ASSESSING, ANALYSING AND MONITORING NUTRITION SITUATIONS

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SUMMARY
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Nutritional status is an outcome of a wide range of social and economic conditions and is a sensitive indicator of the overall level of development. Nutrition-related information is essential for selecting and implementing effective policies and programmes to improve nutritional well-being. To be useful, information must be provided to the appropriate dccision-makers in a timely manner and in an easily understood format. Information related to nutrition is needed for a variety of purposes, such as: identifying chronic nutritional problems and their causes; predicting and detecting short-term or acute nutritional problems; targeting population groups for both short-term relief efforts and longer-term policy and programme development; monitoring changes and evaluating the impact of interventions and development programmes.

Efforts to collect and analyse nutritional information must be cost-effective, timely and directed toward specific goals such as preparation of development plans, programme design and management and budget decisions. Two fundamental principles in choosing assessment and monitoring methods are:
, 1) information is useful only if it is used, and 2) the resources used for data gathering and analysis must be balanced against the even greater ICSUULCLJ required for intervention. Clearly, only relatively minor resources for information are justified in an exploratory phase. While the cost of information is low compared with ineffective expenditure, continued expenditure on information in the absence of action is clearly inappropriate. However, interventions likely to have a significant effect on nutrition can be expensive, and the cost of obtaining relevant information, including through special surveys, is likely to be readily justitiable in terms of ensuring effective use of public funds.

Governments considering increased commitment to solving nutrition problems will need, early in the process, to assemble some information as a basis for deciding priority problems and possible action. Generally, this assessment will include indicators of nutritional problems by various population groups, possibly with trends in these; indicators for subsequent monitoring will often be the same.

Particularly when resources are very constrained, emphasis should be on drawing on existing sources of data. In many countries, growth monitoring programmes accumulate much data which can be tapped. Similarly, birth weights, when available may be compiled. Price monitoring is part of many

routine statistical systems, and may be used for monitoring trends in household food security. When resources are very limited, and/or rapid reporting and improved quality are important, a fewtrepo’rting points (sentinel sites), often in the most vulnerable areas, can be selected. Rapid assessment procedures have a potentially important role in obtaining detailed information on programme delivery and in following up indications from reporting systems that further investigation is required.

Defining information needs first depends on deciding on the problems of concern. An initial distinction is between priority for malnutrition due to underconsumption and infection, for which poverty is a major cause, and diet-related non-communicable chronic diseases (NCCDs). In most developing countries malnutrition/infection remains the major problem. Acute food crises now mainly experienced in Africa should be distinguished from endemic (chronic) undernutrition - usually the most serious problem - and from micronutrient deficiencies. If not already done, an initial assessment of priority problems, including identifying people most affected is required. This can usually be based on compilation and analysis of existing information.

Generally, the most practical approach to nutrition monitoring is to use a minimum number of indicators and to focus on those that lend themselves to regular assessment. The prevalence of underweight status in pre-school children is the most commonly used indicator of undernutrition. Some analysis by criteria ,tt. 1 ..
such as administrative aieas, urban/rural areas, ecological zones and posaiui) selected socio-economic factors, such as income source, access to services and programmes is useful.

Ideally, information should be provided on the number of people who are currently affected by SPCCifiC types of malnutrition, as well as those who are likely to become malnourished. Additional information about the location of malnourished groups and changes in their nutritional status over time should also be provided. Gathering information on the factors affecting nutritional well-being is also important for cosheffective programme development and monitoring.

In the case of food crises, timely commitment of resources for public works and food distribution is required. Often, the most important early warning indicators are based on forecasts of food availability and price indicators. In drought-prone countries, it is useful to combine data on rainfall and food crop and livestock conditions with other information on food stocks and reserves, market conditions and various socio-economic indicators to predict food crises. Experience from Botswana, India and Indonesia shows that food crises can be successfully resolved with the help of appropriate and timely information.

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Addressing endemic undernutrition requires assessment and monitoring of general nutritional status, usually by anthropometry (birth weight, infant and child weight and/or height; women,s weight and height) sometimes mortality rates. While assessing the food security status of specific households may be a
difficult, monitoring changes in food prices is relatively simple and can be reported in some national early warning systems. These should be based as far as possible on existing survey data, including reanalysis and regular information such as prices relative to wages and local production changes. Health data may be more directly related to intervention - detecting a specific disease leads to defining action.
Monitoring of infectious diseases can be conducted at the community level through the health system or the Primary Health Care service. Monitoring of breast-feeding practices and their determinants should be undertaken, given their importance for nutrition in early life and their influence on maternal health. Infant feeding and weaning practices should also be assessed.
Assessment and monitoring of caring capacity needs development. A central issue concerns womenis constraints, such as lack of knowledge, time and access to and control over resources, and improving their position. A situation analysis could provide information on aspects such as education, access to services and technology, property and income rights and social security, as well as women’s nutritional status.
Micronutrient deficiencies - primarily of iodine, iron, and vitamin A - can be assessed and monitored in terms of: dietary availability, clinical signs of deficiencies and biochemical tests. Combinations of surveys and data from the health system can provide information as can deficiency control programme monitoring. For iodine, vulnerable areas can be identified from knowledge of the iodine content of foods and soils, often in mountainous areas and flood-prone regions where the soil has been leached, which can be mapped. Where salt is iodized, salt supplies should be monitoried. Iodine deticiency can be assessed clinically by goitre rates, as well asiby more severe manifestations such as cretinism. Such data may be obtained by surveys, or by reports from health centres.
Iron availability in the diet can be assessed from consumption survey results and iron status can be assessed from clinical and biochemical assessment, focusing on the most vulnerable groups (women and young children). Anaemia resulting from iron deficiency is most commonly assessed. Vitamin A intakes vary widely with availability of fruits and dark green leafy vegetables and changes in their prices, so that assessments of consumption need to take account of such

need to take account of such effects. Clinical assessment, by survey or through clinic reports, primarily uses observation of eye changes based on established diagnostic criteria.
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Following dietary and lifestyle patterns and disease trends may be useful for monitoring diet-related chronic diseases. Trends often assessed at the national level from food balance sheet data relate to total energy intake, percentage of energy from fat and from fat of animal origin. Disease outcomes can be tracked using both morbidity and mortality data. The latter can be compiled from death registrations, and in many countries improving the coverage of vital registration, including causes of death, would be useful for this and other purposes.
Morbidity data are scarcer still; possibly sentinel site reporting from selected hospitals and health centres should be considered while systematic coverage through the health system is built up.
Information is also needed on the implementation and cost-effectiveness of programmes aimed at resolving particular nutritional problems or targeted at a particular group or geographic area. Appropriate institutional capacity is central to nutrition monitoring. Many countries are still at the stage of establishing nutrition information systems, generally starting with data on childhood undemutrition. Often, with the use of established data sources and information systems, a more multifaceted system can be developed in accordance with a
’ countryts priorities and resourmc
Global-level assessments of food security have two types of objectives: to 1 advocate the allocation of resources to address hunger and malnutrition; and to i alert donors to impending food crises. These are based on various sources, two L of which are FAOts food balance sheet procedures, and the Global Information If
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and Early Warning System (GIEWS).
The GIEWS monitors continuously the world supply/demand outlook for basic ii foods in order to assist governments to take action in quickly changing z: situations, to identify countries and regions where serious food shortages and . worsening nutritional conditions are imminent to assess possible emergency food ’ requirements, and to support the efforts of governments to establish and ! Strengthen national and regional food information and early warning systems. i
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International health monitoring projects are under way through WHO involving a number of countries, such as MONICA and EURONUT projects. The MONICA project is being extended to include some developing countries through the Global Cardiovascular Disease Monitoring and Prevention Network (GCMP Network). WHO has also established the global nutritional anthropometry data bank and the Global Data Base for Nutritional Trend
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Assessing, analysing and monitoring nutrition situations
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1, STRENGTHENIN G NUTRITION INFORMATION SYSTEMS

1.1. Introduction

A fresh commitment to more effective policies to alleviate malnutrition requires information on the problems, causes, and policy options. The purpose of this paper on assessing, analysing and monitoring nutrition situations is to help governments become familiar with: the kinds of information needed to make policy decisions to improve nutrition;

how best to obtain that information; and how that information can help to assess various options for policies and programmes.

The fundamental principle in choosing appropriate assessment and monitorin g methods is that information is only useful if it is used. Information must be timely, relevant and communicated effectively to the appropriate levels of decision-making. An important point to be made at the outset is that measures of change in nutritional outcome are usually non-specific to cause; identifying a problem does not necessarily tell you what the cause of it is

or what to do about it. Problem detection and decision on the policy implications may, therefore, need to be dealt with in different ways. Ideally, data and analysis will lead directly to defining policy options, and indeed data should be restricted to that needed for this

purpose.

The scope of actions that should be Ponsidered as relevant to improving nutrition is important not only in terms of acquiring the appropriate information, but more broadly in being effective in influencing policies and programmes. "Intluenceability" refers to the trade-off between impact of a policy and how far it is affected by nutritional considerations.

For example, macro-economic development strategies may profoundly affect nutrition, but are not primarily driven by nutritional objectives; at the other extreme, nutrition education

has probably some lesser effect, but is highly intluenceable. Early decisions must, therefore,

be made as to which types of policies, in which sectors, it is intended to influence, and what

kinds of programmes might follow.

Governments considering increased commitment to solving nutrition problems will need, early in the process, to assemble some information as a basis for deciding priority problems and possible action. Generally, this assessment will include indicators of nutritional

problems by various population groups, possibly with trends: indicators for subsequent monitoring will often be the same. An early policy decision is to make this assessment of priority problems and potential action, if it is not already available. The connection between

problems and possible actions may require policy research. A related decision is to determine

the institutions with the required or potential capabilities. Often this may mean linking different sources of information and expertise, for instance if nutritional outcome, often

assessed by the health sector, is to be related to household food security. Some cross-sectoral coordination is commonly needed.

Generally, it is most effective to choose one, or at most a few, indicators of nutritional status rather than an extensive range. For example. prevalence of underweight l

in pre-school children is probably the most commonly used for endemic undemutrition. It is usually more useful to concentrate on trends in such indicators, with small samples if necessary, than on detailed one-time surveys. Trends can be assessed from repeated survey s.
and/or from administrative sources such as health centres and schools. Some disaggregatio n
below national level is important, by criteria such as administrative area, urban/rursJ differentials, and possibly selected socio-economic factors such as income source and acc ess
to services and programmes, where data are available. Unless there are strong indications otherwise, it is likely that causes and required interventions may involve several proble m
areas - household food security, infection, and care. Again, one or a few indicators in t hese
areas should be chosen. Appropriate examples might include: indicators based on food prices; morbidity data from the health system; and measures of womenls status such as school enrolment.
The question of resources used for data gathering and analysis must be seen in relation to the efficient use of the much larger resources required, directly or indirect ly, for
intervention. Clearly, only relatively minor resources for information would be justified in
an exploratory phase. While the cost of information is low compared with ineffective expenditure, continued expenditure on information in the absence of action is clearly inappropriate. However, interventions which may have a significant effect on nutrition. especially via household food security, are expensive, and the cost of obtaining relevant information, including through special surveys, may be readily justifiable in terms of ensuring effective use of public funds.
, Particularly when resources are very constrained, emphasis should be on drawing on existing sources of data. In many countries, growth monitoring programmes accumulate much data which can be tapped. Birth weights, when available, should be compiled. Price monitoring is part of many routine statistical systems, and may be used for monitoring tr ends
in household food security. Programme management data may also be relevant. A commonly fruitful approach is to add nutritional measurements to household surveys. The possibility of processing household expenditure data to assess kcal consumption needs to be
explored. When data available is very limited, and/or rapid reporting and improved qualit y
is important, the selection ofa few reporting points (clinics and markets), usually in th e most
vulnerable areas, should be considered. Rapid assessment procedures have a potentially important role in obtaining detailed, often qualitative, information on programme deliver y
and in following up indications from reporting systems that further investigation is requ ired.
Experiences from a number of countries in developing and using monitoring systems indicate that generally the policy decision to take deliberate action to alleviate malnut rition
depends on many factors, within which sound information contributes but often is not cent ral.
This decision responds to political concerns, public opinion and awareness and outside events, it may translate into interventions to a greater or lesser extent, depending on o ther
factors. Many countries have some degree of deliberate action aimed at improving nutritio n.
When this is the case, information from monitoring becomes (a) more feasible because some resources are available and (b) more effectively used as experience increases and institu tions
become established. It then becomes important to develop a cycle of intervention and monitoring. A considerable number of countries have moved to this stage. In Asia, for

example, India has the ICDS, which includes monitoring, China has monitored food consumption for some time, now adding anthropometry, aimed at food security and health policy. Thailand and Indonesia have several years of experience in relation to nutrition programmes. In Latin America there are many direct nutrition programmes, some of long standing (e.g. Chile). Recently it was estimated that over half the poor population of La tin America is covered by food distribution programmes, over 4 times the number of ’- malnourished children with a programme expenditure of around $20/beneficiarylyear (1). In other regions programmes are also being established.

Information needs to be timely in the sense of fitting in with real needs for decision-making. It must be presented in a way that is understandable, interesting, and in line wi th decision-making cycles for development plans and budget decisions. Programmes for nutrition monitoring must pay special attention to providing wanted information to identi fied users at the right time. For this, adequate institutional links are essential. Underlying this is, therefore, the central need to develop institutional capability. In most cases where monitoring systems have evolved, sustained support has allowed the system to develop over periods of years. These then reach the point of an effective cycle of information and act ion.

The capability usually requires a mixture of expertise, which may be drawn from the relev ant sectors; linkage to academic and research institutions is valuable for training, design a nd analysis. At local levels, fewer indicators are normally used, less formal analysis is ne eded and local staff may be successfully trained in monitoring, it’ adequate sustained support is forthcoming. Examples of expertise contributing to functioning systems at central level, depending on the objectives, include nutrition, epidemiology, demography, public health, economics, agronomy and social sciences. An indispensable feature centrally is a function ing wait for design, analysis, interpretation, and communiraring information by informal mean s as well as regular publication. Such capability needs adequate training and sustained sup port.

The first step is to assign priority to types of problems, for example along the lines given in this paper: food crises, endemic undernutrition, micronutrient deficiencies and non-communicable chronic diseases. This decision on priorities is clearly situatiomspecitic, although drawing on some fundamental considerations like relative mortality, morbidity, a nd disability from different conditions. Prospects for prevention and related costs must be brought in. Setting priorities has ethical dimensions, when resources are limited, as the y usually are. Cretinism, anaemia, infant mortality, poor child growth and development, adu lt hunger - all these problems and others may need to be considered, and resource allocation s decided.

Second, the population groups affected by nutritional problems must be defined. This definition is needed both in terms of risk - biologically such as mothers and infants, geographically and socially, usually the poor and economically vulnerable - as well as relating to intervention design and target groups.

Third, some assessment of nutritional trends in vulnerable groups is useful. Clearly an increased urgency for intervention is indicated for people whose nutrition is poor and worsening.

