IMPROVING THE ANALYSIS OF FOOD INSECURITY

FOOD INSECURITY MEASUREMENT, LIVELIHOODS APPROACHES AND POLICY: APPLICATIONS IN FIVIMS

Stephen Devereux
Bob Baulch
Karim Hussein
Jeremy Shoham
Helen Sida
David Wilcock

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[1] For copies of these papers, contact Stephen Devereux (s.devereux@ids.ac.uk) or Jenny Edwards (j.a.edwards@ids.ac.uk).

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ABBREVIATIONS

ACF	Action Contre la Faim
CGIAR	Consultative Group on International Agricultural Research
CSI	Coping Strategies Index
CWIQ	Core Welfare Indicators Questionnaire
DHS	Demographic and Health Survey
DFID	Department for International Development (UK)
ESAF	Food Security Service (FAO)
FAO	Food and Agriculture Organisation
FEG	Food Economy Group
FEWS	Famine Early Warning System (USAID)
FILSIS	FIVIMS Integrated Livelihoods Security Information System
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
FS	Farming Systems
FSAU	Food Security Assessment Unit (Somalia)
FSIS	Food Security Information System
GIEWS	Global Information and Early Warning System (FAO)
GIS	Geographic Information System
HEA	Household Economy Assessment
HFE	Household Food Economy
HLS	Household Livelihood Security (CARE)
IAWG	Inter-Agency Working Group (FIVIMS)
ICRISAT	International Crop Research Institute for the Semi-Arid Tropics
IDS	Institute of Development Studies
IFPRI	International Food Policy Research Institute
LSMS	Living Standard Measurement Surveys
MDG	Millennium Development Goals
MIS	Market Information Systems
MSF	*Médecins Sans Frontières*
NIM	Nutrition Indicators Monitoring
NSP	Nutritional Surveillance Programme (Ethiopia)
ODI	Overseas Development Institute
PAM	Policy Analysis Matrix
PAPSL	Participatory Assessment and Planning for Sustainable Livelihoods (UNDP)
PEM	Protein-Energy Malnutrition
SADC	Southern African Development Community
SC-UK	Save the Children (UK)
SDAR	Rural Institutions and Participation Service (FAO)
SFLP	Sustainable Fisheries Livelihoods Programme (FAO)
SFP	Supplementary Feeding Programme
SLA	Sustainable Livelihoods Approach
SLSO	Sustainable Livelihoods Support Office (DFID)
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
VAM	Vulnerability Assessment and Monitoring (WFP)
WFP	World Food Programme
WFS-fyl	World Food Summit – five years later

EXECUTIVE SUMMARY

Since the mid-1990s, livelihoods-based approaches have increasingly come to dominate the analysis of poverty and food insecurity, and the design of anti-poverty and famine prevention interventions, especially at the local (community to district or 'food economy zone') level. There is a growing consensus on the usefulness of livelihoods approaches for assessing, monitoring and mapping food insecurity and vulnerability, and a number of analytical toolkits have been developed and adopted by development agencies that draw on the holistic nature of livelihoods-based approaches. Because of their integrated view of livelihood systems, methodologies such as the 'Household Economy Approach' are better placed to interpret information on 'coping strategies' and nutritional status. Also, because they generate information on disaggregated livelihood categories or 'vulnerable groups', livelihood approaches have the potential to generate more sensitive and appropriate interventions than is possible with generic policies and programmes that are not tailored to local circumstances.

The greatest strengths of livelihoods approaches – their holistic and disaggregated nature – are also the source of their major limitations. Any multi-dimensional analysis is difficult to incorporate within government Ministries and agency programmes that are organised sectorally, around agriculture, health, and so on. Like other participatory and qualitative methods, livelihoods approaches also face the challenge of scaling up local-level findings to national level at affordable cost. On paper, these limitations suggest that the relevance of livelihoods-based approaches is less apparent for national and global FIVIMS work than for sub-national monitoring and locally relevant interventions.

One solution to these challenges may be to develop stronger analytical linkages between a range of methodologies and sources of information that all have the potential to contribute to food insecurity assessment and vulnerability monitoring. One under-exploited source is household surveys – whether donor-funded, nationally-owned, or specialist topic surveys – which have been conducted in almost all developing countries. Conventional household budget surveys can provide a great deal of relevant data for food security analysts, but their sampling frames may not be large enough or suitable for disaggregation by livelihood category, recall and measurement errors are inevitably associated with expenditure and consumption variables, household-level data cannot be easily disaggregated to generate intra-household distribution data, and a single cross-sectional survey is not very informative about trends in food insecurity and vulnerability over time. On the positive side, several recent developments in household survey analysis, reviewed in this paper, could be of great interest to food security information systems. These include: (1) a methodology based on 'net benefit ratios' that assesses the 'winners and losers' from policy changes, or shifts in food prices; (2) innovative techniques in poverty and vulnerability mapping, involving geo-referenced data and GIS software; (3) using cross-sectional or panel data to estimate household vulnerability to poverty; (4) non-parametric techniques such as Receiver Operating Characteristics curves to assess proxies for poverty and food insecurity.

Another area with great potential for FIVIMS is to incorporate nutrition indicators monitoring into food security information systems. Much positive experience has been accumulated on the use of nutrition surveillance to monitor food security status and predict vulnerability to food crises. However, nutritional indicators in isolation have several limitations, including: (1) as an outcome indicator, anthropometry cannot explain the causes of food insecurity; (2) since an individual's nutritional status is determined not only by food intake, but also by health status and caring practices, the risk of misdiagnosing a poor nutritional outcome is high; (3) declining nutritional status may be a late indicator of a livelihood crisis, especially if children are monitored but adults protect their children's food consumption. These factors make a strong case for integrating nutritional data with livelihoods information. Indeed, a number of recent actual or averted food crises (in Afghanistan, Burundi, and Sudan) show the value of combining nutritional status data with contextual information on livelihoods – including livelihood activities, assets, coping strategies, and market prices. Taken together, a fuller picture can be derived of the severity of a situation as well as its causes and impacts than if the two types of information are collected and analysed separately.

The argument for combining different types of food security information applies not only to data collection and analysis, but also to the establishment and improvement of integrated food security and information systems. With this in mind, this paper proposes a 'FIVIMS Integrated Livelihoods Security Information System' (FILSIS), defined as: *"an integrated, spatially detailed, national information and mapping system which follows basic FIVIMS ideas on inter-agency collaboration and which is able to address two types of related problems: (a) transitory lack of access to adequate food, and basic medical care, water, and sanitation services which, together, impact on the nutritional status of well-defined population groups; and (b) more chronic sources of risk to the security of livelihoods, as measured by the level and stability of household income and other relevant indicators".* This system is eclectic in terms of information needs and methodologies, and it supports a two-track approach to fighting both food insecurity (i.e. dealing with shocks) and underlying household income poverty (i.e. strengthening livelihoods). Prerequisites for successful implementation of a FILSIS – or even more effective national and global FIVIMS – include: (1) better inter-agency collaboration; (2) higher levels of donor resourcing; (3) effective use of innovative GIS, mapping and database software; (4) genuine commitment to building in-country capacity to collect, analyse and disseminate quality food security information. The institutional, technical and financial challenges are daunting, but the potential returns, in terms of effective information systems for fighting poverty and hunger, are enormous.

1. INTRODUCTION

The purpose of this paper is defined by the project's Terms of Reference: ***to produce a policy paper which outlines best practice in the use of livelihoods analysis in influencing policy issues in relation to food security and the measurement of hunger.*** The target audiences include: FIVIMS Secretariat, IAWG members and partners; and all other actors interested in food insecurity measurement. The paper aims to achieve four objectives:

i) to outline key elements of livelihoods approaches that are relevant to food insecurity measurement at the national, sub-national and international levels;

ii) to identify practical experiences that demonstrate how livelihoods approaches to food insecurity measurement can lead to improved decision-making at the national level;

iii) to explore how local-level livelihoods-based analysis can contribute to decision-making concerning food insecurity and poverty reduction; and

iv) to draw out lessons for FIVIMS on what can be done to maximise the opportunities presented by livelihoods approaches regarding food insecurity measurement.

As can be seen [in Box 1], this paper therefore contributes directly to the mandate, activities and core objectives of FIVIMS.

Box 1. ***FIVIMS: An international instrument for food security measurement and analysis***

FIVIMS – 'Food Insecurity and Vulnerability Information and Mapping Systems' – is a network of systems that assembles, analyses and disseminates information about people who are food-insecure or at risk (i.e. vulnerable to food insecurity). FIVIMS was established following the World Food Summit in 1996, with three core objectives:

1. international comparative monitoring of undernutrition and global food insecurity indicators to evaluate progress towards achieving global food insecurity targets (including, principally, halving the number of undernourished people by 2015) and further targets included in the Millennium Development Goals;
2. promotion of best practice across agencies in food insecurity and vulnerability information and mapping at the country level;
3. facilitating the coordination of food insecurity measurement and response at the national level and improving performance of national food security information systems.

Although FIVIMS has a small Secretariat based at FAO and most data collection and analysis activities are undertaken by FAO technical divisions, FIVIMS is an inter-agency initiative with over 25 members including multilateral, bilateral and non-governmental organisations. At the global level, FIVIMS provides estimates of undernutrition and monitors a range of global food security indicators. At the national level, it undertakes activities to improve national food security information systems.

Source: Hussein, 2002

This paper is structured as follows. Section 2 introduces livelihoods concepts and identifies issues of relevance for FIVIMS. Section 3 considers some recent developments in household surveys and approaches to poverty measurement and mapping that have application to food security monitoring. Section 4 considers how nutrition surveillance could both draw on, and be integrated with, livelihoods-based approaches to food security monitoring. Section 5 outlines a proposal for a 'FIVIMS Integrated Livelihood Security Information System', drawing together early warning systems, GIS mapping and farming systems research, as well as poverty and nutritional data into an integrated system that will meet the specific needs of FIVIMS, as well as contributing more broadly to holistic and responsive food security information systems.

2. LIVELIHOODS AND FOOD SECURITY[2]

2.1. Defining livelihoods approaches

The usefulness of livelihoods-based approaches to development has been recognised since the late 1980s, when the concept was popularised by international agencies such as the World Commission on Environment and Development (WCED) and prominent researchers such as Robert Chambers and Gordon Conway (Chambers and Conway 1992). The growing popularity of livelihoods as an analytical construct during the 1990s paralleled several 'progressive' trends in development thinking, including shifts towards participatory, 'people-centred' and holistic approaches to poverty analysis and development interventions. This popularity culminated in several development agencies – including donors like DFID, UNDP and WFP, and NGOs like CARE and SC-UK – developing livelihoods-based frameworks to inform their operational work.[3] These frameworks have been applied, to varying degrees, to problem assessment and analysis, programme design, even project implementation and evaluation (Carney *et al.* 1999; Hussein *et al.* 2002b).

Although many researchers and agencies have developed their own definitions of livelihoods and related concepts, most of these definitions share common characteristics, including a focus on various categories of *assets* (rather than *income,* the standard focus of poverty analysis) and the *institutions* that influence individual or household access to these assets. Some definitions include an explicit focus on livelihood *strategies* ('how the poor make a living') such as agricultural intensification, livelihood diversification, or migration (Scoones 1998). A good working definition of livelihoods is provided by Frank Ellis (2000:10):

> "the assets (natural, physical, human, financial and social capital), the activities, and the access to these (mediated by institutions and social relations) that together determine the living gained by individual or household".

Later work indicates that it might be useful to add political capital as this can be a key asset defining livelihood activities, access to resources and opportunities.

Livelihoods approaches reflect the diverse and complex realities faced by poor people in specific contexts. Unlike many 'conventional' approaches to poverty assessment and project design, a focus on livelihoods requires incorporating an understanding of the ways in which various *contextual* factors – political, institutional, environmental as well as macroeconomic – either constrain or support the efforts of poor and vulnerable people to pursue a viable living. The 'sustainable livelihoods approach' (SLA) also emphasises the ability of people to maintain a viable livelihood *over time,* whereas conventional poverty analysts tend to measure income or consumption at a point in time.[4] Another virtue of livelihoods approaches is that they attempt to build on the strengths already present in people's existing assets, strategies and objectives, rather than 'importing' blueprint development models that often ignore or even undermine these positive features.[5]

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[2] This section draws on Karim Hussein's paper – 'The Relevance of Livelihoods Approaches to Food Insecurity Measurement' – which is available as a stand-alone output of this project.

[3] These frameworks are discussed later in this paper, and are summarised in Helen Sida's paper on 'Agency Approaches to Monitoring Food Security and Livelihoods'.

[4] According to Ian Scoones: "A livelihood is sustainable when it can cope with and recover from stresses and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Scoones 1998:5).

[5] A successful example of how the assets of the poor can be built on is the Grameen Bank model of microfinance, which utilises the social capital (trust and mutual knowledge) within poor communities to establish borrower groups, whose members stand as 'social collateral' for each other to access loans.

On the other hand, because of its disaggregated, participatory and holistic nature, livelihoods analysis presents serious methodological challenges to researchers and decision-makers. As with participatory approaches more generally, livelihoods analysts face enormous difficulties in terms of 'scaling up' qualitative community-level information to aggregated (regional or national level) data, in a form that decision-makers find useful for planning interventions. This is a key concern that must be addressed if livelihoods approaches are to be relevant for food security monitoring, and specifically for extending FIVIMS analysis to the sub-national level.

2.2. Food security and livelihoods approaches

Early definitions of food security focused on aggregate food supplies at national and global levels, and analysts advocated production self-sufficiency as a strategy for nations to achieve food security. The 1974 World Food Conference defined food security as: "availability at all times of adequate world supplies of basic food-stuffs" (United Nations 1975). Just 12 years after the World Food Conference, however, the World Bank proposed a definition of food security which remains current today, that broadened the emphasis from food *availability* to include *access* to food, and narrowed the focus from the global and national to households and individuals: "access by all people at all times to enough food for an active, healthy life" (World Bank 1986:1). Since the 1980s, it has been recognised that the achievement of food security requires paying attention to both supply-side and demand-side variables.[6]

The opposite of food security is food insecurity – lack of access to an adequate diet – which can be either temporary (transitory food insecurity) or continuous (chronic food insecurity). These concepts underline the temporal dimension of food security – a feature that it shares with 'sustainable livelihoods', which are essential for ensuring household food security and reducing vulnerability to food insecurity.

FIVIMS, similarly, defines food security as a state that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food which meets their dietary needs and food preferences for an active life. Food insecurity, when people lack this, is seen as due to unavailability of food, insufficient purchasing power, inappropriate distribution, or inadequate utilisation at household level. Vulnerability is also seen to be key, referring to factors that place people at risk of becoming food insecure or reducing their ability to cope.

It is clear from this brief overview that food security and livelihoods approaches share many common features that point to strong conceptual overlaps and, at the same time, distinguish these concepts from narrower notions such as income or consumption poverty. Definitions of food security and sustainable livelihoods both emphasise well-being *over time;* both focus on *access* to food and incomes; and both demonstrate a concern with *risk and vulnerability.* Analytically, household food security and the sustainable livelihoods approach each require a *disaggregated* analysis, as well as an analysis of livelihood *diversification* (agriculture and non-agricultural activities). These close linkages suggest that livelihoods approaches might provide a practical toolkit for linking the analysis of food insecurity with a multi-dimensional and people-centred analysis of poverty – looking beyond income and consumption levels to include an assessment of people's strategies, assets and capabilities. The potential for a livelihoods-based analytical framework to generate improved approaches to poverty and food security measurement is very promising.

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[6] On the supply-side, for instance, food supplies can be secured through agricultural production, commercial imports or food aid – the key components of the FAO's 'food balance sheets'. On the demand-side, food has to be safe, nutritious, and appropriate to meet food preferences.

2.3. Practical applications of livelihoods approaches in food insecurity measurement and FIVIMS

In principle, FIVIMS is broadly defined to include any information system – or network of systems – that monitors the situation of people who are poor or vulnerable to transitory and/or chronic food insecurity. Relevant information systems might include famine early warning systems, nutrition and consumption surveys, agricultural surveys, environmental assessments, household budget (income and expenditure) surveys, poverty mapping, and vulnerability assessments. At the national level, FIVIMS can also draw usefully on 'food balance sheet' and population census data. At the level of national and global food insecurity monitoring systems, however, livelihoods approaches have several obvious limitations, related to:

- the demand by policy-makers for information that is aggregated into summary statistics and national averages;
- the costs of scaling up resource-intensive local-level data collection methods;[7]
- incompatibility between livelihoods data and standard national information systems.[8]

It follows that the relevance of livelihoods approaches is most apparent at the sub-national level, since the *distribution* of food insecurity can only emerge from an analysis that generates information disaggregated by geographic areas (e.g. agro-ecological zones or 'food economy zones') or demographic categories ('vulnerable groups' such as female-headed households). Another advantage of disaggregated sub-national analysis is that it allows a closer exploration of *causality.* If certain livelihood groups are identified as being at above average risk of food insecurity, the explanation frequently lies in the low returns or high vulnerability of the livelihood activity being pursued, which in turn suggests appropriate policy interventions to address this group's food insecurity – raising returns, reducing vulnerability, or encouraging diversification away from that source of livelihood.

