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Theme 2: The use of nutritional indicators in surveillance systems

Contents

Technical Paper 2: The use of nutritional indicators in surveillance systems

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Final Draft

Technical Paper 2

The use of Nutritional Indicators in Surveillance Systems

Nutrition *Works*

International Public Nutrition Resource Group

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Executive Summary

The aim of this paper is to improve understanding of the use of nutritional indicators in surveillance systems that feed into Food Insecurity and Vulnerability Information Mapping Systems (FIVIMS) both at global and at national level[1]. The focus is on nutritional indicators (i.e. anthropometry and indicators of micronutrient status) rather than the total range of indicators often collected as part of nutritional surveillance systems (e.g. indicators of food production, food prices, etc).

The paper has drawn extensively on experiences over the past 25 years of nutritional indicator monitoring in both stable and emergency settings. The first part of the paper reviews the strengths and weaknesses of the main methods of nutritional indicator monitoring and makes recommendations for strengthening adopted methods. The second part of the paper sets out to answer certain key questions about both nutritional indicator monitoring and nutritional surveillance systems within which such monitoring takes place. The third section of the paper deals with conclusions and makes a number of recommendations for FIVIMS.

The main findings and recommendations of this paper are as follows:

FIVIMS should be aware that nutritional indicators are not exact measures of food security (or poverty) and that different nutritional indicators measure different things. Nutritional indicator monitoring can, however, form a valuable component of nutritional surveillance systems. FIVIMS should therefore incorporate nutritional indicators, which are already collected through existing surveillance systems.

There are many methods employed to monitor nutritional indicators. Each method has advantages and disadvantages. Furthermore, experience of these methods over the past 25 years indicates important ways in which each method can be strengthened. FIVIMS should support the establishment of nutritional surveillance systems and strengthen existing systems through:

i) increasing awareness of the institutional, methodological, design and resource issues pertinent to different methods of nutritional indicator monitoring;
ii) ensuring understanding of the conceptual framework for malnutrition and encouraging the inclusion of additional data into nutritional surveillance systems which can enhance causal analysis.

There has been less investment in establishing micronutrient surveillance systems than in anthropometric indicator monitoring. As a result there is a lack of baseline and time-series data on micronutrient deficiency diseases. Furthermore, during emergencies micronutrient surveillance is generally only established once a public health problem has emerged. FIVIMS should therefore support the development of micronutrient deficiency surveillance systems, particularly pre-emptive systems during emergencies.

[1] National FIVIMS is distinct from the IAWG-FIVIMS co-ordinating secretariat and technical specialists at the international FAO level. National FIVIMS usually refers to a co-ordinated inter-ministerial information mapping system focused on food insecurity and poverty reduction. Where national FIVIMS systems exist, they tend to be composed of staff responsible for a national food insecurity and mapping system. There are also a number of FIVIMS programmes funded by specific donors in a small range of countries – primarily working to strengthen national FIVIMS.

There are many examples of situations where good nutritional surveillance information has not elicited appropriate or timely response. One of the key factors in poor response has been the lack of an institutional framework setting out how information should be used and acted upon. FIVIMS should support initiatives (on a country-by-country basis) to involve decision-makers in the design of nutritional surveillance systems and should encourage consideration of the most appropriate institutional linkages and location of nutritional surveillance systems in order to maximise potential responses to information.

Newly emerging sustainable livelihoods approaches (SLA) and a sustainable livelihoods (SL) framework offer potential 'pointers' for strengthening certain aspects of nutritional surveillance. FIVIMS should explore the potential benefits of incorporating aspects of an SL analytical approach into nutritional surveillance system design and implementation.

Contents

ACKNOWLEDGEMENTS ..... **II**

EXECUTIVE SUMMARY ..... **III**

CONTENTS ..... **V**

LIST OF BOXES ..... **VI**

LIST OF TABLES ..... **VI**

ACRONYMS ..... **VII**

INTRODUCTION **2**

SECTION 1: OVERVIEW OF NUTRITIONAL SURVEILLANCE SYSTEMS **3**

1.1 THE EMERGENCE OF NUTRITIONAL SURVEILLANCE SYSTEMS 3
Context and scope 3
1.2 OBJECTIVES OF NUTRITION SURVEILLANCE SYSTEMS 4
1.3 METHODS USED IN NUTRITIONAL SURVEILLANCE SYSTEMS 4
1.4 REPEATED SURVEYS 4
Repeated surveys at national level 4
Repeated small-scale surveys 5
1.5 GROWTH MONITORING 6
Clinic-based growth monitoring 6
Community-based growth monitoring 8
1.6 SENTINEL SITE SURVEILLANCE 9
Centrally-based sentinel site surveillance 9
Community-based sentinel site surveillance 10
1.7 SCHOOL CENSUS DATA 10
1.8 KEY VARIABLES IN DETERMINING THE APPROPRIATENESS AND FEASIBILITY OF NUTRITION SURVEILLANCE METHODS 11
Objectives of the system 11
Cost and availability of resources 11
Response capacity 11
Environmental factors 11

SECTION 2: KEY ISSUES **12**

2.1 HOW IS NUTRITIONAL STATUS RELATED TO FOOD SECURITY AND POVERTY? 12
Is nutritional status a good measure of food security? 12
Is nutritional status a good measure of poverty? 14
2.2 IS NUTRITIONAL STATUS A USEFUL MEASURE ON ITS OWN? 16
2.3 WHAT DO DIFFERENT INDICATORS OF NUTRITIONAL STATUS MEAN? 17
2.4 WHAT IS THE CURRENT STATUS OF MICRONUTRIENT DEFICIENCY SURVEILLANCE? 19
Micronutrient surveillance during emergencies 20
2.5 HOW IS NUTRITION INFORMATION RESPONDED TO AND USED? 21
Misconceptions about the nature and causes of malnutrition 21
Institutional linkages and accountability 21
Level of data analysis and control over resources 23
Ease of response 23
Response to NS data in emergencies 23
2.6 CAN AND SHOULD A LIVELIHOODS ANALYSIS BE MORE CLOSELY INTEGRATED WITH NUTRITIONAL INDICATOR MONITORING? 24

SECTION 3: CONCLUSIONS AND RECOMMENDATIONS FOR FIVIMS **27**

3.1 ANTHROPOMETRIC INDICATORS AND FIVIMS 27
3.2 STRENGTHENING EXISTING NS SYSTEMS AND SUPPORTING NEW SYSTEMS 28

National surveys....28
Small-scale surveys....28
Clinic and community-based growth monitoring programmes....28
Central and community-based systems sentinel site surveillance....29
Causal analysis of malnutrition....29
3.3 MICRONUTRIENT DEFICIENCY SURVEILLANCE....29
3.4 RESPONSE TO NUTRITIONAL SURVEILLANCE DATA....30
3.5 SUSTAINABLE LIVELIHOODS APPROACHES AND NUTRITIONAL SURVEILLANCE....30

ANNEX 1: EXAMPLES OF REGIONAL AND GLOBAL SYSTEMS OF NUTRITIONAL SURVEILLANCE....32

The Refugee Nutrition Information System (RNIS)....32
The Micronutrient Deficiency Information System....32

ANNEX 2: COUNTRY CASE STUDIES....34

Case Study 1: Using the Nutritional Surveillance Project (NSP) to monitor the impact of floods on health and nutrition in Bangladesh....34
Case Study 2: Repeated Nutritional Surveys Versus Community Screening in Ethiopia 35
Case Study 3: An overview of Tanzania's National Nutritional Surveillance System and the development of the District Surveillance System....36
Case Study 4: Adapting the crisis impact and recovery monitoring Nutritional & Health Surveillance System (NSS) in Indonesia for use in a decentralised government through the application of affordable new technologies....38

REFERENCES....40

BACKGROUND DOCUMENTS....41

List of Boxes

Box 1: The use of nutritional surveillance to monitor the impact of floods on nutrition in Bangladesh.... 5
Box 2: Using repeated small-scale surveys to target food aid and assess impact in Ethiopia . 6
Box 3: The use of clinic-based growth monitoring data in predicting deterioration in health and food security in Ghana.... 7
Box 4: Improving the quality of community-based growth monitoring in Bangladesh.... 9
Box 5: The uses and constraints of community-based sentinel site surveillance in Sudan....10
Box 6: School census in Costa Rica and Panama....10
Box 7: Commonly used measures of poverty....15
Box 8: Relationship between malnutrition and poverty in Tanzania....16
Box 9: Improving the causal analysis of malnutrition through combining measures of maternal and child nutritional status....17
Box 10: The use of different nutritional indicators to assess malnutrition in Bosnia....19
Box 11: The importance of institutional linkages – conflicting experiences in Kenya and Botswana....22
Box 12: Ending 'hidden hunger' in Tanzania....23
Box 13: International responses to nutritional surveillance data during emergencies – determining factors....24

List of Tables

Table 1: Anthropometric indicators commonly collected in surveillance systems....18
Table 2: Micronutrient indicators commonly collected in surveillance systems....20

Acronyms

ACC/SCN	Administrative Committee on Co-ordination/Sub-Committee on Nutrition
ACF	Action Contre le Faim
BMI	Body Mass Index
CNP	Community Nutrition Promoter
CPI	Capability Poverty Index
CRS	Catholic Relief Services
DHS	Demographic Health Survey
EPI	Expanded Programme of Immunisation
FIVIMS	Food Insecurity and Vulnerability Information and Mapping Systems
GNP	Gross National Product
HFE	Household Food Economy
HPI	Human Poverty Index
IDA	Iron Deficiency Anaemia
IDD	Iodine Deficiency Disorders
IDP	Internally Displaced Population
LBW	Low Birth Weight
LSMS	Living Standards Measurement Survey
MCH	Maternal and Child Health
MDD	Micronutrient Deficiency Disease
MDIS	Micronutrient Deficiency Information System
MICS	Multiple Indicator Cluster Survey
MSF	Médecins Sans Frontières
MUAC	Mid-Upper Arm Circumference
NASTF-NS	National Academy of Sciences Task Force on Nutritional Surveillance
NS	Nutritional Surveillance
NGO	Non-Governmental Organisation
OPM	Oxford Policy Management
RNIS	Refugee Nutrition Information System
SL	Sustainable Livelihoods
SLA	Sustainable Livelihoods Approaches
UN	United Nations
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
VAD	Vitamin A Deficiency
WFP	World Food Programme
WHO	World Health Organisation

Introduction

The aim of this paper is to improve understanding of the use of nutritional indicators in surveillance systems that feed into national Food Insecurity and Vulnerability Information and Mapping Systems. The focus is on nutritional indicators (i.e. anthropometry[2] and indicators of micronutrient status) rather than the total range of indicators often collected as part of nutritional surveillance (NS) systems (e.g. indicators of food production, food prices etc). This focus has been requested by the IAWG-FIVIMS co-ordinating secretariat who commissioned this paper in order to enhance their understanding of this important element of nutritional surveillance and food insecurity monitoring. It is recognised however, that surveillance systems which monitor nutritional status must also monitor a broad set of other (non-nutritional) indicators in order to understand the causes of malnutrition and to make the most effective use of nutritional information. The paper covers the use of nutritional indicators included both as part of NS systems and as part of other types of surveillance systems whose primary objective may not be nutritional.

The paper is divided into three sections. Section 1 provides an overview of NS systems. Different types of NS systems used both in development and emergency contexts are described and the main strengths and weaknesses of different approaches are discussed. Case examples are included in the text to illustrate key points. More detailed case studies on Bangladesh, Ethiopia and Tanzania have been included in Annex 2 as these are the main countries of focus in Technical Paper 1. The key variables in determining the appropriateness and feasibility of different NS methods are also discussed. Annex 1 provides a detailed description of two important global NS systems.

In Section 2, key issues are highlighted. Specifically, the following questions are addressed:

- How is nutrition status related to food security and poverty?
- Is nutritional status a useful measure on its own?
- What do different indicators of nutritional status mean?
- What is the current status of micronutrient deficiency surveillance?
- How is nutrition information responded to and used?
- Can and should a livelihoods analysis be more closely integrated with nutritional indicator monitoring?

Conclusions and recommendations are presented in Section 3.