These first three steps are required under almost any circumstances. In a checklist format: which nutritional problems are most important? Who is most affected by them? What is the trend for these people?

Founh, consideration must turn to the possible decisions on policies and programmes that could in principle address the nutritional problems. This stems from analysis of the reasons for the problems and their trends, distinguishing household food security, infectious disease, and care. Organizational levels of responsibility (central/local), availability and flows of resources, and hence decision-making points and practices must be defined. These vary by policy and intervention type, as well as local politics: some decisions inevitably are central (e.g. price policy, essential drug supply), others better at local level (e.g. food stocks, community health services).

Fifth, for initially considering information systems, required data outputs to support decisions at different organizational levels should be defined and possible data sources explored.

Finally, the institutional responsibilities, capabilities, and funding have to be decided: the "who does what, and how?" Eventually, institution-building will be the most important consideration in sustaining nutritional improvement, and in the information support for this.

Moving to the next stage of continuing information systems usually required that resources have been committed to nutritional improvement policies. If so, a fraction of these . will usually be available for nutrition information systems - so the next steps become feasible. If not, the major priority is probably using ad hoc information for advocacy, to get resources committed.

1.2 National Support for Nutrition-Relevant Information Systems

Continuing production of nutrition-relevant information is justified when there is a need or demand for the information. In practice, this generally follows decisions to commit resources to improving nutrition, through broader policies and/or through programmes specifically identified as having explicit nutritional objectives. Indeed, it can be observed that many of the existing sustained nutrition information systems have been set up, at least partly, to meet the information needs of such nutrition programmes, and are funded for this reason (2). Thus, it could be recommended that this practice continue and be fostered. When resources are committed to nutritional improvement, a certain limited proportion of these resources should be allocated to supporting the necessary nutrition or "nutrition-relevant" information system.

Given that resources are made available for initiating and sustaining nutrition information systems, for defined purposes, what are their priority uses? Generally, functioning institutional capability is the key factor. This means people, with the necessary skills, support, and links to decision-making, at the appropriate administrative or

organizational levels. Such capability needs not only to make available relevant information,
including guidance on action, but be able effectively to communicate this.
Establishing or strengthening this capabilitytreqnires decisions by governments on
issues such as institutional location and intra-’ and inter-sectoral communication links. The
more decision-making is decentralized, the easier it hsually is to take timely action, but this
clearly depends on the types of problems and decisions. Analytical capability is a common
bottle-neck, and linkages with research institutions with the necessary experience may be a
solution, moreover with budgetary provision to commission work (2).
Developing capability also requires access to adequate and appropriate training, and
to experience of methods applied elsewhere. Deliberate steps to meet these needs will be
required. Generally, strengthening institutional capability in this field is similar to that in
most others - requiring sustained support and encouragement for those responsible.
Govemment commitments to nutritional improvement should thus include support for the
information system to provide adequate assessment, analysis and monitoring, for the purposes
of better using resources to benefit nutrition.

1.3 Support for National Actions by International Avencies

Support for national actions from international agencies may be appropriate and useful
for both initial assessments and for establishing information systems. At the same time,
international agencies can help substantially, and benefit themselves, by systematically using
support may often be appropriate for strengthening national and sub-national institutions.
This requires willingness to continue support for substantial periods of time, possibly even
when things are going badly for institutions or when modest success has been established (3).
Indeed, the institution-building effects of external assistance projects should be regularly
assessed and promoted.
Support to institutions has many aspects, three of which may be highlighted for
international inputs: training, method development, and exchange of experiences and
information dissemination. Training at various levels is required, from higher level degrees
through to short courses, workshops and seminars. Provision of fellowships, training
materials, support for course development, and other inputs are needed. Method
development is linked to exchanging experience, as methods used in one place may often be
adapted for use elsewhere, and the international agencies are well-placed to foster such
communication. At the same time, research into methods must proceed - methods for data
collection (qualitative or quantitative), analysis, interpretation, communication. International
agencies can encourage this.
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In facilitating exchange of experiences between countries the international agencies have a particular comparative advantage and responsibility. Especially at the present tim e, a vigorous effort in this area would pay large dividends. Expansion of information dissemination should be by multiple routes, particularly publications and meetings. Finally, international agencies could set an important example by themselves using nutritional information much more widely in their own work. Nutritional information has been recognized as a measure of development, as a criterion for targeting, and an indicat or of need. Systematic application of nutritional information for these purposes is now needed.

II. WHAT INFORMATION IS NEEDED AND WHY

Procedures for assessing, analysing and monitoring nutrition are distinct according to certain characteristics of decisions and data. These include the following, elaborated in the subsequent sections.

I The type ofnutrin’onal problems of concern determines the decisions and data needs. Acute food crises are distinct from endemic undernutrition which, in turn, is separate from micronutrient deficiencies, and diet-related non-communicable chronic diseases (NCCDs). A "situation analysis", if not already done, is a first step. This includes initial identification of vulnerable groups.

I The required timing of information is important in determining procedures to prevent crises, but less so for planning.

l The level ofdecision-making involved influences the design and use of the information system.

I Data analysis and data sources must be considered. This affects the assignment of responsibilities to institutions, funding and timing. Potential data sources must be initially identified early on to ensure feasibility and reasonable cost.

2.1 Assessment of Problem Types - Situation Analvsis

Deciding on the nutritional problems of priority concern is of obvious importance and requires some initial information and analysis. This may be referred to as a "situation analysis." The situation analysis should review the likely problems - acute food crises. endemic undernutn’tion, micronutrient deficiencies, diebrelated chronic diseases - and sh ould provide estimates of numbers and proportions of people affected by different problems If? such criteria as geographic location, age and gender, and some indicators of socio-econot mc status. The severity of problems, and characteristics such as seasonality should be considered. This should lead to conclusions on relative priorities.

Data availability for such an analysis has increased greatly in recent years, and almost all countries have at least some suitable information. For child anthropometry, for example, in 1975 only six nationally representative surveys were identified for the Fourth World Food Survey (4); by the mid-19803, some 45 surveys had been conducted (5, 6) and now over 100 are available (7, 8). Household budget surveys which can provide data on food availability levels and patterns are becoming more common and are carried out regularly in many ,countries. FAO food balance sheets provide annual data available for each country and lcontinue to form an important basis for nutritional assessment, although some caution is needed in their interpretation.

Distinguishing between undernutrition and diet-related non-communicable chronic diseases (NCCDs) is easy, but it needs to be done explicitly because analyses and policy decisions are very different. Undemutrition, involving severe deprivation and hunger, affects poor people. Diet-related NCCDs also affect the more affluent in poorer countries as well as those in better off countries. Usually dietary causes of NCCDs are of most concern when food availability is fairly adequate.

A variety of relevant information is usually available in countries where diet-related NCCDs are of emerging importance. These include anthropometry, and age- and cause-specific mortality rates. In particular, significant prevalences of obesity are strongly indicative ofrisk of NCCDS, including cardiovascular disease, certain cancers, and diabetes.

Any country with an elevated infant mortality rate (IMR above 20 per 1 000 live births) is likely to experience problems of endemic undernutrition, which can coexist with obesity and diet-related NCCDs. The relative rates of premature death from NCCDs and infectious diseases can be calculated as a readily available indicator. when there is adequate death registration. Where there is not, NCCDs are likely to be less of a problem, but other indicators such as obesity should be sought. An example is shown in Figure 1. Here the patterns are readily distinguishable. In this example, infectious disease clearly dominates causes of mortality at all ages in Guatemala, compared with the example of the Netherlands.

Mortality rates from infectious diseases are also much higher among young children in Guatemala, while the Netherlands shows the opposite trend. Intermediate conditions can be observed in middle-income countries. Such information may be useful to emphasize that a b3.i:.nce of concern is needed; in middle-income countries, or some with, for example, rapid urbanization causing rapid diet change, concefn for both problems may be valid. It should be emphasized that concern for the "newer" nutritional problems of NCCDs must not distract efforts from improving the "traditional" problems of malnutrition related to poverty.

The relative importance of malnutrition/infection and NCCDs is linked to health and dEmOgraphic transitions under way in many countries. The demographic transition refers to the Change from high mortality/high fertility rates to low mortality/low fertility rates; in the Intermediate phase mortality drops before fertility, leading to population growth. The related Epidemiological transition" is observed as a change from high infectious disease incidence $3M mortality) to increased chronic diseases and lowered infectious disease, with improved "fCOme, living conditions and medical treatment. Nutrition is also in transition, from the - -. diets of hunter-gathers, through cereal and root-based diets of agriculturalists, to the high fat,

highly processed diets of industrialized societies (9). While better nutrition is an impo rtant
factor in reducing the toll of infectious disease, some aspects of the diets of industria lized
societies predispose to some of the major chronic diseases. The initial assessment could locate population groups with respect to these transitions.
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Figure 1
Comparing Age- and Cause-Specific Mortality in Guatemala and the Netherlands
GUATEMALA NETHERLAN DS
(1981) (1983)
Percentage deaths by age group Percentage deaths by age group
100
0 20 40 so 3) 100
Age group (years) Age group (years)
-- Infectious dnsease --- Chronic disease
Age : mnd-poinl oLlO-ysa: age gloupc
Source: Gillespie, 8., Mason. J.. 1991. Nutrition-relevant actions. ACCISCN State-ot-the-An Series. Nutrition policy discussion
paper No. 1. ACC/SCN, Geneva: ACC/SCN, 1992. Some preliminary fmdings tor the second repo rt on the World
Nutrition Situation, SCN/HWNS. ACC/SCN, Genevat WHO. Wotld health statistim annuals Genev a.
In the initial assessment the distinction between the clusters of underlying problems - defmed as household food security, infectious disease, and caring capacity - is necessa ry
and some conclusions are therefore needed on the relative importance of each of these. It should be emphasized that adequacy in each is a necessary but not sufficient condition fo r

good nutrition. Unless there are clear indications otherwise it should be considered likely that there are deficiencies in all three areas.

Procedures for the assessment of adequacy of household food security, malnutrition/infection and care can range from pqlicy-related research to informed discussion based on non-numerical data. Informed discussion at the level of making decisions is a useful way of analysing causes and possible interventions, when there is a real need to come to valid conclusions and to take action. A recent meeting on nutritional surveillance (2) concluded that the underlying and basic causes do not need to be measured rigorously and that important information leading to decisions can come from meetings and local judgements and is not necessarily numerical. This requires an institutional set up, a conceptualization of the problem, and a desire to make informed decisions. Nonetheless, an adequate understanding of the likely situation is a prerequisite, and misconceptions must be avoided.

In the initial assessment, a preliminary identification of vulnerable groups is useful. In the context of nutrition, "vulnerable" has been used somewhat interchangeably to mean either "affected by malnutrition" or "at risk of being affected by malnutrition". Most analyses have dealt with those affected by malnutrition, and this is the sense here, except in relation to food crises and risk mapping.

Data to define vulnerable groups is straightforward. involving assessment of nutritional status and the classification of variables relevant to policy. These, generally, include identifying groups for targeting specific programmes and defining those likely to be affected by broader policies. An example of the first could be malnourished children in certain geographical areas; of the second, farmers producing a certain crop. Variables commonly used for defining vulnerable groups for targeting in large-scale operational nutrition programmes are: geographical area; biological status (e.g. children below a certain age, pregnant and lactating women); nutritional status as measured by anthropometry.

Classifying variables for identifying vulnerable groups for direct programme intervention should focus on geographical location and biological status. Identification of groups likely to be affected by broader policies depends on the policy itself, and on a careful consideration of possible losers and gainers. This is likely to include such factors as occupation, education level, farming system and land holding, as well as income group and source of income.

Risk mapping involves not only identifying groups at n’sk of deteriorating nutrition, but also the factors that will make this vulnerability turn into disaster (10). One has to look at the set of circumstances that bring acute crises, thus identifying the indicators that need to be monitored to predict that crisis. The outcome can say, for instance, that "there are x million cattle-dependent people in such an area; if there is a drought and terms of trade are affected such that the ratio of livestock to grain prices changes by so much, then the probability of requiring emergency distribution of free food is such and such". Indicators for such prediction will usually be from diverse sources, generally not from formal household surveys, in fact many not on a population basis. Agro-meteorological data (e.g. crop water balances), livestock conditions, crop prospects, areas planted and growing, and food prices, are good indicators.

Identifying vulnerable groups as an objective also has implications for design of data collection. Household surveys usually provide the best opportunity for investigating associations and causality. Considerable progress can often be made by judicious assembli ng
of existing data, which can sometimes be linked at area level, although seldom at househo ld
level. Such an assembly and preliminary analysis is needed before embarking on funher survey activities, and the preliminary findings may serve to guide future survey designs. Approaches depend very much on the level at which there is a need to identify vulnerable groups. The more local this is, the more it is likely to depend upon qualitative informed discussion, rather than statistics. Considerable guidance at national level may be availa ble
from case studies and rapid assessment procedures. As in all such cases, it is essential to ask
the right questions relating to what decision might be made, then to go and find the information, rather than the other way round.
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Decisions about future data needs must take account of the intended sequence of events leading to intervention. In acute situations clearly this is a major concern. On the othe r
hand, for many decisions timing is not of overriding importance. Many of the advances in policy understanding have come from retrospective studies. Knowledge of the relationship of nutrition with development strategies, the environment, income, gender roles and healt h
is crucial for policy decisions and has often come from retrospective analyses. Careful d ata
collection and analysis are important and cannot always be done quickly, nor do they need to be. A reference to "timely" rather than "early" warning is intended to stress that the information must be early enough to trigger action; in practice this often refers to urge nt
action which therefore must be predetermined. A timely warning is one which is available in time to initiate an effective intervention. It is noted that "timeliness" can be consi dered
implicit in an early warning system.
Nutritional status data- e.g .prevalences of wasting - h’axe a place, albeit subordinate, in timely warning systems. There are two roles for anthropometry: first, it provides data for
retrospective analysis to validate indicators and determine their characteristics, includ ing cut-
off levels and trigger or warning points; the second use is as a safety net, depending on rapid
data tum-around (11). In Botswana, for example, weights-for-age of children attending clinics (often for food distribution) are recorded and information is aggregated at the l evel
of the clinic and rapidly reported to the centre (12). The turn-around time is around one month, which is timely enough to pick up problems (e.g. of food distribution).
Timeliness is also a consideration for long-term planning, but is far less constraining- In particular, actions are less pre-determined, often decided from analysing the data themselves. Nonetheless, there are certain timing considerations. There is no substitute for
carefully collected data on nutritional status, causal factors. and policy effects, corre ctly
analysed and available in time for making planning decisions. Often these decisions are y ear-
to-year, and can adequately be supported by information from the previous year. A reasonable degree of efficiency in data handling and analysis is required, determined bY institutional capability.

