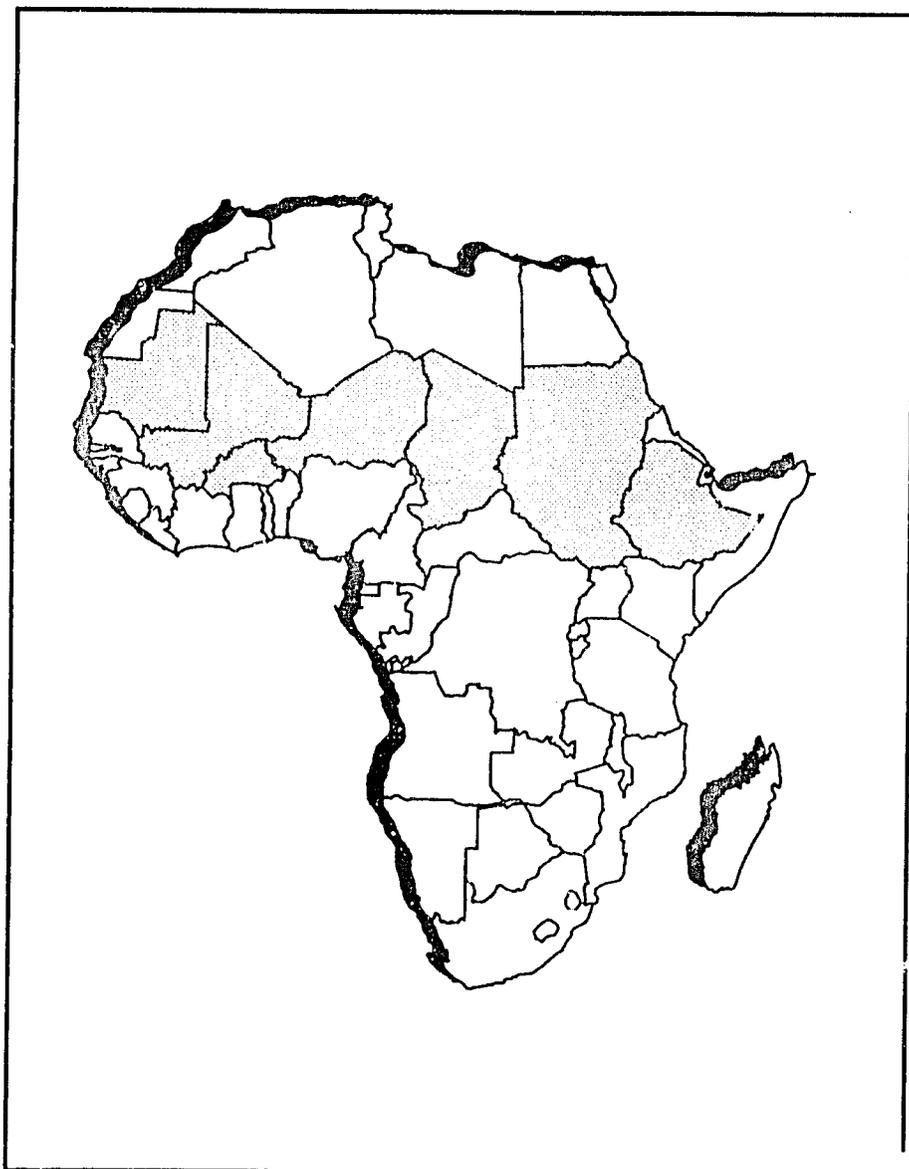


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Executive Summary

MAURITANIA

The vulnerability of rural populations in many parts of Mauritania has lessened due to improved agricultural and pastoral conditions. Rainfall levels for 1993 were very good and contributed to the positive upturn in the agricultural sector of the economy. Agricultural production was the best in perhaps ten years, according to the regional delegations of the Ministry of Rural Development and Environment (MRDE). Improvements in production were realized despite a large invasion of Desert Locusts that began in July 1993. The agricultural statistics department of the MRDE still has not published definitive statistics for last year's 1993/94 harvest campaign, but there is evidence that in general, vulnerability in rural areas has declined, while vulnerability is increasing among the growing numbers of poor urban residents of Nouakchott, Nouadhibou, and Zouerate.

MALI

Over 432,000 people in northern Mali are highly to extremely vulnerable to famine due to continuing insecurity. In western Mali and in the central Niger River Inland Delta, pockets of high vulnerability persist after inadequate 1993 rainfall and river flooding resulted in poor harvests. Good 1994 rainfall, and a reduction of conflict in northern Mali, are necessary to limit or even reduce the growing vulnerability and food insecurity.

BURKINA

The 1993 agricultural season was excellent. Cereals are widely available and prices are low. Prices for livestock continue to rise following the devaluation of the CFA franc. The 1993/94 harvest has reduced vulnerability for over 1,250,000 people, who were identified as highly and moderately vulnerable in the *FEWS 1993 Vulnerability Assessment*. The majority of Burkinabé are now only slightly vulnerable to famine.

NIGER

Regional pockets of moderately and highly vulnerable populations exist throughout Niger despite a near-average year for overall cereal production. Over 600,000 farmers, herders, and urban dwellers are estimated to be at least moderately vulnerable due to poor cereal and cash crop harvests, inadequate rangeland resources, reduced income from lower livestock prices and declining terms of trade, and civil insecurity. The principal areas of concern are in the arrondissement of Ouallam (Tillabéry Department), where 100,000 people are estimated to be highly vulnerable, and in the department of Agadez (including Agadez city), where another 80,000 people are considered highly vulnerable. Other populations considered moderately vulnerable are located in: northern Filingué and Téra arrondissements in Tillabéry Department, the central arrondissements in Tahoua Department (Tahoua, Bouza, Illéla, and Keita), parts of Diffa Department (N'Guigmi and Maine Soroa), and Maradi and Zinder departments.

CHAD

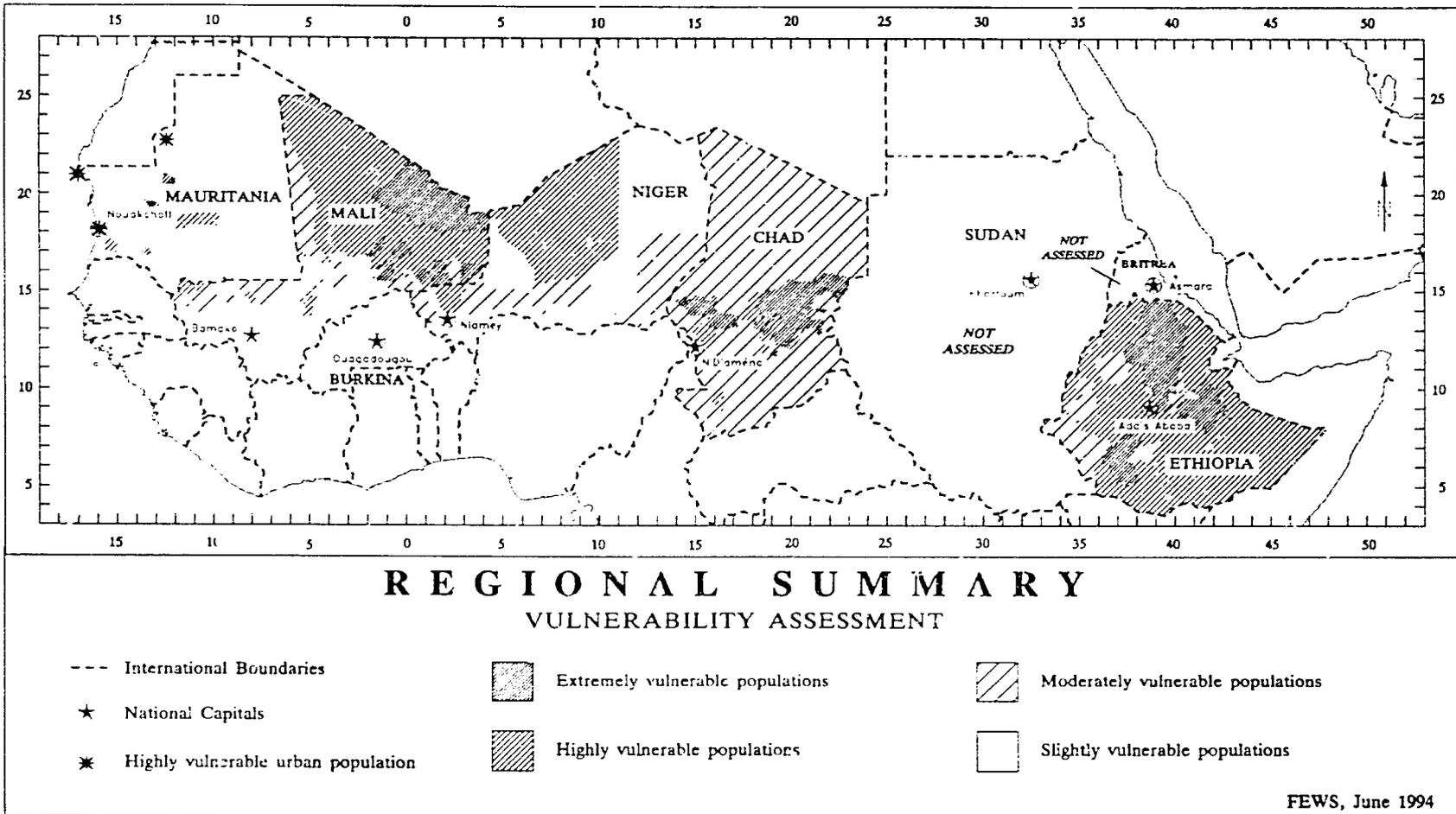
Cereal production was poor in 1993 across much of the Sahelian zone, and in the rice growing region of the Sudanian zone, due to inadequate and erratic rainfall. A potential famine situation was averted in early 1994 by timely distribution of 15,000 MT of cereal to approximately 718,000 rural Chadians. Lack of cereal reserves in rural households, escalating cereal prices, unfavorable cereal exchange conditions for livestock sellers, general socioeconomic insecurity, and chances of future unsatisfactory rainfall in parts of the Sahelian zone create conditions of general food insecurity and make 451,000 Chadians extremely vulnerable and 415,000 highly vulnerable to famine.