[2] Anthropometric indicators in children refer to underweight (low weight for age), stunting (low height for age) and wasting (low weight for height) and in adults to body mass index (weight/height^2).

Section 1: Overview of Nutritional Surveillance systems

1.1 The emergence of nutritional surveillance systems

Nutritional Surveillance was first defined at the World Food Conference in 1974 as *"an ongoing system for generating information on the current and future magnitude, distribution and causes of malnutrition in populations for policy formulations, programme planning, management and evaluation"* (UN 1975).

In the late 1970s, the United Nations agencies established the Administrative Committee on Coordination- Sub-Committee on Nutrition (ACC/SCN) under which, a number of working groups were set up, including one on NS. The NS working group first met in 1979 and, at the same time, a number of regional meetings on NS were held signalling a growing interest in this area. Another body that was also active was the United States National Academy of Sciences Task Force on Nutritional Surveillance (NASTF-NS) which was set up in late 1978. Both the ACC/SCN and NASTF-NS have continued to be involved in reviewing NS activities, in analysing the data generated from NS systems and, in describing new approaches to improve global nutrition.

As concern grew in the 1980s about the potentially negative effects of economic recession on poor and vulnerable groups, NS systems were considered to be one of the best methods of assessing how people were being affected by economic adjustment policies and whether compensatory measures were working. During the early 1990s, however, there was a growing recognition that too much time had been spent on designing often elaborate NS systems and too little time had been spent on understanding how such information could actually improve the decisions that led to good policies and programmes. As noted by UNICEF *"While many NS systems involved significant data collection, too few data were being compiled, fewer still were being communicated, and ultimately very few were used to improve nutrition related action"* (UNICEF 1998).

Context and scope

Nutritional surveillance systems are established and operate in both stable and emergency situations. The objectives of a particular NS system will be determined by the context. For example, in stable situations information may be required to inform broader developmental initiatives such as poverty reduction, while in emergencies, the information may be required to mount rapid food-aid focussed responses in order to save lives. The objectives of the system will influence which method of surveillance is adopted. In stable situations there is generally less urgency for information so the length of time between monitoring rounds can be longer than in emergencies. The choice of indicators may also vary between surveillance systems established for development versus emergency planning.

In some cases, surveillance systems may have been designed to operate in one context, e.g. a stable environment, but due to a change of circumstances may be used in another, e.g. emergency. In such situations the method may need to be adapted to meet revised objectives.

In recent years as conflict has become a major cause of emergency in developing countries (as well as natural disaster), emergency NS system design has had to adapt and in some respects 'compromise' methods of data collection.

Surveillance systems range from repeated measurements on small populations of a sample of households, e.g. sentinel site monitoring, through national level surveys involving thousands of households, to regional and global systems of surveillance (see Annex 1 for a description of two global NS systems).

1.2 Objectives of nutrition surveillance systems

NS systems have four principle objectives*: programme design, programme management and evaluation, policy-making,* and *crisis management* (Mock and Mason 2000). These objectives are not mutually exclusive and may also be modified over time depending upon changes in the external environment. In practice, NS systems are frequently used for a range of activities. These include the prioritisation of social sector resources, early warning of food crisis, targeting specific interventions, on-going monitoring and evaluation of nutrition programmes, developing the capacity of individuals, households and communities to manage their nutritional problems, and for macro and international level policy and advocacy.

1.3 Methods used in nutritional surveillance systems

The methods of data collection in NS systems are usefully grouped into four categories: *repeated surveys* (national sample surveys and smaller-scale surveys), *growth monitoring* (clinic based and community based), *sentinel site surveillance* (community based and centrally based)[3] and *school census data.*

1.4 Repeated surveys

Repeated surveys refer to statistically representative population-based surveys carried out at regular intervals. This category covers national surveys regularly undertaken in stable situations such as the national Demographic Health Surveys (DHS), the UNICEF supported Multiple Indicator Cluster Surveys (MICS) and the World Bank supported Living Standards Measurement Surveys (LSMS). It also includes small-scale surveys that are carried out to guide specific nutrition-related programmes. Repeated small-scale surveys are used in planning, monitoring and evaluating development projects and are also commonly used during emergencies.

Repeated surveys at national level

The main strength of national surveys is that they are representative of an entire population and can therefore be used to assess macro-level policies and the impact of national nutrition-related programmes. Survey results may also be used to determine geographical areas for targeting on the basis of high levels of malnutrition. Weaknesses include the very high costs of implementation[4] the frequent lack of contextual information, the exclusion of some population groups[5] and the inability to disaggregate data on the basis of gender or socio-economic groupings.

[3] Distinction between community and centrally based sentinel site surveillance may not be clear cut, e.g. centrally administered systems may utilise community enumerators and involve elements of community-level analysis.

[4] The Kenya National Welfare Monitoring Surveys in 1994 and 1997 cost an estimated $700,000 (personal communication).

[5] The pastoral and nomadic communities were included for the first time in the Kenya National Welfare Monitoring Surveys in 1994. However, the logistics and field costs for these areas accounted for 50 per cent of survey costs. Although, planned for the 1997 survey, lack of funds meant that coverage of the same areas was not possible (personal communication).

National-level surveys can be expanded or adapted to capture the impact of a major crises and to determine where resources are most needed. A recent example of this is presented in Box 1 below.

Box 1: The use of nutritional surveillance to monitor the impact of floods on nutrition in Bangladesh

A NS project was established in Bangladesh in late 1989. This grew from a small-scale project into a nation-wide monitoring system. The NS project collects nutrition, health and socio-economic data every two months from a random sample of households throughout rural Bangladesh. Data collected through the project are used extensively within Bangladesh to monitor trends in nutritional status, to advocate for health and food policies and programmes, and to assess the impact and recovery from natural disasters.

In August 1998, one of the worst floods of the century hit Bangladesh. The NS system was flexible enough to expand the sites for data collection and to allow several questions to be added to the household questionnaire to capture information on the extent and magnitude of this particularly devastating flood. In order to act upon the results as quickly as possible, the completed questionnaires were processed immediately and the results were shared within Bangladesh through presentations and a series of short bulletins. Local NGOs, donors and others used the results to advocate for, and secure resources for households affected by the flood.

Source: Helen Keller International/Bangladesh

Repeated small-scale surveys

The advantage of repeated small-scale surveys is that they are relatively quick to implement and to analyse. In emergency contexts, this is particularly important as data on the prevalence of wasting can be used to trigger specific interventions[6], although this may be problematic in situations of chronic emergency[7].

The weaknesses of using repeated smaller-scale surveys relate to the often limited scope for data disaggregation which may not be sufficient to allow targeting of particular population groups (targeting may in any case be difficult for political reasons). The costs, in terms of human resources and staff time, are also high when surveying in widely dispersed communities[8]. Obtaining statistically representative samples in areas of insecurity may also be problematic[9]. If the information collected

[6] Guidelines advocate that a prevalence of wasting above 20 per cent or between 10-19 per cent with aggravating factors like inadequate general food rations should trigger blanket and targeted supplementary feeding programmes in conjunction with therapeutic feeding. Prevalence rates of 10-19 per cent or 5-9 per cent with aggravating factors would trigger targeted supplementary feeding and therapeutic feeding only (MSF 1997).

[7] In Mandera in Kenya, for example, widespread and severe poverty and lack of services amongst the resident community has lead to a situation where the prevalence of wasting has continuously been at a level that would normally trigger an emergency response. However, such a response is inappropriate without other multi-sectoral interventions (Duce-Marques 1998).

[8] In 1991, Concern conducted a rapid (Mid-Upper Arm Circumference) MUAC survey in 600 villages in South White Nile Province in Sudan in order to determine the need for emergency supplementary feeding at village level. The survey took over six weeks in contrast to two nutritional surveys conducted in internally displaced population (IDP) camps in Kosti which took only two days. The advent of a harvest meant that the survey findings rapidly became out of date and it was too costly and time consuming to conduct a repeat survey (Borton, Nicholds and Shoham 1991).

[9] The methodology adopted in a NS system based on repeated surveys in Bosnia between 1993-5 involved purposive household sampling rather than random sampling due to logistical and security constraints. Samples were therefore not representative (Watson and Vespa 1995).

is confined to anthropometry, the survey will lack important contextual information concerning factors such as food security, main livelihoods groups and access to public services in the area. An additional problem is that the methodology adopted in repeated surveys may not be standardised so data may not be comparable between surveys or over time[10]. Furthermore, surveys have limited value at the community or household level in terms of nutritional education and support for the management of individual cases of malnutrition (unlike growth monitoring programmes).

Box 2 provides an example of how small-scale surveys were used in Ethiopia to target food aid, measure the impact of the intervention and determine when it was appropriate to phase out support.

Box 2: Using repeated small-scale surveys to target food aid and assess impact in Ethiopia

Following three successive poor harvests in Damot Woyde Woreda in North Omo Zone in Ethiopia, Concern Worldwide conducted a nutrition survey in April 2000. The prevalence of wasting (weight for height < -2SD) was 25.6 per cent of which 4.3 per cent was severe (weight for height < -3SD). In response, Concern mounted targeted therapeutic and supplementary feeding as well as a general ration programme. Concern also distributed seeds required by farmers, including teff, sweet potato, wheat, maize and beans. In addition to identifying the acute need for intervention in these areas, the survey results gave Concern the necessary information to highlight the whole area of Wolayita as one that required urgent attention and as a result received priority status for food distributions by WFP.

A second survey was undertaken three months later. This identified a dramatic improvement in nutritional status (6.4 per cent wasting with only 1 per cent severe wasting). A third survey in October showed stabilisation in the rate of malnutrition (7.2 per cent wasting with 1 per cent severe wasting). The improvement was partly attributed to the interventions. The stabilisation of malnutrition and the imminent arrival of another harvest allowed Concern to phase out the general ration. The therapeutic feeding programme was stopped in October and supplementary feeding only continued until the large number of beneficiaries had reached their target weight.

Source: Concern Worldwide, Ethiopia

1.5 Growth monitoring

Growth monitoring refers to the continuous monitoring of growth (usually weight for age) in children. Growth monitoring can be conducted by health professionals at Maternal and Child Health (MCH) clinics (clinic-based) or by trained members of the community in villages (community-based). The main objective of growth monitoring is to monitor and manage the nutritional status of individual children and to mobilise local resources to support nutrition-related activities. Families with children at risk may be given a food supplement and/or nutrition counselling. Children are usually measured once per month. Community based growth monitoring is mainly used in UNICEF supported programmes or by international NGOs.

Clinic-based growth monitoring

An important strength of clinic-based growth monitoring data is that it is frequently the only regular source of nutritional data available nationally. Furthermore, as it is frequently an established part of the national health information system, it is an easily

[10] A review of 27 nutrition surveys in Iraq since imposition of the sanctions in 1991 found that many one-off small-scale surveys had been of little value as there had been little standardisation of measurements methods so that surveys were not comparable with other concurrent surveys or with larger baseline studies.

accessible source of data providing a potential source of information on trends and allowing comparison between geographical areas. Through identifying vulnerable geographic areas, targeting decisions can be made[11]. Clinic-based growth monitoring data may be especially useful in emergencies where there is insecurity and it is not possible to carry out surveys[12]. It may also provide early warning of a deterioration in health and food security as box 3 illustrates.

Box 3: The use of clinic-based growth monitoring data in predicting deterioration in health and food security in Ghana

From 1978, Catholic Relief Services (CRS) operated a feeding programme through the MCH infrastructure in conjunction with a NS system. About 7 per cent of pre-school children in Ghana were enrolled in the CRS MCH growth monitoring programme in 1981. Children under 80 per cent weight for age received a small supplementary ration. All data collected through the NS system were sent to Accra, and quarterly and annual reports prepared. These reports presented data graphically on regional and national rates of malnutrition and on regional attendance fluctuations.

By September 1981 the level of malnutrition (less than 80 per cent weight for age) was higher than usual and the normal post-harvest improvement had yet to take place by the end of the year. Over 1982, the system showed a more rapidly deteriorating situation with aggregate levels of malnutrition increasing from 38-45 per cent by June and recovering slightly by the end of the year to 41 per cent so that the hungry season effect was far more pronounced than in previous years. In 1983, there was a continued decline in nutritional status when, between January and June malnutrition, levels rose to 51 per cent improving somewhat by the end of the year to 46 per cent. In June 1983, the Government of Ghana declared a state of national emergency and requested international food aid assistance.