2.3 Level of Decision-Making

Systems for data depend on levels of analysis and decision-making. The more this can be decentralized, the more effective systems are likely to be. Sustaining data collection and reporting systems at local level depends on these seeming useful at that lev e1. Levels a re not mutually exclusive: data systems can be organized with local levels informing distric t and central and central informing global. Developing information systems in this way is especially viable because there IS motivation at every level. The origins of data and req uired aggregation levels must be considered when designing information systems. Aggregations and classifying variables necessarily Change as one moves from the individual level to household, to community, local government, national level, and indeed global. Certain dat a originate at certain levels, and thus can only be available at that level or higher when aggregated. Examplesare:1nd1v1duallevel anthropometry; householdlevel household food availability, 1ncome; community level, prices, environmental factors; national lex el, su pply-utilization of food (food balance sheet).

Different decisions are made at different levels (13). As examples. food security insurances in rural areas by traditional means tend to be local; in contrast, delivery of health supplies requires more central action. Again timing is important: Indonesia deals with fo od crises at area level, by having funding pre-assigned for local decision on launching emergency public works programmes to forestall acute food shortages (l4)- Local IEVCI decision-making may work best by using minimal numerical information. For example, in Tanzania the Iringa Nutrition Programme primarily used prevalences of underweight children, making these focal points for local discussions on causes and necessary actions (2).

the Indian famine codes also use primarily non-nun...ieal information (15). 111 general, at local level, it may well be that even one source of nutritional status infonnntion may be the main need. At more central levels, outcome data remain the priority, and may be supported by other sources which would allow informed discussion of causes and necessary actions, f or example press reports. The location of accountability and democratic processes determines substantially the levels at which information is used (16).

Perhaps, the most important point concerning levels of decision-nmking relates to the motivation for assessing, analysing, 311d using data. Simply, those who actually need information to make decisions are going to be those who have the motivation for ensuring that data are collected and analysed. Reporting systems based on passing informatlon upwards (e.g. from clinics), without experiencing any utility at their own level, have. generally, not been sustainable; only if people are using data will they, generally, cont lnuc to collect them.

2.4 Data Analysis and Potential Data Sources

Assessing changes in nutritional status and in certain pre-defmed causal factors, 15 within the operational capacity of routine data systems, for example, as done by govemmen l statistical departments and ministries of health and agriculture. Such information can id enhf y progress or a worsening problem, but does not itself tell what to do about it. This may . be referred to as "routine information", and is the main focus in this paper. Routine data W ith

further analysis may yield useful results for deciding policy. The information on require
d
policies - what to do about it - may be called "policy-related research"; this frequently
requires sophisticated analysis, and is often d0ne on a case-study basis. Generally, the
institutional capability for such research lies more in universities and research institu
tions
than with local or central government departments.
Monitoring and assessing nutritional outcomes and causes is feasible in routine systems
and in "real time". Analysis of causes in relation to outcome and evaluation requires mor
e
sophistication, more data, and takes longer - that is should be regarded as "policy-relat
ed".
With longer timing, for instance in long-term planning, there is increasing overlap and
interdependence between monitoring and research. The temptation to repeat general researc
h
(particularly biological) should be resisted, in favour of obtaining data directly useful
for
solving problems in specific situations. Much of the basic research has now been done, an
d
is usually generalizable. For example, on the one hand, it is not necessary to show that
feeding deprived children makes them grow. On the other hand, in a specific situation, it
may be very important to know if large-scale programmes that aim to feed children actuall
y
work in practice.
Although choice of data source should be based on relevance to data decisions, in
practice the potential sources of data need to be considered at a relatively early stage.
In
fact, defining data possibilities is cyclic. This in turn means that, as far as possible,
reliance
needs to be made on existing information. Data sources should be selected as the required
information begins to be defined. In practice, ideal data needs must obviously be modifie
d
in the light of feasibility and cost. Choice of data source depends on the variables want
ed,
and also of other characteristics of the required outputs.
Administrative sources refer primarily to data that are already being gathered. It is
frequently possible to capture data from clinics, for example, from growth monitoring
programmes. Sentinel sites refer to the deliberate selection of a small number of locatio
ns -
for example, clinics or markets - for particular concentration on rapidly acquiring high
quality data on a limited number of variables. In the present context, sentinel site data
would
be retrieved from measurements already made, such as childrenis weights; however, it may
be necessary to deliberately draw a smallesample in a’village to avoid problems such as
selection bias. Schools have in some cases provided useful information, either by retriev
ing
weights and heights of children already collected but not reported; or by asking teachers
to
make such measurements specially.
Household surveys are well-known, and covered in some detail later in this paper. It
should be stressed that a number of the characteristics of household surveys cannot be me
t
by drawing on administrative sources. This applies to the variables, the validity with re
spect
to the overall population and the quality of data. For most assessments, some inclusion o
f
household survey data is likely to be important.
Rapid assessment procedures have been widely developed in the last decadefmd
include a wide range of possible methods. One of their most important characteristics Is
to
allow for in-depth consultation and understanding of local problems. The focus on "

participation is perhaps its most important characteristic. Wider application of such methods, possibly linked with other more numerical approaches, seems an important way ahead, both for initial assessments and for monitoring.

III. ASSESSING AND MONITORING DlFFERENT NUTRITION SITUATIONS

3.1 Food Crises and Timely Warning

Decisions on actions to prevent starvation from food crises need timely information concerning causes of malnutrition and nutritional status. Food crises mean acute food deficiencies at household level. They are caused by a collapse of household access to food (17); this is more often due to destitution of the household and community than to simple physical lack of food in the area. T hus, data predicting and monitoring food crises need to go beyond early overall production estimates and to take account of the fact that production losses cause starvation through destitution rather than through failures of overall food supply.

See Table 1. One implication of this concerns the need to identify and to monitor vulnerable groups. Another is that intermediate and outcome indicators are necessary.

A common contributory cause of food crisis is drought - but most droughts do not cause famine (15). Recent food crises affecting several African countries have generally been due to the combination of war and drought. A second cause of food crisis, or at least severe stress is related to serious economic problems, which may in turn be linked to structural adjustment. Timely warning and intervention programmes could be applied to these food crises as well (18).

Successful forestalling of food crises, usually triggered by drought, depends on public accountability, and on response to popular pressure, leading to a timely commitment of resources. For example, recently in Botswana, Cape Verde, Kenya and Zimbabwe a series of govemment-sponsored interventions were used, generally a mix of food imports and food aid, food price stabilization, large-scale labourdntensive public works, and free food distribution to vulnerable groups. In India the Famine Codes (tirst drafted in 1880) and related programmes are similar, involving public works and food movements (15). Indonesia has effective local systems, again relying on emergency public works employment and stabilized supplies (14). In all these cases early warning was effective because there was determination to commit public resources to prevent starvation.

Inevitably, there are lags in the system between, for example, rainfall deficits and falls in food consumption. Each of these lags can be minimized by technical improvements, and particularly by decentralization. The lags in the system increase as the decisions are made more remotely from the problem, while the information needed is also more difficult to obtain at a distance. At local level, communities have no difficulty in knowing what is happening. At the global level, the lags in decisions, and information needs, get increasingly difficult. For functioning famine prevention systems, the information required is also useful for programme management. Timing is however less of a constraint when a programme has

already started. Botswana is a case in point: data on trends in malnourished children, la gged
by a month or so, is used to help manage the food distribution system.

Tablle 1
Factors that may precipitate a Food Crisis and Early Symptoms

Factors that may precipitate a food crisis			Early symptoms of a food crisis	
m Human-made	Economic	Economic	Social	
Flood	War	Fall in fertilizer prices	Rising food prices in city-	
Cyclone	Civil strife and/or	pesticide Falling	ward move- ment of	
Tidal bore	Influx of refugees	use	livestock prices	rural people
Tornado	Reduced irrigation	Increase in floating		
Drought	Sharp decline supplies in market		population in city streets	
’1 Excessive	Non-availability of quality seeds		basic foodstuffs	
ll ultimate			Increase in the number of	
- rains			beggars	
l3 Decline in	Fall in production			
l Plant pests			government food stocks	
i credit			Increase in infant mortality	
Animal , diseases			Lower HYV acreage	
Rising global food prices			Psbrl- -’....i:1g " famine foods	
Lower world production	food exchange	Shortage of foreign Long queus in VGF centres		
Unfavourable producersl incentives, e.g. low pre-planting or previous year’s output prices, low guaranteed price				
Decline in wages				
Shortage of employment				
Panic-buying of foodstuffs				
Speculative hoarding of foodstuffs				
Smuggling of foodstuffs across border				
Cut in food aid programmes				

NOTE: When a food crisis is developing, some of the symptoms such as those listed above w ill occur; and
some of them may then also precipitate the crises. e.g. panic-buying leading to stock-pil ing by some ,
consumers/traders will adversely affect marketed supplies.

Source: "National Early Warning and Food Information Systems (NEWS) in Asia and the Pacif ic: Their
Objectives, Actwntes and Outputs" presented at Workshop on Strengthening National Early W arning
and Food Information Systems in Asia and the Pacific. FAO, October 1991. Bangkok.

Contingency planning for decentralized action takes place at sub-provincial level in Indonesia, where the local governor in drought-prone areas has pre-assigned a fund for emergency public works and potential projects. Food is almost always available in the market, through the rice-marketing agency (BULOG) and risk of food crisis is due pn'maril y to income loss and destitution from localized droughts. The governor is authorized to rel ease such funds for public works employment if it is decided that starvation threatens because of drdught. The criteria for launching such projects include: Crop forecasting data, notably percentage rice area planted that has been destroyed by drought; this provides "yellow li ght" warning, and leads to household interviews to gain such data as: use of "famine" foods, distress sales; when such indicators show increasing stress, interventions can begin, tar geted to affected areas.

Information available in Botswana for coping with drought includes agro-meteorological data, reports on livestock conditions and clinic-derived underweight prevalences as a "fa il safe" and for management (12). The experience in Kenya in preventing famine in 1984 provides another example; the seasonal (March-Apn'l) rains failed almost completely: everyone knew that, no surveys were necessary. The Government was further alarmed by a rapid depletion of stocks of the National Cereals and Produce Board. Interventions invo lved both food imports and commercial distribution. A key decision was taken in June to use financial reserves to order major imports of food and within two to three months the food distribution was able to begin.

It could be concluded that when there is determination to prevent the effects of food crisis, the data collected can be effective. This generally involves early assessments of rainfall, crop and livestovk conditions, sales and draw-down of stocks, and a whole range of qualitative information. In certain cases monitoring nutritional status, plays a suppouin g role. Wherever there is clinic-based nutritional surveillance, this can be drawn upon to support actions to alleviate the effects of food crisis. The mix of actions normally incl udes public works, food distribution, and food price stabilization. Where there is not determination to prevent the effects of drought, information will generally not create th is determination.

Development of information systems thus should be regarded as relevant where there is the determination to take action based on it. The areas outlined below apply roughly i n 111s order of their relevance to impending food crises: for example drought leading to cr op miiure and livestock losses, human responses to these from reducing food intakes to n1igration,effects on market,notab1y prices, and hunger and malnutrition. Since circumstances differ by place and time, there is overlap between these, and various data sources may be useful for different purposes.

Agricultural Reporting Systems. Early warnings of rain failures are usually available fro m monitoring stations in vulnerable areas; these may be interpreted with respect to water requirements for crops at different stages of growth. Crop development itself is often reported through the agricultural services. Such data are already central features of ear ly waming systems, and require continued support. One contribution that nutritional considerations can make to this process is to facilitate improving the specificity of suc h data

with respect to risk of food crises and malnutrition. Satellite information is being increasingly used to assess rainfall and vegetation, particularly in African drought situations (19). Technology development has now made (it feasible to assess conditions with delays of only a few days. Satellite information has a role also in communication: the images, for example of vegetation indices (e.g. N DVIs), are readily grasped in principle by those making 1. decisions. Livestock and rangeland conditions are particularly relevant, because populations most affected by drought are very often in marginal rainfall areas, and thus dependent on livestock. Particular attention may be warranted to ensuring that such information is obtained and used.

Local Opinion. Situations where food crises are effectively handled generally are those where the press is relatively vocal and unfettered. The press can be a powerful source of information which demands action. In India, when the generally successful efforts to avert famine involve decisions at state level, the main information comes from people themselves when threatened by drought and famine. T hey know that they are at imminent risk and can effectively get action. An effective early warning system can come from the people themselves, if they are listened to. This applies particularly where drought may effect emote areas, where the press is not represented, or where information is restricted for other reasons. Opening up channels of communication from local areas is one aspect. and giving credence to the knowledge of local people about their situation. Encouraging voluntary agencies to contribute by reporting through local government or local channels is also important. Active approaches to finding out local situations should be initiated and the capability for visits to areas where drought is suspected should be part of a timely warning system. In India, early repo"c 1ad to local visits by officials, where the situation is assessed. In Indonesia the "yellow light" warning from agricultural reports leads to local investigations, within which specific information such as shifts of dietary patterns towards famine foods are included.

Monitoring Behavioztr. The behavioural responses to food shortage are generally well-known in different circumstances. These usually involve distress sale ofassets. reducing the number of meals per day and the use of famine foods. Such indications can be quite readily picked up by rapid surveys and by inquiry at local level. In many parts of Africa, for example, there are well-recognized responses in eatingesmaller portions of food or cutting out a particular meal. Shifts to less preferred foods, such as from cereals to cassava, or from milk to other products in drought are locally well-recognized (21). Migration is a widely r-xognized feature from the early stages of food crises, and is often one of the signs that brings attention to the problem. Local authorities and voluntary agencies are generally aware of migration trends, especially when migrants congregate in camps. Improved reporting of signs of migrations can be an effective early warning of famine. However, given the difficulties that centrally-based early warning systems typically have in monitoring and interpreting local behaviours, there is a need to invest in locally-based institutions for effective early waming and famine prevention (21).