ETHIOPIA

Ethiopia's food needs dwarf those of other FEWS-monitored countries. Half of its 55 million people are thought to be food insecure as a result of long-term problems of food shortages and poverty. This year nearly 6.7 million people are highly or extremely vulnerable, and are already in need of food aid. For 1994/95, need predictions range from a 500,000 MT food deficit if the *meher* (main) harvest is good, to a major famine if it fails.

Map I. Regional Summary: Vulnerability Assessment

FEWS REGION



Deteriorating Economies and Increased Civil Tensions Disrupt Recoveries

Regional Summary of Vulnerability

The areas of greatest vulnerability to famine in FEWS' Sahel and Horn Region are affected as much by weak economies and a general lack of resources for weathering bad times, as they are by poor harvests. The levels of vulnerability to famine (see page 47 for FEWS Vulnerability Index) have increased over those of June 1993 and are now: Ethiopia (6.7 million highly or extremely vulnerable, 13 percent of population), Chad (866,000 people highly or extremely vulnerable, 13 percent of population), and Mali (768,000 people highly or extremely vulnerable, nine percent of population). The most worrisome of these countries is Ethiopia. While the percentage of Ethiopia's population that is most vulnerable is about the same as in Chad, the number of people this represents is an entirely different order of magnitude. In addition, the percentage of the population who are extremely vulnerable to famine is much larger than in Chad. In Chad, the 1993/94 harvest was just below average overall, but very poor over large parts of the Sahelian zone and in the rice-intensive production area between the Logone and Chari rivers. In the best of times, Chad's decrepit infrastructure impedes the movement of cereals and other food stuffs from surplus to deficit areas—grain from the traditionally surplus southeast are as likely to be shifted to Sudan as they are to other parts of Chad. An additional problem since late 1993 has been the increasing levels of civil tension (if not actual insecurity) throughout the country. For Mali, the main cause of heightened vulnerability is insecurity, especially in the three northern regions (although two consecutive years of locally poor crops contributed to the increased vulnerability of the remaining highly and extremely vulnerable populations).

Vulnerability levels have decreased over the past year in the other three countries of FEWS' Sahel and Horn Region and are now: Mauritania (400,000 people highly or extremely vulnerable, some 20 percent of the population)¹, Niger (180,000 people highly vulnerable, about 2 percent of the population), and Burkina (no significant population groups are highly or extremely vulnerable). The excellent harvest in Mauritania has sharply reduced the vulnerability of its rural populations. At the same time, however, declining economic conditions have kept a major portion of the urban poor and populations of certain interior oases and pastoral zones highly and extremely vulnerable (about 20 percent of the population). In Niger, a near average harvest has vastly improved food security conditions since May of 1993. However, pockets of bad harvest and poor pasture, plus insecurity in northern Niger, has kept a small portion of the population highly

vulnerable. For Burkina, 1993/94 was the third consecutive year of excellent harvests. While there are still poor people in the country, there is no significant population group that remains even highly vulnerable.

FEWS' Vulnerability Assessment Methodologies

Famine conditions normally invoke images of a gross lack of food, however, this often is not the only problem. Even when food is present in a region, if segments of the population do not have the means to obtain food, they will go as hungry as if there were no food available. Food availability and food accessibility, go hand in hand; as the availability of food in an area grows less, it is common for the price of that food to increase. If the income earned by various socioeconomic groups in an area remains constant during that time, gradually increasing prices will slowly put food out of reach of more and more people. If the income earned by population groups actually decreases during such periods, their ability to obtain food would dwindle even faster.

FEWS addresses both food availability (is there enough food in the area) and food access (do the people have the wherewithal to obtain food) in its approach to studying food security. Also essential to the FEWS strategy is the assumption that decisions on how to obtain the income are made at the household level, and that the mix of production strategies used by households can be used to divide those households into 'socioeconomic groups' (e.g., farmers, agropastoralists, and strict herders). The success of (income produced by) a group's income generating strategies will have a direct bearing on that group's ability to obtain food, and hence its food security. This fact is at the core of the household income model used by FEWS to study vulnerability to famine. We look at the various production strategies in a hierarchical manner. If a group relies primarily on rainfed agriculture and the rainfed harvest has been good, that group's food security is probably good, or at least improved over that group's condition in the previous year. If the rainfed harvest has been poor, however, how well have that group's other strategies performed? Does that additional income make up for the crop failure?

While FEWS operates on this common model, different methods have been applied in conducting vulnerability assessments, depending in large part on the sorts of data available in any given country. Originally, these methods could be easily grouped into a more qualitative set and a more quantitative set, with the former dependent largely on field trips and anecdotal reports of problems or the lack thereof, and the latter dependent on quantitative data that were used as indicators of food security components. Over the course of FEWS work since 1989, datasets have become more complete and the understand-

1. Well over one quarter of Mauritania's population lives in the three largest cities: Nouakchott, Nouadhibou, and Zouerate.

ing of food security issues more sophisticated. With this, the methods for carrying out vulnerability assessments have also evolved. While there is still a need for qualitative assessments, the use of indicators has become more systematic. It is now possible to carry out truly quantitative assessments of income, hence food security (or its opposite, vulnerability to famine), in certain countries. All three types of methods in this continuum (qualitative to indicator to quantitative) are included within this report. The chapters on Mauritania and Ethiopia illustrate FEWS' qualitative methods, the assessments of Mali, Burkina, and Chad were carried out using indicator methods, and the chapter on Niger demonstrates the development to-date of a purely quantitative approach.