The CRS nutritional surveillance system had, therefore, been able to provide clear warning of an impending crisis 18 months before the Government's emergency declaration. Furthermore, the NS data could be disaggregated on a regional basis and could help to determine where the situation was deteriorating most rapidly.

Source: CRS Ghana

A major weakness with using clinic-based growth monitoring data is that the population who attend clinics is not representative of the total population[13]. There are several reasons for this. Firstly, only 'healthier' children tend to attend clinics for growth monitoring. Secondly, fewer children over the age of one year attend clinics for growth monitoring as vaccinations are complete and mothers may see no reason to attend. Thirdly, weighing and recording by clinic staff can be inaccurate. Nevertheless, the problems of underreporting at clinics is likely to be true in all clinics, thus information collected from different regions of the country can still be

[11] Clinic based growth monitoring data has been used successfully in Botswana for many years to identify and target areas for supplementary feeding and special direct feeding programmes involving family rations (Morgan 1985).

[12] The Food Security Assessment Unit in Somalia has used clinic-based growth monitoring data as part of its regular assessment of food aid needs. Although there are many weaknesses with the data, it has been acknowledged as a useful resource given the security risks of conducting nutrition surveys in many parts of the country (OPM 1998).

[13] A disparity of 13 percentage points was found in levels of underweight children (defined as weight for age < 80 per cent among under-fives) using clinic-based growth monitoring figures compared to a representative population-based survey of the same area. A survey conducted in Mbeya in June 1992 assessed the level of underweight as 22 per cent, while the figure assessed through clinic-based growth monitoring for the same month was 9 per cent (HANDS project 1993).

usefully compared and *changing* levels of malnutrition can be assessed. There are, however, some reported cases in the literature where this is not the case[14].

A further problem with clinic-based growth monitoring is that MCH staff often do not have the time or the training to be able to analyse and act on the population data which they are collecting. Usually it is necessary for a central body to collate and analyse data sent in from the clinics. This requires resources that many governments do not have. Unless donor funding is forthcoming, therefore, vast amounts of data can be collected but are not analysed or used. The system may be unsustainable without outside donor funding and so the system collapses[15].

Clinic-based growth monitoring data also suffers from the constraint that information, which could explain the causes of malnutrition, is not necessarily available. Growth monitoring data alone is of limited use.

Community-based growth monitoring

Community-based growth monitoring is widely supported by UNICEF, international NGOs and, more recently, World Bank supported nutrition programmes. An important element of this approach is to empower communities to gather, interpret and act on nutrition-related information.

The strengths of a community-based growth monitoring system is that it can work very well when community nutrition mobilisers are adequately resourced, trained and supported to facilitate communities to deal with nutritional problems. They can also provide a more comprehensive coverage of the under-five population compared to clinic-based growth monitoring.

The weaknesses of this approach include problems of data accuracy, delays in analysis, lack of contextual information to complement the growth monitoring data and difficulties in ensuring that information receives attention from the district or regional level. Box 4 provides an example of a large-scale community-based growth monitoring system in Bangladesh and highlights the importance of effective management of such a system.

[14] A study from selected areas of northern Malawi concluded that the validity of clinic-based data for nutrition surveillance within countries for targeting purposes is highly suspect and that their validity in each setting should be demonstrated rather then assumed (Pelletier, D. and Johnson, C. 1994).

[15] The national NS system in Tanzania that relied on data collected through clinic-based growth monitoring collapsed after less than 10 years as it relied on outside donor funding which was withdrawn (Tanzania Food and Nutrition Center, personal communication).

Box 4: Improving the quality of community-based growth monitoring in Bangladesh

The National Nutrition Programme (NNP), implemented in the late 1990s in Bangladesh includes a monitoring system designed to support decision-making in the programme that utilises data 'on the way up' i.e. at the village, union and upazila levels before data is aggregated at the central level.

Monthly weight for age of children up to 24 months and pregnancy weight gain data are collected by Community Nutrition Promoters (CNP): women from the community who are trained by contracted NGOs and supervised by community nutrition officers. The data are intended to trigger an appropriate response at the village, union or upazila level. For example, communities with less than 80 per cent growth monitoring coverage or less than 90 per cent of eligible children and women receiving food supplements, or more than 5 per cent of children with severe malnutrition (<60 per cent weight for age) are identified for special follow-up by the relevant community or government worker and appropriate action taken.

The nutrition monitoring data is also used to assess the effectiveness of the programme inputs. For example, it has been possible to assess the impact of a daily food supplement (equal to 600 kilo calories) targeted at low Body Mass Index (BMI) pregnant women and to establish that these women have had better pregnancy outcomes (pregnancy weight gain and birth weight) than the higher BMI and economically more advantaged pregnant women.

Data reliability has been an area of concern in the NNP and is mirrored in many other programmes of this kind. The problems range from mechanical failure of the weighing scales, reading and recording failure and in some instances, intentional misrepresentation of the data by community workers wanting to make their performance in relation to nutrition outcomes look good. Having recognised these problems, the NNP is implementing quality checks that include 'day after' re-weighing, improving the quality and reliability of the weighing scales and increasing the level of supportive supervision for the CNPs.

Source: Personal communication

1.6 Sentinel site surveillance

Sentinel site surveillance refers to the monitoring of purposively selected communities or service delivery sites in order to detect changes in context, programme and outcome variables. Communities are purposively selected for a number of reasons. For example, a community may be of particular interest because of its innovative farming practices or a community may be particularly vulnerable to food insecurity in times of crop failure. Data can be collated and anlaysed centrally (centrally-based) or by trained members of the community (community-based). Clear distinction may be difficult as centrally based systems may have elements of community involvement. Centrally based systems are more likely (but not always) to carry out statistically valid anthropometric surveys.

Centrally-based sentinel site surveillance

Centrally-based systems are less costly than national surveys and can reveal more in-depth information on the causes of malnutrition. Data collectors tend to spend a longer period in the targeted communities (as they are covering fewer areas) and, where the results are pre-processed in the field, rapid feedback can be given to the community. Where the surveillance targets the most vulnerable communities, this can provide good early warning of crises.

The main weaknesses of the approach are: the lack of inclusion of population groups which may also be of interest but have not been selected; the fact that the data

collected is not representative of the wider population and cannot be generalised; and the risk that the data may not be comparable with other survey data.

Community-based sentinel site surveillance

Community-based surveillance, as with community-based growth monitoring has the potential advantage of empowering the community whilst at the same time being of relatively low cost when compared to centrally based systems. This kind of system is particularly useful in emergencies when insecurity prevents representative sampling.

The major constraints of the method are that the areas selected may not be representative of the wider population and that data quality may not be high. These constraints may mean that data are not used by decision-makers because of their unreliability, and that as a result of inaction, the level of community participation is reduced. Another constraint may be the 'opportunity cost' to those collecting data as there may be no remuneration. Box 5 illustrates some of these problems.

Box 5: The uses and constraints of community-based sentinel site surveillance in Sudan

A community-based sentinel site NS system was set up in Darfur, Sudan. Results from the system showed that the prevalence of malnutrition increased at the same time as market prices changed between 1988-90. Weight for height data therefore provided a timely indication of change in food security. The key underlying cause of increasing prevalence of malnutrition was food insecurity. as a result of prolonged drought, lack of income earning strategies and isolation. These causes operated beyond the level of the community and could only be addressed at regional or national level. In June and July 1991, the nutrition monitors carried out an assessment and weighed and measured all children. The results showed high rates of malnutrition, which fitted in with previous patterns. But the authorities of Khartoum questioned the reliability of such community monitoring. Observers believed that this provided a convenient excuse to ignore the data. The sentinel site surveillance system was replaced by province wide nutritional surveys soon after.

Source: Young and Jaspars 1995

1.7 School census data

Nutritional indicator monitoring is occasionally undertaken in schools (see box 6 for an example). The usual form of measurement is height for age (height retardation or stunting). First grade children are often measured through censuses that are carried out every two to three years. The method has been used to identify high-risk populations with poor health, malnutrition and low socio-economic status.

Box 6: School census in Costa Rica and Panama

Cost Rica began conducting school censuses in 1979 and completed its fifth census in 1989. Stunting levels, as measured through the census, decreased by 45 per cent between 1979 and1985. The change in prevalence is believed to be a valid indicator of improvements in quality of life and development in Costa Rica during this period. This contrasts with Panama where the prevalence of stunting as measured through the school census increased between 1985 and 1988 from 19 per cent to 24 per cent. This was believed to reflect the socio-political crisis and the internal rural to-urban migration that was taking place.

Source: Food and Nutrition Bulletin 1991.

The main strengths of this method are that it is both cheap and provides very good population coverage. It can, however, be easily confounded by external factors such

as a reduction in attendance rates (particularly among girls) and the data cannot be extrapolated to the general population.

1.8 Key variables in determining the appropriateness and feasibility of nutrition surveillance methods

Many factors need to be considered when determining which type of surveillance method to implement or strengthen. Appropriateness and feasibility should ultimately underpin the choice of method. The section below briefly highlights four key factors to consider.

Objectives of the system

The primary objectives of the NS system should largely determine the method adopted. For example, if the primary objective is to strengthen resource-targeting decisions at national level, national surveys may be most appropriate. On the other hand, if the primary objective is to support households in the prevention and treatment of malnutrition then community or clinic based growth promotion programmes may be most effective. Clarity of objectives is therefore vital. There may, however, be multiple objectives when designing an NS system so that attempting to prioritise objectives will help decide which kind of system is most appropriate.

Cost and availability of resources

Matching recurrent costs with resource availability is key to deciding which type of method to employ. Some methods are far cheaper than others. For example national surveys are very expensive relative to community based systems so that donor funding often has to be found. In some situations this has severely compromised survey design (e.g. the Kenya national surveys conducted in 1994 and 1997). Clinic and community-based growth monitoring programmes frequently lack sufficient resources for data collection, collation and analysis. A view on the need to sustain a system over a period of time is a critical related consideration.

Response capacity

While the method may be partly determined by the objectives of enhancing decision-making capacity at different levels, e.g. household, community, district, national and international, the response capacity may vary enormously on a country by country and area by area basis. Choice of method will therefore need to account for response capacity at different levels. For example, if there is little response capacity at community level then there may be little point in implementing community based growth monitoring or sentinel site surveillance (see Box 5).

Environmental factors

Security, geographical terrain and infrastructure may be key determinants in choice of method. Insecurity may prevent representative sampling so that surveys are not feasible while poor infrastructure and difficult terrain may constrain regular information collection and flows in community-based systems of data collection.

Section 2: Key Issues

2.1 How is nutritional status related to food security and poverty?

The UNICEF conceptual framework described in the 1990 UNICEF Nutrition Strategy has become one of the most familiar images within the international nutrition community and has undoubtedly helped to foster an improved understanding and dialogue about the nature and causes of malnutrition.

In the framework malnutrition and child death are viewed as two of the manifestations of a multi-sectoral development problem that can be analysed in terms of the immediate, underlying and basic causes. The immediate causes are inadequate dietary intake and infectious disease. The underlying causes are household food insecurity, inadequate maternal and child-care, and inadequate health services and health environment. The basic causes include formal and non-formal institutions, political and ideological superstructure, economic structure and potential resources .

The framework does not imply that food, health and care are inadequate in all settings but that these three define the full range of possible causes of malnutrition. The relative importance of each must be *a*ssessed and *a*nalysed in each setting in order to define priorities for *a*ction (referred to as the Triple A cycle). For example, the dominant problem may relate to health conditions in a given community but individual households may still face problems related to food insecurity and/or care.

FIVIMS have developed and modified the conceptual framework so that it is a framework for understanding the possible causes of low food consumption as well as poor nutritional status (IAWG Guidelines series No 1). Food security related factors at different levels are therefore given a greater focus in the framework. However, the framework shares many similarities with the UNICEF framework in identifying the numerous factors that influence nutritional status.

Is nutritional status a good measure of food security?