Assessing, analysing and n::v::’.’:’t’.; earrition Situations
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Monitoring Prices. An important possibility for zitjsrovement in time.) mmmti Nwmm
the increased use of price reporting, as there 3:3 :15: indications that 7’0 imClllx m um MS
prices are relevant to changes in food consxtgisz Lind nutritional s ?- Mi’lkvt Pm T
reporting is already quite widely available. ’4," relatively easy to TITOVU: metc
Reporting is frequently available in the cozzex: 0:" monitoring c0215: "3’? WIW mthtt i
although these may not be focused in areas witii-"izble to food ShOTiETf’, Mm’wt WC;
reporting does not depend on household surveys. .221: can provide f9: ":19 Wlh’vuu. i
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transfer of information; It does, however, require some tralmng am. w d! .tnplum W
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well as careful enquiry, to pick up accurais ?TICSS- Some T937 "’2 "’"l tHLtlLJ
infrastructure is, therefore, necessary.
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Introducmg more systematic price mo::::c::.;_ requires delttx.m _ "m .u Hmmw
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reporting systems can be used, and the prtnzsq’ :t-esd ts to make the s ""1 ll hut. H HI.
timely warning, and for analysis. Monitoring by terms of trade has Sh; Frrmd um I...
example in Sudan (22). The ratio of prices :0 xx_somet1mes cahxur ’ - i) ’9’" ’s HI H W I
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level, and the specifics of each situation need :0 1w :ztx’estigated. Oft-cr’. t
necessary to buy a standard food basket, has 5::
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prevalences of underweight (or wasting) in c’zziidrezt. usually With chs-xigf e- (’1 ’t 1
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changes 1n child malnutrition by arouna 1.1.;t months (22, ’3’ ’., "H I- I.,,,
increasing reason to suppose that these indicators could be more ui-s 972/! 1mm,
research is needed to establish more precisely "s: :-.pp1ication of $115.17 " ’53-’1’2, t
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situation is well enough understood tha :-.ppii:.zmm need not w:-.:: T 3-; "77 Mr M h
trough sentinel Sttes :s s 5- ---"/: t.,,/
particular, the possibility of reporting prices t
Anrhropometry. This refers to establishing 21-: best predictive indict? j .’-..r mu, , ,l
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off points, that have been shown to, under specific Circumstances. ’ w
subsequent malnutrition as measured by child anthropometry. For :vu
in Indonesia that the area of rice planted that was harvested did pretty t ,
(14). In Botswana, a similar analysis gave cut-oft points and precl’xxx _ ’
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indices (26). Such analysis can contribute t6 the design of timely xi -_ , ’ , H, I, ’1
concern that changes in anthropometry may come rather late in 111-: 1) Nita: ’4 Cup I ,
food crisis, under conditions where very little data are available. . u; 1mm; ’a,/
picking UP changes in wasting prevalences in children in vulnemblc -::---w---’::’-,
relatively sensitive and early indicator. The use ttt’ttntlerweight prcx: ; , ,- , -. 21/
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small-scale surveys for the management of preventive measures ’9 " ,’-, ,,,_ w;
shown to be useful. It is important to ensure that population gretzgw .- 2:1; "a-
vulnerable. This has two purposes. The tirst. clearly, is to 6115111? 13 4 ’1’- 7/,,, .y
those most at risk are covered. Second. however, it should be NXTZ 72" I
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vulnerable will show the first signs, thus giving some earlier wanwb - 1"
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the population. Picking up changes in wasting prevalenccs m .__ ----- xa/ (W,
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Circumstances is generally done by rapid actm surveys, but clubs . J) .- 1, ,v, 0/,
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Sentinel Sites are pre-selected points of data collection and transmission. The sites are generally chosen not to be representative of the population, but to pick up early changes in indicators among vulnerable groups. Among the advantages of choosing sentinel sites is the possibility of higher quality data and speed of transmission. The purpose of such a system is to trigger intervention that has been predetermined, rather than to investigate any Causes,
Sentinel site systems are used quite extensively in developed (27) as well as in developing countries (28, 29). Some of the principles of applying sentinel site systems have been pul forward (19). A strictly limited number of different indicators should be used, particularly food prices and anthropometry and shifts in the patterns of these indicators, seasonally adjusted as appropriate. The anticipated use of the data would be for triggering action for deflned population groups, so that as far as possible sentinel sites would be located to cover such groups. A very limited number of sites could be used, at least in a development phase. because the aim is to detect changes in indicators over time, and their relationships. The analysis of data should be immediate. Nonetheless, the system requires some possibility to follow up changes detected in indicators, determining such factors as occupation groups affected or possible causes of price changes.
Refugees are a particularly vulnerable group, and a special case for prevention of food crisis.
It is now becoming well-known that a disproportionate number of refugees are affected by both overall food shortage and micronutrient deficiency diseases. Worldwide, there are an. estimated 30-40 million refugees and internally displaced people. The number in camps in Africa and Asia is rising and particularly in the African camps, severe difficulties have been experienced in maintaining adequate food supplies. An important element in preventing a future severe food shortages and micronutrient deficiencies is to improve the monitoring of refugees, their access to food, and their nutritional status (25). Timely warning of disruption of food available to refugees would be situation specific, although assessment of food commitments and allowances could probably give more information than is currently available and used. However, monitoring of refugees’ nutritional status could be rapidly improved. A minimal system would detect severe malnutrition and excess mortality. A better developed system would include not only food availability, but estimates of prevalences and trends of malnutrition, and the equivalent in terms of excess mortality, by age, gender, and other groupings.
Monitoring of health, nutrition and other aspects of welfare is needed in refugee camps. Where these exist and are fed into decision-making the problems may be minimized. Unfortunately, particularly in Africa, monitoring efforts are sometimes overcome by events, and special measures may need to be considered. Two measures proposed are: the selection of a small number of camps for rapid reporting (which might be considered as "sentinel’ camps); and rapid reporting of observed problems of severe malnutrition and trends. Selection of sentinel camps should be based on those most vulnerable and not the overall population of refugees. Given the difficult circumstances of the worst off camps (which should be selected) estimating prevalences of malnutrition and disease is diff’lwll because the total number is often unknown, and there is little means of drawing a sample- Under these circumstances, action may be urgently needed and may require close SCFUU"Y’ Two indicators suggested are cases of very severe life-threatening malnutrition (perm!JS

excluding infants) and any mortality in children tive to ten years of age. If a camp r533
3
that either of these are occurring, it is clear that here is a problem. In the host polez
jg;
in the developing country in which the camp exists. both these should be very nearly :31
A second question would then be whether there 9:: more or less than the previous W53 3
month. A sentinel site reporting system which su-:ce-eds in getting such information rzgi
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to the attention of those making decisions, either 2’: :ationalievel or at global level,
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go ’a long way towards providing timely wamixg of the severe malnutrition that is 2:1
afflicting a number of refugee populations, and ’KOI’ld have the possibility of stimuli;
limely action.
Decisions at global level based on assessmez: of food security tend to be of two 71x5.
First, for advocating for allocation of major rescures and related actions (eg. tree: .3
broadly address hunger and malnutrition. Second. :9 alert donors to impending food Lax:
ht
mainly in relation to allocating supplies and funds :3: emergency food aid. These are -gx
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primarely 0n the Global Information and Early Visiting System (GIEWS). GIEWS ’; .
established by FAO in 1975 to:
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L.
f, -.._’.__-
- monitor continuously the world supply :iernand outlook for basic foods ii. -__-_
to assist governments to take action if. q;i:I-;1y changing situations;
- identify countries and regions where serious food shortage and wo..xe_%5
nutritional conditions are imminen: .ii to assess possible emergency :0:
requirements;
- support the efforts of government: :: ::’:i:-ish and strengthen national and r5;::
: km,
To meet the first two of these objectives, :3 System continuously monitors the Na,
and food supply prospects at national, regions; 2:. global levels. Its assessmen: __
disseminated through a series of regular reports. More"
by exceptional food shortages or surpluses, "S
’217’3ever a country or region is threa-.._-._
electronically to government capitals. Clearly, uriional surveillance has an imports; 73-
5
to play in support of the Systems assessment of ::::::y and regional food supply situa:-:
:s-
Extending and strengthening the monitoring of izrltional and socio-economic indicarss
Within GIEWS is needed. Such indicators would :21:de: anthropometric assessments. 5:0:
pnces, livestock sales, consumption patterns, migraion rates, etc. This would enhance :5
5Ystems capability to alert the international cornrxzirj: to any actual on likely deterio
z’aic:
m nutritional status as a basis for action.

3.2 Endemic Undernutrition (Chronic PEM)

Communities, local and central governmetzs need some regular data on nutritional
Status. This is necessity for improving nutritionai sztus, and some progress can be made
0:-
this basis even if the collection of other numerical data is not feasible. The most commo
n
general measures are anthropometric. Prevalences of underweight pre-school children are
the most usual, obtained either from household surveys, from growth monitoring, or from

community weighing programmes. Incidences of low birth weight provide similar information, although the coverage is usually inadequate for disaggregation or estimating trends. School surveys are another important source of anthropometric information. In some cases, children are measured for weight and height at thetime of school entry, and it has proved possible to retrieve such data. A second potential use of such school surveys would be to assess growth in adolescents. Another general indicator sometimes available is infant and child mortality rates. These are more useful cross sectionally than to show trends. except over long time periods. They are, however, very effective in illustrating nutrition and health problems.

Adult anthropometry has been suggested as another important indicator. First. monitoring of weight changes in adults has demonstrated indications of seasonal stress. Second, maternal anthropometry is sometimes collected in relation to antenatal visits, since pre-pregnancy or early pregnancy weight and weight gain during pregnancy are important risk indicators (30, 31). Third, it has been suggested that adult thinness, assessed bv a weight-for-height squared index (BMI), would be a useful indicator (32). This has been elaborated in a recent report for FAQ (33). The interpretation of adult thinness on a population basis, in relation to household food security is in the process of being further developed.

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Indicators for monitoring health goals of the World Summit for Children are being put forward by WHO and UNICEF (84). These include certain of the anthropometric and mortality indicators discussed here. Added to these the following are proposed as outcome indicators: maternal mortality rates, stwnting and wasting in children, incidences of polio. neonatal tetanus and measles; in terms of process, data such as access to safe water and immunization rates.

C...

The analysis of nutritional outcome indicators, mainly anthropometric, involves identification of groups affected by malnutrition. Thorough research can help to elucidate causes. It is becoming increasingly possible to evaluate trends. This is certainly the case where the information comes from specific programmes. but the possibility of evaluating national data in this way is also increasing. Results are more persuasive when viewed as trends; that a situation is serious and getting worse is more powerful than the at-one-timc assessment. Since such data are non-specitic to cause, they cm primarily provide guidance as to whether, where, and for whom action is needed.

Unfortunately, it is too simplistic to say that because there is a nutrition problem_1 nutrition programme is required. At the local level, the causes may often be known, and W5 information can then provide the basis for local decisions. This in turn can lead, f0! example, to planning local programmes or requesting assistance from more central levels and donors. A locally available assessment of nutritional trends may be an important SW93 point. While using data is straightforward for targeting and triggering action, dCClqmg between policy options requires considerably more detailed analysis and other informauw-

Processes will vary by situation and level of decision-making. At local level, one or a few indicators may be all that is needed to give a basis for assessment and analysis, using local knowledge and asking the right questions. At the national level, more analysis may be feasible.

Unless there are good reasons to believe otherwise, ’it is likely that a number of factors notably household food security, infectious disease, and caring capacity - are all involved in causing endemic undemutrition and require intervention. Such factors are likely to affect more than isolated groups if, for example, prevalences of underweight preschool children are greater than around 10 percent; or IMR is greater than around 20 per 1 000 live births.

This applies to sub-national as well as national levels, and this is important in larger countries which are borderline on national data. The next step is thus to consider assessment, analysis and monitoring of the individual problem areas.

3.3 Household Food Security

Household food security measurement refers to food consumed or available for consumption at the household level. An ideal measure of household food security includes the measurement of household food availability and average household food consumption levels over a period of time, in relation to need (34). The implications of dietary intake need to be understood in deciding approaches to measurement. Food insecurity may affect households constantly, transitorily, or periodically; the latter may be seasonal, and occur most years, or may deteriorate into food crises in times of particular hardship as in drought or conflict. Food crises have been covered in the previous section on timely warning. Chronic food insecurity is dealt with here, as part ot chronic or endemic undernutrition. It is recognized that often hunger and inadequate access to food is seasonal, certainly in rural 211’ eas.

Methods of assessing and monitoring food security - which may be referred to as food security information systems (35) - may focus on the need for cross-country comparisons and thus national-level data, or on within-country information. distinguishing and tracking vulnerable groups. This section is primarily concerned with in-country data although compilation of such data may eventually give more global results and emphasizes assessment for population sub-groups, defined by location and socio-economic status.

Data relevant to food security at national level, for global monitoring, generally combine national indices of food availability (from food balance sheets) or income (GDP) with estimates of distributions of these. Food availability data lead to the global estimates in FAO,S World Food Surveys and the assessment of the prevalence of undernutrition for the ICN (43). Estimates from GDP and other data have been proposed for development of a composite household food security index for global monitoring (36).

Problems in practical assessment of current household-level food consumption derive from complexities in both measurement and interpretation. One important aspect is the time.

If it could be measured, ’daily household energy consumption would probably be seen to vary considerably day by day. Cross-sectional measurements of 24-hour intakes would pick up

some well-off households who happened to eat little that day, and vice versa. Daily intak
e
is thus too fine a measure: one low-intake day may .not be meaningful, while a Iow-intake
week probably is, and a low-intake month definitely is. For interpretation of household
survey data for within-country planning, a reference period of a month is probably best.
For
some purposes, such as global assessments, averaging over a period of one year is
appropriate. See Table 2.

Should Levels 0r Changes in Household Food Securiry be Measured? An important
distinction is between levels of food intake, and changes in these. "Levels" mean actual
kcal
intakes averaged over suitable periods in relation to need. "Changes" mean changes in the
se
levels, again averaged over suitable periods. However, it is not always essential to know
levels accurately in order to interpret changes. If it is likely that levels are marginal
ly
inadequate (from other indicators), then a change in the level towards deterioration is c
learly
cause for concern, and an improvement a sign of progress. This distinction is important,
since it is probably considerably easier to measure changes in food intake, than levels.
This
is recognized in food security information systems, which should provide data for identif
ying
problems of vulnerable groups, and for following the evolution of the food situation over
time (35).

How Necessary is it to Measure Levels of Food Intake? Essentially, if major decisions
concerning resource commitment are to be made on the basis of food security consideration
s,
then the cost of getting the necessary information should not be an overriding constraint
. For
example, millions of dollars in government expenditure have been more efficiently allocat
ed
by changing food subsidy schemes based on such data, expensrve though they were, and this
has been regarded as well worthwhile. On the other hand, there are plenty of examples of
expensive household food consumption surveys which have not led to any resource
commitments or changes. Generally, it is likely that where there is a persistent signific
ant
prevalence of underweight children, household food security is inadequate. This would
indicate need for interventions aimed at improving household food security. If the decisi
on
is made in principle to take action, specific designs of such interventions may require
estimates of levels of household food security.

It should be stressed again that whether information is expensive or not, whether it
refers to household food security or other matters, it is only useful if used. Thus, desc
ription
of methods here does not constitute advocacy for their application. If one needs to asses
s
levels of household food security - that is, how much people are eating - there is no
alternative but to initiate an enquiry to measure these. On the other hand, if it is adeq
uate
to assess changes in household food security - when people start to eat more or less - th
en
other methods may be applicable.

The assessment of the status of household food security or of its trend is unlikely by
itself to indicate the necessary policy choice, for which additional research will usuall
y be
required. Perhaps in contrast to health, specific actions are not always obvious. Many of
 the
actions affecting household food security involve rather substantial investment of resour
ces,

. Assessing, analysing and monitoring nulrilion situations
Theme paper No. 7
Table 2
Methods for Measuring Different Aspects of Household Food Security (hfs)
for Different Decisions (Within Countries)
.