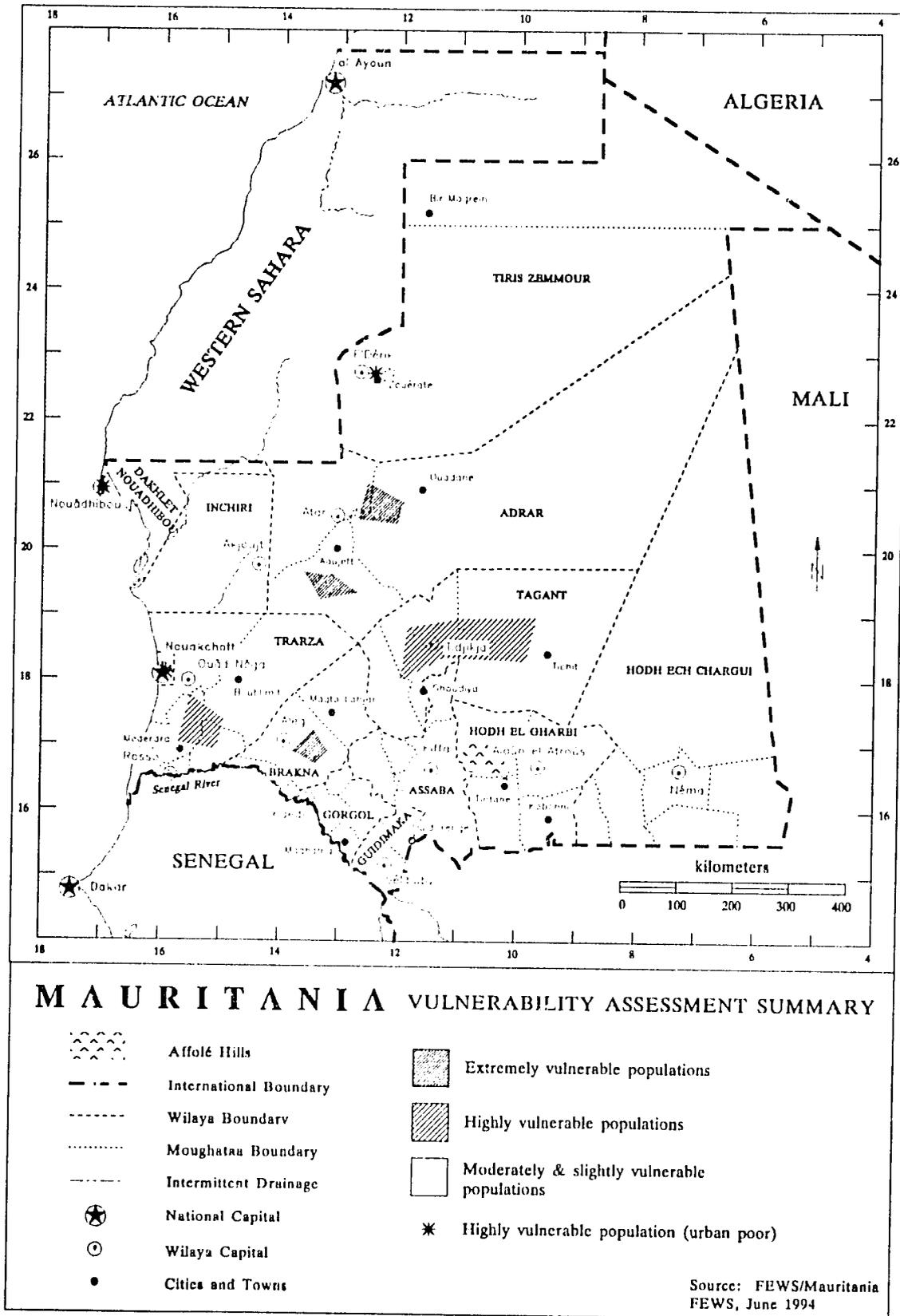
FEWS has been evaluating the merits of the relative, versus absolute levels, of vulnerability. Determining the relative level of vulnerability among various socioeconomic groups within a country is fairly easy. Each of the qualitative, indicator, and quantitative approaches are suited to this task. It is more difficult to accurately determine just how close to famine the most vulnerable group within a country might be. Most difficult of all is determining, in a cross-country comparison, whether conditions in the worst parts of one country are more or less intense than the conditions in the worst parts of a second (are the food security problems faced by the 866,000 highly and extremely vulnerable people in Chad as severe as those faced by the 6.7 million highly and extremely vulnerable people in Ethiopia?). Yet, the answer to this is what USAID decision makers require to best allocate limited aid resources. The answer is most difficult to find when comparing assessments made using qualitative approaches. The purely quantitative approach would allow for answering this question if applied to all countries under study. At this point, however, country datasets are not sufficiently complete to allow for this. Being more flexible in what data are suitable to the exercise, the indicator could allow for cross-country comparisons if applied identically within the countries in question.

Such an exercise was carried out recently across Mali, Burkina, Niger, and Chad in preparation for the vulnerability assessments contained here. The several FEWS Field Representatives (FFRs) and FFR Assistants met in April to determine which indicators to use and how to use them, given FEWS' household income model. The indicators were then built (using quantitative data) and combined, and the results studied. The results showed that certain indicators (especially those for showing the quality of the growing season) did not represent conditions in all agroecological zones (from Sudanian through Sahelo-Saharan). The indicators were then revised, and process of building and combining the indicators was repeated. While the results fit for Burkina and Mali, they did not for Niger and Chad. At this point, there was insufficient time to repeat the process yet again for the May/June vulnerability assessment, so the country teams for Mali, Burkina, and Chad used those parts of the joint assessment that fit their own countries' profiles, and the Niger team completed the quantitative, income-based assessment that it had been working on concurrently.

One of the constraints found was that the datasets were not sufficiently complete across all four countries to calculate all of the indicators the same way. Especially, attempts to account for income from sources other than rainfed agriculture were not entirely successful in all countries. In addition, questions of weighting indicators and indicator categories were not sufficiently addressed.

At the same time, however, the regional vulnerability exercise gave the FFRs the first chance to see the relative strengths and weaknesses of their countries' environments with respect to those indicators for which there were sufficient data to perform calculations across all four countries. This understanding has allowed them to better assess the actual levels of famine vulnerability found within each of their countries.

Map 2. Mauritania: Vulnerability Assessment Summary



Rural Population's Vulnerability Improves, While Urban Poor's Appears to Worsen

Based on a report released by US Embassy/Mauritania on May 15, 1994

SUMMARY

The level of vulnerability to food insecurity is reduced compared to 1993, due to improved rainfall, enhanced agricultural production, and improved pasture conditions. Many rural populations are now better off than poor urban dwellers.

Apart from the chronically extremely vulnerable populations of the isolated communities of Ouadane and Aoujeft in Adrar, the most vulnerable groups in 1994 are poor residents of shanty towns in the three largest cities of Nouakchott, Nouadhibou, and Zouerate. This group may number as many as 400,000. Another 68,000 people in rural areas are moderately to highly vulnerable.

METHODOLOGY

In preparing the 1994 vulnerability assessment, FEWS/Mauritania considered available data from various sources in the country: ministries of the Government of the Islamic Republic of Mauritania (GIRM), nongovernmental organizations (NGOs) working in health, nutrition, agriculture or related areas, United Nations agencies present in the country, such as the United Nations High Commission for Refugees (UNHCR), the United Nations Children's Fund (UNICEF) and the United Nations Development Program (UNDP), informal sources or "key informants" both in the capital and throughout the country, as well as FEWS/Mauritania field trip reports.

The lack of systematic, consistent, national or regional data sources (there are no agricultural and market production/price information collection systems as there are in other Sahelian countries, and definitive agricultural statistics for the 1993/94 harvest campaign have not been released from the Ministry of Rural Development) forced FEWS/Mauritania to rely heavily on information gathered during field trips.

FEWS/Mauritania staff made field trips to the following *wilayas*: Dakhlet Nouadhibou, Trarza, Brakna, Gorgol, Guidimaka, Assaba, Tagant, Hodh el Gharbi, and Hodh ech Chargui. The contacts of primary importance included: the general population (farmers, herders, nomads and merchants), regional delegations of the Ministry of Rural Development (MRDE), and other professionals working in the health, agriculture, and forestry sectors.

ANALYSIS OF SOCIOECONOMIC GROUPS

The Urban Poor

Nouakchott has experienced massive influxes of rural populations during the last 10 or more years. There are no exact population figures, but the rapidly growing number of peripheral neighborhood and shanty-town inhabitants represent about half of Nouakchott's population. The population of urban poor -- refugees from the ecological degradation and socioeconomic dislocation of the countryside -- were classified as highly vulnerable in the 1993 FEWS Vulnerability Assessment, and their status remains unchanged.

Nouadhibou and Zouerate contain the other principal concentrations of urban poor. Nouadhibou is the economic capital of Mauritania and has an estimated population of 80,000. Zouerate is the site of Mauritania's main iron ore mine and has an estimated population of 32,400. Nouadhibou is the home of the SNIM (Societe Nationale d'Industrie Miniere) iron company and to numerous fishing enterprises. The city is a magnet for Mauritians in search of work. The recent fall in world prices of iron ore and the depletion of Mauritanian coastal fishing areas have led to layoffs at SNIM (although not in the past two years), and in the fishing industry. This has created a continuing reduction in employment opportunities and resident's livelihoods.

Over the past ten years, the city's peripheral slum areas have grown rapidly. During a recent visit to three of the largest peripheral shanty town areas, Kra Beadou, Saleh, and Wezerat, the local medical officer estimated the sizes of the three neighborhoods at 3,000, 5,000, and 2,000 families respectively (one family is approximately 5.4 people).

There is one health center and one school serving these slum areas. There are no NGOs working in the slum areas or in Nouadhibou (there is one Peace Corps Volunteer). Large sections of the slum areas are located far (between 5 and 10 km) from the center of town, where the main hospital is situated. Public transport costs between peripheral neighborhoods and the city center (where those who work must travel each morning) are very high and household commodity prices also vary considerably between the city center and periurban areas (see Table 1).