The argument that livelihoods-based approaches have less precision and utility as the level of analysis moves away from households to national and international levels implies that they are less relevant to FIVIMS' work in generating global comparisons and monitoring cross-national trends in food insecurity. Others assert that livelihoods approaches have strong potential for scaling up micro- or meso-level analyses and assessments. In fact, livelihoods approaches are relevant to national and sub-national food security measurement in at least two ways:

- *Scaling up local-level data* from district, regional and other sub-national analyses of food insecurity, to inform national and international assessments. Methodologies such as household food economy and livelihoods assessments are particularly relevant.[9]
- *Disaggregating national-level data* according to sub-national differences; for example, according to livelihoods systems.

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[7] As will be seen, this critique is often levelled against fieldwork-based methodologies such as SC-UK's Household Economy Approach, which demands high levels of technical expertise as well as being very time-consuming to implement properly.

[8] Typically, sectoral databases such as Health Information Systems are organised around administrative divisions (e.g. districts), whereas livelihoods-based approaches often construct their own units of analysis, such as 'food economy zones', which do not correspond to these. Living Standards Measurement Surveys (LSMS) are slightly different due to their household focus; however, the overall aim remains to produce national averages and they are less useful in terms of producing information needed for undertaking interventions at the district level.

[9] See Save the Children, 2000; and Hussein (2002a).

Food insecurity measurement needs to examine *both* of these perspectives. The challenge remains to identify mechanisms for effectively combining the two perspectives in order to qualitatively improve food security measurement processes. Livelihoods analysis is also likely to be key to interpreting the relationship between short- and long-term phenomena that affect food security, particularly at the national level.

One leading approach that is discussed later in this paper, the Household Economy Approach (HEA) developed by Save the Children UK, has been applied across a number of countries in east and southern Africa with considerable success (Save the Children 2000). The utility of incorporating a livelihoods approach into food insecurity analysis and measurement is currently being examined by FIVIMS. Drawing on issues emerging from recent innovative work in Kenya (see Wilcock, Schmidt and Riches, 2001), initial livelihoods work with FIVIMS might usefully focus on:

- capturing a consensus on best practices at a district/regional level;
- examining issues related to scaling up district- or regional-level and national-level work that has yielded positive and cost-effective results;
- exploring potential relationships between poverty and livelihoods monitoring
- drawing explicit linkages between nutritional surveillance and livelihoods approaches.

Linkages between poverty and livelihoods are explored in Section 3, while linkages between nutritional surveillance and livelihoods approaches are examined in Section 4. It is important not to forget that the institutional context is crucial, if data collected, analysed and disseminated by information systems are to generate timely and appropriate responses by decision-makers. The problems of unintegrated data collection systems and poor linkages between data analysts and information users is considered in more detail in Section 5, which offers some constructive ideas on ways forward for FIVIMS.

To take one example: nutrition indicator monitoring and nutritional surveillance systems at the national and sub-national levels provide data of enormous potential use for FIVIMS at the national and possibly global levels. However, case studies show that the existence of good nutritional surveillance information has not always produced an appropriate or timely decision on interventions to bolster food security. One of the factors explaining poor response has been the lack of an institutional framework setting out how information should be used and acted upon at the country level. To address this, it has been suggested that decision-makers at country level should be involved in the design of nutritional surveillance systems, ensuring that institutional linkages are established at set-up stage so as to maximise the likelihood of action in response to information. A second important principle is to adopt a more consultative and participatory approach to information gathering at local level and in analysis – ensuring that increased attention is given to the views of the food insecure in data collection, data analysis and identification of interventions. Finally, steps should be taken to strengthen demand for, and use of, nutrition data among food security decision-makers (Shoham *et al*. 2001).

2.4. Emerging issues and ways forward

FIVIMS is exploring ways in which livelihoods approaches may complement and inform other approaches to the measurement of food insecurity and vulnerability. Pilot work has been undertaken in Kenya and Bangladesh to identify ways in which FIVIMS might help the UN in its country-level assessment and planning exercises, particularly in obtaining information and focusing action on livelihoods and food security issues at the sub-national level. In June 2002, FIVIMS held an international 'scientific symposium', hosted by FAO, on 'Measurement and Assessment of Food Deprivation and Undernutrition'. FIVIMS is also analysing ways in which

SLA might be systematically incorporated in the estimation procedures used for determining and regularly updating the global number of undernourished people. FIVIMS has begun to explore how SLA can inform the sub-national collection and analysis of data on food security and vulnerability. However, challenges remain in terms of integrating the diverse forms of local livelihoods data that exist into aggregate level cross-country comparisons in such a way as to usefully inform policies and interventions (Hussein 2002a). Additional challenges to incorporating livelihoods approaches into food insecurity analysis at the global and national levels include:

- integrating local livelihoods data gathered by a range of agencies at the national level into central systems based on comparable summary indicators and national averages used for making global comparisons;
- at the level of national information and mapping systems: financing the scaling up of resource-intensive methods used principally at district level; developing satisfactory methods to aggregate information while retaining relevant livelihood information; developing ways for livelihoods data to feed into current national statistical and information systems (especially sector-specific efforts in agriculture, health and nutrition and to some extent poverty monitoring).

Nonetheless, incorporating a livelihoods approach to the analysis of food security would have numerous advantages.

1) Livelihoods principles could inform ongoing efforts to improve FAO's 'undernourishment' measure.
2) Livelihoods analysis can identify causal factors behind food insecurity and vulnerability among diverse vulnerable groups in different contexts.
3) It allows a more nuanced analysis to be incorporated into nutritional surveillance.
4) It would also highlight the importance of micro-macro linkages, drawing lessons from local-level experiences to inform sub-national and national-level decision-making.
5) It should move food security analysis and action from a narrow focus on agriculture towards a range of interventions to support diversified, agricultural and non-agricultural livelihood strategies.
6) It would highlight the need for food security analysis to begin by understanding people's experiences of hunger and the relationship between food insecurity and the constraints and opportunities to their existing livelihoods, prior to identifying interventions.
7) Livelihoods approaches would provide a useful aid to disaggregating national-level data, giving rise to enable more sensitive and differentiated policies and interventions.

This discussion highlights a number of issues that need to be explored in order to identify the practical relevance and contribution of livelihoods approaches to food insecurity measurement and FIVIMS.

- Develop capacities for in-country monitoring or collation of information on changes in food insecurity in a particular region or to specific vulnerable population groups, drawing on the monitoring systems of a variety of agencies (e.g. country-level WFP Vulnerability Assessment and Mapping (VAM) units or NGO Household Economy Analyses). This information then needs to be reconciled to existing quantitative data, providing a bridge between assessment and action (see Haddad *et al.* 2001).

- Establish operational ways to link sub-national livelihoods analyses into existing national level statistical systems and surveys (e.g. World Bank Living Standard Measurement Surveys (LSMS), FAO vulnerability and poverty profiles; livelihoods monitoring). Issues to consider would include:
  - integrating data and perspectives from sub-national population groups (drawing on qualitative assessments);
  - comparing experiences of doing this in settings where greater or lesser numbers of institutions are involved, or degrees of diversity differ.
- Review links and synergies between FAO's DFID-funded Livelihood Support Programme and FIVIMS.
- Review of whether the shift to a livelihoods orientation requires a shift in the way that FAO collects food security data (e.g. moves to collect data on all household sources of income or to more participatory, community-led data collection and analysis).
- Examine the relevance of the five food security data collection methods discussed at the June 2002 'scientific symposium' at country level, within a livelihoods perspective.[10]
- Analyse ways to scale up sub-national multi-sectoral analyses to be useful to sectorally organised national governmental statistical and decision systems and establish ways to operationally link diverse sub-national livelihoods analyses into existing state surveys. Consider appropriate approaches to aggregation of livelihoods data from sub-national through to national and international levels.
- Establish ways to draw in vulnerability assessment and profiling as a tool to link food security, poverty and vulnerability issues.
- Examine the feasibility of integrating livelihoods approaches (e.g. HEA) into national government department resource allocation and operating procedures.

2.5. Conclusion

Livelihoods approaches can provide an effective and practical vehicle for linking rights-based approaches, measurement and action to reduce food insecurity and vulnerability. In particular, these approaches are relevant because they provide:

- a way into addressing the realities of sub-national variation and diversified livelihoods;
- a tool to improve indicators of food insecurity by drawing on contextual realities;
- a framework for the analysis of food insecurity in any given context and incorporating vulnerability and policy impacts into the analysis;
- a framework that links poverty and food insecurity with issues related to social capital, empowerment and participation.

Incorporating livelihoods approaches into food security measurement is a strong complement to a rights-based approach to food security, providing an analytical framework on which to build appropriate operational interventions to eliminate hunger in diverse contexts. Building on core principles of participation and empowerment, they complement an approach centred on enabling the food insecure to demand their rights, entitlements and access to food.

[10] The five methods are: the FAO measure of undernourishment; household expenditure surveys; food intake surveys; anthropometric status; and qualitative measures.

3. HOUSEHOLD SURVEY DATA[11]

By 1998, household surveys had been conducted in more than 110 developing countries, of which 60 had comparable data for two or more periods of time (World Bank 1999). However, they remain an under-exploited resource in the assessment of food insecurity and vulnerability. This section examines how household survey data may be used for national and sub-national FIVIMS. After a brief survey of different types of household surveys, their advantages and disadvantages for food security analysis are analysed. The section concludes with an account of some relevant recent developments in the analysis of household surveys.

3.1. Types of household surveys

The types of household survey conducted in developing countries vary, from large-sample single questionnaire surveys that aim to collect timely information on selective indicators of living standards, to specialist multi-topic longitudinal surveys, that administer multiple-round questionnaires to relatively small purposive samples. It is useful to distinguish here between (1) *donor-funded*, (2) *nationally-owned and implemented*, (3) *specialist* household surveys.

3.1.1. Donor-funded household surveys

Since 1979, the World Bank, in conjunction with national statistical offices, has fielded Living Standard Measurement Surveys (LSMS) in 29 developing and transition economies.[12] LSMS use a combination of household, community, prices and (sometimes) facilities questionnaires to collect information on many different topics connected with household welfare (Grosh and Glewwe 2000). Questionnaires are administered to nationally representative samples of 2,000 to 5,000 households, which yields fairly precise estimates for the country as a whole, urban and rural areas, and major administrative regions. Although LSMS capture many dimensions of living standards, they are too complicated and expensive to repeat on a regular basis, and are typically only conducted at 3-5 year intervals.

Simpler and cheaper survey instruments have therefore been developed to allow more regular monitoring of living standards. These include the 'Priority Surveys' developed by the Social Dimensions of Adjustment project, and more recently the 'CWIQ' – Core Welfare Indicators Questionnaire. The Priority Survey was a relatively simple multi-topic household questionnaire, which aimed to provide a quick indication of the location and socio-economic profiles of different household groups at annual intervals. The CWIQ has a similar focus but monitors a small set of living standards indicators together with information on household access and utilisation of key services (water, schools, clinics). The CWIQ's single-visit questionnaire takes just half-an-hour to administer, with another 15 minutes if child anthropometrics are included.[13]

Another donor-funded survey is the Demographic and Health Survey (DHS), which has been conducted (with USAID funding) in 68 developing countries and transition economies since 1984, with the objective of providing data for monitoring and impact evaluation in the areas of population, health and nutrition. The DHS are large (5,000 to 30,000 households), nationally

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[11] This section draws on Bob Baulch's contribution to this project – 'Assessing Food Insecurity and Vulnerability using Household Survey Data' – which is available as a stand-alone paper.

[12] Albania, Armenia, Azerbaijan, Brazil, Bulgaria, Cote d'Ivoire, Ecuador, Ghana, Guatemala, Guyana, India (Uttar Pradesh and Bihar), Jamaica, Kazakhstan, Yugoslavia, Kosovo, Kyrgyz Republic, Morocco, Nepal, Nicaragua, Pakistan, Panama, Papua New Guinea, Peru, Romania, Russia, South Africa, Tajikistan, Tanzania, and Vietnam (www.worldbank.org/lsms/guide).

[13] Only one CWIQ survey, in Ghana in 1997, has been completed, though the results of surveys in Guinea Bissau, Mali, Mozambique, Rwanda and Senegal are pending. Others are underway or are planned in Benin, Burkina Faso, Guinea, Lesotho, Malawi, Mauritania, and Nigeria.

representative household surveys, which collect information on household characteristics, housing, education and employment. A second questionnaire on reproductive behaviour, contraceptive practices, child health and immunisation, and women's status is administered to women aged 15-49 years, and anthropometric data (height and weight) are also collected on children under 5 and women aged 15-49. Interim and follow-up surveys are sometimes conducted between regular rounds of the DHS for monitoring and impact evaluation purposes. From the point of view of poverty monitoring, it is important to note that while the DHS collects information on household assets, information on income or expenditures is not collected.

3.1.2. Nationally-owned and implemented household surveys

Some developing countries have implemented their own household surveys without the support of donors. These include India's National Sample Survey (since 1950), Pakistan's Household Income and Expenditure Survey, China's Rural and Urban Household Surveys, and Taiwan's Survey of Personal Income Distribution. The purpose of these surveys is usually to provide data on poverty and income distribution, and to assist in the compilation of national accounts or consumer price indices. Breaking down the data into useful sub-groups for poverty and vulnerability analysis (e.g. by livelihood categories) was not the intention. In many other countries, large-scale nationally owned surveys have developed from smaller donor-funded efforts. Examples include Indonesia's SUSENAS *(Survei Soscial Ekonomi Nasional*), Jamaica's Survey of Living Conditions, and Vietnam's Household Living Standards Survey.

These nationally-owned and implemented household surveys tend to focus on a smaller set of topics than an LSMS. In particular, either income or expenditure data (but not both) is collected as the key welfare measure, and few questions (if any) are asked about education and health. Also, they tend to have larger samples (the SUSENAS surveys a provincially representative cross-section of 75,000 Indonesian households), and access to the data tends to be more restricted than to that generated by donor funded surveys. In China and India, for example, only summaries of the frequency distribution of data are made available to non-Government agencies. This presents a challenge to the use of these surveys for food security monitoring, since unit record household-level data are always more valuable for sub-national analysis.

3.1.3. Specialist household surveys

In addition to nationally representative household surveys conducted by national statistical offices, with or without the assistance of donors, specialist household surveys have been conducted in many countries. Of special interest to food security analysts are multi-round panel surveys, which visit the same households several times over a period of years. These include IFPRI's Household Food Security Panel in Pakistan, 'Family Life Surveys' in Malaysia and Indonesia, ICRISAT's agricultural panel survey in South India, the Ethiopian Rural Household Survey, a resettlement panel in Zimbabwe, and Save the Children's 'Young Lives Project', which is surveying a cohort of young children born in 2000 in Ethiopia, India and Vietnam. Because of their time dimension, such panel surveys can be extremely useful in the analysis of issues to do with vulnerability. On the other hand, each specialist survey has its own thematic focus, so some panels will be more useful for food security monitoring purposes than others.

3.2. Advantages and disadvantages of household surveys

Geographic coverage: Most household surveys have well-specified sampling frames, which allows precise statements to be made about the surveyed populations. For many of the donor-funded and nationally-owned household surveys mentioned above, the sampling frame is the latest Census, which ensures national representativeness. On the other hand, since censuses are usually conducted every 10 years, they rapidly become out of date. There may also be some sub-groups of the population (street-dwellers, refugees, migrants) who are not included in censuses, which is significant because these excluded groups are

often more food insecure or vulnerable than the remainder of the population. Household sample surveys are carefully designed to ensure statistical significance of certain key variables at specific levels of disaggregation, quantified by confidence intervals that show the precision of the survey estimates. These can be extremely useful in, for example, testing whether the poverty headcounts of two adjacent states are statistically different from one another, before deciding on the level of transfer from central government. On the other hand, the sample sizes used for nationally representative household surveys are generally not large enough to disaggregate the data into small subgroups – say, down to district level – with any reliability. It is, for example, quite common not to be able to provide precise statistics for key variables such as poverty or access to clean water for districts, since these calculations will be based on just 50 or 100 households, and therefore have extremely wide confidence intervals. This also means that it is not possible to make confident statements about variables such as maternal mortality, which is a relatively rare event (one of the highest rates is Ethiopia's, at 14 per 1,000 live births) and thus requires larger samples in order to generate robust estimates. In such cases, administrative records or rapid appraisal techniques are often used for data collection and policy-making instead.

