders (to understand market workings – see below). For households, the questions of interest are the extent to which people are dependent on markets for food, what proportion of food different groups acquire through the market, physical accessibility of markets, and non-price discrimination in markets.

Box 1 enumerates candidate questions that can be used in focus group discussions and key informant interviews to tackle question 1a.

Box 1: Are food insecure households well connected to local markets?
- Which households use local markets? What types of markets: shops, wet markets, supermarkets, informal barter?
- What staples and substitutes do they buy from local markets? At what prices relative to those prevailing in the principal national market(s)?
- Do households use cash, credit, or barter?
- How far away are the markets? How frequently do households go and at what cost?
- Does everyone have equal access to local markets?
- Can households travel to a larger market if local market prices increase too much?
- Are there key products not locally produced unavailable in the market? Is this due to commercial supply disruptions, government trade bans, high prices, insufficient local demand, or some other reason? Assess particularly staples and substitutes, but also key complementary goods and services, such as water, medicine, fuel, or shelter.

A variety of methods can be used to gather information. Typically bean piling exercises are helpful to get a qualitative idea of relative proportions – for example, the proportion of food that different groups purchase (as opposed to other means of access); bean piling exercises can also be useful in understanding recipients own preference for the proportion of cash and in-kind assistance, useful for question 1e.

Key informant interviews: these can be with government officials, local NGOs, bankers, transporters, etc. as appropriate to the question being asked. Key questions relate to government policies that affect food markets (see Box 2 for sample questions), transport capacity, competitive behavior in markets, and needs and crop and food supply assessments. See K. Kumar (1989). *Conducting key informant interviews in developing countries* (Washington, D.C.: USAID) for good guidelines on key interviewing techniques.

Box 2: Government Policies That Can Affect Food Market Performance
- Does the government control imports?
- Are staple products taxed? Do importers pay tariffs on staple products?
- Does the government require trader licensing? Is it difficult, time-consuming or expensive for traders to gain these licenses?
- Are imports, inputs (e.g., fuel) or retail food subsidized?
- Does the government set wholesale prices for staples or substitutes? Are there price ceilings or fixed producer prices?
- Are exchange rates fixed or floating? If the exchange rate for domestic currency is fixed, is it properly valued, overvalued or undervalued?
- Does the government have large grain reserves? Does it plan to release reserve stocks? Will they make that decision known to traders beforehand?
- Does the government plan to change its food and trade policies? Is there speculation about significant policy change (i.e., policy risk to traders)?

Trader interviews:
Trader interviews and surveys are commonly essential to get a good feel for the marketing channel and to fill in key gaps in secondary data sources (e.g., on transportation costs, informal government regulation of trade, etc.).[2] It is preferable to include traders all along the supply chain, from farmgate collectors to local non-motorized transporters to long haul motorized transporters to processors to wholesalers, importers, retailers at marketing hubs, and retailers operating in small markets. Donovan et al. (2006, p. 34) suggest that 10% of traders (and a minimum of 10 traders) should be interviewed in large public (i.e., retail) markets. At the wholesale market level, at least 5 traders should be interviewed in each location (town, city-center etc.). The questions to be explored include both cost data necessary to answer question 1b and competitiveness questions necessary to answer question 1c.

At the most basic level, questions to be asked of traders include how much more volume they could deliver to the local market at their current cost (i.e., procurement cost of food wherever they source it, transport and handling costs, etc.). Then ask how much additional it would cost them to increase throughput volume beyond that and why/where the added costs arise. Continue this process and record the resulting costs and volumes for each trader. Cumulatively, these create the aggregate supply curve in the local market.

---

[2] CARE's field staff may also be a valuable source of market information regarding their perceptions on the number and diversity or traders, etc.

Box 3: Pre- and Post-Crisis Trading Costs and Obstacles
How does trade operate in a normal year:
- How do traders transport goods to market?
- How much competition do they face from other traders?
- What is the normal volume of sales at different times of year, for key goods?
- Who are traders' main customers?
- Do traders borrow money to buy goods and extend credit to customers?
- What are the seasonal trends in the prices of key goods?
- What barriers to trade do traders face, whether due to formal or informal government regulation, financing or logistical constraints, licensing, staffing issues, etc.?
    - Does the local government support a local cartel?
    - Are pieces of the supply chain controlled by syndicates or local elite?