Table 1. Mauritania: Nouadhibou—periurban vs. city center—commodity prices 5/94

Commodity	Periurban areas UM/kg	City center UM/kg
wheat	69	45
rice	70	55
cooking oil	160	140
sugar	110	90
fish	200	150
commodity basket total	600	480

Note: 118–120 UM = US\$1.

Source: FEWS/Mauritania

The coordinator of a nutritional and educational center at the city hospital, which does growth monitoring and supplementary feeding of malnourished children, described a very high (although unquantified) prevalence of malnutrition (marasmus) among local children. Cases of vitamin A deficiency are routine, as are cases of pneumonia and tuberculosis. The coordinator also reported that in the periurban neighborhoods, it is rare to find a family without at least moderately or severely malnourished child.

The area's largest employer, SNIM, has 1,400 workers in Nouadhibou and 1,500 in Zouerate. According to the director of personnel, 673 of the workers in Nouadhibou (around 48 percent) earn 10,000 UM or less per month (US\$ 85). Another 189 persons earn between 10,000 and 20,000 UM. Only 105 employees (7 percent) earn more than 50,000 UM per month (US\$ 416). Mauritania's average per capita GDP was US\$535 in 1991. Additionally, there are around 700 other workers who are employed by subcontractors. These workers receive none of the regular SNIM benefits (housing or allowances, travel fares, electricity or water allotments).

Several fishing companies have not paid workers salaries for up to six months. Some companies have laid-off almost 80 percent of their employees and are in danger of closing.

An important part of Nouadhibou's population now lives a very precarious existence. The inhabitants of the city's growing shanty towns are the most vulnerable, but even people who do work (employees of the SNIM, subcontractors, fishing industry workers), face increasing food insecurity with the exception of a handful of well paid high-level workers. Unemployment, low salaries, high prices, a faltering economy, the absence of NGO activity, and an almost complete lack of health and educational infrastructure have resulted in chronic vulnerability for shanty town dwellers. FEWS/Mauritania estimates there are 300,000–400,000 people who are moderately to highly vulnerable in periurban shanty areas of Nouakchott, Nouadhibou, and Zouerate (see Table 2).

Farmers

The Agricultural Statistics Department of the MRDE has not released final results for the 1993/94 harvest. There is, how-

ever, a general consensus among regional delegations of the MRDE, as well as among many farmers in the country, that the 1993/94 season was the best in ten years (in an exceptional year Mauritania only produces about 40 percent of its cereal needs). Good harvests in Senegal have also benefited southern Mauritanian populations where the borders are permeable, making trade possible.

Despite generally good agricultural production results, the following areas were less fortunate and require more intensive monitoring.

Farmers in Magta Lahjar Moughataa, Brakna Wilaya

Rainfall was very poor during the 1993/94 season. The largest dam in the *moughataa* held very little water this year. This is the largest agricultural site in the *moughataa* (47 percent of farmers cultivate in this space, about 20,000 people). Local production of sorghum declined considerably. Market prices for sorghum are already high at 50 UM/kg, and are likely to rise. Last year this group was classified as moderately vulnerable; their situation has worsened, making the estimated 20,000 people now moderately to highly vulnerable.

Farmers in Trarza Wilaya, along the river between Keur Mour and Tekanguel

There is no *dieri* (rainfed) agriculture in this area. *Walo* agriculture (flood recession) was very poor this year due to the inadequate flooding of the Senegal River. The conditions of Keur Mour and Tekingal villages are typical of the production problems in the area.

In the village of Keur Mour, (30 km east of Rosso), the president of the village rice cooperative reported the *walo* millet and sorghum season had been mediocre at best. Wild boars, monkeys, and birds were responsible for some destruction of sorghum fields. The market gardening season, still in progress, has been very successful (mainly tomatoes and onions). However, market prices are very low—a 25 kg box of onions or tomatoes costs only 300 UM (around US\$0.05 per pound).

In the village of Tekingal, the *walo* season was poor due to insufficient flooding, but millet prices are relatively low for the moment (80 UM per *mood*—roughly 20 UM/kg). Good harvests in Senegal this year may account for the low prices and availability of grain in Mauritanian markets. Because of the low purchasing power of local populations, the estimated 5,000 residents of these two villages are considered moderately vulnerable.

Farmers in Maghama Moughataa, Gorgol Wilaya

Farmers in this area were also affected by the very poor *walo* season; although the area sown was around the same as that of last year, yields declined due to the very late withdrawal of flood waters. An adequate *dieri* sorghum harvest produced stocks adequate for the next few months, but residents could encounter difficulties during the latter part of the *soudure* (preharvest hungry period). An estimated 6,000 people (1/6 of the *moughataa's* population) are considered moderately vulnerable.

Table 2. Mauritania: Vulnerability status by socioeconomic group and population affected

Wilaya	Moughataa	Socioeconomic group	Vulnerability level	Population affected (approximate)
Adrar	Aoujeft	agropastoralists	extremely	23,000
	Oudane	agropastoralists	extremely	
Brakna	Magta Lahjar	farmers	moderately to highly	20,000
Dahklet Nouadhibou	Nouadhibou	urban poor	highly	*300,000–400,000
Gorgol	Maghama	farmers	moderately	5,000
Guidimaka	Ould Yenge	farmers	moderately	2,800
Hodh ech Chargui		agropastoralists	moderately	11,000
Hodh el Gharbi		agropastoralists	moderately	11,000
Hodh el Gharbi		farmers	moderately	8,000
Nouakchott	Nouakchott	urban poor	highly	*300,000–400,000
Tagant	Tichit	agropastoralists	moderately to highly	5,000
Tiris Zemmour	Zouerate	urban poor	highly	*300,000–400,000
Trarza	Ouad Naga	pastoralists	highly	29,000
	Mederdra	pastoralists	highly	
	Boutilimit	pastoralists	highly	
Total				**387,000–487,800

Note: * this figure includes the estimated affected populations of these three cities: Nouakchott, Nouadhibou, and Zouerate.

** This total includes the estimated figure for cities from the note above.

Source: FEWS/Mauritania

Farmers in the north and west of Guidimaka Wilaya Agropastoralists

An early end to rains in the *moughataa* of Ould Yenge led to the drying out of sorghum before maturity. There is very little *bas-fonds* (lowland) agriculture in this area, and it is not a pastoral zone. The inhabitants normally depend on good rainfed harvests for their subsistence. An estimated 2,800 persons are affected by the poor harvests, and are moderately vulnerable.

Farmers in the Affole region of Hodh el Gharbi Wilaya

This region is primarily an area of *bas-fonds* (lowland) and behind-dam (small wadi) cultivation. According to local MRDE technicians and OXFAM personnel, harvest production was poor this year because many dams broke, and because of Desert Locust attacks on developing crops. An estimated 8,000 persons are affected and are considered moderately vulnerable.

Agropastoralists in the south of the two Hodhs

The most pressing problem in the south of Hodh el Gharbi and Hodh ech Chargui is the lack of water resources. There are few wells available for potable water (in the town of Adel Bagrou, Hodh ech Chargui, a 200 liter barrel of water costs 1,000 UM/US\$ 7.50) or for watering animals. The main agricultural scheme is rainfed, and an early end to rains in many areas reduced 1993/94 yields. Large brush fires in Kobonni and Tintane *moughataas* in Hodh el Gharbi destroyed vast areas of pasture. In response, herders have led much of the region's livestock into Mali earlier than usual. This creates food problems for dependents left behind; there is less milk and meat available for local consumption.

There are large animal concentrations in southern Hodh ech Chargui, including those of the estimated 58,000 Malian

Tuareg and Maur refugees living in camps. Pastures are being depleted rapidly. Most of the refugees' livestock have not been vaccinated this year, raising fears of livestock disease outbreaks. About 22,000 people in these southern Hodh areas (around 20 percent in the *moughataas* of Tintane and Kobonni) are moderately vulnerable.

Agropastoralists in Adrar Wilaya

Populations in the *moughataas* of Ouadane and Aoujeft are extremely (geographically) isolated. This complicates the task of supplying the markets with cereal and other foods. Two consecutive years of practically no rainfall during the growing season has reduced local agricultural production to near zero.

About 23,000 people are still extremely vulnerable, down slightly from the 27,000 people judged extremely vulnerable last year.

Agropastoralists in Tagant Wilaya

Isolated populations in Tichit Moughataa and in the arrondissement of Ghoudiya, which were classified as extremely vulnerable last year, are slightly less vulnerable after improved rainfall levels and harvest production. They remain moderately to highly vulnerable because of their geographic isolation from markets and chronic drought conditions. Approximately 5,000 persons are moderately to highly vulnerable (populations of Tichit and Ghoudiya). This reflects an improvement from 1993 levels of 41,000 extremely vulnerable people.