Recall and measurement error: Total expenditure and expenditure on individual food items are of great interest to food security analysts. Household surveys provide detailed information on different components of household expenditure, from which total expenditures can be calculated and (using conversion tables) calorie intakes can be estimated. These estimates can be used to estimate Engel curves, demand systems and various elasticities, and to characterise the food consumption behaviour of different socio-economic groups. It is important, however, to recognise that all estimates of expenditure suffer from both recall and measurement errors, and failure to take account of these in assessing food insecurity and vulnerability can lead to biased results and incorrect inference. The use of short recall periods (such as one week) for frequently consumed items, such as food, invariably results in higher estimates of expenditure than when longer recall periods (such as a month) are used.[14] As the recall period increases, so food consumption estimates are biased downward by respondents forgetting small purchases. On the other hand, short recall periods tend to overestimate the variance of expenditures, because some goods are only purchased periodically. Many people will spend nothing on food (and also receive no income) during any particular day or week. In such cases, grossing-up daily or weekly expenditures to annual expenditures by simply multiplying by 52 weeks or 365 days is highly problematic. Most surveys now adopt designs which trade-off potential recall error from long periods against increased potential variance from short periods. For frequently purchased items such as food, recall periods of a week or two weeks are often used, while for large indivisible items (such as consumer durables), annual recall periods are used. In studies where intra-annual variations are of interest, and where seasonality of food production and prices is significant, it is especially important that recall periods are chosen carefully and are correctly aligned to the agricultural calendar.

Intra-household distribution issues: One serious drawback of household surveys is that they do not allow enumeration of intra-household distribution of key food security variables, such as expenditure or calorie consumption. This is for practical reasons such as the impossibility of attributing individual expenditures for jointly consumed foods, or of weighing and recording the amount of food each household member consumes. Instead, some indication of intra-household distribution might be derived from outcome indicators – for instance, height-for-age and weight-for-height of children can serve as proxies for how much food they receive.

[14] The same arguments about recall and measurement error apply to food consumption surveys. It is easier for respondents to recall what they ate yesterday than last week, especially for snacks between meals, hence the popularity of a 24-hour recall period for food intake surveys.

Topic coverage: Most household surveys have certain common elements, such as a household roster, collection of information on the education and occupations of household members, and detailed questions on expenditures and/or incomes. However, it is often the case that (for reasons of either cost or ease of implementation) detailed information is not collected on many nutrition or health variables. Most LSMS-type surveys collect anthropometric data on children but not adults, while shorter survey instruments (such as Priority Surveys and the CWIQ) collect no information on anthropometrics at all. Many health professionals are also critical of the self-diagnosed health information (for example, occurrence of diarrhoeal disease) collected in conventional household surveys. Apart from the inherent dangers of self-diagnosis, responses have been shown to be highly susceptible to the type, level of detail and recall periods of the questions asked. Information on immunisation, micronutrient deficiencies, blood haemoglobin, and other health data are only collected by the DHS and other specialist household surveys. There are broader aspects of well-being and ill-being, intimately connected with vulnerability, on which it is not feasible to collect information within the context of a closed-form questionnaire survey. For example, issues connected with powerlessness, lack of physical security, crime and corruption require in-depth, open-ended discussion. To study attitudes, perceptions and motivations, semi-structured interviews, focus group discussions and participant observation methods are more appropriate.

Analytical capacity: If maximum use is to be made of household survey data, it is important to have well-trained analysts available in-country. Making sense of the multiple records and thousands of variables generated by a typical nationally representative household survey is analytically much more demanding than writing up the results of a village-level participatory survey. Knowledge of statistics, familiarity with the relevant computer software, and – most important – skill in identifying key policy questions that are tractable are needed. Until recently, the number of analysts trained to this level in many developing countries was small. Technical assistance from overseas and substantial delays were often involved in the processing of household survey data. One response to such analytical capacity constraints has been to develop household survey modules that are quick and easy to process. The CWIQ, for example, uses scannable questionnaires to avoid time consuming data-entry, and includes pre-written data validation and tabulation software. The aim is to allow preliminary tabulations of the principal results of most CWIQ surveys to be available to policy-makers within three months of completion of the household survey. Experience from Ghana and elsewhere indicates that is increasingly possible to deliver such timely analysis.

Limited time dimension: A final drawback of most household surveys that limits their usefulness for food security analysis is their short time dimension. With the exception of a few countries (e.g. China, India, Indonesia) with long-standing nationally-owned household surveys, only two or three comparable households surveys have been conducted in most developing countries. Furthermore, it is usually the case that only repeated cross-sections exists, so it is not possible to follow the welfare of the same households over time. Some techniques exist for estimating vulnerability measures using cross-sectional data [see Section 3.3], but these are still new and involve quite restrictive operational assumptions. The lack of time depth is a particularly severe drawback for the analysis of vulnerability, where it is important to be able to track the welfare of the same households over time. One common response is to field rapid appraisals or specialist panel surveys with small samples [as described in Section 3.1.3], with the aim of identifying sub-groups in the population that are especially vulnerable to different types of shocks.

3.3. Some recent developments in the analysis of household surveys

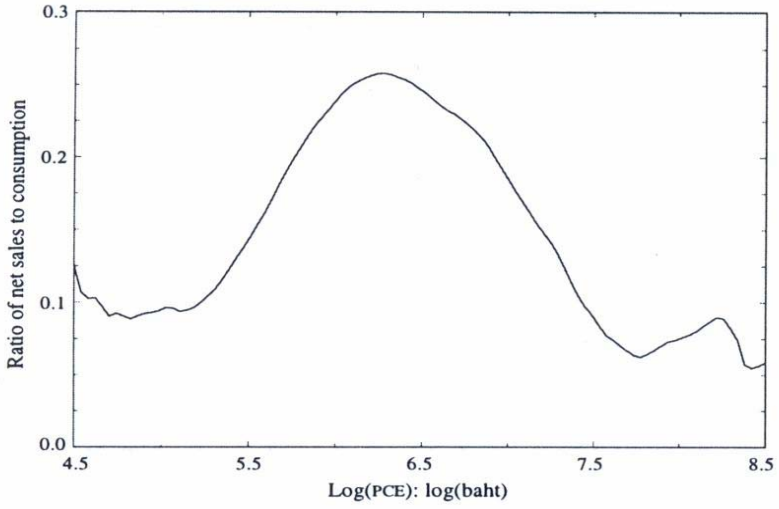
This section discusses four recent developments in the analysis of household surveys, that may be of particular use in analysing food insecurity and vulnerability. Although some of these

techniques have been in existence for more than ten years, they are still relatively rarely used in food insecurity analysis. With the growth of interest in issues of livelihood insecurity and vulnerability (see, for instance, the 2000/01 World Development Report), more effort is now being devoted to applying these techniques in developing countries. The release of more and more datasets from household surveys and censuses is assisting in this task.

3.3.1. Analysing the distribution impact of price changes

Price changes such as food price inflation, subsidy removals or tax increases are associated with increasing food insecurity and vulnerability for all food purchasers – urban consumers, landless labourers, even small farmers who are not self-sufficient in food production and depend on the market for part of the year. Deaton (1989; 1997) describes a methodology based on calculating 'net benefit ratios' for identifying which groups of households gain and which groups lose from policy changes that affect food and other prices.[15] Figure 1 illustrates how changes in the Thai Government's export tax on rice would affect different socio-economic groups, and shows that households in the middle of the expenditure distribution would benefit most from the increase in the domestic price of rice that a reduction in the export tax would create (a flat line would mean that all households benefited proportionately). The rural poor gain from a price increase, but not by much since although they grow rice, they consume most of what they grow, and some of them have to buy additional rice to meet their consumption needs. Wealthy households also benefit modestly because few wealthy rural households are rice farmers, although those wealthy households that do grow rice sell most of their crop. Thus it is farmers in the middle of the distribution, who have larger landholdings than the poorest farmers and have a surplus of rice to sell, who benefit most from an increase in the rice price.

Figure 1. ***Net Benefit Ratios for Rural Households in Thailand, 1981-82***



Source: Deaton (1997), based on Thai Socio-economic Survey of 1981-82

[15] For a detailed technical exposition, see Bob Baulch's stand-alone paper. For more on the impact of food price and subsidy changes, see Deaton (1997), Chapter 5. Other applications of this methodology include the cases of coffee and cocoa (Benjamin and Deaton, 1988) and food crops (Budd, 1993) in Côte d'Ivoire, and rice in Vietnam (Benjamin and Brandt, 2002).

3.3.2. Poverty and vulnerability mapping

A second development in the analysis of household surveys involves merging household and census data to generate high-resolution poverty maps. This technique has been developed in response to the need of many governments and donor agencies for information on poverty that is more spatially disaggregated than the estimates produced by conventional household sample surveys. The combination of the small-sample estimates of poverty produced by such methods with Geographic Information System (GIS) and other mapping software also produces a way of displaying information about the spatial distribution of ill-being that is much more accessible to policy-makers and other users than conventional statistical tables. Furthermore, overlaying maps of the geographic factors associated with poverty and vulnerability (such as terrain, agro-ecological zone, distance from major cities, or frequency of natural disasters) on a base poverty map, can be extremely helpful in identifying the causal determinants underlying the spatial distribution of food insecurity and vulnerability.

The basic approach to mapping poverty involves three steps (Hentschel *et al.*, 2000).[16] First, household survey data is used to estimate household welfare as a function of household characteristics such as household composition, education, occupation, housing, and asset ownership. Often per capita expenditure is used as the welfare measure. (Note that the household characteristics used must exist in both the household survey and the census and be useful in predicting household welfare.[17]) Second, census data on the same household characteristics are inserted into this equation, to predict household expenditures. Finally, the predicted expenditures for each census household are used to estimate the probability that each household is poor or not poor. These probabilities are then mapped using a suitable GIS or mapping package. To date, poverty maps have been constructed using this methodology in 10 countries: Brazil, Ecuador, Guatemala, Madagascar, Malawi, Mozambique, Panama, Peru, South Africa, and Vietnam (World Resources Institute, 2002). Efforts are underway by the CGIAR and World Bank to extend it to many more countries, including China, Ethiopia, Kenya, India, Indonesia, and Uganda.[18]

Since the major component of most poverty lines is the cost of acquiring an adequate number of calories, it is possible to map both poverty and food insecurity (interpreted as calorie deficiency) using these methods. This does not, however, appear to have been done in the above studies. Other applications of poverty maps involve the identification of the poorest communities for the distribution of food aid and/or food-for-work interventions (Cambodia), improving the targeting of public expenditures (Guatemala, Vietnam), and contributing to local-level decision-making (Brazil, Panama). When combined with appropriate GIS techniques, poverty maps can also be used to examine the relationship between poverty and vulnerability. In Vietnam, for example, it was found that the second poorest category of provinces were those with the highest incidence of storms and typhoons (Minot and Baulch, 2002). The extension of such techniques to other natural disasters, together with transportation networks, environmental shocks, and even industrial pollution offers great potential for understanding the geographic determinants of food insecurity and vulnerability.

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[16] It is important to distinguish between poverty maps constructed using this methodology, an application of small estimation theory, and the use of GIS or mapping software to produce a spatial representation of poverty and ill-being using existing variables.

[17] Some applications of this methodology have also used additional geographic variables from geographic databases in predicting household expenditures (see Bigman and Fofack, 2000).

[18] A review of poverty mapping efforts by the World Resources Institute (2002) recommended that every country should map the distribution of its poor within the next ten years, and that the international community needs to provide financial and technical assistance to develop long-term strategies and capacity to carry out poverty and vulnerability mapping in the future.

3.3.3. Assessing household vulnerability to poverty

Several recent studies have developed and applied quantitative measures of vulnerability, defined as the risk that a household will face consumption poverty in the near future. Although the type of data and the methodology they employ differs, they each estimate vulnerability to future poverty using a measure of the variability of household expenditures, without directly observing the household's current level of vulnerability. Pritchett, Suryahadi and Sumarto (2000) estimate this vulnerability measure using panel data from two waves of Indonesia's "100 villages survey" of 1997 and 1998. This period contains 8,000 households and spans the worst effects of the East Asian crisis and the collapse of the Rupiah. They found that 50% of their sample was vulnerable to poverty, even though only 20% of the population was defined as poor in the first year. This confirms that "the poor at any point in time are only a fraction of those who must worry about, and struggle to avoid, falling into poverty".

A related paper by McCulloch and Calandrino (2002) applies the same technique to panel data from Sichuan, the most populous province in China, between 1991 and 1995. They find that vulnerability was highest for those households in the lowest income and consumption quantile. But households in Sichuan were found to be vulnerable to falling into poverty even when their average income is well above the poverty line. For example, the vulnerability of households in the third income quantile was 13%, compared to 60% for the poorest quantile.[19]

Chaudhuri *et al.* (2001) calculate the same poverty measure, using cross-sectional data from the mini-SUSENAS in Indonesia in December 1988. They find that while, at the national level, 23% of the Indonesian population is poor, 45% of the population is vulnerable to falling into poverty in future. Their estimates also show that the highly vulnerable are disproportionately rural, are most likely to live in remote areas, and to live in households whose heads have no schooling. However, in contrast to conventional static poverty profiles, no clear associations emerge between occupational status of the household head and households' demographic characteristics. Access to clean water is associated with a sharp drop in household-level vulnerability. For rural and poorly educated households, the main source of vulnerability to poverty is their low consumption prospects; whereas for urban and more educated households, vulnerability stems primarily from the volatility of their future consumption streams. Chaudhuri *et al.* argue that this highlights the need to distinguish between poverty prevention programmes and poverty alleviation programmes, as each should target different population sub-groups.

It should be noted that some of the assumptions required to estimate these 'vulnerability to poverty' measures (especially using cross-sectional data) are quite restrictive. Nonetheless, the computation of such measures offers considerable potential to integrate the analysis of household-level poverty and vulnerability, and how their correlates differ. Furthermore, the mapping of such vulnerability using GIS software allows analysis of the spatial distribution of vulnerability, although at a more aggregated level than for the poverty maps discussed above.

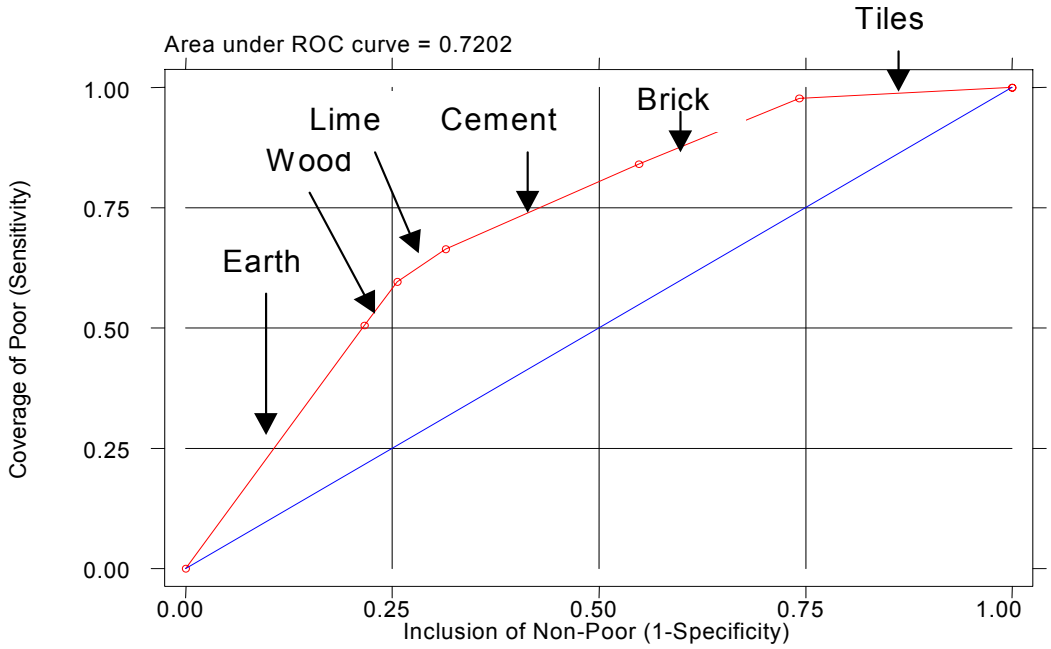
3.3.4. Identifying proxy indicators of poverty

A final recent development is the development of techniques to identify proxy indicators of poverty from household survey data. This literature stems from the desire of governments and donors agencies to measure poverty more frequently and at a more disaggregated level than the periodicity of most household surveys allows. In some cases, there is also a desire to target anti-poverty interventions (e.g. food aid distribution, access to micro-credit) using such proxy indicators of poverty.