How do the normal year and the current situation differ:
- Transport access and costs
- Storage access and costs
- Processing access and costs
- Availability of goods to sell
- Numbers of customers
- Prices of goods (inputs and outputs)
- Availability of credit
- Impediments to commerce

Ask traders to:
- Estimate when goods will arrive in markets where households have received cash benefits
- Estimate the percentage of food flowing along various marketing channels
- Estimate the number of traders involved in each step
- Construct the marketing margin for their product
- Explain which costs would increase for moving and additional 1, 2, 3 etc. metric tons etc. more of the good (e.g., transport, storage, procurement costs etc.)
- Estimate by how much each of these costs might increase for the each of the additional amounts.

Traders' attributes:
- What are traders' attributes: age, religion, gender, volume of transactions, profitability? How diverse are they as a group?
- How many traders operate in similar marketing chains?

The objectives in trader interviews are to identify (i) what constraints might exist to trader supply response to added local demand fuelled by cash transfers, (ii) what traders' marginal cost structure looks like if cash transfers fuel demand expansion, and (iii) how competitive the food marketing channel is. Common constraints include transport capacity (i.e., is there enough lorry, ship or rail capacity to deliver much more added food?), financing capacity (i.e., will banks or

other financial institutions provide letters of credit to provide necessary short-term financing of added inventories?), government interference (are there local bureaucratic bottlenecks due to licensing, tariffs, non-tariff barriers such as sanitary and phytosanitary standards or biosafety controls – especially important with respect to genetically modified foods – or corruption?), crime (are traders reluctant to handle larger volumes of cash or commodities for security reasons?), suitable storage capacity (do traders have access to silos, warehouses or other secure facilities where commodities can be kept safely?), and management capacity (do traders have the know-how to manage significantly greater volumes of food transactions?). Marginal cost structure can be elicited through questions such as those enumerated in Box 3. Further, assessing the number and diversity of traders operating at each point in the supply chain can provide insight into the relative competition in that sector. The more diverse and more active traders are, as a rule of thumb, the more competitive the market segment.

Appendix 3: Details and references on individual diagnostic tools

<u>Accompanying Spreadsheets:</u>
When feasible, the tools described below have been compiled into accompanying sample spreadsheets. The spreadsheets are intended to help analysts track and analyze local data. Columns in the spreadsheets with **bold** headings are embedded formulas. The spreadsheets can be tailored to fit specific country needs. Not all data will be available in all countries. In addition to routine monitoring of select data, analysts should determine from where less frequently required data is available. Regular data collection and monitoring will streamline response analysis and help COs make informed decisions.

Diagnostic Tools	Timing of Data Collection	Spreadsheet Name	Accompanying Graph Name
Concentration Ratio	Update regularly		
Demand Analysis	Pre-onset research	Elasticities	
Import Parity Prices	Update regularly	Monitoring Staples and Marketing Margins	Graphing Staples
Margins Analysis and Market Supply Chain Mapping	Update regularly	Marketing Margins	
Market Mapping	Requires market mapping and/or market integration		
Monitoring Prices and Supply Trends	Update regularly	Monitoring Staples	Graphing Staples
Regression Analysis	Pre-onset research		
Spatial Market Integration Analysis	Update regularly	Market Integration	
Supply Analysis (requires Elasticities)	Pre-onset and after onset research; requires Elasticities	Marginal Costs and Elasticities	See "Estimating Induced Price Effects" in Decision Tree Background Paper

<u>Concentration ratios:</u>
Concentration ratios are a standard numerical diagnostic in anti-trust work. The statistic is simple: the aggregate market share of the largest N firms, where N is a small number. The higher the aggregate market share of a small number of firms – e.g., CR4 in the case of N=4, the most commonly used level – the more opportunities exist for collusive behavior.

The lower the CR4 estimate, the more competitive the market. There exist other measures or market concentration, such as the Herfindahl index (the sum of the squared shares of all firms in the market, which equals one for a pure monopoly and approaches zero the more firms are in the market and the more evenly market share is spread among them). But the CR4 is the simplest measure to compute and works equally well as the others.