Herders in Trarza Wilaya

The food security status of herders in the *moughataas* of Ouad Naga, Boutilimit, and Mederdra needs to be closely moni-

tored. According to the regional health director's assistant, populations in these *moughataas* experience very high levels of malnutrition. Last year these populations were classified as highly vulnerable and they remain so this year for several reasons. The majority of their livestock are forced to graze in southern Mauritania and Senegal. Also, there is negligible agriculture production in the region, aside from commercial irrigated rice production. Around 29,000 people (about 25 percent of the population of the three *moughataas* are herders according to the regional MRDE delegate) are considered highly vulnerable.

CONCLUSIONS

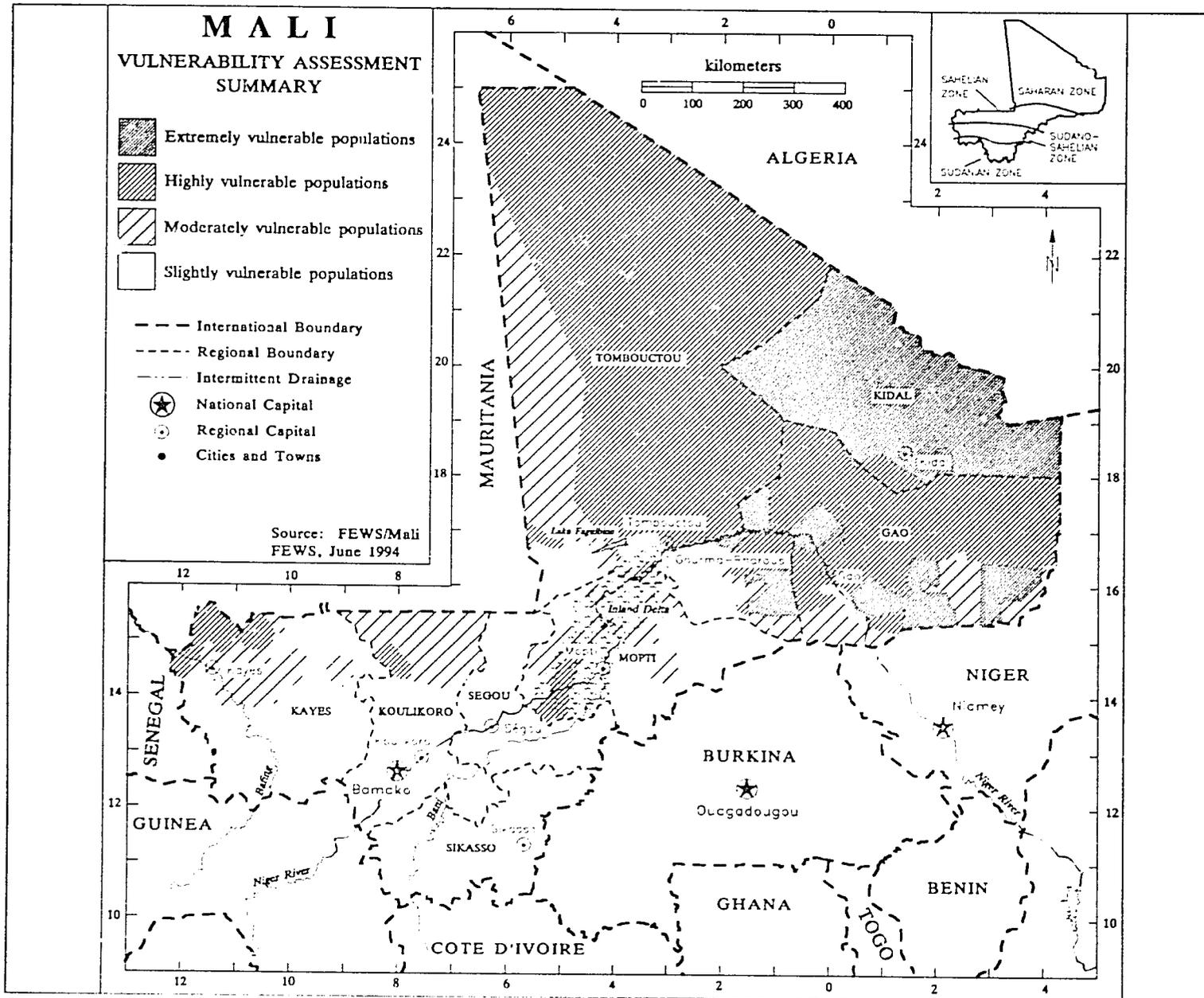
Aside from the small, extremely isolated and chronically vulnerable communities of Ouadane and Aoujeft in Adrar, the most vulnerable populations this year are the approximately 400,000 shanty-town dwellers in Nouakchott, Nouadhibou, and Zouerate.

Vulnerability levels have steadily declined in Mauritania since 1993. In 1993, over 68,000 people in Tagant and Adrar *wilayas* were extremely vulnerable. This year, although the isolated residents of Ouadane and Aoujeft remain extremely vulnerable to famine, the population of Tagant Wilaya has been reclassified as moderately to highly vulnerable as a result of improved rainfall during the growing season.

Other moderate to highly vulnerable groups (64,800 people), including farmers, agropastoralists, and herders, have been identified in parts of Brakna, Guidimaka, Trarza, Tagant, and Hodh el Gharbi *wilayas*.

Map 3. Mali: Vulnerability Assessment Summary

MALI



Insecurity in Northern Mali Increases Highly Vulnerable Populations

Based on a report released by FEWS/Mali on May 17, 1993

SUMMARY

Approximately 432,000 pastoralists and agropastoralists in Tombouctou, Gao, and Kidal regions are highly to extremely vulnerable due to civil strife and general insecurity north of the Niger River. Another 1,259,000 agriculturalists and agropastoralists are moderately to highly vulnerable due to a poor 1993 harvest, poor pasture conditions, and insecurity along Mali's western and northern border with Senegal and Mauritania.

Since the devaluation of the franc Communauté Financière Africaine (FCFA) in January 1994, cereal prices in Mali have risen slightly. The magnitude of cereal price increases is well within the normal seasonal pattern. Stable cereal and animal prices, and sufficient local stocks, have helped to reduce high vulnerability levels in the Sahelian zone. Currently, there are adequate national security stocks to meet immediate needs. The Government of the Republic of Mali (GRM) is providing assistance (4,000 MT of food aid) to highly and extremely vulnerable populations in Mopti, Ségou, Gao, and Kidal regions.

METHODOLOGY

Vulnerability to famine comprises two components; chronic and current. As part of a regional vulnerability assessment (RVA) exercise, 23 indicators were selected. These were grouped according to their importance for indicating chronic (or structural—10 indicators) and for indicating current (short-term—13 indicators) economic crises that are the result of major disruptions to household incomes during the past three years. The 1994 VA analysis was performed at the arrondissement level in Mali, using the model identified for the RVA. Any data collected at a higher level were disaggregated using methods involving biomass and area weighting. Values for each indicator were normalized to standard scores (z-scores).

The 10 indicators of chronic vulnerability were further grouped into four categories: economic importance of livestock and cereals; quality of the agropastoral season; other sources of income; and physical access to markets and urban infrastructure. The 13 indicators of current vulnerability were grouped into three categories: quality of the past three agropastoral seasons; markets responses; and civil unrest and insecurity. The averaged chronic vulnerability score, and that of current vulnerability, were combined to form the 1994 Vulnerability Assessment score.

ANALYSIS OF SOCIOECONOMIC GROUPS

Irrigated and Recessional Land Farmers

Farmers on irrigated and recessional lands are composed of two main groups: those who farm within large scale water management areas (such as the Office du Niger), and those who farm outside these areas. The second group depends on the natural cresting of rivers and lakes. The vulnerability level of the first group is normally the lowest among Malian populations. The vulnerability level of farmers outside the managed areas is tied to the variability of river levels, which has increased in recent years.

In 1993, for the second consecutive year, the Niger and Bam rivers and the lakes in southwestern Tombouctou Region registered their lowest levels in more than ten years. Consequently, areas available for recessional farming decreased sharply compared to previous years. This has resulted in an appreciable drop in the output of river recessional rice and sorghum crops. The most affected areas are the Niger River Inland Delta of Mopti Region and the lake areas in southwestern Tombouctou Region. After two below-average years, 80,000 irrigated- and recessional-land farmers in Mopti Region and 111,000 of this group in Tombouctou Region are moderately to highly vulnerable to famine (see Table 3). Nearly 7,000 irrigated and recessional-land farmers in Gourma Rharous Cercle, Tombouctou Region, are extremely vulnerable due to local insecurity, very high grain prices, poor to no harvest production, and exhausted grain stocks.