The answer to this question depends on two key factors. Firstly, how reliably food security can be measured, and secondly whether and to what extent factors other than food security influence nutritional status.

In terms of the first key factor, food security is defined as: "*access by all people at all times to the food needed for an active and healthy life*" (World Bank 1986), but it is difficult to measure food security accurately at a national or global level. Usually, proxies of food security are used such as per capita caloric availability or percentage of the population with caloric deficits. The methodologies for these calculations are described and critiqued in Theme paper 1. There are clearly many conceptual and technical weaknesses with measuring food security using the above parameters. For example, food production estimates are notoriously inaccurate and many sources of food are unaccounted for. However, the main weakness of equating food security with caloric availability based upon food balance sheet estimates is that food security is a function of effective demand and entitlement as well as food supply. Although methodologies have attempted to address some of these weaknesses over the years (for example, measures of income distribution are taken account of) there are still many conceptual and methodological flaws which render these measures of food security unreliable.

A frequently overlooked conceptual weakness with measuring food security on the basis of caloric supply or deficit is that other key nutrients which are also essential to growth and weight maintenance are not considered. Adequacy of caloric supply may mask insufficient availability of micronutrients. Given the above definition of food security, omitting other nutrients that are essential for 'a healthy life' means that food security cannot be defined in terms of caloric availability alone.

In terms of the second key factor, the conceptual framework on causes of malnutrition illustrates that food security is only one factor among others which result in malnutrition. Thus, an exact relationship between malnutrition and food security would not be expected, as the health and care environment are equally important in determining malnutrition.

One attempt to examine the relationship between malnutrition and measures of food security was the ACC/SCN second report on the World Nutrition Situation (ACC/SCN 1993). In this report trends in levels of malnutrition (defined in terms of underweight children) were examined in relation to measures of food security (based upon per capita caloric availability) using a large sample of countries. The report found that the most important independent variable predicting level of underweight is the per capita caloric supply, which accounts for more than half of the explained variance in prevalence of underweight. As expected, the prevalence of underweight declines as kilo calories per capita per day increases. However, the data also showed a strong association with the percentage of government fiscal expenditures devoted to health, education and social security. In particular, there was a strong correlation with education of females and child underweight.

The ACC/SCN report above examined child malnutrition and measures of food availability. The work of the renowned economist Amartya Sen introduced the concept of food *accessibility* as opposed to food *availability.* The pivotal work by Sen in the 1970s established that historically in Bangladesh a poor correlation existed between overall per capita food *availability* and years in which there were food crises or famine. This work led to the development of Sen's entitlement theory whereby effective demand as well as food availability came to be seen as an important element in the development of famine conditions. (Sen 1981; Sen 1986). This analysis led to a paradigm shift in thinking about the development of famine and analysis of food security. Hence the definitions of food security used today emphasise accessibility to food (which incorporates both measures of effective demand and food availability). However, measuring accessibility to food is extremely difficult.

The ACC/SCN findings which showed a relationship between *availability* of food and malnutrition may be explained by a number of factors:

i) the way in which income distribution is accounted for in the ACC/SCN analysis goes some way towards representing effective demand;
ii) the large number of countries utilised in the ACC/SCN aggregate analysis masks individual country situations where there is a weak association between caloric availability and nutritional status;
iii) the strength of association between food availability and nutrition is partly a reflection of a strong association between food availability and fiscal expenditure on health and education.

Currently, the household food economy assessment (HFE) methodology developed and pioneered by Save the Children UK is probably the best methodology commonly being employed for quantitatively estimating access to food (or food deficits) for defined population groups. However, there are a number of concerns with HFE, e.g.

the validity of using qualitative methods to produce quantitative estimates of food deficits. The HFE methodology assesses food and income sources for different food economy groups as well as different wealth strata within these groups and also explores capacities to adapt to shocks. The result of the assessment is a calculation of food deficit for each food economy group. There have as yet been no systematic attempts to relate food deficits estimated by the HFE approach to the nutritional status of the same population group, although there is a growing awareness of the need to integrate food economy assessments within nutrition surveys (Field Exchange No 13). Until now, the most common use of the food economy approach has been to estimate food aid needs.

In conclusion, whether nutritional status is a good measure of food security will depend upon the existence and strength of other factors that may affect nutritional status, e.g. the health and care environment. In situations where food security is having a significant impact on nutritional status, the strength of association between nutritional status and food security will depend upon the accuracy of the food accessibility measurement. At a conceptual level (and based on good empirical evidence) it is best to utilise measures of food security which incorporate measures of effective demand as well as food availability and to only look for associations with nutritional status using such measures. In this context, there is a need for greater routine integration of food economy orientated analysis with anthropometric investigation.

Is nutritional status a good measure of poverty?

Poverty is both difficult to define and difficult to measure because of its multi-dimensional character and because of the different understanding by 'insiders' (those affected by poverty) and 'outsiders' (those studying poverty). It is therefore difficult to address the question of whether nutritional status is a good measure of poverty when there is uncertainty about what poverty actually is, and how it can be measured.

Different measures of poverty that are commonly used are shown in Box 7 below. Today, most organisations don't confine definitions of poverty to economic parameters alone, but include parameters relating to quality of life (educational level, access to resources etc.). For example, the United Nations Development Programme (UNDP) Human Poverty Index (HPI) uses composite indicators of deprivation: a short life, lack of basic education and lack of access to public and private resources. The latter is a composite of three variables: the percentage of people with access to health services, with access to safe water, and the percentage of malnourished children under five (underweight)[16].

[16] Stunting (cumulative deficits in height) is believed to be the nutritional indicator most closely associated with social deprivation and poverty. This is because the chronic conditions that lead to stunting (i.e. prolonged inadequate food intake and frequent episodes of illness) are associated with poverty. Most child underweight in developing countries in stable situations is caused by stunting.

Box 7: Commonly used measures of poverty

- The UN and World Bank currently use the figure of less than US$1.00 per capita per day at Purchasing Power Parity[17] to define global poverty.
- An absolute poverty line can be set which is equivalent to the cost of a minimum package of goods and services required for living.
- A relative poverty line can be established. This may be set at 50 per cent of mean income or expenditure, or set at a level below which a certain percentage (usually 30 per cent) of households will fall.
- Well-being indicators of poverty can be used which focus on outcomes. A matrix of key well-being indicators frequently include health and nutrition indicators such as life expectancy, infant and child mortality, and child malnutrition.
- A matrix of 'welfare indicators' can be used (these are socio-economic variables which capture aspects of living standards and details of people's lives which can be assessed at the individual or household level but cannot be readily reduced to a monetary estimate).

Source: Dolan and Watson 1998

The evidence suggests that while there is an association between nutritional status and measures of poverty, nutritional status alone is not an accurate or reliable measure of poverty. Multi-country data sets analysed in the Second Report on the World Nutrition Situation (ACC/SCN 1993), show a strong non-linear relationship between Gross National Product (GNP) per capita and prevalence of underweight in children. Furthermore, the effect of government social expenditures and female education (also measures of poverty) were also strongly related to the prevalence of underweight in children.

Analysis on a country-by-country basis showed, however, that the correlation between GNP and prevalence of underweight is not straightforward. For example, there are countries where improvements in nutritional status are far greater than would be expected based on improvements in GNP (e.g. in Indonesia in the early 1980s). The greater than expected improvements were attributed to successful outreach nutrition and health programmes.

There are also examples where nutrition has improved in spite of declining GNP. For example, in Kenya, national nutritional surveys conducted in 1994 and 1997 showed only a weak correlation between the prevalence of underweight children and poverty (measured using the Capability Poverty Index – CPI)[18] at provincial level while a stronger correlation was found with maternal education. Conversely, in Tanzania, where GNP has been steadily growing at a rate of four per cent, high levels of child malnutrition have remained virtually unchanged for the past ten years.

It is widely held that in times of economic growth, those countries that support nutrition programmes achieve a more rapid nutritional improvement than countries growing at similar rates without programmes. Similarly, in times of economic decline or stagnation, nutrition programmes protect or buffer the nutrition of vulnerable groups.

[17] Purchasing Power Parity is the purchasing power of a country's currency - it is the number of units of that currency required to purchase the same representative (or similar) basket of goods and services that a US dollar (the reference currency) would buy in the United States (UNDP 1995).

[18] The CPI is a composite of the per cent of: births unattended by health professionals, female illiteracy and well-nourished children under five years of age.

Box 8: Relationship between malnutrition and poverty in Tanzania

In Tanzania a follow up survey in Mbeya region to evaluate impact of a health and nutrition project showed an association between stunting and different measures of poverty. However, not all households classified as poor had stunted children, while stunted children were found in households classified as non-poor. Child stunting was therefore a sensitive indicator of the different measures of poverty but was not specific. Four possible reasons for the level of disagreement were identified:

- Inadequacy of poverty measures employed;
- Multi-causal nature of stunting which is not just caused by poverty;
- Stunting is a reflection of historical events which may not be captured by measures of current poverty;
- Stunting may occur in one child in a household due to discriminatory practices within the households so it is a better indicator of individual poverty than household poverty.

Source: Dolan and Watson 1998

During emergencies or food crises the link between nutritional status (measured by wasting) and poverty may be weak. This may occur for a number of reasons. Firstly, the poorer households may have already developed a more diverse set of coping strategies so that in the event of a shock some of these coping strategies may still be viable. Secondly, the emergency may have a significant impact on the health environment so that all socio-economic groups are at risk of infection and resulting malnutrition and, thirdly, in some cases, the localised impact of food insecurity may far outweigh differences in wealth between households[19].

In conclusion, poverty plays a major, but not exclusive role in causing child malnutrition. Anthropometric status does not therefore reflect household poverty perfectly. However, as an approximate proxy indicator anthropometric status (particularly stunting) has certain advantages: it can identify poor areas in a country which coincide with those identified by other indicators that are more complex and expensive to collect[20]. It is also an objective measure that avoids observer bias, and can be measured relatively quickly and easily by both technical and non-technical personnel. Furthermore, the concept of malnutrition is well understood by health personnel and local people and can offer an entry point into discussions about poverty leading to a better understanding of poverty related issues.

2.2 Is nutritional status a useful measure on its own?

Nutritional status data alone are of limited use in identifying what sort of intervention may be necessary (an exception to this may be in emergencies when prevalence of high levels of wasting indicate a need for selective feeding programmes). Additional data are usually necessary to be able to determine the likely causes of malnutrition and therefore the appropriate interventions. The UNICEF and FIVIMS conceptual frameworks suggest the type of information needed to ascertain cause of malnutrition. However, there is no 'scientific' methodology or consensus on how to utilise complementary data to determine the significance of, or to prioritise causes of malnutrition. For example, while information on disease patterns/trends may indicate

[19] A study in northern Darfur at the end of the 1980s found that differences in wealth had no relationship with nutritional status. Due to the scale of the crisis the wealthy had to reduce food intake in order to preserve assets, milking animals were grazed far away and richer households had significant kinship and community demands on their resources (Young and Jaspars 1995).

[20] This was found to be the case in Central American countries conducting school censuses on stunting in first year school children.

a role for disease in creating a nutritional problem, there is no method for determining the extent to which a change in prevalence of malnutrition has been caused by a disease outbreak or seasonal morbidity trends. There have, however, been some recent attempts to develop methodologies that will allow an analysis of primary cause of malnutrition as highlighted in Box 9 below.

Box 9: Improving the causal analysis of malnutrition through combining measures of maternal and child nutritional status

A recent study was based on the premise that the use of two types of nutritional data may improve understanding of cause of malnutrition and therefore help define the most appropriate method of intervention. The study examined nutrition survey results in India, Ethiopia and Zimbabwe that included data on maternal BMI as well as nutritional status of children under five. 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 security factors such as disease and care.

There are many studies that show a strong correlation between adult nutritional status and seasonal fluctuations in food security. Possible alternative explanations to these fluctuations include level of intestinal disease, HIV infection or trace element deficiencies. These problems would have to be very widespread, however, to explain the seasonal patterns observed in these studies. The nutritional status of young children was assumed to be more sensitive to non-food security factors (e.g. disease and care) than to food security, as young children are in the process of developing a competent immune system and are dependent upon carers.