[19] The poverty headcount income varied between 22% and 28% over this period.

Wodon (1997) and Baulch (2002) propose the use of a non-parametric technique – Receiver Operating Characteristics (ROC) curves – to assess the accuracy of different proxy indicators of poverty. A ROC curve shows the ability of a test to distinguish correctly between two states or conditions (such as poverty and non-poverty, or food insecurity and food security). Consider the case of a proxy indicator sometimes used to identify poverty in the field: floor type. Figure 2 shows an example of a ROC curve drawn from household survey data from Vietnam.

Figure 2. ***ROC Curve for Floor Types in Vietnam***



The six segments of the curve correspond to the six different types of floor observed. The vertical axis shows the extent to which different floor types allow one to correctly classify poor people as poor (which is the test's 'sensitivity') using an absolute poverty line based on per capita expenditures. The horizontal axis, read from right to left, shows the extent to which different floor types, which have been ordered by their likely association with poverty, allow non-poor people to be correctly identified (which is the test's 'specificity'). In order to show the trade-off between coverage of the poor and leakages to the non-poor, the usual format for a ROC curve is to plot 'sensitivity' against '1- specificity'. Consider the first and lowest segment of the curve, which corresponds to people living in houses with earth floors (some 32% of the total population). If all people living in houses with this simplest type of flooring were classified as poor, then just over half (51%) of poor people would be identified. However, over one-fifth (22%) of non-poor people also live in households with earth floors. Now consider the second segment of the ROC curve, which corresponds to wooden floors. If all people living in houses with earth and wooden floors (38% of the population) were considered poor, the percentage of the poor covered would increase to about three-fifths (59%), but at the expense of around a quarter of non-poor people also being classified as poor. As higher quality floor types (made, respectively, of lime, cement, bricks or tiles) are successively included, so the coverage of the poor increases but at the expense of more and more non-poor people being wrongly included.

Several additional points can be made using this illustration. First, as shown in Table 1 below, choosing the categories (earth+wood) which correspond to the highest percentage of correctly classified poor and non-poor people is not unambiguously the best cut-off. Some policy-makers might argue that it is better to err on the side of caution and also include those living in houses

with lime floors as poor, in which case two-thirds of poor people would be correctly classified. On the other hand, expenditure 'hawks' who were keen to exclude as many people as possible from programme benefits might argue for only those living in houses with earth floors, in which case leakages to the non-poor would be minimised. ROC curves (and their accompanying tables) provide a useful way of summarising this trade-off.

Table 1. ***Trade-off between Coverage of the Poor and Inclusion of the Non-Poor***

Type of Floor	**Coverage of Poor** (Sensitivity)	**Inclusion of Non-Poor** (1-Specificity)	**% Correctly Classified**
Earth	50.5%	21.7%	67.9%
Earth + Wood	59.6%	25.6%	68.8%
Earth+Wood +Lime	66.4%	31.4%	67.8%
Earth +Wood+Lime+Cement	84.1%	54.8%	59.7%
Earth+Wood+Lime+Cement+Brick	97.7%	74.3%	52.6%

Source: Baulch (2002)

Second, ROC curves can be linked to the Type I and Type II errors familiar from conventional statistical hypothesis testing (known as 'false positives' and 'false negatives' in epidemiology and medicine) as follows. Sensitivity is 1 minus the probability of a Type I error (incorrectly classifying a poor households as non-poor) while 1 minus the specificity of a test is the same as the probability of a Type II error (incorrectly classifying a non-poor household as poor).

Furthermore, it is possible to improve predictive accuracy by combining several different proxy indicators together. A number of previous studies have proposed different methodologies for producing such a composite indicator (usually in the context of targeting an anti-poverty alleviation). These include using regression analysis to predict per capita expenditures (Grosh and Baker, 1995), linear and quadratic programming (Glewwe, 1992; Ravallion and Chao, 1989); principal components (Zeller *et al*., 2001); and stepwise Probits (Baulch, 2002). In each case the idea is to identify a parsimonious list of variables which, when combined, predict the probability that a household is poor with the greatest level of accuracy. Baulch (2002) for example, shows that a stepwise Probit can be used to identify and compute a composite poverty indicator for rural areas in Vietnam involving just nine easy to collect variables.[20]

To date these methods have chiefly been used to identify proxies of poverty, but there is no reason why the same data and methods could not be applied to measures of food insecurity. Baulch (2002) also includes a ROC curve for 'food poverty' – defined as expenditure that is insufficient to acquire 2,100 Kcals per day – in Vietnam. Furthermore, these methods could also be used to identify proxies for the household 'vulnerability to poverty' measures described above. To distinguish between chronic and transitory food insecurity (or between chronic and transient poverty) would require household level panel data.

3.4. Conclusion

Conventional household surveys are an under-exploited resource in food insecurity and vulnerability analysis. It is important to note that, like qualitative surveys and participatory assessments, household surveys are very diverse. Though the LSMS, DHS, and increasingly

[20] These variables are: number of children and women in the household; whether the household head came from an ethnic minority; whether the household owned a television, radio or motorcycle; whether the floor of their main dwelling was made of earth; and if leaves, straw or wood was used as the main cooking fuel.

the CWIQ have introduced some standardisation, there is still enormous variance in the household surveys conducted in different countries. Most donor-funded and nationally-owned household surveys have sample sizes that do not allow for detailed geographic disaggregation, and also do not allow intra-year and intra-household issues to be addressed satisfactorily. On the other hand, they are relatively cost-efficient and (especially in the case of the CWIQ) timely instruments that allow precise statements to be made about certain variables (such as income, expenditure and other indicators of living standards) for the population represented by their sampling frames. Only in a few cases (usually involving specialist panel surveys) is there sufficient time-depth to undertake a direct examination of vulnerability at the household level. Food security analysts must therefore exercise a good deal of judgement concerning what could, and what should not, be done with any given household survey.

Nonetheless, recent developments in the analysis of household surveys offer many exciting – but still unexploited – opportunities for assessing and mapping food insecurity and vulnerability at sub-national level. These include: analysing the distributional impact of price changes, combining household survey and census data to produce poverty and vulnerability maps, estimating household vulnerability to poverty, and identifying proxy indicators of poverty and food insecurity. Since a high level of technical skill is usually required to apply these techniques they have not yet been applied in many developing countries. However, their more widespread use could add much to our understanding of who and where the food insecure and vulnerable are, and why they are vulnerable to poverty and food insecurity in the future.

4. NUTRITION INDICATORS MONITORING[21]

A recent review of nutrition indicators monitoring (NIM)[22] drew the following conclusions about the potential contribution of NIM to the development of national and sub-national livelihoods-based FIVIMS (Shoham, Watson and Dolan, 2001):

- Incorporating nutritional indicators (i.e. anthropometric measures and measures of micronutrient status) in FIVIMS would help to strengthen these systems, because nutrition outcome indicators are a direct manifestation of the broader problem of multi-sectoral development of which food insecurity is a critical aspect.
- An added advantage to FIVIMS is that nutritional indicators are already widely collected to inform nutrition-related programme design, programme management and evaluation, policy-making, and crisis management so that data are readily available. But careful consideration will need to be given to the appropriateness of different anthropometric indicators in relation to the demands of FIVIMS, since different indicators measure different things. If FIVIMS' requirement is for nutrition indicators that reflect acute food insecurity, then levels of child wasting or low adult BMI may be appropriate, whereas monitoring levels of stunting would better reflect the effects of chronic food insecurity.
- National FIVIMS should also be made aware of the limitations of nutritional indicator information in terms of measuring poverty and food security. National FIVIMS can support assessment approaches in-country which most accurately measure food security, i.e. include measures of food access and availability and support initiatives to integrate food security analysis with nutritional indicator monitoring.

This section will focus on the latter conclusion, i.e. initiatives to integrate food security analysis with NIM. The importance of integrating these two types of information is being increasingly stressed in a number of quarters (Chastre and Le Jeune, 2001; Mourey, 2002), for reasons that will become evident.

4.1. Understanding the factors which lead to malnutrition

Reliance on nutrition indicators monitoring alone will not provide an understanding of factors which are determining current nutritional status or are likely to influence short-term nutritional trends. As a result, inappropriate interventions may be implemented.

Such criticisms of nutritional surveillance systems started to be voiced during the 1980s. It is now widely understood that nutritional status is determined by three immediate factors – food security, health and caring practices. These factors are in turn influenced by a number of underlying conditions, e.g. government policy, poverty, and land tenure legislation. Without an analysis of both the immediate and underlying causes of malnutrition (as set out in the UNICEF conceptual framework) it will not be possible to identify the most appropriate remedial action. Such analysis can only be carried out by integrating food security, health and nutritional data collection and analysis [see Case Study 1 and Case Study 2].

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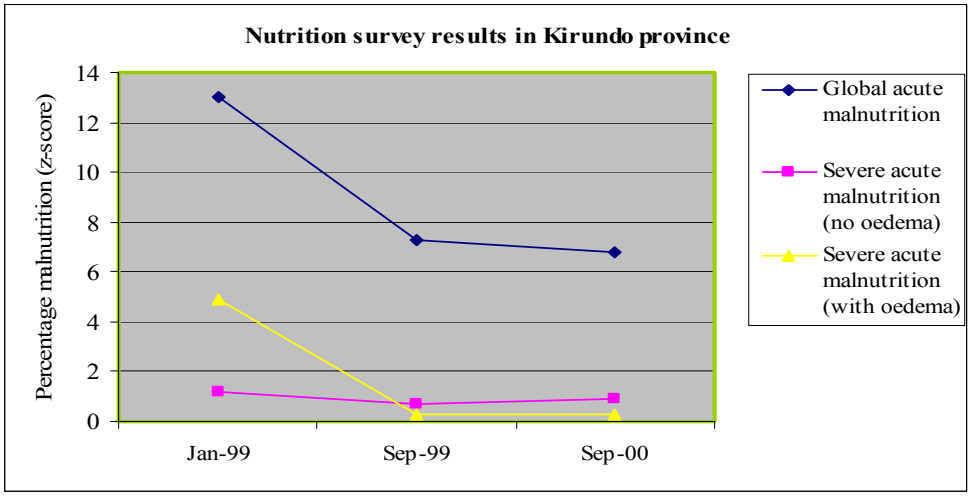
[21] This section draws on Jeremy Shoham's contribution to this study – 'A Case for the Integration of Nutrition Indicator Monitoring with National and Sub-national Livelihoods Based FIVIMS' – which is available as a stand-alone paper.

[22] The term 'nutrition indicators monitoring', as used in this paper, denotes the range of methods used to collect nutritional data, including nutritional surveys, growth monitoring at community level, and nutritional monitoring through sentinel site surveillance.

Case Study 1. ***Burundi, 1999-2000: Using combined data sources to predict food crises***

The majority of the people in the province of Kirundo in Burundi are engaged in agriculture and pastoralism. In the late 1990s, the province experienced three consecutive years of inadequate rainfall and reduced crop production. Three nutritional surveys and two Household Food Economy (HFE) assessments were conducted between January 1999 and January 2000. The HFE assessments covered the area most affected by the drought within Kirundo province: the Bugesera agro-ecological zone.

Results: The first survey showed higher overall levels of malnutrition, mainly reflecting a high prevalence of oedema, while subsequent surveys indicated a lower but stable prevalence of malnutrition with low levels of oedema.



HFE data showed that food and cash income from production is traditionally earned during the first 7-8 months of the year. This was the case in 2000, although the two main harvests were reduced compared to normal. The poorest households coped through reducing their food consumption (while protecting children's food intake), eating food they would not normally eat, and increased migration in search of labour. These strategies allowed households to cover their minimum energy requirements over the first 8 months of the year. The July 2000 HFE assessment anticipated for the remaining months of the year, an increased reliance on the labour market to access food and income (in an almost saturated labour market) and an increase in prices of basic commodities. Findings also indicated that the poorest households would be confronted with a food deficit over the last four months of the year, in the absence of interventions. During the last part of the year, when food security was expected to be at its worst, only half of the recommended food aid was distributed, due to shortage of food stocks in country. In addition, the area was hit by epidemics in November.

Analysis: Coping strategies protected the children's food intake, so their nutrition status had not been affected by September 2000. It is however possible that the nutritional status of poorest households had been adversely affected but that this was masked by the fact that the nutritional survey findings were aggregated for the whole population. The predictive value and seasonal dimensions of the HFE approach should be taken into account when planning a nutritional survey. It was justifiable to request a nutritional survey in September 2000, as at that stage it was not clear how much the households' reduction in food intake had impacted on children's nutritional state. However, the interpretation of results needed to take into account the fact that the survey was conducted just after the most food secure part of the year and just before food insecurity was expected to worsen.

In the case of the January 1999 survey the harvest that month had had little time to impact significantly on the nutritional status of children. The high rates of oedema may have been a function of changes in diet and/or the end of the food deficit period. Following the September 2000 survey, it is possible to predict that nutritional status would have worsened again (as happened in neighbouring provinces) given the food distribution problems and the epidemics that occurred. This example shows how nutritional surveys in the absence of food security analysis have a limited value in terms of prediction and planning interventions.

Source: Chastre and Le Jeune, 2001

Case Study 2. ***Sudan, 2000: Combined information leads to more appropriate interventions***

A nutritional survey was conducted in Darfur, Sudan, at the same time as a household economy assessment (HEA). The HEA predicted that there would be a food deficit at some point in the future, based on poor cereal production, high grain prices and low groundnut prices. The anthropometric survey showed a current high rate of global malnutrition, as well as signs of Vitamin A deficiency. The nutrition survey also indicated that there had recently been a measles epidemic. If the malnutrition rates had been interpreted in the absence of HEA data, the high rate of wasting may have been attributed mainly to food insecurity, as there had been a harvest shortfall, and the role of the measles epidemic as a major contributing factor may have been overlooked.

Source: Chastre and Le Jeune, 2001

4.2. Is nutritional status an early or late indicator of developing crisis?

Measurable changes in nutritional status may occur too late – both in a development and an emergency context – for appropriate intervention.

The effects of livelihoods shocks are moderated through a wide range of 'coping' or adjustment strategies adopted by households and individuals, who change their economic activities and social behaviour patterns. These coping processes themselves offer a promising approach to devising indicators that would give early warning of adverse trends and could also be related to specific welfare policy issues. In particular, it has been argued that emergency interventions should support livelihoods before nutritional status declines, in order to protect assets and prevent a longer-term increase in vulnerability. However, the livelihoods approach is rarely incorporated in a practical way into emergency needs assessment or response. Furthermore, there are no generic guidelines or policy clarity about how or when to respond to a threat to livelihoods. The challenge is to define and achieve consensus on 'levels of threat' to livelihoods that warrant an emergency intervention, and when to phase out these interventions (Young *et al.* 2001). There are many examples of situations where a focus on monitoring nutritional information has been misleading in terms of severity of situation – for instance, where low levels of wasting have masked severe erosion of livelihoods and an urgent need for livelihood support measures [see Case Study 3].

Case Study 3. ***Afghanistan, 2001: Low levels of wasting mask the erosion of livelihoods***

In March 2001 SC-US conducted a rapid assessment in drought affected southern Faryab in Afghanistan. This assessment confirmed the seriousness of the impact of three years of drought. SC-US conducted a nutritional survey at the beginning of April. The survey found only 7% wasting, which was close to normal. In contrast, the micronutrient status of the population was very poor, with reports of scurvy affecting people of all ages and both genders. The consumption of fruits and vegetables by most of the population had been minimal for several months. It appeared that grain stocks from previous years had made a significant contribution in mitigating the impact of the drought in the first two years. Selling livestock was an important coping mechanism employed by most people. However, few animals were left at the time of the survey and there were very few other economic opportunities, e.g. selling labour, or craftwork. People were resorting to risky coping strategies with very low returns such as selling land, displacement, begging and taking loans with high interest rates. According to respondents, labour migration to Iran is not a usual or preferred income source under normal circumstances, as the type of work available is considered physically difficult, degrading, and poorly paid. However, at the time of the survey almost every family in the district had sent at least one man to Iran. The adult female : male ratio had risen from 1.1 to 1.6. The impact of the drought was also reflected in changes in certain cultural and traditional values. In particular, many villagers reported that daughters were being given to marriage at lower than normal ages and at far lower prices than usual.