Dryland Agriculturalists

The vulnerability levels of dryland farmers practicing traditional agriculture are related to the variability in mean annual rainfall. On average those farming in the Sahelian zone of northern Mali have higher vulnerability levels than those farming in the humid Sudanian zone of southern Mali. Sahelian farmers often suffer severe crop losses due to drought and pest damage. Thus, dryland farmers in northern Kayes, northern Koulikoro, Ségou, and Mopti regions have moderate levels of chronic, or structural, vulnerability to famine.

In 1993, rainfall conditions were good throughout the country except in northwestern Kayes Region (along the Mali

Mauritania border), and in Mopti Region. For many farmers who live in these areas, this marks the second year of poor rainfall.

In Kayes Region, 302,000 dryland farmers are moderately vulnerable. In Koulikoro, Ségou, and Mopti regions, 300,000 dryland farmers are moderately to highly vulnerable.

Agropastoralists and Pastoralists

Agropastoralists

Many residents of the Sahelian zone maintain a few head of cattle, a small herd of goats and sheep, and also engage in small scale agricultural production. In 1993, rainfall in the southern Sahelian zone was adequate for good pasture produc-

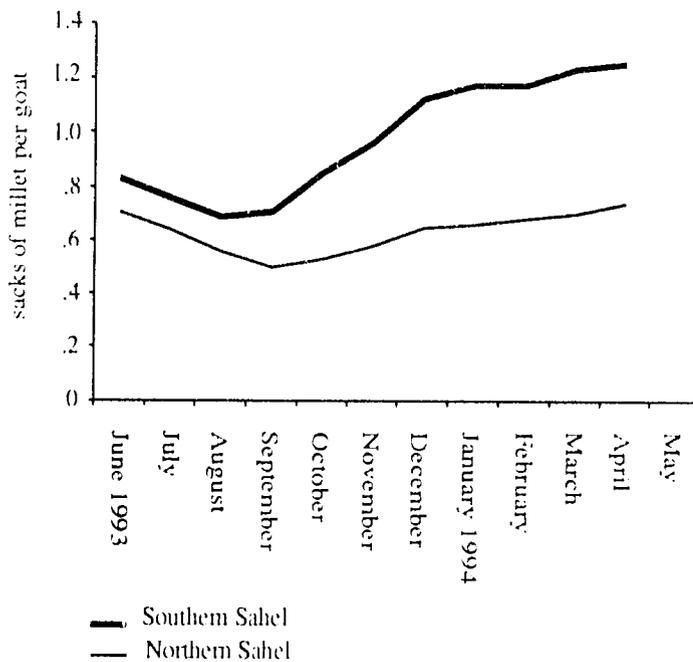
tion. Livestock production and market prices increased and crops were harvested. Market prices for livestock also increased. The higher livestock prices combined with low, stable cereal prices translates into favorable terms-of-trade for agropastoralists (see Figure 1) —income from the sale of one goat will buy over one sack (100 kg) of millet. Because of the combination of these factors agropastoralists in the southern Sahelian zone have low levels of vulnerability.

In the northern Sahelian zone, pockets of poor rainfall affected agricultural production. Some areas in northern Kayes, northern Koulikoro, and Mopti regions experienced a poor 1993 harvest. Cereal prices in these areas are high compared to average for this time of year. As a result, terms-of-trade in the northern Sahelian zone are less favorable than further south, as

Table 3. Mali: Vulnerability status—region and socioeconomic group

Region	Socioeconomic group	Vulnerability level	Population affected
Kayes	dryland farmers	moderately	302,000
	pastoralists and agropastoralists	highly	160,000
Koulikoro	dryland farmers	moderately highly	33,000 27,000
	pastoralists and agropastoralists	moderately	120,000
Ségou	dryland farmers	moderately highly	29,000 46,000
	pastoralists and agropastoralists	highly	23,000
Mopti	irrigated and recessional farmers	moderately highly	40,000 40,000
	dryland farmers	moderately highly	145,000 20,000
	pastoralists and agropastoralists	moderately highly	64,000 20,000
Tombouctou	irrigated and recessional farmers	moderately highly extremely	60,000 51,000 7,000
	pastoralists and agropastoralists	moderately highly extremely	20,000 50,000 28,000
Gao	pastoralists and agropastoralists	moderately highly extremely	88,000 145,000 101,000
Kidal	pastoralists and agropastoralists	highly extremely	2,000 48,000
Total			1,669,000

Source: FEWS/Mali

Figure 1. Mali: Sacks of millet per goat in the Sahelian zone—6/93–4/94

Source: National Early Warning System, prepared by FEWS/Mali, FEWS/W

the sale of one goat will only buy about half a sack of millet. Approximately 292,000 agropastoralists in the northern Sahelian zone are moderately vulnerable.

Pastoralists

Nomadic cattle-raising is common in the Saharan and northern Sahelian zones. Herders migrate south and southwest towards the Niger Inland Delta and the Niger River at the end of the rainy season for winter pastures. These populations depend mainly on animal products for their income. Due to their mobility, they are able to leave depleted pastures for better ones. Consequently, nomadic herders are largely self-sufficient and have a low level of chronic vulnerability.

However, insecurity in northern Mali over the past three years has resulted in greatly restricted movements of people and cattle. In addition, cattle raids have occurred frequently during this period. Pastoralists in northern Mali now have to contend with diminished herd sizes, disruption of normal migration practices, and poor pasture conditions. Animal deaths are on the rise, especially in Kidal Region. Some pastoralists have lost their herds, joined other displaced people in northern towns, and are relying on food aid. Some have fled into neighboring countries. Over 177,000 herders in Kidal, Gao, and Tombouctou regions are extremely vulnerable due to the serious disruption to their normal way of life. Another 197,000 herders in Gao and Tombouctou regions are also highly vulnerable. Proximity to the Niger River and better pasture are responsible for their slightly better status compared with those further north in the Saharan zone.

Fisherfolk

Fishing is an important activity for populations living near

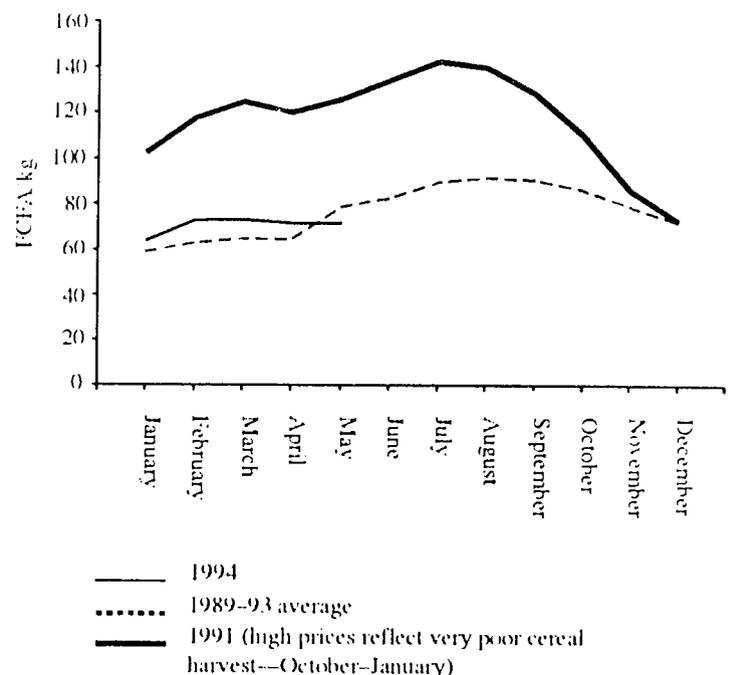
rivers and lakes. On average income from fishing accounts for 10 percent of total income for agriculturalists and 60 percent for fisherman. Due to low river and lake levels, the 1993 catch size was below average for the third consecutive year. Market prices for fish remain high. Supplementary activities such as on-farm labor help augment the income of fisherfolk, thus they are only slightly vulnerable.

Urban Dwellers

Urban populations in Mali are concentrated in Bamako, Ségou, Kayes, and Mopti. Many urban dwellers are salaried workers in the private or public sector. The vulnerability level of urban populations corresponds closely to their purchasing power. All of the urban populations, especially the urban poor, are slightly or moderately vulnerable due to the impact of price increases. Since the devaluation of the FCFA, cereal prices in Mali have risen slightly (by 10 to 20 percent). However, this increase is well within the normal seasonal pattern. Cereal prices are also low compared to average which benefits most urban groups (see Figure 2).