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

Source: James, 2000

The need for additional information (on factors such as livelihoods, health, caring practices) to help interpret nutritional status data has implications for the decision about which method of nutritional indicator monitoring to adopt. For example, health data may be more easily collected as part of a growth monitoring programme based at clinic level as health staff will be present, whereas sentinel site systems may provide a better opportunity to collect in depth livelihood and food security information.

It is clear from these two frameworks that poverty and food insecurity are part of a complex of factors which operate at various levels and can contribute to malnutrition. It is therefore axiomatic that the strength of association between nutritional status and food security or poverty will vary depending on the impact of other factors.

2.3 What do different indicators of nutritional status mean?

Indicators can be broadly grouped into three categories: *outcome, process and context* (Mock and Mason 2000). Outcome refers to population-level change in the prevalence of, for example, child wasting or low birth weight and therefore reflects the immediate causes of malnutrition as represented in the UNICEF conceptual framework. Process refers to programme-related activities such as coverage, quality, targeting etc. whilst context reflects the basic and underlying causes of malnutrition (women's education level, quality and coverage of health services etc). Nutritional status indicators are measures of *outcome*.

Different anthropometric indicators measure different things. It therefore follows that different measures are appropriate in different situations/scenarios. For example, in South East Asia, where the prevalence of Low Birth Weight (LBW) arising from poor maternal nutrition is particularly high, monitoring LBW as a key outcome indicator is important to measure the impact of programmes designed to address intrauterine development. In Europe, the elderly may be included in nutritional monitoring as they are a potentially vulnerable group. Wasting is the most useful indicator in emergencies whereas stunting is a more useful proxy indicator for poverty. Some nutritional indicators may also be complementary when combined (see Box 9 above). Table 1 summarises the main anthropometric indicators collected in NS systems.

Table 1: Anthropometric indicators commonly collected in surveillance systems

Anthropometric Indicator	What it measures	Contexts where used
Children		
• ***Underweight***	*Underweight (low weight for age) either due to wasting or stunting or a combination of both.*	*Underweight is the most common indicator collected through growth monitoring systems.*
• ***Stunting***	*'Shortness' (low height for age) as a result of chronic malnutrition.*	*Stunting is associated with poverty and may be assessed in stable situations to measure changes in chronic poverty.*
• ***Wasting***	*'Thinness' (low weight for height) as a result of acute malnutrition.*	*Wasting is the indicator most commonly assessed through nutrition surveys in emergencies.*
Adults		
• ***Body Mass Index***	*'Thinness' (low weight for height) as a result of acute malnutrition.*	*BMI is the indicator used to assess adult nutritional status in both stable contexts and emergencies. It is of particular importance in European countries where adults may be more vulnerable to malnutrition than children, and in emergencies when adults may be as vulnerable to malnutrition as children.*
• ***Low Birth Weight***	*Associated with poor nutrition in mothers.*	*LBW is a useful indicator for stable contexts where it can measure changes in maternal malnutrition over time. It is a particularly important indicator in Asian countries where maternal malnutrition is common.*
Elderly		
• ***Body Mass Index***	*'Thinness' (low weight for height) as a result of acute malnutrition.*	*Although there are problems with using BMI to assess malnutrition in the elderly, it has been used in emergencies. For example, in European crises (e.g. Bosnia) where the elderly were particularly vulnerable to malnutrition.*

The indicator selected for use in a surveillance system may have far-reaching effects on the efficacy of interventions. The case of Bosnia presented in Box 10 serves to illustrate this point.

Box 10: The use of different nutritional indicators to assess malnutrition in Bosnia

War broke out in Bosnia in April 1992. In the summer of 1993 a number of nutrition and health surveys were conducted on the 'at-risk' populations of the besieged enclaves. These surveys collected anthropometric data on under-fives and found no signs of malnutrition. However, a NS system 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 and adults were experiencing substantial weight loss. Furthermore, wasting levels in the elderly and weight loss in adults mirrored changes in indicators of food security such as quantity of household food stocks, food prices and food aid deliveries.

The NS system was able to highlight the vulnerability of the elderly, and provoked agencies to initiate special programmes focusing on the elderly particularly those living alone. If the NS system had concentrated only on assessing the nutritional status of young children (as is the normal practice in emergencies in developing countries), there would have been an assumption that the population were not at nutritional risk. In addition, weight loss in adults could be used as one 'early warning' indicator of deterioration in the food security situation.

Source: Watson and Vespa 1995

2.4 What is the current status of micronutrient deficiency surveillance?

There has been a significant increase in the level of micronutrient surveillance over the past decade[21]. This partly reflects the increase in micronutrient deficiency disease (MDD) related projects, especially salt iodisation, anaemia and vitamin A deficiency (VAD) interventions. Much of the surveillance is sentinel site based with the objective of monitoring project coverage and impact.

Nationally representative baseline data on MDDs are limited, notably so when compared to data on child underweight. There are very few data that allow for comparison over time. Furthermore, there are virtually no data on certain endemic deficiency diseases such as pellagra (vitamin B3 deficiency) or zinc deficiency, (although mild and moderate forms of zinc deficiency are likely to be widespread) while pellagra is known to be endemic at low levels in food insecure areas of southern Africa. Zinc deficiency may be an underlying cause of the very high rates of maternal mortality in parts of sub-Saharan Africa.

[21] Criteria for monitoring progress towards the goal of iodine deficiency disorder (IDD) elimination as a public health problem was only established by WHO/UNICEF/ICCIDD in 1994. National figures of IDD do not exist. In the last decade the degree of increased activity related to VAD is reflected by the fact that 72 countries have conducted nationally representative surveys. However, only a few of the surveys were re-assessments that could be used to document trends particularly following implementation of control programmes.

Table 2: Micronutrient indicators commonly collected in surveillance systems

Micronutrient Deficiency	Indicators	Contexts where used
Iron deficiency anaemia	• Clinical signs (pallor, tiredness, breathlessness and headaches) • Haemoglobin	Clinical signs of anaemia are monitored in surveillance in stable contexts. Women of child-bearing age, school children and children under five are most vulnerable to anaemia and surveillance systems may focus only on these groups. Same as above
Vitamin A deficiency (xeropthalmia)	• Clinical signs (night blindness, bitot's spots, corneal xerosis, keratomalacia). • Blood assays	Clinical signs are monitored in both stable contexts and emergencies. Children under five are usually monitored.
Iodine deficiency	• Clinical signs (goitre and cretinism). • Urinary assays	Clinical signs are monitored in stable contexts in areas where iodine deficiency disease is endemic.
Vitamin C deficiency (scurvy)	• Clinical signs (painful joints, minute haemorrhages around hair follicles, swollen and bleeding gums and slow healing)	Clinical signs may be monitored in emergencies where cases have already been identified. Often part of multiple vitamin deficiency syndrome and appearance often seasonal.
Thiamin	• 8 Clinically recognisable signs of beriberi – five in adults and three in children. Signs include anorexia and oedema in wet beri beri and polyneuropathy and wasted muscles in dry beri-beri	Clinical sings may be monitored in emergencies once cases identified. Symptoms easily confused with other conditions but most likely to occur in rice-eating populations
Niacin	• Dermatitis, dementia and diarrhoea • Cassals necklace	Clinical signs may be monitored in emergencies once cases identified. Occurs mainly amongst maize eating populations and appears to mostly affect females over 15 years of age although this may be artefact due to means of diagnosis.

Other concerns with MDD surveillance are that little process or causal information is collected during surveys. However, it has been argued that given the relative ease of tackling MDD through technical interventions (e.g. salt iodisation to tackle IDD) there may be less need to determine the complex of underlying causes.

Micronutrient surveillance during emergencies

There have been many outbreaks of MDDs in the past 15 years in both refugee and non-refugee populations. Outbreaks of scurvy, pellagra, beri-beri and angular stomatitis have been associated with inadequate food aid provision where the beneficiary population is heavily dependent on food aid rations. Surprisingly, in spite

of these recurrent outbreaks, micronutrient deficiency surveillance systems in emergencies are only established once an outbreak has been identified. There are no examples of 'pre-emptive surveillance'[22]. Food basket monitoring does take place but this is mainly used to monitor size of ration, i.e. per capita caloric receipts. The surveillance systems which have been established once an outbreak has occurred are either based upon reported cases of deficiency seen at clinics and health centres or repeated surveys amongst the affected population

Surveillance systems have shown that once identified, problems have been resolved fairly quickly by introducing micronutrient rich foods into the emergency general ration. However, while surveillance systems have been sensitive in showing declining levels of deficiency in response to an intervention, they have not always been effective in identifying reasons for failure to completely eradicate certain conditions[23]. Micronutrient surveillance data needs to be disaggregated to determine the most vulnerable demographic or socio-economic groups. This may assist in targeting scarce intervention resources[24].

2.5 How is nutrition information responded to and used?

Although there are examples of successful surveillance systems (as noted in boxes contained in this report), nutrition information collected through surveillance systems is often poorly used. There are many reasons for this lack of response but key among these are misconception about the nature and causes of malnutrition, constraints in relation to institutionalisation of NS systems, problems relating to level of analysis and availability of resources, and finally, the ease of response. These are dealt with in more detail below.

Misconceptions about the nature and causes of malnutrition

Misconceptions about the nature and causes of malnutrition still exist and may prevent appropriate action. This often occurs at the district or community level where a mother's 'ignorance' may be perceived by health personnel to be the major cause of child underweight rather than poor household food security or child illness. Furthermore, most NS systems appear to be designed either in the absence of an explicit conceptual framework concerning causes or in the presence of a biased framework that assumes the dominance of one cause over others. Very often this is a food-biased system which stems from the mistaken belief that lack of food is the primary cause of malnutrition.

Institutional linkages and accountability

A lack of accountability for nutrition problems at the national level with corresponding weak demand for, or interest in, nutrition related information and policy options is an important problem. Weak institutional linkages between the location of the information system and decision-makers or resource holders further undermines the utility of an NS system.

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[22] An exception was the emergency in Bosnia, where repeated surveys were carried out to examine Hb levels in the emergency-affected population. Whilst anaemia levels were found to be high, it was difficult to conclude that this was due to the crisis and not to chronically high levels in the pre-crisis population (Watson unpublished).

[23] Angular stomatitis and beri-beri has persisted at very low levels among the Bhutanese refugees in Nepal in spite of addition of fortified blended foods to the general ration (Upadhyay 1998).

[24] In the recent pellagra outbreak in Angola highest prevalence occurred amongst IDPs and women over the age of fifteen. Scarce resources were therefore targeted at these groups (Baquet and van Herp 2000).

The multi-causal nature of malnutrition invariably requires a broad-based inter-sectoral response. This may involve poverty reduction measures as well as food security, health and social interventions. However, government departments responsible for poverty reduction, food security and social services are often not accountable for nutritional problems and do not 'require' or 'demand' nutritional information. Nutritional surveillance systems are very often entrapped within the health sector or linked most directly to food aid response mechanisms as highlighted in Box 11.

Box 11: The importance of institutional linkages – conflicting experiences in Kenya and Botswana

Kenya

The population of Mandera in Kenya are largely ethnic Somali pastoralists who have lost their livelihoods and live in conditions of extreme poverty. Their needs are for multi-sectoral interventions such as income support programme, health service provision and social welfare measures. Since 1996 international NGOs have been recording levels of wasting in Mandera of over 20 per cent. When levels have risen to above 30 per cent the response has been food aid in the form of general rations supplied by international agencies and the Government of Kenya and selective feeding programmes implemented by NGOs. These interventions have invariably lowered levels of wasting to around 20 per cent. However, the underlying factors that cause the chronically high levels of wasting have not been addressed so that high levels of wasting have continued.

Over the past few years information on nutrition (including nutrition survey data from Mandera) has been channelled into the Kenya food security steering group based in Nairobi. The main decision-makers in the steering group is the Relief and Rehabilitation Commission (responsible for Government of Kenya food aid decisions) and donors divisions/UN agencies who are responsible for providing international food aid resources. There are also a consortia of NGOs present in the group some of whom respond to information by implementing small-scale health or income support programme. However, the primary modus operandi of the Kenya food security steering group is the implementation of food security interventions. Nutritional data are therefore most likely to elicit a food aid response as the steering group is so closely linked to the Relief and Rehabilitation Commission and not to other government departments or international donors.