(1:) Changes in hfs: for triggering interventions	(3) Levels ofhfs: for design of major long-lcrm inwrvcnlions
Decisions: inlcrvcmion to prevent effects of food crises	
Data lype/sourcc	
Applicable if interventions predesigncd (ifso, like timely warning)	
Initial ’ycllow light’ warnings	
Crop forecasting: rainfall, crop and livestock rcpons, satellite daxa	
Household surveys	
May be useful if system in place	
May be important	
- agricultural production	
Useful annually only if system in place	
May be worth selling up specially e.g. evcry 5 ycars	
- expenditure	
May be wonh adding to hh survey syslcm	Probably too costly andslow c.g. every 5 to analyze years
- consumption module	
Probably too imprecise important for e.g. annual update cf. larger survey	
May be useful if system in place	
- small samplc	
For understanding causality May be useful ralcr than quantitative estimates ofhfs level:	
- rapid assessment	
Useful e.g. for ditury pattern shih (faminr: foods); migration; distress sales	
Useful, should be added to hh survey syslcm	UsHixl annually if system in place
Wasting in children is key indicator module	
Imponam data source; relate to wages elc.	
Important for food price changcs	
Market surveys	
I Clinics, schooLs	
May be useful ifchangcs are lugs: E.g. on migration, use of famine foods	
- general reports	
Data from weighing programmes may be useful to monitor change	
As food crisis indicator, and for managcmcnl of relief	
- anthropomelry	
For undcrslanding causality May bc uscful	

rather than quantitative
cslimalcs ofhfs lcvcls
Useful e.g. for migration,
olhcr rcsponses lo impending
shortages, and local opinions
on it
C ummunity rapid
l - nutrition (anthropometric)
I assessment
May be useful
Very important when there is
free press
Worth testing if response
mechanism in placc. as for
timely warning
Could be useful if syslcm in
place for change monitoring
Wonh testing, to report
market prices and
anIhropomclry
Sentinel sites

resources so such research is well-justitied. The degree of analysis may be less extensiv
e
when the assessment and decisions are made at local level, if the resources are under the control of the community, since at this level needs may already be known.
Vulnerable Groups, Risks, and Policy Options. Households and people at food security risk
,
the risks they face and various policy choi’ces, are described in the ICN theme paper "Improving Household Food Security". Measuring household food security levels and differentials for vulnerable groups may indicate relative priorities and urgency for intervention for these groups. The definition of such groups should thus be included in surveys of household food security. Exposure to risks varies by group, for example, food producers versus net food purchasing households, with respect to risks from changes in fo
od
prices. This guides choice of indicators for assessing change in household food security. One example might apply in rural areas, where smallholders may specialize in certain export crops, or be diversified between food and export crops; there may also be those wi
th
very small landholdings, or landless. Measurements of general nutritional status, for example by anthropometry, may give some initial indication of the probability of househol
d
food insecurity in such groups. If the anthropometric status is satisfactory, there may b
e less
concern that household food insecurity exists. However, if there is a certain prevalence
of
underweight children in these groups, interventions to improve household food security ma
y
be indicated. For effective policy planning, it may then be necessary to assess, at one t
ime,
the level of household food security by such groups. It might be found that the current f
ood
security situation for farmers growing a high-value export crop (e.g. coffee) was good, whereas that for the more diversified farmers was moderate, but likely to be relatively s
table.
For the smallest landholders and the landless the situation might be of greater insecurit
y.
Further considerations might then be that the coffee-growers, whilst presently doing well
,
were particularly vulnerable to change in producer prices, and these prices might then be monitored. For the diversified farmer, the main risk might be drought, which should be tracked. For the near-landless, longer-term food security might be enhanced by credit schemes, or public works.
A second vulnerable group whose household food security status might require assessment is the urban poor. Again, initial indications might come from prevalences of underweight children. The groups could be defined in terms of employment, occupation or female-headed households. Assessment of levels of household food security could show relative priority among these groups, and point to possible policy interventions. Risk fa
ctors,
such as food prices in the market, would be indicated for monitoring changing household food security.
Assessing Household F 00d Security Status
Ideally, measuring household food security status or levels involves measurement of household food availability and average household food consumption levels over a period o
f
time. As discussed above, there are considerable constraints in terms of measurement and interpretation. The following indicators and methods should be considered when it iS

dx
necessary to assess levels of household food security, bearing in mind the cfim information needs for different levels of monitoring:
--
reference period, preferably one month)
1 - percentage of total expenditure on food
- dietary pattems/choice of food
- experiences of hunger and food insecurity, by interview
- adult anthropometry (mainly thinness).
Dietary Energy Intake Szm’eys (kcals/capm/day) are the basic way in which 11 1 ’1 tood security status has been measured in the past, and will remain important 11.. 1 i is necessary to make such measurements. Many different methods have been ex. ’ Reviews of household survey methods, including income/expenditure and food com: 1. - ’ are found in the References - food consumption surveys and their methods are 1; compiled by FAO. Characteristics of these include:
(a) Such surveys have to be done at household level. Estimates of hit consumption cannot be derived from national data, like food balance sheets, ’ estimate of the distribution as well as the mean is required, 11l11th dictates house’. 1 data. Results should be expressed averaged ov er household n1 embers; accurac_ improved by taking account of the household composition in terms of age and expressing results as per adult equivalent.
(b) Household surveys can be done at one time, or be repeated over several 1 an approximation to repeating for the same households over several rounds (11 _ technical problems of response) can be achieved by spreading the survey over the period, e.g. one year. Assessing food consumption over at least a one year perioc. .1 important, so repeated measurements, preferably as a panel of households revisxc recommended.
.w
(c) The reference period to which the data apply is a central issue, needzix carefully thought out and specified. As indicated above, it is suggested that a period of a month could be used; this means that the average intake over a month 3 estimated. Adjustments can be made analytically if the reference period is she households record consumption in the previous week or day, but this is not ideal. R compromise would be to assess the average kcal intake for each household during 11% 1:1 (1 time, repeated every three months for a year, Lefour times. This would give as ’ ’ 4 of typical consumption at four points in time, generally covering seasonal changes data would be so useful that it would probably be worth some sacrifice of sample _ achieve it. Experience exists, for example, with the valuable studies carried out by :1 ’ of countries in collaboration with IFPRI (38, 39).
ts
55 -. -,
"14.
1.
(d) Energy intake (Kcal) estimates can be made using existing househo 11 V procedures, most commonly household expenditure in budget sun eys. Generall) (31 1
.1;_5.,
Ix)
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measurements are: (i) expenditure by food item; (ii) record of quantities purchased, harvested and/or taken from the store; (iii) weigh quantities of food for consumption (an added module beyond the scope of routine household surveys; (iv) measures of .food quantities as prepared or eaten. Recording the quantities purchased by interview; as in (ii) is little additional burden wand is recommended.

Data on percentage of total expenditure on food may be obtained fairly readily from household budget surveys. Since the poor spend alarge part of their income on food. This indicator may be particularly useful if interpreted well. As income increases, the proportion of income spent on food remains steady initially, often as high as 80% (40). At a certain point, the proportion of expenditure begins to fall, presumably as food needs begin to be satisfied. This could be seen as entering the range where food security begins. Eventually, food expenditure tends to plateau at around 30% when food is no longer a constraint. This relationship can be used to interpret food expenditure proportion as an indicator of the level of household food security. The proportional expenditure on food itself indicates the cost of achieving household food security. There is a distinction between households (a) that achieve food security at great cost, (b) those that achieve it at less cost, and (c) those that despite using a large proportion of available resources on food remain food insecure (41).

Related data that can be obtained from household budget surveys can also assess the variety of foods used. A similar assessment could be obtained from the proportional expenditure on staple foods to the overall food expenditure; from the contribution of less-preferred staples te.g. cassava, sorghum) to the diet.

Dietary Pattern and Food Choices are further indicators of food security, although these are less easy to discuss in general terms. While data may be obtained from household surveys, dietary patterns are particularly suitable for observation in qualitative or semi-quantitative terms by rapid assessment methods. Those most food insecure may be defined by such factors as: (a) buying the cheapest and least-preferred staple; and (b) only buying small amounts of preferred foods such as animal products. A similar indicator of numbers of meals per day cooked and/or eaten can be obtained by such methods, but is probably more relevant to monitoring change.

Erperiences of Hunger are closely related to household food insecurity. Preventing hunger is the major humanitarian objective of addressing food security. And hunger, or fear of it, drives food-seeking behaviour, leads to major sacrifices to obtain food, and may control the reduction of activity when food is scarce and people are hungry. Achieving freedom from hunger probably means much the same as attaining food security. Thus, a direct measure of hunger would be very significant in assessing food security. A considerable amount of the hunger in poor societies is seasonal. This is difficult to capture by quantitative survey methods, requiring more frequently repeated measurements than are usually pOSSib1?-

Questions to measure hunger can be included in rapid assessment procedures, and within more formal household surveys where the sample is defined; the latter has some advantage in that prevalence estimates of hunger can thus be produced on a population basis.

Questions include quantity, quality, psychological factors (leading to food anxiety in the household, and deprivation among individuals) and social dimensions (unacceptable means for acquiring food, disrupted eating patterns (42). - This has led to the development of questions to identify hunger in households, among women, and for children. For example: whether the household is anxious that food will run out; whether women consider they cannot afford to eat the way they should; whether mothers can give their children a balanced meal; and whether they consider they are not eating enough because they cannot get access to enough food. Such enquiries provide results showing, for example, that children tend to experience hunger later than their mothers, because their mothers will sacrifice their own intake first. There is important potential for such direct estimates of the expenence of hunger, which would need to be developed taking account of local circumstances. Greater inclusion of such questions in household surveys, both formal and by rapid assessment, would give useful information for planning interventions to prevent hunger and food insecurity.

There is evidence that Changes in Adult Anthropomeny also relate to changes in household food security (33), but the paucity of adult data has limited its widespread use.

Thinness in adults measured by weight in relation to a function of height (e.g. weight/height2 known as the Body Mass Index, or BMI) has been proposed as an index of chronic energy deticiency or a stable state where low weight is maintained with energy balance between a deficient intake and reduced activity (32). Thinness in adults has been convincingly shown to be associated with functional disadvantage, including lowered work output, increased vulnerability to infection, poor pregnancy outcome, etc. (33) There is also strong evidence that weight changes in adults fluctuate seasonally, and are related to socio-economic status and age (44, 33).

The measurement of height and weight is relatively easy to do on adults, and errors in measurement are not as critical as with children. However, in order to carry out the measurements, adult scales and height measures are required and can be cumbersome to carry around. There is the appeal of simpler and less obtrusive measurements such as the upper arm circumference but its use has been less extensive than height and weight. Ind addition, the range of measurements has not been standardized as has been the case for the Bhll (32).

Monitoring Changes in Household Food Security

The relatively simple methods for assessing changes in household food security offer a particular opportunity for improving the information available for decisions on improving it. Changes in household food security can be satisfactorily monitored by repeating the measurements discussed in the previous sections; this should be done when the capability exis:s for periodic measurement. Such monitoring of changes can be achieved through repeated household surveys, re-estimating indicators such as household intakes of kcal/per captufday averaged over one month. Such assessment of trends in kcal intakes from repeated surveys needs to take careful account of seasonal factors and changes in household composition. Changes in proportion of expenditure on food may equally be determined from

repeated surveys, and again be informative when changes are viewed by, for example, expenditure bands. Similar results can show changes in dietary patterns, again generally interpretable in terms of improving or deteriorating household food security by viewing t he
relative proportion of staples although account needs also to be’taken of food prices.
The main opportunity, however, is to set up systems, often based on data already being collected, to track likely changes in household food security. This concerns especially t wo
categories of information: based on prices, sometimes with wages; and based on changes in anthropometry, often derived from clinics. Importantly, large food price-based indicator changes sometimes precede major changes in anthropometry. In Sudan deteriorating terms of trade between livestock sales and grain purchases were seen to precede increases in ch ild
wasting (22, 13). Similar results have been observed in Sahelian countries (37). Experien ce
to date is that the besr predictions of anthropometric changes are obtained from food pri ces
as a ratio to the general price index; or to minimum wages when these are adequately recorded and actually vary (24). This relationship suggests some innovative low-cost syst ems
that could be set up.
Price-bascd Indicators have been reviewed in the context of timely warning, where it was suggested that some indicators derived from food prices in relation to general prices see med
to give short-run predictions of changes in nutritional outcome, at least under condition s of
potential food crisis. Food price indicators may be analysed in relation to the minimum wage, and results may be expressed, as, for example, number of days work required to purchase a food basket, or other standard food measure. One drawback in using the minimum wage itself, is that this tends to vary infrequently, but when it does, it produc es
a step in the indicator. Deriving such indicators usually depends on relatively simple calculations from routinely reported government statistics such as the consumer price ind ex.
This is available, at least in urban areas, in many countries, and is generally reported quite
rapidly. It may well be worth considering when household food security is marginal, establishing additional sites for reporting market prices in vulnerable areas. A recent example of using such an indicator is from Malawi, where a sharp increase in the hours of work required to purchase a standard bag of maize was used to trigger an increase in the minimum wage.
Changes in Anthropometric Indicators. Whereas long-term (year-to-year) changes in anthropometry are regarded as a general outcome, not specitic necessarily to household fo od
security, rapid changes in anthropometric indicators (unless there is an epidemic) are li kely
to reflect household food security changes at community level. Rapid change in prevalence of underweight can only represent wasting. The seasonal patterns detected on analysis of clinic-derived data appeared to confirm their relationship to food security, as discussed -
Seasonal patterns always coincided with the pre-harvest hungry periods; longer-run trends have been observed to coincide with known food shortages. The correlation of underweight prevalences with food price-derived data support the argument. Thus it is suggested that monitoring month-to-month or quarter-to-quarter changes in underweight prevalences in pre -
school children, from clinics or sentinel sites, could provide reasonably up-tO-date assessments of changes in hfs.

Sentinel Site Systems have already been discussed in the context of timely warning, for which the approach has the advantage of rapidity of reporting. In the context of longer t erm planning, the approach also has merits for tracking changes in household food security through price and anthropometric indicators. (In this case, it may be broadened to allow follow-up to investigate changes, through rapid assessments or’small-scale surveys of som e of the factors discussed earlier, such as changing dietary patterns, and experiences of h unger.

Carin g Capacity

At given levels of household food security and health environment, some families and children have better nutrition than others. Central to this are womenls coping strategies and capabilities which can affect household food security, and the health environment and the nutrition of individual family members. Constraints on women’s coping strategies and capabilities have been defined as lack of knowledge, lack of time, and lack of assets and control of resources both within the family and outside (34). Underlying causes and interventions embrace education, social security, property and income rights for women.

It may be useful to distinguish short- and long-term factors affecting women-ls caring capacity (see Table 3). In the short run, women in poor households are vulnerable to deterioration in their income and work-load (or time available), from occurrences such as ill-health, unemployment or taking on additional employment, deterioration in prices, access to services, and personal misfortune such as the death or incapacity of spouse or migration. In more developed countries social security systems are designed to mitigate just such ef fects.