The main findings of the survey were:

- micronutrient deficiencies can occur in the absence of raised levels of malnutrition;
- signs of PEM have been a late indicator of the food crisis;
- coping strategies have allowed the population to consume sufficient calories but not sufficient nutrients;
- coping strategies employed have become increasingly desperate and socially disruptive, while at the same time undermining sustainable livelihood patterns;
- given exhaustion of coping strategies and considering poor harvest prospects, acute malnutrition could increase rapidly in the near future, and/or people will become displaced before they get malnourished.

The report concluded that the response should include interventions aimed at minimising the long-term risk to livelihoods and that systematic in-depth monitoring of the food security situation, especially the use of coping mechanisms, should be the key to trigger appropriate responses that are directed not only to saving lives but also to saving livelihoods.

Source: Assefa, 2001

However, it has also been argued that nutritional status itself is not intrinsically a late indicator in terms of behavioural responses to livelihood stress, e.g. coping strategies. Reduction in meal frequency appears to occur early on in response to drought-induced food shortages. As a result populations begin to lose weight (although they may not become malnourished). The difficulty for determining such changes is that nutritional surveillance systems may not be sufficiently sensitive to detect subtle changes in nutritional status at the population level. Furthermore, determining such changes requires good seasonal baseline data over a number of years. Nevertheless, there are examples of systems which have detected relatively small changes in population nutritional status early on in the development of food crisis conditions, e.g. in Botswana and Ghana (Shoham, Dolan and Watson, 2001). In conclusion, it may be stated that nutritional status is not intrinsically a late indicator of emerging food crisis, but that nutritional surveillance systems are often not sufficiently sensitive to detect and interpret small shifts in population level nutritional status.

4.3. Whose nutritional status should be measured?

A related issue concerns whose nutritional status should be measured. It has been observed among populations affected by food crisis that food consumption of children may be protected by adults forgoing meals. As a consequence the nutritional status of children may be the last to suffer. Also, in some contexts other groups may be more nutritionally vulnerable. For example, in Bosnia a number of nutrition and health surveys were conducted on the 'at risk' populations of the besieged enclaves in 1992 and early 1993. These surveys collected anthropometric data on under-fives and found no signs of malnutrition. However, nutritional surveillance systems set up to collect data in the same besieged enclaves at the end of 1993 collected nutritional, health and socio-economic data on all household members and found that while the nutritional status of children remained normal, the elderly (over 60 years of age) showed elevated signs of wasting while adults experienced substantial weight loss. This finding argues for including adults and the elderly in nutritional surveillance in certain situations.

There may be additional advantages to including other demographic groups than under-fives in nutrition indicator monitoring. A recent study examined nutrition survey results in Ethiopia, India and Zimbabwe that included data on maternal BMI as well as nutritional status of children. The assumption underpinning the study was that high levels of maternal malnutrition indicated food insecurity, while high levels of child malnutrition was related more to non-food factors such as disease and care, since young children are in the process of developing a competent immune system and are heavily dependent upon carers. The study found that households with higher

proportions of combined maternal and child malnutrition (e.g. India) were most likely to be food insecure, while households with a low proportion of combined malnutrition were more in need of public health measures and support for caring practices (e.g. Zimbabwe).

4.4. Over-specialisation of the nutrition profession

There is growing concern among practitioners that the 'professionalisation'-driven trend of separating nutrition and food security as disciplines is leading to over-specialisation and loss of a comprehensive overview. This trend is apparent in both the professional literature – separate chapters on nutrition and food security in the SPHERE 'minimum standards' – and in the field, where agencies increasingly specialise in either nutrition or food security related interventions (e.g. ACF *versus* Oxfam). It has been argued that this distinction and over-specialisation leads to incomplete interventions which ultimately undermines programme impact (Mourey, 2002).

Case Study 4. ***Burundi, 2000: Over-specialised agencies and compartmentalised interventions***

"My recent experiences in Burundi have consolidated my worst fears about the lack of coherence in the nutrition profession and the folly of mindlessly implementing supplementary feeding programmes. SFPs in Burundi had been in operation for a number of years and had evolved into a kind of safety net programme during the non-crisis period until 2000. Up until this time they may have served a useful purpose. However, when information started to emerge that the rate of admissions in the centres had increased above normal (up to an alarming level taking into account the seasonal patterns), there was at first not much practical reaction. This was largely because there was nobody with a mandate to investigate what was going on and to take a global overview of the nutrition situation. The nutrition coordination meetings at Bujumbura level were limited to focusing on the nutrition centres and to issues of food supply for these centres. However, nobody was systematically looking at the access to food. This would have been the only way to detect the evolving crisis early enough, which was largely due to erratic climatic conditions during the previous two years.

"In the field, things were a little different. The staff running the nutrition centres were well aware that the situation was deteriorating because the beneficiaries were quite clear about the nature of the problem, and the nutritional status of the children at the centres did not improve any more (and in many cases started to decline sharply). This was simply because there was insufficient food at home. Therefore either the take-home supplementary ration was shared by the whole family, or those entitled to a meal at the centre (on-site feeding) would not receive enough food at home. The rate of re-admission also increased sharply, the centres became over-crowded and the food supply could not keep pace with the influx. Frustration amongst feeding centre staff was high and the 'beneficiaries' became quite desperate. Eventually, the humanitarian agencies reacted. A proper nutrition surveillance system, owned and used by all the agencies, would probably have helped relevant actors to understand much earlier that a general food distribution was necessary. However, the specialisation of agencies and the compartmentalisation of activities did not allow for this. Such problems are extremely worrying and must be taken seriously by the nutrition community."

Source: Mourey, 2002

4.5. The importance of anthropometry and emerging trends in the integration of such data with livelihoods information

In spite of the shortcomings of utilising nutritional information in isolation, monitoring such information still remains of critical importance, especially in emergencies. Anthropometry has unique emotive power and in situations where donors or agencies may be reluctant to respond for political or resource-related reasons, it is widely recognised that such information is most likely to elicit response (Shoham, Dolan and Watson, 2001). Furthermore, information on prevalence of malnutrition in emergencies is vital to help determine the need for certain types of intervention, e.g. selective feeding programmes. Yet, following years of complaint by the humanitarian community that donors are only 'forced' into response by evidence of frank

starvation and related mortality, there are signs that some donors are beginning to formalise response procedures in relation to information on erosion of livelihoods (examples include DFID in Kenya, and WFP in Uganda). However, the donor/country situations where this has occurred probably reflect a unique mix of circumstances, e.g. a long and trusting relationship between donors and the agency collecting livelihood information – as in Wajir, Kenya – or key donor staff who operate on the basis of a livelihoods framework (Jaspars *et al.,* 2002).

With a few notable exceptions (such as experiences with functional classification in the Costa Rica nutritional surveillance system in the 1970s), it is probably true to say that national (and sub-national) FIVIMS have not explicitly integrated NIM with food security or livelihood-based monitoring. However, NGOs and WFP have recently developed assessment procedures which do integrate the two types of information. The needs assessment methodologies developed by CARE (HLS) and Oxfam specifically integrate livelihoods analysis with anthropometric surveys (Frankenberger *et al.,* 2000; Young *et al*., 2001). VAM is also developing an approach which integrates food consumption data with food security information. While the CARE methodology has barely been tested in emergency situations (with the exception of Kosovo and Burundi), Oxfam's approach is mainly geared for emergency situations.

Household Economy Assessment, developed by SC-UK, which has been increasingly adopted by WFP in a number of countries, has not until recently integrated nutritional and food security or livelihoods information. However, SC-UK's growing belief in the importance of an integrated approach can be seen in their recent proposal for reviewing Ethiopia's Nutritional Surveillance Programme [Case Study 5], and the incorporation of the HFE approach into the Early Warning and Food Information System in Darfur, Sudan [Case Study 6].

Case Study 5. ***Reviewing Ethiopia's Nutritional Surveillance Programme***

Save the Children (UK)'s earliest involvement in nutrition related work in Ethiopia dates back to 1974. In the late 1970s and early 1980s SC-UK began to undertake regular nutrition assessments in some of the most food insecure areas of the country. The Nutritional Surveillance Programme (NSP) underwent a number of changes based on recommendations from formal evaluations of the programme. In the final years, data on both typical early warning indicators (crop price and production, rainfall, livestock health and prices, etc.) and outcomes (mortality and anthropometry) were collected.

In the late 1980s there was a push to hand over the NSP to the Relief and Rehabilitation Commission (RRC) – now the Disaster Prevention and Preparedness Commission (DPPC), which did not materialise. However, in July 1998 an agreement was finally signed between SC-UK and the DPPC, which outlined a phased withdrawal from operational areas over a three-year period, along with a transfer of skills to DPPC. Training would be provided to DPPC staff at Federal, Regional, and Zonal levels to transfer NSP's skills in data collection, analysis, and report production. Additionally, the longitudinal data series would be handed over to the DPPC.

With the closure of the NSP, SC-UK argued for the implementation of a review, one major objective being to conduct statistical analysis of the longitudinal data sets by Region to draw out valuable information that can be utilised by nutritionists and agencies (governmental and non-governmental) involved in improving early warning and food security efforts in Ethiopia. In particular, for each Region where NSP has been operational – Amhara, Tigray, SNNPRS, and Oromiya – this statistical analysis will assess the linkages between environmental, socio-economic status, anthropometric and mortality data in different years, different seasons, and different food economy or agro-ecological zones. It is envisaged that this analysis will assist in both improving early warning and monitoring systems in these areas, and also provide a baseline picture of the nutritional and socio-economic situation of these Regions.

Source: SC-UK, 2002

Case Study 6. ***Incorporating the HFE Approach into the Darfur Food Information System, Sudan***

SC-UK has been involved in information collection in western Sudan since the 1984 famine. Until 1993, regular information collection concentrated on health and nutrition, but in 1993 the Darfur Early Warning and Food Information System (DFIS) was established to make SC-UK's information work in Darfur more systematic and relevant to policy needs. Phase I of the DFIS ran from 1993 until 1996; Phase II from 1996 until the present time. During Phase I the system used an 'indicator approach' (crop production, nutritional status, market monitoring). At that time SC-UK was developing a new approach to early warning, based on models of the rural economy: the Household Food Economy approach (HFE). The aim was to move away from indicator methods towards an approach that could directly estimate the extent to which drought or other shocks affect a household's ability to access food and non-food goods. In 1996 the Phase I evaluation recommended adoption of the HFE model, and by the time of the Phase II mid-term review in 1999, this approach was fully incorporated in the DFIS.

The Darfur Food Information System is primarily based on several types of household and market surveys:

The annual ***Harvest Assessment*** is conducted each September, surveying 69 sampled villages in North Darfur. The aims are: (i) to assess the type and scale of problems in a given year; (ii) to estimate harvest outcomes; (iii) to assess the food gap which results after allowing for the ways that farmers themselves try to make up the deficit. DFIS surveys now use the HFE methodology, which links harvest and market data together into a single economic model, while the analysis delivers an assessment of food needs(metric tons). This is verified or revised by a ***Dry Season Assessment****,* carried out each April but only in areas identified as high risk.

Baseline Household Food Economy profiles were first conducted by DFIS in 1999. To date, 11 HFE profiles have been completed, covering pastoralism, cash crop farming, food crop farming, mixed economies, urban and peri-urban areas. The profiles give a picture of how households obtain food in a 'normal' year, and how their food and income sources change in a bad year. Those sources that can be expanded – when others contract – are called 'coping strategies'. Other information collected includes household expenditure, labour flows and market dynamics. All information is organised by wealth rank (poor, medium, and rich households), and a basic asset profile is recorded for each wealth group. Baseline profiles provide a yardstick by which to measure the impact of an event in any current year.

Market monitoring is carried out in 12 markets, selected to reflect the different food economies of North Darfur. The objectives are (i) to monitor supplies and prices of major commodities; (ii) to determine terms of trade as an indicator of the purchasing power of the poor.

Nutrition Surveys: Until 1997, DFIS conducted anthropometric surveys of children aged 6-60 months each April and September. But this sample gave results at provincial level and was therefore: (i) relatively insensitive to local changes in nutritional status; (ii) difficult to interpret where small changes were observed; (iii) not clearly related to HFE findings. In 1998 the sample frame was changed, to improve the sensitivity of the surveys and to allow these to be more closely related to the HFE work. In March-May each year, a cluster sampling survey is conducted of children in vulnerable food economy areas. If a fall in nutritional status is detected, the survey is repeated, with the sample size adjusted on the basis of previous malnutrition estimates. The nutrition survey results can now be used to monitor expected changes in household food access, determined using the HFE. Efforts have also been made by the DFIS to reanalyse nutrition survey data, to improve the understanding of the relationship between nutritional status and other factors. A comparison of data between a good year and a bad year from one area found a clear relationship between nutritional status and livestock holdings, rates of malnutrition being greater in areas with less access to animal milk.

Sources: Bush and Seaman, 2000; Collins, 2001; Anema, 2002; Taylor, 2002

Two recent case studies, from Sudan [Case Study 7] and Afghanistan [Case Study 8], provide positive examples of food crisis management, using a combination of nutritional and livelihoods monitoring data. Both cases demonstrate the value of merging these two types of food security information in predicting and averting potential food crises.

Case Study 7. ***Sudan, 2001: Integration of nutritional data with HFE data in food security analysis***

After a bumper year in 1998, crop production in North Darfur was low in both 1999 and 2000. In October 2000, the annual assessment of food needs, undertaken jointly by SC-UK and the Development & Rehabilitation Committee (DRC), and the FAO/WFP 'crop and food needs assessment' mission to Sudan, concluded that two consecutive poor years had stretched people's coping capacities to breaking point. In addition to crop failures, the SC-UK/DRC report identified high cereal prices, stagnating livestock markets, loss of income from tobacco sales, reduced availability of wild foods and poor prospects for local and migratory labour, as major additional threats to food security. The pre-harvest assessment for North Darfur showed a food deficit of 121,000 MT. The SC-UK/DRC assessment applied the food economy model to this baseline production figure. They calculated that that there was an average food deficit of 24% over five of the six food economy zones, and that the people of North Darfur would require between 17,192 MT and 26,057 MT of relief grain in order to prevent loss of life and destitution. Based upon this assessment, in February 2001 the UN revised its Consolidated Annual Appeal for Sudan, including additional relief grain needs of 26,000 MT for North Darfur.

SC-UK conducted a nutritional survey in five out of six food economy zones in North Darfur, and among displaced people in El Fasher, between March and April 2001. Key results included a global malnutrition rate of 23.4%, and a prevalence of severe malnutrition of 2.1%. (Among the displaced population, however, severe malnutrition stood at 4.4%, indicating that their coping strategies had broken down and the public health environment was poorer.) The high global malnutrition rate, combined with the relatively low severe malnutrition rate, indicated that although nutritionally stressed, the local population was still coping with their food insecurity. However, the report cautioned that once coping breaks down, rates of severe malnutrition can increase very rapidly. The crucial question was: how long would these coping strategies last?

To answer this and provide information that was useful to guide planners, the results were interpreted in the light of wider food security information, including SC-UK's food economy data. Key relevant indicators included:

- The food reserves of the population were very low: only 12.3% of households reported eating mainly their own produce, while 87.7% were dependent on the market for food.
- The market price for a sack of millet rose by almost 50% in just four months, reaching record highs, while goat prices fell, resulting in collapsing grain : livestock terms of trade. Especially in the pastoral food economy zone, changes in market prices are closely correlated with changes in malnutrition rates.
- The average daily wage for labour declined substantially, with more migrants competing for fewer jobs. The concurrent high price of millet meant that by March 2001, 27 days of labour were required to buy one sack of millet, compared to 13 days in March 1999.
- Support from kin started breaking down at the beginning of the hungry season – fully six months before the next harvest.

SC-UK's analysis of nutritional, market and livelihood indicators concluded that almost all the individual factors that usually enable the North Darfur population to maintain their food security were already stretched to breaking point, six month before the 2001 harvest. These findings suggested that rates of severe malnutrition would increase dramatically within the coming few months, and that humanitarian intervention was imperative to avoid wide-scale displacement, destruction of livelihoods and loss of life. In the event, the government, WFP, SC-UK and other agencies distributed substantial quantities of free food aid and, although rates of malnutrition reached 15% and 21% in two food economy zones by July 2001, large-scale mortality was avoided. Subsequently, SC-UK was criticised for overstating the severity of the food crisis. One lesson learned from this case study is the importance of a detailed understanding of the variety, depth and resilience of coping strategies in helping people survive livelihood shocks.

Source: Collins, 2001. A detailed exposition is included in Jeremy Shoham's stand-alone paper.