Demand analysis:
If supply is not perfectly elastic, demand patterns will matter to the price effects of different transfer or procurement actions. Several different demand parameters are necessary. The key essential estimate is the income elasticity of demand, ideally differentiated by transfer form, income or wealth class, and season. The income elasticity of demand reflects the expected percentage change in demand for a product (in this case, food or a particular food commodity) for a one percent change in household income (e.g., due to an inflow of cash or food). Elasticities are estimated by economists for particular goods in particular regions and may be found in publications or on-line. Income elasticities of demand for staple food commodities typically vary between 0.15 and 0.85 depending on the population, season and commodity, higher for poorer groups and hungry seasons and higher quality foods. If elasticities are not available for the country/product in question, use high and low values of the next best available elasticities to compute a band of expected changes. The expected demand expansion due to a transfer equals the product of the income elasticity of demand and the value of the transfer to households. Note that when trying to estimate the induced price effects in a market, the analyst wants to use the aggregate transfers to households in the area so as to capture the aggregate demand effect, which needs to be matched up to the elicited supply curve in order to establish expected price increases. The same technique can be applied when trying to estimate the expected price increases in source markets due to local or regional purchases by operational agencies, using the total purchase value instead of aggregate transfer value. If the expected induced price increases are on the order of 10% or more in a market, the posited actions (whether LRP or cash transfers to households) are likely to harm food insecure net buyers in those markets and may be inadvisable. *See accompanying spreadsheet named "Elasticities".*

When supply expands due to food aid deliveries, induced price changes depend on the slope of the relevant demand curve, i.e., on the price elasticity of demand, which reflects the expected percentage change in demand for a good given a one percent change in the price of that same good. Donovan et al. (2005) and other sources report that price elasticities of demand for staples tend to be between -0.25 and -0.8. In other words, a 1% increase in price will *decrease* demand for that good between 0.25% and 0.8%. Specific price elasticities exist for particular crops and countries. If multiple estimates price elasticities of demand are available, computing the highest and lowest will give a range of price increases. In order to estimate the price effect of added supplies released into a local market through food aid deliveries, multiply the added supply volume as a share of total market supply (i.e., the percent expansion of supply in the market) by the reciprocal of the price elasticity of demand (this is sometimes called the "inverse price elasticity of demand"). This product gives a crude estimate of the expected price change due to supply expansion. If price elasticities of demand vary by season, then the timing of food aid deliveries may matter to the distribution market effects of food aid deliveries. *See accompanying spreadsheet named "Elasticities".*

Import parity price:
The import parity price (IPP) is the price of imported goods at the national market hub (usually the capital city or major port or transportation center). This is the global market price delivered to the country, usually reflected in import prices (cif, or including "cost, insurance and freight"), as recorded in balance of payments or customs statistics by the relevant national ministry or statistical agency, plus any tariffs assessed on the commodity. When import parity price series are not available directly from publicly accessible government data, IMF data series or interviews with importers or NGO offices that procure aid regionally can often generate reliable series. It may be the case that the local product and imported product are not directly comparable (e.g., palm oil produced domestically versus imported vegetable oil), in which case there is necessarily some noise in the quantitative comparisons, which will imprecisely capture traders' incentives to import commodities.

Box 4: Trader incentives to import: the role of import parity price (IPP)
Country offices need to continuously monitor IPP and domestic wholesale prices.
- If IPP (including any applicable tariffs) + transport costs to local market > local price, traders have no incentive to import food commercially. Is enough local food available? If not, consider regional purchase.
- If IPP (including any applicable tariffs) + transport costs to local market < local price, traders have a commercial incentive to import unless restricted by government and financial/logistical bottlenecks.


In principle, the import parity price sets an anchor price from the global market so that prices in local markets that are well-integrated with the national hub market should not rise above the IPP plus the domestic cost of transport to the local market. Where transport costs are high (from global markets to the national hub market, and/or from the national hub market to the local market), the upper boundary on prices created by the IPP can be high, even in perfectly competitive and well-functioning markets. *See accompanying spreadsheets named "Monitoring Staples" to track IPP. The spreadsheet entitled "Marketing Margins" tracks transport costs and local costs. The sheet "Graphing Staples" charts IPP.*

See "Chapter 4: Social Benefit-Cost Analysis (The PAM's Middle Row)", in Pearson, Gotsch, Bahri (2003) Application of the Policy Analysis Matrix in Indonesian Agriculture for more information on computing Farm Gate Import Parity Prices. Their technique can be used to compute import parity prices at the wholesale market, by not including costs associated with moving the good from the wholesale market to the farm gate, such as transport and insurance and processing costs where applicable.
http://www.stanford.edu/group/FRI/indonesia/courses/manuals/pam/pam-book/Output/chap6.html#wp435170

Margins analysis and market supply chain mapping:
Diagramming supply chains can provide information on how markets functioned before the crisis and what constraints it now faces (Adams and Harvey, Issue Paper 1, 2006).