In such cases, monitoring is at the individual level through the social services, to try to ensure access by the needy. H0wever, in the present context, population-based monitoring which aims to track the situation of vulnerable groups and link them to some form of supp ort programmes is more relevant. For example, during some structural adjustment programmes access to health services has deteriorated; women have entered the labour force at very l ow wage rates to make up for losses of total family income, with consequently increased workload (83). Such changes affect caring capacity and should be monitored; responses may be within compensatory programmes linked to structural adjustment.

Social discrimination and inadequate control of resources by women - central constraints to caring capacity - can be addressed in the longorun by measures such as education, improved technology and infrastructure, legislation for woments property and income rights and access to credit (34). Such factors are related fairly straightforwardl y to simple indicators. Most of these should be analysed disaggregated by gender. Probably all are best obtained by household surveys, although some may be approximated from administrative records.

In this context, attention needs to be paid to womenls own nutritional status. This could be an important benefit of increasing use of adult nutritional status assessment. Priority here would be not only to thinness, but to anaemia (8). Relevant indicators can also be derived from demographic data, for example, showing the percentage of reproductive lif e in stress (for about 1/3 to 1/2 of their reproductive lives, women in developing countrie s are

pregnant, lactating, or both). Such indicators could be produced at sub-national level, a
nd
could be revealing.
J
Table 3.
Care Indicators
Decisions to improve capacity for child Data
care and women,s status
Short term, e.g.: Short term vulnerability: e.g. wage rates,
funding of health services, % of female-
- social security safety nets, for headed households
unemployment, ill-health, family
misfortune (e.g. death or incapacity
of spouse)
- improve access to health services
Longer term: the type of data that would
Longer term: with priority to women: be useful would include the following,
generally distinguishing femaJe/male:
- education and literacy programmes
- improving access to health and - school enrolments (and
related services, including family completions) esp. for girls
planning - adult literacy
- improving fuel and water supplies - woments time allocation (usually
- access to credit, employment requires special studies)
1 opportunities - access to fuel. piped water, etc.
- day care for children - woments access to credit, social
J security
- woments employment, property and
I
ll e income rights
It, - access to day care for children
I
3.4 Infectious Disease v
Specific actions directly relevant to nutrition, and most likely to be influenced by it,
in the health sector have been defmed as dietary management of infection and dietary
prevention of infection. Generally, dietary management of infection can begin to be
implemented incrementally through health services, but dietary prevention usually requite
s
some aspects of conventional nutrition programmes. Data needs ’can be proposed With
reference to these, as discussed below.

Dietary management of infection refers mainly to promotion of several aspects of behaviour that would improve case-management through nutrition. Most of these interventions are feasible as incremental activities within health services. For persistent diarrhoea, for example, dietary management is one of the few interventions available. Assessment and monitoring needs flow logically from these interventions. Thetquestion of priority for data relates directly to the priority for the intervention. Thus, for example, assessment of continuation of feeding of infants and children during sickness - breastfeeding and complementary - will usually depend on household survey results (including RAPs), as will assessment of effective use of oral rehydration therapy. Specific treatment given at clinics may be assessed and monitored from clinic data. These include vitamin A administration during measles and acute respiratory infections, oral iron supplementation during malaria, other micronutrient supplementation. and treatment of intestinal parasites.

Dietary prevention of infection more often requires specific programme activities - for example, defined by hiring staff for the task - partly because outreach beyond those presenting at clinics is usually required. The interventions listed are not necessarily run by the health services, although this tends to be the case. The activities listed start at birth, with breastfeeding promotion, weaning practices and supplementary feeding; land womenls health and nutrition including family planning. Breastfeeding practices are generally assessed by surveys, including periods of exclusive breastfeeding and introduction of complementary foods. The Demographic and Health Surveys have recently published useful summary material from a considerable number of countries (46). WHO has issued guidelines for assessment of breastfeeding practices (47). Weaning practices, covering feeding frequency, mcthoas of preparation of weaning foods, may be assessed by survey, and/or from programme data when interventions are underway to improve such practices. Family planning programmes which can affect maternal health and nutrition, may be assessed either by survey or from programme sources, using indicators such as contraceptive prevalence rates, age at first pregnancy, proportion of short-birth intervals, etc. Indicators of ante-natal and obstetric care such as attendance at antenatal clinics, and percentage of births attended by trained personnel are not necessarily nutritional, but can also be noted here.

Supplementary feeding through the health system is a common feature of many nutrition programmes. Often this is selective, on the basis of biological status (pregnant/lactating, age) and then selecting on the basis of growth monitoring or other screening methods. Where this is the case, it may often be possible to obtain information on distribution of supplementary foods through the programme, although specific surveys are often needed if careful evaluation is required.

Indicators ofhealrh services development are particularly important in relation to health and nutrition. At the national level. these include government expenditure on health, intra-sectoral allocation of health resources (urban/rural; hospital/peripheral: doctors/nurses), type of health care (preventive/curative), and access to health services (population per health worker). Indicators of environmental health should also be included, such as proportion of population with safe water and adequate sanitation. Immunization coverage rates are assessed by two methods: the more accurate uses a population-based survey and obtains information on immunization by interview of the mother and/or from the health card; the second method

is to record numbers of children immunized, then assess as a proportion of the populatiOn of that age. The immunizations relevant are diphtheria, tetanus, pertussis, measles, and tuberculosis. In addition, the coverage of pregnant women fully immunized against tetanus needs to be assessed by similar methods.

Record Sampling and Sentinel Sites. From the above, it should be clear that there are several potential sources of data, depending upon the indicator required, accuracy and timeliness. These broadly fall into the categories of administrative sources (health centres and clinics, vital registration) and sample surveys (a population-based sample). Considerable amounts of information are collected by the health system for purposes of individual diagnosis and treatment. Growth monitoring is an obvious example, clinical examination for diagnosis and treatment are others. Such information could be better utilized for population assessment and monitoring, if it could be extracted and summarized. One of the major constraints to this is the sheer volume of information. The solution that should be more frequently tried is record sampling - that is systematically taking every record and extracting the information. This method is unlikely to produce systematic bias, and producing statistics based on such a relatively small sample is better than failing to get any information at all because the work load is too heavy. Such methods work much better if there is actual need for the summarized information on the part of the person doing the summarizing - often the health worker. This argues for concurrent institutional development, decentralization of decision-making, which would improve data availability.

, Reporting from sentinel sires involves selecting a small number of clinics, and supporting them for rapid reporting of selected data. In this case, additional funding and/or personnel would be provided to capture information already collected, or specially make additional measurements, not primarily for the purpose of the site itself, but for more centralized monitoring. The method allows more attention to quality of information in a few sites and more rapid reporting, than a more blanket approach. Sentinel sites can be located in areas of particular vulnerability, interest, or chosen according to other criteria. They do not generally aim to provide a representative population-based set of results, but early indicators of trends. In developed countries this method is applied to a number of different topics, including economics, and it seems particularly suitable for testing developing countries when infrastructures are weak.

3.5 Micronutrient Deficiencies

Iodine, Iron and Vitamin A

The three micronutrients of most concern currently are iodine, iron and vitamin A; deficiencies often coexist. In fact, concern is not restricted to these three, since other micronutn’ent deficiencies are now appearing, for example in refugee populations. The re-emerging deficiencies are: scurvy (vitamin C deficiency); pellagra (niacin deficiency); and beri-beri (thiamin deficiency). Because these are affecting a distinct group - refugees and displaced people - they are covered in a separate section below.

The methods available for assessment and monitoring of the three main micronutrient deficiencies are: dietary availability and consumption, and micronutrient status from cli nical and biochemical assessments (Table 4). For dietary assessment certainly, and often for clinical/biochemical, assessment of the status of several micronutrients can be done at t he same time. For iodine and vitamin A, the first Step is to decide if there is any reason f or concern that the deficiency may exist. This does not apply to iron deficiency,1 which in developing countries is almost certain to exist among vulnerable groups.

For iodine, the first question to ask is whether iodine deficiency exists in a particular region or population, and if so, how severe it is. Usually some previous information will be available. For example, travellers or local health workers may have noted that many people from a certain area have visible goitre. Often the likelihood of iodine deficiency in a given region can be predicted from knowledge of its geographical location. For example, iodine deficiency should be suspected in an area surrounded by other iodine deficiency regions, or in inland areas, especially those with high mountains. If such information, p lus knowledge of the extent of iodine control programmes, indicates the likelihood of iodine deficiency, further assessment steps as discussed below are indicated. It is striking tha t new areas of iodine deficiency are still being discovered, partly because surveys have tended to focus on areas of known deficiency.

Similar first steps usually apply to vitamin A deficiency. Some indication of the likelihood of vitamin A deficiency in an area should be available from knowledge of food availability patterns and dietary habits; the latter are important because vitamin A defi ciency, especially 1n children, can occur even when vitamin A sources are available. Another earl y step is referred to as "case-finding". Since the eye lesions due to vitamin A deficiency - xerophthalmia - are rarer, less easy to casually identify than goitre, and more often ope n to mis-diagnosis, a deliberate search is recommended. Nightblindness, and active or healed cases of xerophthalmia should be sought by someone with adequate experience in the clinic al recognition of the disease. The existence of these eye signs in children at risk would in dicate the need for further information. With increasing evidence for effects of vitamin A deficiency on morbidity and mortality at levels less severe than required for nightblindn ess and xerophthalmia , making initial assessments from considerations of dietary availabilit y and food habits may become even more important (49).

At national level, the overall availability of iron and vitamin A, and trends in these over time, can be roughly assessed from food balance sheet data. The assessment is more approximate than, for example, for calories, because the conversion factors from major fo od items may be less precise, and there are often very substantial contributions to micronut rient intakes from relatively minor dietary items in terms of quantity. Such data do not show t he

l Iron deficiency and anaemia are not the same. Anaemia may have other causes, although i ron deficiency is the most common; this, nonetheless, may itself be caused by parasitic infection (notab ly malaria and hookworm), which would require different control measures. However. iron deficiency can o ccur before haemoglobin levels drop i.e before being detectable as anaemia, with other effects (e.g. behavioural) that are now becoming known; this would be indicated at population level by indices for iron s tores, such as serum ferritin and transferrin saturation levels (48).

situation for vulnerable groups, although trends in overall availability may be of some relevance to these. Iron availabilities are particularly difficult to interpret, since th e bioavailability of iron is low, particularly from vegetable products, and strongly affect ed by other components of the diet. Assessing trends in iron from animal sources, which can be distinguished in food balance sheet data, may be worthwhile. In general, iodine deficient areas will tend to be mapped from goitre rates, rather than from dietary information. It is important to consider vulnerable ecological areas, mountains and leached plains.

Table 4
Data Sources for Assessing Micronutrient Deficiencies

Useful for national trends; look at animal soume iron (as bioavailabilily varies greatly by source)		
Not available	Useful for national trends	
Food balance sheet	Useful; include absorption inhibitors (e.g. phytate) and enhancers (e.g. vil. C)	
	Useful; include frequency in diet of, e.g. dark green leafy vcgczuhlcs	
Food consumption/food frequency surveys	Not very important; estimate goilrogcns, esp. cassava	
Clinical signs	Goitrc existence, from casual - preliminary reports useful for assessment	Case-Gnding, needs expert step s:ouling text)
- prevalence surveys	Goiln: classifications and rates essential (often from schools)	Not really necessa ry (see Eye signs important - large sample needed
Haemoglobin and/or haematocril in capillary blood samples	Not very reli able	
Anaemia if recorded may usefully be compiled	Not usual (not most 31- risk group)	
Serum relinol estimates in blood samples; distributions; dose responses		
Casual urine samples for iodine concentralion		
Biochemical tests		
Eye lesions may be noted. but not very specific		
Clinic records	Goitre reports if available	
survey pcim for :01": surveys		
Control programmes - examples		
Nol most sensitive age group		
Ferrous sulphate table! distribution through health system: monitor as for essential drugs		
Supplement distribution. through PHC, immunization. may be monitored		
Salt iodization: quality control and surveillance		

Dietary intake and/or food frequency surveys may be used to ascertain the likely availability of these micronutrients in the diet and how far available dietary sources.0f micronutn’ents are being used. The surveys should include information on breastfeeding practices; prevention of deficiencies of iron especially and also vitamin A in infants an

d
young children depends greatly on adequate breastfeeding.
Standard methodologies for food consumption may be applied (50)- Diem ’-
assessment methods for vitamin A have been developed by IVACG (51). These survey! _
34

assess dietary patterns. Such methods as frequencies of use of vitamin A containing foods may be particularly relevant for micronutrients in general, not only to investigate how far micronutrient sources are actually used in the diet, but also to assess at the same time the consumption of foods which inhibit or enhance absorption. Market surveys for availability of foods providing vitamin A and precursors, and bioavailable iron, Can help to assess likely deficiencies. ,

The bioavailability of iron is a major constraint on meeting iron requirements, and is importantly altered by other components in the diet (48). Factors that enhance the absorption of (non-haem) iron are vitamin C (from fruits and vegetables); meat, poultry, and fish; and fermented foods because of their acidity. The effects are dramatic, particularly from meat and fish, which have a double effect both by providing available iron and enhancing the absorption of other iron. Factors that inhibit non-haem iron absorption include phytates from cereals and tannins from tea and coffee. For other micronutrients also, the presence in the diet of factors altering absorption or metabolism can be observed. For vitamin A and particularly provitamin A, a minimum level of fat in the diet is required for absorption. A very low fat diet could thus be noted as possibly inhibiting absorption, although this level may be so low that this may only be a constraint in very poor diets, and especially when weaning foods are traditionally very low in fat.

Goitrogens in some diets contribute to endemic goitre by interfering with transport and metabolism of iodine (52). These effects can generally be overcome by increasing dietary intakes of iodine, (through iodized salt), but reducing consumption of goitrogens by improved processing and altered dietary habits can contribute. Inadequately processed cassava frequently contains small quantities of cyanide. These should be removed in processing, but when this treatment is insufficient the cyanide is metabolized to thiocyanate, which aggravates goitre and cretinism due to iodine deficiency (52). Food consumption and dietary pattern surveys in areas where goitre is a possible problem should, therefore, include data on consumption of foods possibly containing goitrogens. With cassava, the issue is adequacy of processing to remove cyanide, and possibly samples of foods as eaten should be taken for analysis of cyanide and cyanide-producing compounds.

In the context of dietary surveys, it may be relevant to analyse water supplies for iodine content. The level of iodine in drinking water indicates the level of iodine in the soil which, in turn, determines the level of iodine in the crops and animals in the area (53). Assessing iodine content of drinking water is thus one way of mapping iodine-deticient regions. Iron may be contributed significantly to the diet from iron cooking pots (egg. from soups, fermented products, and stews); this habit may be worth recording in surveys. When sample analyses can be undertaken, iron content of such foods as cooked and consumed would be relevant. Finally, the consumption of fortified foods, if available in the area, should be recorded. Recording the frequency of consumption of potentially fortifiable items is useful for designing interventions; these include (54): salt, refined sugar, monosodium glutamate, cooking oils, soy sauce, powdered milk, wheat flour, and possibly rice.