Case Study 8. ***Afghanistan, 2001: Combining nutritional survey and food economy analysis***

In August 2001, Concern commissioned a nutrition, food security and health assessment in Badakshan Province in north-east Afghanistan, following three years of drought. The survey used both quantitative and qualitative methods to estimate the prevalence of acute malnutrition in children and mothers. The survey also provided information about agriculture, household food security, coping mechanisms, and patterns of morbidity and mortality. The survey found only 11% prevalence of wasting, although other information indicated a severe crisis with the population on the verge of famine. For instance, yields from the rain-fed winter and spring wheat crops were very low for the second consecutive year, and other food and cash crops, including opium, were also poor.

Most poorer farmers had already sold their livestock to compensate for production shortfalls. Livestock prices were low and wheat prices were high. The loss of animals also affected dietary quality, e.g. less milk, meat, animal fat and eggs. Most people were reducing meal frequency and quantity. Preferential feeding of children was increasingly common. Borrowing was increasing. Food was borrowed against security of land or other assets. Borrowers had to repay in cash or grain at a later date which usually meant after harvest when prices were at their lowest. Effective interest rates were therefore 350%. Default resulted in loss of land or taking up status as a sharecropper. Sale of land was a last resort before displacement with land prices plummeting. Most poor households had already sold their assets. Prices for household assets were extremely low so this was no longer anything but a stop-gap measure. The supply of casual labour exceeded demand and wage levels were insufficient to meet household food requirements. Labour migration was widespread.

The survey performed a basic food economy analysis. It determined that in 2000 there was a 24% food gap filled with one or more of the coping strategies outlined above. However, in 2001 the food gap was 22% higher. Given exhaustion of coping strategies the survey authors concluded that this food deficit gap was likely to be higher. The survey also predicted that if farmers were to resort to two 'crisis' strategies – selling their remaining cows, sheep, goats to buy grain, or eating seed stock – the food gap could be reduced to 12%, but these strategies would impair people's ability to survive in subsequent years. Based on these calculations the survey predicted the percentage of farmers who could meet household consumption needs by employing different strategies.

The report concluded that when interpreting nutritional surveys it is vital to consider context. In this case, a figure of 11.5% wasting would not convince donors to fund immediate emergency nutritional interventions. However, the contextual data clearly showed a near-famine situation.

Source: Myatt *et al*., 2001

4.6. Discussion and conclusions

The above discussion and analysis of case studies suggest a clear role for strengthening the integration of nutritional data and nutrition surveillance systems with national and sub-national livelihood-based FIVIMS: The main findings and conclusions from this analysis are as follows:

i) Analysis of nutritional information can provide additional information about whether (and to what extent) populations are 'coping', e.g. the degree of severe malnutrition compared to global malnutrition. Analysis of variance of malnutrition within a population can demonstrate which sections of a child population are most affected, which in turn can indicate 'proximity' to failure of coping strategies.[23] However, although nutritional information can strengthen understanding of the degree of coping and imminence to famine, it can also mask imminent

[23] The term 'coping strategies' as used here is meant to denote a range of responses to 'shock'. These responses will comprise intensifying existing livelihood activities as well as expanding activities in order to diversify food and income sources. The sustainability, legality and adverse impact of these activities (on adopters and the community) will vary depending on the severity and duration of the shock.

famine unless combined with food security/livelihood analysis.[24] Specifically, low rates of malnutrition may exist alongside (and therefore mask) severe erosion of livelihoods and exhaustion of coping strategies. In effect, as shown in the case studies of Burundi and Sudan [Case Studies 1 & 2], nutritional indicator monitoring in isolation can lead to 'false positives' and 'false negatives' in terms of identifying food crises.

ii) There is often a need to intervene before nutritional deterioration can be measured, as seen in the case of Afghanistan [Case Study 8].

iii) In some situations micronutrient deficiency disease outbreaks may occur before widespread PEM so that NIM need to expand indicators to include micronutrient status. This type of monitoring is rarely carried out except through clinic infrastructure, in spite of the fact that recommendations about food basket monitoring and micronutrient surveillance have been made in international fora for over a decade, especially in emergency contexts (RSP 1991).

iv) Analysis of the nutritional status of adults (BMI) in conjunction with the nutritional status of under-fives in the same household can help determine the degree to which nutritional problems are related to disease or caring practices, rather than food security constraints (James, 1998). In some contexts where child nutritional status is protected at the expense of adult food consumption, measuring the nutritional status of adults can lead to earlier detection of nutritional stress caused by food insecurity.

v) In emergencies, weight-for-height and BMI measurements should comprise a minimum set of nutritional indicators for NIM. In non-emergency contexts, other indicators may be more appropriate, e.g. stunting (height-for-age) as a proxy measure of poverty, or low birth-weight (LBW) where maternal malnutrition is extensive (for instance, in southeast Asia).[25]

vi) Nutrition information must be complemented by food security and livelihoods – including coping strategy – information, as well as information regarding health status and health service provision, to determine the degree of risk being experienced by a population affected by a shock. At the same time – as shown by the case of farmers and displaced people in Darfur [Case Study 7] – it is not straightforward to extrapolate findings to the same livelihood groups in different locations. A series of control group situations (where there has been no intervention) might be necessary to understand the sequence and intensity of coping strategies that precede famine, in order to interpret correctly the meaning of any observed behavioural change in a given locality. Coping strategy information could also usefully be developed into some form of index.[26]

While there are sound conceptual reasons for strengthening the integration of nutritional and food security or livelihood information in national and sub-national FIVIMS, implementing this integration faces a number of technical and institutional challenges.

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[24] The term food/livelihoods security information, as used in this discussion, is meant to denote all information which informs understanding of a population's access to food. Coping strategies are therefore a component of this type of information.

[25] Since different anthropometric indicators measure different things, it follows that different measures are appropriate in different situations. Wasting is the most useful indicator of food stress in emergencies, whereas stunting is a more useful proxy indicator for chronic poverty

[26] CARE and WFP have developed a coping strategy index (CSI), which was piloted in Kenya. The CSI enumerates both the frequency and severity of coping strategies of households faced with short-term insufficiency of food. Four general categories of coping are measured, with individual strategies defined specifically according to location and culture: (i) *dietary change* (eating less preferred but less expensive foods, etc.); (ii) *increasing short-term food access* (borrowing, gifts, wild foods, consuming seed stock); (iii) *reducing numbers of people to feed* (short-term migration, sending children to relatives, etc.); (iv) *food rationing strategies* (mothers prioritising children or men, limiting portion size, skipping meals, etc.).

- The types of individuals who are able to collect nutritional information (health centre staff, district nurses, nutrition surveillance enumerators) may not be suited to collecting more analytical information using participatory methods, unless they receive intensive training.
- Collecting livelihood information or adopting a livelihoods-oriented approach will require spending time with respondents to allow in-depth questioning. This would favour sentinel site nutritional surveillance rather than repeated surveys or growth monitoring.
- Nutritional indicator monitoring is rarely carried out on samples that represent specific livelihood or food economy groups. This makes it difficult to integrate the two types of information into an analytical framework. Furthermore, monitoring nutrition indicators requires a larger sample (for statistical reasons) than most livelihoods data, which might prevent useful statistical correlation between the two types of dataset.
- Combining the two types of information collection will increase costs substantially. For example, national surveys are very expensive relative to community-based systems – but even clinic and community-based growth monitoring programmes often lack sufficient resources for data collection, collation and analysis. A key related consideration is how the system will be maintained and financed over a period of time (Shoham *et al*., 2001).

Finally, it might be useful to reverse the focus of this section, and to consider the potential contribution of national and sub-national livelihoods-based FIVIMS to nutritional indicator monitoring systems. The reason for this is that nutritional surveillance systems have already been established in many countries; many were set up in the 1970s and 1980s for a variety of reasons, including to monitor the impact of structural adjustment policies.[27] Given the vested institutional and political interests in maintaining the 'sovereignty' and 'discretion' of these systems as well as the established response mechanisms within certain governments, it may be more appropriate in such countries to consider the integration of livelihoods-based FIVIMS within existing NIM systems. The following advantages may be envisaged:

1) A focus on livelihoods in monitoring systems should lead to responses being triggered when 'coping' or survival strategies threaten to undermine livelihood sustainability. Adopting this approach would move nutritional surveillance systems away from a focus on measuring and responding to impacts on nutritional status towards a focus on people's responses to food insecurity.
2) The sustainable livelihoods approach (SLA) attempts to identify micro-macro linkages. This contrasts with nutritional surveillance where, although the underlying conceptual framework for malnutrition acknowledges basic causes at macro- and policy level, these are given less significance than immediate causes (e.g. disease or lack of food). The livelihoods approach therefore provides an analysis that is more relevant to policy-makers.
3) Whereas SLA seek to identify multi-sectoral linkages relating to livelihoods, most nutritional surveillance systems do not adopt a multi-sectoral approach to the analysis of nutritional problems. This is one reason for weak or limited responses to information generated. NIM systems could be more useful to decision-making if they learned from SLA in this respect.
4) The SL approach promotes a consultative and highly participatory approach to information gathering. Nutrition surveillance systems have, however, traditionally used technicians to collect data in a way that is more oriented to external measurement and is less inclusive of participant views. A more participatory approach may lead to the generation of ideas for more imaginative, relevant and effective interventions.

[27] The strengths and weaknesses of these systems are fully discussed in a review conducted in 2001 (Shoham, Dolan and Watson, 2001).

5. 'FIVIMS INTEGRATED LIVELIHOODS SECURITY INFORMATION SYSTEM'[28]

This section reviews ways in which poverty and food security information and spatial mapping may be more practically useful in decision-making, both in policy formulation and in field interventions to reduce hunger and underlying poverty. The approach is eclectic: assembling a set of existing methods that can serve as the building blocks for a family of similar, country-level information and mapping systems that can be used to implement *a 'two-track' approach to fighting food insecurity and underlying household income poverty*. One track involves short-term interventions with the objective of helping to stabilise vulnerable population groups so that they remain physically able to engage in productive work, and the second, longer-term track involves improving household incomes obtained from different livelihood activities (i.e. reducing poverty).[29] The types of information needed to engage in these two types of interventions are closely related, because both have to do with patterns of risk facing the livelihood systems of the rural poor. These risks may come from the natural environment, the market context, or be directly caused by man (disruption of civil order, corruption and other misuse of resources). While the emphasis is on agricultural and food-based livelihoods, the methodological approach can be applied to other livelihoods that are not as dependent on the natural resource base.

Figure 3 below introduces the concept of a 'FIVIMS Integrated Livelihoods Security Information System' (FILSIS) and describes some of the antecedents and components of such a system. Clearly, the FILSIS is an idealised conceptualisation that would combine the narrower previous depictions of a national FIVIMS (just focused on food insecurity) with the broader concept of an information system that is also relevant to the second track, of making inputs into sustainable poverty reduction programs by strengthening major livelihood systems. A working definition of FILSIS is as follows:

> A **FILSIS** is an integrated, spatially detailed, national information and mapping system which follows basic FIVIMS ideas on inter-agency collaboration and which is able to address two types of related problems: (a) transitory lack of access to adequate food, and basic medical care, water, and sanitation services which, together, impact on the nutritional status of well-defined population groups; and (b) more chronic sources of risk to the security of livelihoods, as measured by the level and stability of household income and other relevant indicators. The **purpose of a FILSIS** is to facilitate interventions to reduce the severity of the twin problems of: (a) inadequate access to food and services which determine nutritional status; and (b) insecure livelihoods.

The FILSIS concept, as shown in Figure 3, marries livelihoods concepts with existing ideas on food insecurity and vulnerability information and mapping systems. In this type of work in poor countries, researchers and practitioners are certainly not starting from zero. Many information collection methods have been developed over the years, and the core ideas in this section all come from those past efforts. The difference is how the methods are assembled and used at country level.

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[28] This section draws on a paper prepared by David Wilcock – 'Reducing Poverty and Food Insecurity: The Role for Information Systems Using National Surveys, Farm Management Data, and Other Sources of Personal and Livelihood Vulnerability Information' – which is available as a stand-alone output of this project.

[29] The need for this 'two-track approach' has been recognised in general by field practitioners for many years, but it has only recently been explicitly advanced as a joint hunger and poverty-fighting strategy in the poorest countries. Two recent statements of the rationale for this approach are: (a) the joint FAO-IFAD-WFP paper presented at the March 2002 International Conference on 'Financing for Development' in Monterrey, Mexico; (b) the FAO anti-hunger strategy paper presented to the WFS-fyl in June 2002.

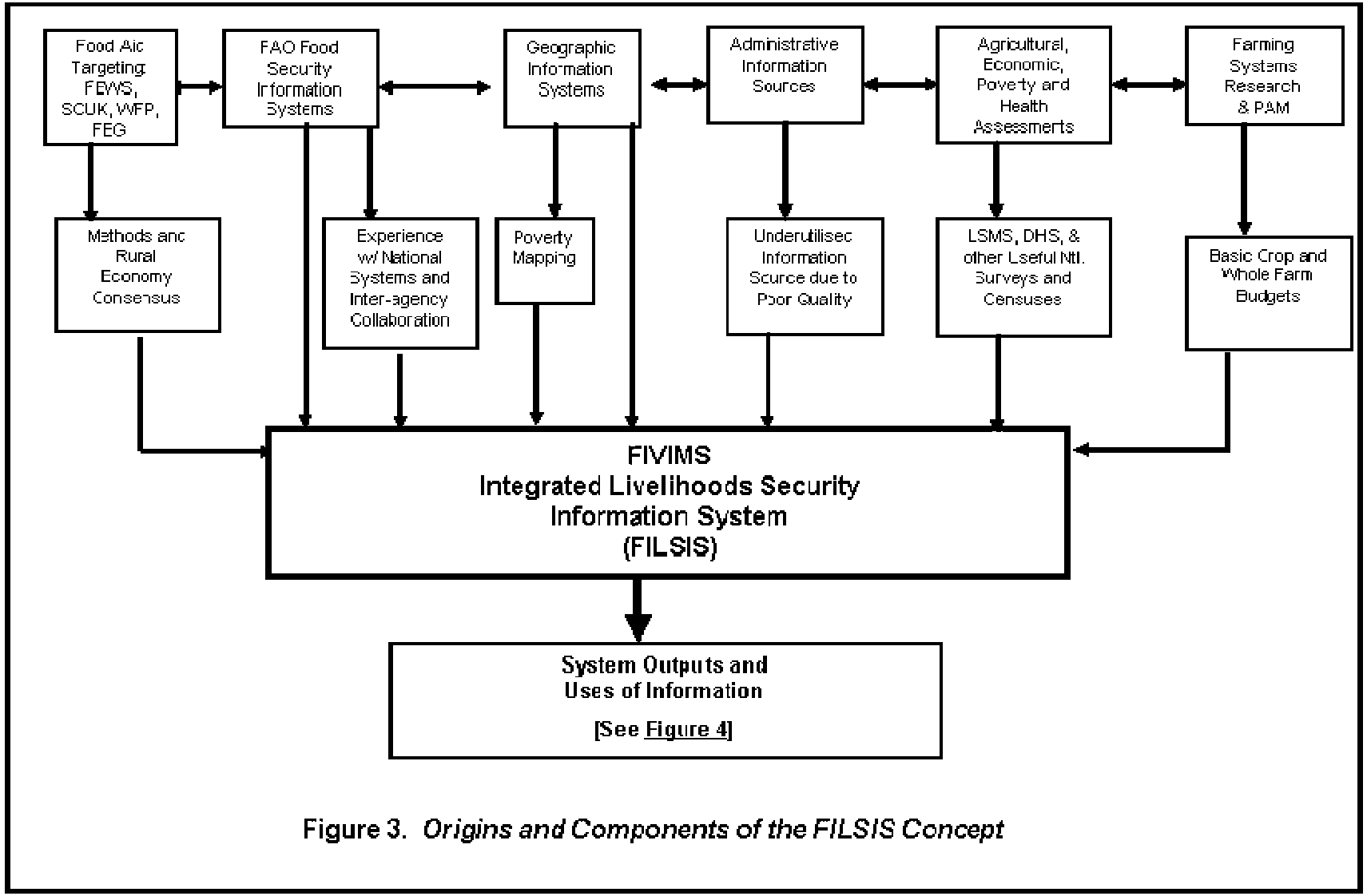

Figure 3. *Origins and Components of the FILSIS Concept*

5.1. Components of a FILSIS

Although no country as yet has a working information and mapping system that fully meets the FILSIS ideal as elaborated in this paper, the FIVIMS system that has been evolving in Kenya is similar in many respects.[30] The following sub-sections look at the antecedents and components of a FILSIS, as set out in Figure 3.