Botswana

The Kenya experience contrasts with the NS system in Botswana where data are used at different government levels and by different sectoral departments. The collection of NS data begins at the health facilities and at this level the information is used by clinic staff to identify malnourished children so that appropriate and immediate action can be taken. The data collected at the clinics are then passed up to the Regional Health Teams who in turn use the information in planning their regional health activities. In addition the nutrition data are used by the District Officers and the District Drought Committees to plan their district drought relief and development programmes.

At the central level the Central Statistical Office is responsible for computerising and tabulating the NS data from the health facilities reports into monthly NS report which presents the malnutrition figures at the regional/district and health facility level. The central Nutrition Unit in the Family Health Division uses this information for planning their activities. In addition the Nutrition Unit in conjunction with inter-ministerial Drought Committee and the Early Warning Technical Committee rely on the data along with agricultural and meteorological data for planning and managing the national drought relief programmes. At the national level the data are integrated into the development of a national food security strategy.

Source: Shoham 2000 and Morgan 1985

Level of data analysis and control over resources

In some situations there will be a tension between the level of data analysis and capacity to respond in terms of access to resources. For example, in Darfur, northern Sudan, community level sentinel site monitoring and analysis was weakly linked to response capacity that existed mainly at national and international level so that responses were either later or not forthcoming during the crisis years of 1988-90. In contrast the Growth Monitoring Programme in Thailand and linked community based nutrition programme have been instrumental in reducing levels of underweight in children from 53 per cent between 1979 and 1982 to 23.5 per cent in 1987. Local level data collection and analysis has been instrumental in mobilising resources at community and national level. The NS system in Indonesia (case study 4) has recently been developed to allow information sharing at decentralised level. It is anticipated that the new initiative of the NS to include local government and communities in collecting and using information will help to strengthen the role of the community in determining their own public health and nutritional needs.

Ease of response

It seems intuitively obvious that response to data is more likely to occur where the response required is relatively straightforward technically, institutionally and politically. It has been argued that micronutrient supplementation and fortification have been able to attract so much of the attention of the nutrition community and the resources of donors because it is largely a technical and often a top-down solution; a so called 'technical fix'. There has been simultaneous concern that this focus has reduced international commitment to tackling the more complex problem of protein-energy malnutrition, associated with poverty, lack of empowerment and poor access to health and educational services.

Box 12: Ending 'hidden hunger' in Tanzania

The international shift towards micronutrient malnutrition is mirrored in Tanzania. Ending 'hidden hunger' has, to a large extent, displaced the broader and more complex task of tackling protein energy malnutrition through community-based efforts. Through the late 1980s and 1990s, the bulk of financial and technical assistance to the Tanzania Food and Nutrition Centre was micronutrient-related. By the early 1990s, the Centre's Department of Food Science and Nutrition was involved primarily with vitamin A and IDD activities, while its Department of Community Health and Nutrition was dominated by anaemia control.

Today in Tanzania, the micronutrient accomplishments of the Tanzania Food and Nutrition Centre with this donor support is positive. Over half of households on the country's mainland are consuming salt that is adequately iodised and Vitamin A capsule distribution has been incorporated into EPI throughout the country, and now reaches roughly 80 per cent of children in the country.

In contrast, between 1992, 1996 and 1999 the trend in measures in protein-energy malnutrition is largely one of stagnation. Levels of severe and moderate stunting and underweight have remained at around the same level since 1992 while the prevalence of moderate and severe wasting has declined only slightly from 7 per cent to around 6 per cent.

Source: Dolan and Levinson 2000

Response to NS data in emergencies

While the factors above constrain response in both a development and emergency context there may be certain 'limiting' factors that are particularly relevant in an emergency scenario. These mostly relate to the fact that resources for response come from international agencies. There have been many examples where nutritional data have demonstrated the need for an emergency intervention but failed to elicit an

appropriate response. The reasons for this include the lack of credible data, lack of resources or the length of time taken to mobilise resources and foreign policy and international political considerations (see Box 13 below).

Box 13: International responses to nutritional surveillance data during emergencies – determining factors

In Somalia WFP was so closely involved in the development of the food assessment methodology that their response was more or less guaranteed (1996-9). This contrasts with Kenya where the system of food aid response was largely politically driven until recently and relied on very little credible data feeding into the response structure. The genesis of the Kenya food security steering group and the involvement of donors and humanitarian agencies in the process of developing an information system has increased the credibility of the system and facilitated response to the information it generates. The closer and more inclusive the system to national and international decision making structures the greater the credibility of the system.

There are situations where the findings of NS data are over-ridden by political considerations. For example, it has proven increasingly difficult to mobilise international humanitarian aid resources for Angola and Uganda in spite of alarming findings on nutritional status (Shoham, O'Reilly and Wallace 2000). This undoubtedly reflects political resistance at international level. In southern Sudan a recent evaluation found that levels of malnutrition that would have automatically triggered an Operation Lifeline Sudan response in previous years were no longer doing so for political reasons.

Source: Field Exchange issues 1 and 12; Shoham, O'Reilly and Wallace 2000

In conclusion, good nutritional surveillance should present findings and analysis with recommended actions to users that have participated in the design of the system and that are within the resources of the target audience.

2.6 Can and should a livelihoods analysis be more closely integrated with nutritional indicator monitoring?

A number of criticisms of NS systems emerged in the 1980s. These included their viability for evaluating the long-term trends in welfare during periods of economic growth or for assessing the impacts of recession and structural adjustment. In particular, the reliance on conventional indices of impact such as nutritional status of children may not be the most sensitive, timely or cause specific monitoring system. The effects of economic recession are moderated through a wide range of coping or adjustment strategies adopted by households and by individuals who change their economic activities and social behaviour patterns.

The coping processes themselves offer the most promising approach to devising indicators that would give early warning of adverse trends and which could also be related to specific policy welfare issues. Appropriate process indicators need to be identified by first of all establishing the common patterns of livelihoods of population groups and hence the different categories of poor and vulnerable households. (Payne 1988).

The emergence of the sustainable livelihoods approaches (SLA) to poverty reduction in the late 1990s appears to offer solutions to some of the criticisms above. The SL framework is an analytical device for improved understanding of livelihoods and poverty. The approach supports poverty eradication by making enhancement of poor people's livelihoods a central goal of development efforts. A livelihood is sustainable when it can cope with, and recover from, stresses and shocks, and maintain or

enhance its capabilities and assets both now and in the future, while not undermining the natural resource base.

The approach forges links between the micro (e.g. through participatory poverty assessment) and macro level (e.g. identifying macro-policies which impact the poor).

The practical application involves an analysis of people's livelihoods and how these have been changing over time, supporting people in achieving their own livelihood goals, focussing on impact of different policy and institutional arrangements on livelihoods and seeking to influence these arrangements so they promote the agenda of the poor.

The key strengths of the approach are that it can improve the design of interventions by identifying different livelihood interests between stakeholders, it emphasises the links between the local and policy levels and enhances cross-sectoral co-ordination.

Two questions are now considered. The first is:

1. *Are there conceptual and practical strengths of a SL approach that can be incorporated into NS system design and implementation?*

A critique of nutrition indicator monitoring (see above) is that impact monitoring is too late (both in a development and emergency context) and that processes of livelihood change should be monitored in order to inform livelihood support interventions at an earlier stage. In particular it has been argued that interventions should support livelihoods before nutritional status declines in order to protect livelihoods and prevent a longer-term increase in vulnerability. However, the concept of a livelihoods approach is not often incorporated 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 or indeed at which to phase one out.

The SL approach identifies population groups in terms of their pursuit of livelihoods. There is a similarity here to the functional classification promoted by earlier critics of NS in the 1980s. This approach could be developed and applied to NS systems. Given the multi-causal nature of malnutrition population groups could be categorised in terms of the key factors which impact on nutritional status. This varies enormously between population groups. In some situations the categorisation may be similar to food economy groupings while in others it may be more geographically, politically or service access based. The process of identifying and sampling 'functional' groups would lead in turn to identifying more relevant indicators for surveillance and increase the targeting potential and efficiency of NS systems.

The participatory approach involved in a SL approach would lend itself well to nutritional surveillance i.e. participants/individuals would identify factors at micro and macro level which impact on their nutritional status. Thus instead of pre-identifying or pre-determining the types of indicator to monitor as part of a surveillance system, those being monitored would have a greater role in identifying most relevant information.

The approach collects information on the most pressing constraints and most promising opportunities and means of diversifying food security as well as the importance of macro-level policies and institutions on livelihood options. The approach is therefore multi-sectoral. A similar approach in NS could lead to more

relevant nutritional interventions. This may be especially relevant to emergency programmes where there is frequently a need for more imaginative multi-sectoral responses to nutritional insecurity than the routine application of emergency general ration and selective feeding programmes.

2. *What are the practical challenges of integrating a sustainable livelihoods approach into nutritional indicator monitoring?*

Nutritional data are collected on individuals at household or 'family' level. There is therefore an opportunity to collect other types of information using a participatory approach. However, the feasibility or advisability of using an SL framework in conjunction with nutritional indicator monitoring will be determined by a number of factors:

- 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 surveillance (centrally administered) rather than repeated surveys or growth monitoring programme.

- Increasing information demands will increase cost.

- The types of individual that are able to collect nutritional information, e.g. nurses/health staff at health centres or community-based staff in nutrition surveys may not be suited to collecting more analytical information using participatory methods. At the very least substantial training will be required.

- 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, if such data were collected during nutrition indicator monitoring then it could only be collected on a sub-sample otherwise it would be too time-consuming. This would raise the issues of representativeness of data for each type of livelihood related indicator.

Section 3: Conclusions and Recommendations for FIVIMS

In this section, conclusions and recommendation will be made in relation to two key issues pertinent to FIVIMS. The first issue relates to the use of anthropometric indicators in FIVIMS, and the second, to how FIVIMS can better utilise and strengthen existing NS systems and support the development of new systems. It is recognised that many of these recommendations imply substantial resource commitments that will need to be balanced against other competing priorities for the further development of national FIVIMS. There are no criteria offered here for prioritising implementation of one recommendation over another as the situation in each country will vary in terms of information needs, resource availability and competing demands for resources.

3.1 Anthropometric indicators and FIVIMS

Currently, FIVIMS measures the prevalence of undernutrition in terms of calorie deficit (and in some cases, income distribution) and as outlined in Section Two (and covered in detail in Theme Paper One), there are important limitations with this approach. Key among these is the inaccuracy inherent in food production data, the lack of a measure for food entitlement, the emphasis on calories to the exclusion of other important nutrients and the food bias of this measure. It is now widely accepted that undernutrition, (encompassing wasting, stunting and underweight in children and low BMI in adults and the broad range of micronutrient deficiencies) is the outcome of complex multi-sectoral problems and that food security is an important, but not exclusive factor, in it's aetiology.

The correlation between food insecurity and undernutrition it follows, therefore, is not exact. Nonetheless, incorporating nutritional indicators (i.e. anthropometric measures and measures of micronutrient status) in FIVIMS would help to strengthen the system. This is 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 already available and will continue to be available.

Careful consideration will need to be given to the appropriateness of the different anthropometric indicators in relation to the demands of FIVIMS. As described in Section Two, different anthropometric indicators measure different things. If FIVIMS' requirement is for nutritional indicators that reflect acute food insecurity, then levels of child wasting or low adult BMI may be appropriate whereas monitoring levels of stunting, reflects the effects of chronic food insecurity (along with other factors). 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.

Recommendation 1: National *FIVIMS should incorporate nutritional indicators, which are already collected through existing surveillance systems, into the FIVIMS system.*

Recommendation 2: *FIVIMS co-ordinating secretariat and national FIVIMS should be aware that nutritional indicators are not exact measures of food security and that different nutritional indicators measure different things.*

3.2 Strengthening existing NS systems and supporting new systems

National FIVIMS need to be aware of the strengths and weaknesses of different methods of nutritional indicator monitoring. This awareness will help national FIVIMS select and support the most appropriate surveillance systems for a given country and ensure optimal implementation of each system. Knowledge of potential weaknesses will allow planning and pre-emptive measures to minimise these.