Importer → Wholesaler → Local wholesaler → Retail Market
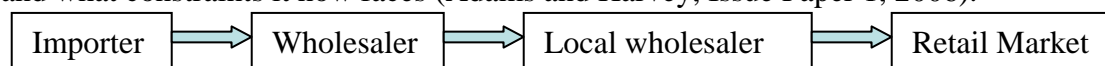
Supply chains can also map the underlying costs associated with moving a product from a center to a specific location. Marketing margin analysis traces out the marketing costs associated with each step along the supply chain. *See accompanying spreadsheet, named "Marketing Margins" for tracking data to compute a margins analysis. The data necessary for the marketing margins analysis come from interviews with traders (see Appendix 2, "Box 3 Pre- and Post-Crisis Trading Costs and Obstacles", observations of local costs and prices, and from secondary sources. The spreadsheet currently tracks margins from the wholesaler at the marketing hub to margins for the wholesaler at the local market to margins for the retailer at the local market. This can be expanded to include additional links in the supply chain, as necessary.*

One estimates margins along the supply chain by disaggregating prices from buyer back to original source (i.e., household retail purchase price = retailer costs (staffing, storage, credit, capital depreciation, taxes) + retailer profits + wholesaler costs (transport, storage, credit, staffing, capital depreciation, taxes) + wholesaler profits + transport charges (including road tolls, taxes) + tariff charges + import parity price). Data typically come from trader and key informant interviews, often cross-checked by examining letters of credit, which are often available at central banks, and customs recordation documents for the cif costs of imported foods. Letters of credit can also supply information regarding both the number of traders and the size of the import market. The disaggregated data can identify what aspects of the supply chain are most costly as well as estimate profit margins for traders for each segment of the marketing chain. If traders' costs are much lower than their profits, they may be colluding, and the market may not be adequately functioning to distribute cash.

Market mapping:
Using a map (e.g., a simple road map) of the nation, plot information collected from traders, from supply chain and marketing margin analyses, and from market integration analysis (Adams and Harvey, Issue Paper 1, 2006). Identify supply shortfalls, infrastructure damage, or certain routes not considered adequately profitable by traders. Also identify main marketing hubs and include approximate numbers of retailers and wholesalers operating in various localities. An additional mapping strategy is to draw lines connecting pairs of markets with 90% correlated prices for the staple (Timmer et al., 1983) See spatial market integration analysis, below.

Mapping can help to identify patterns to market limitations and weak market functioning. Adams and Harvey (2006) note that some areas may not have any traders, because entitlement failures have hurt local purchasing power and traders cannot profitably operate in those regions. Mapping can help identify such areas. Alerting traders to impending cash distributions may give them incentives to resume trading in such regions. Further, when considering the decision of where source food aid from in question 2, having this information readily available will streamline the additional data collection necessary in question 2a.

Monitoring Prices and Supply Trends:
Baseline production data, consumption data, import-levels, and current stocks (public, PVO and commercial stocks) for the past 3-5 years (or for the number of years available) for staples and substitutes should be graphed and monitored to determine supply and price trends. Some of this data will be available publicly (see Appendix 1 for sources). Regularly monitoring this data will help to streamline margins analysis and marketing supply chain analysis, import parity price

analysis, and supply analysis. *See the spreadsheet page "Monitoring Staples." Data from this sheet are graphed in "Graphing Staples."*

In places with active informal cross border trading and parallel markets operating, compute flows and incorporate them into production estimates, particularly if production estimates only include flows in "official" channels. Careful discussions with district level or regional traders may provide insight on the volume of informal trade. FAO/GIEWS(1996) recommends assessing the opinions of receiving market traders about the order of magnitude of unrecorded cross border trade and to sample popular border crossing (counting the number and tonnage of trucks carrying cereals). However, seasonality is extremely important in determining the volume of unrecorded cross border trade. Most likely, the volume will be minimal during non-harvest periods. See FAO/GIEWS, 1996 for more information on measuring cross-border flows.