5.1.1. Food aid targeting and Early Warning Systems

Much of the information system work for very poor countries has been done in Africa and has involved FAO, WFP, USAID (FEWS), SC-UK and other NGOs such as Catholic Relief Services or *Médecins Sans Frontières,* who have operated these systems (with or without government involvement) in a variety of emergency and 'normal' circumstances. However, almost all of these systems have been linked to food aid deliveries or food-for-work projects or other types of emergency interventions. A variety of useful operational tools have been developed through these experiences. One of the most widely used and influential of these tools is the 'Household Economy Approach' (HEA) as articulated by Save the Children UK (SC-UK, 2000). This and variations used by WFP, FEWS or FEWSNet, the Food Economy Group (FEG) and others reflect a growing consensus on a methodological approach involving the collection of information on households' livelihoods and their abilities to cope with shocks to those livelihoods. The analysis of household assets, activities and 'coping strategies' in response to shocks – often involving liquidation of assets – which underlies much of the SLA methodology (as discussed above), is largely derived from these field-level approaches to assessing and understanding rural livelihoods.

Many HEA practitioners (especially NGOs, reflecting their locally-based programmes), have a tendency to disregard other sources of available information, especially those produced by national governments. While it is true that many national statistical series are not very relevant to applied problem-solving, this 'anti-government bias' has resulted in lost opportunities to strengthen and refocus government statistical efforts. This bias is not present in DFID's SLA literature, and recent projects have begun to focus on building stronger linkages among different types of recurrent statistical collection efforts, such as the LSMS and DHS families of national surveys (also discussed above).

5.1.2. FAO's Food Security Information System

Over the past 20 years or so, one of the most active groups in FAO in promoting applied food security information systems (FSIS) at national level has been the Food Security Service (ESAF). This work has been very involved in the establishment and operation (under project funding) of a variety of early warning and related information systems, mainly in sub-Saharan Africa. However, the main point which has distinguished the FAO FSIS work has been its effort to work with and through national government structures, with only rare exceptions (usually in severe emergency circumstances). Many of the basic FIVIMS operating principles and suggestions on the *process* of doing this kind of work through various government structures have come from the ESAF project experience. Much of what has been learned about the sustainability of information systems, and the difficulties that very poor national governments have in assuming even modest recurrent costs, have also come from this body of project experience.[31]

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[30] The best statement of FIVIMS information system objectives remains the 'Guidelines for National FIVIMS: Background and Principles', FIVIMS-IAWG Secretariat, Rome, 2000.

[31] Some of ESAF's project experience and lessons learned have been captured in the FAO's 'Handbook for defining and setting up a Food Security Information and Early Warning System (FSIEWS)', *Agricultural Policy and Economic Development Series No. 6*, 2001.

While there is substantial overlap between these first two groups of FILSIS antecedents, it is useful to distinguish them according to their main contributing ideas. One might also cite the work of the FAO's GIEWS (Global Information and Early Warning System), but this older FAO information system effort in recent years has rigidly maintained its focus only on the production of food supply and availability estimates for countries around the world, and has not made as much of a contribution to improving national information systems.[32]

5.1.3. Geographical Information Systems

Rapid advances in computer hardware and software have allowed increasingly powerful spatial visualisation tools to become widely available. This, coupled with field-level success stories in the use of GIS maps in the political process of resource allocation, have helped GIS approaches become required components of any action-oriented information system.[33] Systematic geo-referencing is increasingly coming into widespread field use.

An area of recent research activity which has significant application in the programmatic use of standard survey data is the *'small area estimation'* modelling technique, in which the detailed population characteristics from nationally representative surveys (LSMS, DHS) can be projected with known margins of error onto geographically detailed data from population and agriculture censuses. This is the heart of the 'poverty mapping' approach which has been used by the World Bank's Research Department in 20+ countries in recent years.[34]

The poverty mapping technique has relied fairly exclusively on the use of conventional regression modelling in order to make projections of population characteristics to fairly detailed geographic units. In addition, other sophisticated GIS practitioners have been developing *'true spatial statistics'* which analyse patterns of spatial correlation which are only subsumed in the error terms of classical regression equation statistics. The application of spatial statistics to small area estimation procedures should allow the better identification of pockets of poverty, although it will still be necessary to have additional information in order to explain why that spatial clustering is occurring (see Weeks, 2002, 2003).

The important point is that these new technologies allow existing data series to be exploited for their geographical explanatory power, which should be of great assistance in the spatial identification of vulnerable population groups. It should be noted, however, that while this should assist in improving certain types of geographical targeting it will not solve problems involved in determining household eligibility for participation in current or future intervention programmes. For targeting purposes, there must ultimately be some information, probably held on a decentralised basis, on all vulnerable households if public funds are going to be used to address both the transitory and longer-term structural causes of their vulnerability.

FAO has recently completed in collaboration with the World Bank a farming systems map of the developing world. It is easy to imagine that farming systems map simply being made more detailed at the country level. In fact, in some countries such as Kenya, district-level maps of farm types have been produced from the ground up. It is then just a short step to combining

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[32] It is ironic that the funding that allowed SC-UK to produce the 'Household Food Economy' manual came in a grant from FAO-GIEWS. FAO now does not have a unified position on the HFE approach, which has heavily influenced the development of livelihood approaches.

[33] Reflecting the potential power of well-targeted GIS maps, the original proposed name for FIVIMS at the World Food Summit in 1996 was 'Hunger Maps'.

[34] For a sample of the rich recent literature on poverty mapping, see: Bigman and Fofack, 2000; David and Siano, 2001; Snel and Henninger, 2001. See also Section 3.3.2 above.

agro-ecological mapping with population density, farming systems or farm type, and poverty maps created using small area estimation.

5.1.4. Administrative information sources

Administrative information sources include a wide range of potential inputs into a national information and mapping system. For those parts of government that have personnel widely distributed throughout the country, the potential for using information they collect and transmit to regional and national levels is very great. This would apply especially to reports coming from the Ministries of Health, Education, Agriculture, Public Works, and so on. In terms of Health Information Systems, for example, records of patients seen, illnesses encountered and anthropometry of children are painstakingly recorded and sent up the hierarchy. Typically, these sources of information are imperfectly transmitted and analysed at national level and there is usually no feedback to the local level, so the systems often deteriorate into very poor quality or are abandoned. This does not have to be the case, however. In Kenya the FIVIMS project worked with the Ministry of Health to see how routine reporting from remote health posts could be used for early warning purposes.

Many of the 48 indicators on the MDG list have to do with the provision of services to various target groups in the population. Much of this could be accomplished through the use of administrative statistics. This would require that enhanced attention be devoted to these statistical reporting functions and that analysts, highly oriented toward the use of 'random samples' and national surveys, do not refuse to use this source of information when appropriate. Another area where administrative personnel are information collectors is Market Information Systems (MIS), which has been one of the most valuable and cost-effective techniques of monitoring the performance of the food system and providing early warning of impending shortages.

5.1.5. Periodic national surveys, assessments and censuses

In terms of basic information for estimating vulnerability of the national population (and sub-populations, depending on coverage), surveys and censuses are of critical importance. For monitoring and evaluation of progress made towards many basic needs targets, they are irreplaceable. However, for action-oriented programmes, their limitations must be kept firmly in mind. The most commonly used censuses are those for population and agriculture. The national population census is also often used to establish the national sampling frame, which is then used for more frequent surveys, such as the LSMS, over 10 years until the next census allows the sampling frame to be updated. Most censuses have two major limitations: long time intervals between counts, and the limited number of questions that can be asked.[35] In addition, the size of censuses and the complexity of household surveys present special challenges in terms of equipment and staff training required in order to correctly exploit the database for information system purposes.

The analyst working on assembling a FILSIS needs to ask three basic questions regarding establishing a baseline assessment and periodic updates of vulnerability and food security:

- To what extent can the census and national survey information paint a detailed portrait of vulnerability by age, sex, and geographic administrative subdivisions? At what level of aggregation is it adequate for monitoring and evaluation purposes?
- To what extent can existing statistical instruments capture relevant information about livelihood groups that is sufficiently detailed to allow for some level of intervention?

[35] There are some exceptions to this limitation. China's remarkable recent agricultural census has close to 200 different variables associated with each agricultural household (full count)!

- To what extent can modifications be made to these census and survey methodologies that will allow them to better capture detail on both general 'life-cycle' vulnerability and livelihood vulnerability?[36]

There is a clear overlap between life-cycle vulnerability, which focuses more on individuals, and livelihood vulnerability, which focuses on the household and the work performed by household members who are economically active. For the latter, a key question is, what type of livelihood map is it possible to produce from existing sources of information? At the national level, Ministries of Labour conduct different kinds of 'labour force' surveys. How useful, from the point of view of livelihood vulnerability, are these surveys? In many cases, inspired by their counterparts in the developed world, these surveys only focus on formal sector employment, which may cover only a tiny percentage of the population, most of whom may be much less vulnerable than the poor majority. Similarly, we need to look at the employment categories used in LSMS and agricultural surveys. Do these get us closer to being able to map or locate livelihood groups?

A few summary implications:

- It is important to distinguish between (a) sources of information and interventions that focus on the vulnerability of individuals in different demographic categories (problems of children under three, school-age children, women of child-bearing age, elderly men, and so on), and (b) those that focus on the household as the unit and on the dominant income-earning activities of those households.
- In terms of identifying and mapping household livelihood patterns, the importance and attractiveness of rural livelihoods that are dependent on natural resource use (fishing, forestry, crop agriculture, livestock production) and on the processing and marketing of derived products, is immediately apparent. Not only can the location of populations practicing these livelihoods be spatially mapped but the biophysical characteristics of the natural resource base also can be concurrently mapped as 'GIS layers' – often at low cost through satellite remote sensing.[37] Moreover, if geographical areas can be defined where farming systems are reasonably homogeneous in terms of bio-physical factors, dominant crops and so on, then the farm management information that characterises typical farm households can be used both for M&E and intervention purposes.
- Finally, poverty assessments have long relied heavily on analysis of household budget surveys, whose strongest output is the measurement of average levels of consumption of goods and services, the level and composition of which are highly correlated with income poverty. But these surveys are weak in geographical detail and the ability to say something about specific livelihood groups and the dynamic process of adjustment to shocks. The FILSIS needs to add additional information sources in order to move beyond these limitations. For at least some livelihoods, the creative use of certain types of farming systems or farm management information offers one such source.

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[36] The 'life-cycle' approach has been used in some FIVIMS vulnerability assessment work and is now being used extensively by operating departments in the World Bank to do basic vulnerability assessments, especially in the Latin American and Caribbean region (see, for example, Heitzmann, Canagarajah and Siegel, 2002).

[37] In fact, the easy accessibility of satellite-collected bio-physical data (on cold cloud cover, rainfall, vegetation cover, etc.) coupled with digitised soil and land use maps, has created a situation where information about the population using those natural resources is lagging behind. The urgent need is to increase the quantity and quality of geo-referenced socio-economic data, to fully exploit the potential of remotely-sensed bio-physical indicators.

5.1.6. Farming systems and farm management information

Basic information collection for farm management purposes has been undertaken for many decades in developing countries, both for large-scale cash-cropping enterprises and for the smallholder sub-sector, using farming systems (FS) techniques. FS approaches tried to improve the understanding of farmer behaviour by adding anthropological and agronomic perspectives to those of production economists, or by adding an economic perspective to a team of research station biological and physical scientists.

Farming systems research peaked in popularity during the 1980s, and is still used in agricultural research today. Farming systems is outstanding at painting comparative static pictures of specific farm types, emphasising the micro-economics of the dominant crop, but is less successful at helping to understand trade-offs among crops, between farm and non-farm activities and – crucially – what recommendations to offer in cases where the farming system generates inadequate average incomes. With hindsight, one of the reasons for the disillusionment of development agencies with farming systems as an operational tool is its failure to incorporate a broad livelihoods approach: it focuses too narrowly on the adoption of improved production technologies as the solution to household survival. On the other hand, the virtual shelving of FS approaches since the late 1980s may have been premature. More useful would have been to integrate farm management information into holistic information systems – e.g. more recent analytical approaches such as SLA or HEA.

In the context of a FILSIS, traditional farm management and FS approaches do still have a positive contribution to make. The relevance is most evident for the natural resource-based economies of sub-Saharan Africa, but the core methods can be applied to understanding any set of livelihood systems. The analysis would begin with some fairly basic questions:

1. What percentage of the population derives a substantial proportion of their income from activities that exploit the natural resource base to produce, process and market food and fibre products for home consumption or for sale in local, national, regional, or inter-continental markets? How does this vary by region of the country?
2. What are the dominant natural resource-based production, processing and marketing activities in terms of their contribution to aggregate national income? How are these activities combined at household level into significant livelihood groupings?
3. What average income levels (and inter-annual variation) are associated with specific enterprises or groups of enterprises that make up livelihood groupings? What are the main natural, market and man-made sources of variability they face (shocks)?

A hypothetical example of how such as analysis could be undertaken is presented below.

Case Study 9. ***Use of farm management information in a hypothetical African country***

A typical sub-Saharan African country might have between 50% and 80% of its total population engaged in livelihood activities that depend, directly or indirectly, on the natural resource base. This population could be further divided into households by region, by urban-rural location, and then grouped into as many livelihood grouping types as is considered useful for monitoring and intervention purposes.

For example, a hypothetical country in Sahelian West Africa might have the 'Sorghum and Millet Livelihood Grouping' in the Eastern Region, covering 75% of the region's population. This grouping's livelihood activities include sorghum and millet production, other food crop cultivation, fibre production (harvested grasses, crop residues, and cotton), large and small ruminant rearing, gathered wild products and hunting. The sum of these agricultural production enterprises make up 60% of average household income. An analysis of inter-annual variation in this income would show that it is primarily due to rainfall variability, and secondarily to fluctuating

market prices and opportunities. This large livelihood grouping, where cereal cropping is the largest source of household income, can usefully be subdivided into rainfall/crop zones: low rainfall north with millet dominating, medium rainfall centre with mixed sorghum-millet, and higher rainfall south with sorghum predominant.

The Eastern Regional FILSIS would assemble any sources of information on personal, life-cycle vulnerability for this region (DHS, health unit records, education statistics, qualitative sources, etc.) This should reveal average patterns of morbidity and mortality, life expectancy, illnesses, access to clean drinking water, school attendance and other use of government services, and so forth. FILSIS would look for any special patterns or unusually high rates of problems, whether correlated with the Sorghum-Millet Livelihood Grouping or not. Next, FILSIS officers would assess what resources are available for basic needs (Track 1) interventions (food aid, medical assistance, etc.) and resources that might be used for stabilising and supporting the Sorghum-Millet Livelihood Grouping in the medium term (Track 2). How can the risks associated with farming in this region be better managed? What national policy changes would have a positive impact on local livelihoods?

The evolution of the social and economic viability of any livelihood is a complex, dynamic process. To characterise the financial situation of the average household dependent on a given livelihood system in a specific geographic area, basic farm management statistics and budgets would be highly relevant.[38] These should be updated periodically to provide 'snapshots' of the changing equilibrium. Other key factors that need to be monitored are: average physical and human capital availability; the average input-output relationships associated with the production technology; input and output prices; and significant weather-induced variations in yields. The first two factors would not change quickly; the latter two would, and thus could (and do) serve as appropriate short-term indicators. Finally, to gain some idea of whether this average household is better off or worse off over time, shifting terms of trade would also need to be monitored, in terms of the local cost of a 'basket' of basic consumption goods. This analytical process should lead to the specification of a reduced set of key, locality-specific early warning indicators.

5.2. Anticipated uses of FILSIS information

The section above attempted to define some key components of a prototype FILSIS, and to examine their origins and pertinent aspects of their use in recent years. The purpose was to provide a 'vision statement' of what such a system could contain. Obviously a more precise definition of these components would need to rely on the nature of the problems to be solved in a specific country and on the nature and functioning of its existing information system institutions and traditions. Next, it is important to think about anticipated system users and the uses they would make of the information database. In poor countries it is assumed that users would include the national government, relevant civil society groupings, and international development partners. Ideas on principle use categories, based on the 'two-track' concept of an expanded FIVIMS, are contained in Figure 4.

5.2.1. Information users and uses in the two-track approach

Figure 4 is presented in a very generic form, mainly to emphasise the dual use of the proposed information and mapping system: dealing with short-term transitory hunger and related nutrition and health problems (track one: "keep people alive and healthy") and providing input into longer-term livelihood strengthening programs (track two: "stabilise and improve household

[38] Starting with *process budgets* which record physical input/output relationships (per hectare or per livestock unit), through *enterprise budgets* which are normally commodity-specific financial summations of costs and returns to the process budget, to *whole farm budgets* which represent groups of enterprises which would be typical combinations for agricultural livelihoods in a particular geographical area, or a *recommendation domain* (groupings of households who have equivalent assets but are necessarily geographically contiguous).

incomes"). In practice this general schematic approach would have to be adjusted to country realities. It would have to take into account the extent and nature of specific problems, existing institutional sources of information, traditions of collaboration (or lack of collaboration), the roles played by international and bilateral partners, resources available for intervention (both short and longer term), and so forth.