Specifically, FIVIMS should be aware of a number of institutional, methodological, design and resources issues that are especially pertinent for each method of nutritional indicator monitoring (based on past experience) and take steps to address these at the earliest stages of establishing NS systems or in strengthening existing ones. These are outlined below:

National surveys

- Collecting nutritional data as a component of broader national surveys can lower costs and allow correlations with other household level indicators to be made.
- Incorporating additional data in the surveys (e.g. maternal anthropometry, micronutrient status on sub-set of the sample, food security and consumption data) will increase understanding about the causes of malnutrition.
- Providing more in-depth policy and programme relevant analyses (e.g. disaggregating data according to gender and socio-economic status) will enhance the value of the data.

Small-scale surveys

- The cost-effectiveness (and appropriateness) of repeated small-scale nutritional surveys should be appraised on a case-by-case basis.
- Where surveys are being designed to allow for targeting decisions, political analysis of the feasibility of targeting is a pre-requisite (especially critical in emergency contexts).
- The appropriate demographic group for assessment should be considered on a case-by-case basis.
- Where many agencies are conducting nutritional surveys, it is critical to ensure a co-ordination mechanism to ensure standardisation of approach and maximum utility of surveys.
- In some situations, it may be appropriate to replace repeated nutritional surveys with community-based surveillance as this can have an additional value for the community.

Clinic and community-based growth monitoring programmes

- Programmes and staff need to be adequately trained, resourced and supported.
- A ‘management by exception’ approach to the nutrition information generated should be a major focus ensuring that ‘trigger’ levels for appropriate response ‘on the way up’ are built into the programme. Data, optimally utilised, should be systematically summarised and used for performance monitoring by programme managers at the sub-national and national level.

- Operational research may be needed to identify innovative and cost-effective approaches to growth monitoring and promotion in areas where illiteracy levels are high or where access to supervision is difficult.
- A database should be carefully protected where it has been built up into a national data baseline of seasonal patterns of malnutrition over several years.

Central and community-based systems sentinel site surveillance

- The information needs of project/decision-makers should be clearly articulated in designing surveillance systems.
- Where possible, decentralise decision-making and available resources for response.
- Sentinel site clinic based monitoring can be undertaken whereby scarce resources are directed at key clinics/locations to strengthen data collection and analysis[25].

Causal analysis of malnutrition

In order to enhance understanding about nutrition, specialists involved in national FIVIMS need to be comprehensively appraised of the conceptual framework for malnutrition and of the critical importance of additional data to clarify and prioritise causes of malnutrition and inform decisions about the most appropriate interventions. National FIVIMS can support NS systems in collecting these additional data.

Recommendation 3: *FIVIMS co-ordinating secretariat should support the establishment of NS systems and strengthen existing systems through:*

i) increasing awareness of the institutional, methodological, design and resources issues pertinent to different methods of nutritional indicator monitoring.

ii) ensuring understanding of the conceptual framework for malnutrition and encouraging the inclusion of additional data into NS systems which can enhance causal analysis.

3.3 Micronutrient deficiency surveillance

Micronutrient deficiency surveillance is a less developed area compared to anthropometric indicator surveillance, and requires support to develop. FIVIMS Co-ordination and national FIVIMS can aid this process by firstly increasing the knowledge base on micronutrient deficiency in a particular country. Secondly, FIVIMS can take steps to support the collection of baseline data for specific endemic deficiencies and strengthen or support the establishment of surveillance systems that monitor the prevalence of these conditions. FIVIMS can also play an important advocacy role in emergency prone countries, to set up pre-emptive micronutrient deficiency surveillance systems. This is particularly important in situations where a population is heavily dependent on food aid.

Recommendation 4: National *FIVIMS should support the development of micronutrient deficiency surveillance systems, particularly pre-emptive systems during emergencies.*

[25] This has been done by ACF in Somalia where certain clinics have received extra resources to ensure a high quality growth monitoring programme.

3.4 Response to nutritional surveillance data

In keeping with the UNICEF findings in 1998, information systems are ultimately only useful if information can be used to direct appropriate responses. National FIVIMS need to take account (based on past experiences) of the potential reasons for lack of response to NS system information. Furthermore, they need to be aware that a key to increasing the probability of response to NS data is identifying institutional locations within different levels of government (and at donor level) where the system will have most impact and support from key decision-makers. This will be country and government specific and should be given as much consideration in establishing a NS system as the type of information to collect and the methodology for so doing.

Although it may prove difficult to secure commitment, key decision-makers should be enlisted in the process of developing the NS methodology and where possible, in identifying an analytical framework for response (this might involve trigger points or ranges of data that require response). However, it must be recognised that response to NS information in terms of resource allocation, targeting and programme design will always be influenced by a variety of political and economic factors that can change over time.

There are many positive examples of community-based nutrition programmes that include nutrition indicator monitoring. Emphasising the empowerment of communities to gather, interpret and to act on nutrition information is a fundamental prerequisite to maximising the allocation of nutrition-related resources at this level.

Recommendation 5:

i) National FIVIMS should involve decision-makers in the design of nutritional surveillance systems.

ii) National FIVIMS should encourage consideration of the most appropriate institutional linkages and location of nutritional surveillance systems in order to maximise potential for response to information.

3.5 Sustainable livelihoods approaches and nutritional surveillance

National FIVIMS and FIVIMS country programmes should consider the extent to which elements of a SL approach can be incorporated into the design and implementation of the types of NS programmes being implemented in country. A key element to consider will be the practical feasibility (e.g. data collection methods, sampling, etc) of adopting or incorporating a livelihoods framework into existing methods of information collection.

The analysis in this paper indicates four key aspects of the SL approach that FIVIMS can draw upon in strengthening nutritional surveillance.

i) A focus on *sustainable* livelihoods in monitoring should lead to an information system whereby responses are implemented when coping or survival strategies potentially undermine livelihood sustainability. Adopting this approach would mean that NS systems move away from a focus on measuring and responding to impact on nutritional status towards a focus on the processes of people's response to food insecurity.

ii) The SL approach attempts to identify micro-macro linkages. This contrasts with NS where, although the underlying conceptual framework for malnutrition acknowledges

basic causes at macro and policy level, these are given less significance than immediate and underlying causes (e.g. disease and lack of food) in the analysis. The SL approach provides an analysis that is therefore more relevant to policy makers.

iii) SLA seek to identify multi-sectoral linkages relating to livelihoods. Most NS systems do not adopt a multi-sectoral approach to analysis of nutritional problems. This is one of the reasons for weak or limited responses to information generated. NS systems could be more useful to decision-making if they adopt a more multi-sectoral approach to analysing nutritional problems – drawing on SLA.

iv) The SL approach promotes a consultative and highly participatory approach to information gathering. NS systems have, however, traditionally used technicians to collect data in a way that is more oriented to external measurement and less inclusive of participant views. This leads to pre-conceived ideas about appropriate interventions. A more participatory approach may lead to the generation of more imaginative, relevant and effective interventions.

Recommendation 6: *National FIVIMS should explore the potential benefits of adopting aspects of a sustainable livelihoods analytical approach into nutritional surveillance system design and implementation*.

Elements of the SLA which could be incorporated into NS include:

- Identifying livelihood groupings and monitoring and responding to information on livelihoods, particularly when these are threatened in the longer-term
- Utilising household level knowledge to establish links between macro-level factors and access to food, health and care at household level
- Identifying multi-sectoral linkages with the nutritional condition of specific livelihood groups
- Strengthening multi-sectoral demand and use of NS data at decision-making level
- Drawing more extensively on the views of potential beneficiaries regarding types of intervention required to tackle nutritional problems

Annex 1: Examples of Regional and Global Systems of Nutritional Surveillance

The Refugee Nutrition Information System (RNIS)

The RNIS, established in 1993, is an international system that monitors the nutritional conditions of refugees and displaced populations world-wide. The main objectives of the RNIS are:

- To provide a channel and means of disseminating information on nutritional problems amongst emergency affected populations. Past experiences had indicated that such data were sometimes sensitive and therefore not widely circulated.
- To build up a historical data base on nutrition of refugees and IDPs and to help identify recurrent issues and problems or improvements in humanitarian response.
- To fulfil an advocacy role where problems are highlighted in order to mobilise resources or response measures.
- To inform agencies (particularly NGOs) of refugee/IDP programmes so that they can make informed decisions about whether to become involved in a response.

The RNIS report is published quarterly and is based on information obtained from a wide range of collaborating agencies, both UN and NGO who provide survey material. The information available is mainly about nutrition status, health and survival in refugee and displaced population and is organised by situation because problems often cross national boundaries. Situations are classed into five categories relating to risk and/or prevalence of malnutrition. The prevalence/risk is indirectly affected by both the underlying causes of malnutrition relating to food, health and care and the constraints limiting humanitarian response. These categories are summations of the causes of malnutrition and humanitarian response.

The RNIS has undoubtedly achieved many of its objectives although it is less easy to determine whether it has been effective in mobilising resources (it has probably had a positive advocacy role where there have been outbreaks of micronutrient deficiency disease). The weaknesses of the system include: partial coverage of emergency affected populations (for example, resident populations are rarely included, data are incomplete, and certain areas of the world such as Latin America and parts of eastern Europe are under-represented). The RNIS does not have access to all surveys. Therefore, estimates of the number of people at risk are based on guestimates.

The Micronutrient Deficiency Information System

The Department of Nutrition for Health and Development at WHO runs 3 global micronutrient databases for Iodine Deficiency Disorders (IDD), Vitamin A deficiency (VAD) and iron deficiency anaemia (IDA) under the collective name of the Micronutrient Deficiency Information System (MDIS). The objective of the system is to track the progress in each of WHO's Member States of each deficiency and report regularly on the progress at country, regional and global level. The system only collects clinical and sub-clinical indicators using the WHO agreed upon cut-offs. The data are collected through a variety of channels: medline searches, constant liaison between FIVIMS country programmes, national FIVIMS and Ministries of Health, UNICEF and NGOs.

The MDIS is the only global tracking system for micronutrient deficiencies and has undoubtedly served a useful role. For IDD there is clear evidence that because this deficiency has been kept in the spotlight by repeated exposure at World Health Assemblies through the MDIS and associated resolutions signed by governments across the world, resources have been safeguarded for IDD elimination programmes. Similar claims can be made for VAD.

However the MDIS has to work within a number of constraints: shortage of staff; problems in getting up-to-date information; problems relating to changes made over the years in cut-offs signifying deficiency which means that all data must be recalculated; lack of standard cut-offs for some indicators; differences in lab analysis methodologies which means surveys are not always comparable, and differences in clinical assessment techniques (e.g. inter-observer bias is notoriously high for certain indicators such as goitre).

Annex 2: Country Case Studies

Case Study 1: Using the Nutritional Surveillance Project (NSP) to monitor the impact of floods on health and nutrition in Bangladesh

(Source: Helen Keller International/Bangladesh)

Background

Every year in Bangladesh, the rivers rise and natural flooding occurs, with dire consequences on the health and well being of its population. With support from the US Agency for International Development , HKI/B established the NSP in late 1989 to monitor the impact of these serious floods on health and nutritional status. At the time, little information was available to document the post-flood situation for households living in the affected areas. Since its inception, the long-established NSP, which has grown in the last 12 years from a small scale program to a nation-wide monitoring system, has been used extensively within Bangladesh to assess the impact and recovery from natural disasters, to monitor trends in nutritional status, and to advocate for health and food policies and programs.

Characteristics of the NSP

The NSP collects nutrition, health and socio-economic data every two months from households throughout rural Bangladesh. A multistage sampling frame is used to select a random sample of households for each survey. From 1990 to 1999, health and nutritional data were collected from children aged 6-59 months in selected households. Children aged less than 6 months and all mothers have been included in the sample since February 2000.

Since it began over a decade ago, HKI/B has been operating the NSP in collaboration with the Institute of Public Health Nutrition (IPHN) and a total of 26 local non-governmental organisations (NGOs). Through this framework, HKI/B employs and trains fieldworkers from the IPHN and NGOs working in the survey areas to carry out the data collection activities. In this manner, HKI/B has not only established a viable information system but also a system for transferring its expertise in conducting nutrition surveillance to local counterparts in support of building local capacity for the future.