Assessing, analysing and monitoring nutrition siluarions
Theme paper No. 7
Clinical and Biochemical Assessment
Having determined the likelihood of micronutrient deficiency in a population, from initial assessment and/or dietary surveys, it is.generally necessary to assess the status of the population using clinical and biochemical data. Sometimes it is feasible and desirable to combine dietary surveys with clinical and biochemical assessment. Data can be obtained either from a survey of individual households, schools or clinics, or from existing recer ds in clinics, or other places. The first method, often known as prevalence surveys, is the most usual and satisfactory. However, prevalence surveys are complex, expensive, and time-consuming. In general, they need to be undertaken only where preliminary investigations indicate the presence of a potentially significant problem. Surveys containing clinical, biochemical, and dietary components are the most efficient and definitive (unbiased) mean s of establishing the nature, magnitude, severity, and geographical distribution of the deficiency; determining whether it constitutes a significant public health problem; selec ting suitable strategies for intervention; and providing a baseline for evaluating the effecti veness of future intervention programmes (54). Prevalence surveys are a substantial undertaking. and need to be done properly. It is worth emphasizing perhaps that such surveys are often needed not so much for demonstration purposes - to show a problem exists - but specifical ly to contribute to design of a control programme. In this context they make sense, and are indeed important. "Although costly and time consuming, assessment is far less expensive than intervention itself, may indicate that the problem is much more limited than origina lly anticipated, and may suggest where and how prevention activities can best be applied" (54).
Prevalence survey procedures have several similarities between micronutrients (see Table 1). They share many organizational and logistical constraints, and under suitable circumstances the nutritional status of the population with respect to several deficienci es may be determined within the same survey. On the other hand, different ecological areas may be of concern for different deficiencies, iodine compared with vitamin A deficiency, for instance. Different age groups may be most affected, which can influence sample design: schools are common survey points for goitre surveys; pre-school children need to be examined for vitamin A deficiency; women are a priority for assessing anaemia. Using the household as the final sampling unit may get around this. One problem, particularly for vitamin A deficiency prevalence surveys, is that the prevalence rate of clinical signs indicative of a public health problem may be very low - (more than 0.05 % for corneal sca rs), so that very considerable sample sizes (10 000) may be required to pick up the relatively rare but significant existence of these signs. Biochemical tests can contribute here, requirin g smaller samples.
Clinical signs and symptoms for iodine and vitamin A deficiencies are the primary data required, based on examination by qualified personnel. Precise criteria for classify ing severity of iodine deficiency and vitamin A are established by WHO. In contrast to iodine and vitamin A deficiencies, the clinical detection of anaemia is unreliable, unless the a naemia is very severe. Signs and symptoms include pallor of the skin and the conjunctiva, wthh can indeed provide guidance for diagnosis. However, for assessing the population prevalen ce and severity, it is generally accepted that laboratory tests on blood are required, parti nlliffly to measure haemoglobin and haematocrit (see below). On the other hand, surveys almlng

to contribute to the design of interventions could usefully gain information on endemic diseases involved in the etiology of anaemia, of which the two most important are malaria and hookworm (55).
Prevalence surveys thus frequently need to include collection of biological samples for laboratory tests. Special attention is required for the collection and handling of blood sai'nples, particularly because of dangers of HIV transmission. The importance of laboratory tests differs by micronutrient dificiency. For iodine estimating, urinary iodine excretion is important but not generally essential, goitre rates can suffice in first assessments. When control programmes are underway, however, urinary-iodine becomes more important as the epidemiological picture based on goitre is harder to interpret in terms of programme impact.
Tests carried out on blood samples may be less essential except for specific research purposes. As such methods develop, they may become feasible for routine use in programme monitoring.
For vitamin A, serum retinol levels on a population basis are useful in various ways. First, as noted above, the sample sizes required to pick up eye signs tend to be very large, whereas a substantially smaller sample size is adequate to assess serum retinol levels in the population. Secondly, with emerging research showing association of even mild vitamin A deficiency with morbidity and mortality, it may become important to assess vitamin A status in populations even when eye signs are absent or very rare. Ideally. population distribution curves of serum retinol levels should be monitored at sequential time periods (56).
Nonetheless, serum retinol values are difficult to interpret since most vitamin A is stored in the liver, and it is these stores that ideally should be estimated; methods exist for indirectly assessing these stores using dose rerpmses. Retinol binding protein levels have also been used for biochemical assessment, but they are subject to confounding famors. Improvement of these assessment methods merits further research.
Iron deficiency assessment depends largely on estimating haemoglobin 0r haematocrit levels in blood samples collected either through surveys, or from health facilities (48), Clinical signs, while helpful for individual diagnosis in the absence of laboratory facilities, are seldom considered adequate for population assessment. Small samples of blood can be adequate, collected from finger- or heel-prick, in capillary tubes: analysis can be done in the field (using battery-powered portable units), 01: samples can be sent to laboratories. For more detailed investigations, notably when the intention is to assess the presence of iron deficiency separately from anaemia, other laboratory tests on blood samples can be used. These estimate serum ferritin (a measure of iron stores); saturation of tmnsferrin, the iron-binding protein in serum, is another measure of iron deficiency. Less commonly, a precursor of haemoglobin that accumulates in iron deficiency, erythrocyte protoporphyrined blood cells, is assessed.
Decisions on Intentemions
Data collection and analysis should be designed to help identify appropriate interventions. T hree specific interventions beyond the usual primary health care methods

are promoting dietary diversity; fortification; and supplementation. The assessments discussed above should identify the specific opportunitiesifor the different approaches under various circumstances and their feasibility, with different urgencies and time horizons. These are elaborated in the ICN theme paper on preventing micronutrient deficiencies. Details of specific interventions for iodine, iron and vitamin A are given respectively in ACC/SCN publications (77, 78, 23). Generally, only information which will facilitate a decision on the type of intervention necessary should be considered for inclusion in data collection to facilitate choices.

Dietary habits influencing intakes of vitamin A and iron are rather different, as has been recently shown by research in the Philippines (57). Generally, micronutrient intakes respond to different biological signals than kcals, as appetite controls calorie intake, but not micronutrient intake (although some effect of micronutrient status on food preferences is possible). Thus, people tend to be unaware of their micronutrient status. Since bioavailable iron tends to be concentrated in more expensive foods (meat) and diets of higher income households overall favour absorption - iron intake will tend to behave like calories, responding to income and food price changes. On the other hand, vitamin A is obtained from relatively inexpensive, but highly seasonally fluctuating, food items, especially fruits and vegetables; thus vitamin A status is relatively less influenced by income (the sources being usually cheap), but is considerably influenced by price changes. Such behavioural considerations are very important in choosing and designing interventions; situation-specitic data may be required, on food habits, infant feeding and weaning practices.

Setting relative priorities between micronutrient deficiencies and their control is a matter for local decision. The assessment data need to be assembled to facilitate such decisions to allow direct comparisons of numbers affected, severity, location, and, importantly, the potential for intervention. Examples of such situation analyses - which go beyond nutrition - are those carried out with UNICEF assistance in many countries.

Another early step in deciding on interventions is to consider causality. Some issues that may be addressed from assessment data to guide the choice of options include the following:

I Is the micronutrient widely available in the area, but not adequately in the diet? This may occur for vitamin A, which indicates the real possibility of changing dietary habits, and/or altering foods available (such as promoting distribution and consumption of red palm oil); under other conditions and for other micronutrient deficiencies, lack of the micronutrient in the diet available or affordable may be a major constraint.

I Are possible vehicles for fortification part of the present diet? Centralization of processing, possibilities of legislation and monitoring, would need to be considered and may require data (53).

I Are there delivery systems for supplementation programmes? These can be implemented for example, through the health system, including immunization services or in schools.

A situation analysis aimed at deciding priorities and options for control of micronutrient deficiencies should assemble data on diet, signs of deficiencies, cauSes, and Opportunities for intervention. There is considerable experience of such data assemny for the individual micronutrients (53, 58) leading to programme formulation. There are a number of reasons for proposing that, more often, several deficiencies should be considered as part of the same exercise; the same government department may be able to deal with, dietary diversification or supplementation for more than one deficiency. Equally, different departments may complement each other with different approaches, such as supplementation and dietary improvement. On the other hand, it is probably undesirable that priorities should be promoted in a competitive way; the responsible authority should not be urged to deal with iron one day, iodine the next, without a solid basis of situation analysis for guidance, covering the range of the most important deficiencies.

Many situation analyses related to nutrition integrate discussion of different nutritional problems. Examples are UNICEF-supported analyses of the situation of children and women in Indonesia (59), and India (60). In the Indonesian report, available data on vitamin A and iodine deficiencies are compiled alongside those on protein-energy malnutrition, leading to an integrated programme addressing several deficiencies. In the study from India, information is analysed and presented by stages in the life-cycle: pregnancy, infancy and early, childhood, school age and adolescence, womanhood. Within these, information on dietary intakes and nutritional status for these three micronutrients are synthesized, In Tanzania, data from separate surveys for the three micronutrients have been brought together, and experience with control programmes for IDD and vitamin A deficiency have contributed to a plan for control of nutritional anaemia (61). WHO is developing a global Micronutrient Deficiency Information System (62), which will facilitate integration of information on deficiencies, and control programmes.

Integrated situation analyses are thus clearly feasible and useful, To summarize, they should cover the following types of data.

I Definition of affected and vulnerable groups (usually from clinical and biochemical assessments), in terms of location, age, sex and access to services; including some estimates of numbers and prevalences, severity, and, if feasible, trends.

I Food consumption and/or dietary patterns (e.g. food frequency) data, for vulnerable groups; infant feeding and weaning practices and relevant endemic diseases.

l Contact of vulnerable groups with services; use of possible foods that could be fortified.

Monitoring Interventions

Once deficiency control programmes are in operation, resources should be made available for adequate monitoring. This applies to the intervention itself, and to at least periodic evaluation of the health and nutritional effects. The latter use the same measures as for assessment, repeated periodically over time, or collected regularly within the programme itself. The methods will depend on the type of intervention.

For food fortification, methods for quality control are necessary of iodized salt, and its biological effects, are well described (63, 64). Distribution of iron supplements requires monitoring at various administrative levels, and needs improvement in most iron supplementation programmes, along with the overall logistical system (55). Information on actual use of iron supplements is important, as compliance with iron supplementation is a major constraint; this may require special research. Monitoring of vitamin A and iodized oil capsule distribution is similar to that of iron, although the target age groups may be different and the time-frame much longer (53, 63).

For dietary diversification, periodic surveys of knowledge, attitudes, and practices may be appropriate. Programmes to change household purchases (through marketing or pricing) may be evaluated through repeated food consumption and dietary assessments. Ifsufficiently extensive, food balance sheet data may be used in the long run, as such data can identify major shifts in food patterns.

Sczmy, Pellagra and Beri-beri

Refugee and displaced populations, amounting to some 30-40 million people, are at particular risk of micronutrient deficiencies - including vitamin A and iron as discussed in the previous section. Indeed it is practically only among these populations that scurvy, beri-beri and pellagra are now found. These deficiencies are potentially easily prevented. Assessment and monitoring can play an important role, including in fostering accountability, and providing some timely warning and thus triggering action. Establishing reporting systems, perhaps using selected tsentinell sites, is not technically difficult, or expensive, and would help to bring the situation under control - a situation likely to otherwise deteriorate with increasing numbers of refugees.

Outbreaks of micronutrient deficiency diseases have occurred sporadically in recent years among populations in refugee camps, and have been well documented. Scurvy (vitamin C deficiency) has hit refugees and displaced people especially in Somalia and Ethiopia. Pellagra (niacin deficiency) has affected Mozambican refugees in Malawi, when groundnut supplies were interrupted. Beri-beri (thiamine deficiency) has affected Cambodian refugees in Thailand. These diseases are particularly tragic as they are in pn’nciple readily preventable. Ironically, assessment methods and experiences are now decades old as they were until recently considered conquered. Some clinical methods are now being revised_and reissued by WHO (65). The assessment, prevention and monitoring of camp populatlons should now take high priority; methods are relatively straightforward and should be adopted without delay.

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Assesxing, analysing and monitoring nutrition situations
77mme paper No. 7
Deficiency diseases from lack of vitamin C, niacin and thiamine (similar consider.2::o;ts in fact also apply to vitamin A, iron and iodine) generally occur in long-stay cazttp populations with total or near-total dependence on rations from food assistance, with r.2 ::c:ts of a very limited variety, and with little possibility of acquiring fresh foods. Specir’x asks are:
c
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la . 3
o xa
I Scurvy: no vitamin C source in the rations, and population has no access to fruit and vegetables.
I Pellagra: maize is the staple, requiring to be complemented by legumes - 05133 groundnuts - and/or fish.
iiiii ’ N
l Beri-beri: an undiversiiied diet based on milled (polished) rice, without amass A other foods containing thiamine, such as whole cereals, legumes, fresh vegetabiss.
An assessment of the rations provided can indicate risk of micronutrient deticicaczcs. It may well be informative to calculate the micronutrient supply in the intended rations - riot forgetting iron, iodine and vitamin A again - to assess whether the rations, even it’ smi yizctl as intended, could prevent deficiency. Not infrequently it may be found that the izatzczt s supplied would not prevent the deficiencies. In such cases, positive evidence ShOUIL (31: : be sought that the camp population is able to trade or otherwise get access to complementary foods supplying the missing micronutrients. Ifsuch evidence is not forthcoming, urgent 3: 595 may be needed to ensure alternative sources. At the same time, the risk that the overall food supply targets (or ration levels) may not be met should be assessed in relation .1180th miCIOnutrients. If the full ration just barely meets requirements for micronutrients. the 115k of micronutrient deficiency is increased. A safety margin in micronutrient concentr;ition S_m the diet should be considered. It should not need emphasizing that the requirements tor micronutrients against which supplies (and consumption) should be judged are the same for refugees as for the rest of the population. If anything requirements for refugees and dis placed persons should be higher, as these groups have often experienced nutritional stress in li l’Clr recent past, and they may be already marginally deficient. Assessment of rations planned. could provide timely warning indicators of micronutrient deficiencies in camps.
Assessing actual food supplies in a particular camp is more difficult, but may .be feasible from records. Calculating per caput availability depends on population data. v h lfh is often problematic. Estimating actual intakes per head or household requires detailed survey work, seldom achieved with any accuracy under these conditions. By the time that survey work becomes feasible (and necessary) it may be that assessing clinical signs is m ore appropriate. Since scurvy, pellagra and beri-beri are usually almost entirely absent in n on-camp populations, reports of their appearance at all would provide evidence of a problem-
A constraint concerns the training and experience of health personnel in camps - these diseases have been so rare that most clinicians have never seen them. Nonetheless’. Wlm suitable training it should be possible to establish reporting systems, and PHWlde confirmatory follow-up.