In terms of 'track one' – safety nets to deal with immediate hunger and other problems with a direct impact on nutritional outcomes – the FILSIS approach would only make sense if it were directly useful to the main organisations providing this type of assistance: UNICEF, WFP, WHO, bilateral donors and the NGOs that work with their resources, and the main national institutions involved (both governmental and civil society). In the case of Kenya for example, the information and mapping system would be the main source of information for guiding food aid deliveries and other nutrition-oriented interventions that were conducted in the targeted arid and semi-arid districts during the recent drought. The bottom-up ALRMP information system (largely World Bank-funded) would be one component in the overall system, and there would need to be vulnerability, hunger and poverty information collection mechanisms in all of Kenya's districts. Given the great differences among the districts, in terms of population numbers, agro-ecology and whether the population and its livelihoods are subject to weather-induced livelihood shocks, these district-specific information systems would need to vary in techniques but also share as many characteristics as possible. Thus, all districts should be able to assess the life cycle vulnerability indicators (e.g. child nutrition, group-specific mortality rates, prevalence of HIV and malaria, primary school attendance from the MDG 'checklist') from both monitoring and early warning perspectives. However, the livelihoods portion of the information system would have district-specific components relevant to the livelihoods in that district.

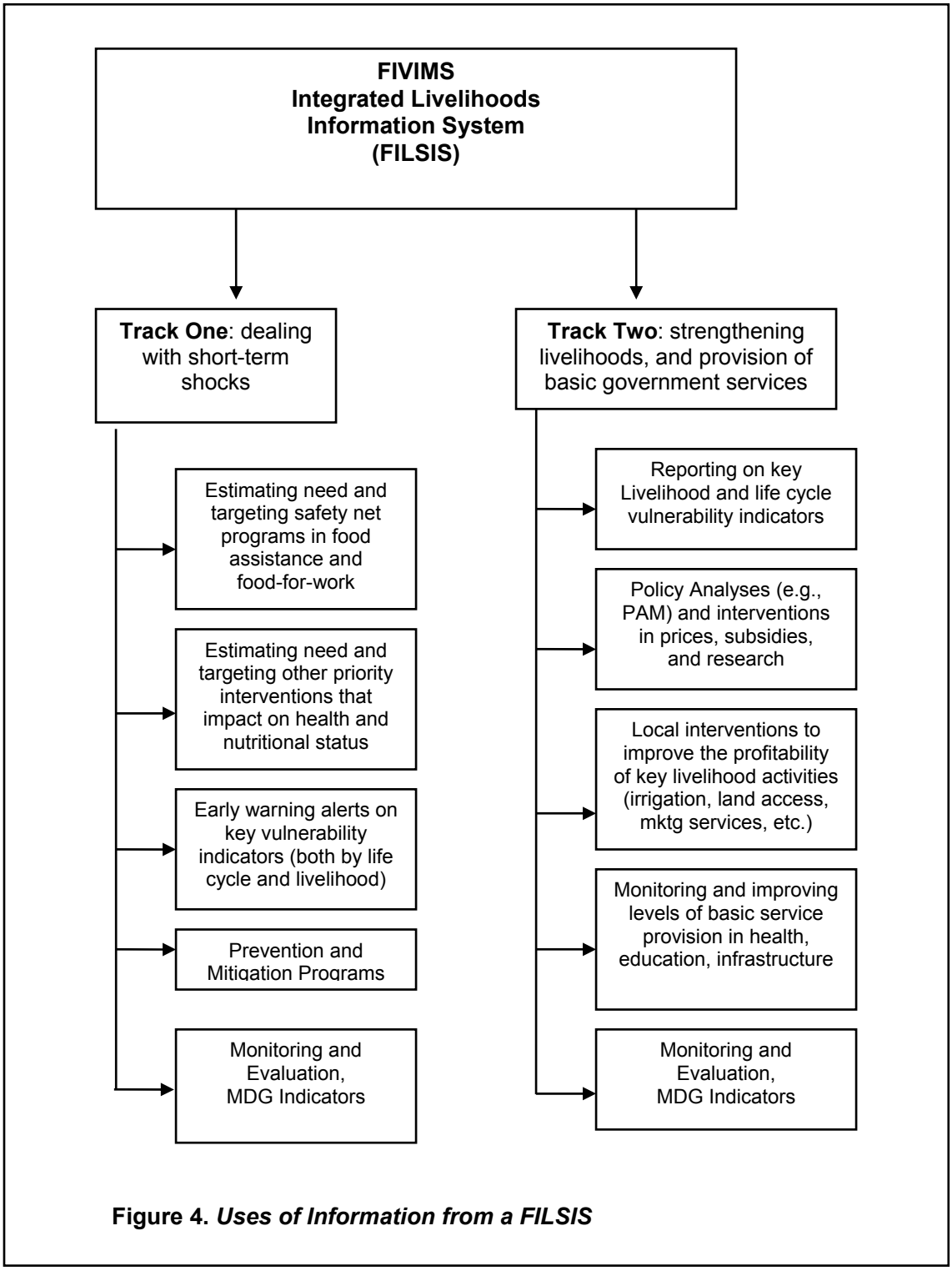

Figure 4. ***Uses of Information from a FILSIS***

Thus in Kenya, the information system for an arid district would collect and monitor early warning information specific to livestock-based livelihoods, while in a high-density, crop-producing highlands district, it would focus on variables such as household composition, size of land holdings, and other determinants of household income relevant to crop-based livelihoods. (In Kenya's 'high potential' districts an important task is to design a method for the identification

of vulnerable households who are living in the midst of relative plenty.) This is the thinking that has underpinned the early development of the FIVIMS programme in Kenya, working within the KFSSC and KFSM institutional framework in the Office of the President. To date, however, limited resources and minimal inter-agency collaboration have prevented this system from developing along the integrated lines presented here [see Section 5.3 for further discussion].

Summary statistics for both personal vulnerability factors and livelihood viability at the household level should be available from the village to district to provincial and broad regional aggregations. In addition, the system would produce early warning indicators that are relevant both to individuals (disease, anthropometry) as well as livelihood vulnerability (rainfall, crop growth, livestock mortality). The information base and reporting would have to be both timely, for early warning purposes, and detailed, to allow for appropriate remedial interventions (highly targeted food aid, emergency assistance in water supply, special vaccination campaigns) in a graduated response to identified and localised problems.

Like other African countries, Kenya is rapidly urbanising. Special approaches need to be developed to collect life cycle vulnerability information and do livelihoods characterisation and mapping in these environments. The FILSIS concept will make even more sense if it can tackle the challenges of characterising urban livelihood vulnerability.

On the 'track two' side of Figure 4, the emphasis is on information about the provision of routine government supporting services (in the areas of health, education, communications, transportation and commercial infrastructure – roads, marketplaces, etc. – and to a wide variety of potential actions to strengthen and support key livelihoods systems. As we know, these two 'sub-emphases' interact over time: basic decentralised government services prepare the population to better participate in livelihood activities (people are healthy enough to work, children are learning appropriate general and technical skills in school, roads are passable which affects input and product prices, time and money-saving use of the phone system facilitates commerce), and growth in profitable livelihoods should allow for local government revenue generation which can help pay for maintaining and expanding coverage of essential services.

Interventions to "strengthen livelihoods" – especially with respect to agricultural or food-based livelihoods – can cover a wide range of interventions, including:

- policy interventions that affect input and output prices and production profitability;
- interventions that affect the input/output coefficients of production, processing, and marketing technology (e.g. agricultural research into new varieties or mechanisation);
- localised interventions that affect the resource position or skills set of the household, such as changes in access to land (land reform), availability of water (irrigation), and local institutions for input and output marketing (farmers associations).

This wide range of interventions is associated with a wide range of information needs about target livelihood groups and activities. Anticipated changes in livelihood profitability will occur over a range of time horizons that vary from several months (price policies with fairly immediate impact) to medium and longer-term time periods (a phased process of land tenure reform). However, the starting place is always an analysis of the current situation. What crops, livestock enterprises, and patterns of activities are grouped together into typical local livelihoods? How are these specific activities connected to asset accumulation and disinvestment and other coping strategies? What activities are currently profitable for at least some households, and have the potential to be more profitable in the future? One useful approach to these questions is the 'Policy Analysis Matrix', which is discussed next.

5.2.2. Use of farm management information by the PAM method

The inter-disciplinary utility of basic farm management data to a FILSIS-type information and mapping system has been shown convincingly in different countries through the use of the Policy Analysis Matrix (PAM) approach (see Monke and Pearson, 1989). The PAM has a number of important strengths:

- A PAM integrates micro- and macro-analysis through the construction of commodity-specific enterprise budgets which can be easily aggregated and evaluated.
- The construction of the basic farm-level budgets is easy for non-economist technical specialists and literate politicians to understand. Interactively, using spreadsheets, they can participate in modifying basic assumptions about the production process, yields, etc. which allows them to develop ownership of the resulting analyses.
- The use of nominal local and international prices for 'tradeable' inputs and marketed products allows comparative static analysis of international comparative advantage of different commodity systems. This makes it easier to justify investments in some commodity development programs. It also indicates where improved technology, etc. can help make other commodity sub-sectors more profitable for producers and other market channel participants through 'reasonable' sensitivity analyses.
- The PAM itself is simply a matrix which aggregates for the economy as a whole the differences among commodities analysed in financial (local prices) and economic terms (international prices), which clearly illustrates the gains or losses from taxes and subsidies. The PAM makes appropriate use of its inherent market orientation, conforming to broad lines of the 'Washington consensus'.

In sum the use of appropriate and proven applied analytical tools such as the PAM can generate critical decision-maker support for collecting the type of data needed for the analyses and for maintaining them in an accessible format in the FILSIS-type data base. This also permits very targeted interventions as part of livelihood improvement programs.

5.3. Desirability and feasibility of undertaking a FILSIS-type programme in the FAO/FIVIMS context[39]

The feasibility of implementing a FILSIS-type programme at country level is dependent on a big change in information system practice at country level in poor countries. Currently, what happens in most settings is that donor resources are carefully manoeuvred into creating an information system capacity within one Ministry which is ignored by other ministries and donor groups, which feel they have to fund their own efforts. Alternative 'lone wolf' scenarios are: (a) the international agency creates its own information collection scheme for its own ends – WFP (VAM), USAID (FEWS), WHO, and UNICEF all do this to a large extent in their programmes in poor countries; (b) sometimes the UN system undertakes an information system activity as a UN 'group project', often ignoring government participation, either for ease of operation or to avoid political clashes. Whatever the reasons – inwardly-looking incentive structures within agencies, weak governments, etc. – the consequence of these divided efforts in information systems is duplication, wastefulness, and a statistical 'failure of the commons'.

[39] In a second paper written for this project, David Wilcock addresses in more detail the topic of institutional and organisational issues in FAO, with specific reference to the design and implementation of global and national FIVIMS.

One lesson from the FIVIMS field programme to date is that it is hard to put a FILSIS-type system into place without substantial resources and concerted effort by both the national government and its development partners. Spending small amounts of money ($200,000 - $300,000 is a typical budget for initial FIVIMS country work) is sufficient to introduce the FIVIMS idea and do some diagnostic studies, but not to achieve a critical mass and begin to change the nature of collaborative information collection, analysis and dissemination. Without that critical mass, it is difficult to marshal continuing demand for higher quality information products (bulletins, special reports, etc.) and services (on-line access to the database and its mapping capabilities and customised outputs and reports, either done contractually for the user or as joint activities between the coordination unit and the user).

What the 'average' poor sub-Saharan African country needs is a long duration (5-10 years), sizeable ($1-2 million/year), well supported effort that begins to translate cross-agency commitments such as FIVIMS, DevInfo, and the Paris 21 initiative into serious collaborative partnerships between governments and development partners.[40] 'Well supported' means active participation by all significant donor partners and government agencies working in basic needs and livelihood strengthening, and an appropriate coordination and technical unit well placed in government structures, to allow access to top national leaders and to assure participation and data sharing by all parties. It is within such country-level programs that the advantages of reduced information system duplication and increased synergies from inter-agency collaboration, economies of scale, technological specialisation, easier reporting, and sustainability can be realised.

5.4. Conclusion

The implications of these proposed changes in country-level practice are far-reaching, both in terms of the design and content of information systems such as FILSIS, but also in terms of re-thinking current (dispersed) information collection processes and the unsustainability of national institutions. A few summary points to conclude this section:

- Current donor practice of *ad hoc,* uncoordinated funding and subsidisation to national information collection efforts has created a situation of declining information quality, when greatly improved quality is needed in order to pursue two-track approaches to making real progress in meeting the MDGs and other international targets.
- One consequence is that participation in donor-funded information collection efforts is parcelled out among government employees and consultants as windfall income, and is not seen as a means of delivering improved services to needy population groups.
- Creating information and mapping capacity with an ability to focus on failures in basic needs service delivery presents a threat to many governments, since it could draw critical attention to distributional inequality (politicisation). Only if donors and technical agencies band together can these political considerations be circumvented.
- Many information collection and data analysis tools that have been imported into poor countries with little modification leave much to be desired.[41] Since the 1980s, household budget and consumption surveys (like LSMS) have emerged that are better tailored to the information needs of poverty and hunger reduction programmes. More work is needed on creating this 'suite' of more appropriate methodologies.

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[40] DevInfo is the intra-UN information system that is designed to accompany the development of the CCA-UNDAF process in participating countries 'PARIS 21' stands for 'PARtnership In Statistics for Development in the 21st Century' (see www.paris21.org).

[41] One example is labour force surveys, which focus too much on formal employment and not enough on the informal and self-employment sectors.

- Collecting, analysing, and disseminating good quality information costs money, and will require continual donor subsidy in the poorest countries to allow use of the latest computer technology, GIS mapping, database software and analytical methods.
- Donors also need to reconsider their attitudes to training and remunerating local staff, including topping up inadequate government salaries when necessary. Donors tend to criticise local information systems as inadequate, but prefer to create parallel information collection services run by expatriate consultants, rather than investing relatively minor amounts of funding for local technical and institutional capacity building. This approach is unnecessarily expensive, and institutionally unsustainable.

The institutional, technical and financial challenges to doing the needed information system work, especially operating through western 'results-based' organisations and their national government and NGO partners in poor countries, are truly daunting. Significant progress will only be possible if this is prioritised and pragmatic mechanisms are set up to enable local personnel to do the job correctly. Developing new country information strategies that are better adapted to the needs of key user groups is a precondition for giving concrete meaning to programmes such as Paris 21 – and 'FILSIS'.

6. CONCLUSION

The new millennium is in many senses the dawn of a new era, not least in the use of new information systems tools (such as GIS mapping) that should assist in the final conquest of extreme poverty and chronic hunger in parts of the world that have historically been the most vulnerable – and least well integrated into food security information systems. These new information tools need to be included systematically into the normal or 'minimum set' of analytical tools for very poor countries, both to improve monitoring and evaluation and to guide food security interventions. This is one part of the emerging agenda for the UN and associated groups around the world. To make progress, the FAO and its international and in-country partners need to work together in the definition, field-testing, and application of this new set of tools.

The ideas explored in this paper have been constructed around what appears to be an emerging consensus on information needs for intervention in the most affected countries. The MDGs provide a common set of target indicators for improved outcomes. There is a consensus among field-oriented agencies on the centrality of livelihoods for understanding and dealing with both short-term shocks and chronic food deficits, and how chronic and transitory food insecurity combine to whittle away asset buffers and erode the resilience of coping strategies. There is also a growing awareness that all of the standard statistical census and survey instruments need to be drawn on – but also adjusted so they are more compatible with understanding practical household survival mechanisms, which are best captured in livelihood studies, until recently conducted mainly on a localised basis.

None of the components of what is suggested are new. The basic methods are already 'on the shelf'. The first challenge is to demonstrate that they can be assembled and made to work together in a useful information and mapping system, simultaneously meeting multiple stakeholder needs. The second (and undoubtedly more difficult) challenge is to get different agencies to truly collaborate together, both at the international level and in specific country-level pilot projects. The FIVIMS external assessment and strategic planning exercise will culminate in a meeting of high-level managers to review results and plans for strengthening the inter-agency process. Hopefully the ideas in this paper, combined with other views, can play a useful role in developing a methodological action plan to help in the combined fight against hunger and extreme poverty.

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