Why is the NSP useful to monitor the impact of floods?

The NSP is comprehensive yet flexible in its design and implementation, thus allowing the system to be highly responsive to relatively sudden events, such as natural disasters or other crisis situations.

In Bangladesh in August, 1998, one of the worst floods of the century occurred. While the NSP had been collecting flood data for years by then, the flexibility of the system allowed the addition of several questions to the questionnaire to capture information on the extent and magnitude of this particularly devastating flood. In order to turnaround the results from the added questions as quickly as possible, the completed questionnaires were processed immediately by the well-trained data management unit of the NSP. The results were shared within Bangladesh through presentations and a series of short bulletins (similar to the highly effective information-sharing strategy that had been initiated by HKI in Indonesia in response to a severe economic crisis; see Case Study 2, p3). Local NGOs, donors and others used the results from the NSP to advocate for and secure resources for households affected by the flood.

Use of NSP data by the Government of Bangladesh and international donors
By the time the initial information on the impact of the flood was released, it had become evident that the 1998 floods were going to be extremely severe and long-lasting. In order to continue to inform the design of rehabilitation activities, to monitor relief and rehabilitation programs and to monitor the longer-term impact of the post-flood period on nutrition and health, the NSP was expanded to several additional sites that were severely affected by the flood. The new sites were selected along the major rivers to have good coverage of the areas affected by the flood. The quality control teams of the NSP were mobilised to collect information in these new sites in order to minimise the amount of time required to start the special study. Information on flood damage, relief and rehabilitation benefits, coping mechanisms, as well as health and nutritional status, was collected over a period of 10 months (5 rounds). In addition to the quantitative survey, several qualitative assessments were undertaken in the flood-affected areas to help provide a deeper understanding of how the households were affected and coping with the flood. The results that were generated by this 'special study' of the NSP were again used extensively by local NGOs, donors and the Government of Bangladesh to modify, extend, and evaluate their relief and rehabilitation efforts.

Several publications were generated from the NSP, including annual reports, bulletins and special reports, scientific articles and numerous presentations in national and international fora.

Case Study 2: Repeated Nutritional Surveys Versus Community Screening in Ethiopia

(Source: Bailey. K)

Background
An International Non-Governmental Organisation (INGO) had been supporting rural development work in 3 districts of North West Ethiopia (Amhara Region) for 15 years. In 1999 there was near-total crop failure in both rainy seasons (belg and meher) and in the first half of 2000 the belg rains came too late for normal planting. This meant that there was almost no harvest for 3 successive seasons.

Monitoring adult and child malnutrition
In response, the INGO provided a general ration for about half the households from July to November 2000. This response effectively averted famine. The organisation wanted to monitor the impact of the food relief on nutritional status through sample surveys. One was conducted in August (before the food distribution in late July could have had any significant impact) and another in mid-October. In the August survey, two districts had a moderate rate of wasting in children under five (about 7 percent wasting while in the third district it was far higher (16 percent wasting). Adult nutritional status was also measured and the mean BMI was found to be low (near 20.0 kg/m^2 for men and women). However, there was no correlation between the nutritional status of children and adults in the same households. This was interpreted to mean that other factors such as child feeding practices and the incidence of diarrhoeal disease were playing a more significant role than food availability in the prevalence of wasting in young children. In October the prevalence of wasting was found to be unchanged.

Since the new harvest was expected in November, and the rainfall and agricultural conditions up to then were fairly good, an improvement in the situation was expected in subsequent months. However, i) there was likely to be a continued level of wasting

above 5 percent- with aggravating factors (especially diarrhoeal disease) and ii) the appropriate response should include at least health and nutrition education, focusing on the prevention of diarrhoea and improved feeding practices for young children.

The conventional approach at this point in an emergency project cycle would have been to continue with sample nutritional surveys e.g. at 3-monthly intervals. This, however, would not have paved the way for action other than another round of relief distribution when/if the prevalence of malnutrition rose above a certain point. The INGO, therefore, implemented a total community based nutritional screening and nutrition education programme targeted at households with wasted children rather than repeating cross-sectional nutrition surveys. This involved training volunteers at the level of each hamlet (which consists of about 50 households). Volunteers were trained to:

i) measure weight and length and record it on a specially designed chart – one chart for each gott with measurements repeated 3-monthly
ii) carry out education on prevention of diarrhoea and optimal feeding practices for young children in households where a wasted child was found.

This involved the communities themselves in a survey process thereby achieving full community coverage and also ensured that the longer-term nutritional problems would be more comprehensively tackled from within each community.

Case Study 3: An overview of Tanzania's National Nutritional Surveillance System and the development of the District Surveillance System

(Source: E. Nyangali, UNICEF and TFNC)

Background

Efforts to develop a nutritional surveillance system in Tanzania date back to the early 1970s. During this period, a number of institutions, working in different sectors, initiated nutrition-related data collection systems. These included the Ministry of Agriculture which set up an Early Warning System (EWS), the Marketing Development Bureau which monitors food prices, the Ministry of Health which collects growth monitoring data from under-fives and data on pregnant women attending MCH clinics and the Bureau of Statistics which collects vital statistics and morbidity and mortality data through censuses and specific surveys. In addition, the UNICEF-supported Child Survival Protection and Development (CSPD) programmes collect community-based growth monitoring data on children under five and Tanzania has carried out DHS, HBS and MICS surveys.

Whilst each of these systems provided useful and relevant information, there have been problems relating to poor co-ordination mechanism to ensure inter-sectoral analysis and use of the information and a lack of a common framework for interpretation and presentation of the data.

The National Nutritional Surveillance System

In 1989, the Tanzania Food and Nutrition Centre with the support of UNICEF through funding from the Dutch and from the Global Inter-agency Food and Nutrition Surveillance started implementing a National Nutritional Surveillance System (NNSS). The overall objective was to provide decision-makers with national level information on nutrition in order to inform policy.

Characteristics of the NNSS
Data on nutritional status in under-fives was collected. The data were routinely collected as part of the Health Information System, and were based on growth monitoring in clinics. Data were collected on a monthly basis and included the following indicators:

a) percentage of children gaining weight;
b) percentage of children having no change in weight;
c) percentage of children losing weight.

Some years later, and due to lack of external funding, weak inter-sectoral co-operation and a lack of flow of information from different institutions, the NNSS ceased functioning.

District Surveillance System
In mid-2000, UNICEF, in partnership with the Ministry of Health and TFNC have developed a community-based District Surveillance System (DSS). The objectives of the system is:

- To strengthen the existing information system in the Child Survival, Protection and Development (CSPD) districts;
- To assess and document the impact of integrated interventions on the situation of women and children in the districts;
- To detect and document the changes in Mortality rates and other selected social indicators in response to the introduction of specific interventions in the district;
- To provide information required for planning, priority setting and policy formulation.

The DSS will be linked with the National Sentinel Surveillance System (NSS) under the department of Policy and Planning in the Ministry of Health.

Indicators and methods of data collection
The information gathered includes child underweight, morbidity and mortality. The DSS operates in six districts that are receiving intensive focus from UNICEF (as a pilot and may expand to other districts). Information is gathered at the village level by trained Village Health Workers. This includes a full registration of all those living in the village (village register). Nutritional status data is gathered on a house by house basis quarterly in many instances but is also gathered through Village Health Days and is used directly to identify children at risk and to provide counselling and support directly to the families concerned.

At the District level, there are 3 supervisors who are trained to use the information to determine which villages are worse of in relation to child malnutrition or morbidity/mortality and then to investigate the underlying problems with ward level committees.

Key issues
Currently there is concern as to how information is going to be utilised and co-ordinated at the national level as there are various institutions implementing surveillance systems. There is a need for the DSS to collaborate in order to harmonise the indicators collected and to build consensus on the computer software to be used at district level. To ensure sustainability of the system, the villages and wards need to own the system and to help facilitate this, the community leadership will be sensitised to use the information in their quarterly and annual reports.

At the district level, local government is responsible for all district development. The DSS is currently looking at ways to ensure that local government sees the DSS information as integral to information from other systems and not as something separate.

Case Study 4: Adapting the crisis impact and recovery monitoring Nutritional & Health Surveillance System (NSS) in Indonesia for use in a decentralised government through the application of affordable new technologies

(Source: Personal communication, Helen Keller International/Indonesia)

Background

When the economic crisis hit Indonesia in mid-1997, the country was still reeling from the effects of a severe El Niño and was yet to experience its first major political crisis in 30 years. In response to the lack of information on the crisis's impact on nutrition and health available at the time, HKI/I rapidly established the NSS in 6 major provinces of Indonesia, based on a model that was set up in the Central Java province in 1995 in conjunction with the Ministry of Health (MOH). The NSS found evidence that diminished purchasing power and high food prices resulting from the shattered economy led to increased levels of micronutrient deficiencies among vulnerable households that cut back on their consumption of micronutrient-rich foods, such as eggs and meat, just to maintain their intake of energy-rich foods. With continued monitoring by the NSS, the Government of Indonesia and international donors were also able to observe the start of the recovery from the crisis. Through the fruitful collaboration with the Government of Indonesia and with the support of USAID, the NSS has since successfully expanded to a total of 11 sites in four large cities and seven rural provinces, collecting nutrition, health, socio-economic, food consumption and other related data to aid in efforts to safeguard the health and well being of vulnerable children and women

The NSS has been successfully carried out over the past several years in close collaboration with the central-level MOH in Jakarta. The current move toward decentralisation of government in Indonesia has also catalysed the NSS system to expand its collaboration with provincial health authorities and other local counterparts. The important role of community participation in ensuring health and well-being was accepted at the Alma Ata Conference in 1974. Food and nutrition programs were identified as important priorities for achieving greater community participation in development. Collecting and using data and information is an important part of developing and formulating programs and policies to improve health and nutrition. The new initiative of the NSS to include the local government and communities in collecting and using information will help to strengthen the role of the community in determining their own public health and nutritional needs.

Characteristics of the NSS

The NSS collects data every three months from mothers and their under five children on nutrition and health related issues, such as household composition, parental education and occupation, sanitary conditions, land and livestock ownership, food production and consumption, vitamin A capsule receipt, child and maternal morbidity, and nutritional knowledge. Weight, height (or length for children younger than 24 months of age) and mid-upper arm circumference (MUAC) are measure from the mothers and their under five children. Blood samples are collected from a random sub-sample by finger prick to measure haemoglobin concentration. Once the data have been collected in one round of data collection, they are processed for analyses

that are disseminated through special bulletins, presentations and other methods of information sharing.

While the Bangladesh NSP sub-contracted and trained counterparts to conduct fieldwork, the NSS recruits Indonesian graduates in nutrition and other related fields in close collaboration with local academic institutions, with a similar focus on building local capacity for the future.

How the NSS can be a useful monitoring tool in the context of decentralisation
The Government of Indonesia issued a directive to decentralise decision-making and resource allocation in January 2001. In response, plans were formulated for the NSS to support decision-making for health and nutrition policies and programs at the provincial level. These new initiatives are being introduced to meet the need for involving provincial health staff in planning and data collection to support decisions on health, food and nutrition programs by sharing comprehensive data collected by the NSS.

Toward this objective, the MOH and HKI/I are collaborating on broadening the system of sharing information collected by the NSS. With the availability of more affordable technology and building on country expertise in the use of digital technology, CD-ROMs have been developed that contain comprehensive data on several key indicators related to health and nutrition, collected within the last year, and providing the tools for analysis of these data at the provincial level. The first step in the development of a digital database, the CD-ROMs have been customised for use within each project province/site and provide clear examples on how to analyse the data with the included free statistical analysis program, EpiInfo. As more data are collected from the field, CD-ROMs such as these will continue to be produced by HKI/I. Through workshops conducted by HKI/I staff on the use of the software and analysis of the data, HKI/I further provides technical assistance to its provincial counterparts toward using the findings to guide decisions about nutrition, health and related programs and converting the findings into action by working with local organisations responsible for inter-sectoral program planning and implementation.

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