Systematic surveying of camp populations for clinical signs should usually be incorporated in surveys of other health and nutritional conditions, except when there are sudden fears of an outbreak of a specific deficieney. In any event, sampling and field methods would be similar to other prevalence sutveys (see earlier section). Specific training in diagnosis and recognition of pellagra, beri-beri, and scurvy would be needed. It is unclear whether biochemical tests are generall y warranted. These are certainly well-established, and for niacin and thiamine (and some other B vitamins) can be carried out on urine samples. For vitamin C, serum ascorbate estimates can be made. Presumably when there is doubt about diagnosis of the deficiencies, it may be useful to use such tests. Facilities for urine collection (for niacin and thiamine), storage, and laboratory analysis are required.

To quickly establish whether a particular deficiency disease is occurring, the most vulnerable in the population should be examined. Risk factors have been assessed in recent research. A recent study in camps for Ethiopian refugees indicates that risk of scurvy increases with length of stay in camps, age, female sex and pregnancy. Among refugees in Malawi, risk of pellagra is higher among youth, but increases with female sex, absence of groundnuts or fish in the diet, unemployed head of household, residence in camp, absence of home vegetable garden or poultry (79).

3.6 Non-communicabie chronic diseases

Non-communicable chronic diseases are a major cause of premature death in industrialized countries. As mortality from infectious disease declines in developing countries, the proportional mortality from these diseases Linersases. In most cases, the mortality rate overall is dropping rapidly, including from NCCDs, although less rapidly. An increasing proportion of the adult morbidity and mortality stems from NCCDs as this transition takes place, although malnutrition/infection, especially in women and children, remains the dominant nutritional problem in poor countries. There is evidence that certain dietary components are risk factors for some NCCDs, diseases of the circulatory system, some cancers, diabetes, and liver cirrhosis. Thus, it is important to monitor changing dietary patterns, and morbidity and premature mortality from such diseases. Such monitoring can help to identify undesirable changes and suggest actions that may forestall later problems.

Research and monitoring should be distinguished, and both are needed. Specific long-term studies are still required to clarify the causes of NCCDs, and results can contribute to the design of monitoring systems. In the meantime, diet and disease patterns should be monitored, even if the precise contribution of dietary components as risk factors for NCCDS is not fully established.

Four elements of population-based information relevant to control of NCCDs through diet can be monitored: dietary intake; intermediate health indicators (e.g. obesity, biochemical measures); morbidity; mortality. The general methods for these are Outlined below. WHO has proposed an integrated approach, involving anthropometry, CVD risk factors (serum cholesterol and hypertension), and food supply and consumption data. In

addition, if interventions have been launched to change dietary habits such as through pu
blic
awareness, then information on knowledge, attitudes. and practices may be required for
monitoring and evaluation through special sunveys; Such data may also explain why
behavioural changes affecting risk of disease are occurring.
x
Table 5
Dietary Risk Factors and Disease
Total energy (kcals)
Total fat (% total energy)
Animal fat (% total energy)
Complex carbohydrate (% total energy)
Fibre
Free sugar
Antioxidants (vitamins A, C, E; beta carotene)
Salt
Dietary Risk
Factors/Indicators
Obesity
Serum cholesterol, lipids
Blood pressure
Blood glucose
a Intermediate Health
y Indicators
Cardiovascular diseases (CVD); especially coronary heart
disease (CHD)
Hypertension
Stroke (cerebrovascular disease)
Cancer (esp. breast and gastro-intestinal tract)
Diabetes
Dental caries
Diseases
Dietary risk factors may relate to more than one disease, and to several intsrmediate hea
lth indlcators
themselves may predict several diseases. Associations between individual risk faxors, int
ermedmte 1nd1cators,
and diseases are not shown here, for simplicity.
Monitoring Dietary Indicators of NCCD Risk
Quantities and patterns of food consumption may be derived from food balance’sheet
data at national level, from household budget and consumption surveys, and .from aletaw
surveys of individuals. Methods for all these are well established, although thexr appllc
atlon
becomes increasingly complex moving from national through household to individual level.
For monitoring purposes, trends in indicators from food balance sheet data are useful.

vulnerable groups. Thus some data from household-level surveys are important. Individual-level survey data are not usually necessary for monitoring itself, although important for research. Household data, in many countries, are regularly collected by budget or income-expenditure surveys. Household budget data; if quantities of food can be derived, can thus provide important indicators of dietary risk factors, the most relevant of which are (see .6 Table 2): total energy (kcals), fat calories percent, saturated fatty acids (often using animal fat as a proxy), complex carbohydrate, dietary fibre, free sugar, salt, to which should now also be added antioxidants like beta-carotene, vitamins C and E.

Focusing on high-risk groups may reduce costs, if special household surveys have to be done, or if analysis of existing household survey data needs to be limited. In general, high-risk groups for dietary contribution to NCCDs may be defined by income group, location, or by other health data such as obesity. Obesity tends to be more prevalent among the poor in rich countries, the rich in poor countries, and probably in middle-income groups in middle-income countries (66). T argeting dietary survey efforts toward groups with high prevalences of obesity makes some sense for these purposes. But it should be borne in mind that poorer groups, even if somewhat less at risk of NCCDs, may be at higher risk of mortality at the same level of disease incidence because of poor access to medical attention.

Trends as well as cross-sectional assessments, are desirable. It may be useful to reanalyse earlier data to compare with fresh information to establish trends (67). A WHO Study group has recommended that interpretation of dietary indicators of NCCD risk is now facilitated by "population nutrient goals" (45). As countries develop such dietary monitoring, greater depth in assessing risk may be needed beyond nutrient goals. Monitoring alcohol consumption should be included where this is a potential problem, and Specific indicators may be needed for high-risk groups.

Monitoring Intermediate Health Indicators

Given likely lags between exposure to dietary risk factors and disease, with serious illness or death as the outcome, some form of intermediate or "early warning" indicators of the state of disease processes in the population would be of great advantage. These are feasible for certain diseases where the mechanisms are better understood (not in cancers).

Insofar as action to reduce the dietary risk factor can undo damage already done, or prevent further damage, an earlier warning may bemobtained by monitoring younger people. For example, examination of serum cholesterol concentrations in young adults could trigger public action aimed at reducing saturated fat and cholesterol intakes. In fact, monitoring children may be worthwhile, and even maternal health and nutrition for their effect on embryogenesis and future health in the later life of the developing child (68, 69)- Measurements for early detection of chronic diseases in individuals can be used for population-level indicators.

WHO suggests that monitoring of adult body weight and height, serum cholesterol, and hypertension could be achieved by measurements on a random sample of 100 - 200 adlflts of each sex in urban and rural areas (45). This information could provide a developing country with preliminary information to alert the Ministry of Health to any major problems-

Data can readily be handled for this size sample, and repeating the survey at perhaps yearly

intervals will allow trends to be distinguished. Anaemia could be assessed on the same samples upon which serum cholesterol was measured. Certain intermediate health indicators are suggested below, and methods briefly described.

Obesity. Increased risk of death is associated with obesity for the most prevalent diet-related NCCDs - coronary heart disease, cerebrovascular disease, cancers, diabetes, digestive diseases (70). Certain dietary indicators are associated with obesity, notably total energy intake and fat intake, but the relationship is not entirely direct, since low energy expenditures with modern life styles are implicated. While the mechanisms leading to obesity are not fully understood, obesity prevalences could thus be a warning sign for CVDs, and monitoring obesity is therefore important. Obesity is assessed from body weight in relation to height. This can be as a ratio to "desirable" weight-for-height (80), or as a "body mass index" (BMI) calculated as weight in kilograms divided by height in metres squared. Common cut-offs in adults are 120 percent of desirable weight-for-height defining overweight, 140 percent detining obesity using BMI overweight is defined as over 25 and obesity is defined as over 30. In Children, a common cut-off for defining obesity is a tQSDs of weight-for-height (7).

Thus monitoring would involve noting an increase in intake to levels above estimated requirements, with an increase in percentage fat, and a concomitant increase in obesity revalences. Such a sequence of events, possibly with reference to a specific population group, might be indicative of the need to take policy action to reverse the trend in high energy and high fat intakes, as well as possibly undertaking other investigations, such as those discussed below.

Biochemical and Clinim/ Indicators. These include: serum cholesterol in relation to CVDs; blood glucose in relation to diabetes; blood pressure relating to stroke and CVDs. Results from screening tests for early detection of such diseases as breast cancer could also be relevant and useful, although comparability through time can present problems as technology and diagnostic criteria change. The issue in all these cases concerns establishing data sources. These can be either by a special survey, or by surveillance systems based on hospital records or on a sentinel network (81). Such studies and surveillance systems are being established in some developed countries. An example of monitoring by special surveys every few years is the "Risk Factor Prevalence Study" of the National Heart Foundation of Australia. However, it is questionable how feasible such approaches are for widespread application in developing countries since they require substantial resources. Surveys of relevant biochemical indices involve taking blood samples and analysing them. Blood cholesterol and other lipid levels, and blood glucose are two important examples. Guidelines are given by WHO for interpretation of such indices. Blood pressure can be assessed in populations by survey (82). Eventually nutritional indices themselves, such as vitamin A status may become relevant if their protective effects for chronic diseases are confirmed and better unaerstood. Screening tests for early detection and prevention of diseases such as reast and cervical cancer are believed to be effective in reducing mortality (73), although the results of such screening do not appear to be widely used for population surveillance.

Monitoring Morbidity and Mortality
It is recognized, even in developed countries, that monitoring morbidity is less comprehensive than disease-specific mortality (71). Mortality reporting presents problems, and of course does not reflect non-fatal illness. Morbidity monitoring of NCCDs generally occurs as special projects, which are not comprehensive in coverage. Examples are WHOts project for monitoring cardiovascular diseases and registers for cancers. In general, a priority now is to assess the effects of implementing guidelines for dietary prevention of chronic diseases. In Belgium, the Netherlands, and the UK surveillance has also been achieved through networks of selected (sentinel) general practitioners, who report on diagnoses (72). Mortality data are compiled from vital registration (death certificates) and coverage appears to reach satisfactory levels generally when the certification of death, with cause, is legally required. The validity of such certification when compiled into mortality data has been studied. However, even in countries with the most advanced administrative systems, substantial error can occur in compiling such records (73). This is further complicated by periodic changes in the International Classification of Diseases. Moreover, morbidity and mortality data, as noted earlier, are especially late indicators. They are thus important for research and for long-term planning, notably when analysed as time trends. They do have a role to play in topical decision-making, but as causality becomes better understood, it should be more possible to use information from earlier in the causal chain, for instance from dietary patterns.

C ardiovascular Disease. The linkage between dietary fat intake, serum cholesterol and other lipids, and cardiovascular disease, especially coronary heart disease. provides a focus for preventive measures and monitoring. Of other major risk factors - smoking, Obesity, and high blood pressure - the latter two are also related to a greater or lesser extent to diet. It can be readily observed that fat intakes tend to rise with income. and that animal fat specifically also tends to increase as a proportion of total fat, with income. Saturated fat increases CVD risk, and is mainly supplied by animal fat. There is legitimate concern, therefore, that as developing countries go through a "nutrition transition" they may begin to experience the rising rates of CVDs seen in developed countries. which peaked in the 1960 5 to 19705. This mortality is now falling, for reasons that are not fully understood (74), but CVDs still remain the primary cause of premature death in industrialized countries.

To assess and monitor cardiovascular diseases, therefore, it is desirable to monitor the following (using methods referred to in earlier sections):

(a) diet: total energy, percent kcals as fat, percent kcals as animal fat (or saturated/polyunsaturated if feasible; plus dietary cholesterol);

(b) prevalences and trends of obesity by age-sex group, and socio-economic group if feasible;

(c) serum cholesterol and other lipids;

’d) morbidity/mortality data;

(e) prevalence and trends in cigarette smoking.
A surveillance system for diet and CVD risk thus aims to pick up warning signs of the consequences of changing dietary and lifestyle patterns, such as rising fat intakes. A rise in obesity prevalences, especially in young adults, wpuld be a further warning. A survey might be organized to get more accurate dietary and anthropometric data, and to assess serum cholesterol and lipid levels. Based on such-results, it could be decided to launch programmes, for example through public awareness, to try to alter trends in food consumption patterns. These, in turn, should incorporate monitoring and evaluation of dietary patterns and outcomes.
Cancers. The exact relationships between diet and certain cancers is less clear than for CVDs, but there is accumulating indirect evidence on the role of diet (75, 76). Much of the evidence comes from observing associations between potential risk factors and outcomes. For example, while the link between dietary fat and breast cancer is uncertain, evidence does suggest that the risks of colon and prostate cancer are associated with dietary fat. Additional research on diet in relation to cancers will contribute to further clarifying such relationships to help guide possiblepreventive measures.
The ways in which diet may affect the incidence of cancer must be considered in designing data collection and analysis. These include: direct carcinogenic effects; the formation of carcinogens in the body; the transport, activation or the de-activation of carcinogens affecting promotion of cells in which transformation into malignant cells has begun; ovemutrition. It may be just as important to identify and promote dietary components that inhibit the development of cancer, as to reduce possible cancer-causing components in the diet. It is important to hear these factors in mind when considering dietary monitoring.
In most developing countries, insufficient information will be available on cancers :0 suggest a diet-monitoring system. An early step is thus likely to be to assess from hospital records or vital registration whether there are unexpectedly high rates of specific cancers that may have a dietary cause. This might direct attention to specific dietary studies. Several countries with well-developed health infrastructures have established cancer registers (73), and the extension of these to other countries will no doubt be considered for purposes of cancer epidemiology. Where such registers exist, special studies may be feasible to investigate associations with possible dietary risk factors.
Inherited Diseases Related to Diet. There are a number of genetically determined conditions, involving inability to adequately metabolize nutrients due to inherited enzyme deficiencies, that may need to be considered for monitoring and policy formulation. The most common of these is deficiency in intestinal lactase, the enZyme needed to digest the carbohydrate (lactose) in milk. In most human populations, the enzyme does not persist beyond early Childhood. Lactose maldigestion is very widespread, but normally causes little problem. The question is relevant to matters such as dairy industry development, and potentially for rehabilitation of severely malnourished populations, for example in food crisis situations.
Generally this is not a major cause of nutritional problems because populations tend to adapt their food habits accordingly; but the issue should be borne in mind in planning.

Much rarer but more serious are certain enzyme deficiencies, that are routinely picked up and dealt with in some developed countries, but not yet in most developing countries. Other deficiencies affect the metabolism of different aminoacids and sugars. The consequences of non-diagnosis and treatment of such conditions for the individual are serious, even if the incidence is relatively minute cbmpared to other causes of infant death and disability. As health systems develop, it may become cost-effective to begin to include the well-established and standardized methods for early detection and management that are familiar in the medical practices of developed countries. Perhaps where infant mortality rates have been brought down to 20/1 000 live births, it may be appropriate to address such preventable causes of death and disability by errors of metabolism. A considerable number of other diet-related diseases have an inherited component, ranging from diabetes to coeliac disease (sensitivity to gluten from wheat). However, these are generally being addressed through the medical system.

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