Regression analysis:
There is rarely time or resource available to initiate household survey work. But relatively recent household surveys exist in many countries, conducted by national statistical agencies, agricultural research institutes, universities, or donor agencies. If such data are readily accessible, reasonably current and offer a sample of the relevant population, they can be very useful for quick, reasonably simple multivariate statistical analysis. This is often useful and easy with respect to question 1a, to establish how well food insecure households are connected to local markets. For market access, typically the dependent variable is binary (1=participates in market, 0=does not participate). Logit or probit analysis is typically appropriate for such data, although linear probability models based on ordinary least squares (OLS) can also work when precision is less important. For an example and detailed explanation of this type of analysis, see "Chapter 17: Markets, Transaction Costs and Selectivity Models" by Stephen Goetz in Scott (1995).

Spatial market integration analysis:
Market integration can be assessed quickly and easily by taking price time series from different markets, detrending them for general inflation (e.g., using the national consumer price index available from the Central Bank or most statistical or donor agencies, or by differencing data by subtracting one month's price from the previous month's price. To correct for the effects of common seasonality compute an index for each month, lumping all locations' prices and years together, and then deflate each observation by the appropriate month's index. The detrending is important so as to remove spurious correlation due to general macroeconomic conditions and seasonality common to all markets under study. Plotting the series provides a good visual depiction of the price series' relationship. If the prices commove closely (i.e., the series move parallel to one another), this signals close price correspondence irrespective of inflation and seasonality and serves as a strong, albeit casual, indicator of likely market integration. Computing the bivariate correlation coefficient matrix for these detrended series, as demonstrated in the spreadsheet. Timmer et al. (p. 21, 1983) suggest that 90% is a good measure for "high" correlation of prices between markets.
To compute correlations of pairs of price-change series in Excel, use the Correlation Tool in the Data Analysis Add-in feature. See the spreadsheet "Market Integration" for an example.
References: Timmer et al. (1983), Scott (1995), Fackler and Goodwin (1999)

Supply Analysis:

The objective here is to recover marginal costs for any *additional* volumes traders would deliver into a market. A supply curve is the locus of marginal costs for different delivery volumes. So one is simply trying to trace out how much it would cost to augment current deliveries by 1 ton, 2 tons, 3 tons, etc. up to the total assessed needs. This is usually best done through trader and key informant interviews (e.g., with banks and transporters) to establish what, if any, costs might increase for traders (i.e., procurement cost of food wherever they source it, transport and handling costs, short-term credit for operating expenses, etc.). If one does trader interviews, a simple questionnaire that asks how much extra it would cost to bring in different additional increments – appropriate units will vary by context, from one ton to hundreds of tons – broken down into cost types – procurement price in source market, transport costs, handling costs, credit, storage costs, tariffs/taxes/fees, etc. Record the resulting costs and volumes for each trader. Cumulatively, these create the aggregate supply curve in the local market.

See "Box 3: Pre- and Post-Crisis Trading Costs and Obstacles" in Appendix 2 for a list of questions to pose to traders to help construct marginal costs. See spreadsheet entitled "Marginal Costs" for data tracking and to compute a graph of marginal costs. See the graph entitled "Estimating Induced Price Effects" in the Decision Tree Background Paper (Maxwell, Lentz, Barrett (2007)) for an example of an elicited stepwise aggregate supply function. To compute a new graph, choose "XY scatterplot" option in Excel, and specify "Added Aggregate Supply" from the "Marginal Costs" spreadsheet as the X-axis and "Total Marginal Cost" as the Y-axis. For the stepwise aspect, at each scatterpoint, draw a vertical line until it is horizontal with the next right-hand scatterpoint. Connect the tip of the vertical line horizontally across to the next scatterpoint. Draw a vertical line from the previous scatterpoint. Draw in price lines from the "Marginal Costs (find from ordered AS schedule at left)" and added demand from "Additional Supply Needed (MT)."

This direct elicitation approach will generate a realistic, stepwise aggregate supply function. If there is not time available to do this exercise, another approach is to canvas local experts to get best guesstimates of the inverse price elasticity of supply, i.e., the percentage increase in price associated with a one percent increase in demand in the local market. Multiplying the percentage increase in demand (ratio of increase in demand divided by total initial market demand; see *Demand Analysis* above) times the inverse price elasticity of supply will give an approximation of the resulting percentage increase in price. This method can be used to compute the resulting percentage increase in price across many percentage increases in demand due to cash transfers or local or regional purchase actions. The inverse price elasticity of supply can then provide a smoothed curvilinear approximation of the supply function.