Prices for imported goods such as some foodstuffs, medicines, and fuel, have increased at a higher rate (between 30 and 60 percent). As a result, consumption of nonfood items has diminished while there has been no appreciable changes in the consumption levels of locally produced foodstuffs.

The GRM implemented salary increases for public servants in April 1994, and a second increase is planned for September. There have been no delays in salary payments, and previously postponed step increases have been honored. Consequently, urban dwellers in Mali are only slightly vulnerable when compared to some of their Sahelian neighbors.

Figure 2. Mali: Averaged multi-year millet prices in major urban center markets (Bamako, Ségou, Mopti, Kayes)

Sources: SIM/Mali, FEWS/Mali

CONCLUSION

A majority of Malians are not now affected by vulnerability to famine. Pockets of problems exist in northern Kayes Region, northern Koulikoro Region, and Mopti Region due to inadequate 1993 rainfall levels and low river and lake levels and elsewhere in northern Mali because of three years of civil insecurity.

The vulnerability level of Malians affected by poor rains and low water levels will depend on the outcome of the 1994 rainy season. Should rainfall be inadequate in 1994, popula-

tion in Kayes and Mopti regions will be most affected as they have already suffered through two consecutive poor harvests.

The now long-term civil insecurity in northern Mali has seriously disrupted normal ways of life for pastoralist and agropastoralist populations. Some have lost their whole herds in cattle raids. Many have become displaced or have fled to neighboring countries. Those who remain have to contend with greatly restricted movements and poor pasture conditions. These populations are highly to extremely vulnerable. The return of civil stability followed by assistance to reconstitute lost cattle herds is necessary for this group to regain their normal level of slight vulnerability.

METHODOLOGY ANNEX

This methodology was based on the household income model for understanding food security. Agriculture is the main source of income in Mali, and is therefore the main resource for obtaining money to purchase food. For this reason, the method here focused on households that are predominately agricultural.

Vulnerability to famine includes both chronic and current dimensions. The basic economic level of well-being of a population (chronic vulnerability) will determine how well that population will be able to withstand shocks such as, partial or total crop failure (a possible determinant of current vulnerability). In this exercise, chronic was defined as more than three years and current was defined as within the past three years.

Indicators were chosen that convey important information for the economic security of peoples highly dependant on rainfed agriculture for their livelihoods. It is assumed that economic well-being is directly related to food security as people with sufficient wealth would be able to purchase food even in years with poor harvests. The indicators were grouped according to their importance for indicating the temporal dimension vulnerability. Chronic vulnerability to famine increases with increased poverty, decreased access to varied income sources, and increased riskiness of those income sources. Current vulnerability increases with increased disruptions to household income sources during the past three years and the ability of the market to function.

Chronic (more than 3 years)

Indicators of chronic vulnerability were aggregated into four variables. These variables cover the major sources of income and the variability of that income over the long term.

1. Basic infrastructure

Lack of access to infrastructure

Percent of population that is either :

- i). beyond 10 kilometers of a town with population of more than 5,000;
- ii). beyond 20 kilometers of a town with population of more than 10,000; or
- iii). beyond 40 kilometers of a town with population of more than 50,000. This indicates of lack of access to markets and other social infrastructure, such as schools and health facilities.

2. Quality of agricultural potential

Coefficient of variation of the annual maximum NDVI over the period from 1982-93

This indicates variability of effective annual rainfall and therefore the riskiness of rainfed agriculture.

The average from 1982-93 length of the NDVI-derived period from the start of vegetation growth to peak

vegetation levels (NDVI growing season)

This indicates the potential for a diversified agriculture. The longer the NDVI growing season, the more options that are available to farmers for crop choice and higher yielding varieties—access to varied income sources all rainfed crops.

3. Importance of livestock and cereals

Per capita tropical livestock units (TLU 1 cow = 1 TLU, 8 sheep = 1 TLU, 10 goats = 1 TLU)

This indicates the importance of livestock in the economy—access to varied income sources—livestock.

Average 1985-92 per capita net cereal production

This indicates the importance of crop production in the economy—access to varied income sources—rainfed cereal crops.

4. Contribution from other income sources

Per capita cash crop income (average production from 1985-92 times net profit to the farmer, divided by population)

Cotton was valued at 30,000 FCFA, peanuts at 100,000, sesame at 150,000, yams at 116,000, *patate* (sweet potatoes) at 148,000, *mébé* (cow-peas) at 120,000, and *vouandzou* (Bambara groundnuts) at 200,000 per the relative prices of these commodities on average in Burkina. This indicates the importance of non-cereal crops to the economy—access to varied income sources cash crops.

Current (less than 3 years)

Indicators of current vulnerability were aggregated into three variables.

1. Quality of the past three agricultural seasons:

Combined coefficient of variation of the plant growth (July and August) and flowering (September and October) periods, 1993, derived from satellite vegetation imagery (Normalized Difference Vegetation Index, or NDVI). Indicates the quality of the growing season in 1993.

Combined coefficient of variation of the plant growth and flowering periods, 1992, derived from NDVI. Indicates the quality of the growing season in 1992.

Combined coefficient of variation of the plant growth and flowering periods, 1991, derived from NDVI. Indicates the quality of the growing season in 1991.

2. Market conditions in the past season

The November to April 1993/94 average millet price compared to the 1989-93 average:

at the nearest monitored market indicates the market's perception of availability of 1993 cereals compared to average availability.

The percent change in millet price from June-August 1993 to November-January 1993/94:

at the nearest monitored market indicates the market's perception of the quality of the 1993 growing season.

3. Civil unrest

Insecurity score from 0 to 3 using the following criteria (degree of interruption of access to food):

- 0 = Little problem (assigned a z-score of 0);
- 1 = Cannot drive at night because of banditry (assigned a z-score of -0.5);
- 2 = Car thefts, deaths occur in raids of villages but population is still there, military escort required for commerce in cereals (assigned a z-score of -1.0); and
- 3 = Very insecure, population is fleeing or has fled, cereals market collapse (assigned a z-score of -2.0).

Administrative Units

The analysis was performed at the *arrondissement* level (fourth administrative level, after nation, region, and *cercle*). Where used for this assessment, lower level data including: infrastructure of towns, demographic data, wells, rivers, roads, dams and dikes, soil delineation, crop use intensity regions, NDVI, and METEOSAT-based rainfall estimates, have been aggregated upwards to the cited administrative unit.

Value Summary

Values for each indicator were standardized using the z-score statistic (normalized index). The z-scores within each variable were combined to create a variable score. The variable scores were then combined to create a temporal dimension score (chronic and current), and these scores were then combined to produce the vulnerability index scores.

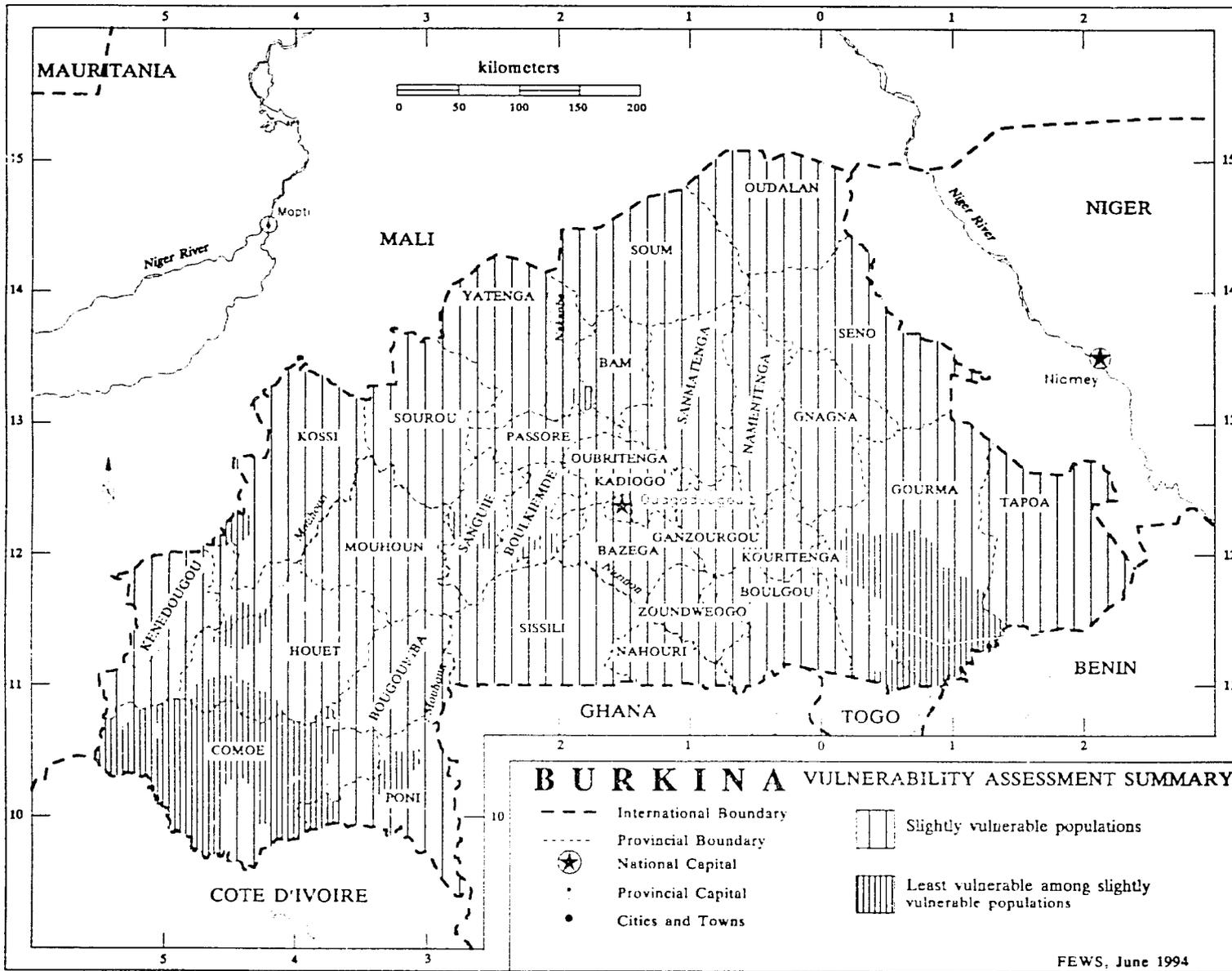
Following the calculation of the vulnerability score, socioeconomic groups within each *arrondissement* were identified using demographic data from the 1987 census. Then, levels of vulnerability were assigned to each group based on z-scores, and its coherency to reports of actual field conditions. Using this method, the thresholds were determined to be:

- less than -2.00 = extremely vulnerable;
- -2.00 to -1.00 = highly vulnerable;
- -1.00 to -0.25 = moderately vulnerable; and
- more than -0.25 = slightly vulnerable.

With this classification, the only extremely vulnerable population in Mali is the displaced pastoralists of northern Mali. Their vulnerability to famine is primarily due to insecurity in the area, which has disrupted their normal living pattern.

The largest highly vulnerable groups in Mali are pastoralists and agropastoralists from the North and the West (Kayes). Their vulnerability is due to a combination of poor rainfall in 1993 and insecurity along the international border with Mauritania and Senegal. Another group of highly vulnerable people are the recessional and irrigated farmers of the Niger Inland Delta in Mopti Region. Their vulnerability is due to poor harvest production and insufficient river flooding.

Map 4. Burkina: Vulnerability Assessment Summary



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BURKINA

Vulnerability Reduced for the Majority of Burkinabé

Based on a report released by USAID/Burkina on May 10, 1994

SUMMARY

The overall quality of the 1993 agricultural season was excellent for the third consecutive year. Cereals are available and prices are low, livestock prices are climbing following devaluation and there have been no significant changes in the availability of nonagricultural income. The good season has reduced vulnerability for the 1,250,000 who were identified as highly and moderately vulnerable in the 1993 Vulnerability Assessment.

For 1994, only the urban poor are moderately vulnerable (appx. 175,000 people). The rest of Burkina's population is only slightly vulnerable.

METHODOLOGY

Sources of household income distinguish the four major socioeconomic groups in Burkina. These groups are agropastoralists, smallholder agriculturalists, largeholder agriculturalists and wage earners/artisans. The quantity and variability of sources of household income determines levels of vulnerability for these socioeconomic groups.

The FEWS 1994 Vulnerability Assessment focuses on smallholder agriculturalists and agropastoralists because they make up 64 percent of the population and their annual incomes are lower, and fluctuate more, than the incomes of largeholder agriculturalists and wage earners/artisans. The analysis was done at the department level (Burkina has 300 departments with an average population of 30,000 per department).

The assessment made several assumptions about conditions that increase vulnerability to famine for smallholder agriculturalists and agropastoralists:

- A short growing season, high year to year variability, and poor access to markets;
- Poor access to nonagricultural sources of income;
- Below average quality of the agricultural seasons over the past three years.

In this assessment, 12 indicators were grouped into three categories of quality of the agricultural resource base, six indicators of access to nonagricultural income, and three indicators of quality of the recent agricultural seasons. For each of the twelve indicators, each department was compared to the average of all 300 departments. The comparison was by the z-score (normalized anomaly index, the same index used for reporting malnutrition rates). The indicators were aggregated within their respective categories using equal weights per indicator. The

three categories were themselves weighted equally in the final aggregation.

ANALYSIS OF SOCIOECONOMIC GROUPS

Smallholder Agriculturalists (SHAs)

Smallholder agriculturalists' households are defined as those with less than seven hectares of land under cultivation. They comprise 49 percent of the total population of Burkina. They depend mostly on their own cereal production for the bulk of their annual income. Livestock, cash crops and off-farm income contribute only a small portion to total household income. They are, therefore, very dependent on these factors that impact on the quality of the agricultural season (distribution of rainfall, crop pests, etc.).

SHAs in the northern areas of Burkina (Yatenga, Soum, Oudalan, and Sanmatenga) suffer from a short growing season with high variability from year to year. Residents live far from markets and far from opportunities to earn other income. The quality of the past three growing seasons has been above average over most of this area, while income from nonagricultural sources has not changed significantly. Farmers continue to accumulate assets and maintain preferred production strategies. They remain slightly vulnerable.

In 1992, more than 800,000 SHAs in the provinces of Tapoa, Boulgou, Nahouri, Sanmatenga, Sangue, Sissili, Gnagna and Boulkiemde were identified as moderately and highly vulnerable due to the poor growing season. The good 1993/94 growing season, and consequent harvest, have reduced their vulnerability level to slightly vulnerable.

Agropastoralists (AGPs)

Agropastoralists make up about 15 percent of the population in Burkina. Although dependent on rainfall, they have diversified sources of household income due to their access to livestock raising in addition to farming. They are more flexible in adapting to pockets of drought because they can move animals to areas of better pasture. However, this flexibility comes at a price. Because livestock are used more as a sellable commodity than for consumption, AGPs are more dependent on market conditions of both cereal and livestock. Because younger members of the household tend the livestock, school attendance and literacy rates of AGPs tend to be lower than

the national average (in Burkina, there is a high correlation between literacy rates and zones where famines have occurred in the past).

More than 250,000 AGPs were highly or moderately vulnerable in 1993 due to poor pastures in major livestock zones and poor terms of trade between animal prices and cereal prices. In 1994, pasture quality and terms of trade have been favorable to livestock owners. The devaluation of the franc Communautaire Financiere Africaine (FCFA) significantly increased animal prices at markets where international traders buy animals. This increase is rippling through other animal markets.

Largeholder Agriculturalists (LHAs)

Largeholder agriculturalists, households that farm more than 7 hectares of land, make up 18 percent of the total population of Burkina. Their land contains productive soils with good water holding capacity. They engage in cash cropping of cotton, cowpeas, and cereals. Because of their diversified cropping strategies, and high level of annual agricultural production, these households usually find it easier to cope with periodic droughts and crop failures. The current vulnerability of LHAs to famine is slight.

Wage Earners/Artisans

This group includes workers in the public and private busi-

ness and service employees, informal economic sector workers, and artisans. Most live in towns of more than 5,000 people and make up 18 percent of the population. They are healthier, better educated and have better access to economic opportunities than most rural populations.

The devaluation of the FCFA early in 1994 caused this group to devote a slightly larger percentage of their household income to food purchases and medical care, but their vulnerability to famine remains slight.

The urban poor are a subset of this group. FEWS/Burkina estimates that they are about 10 percent of the urban population. This group suffers most from the price increases on imported goods such as medicines following the FCFA devaluation. About 175,000 people in this group continue to be moderately vulnerable.

CONCLUSION

Currently there are no food security problems in Burkina that will lead to famine in 1994. The past three growing seasons have been better than the long-term average, cereal prices remain low, and terms of exchange for animals and millet are favorable to livestock sellers.

METHODOLOGY APPENDIX

The goals of the vulnerability assessment are to:

- identify numbers and locations of the major socioeconomic groups, and
- characterize their level of vulnerability according to the FEWS matrix of vulnerability.

This exercise provides a baseline for monitoring socioeconomic groups during the coming year and, in the event of food emergencies, provides a model to aid decision makers in targeting emergency aid and other development assistance. This assessment uses data from the Government of Burkina Faso (GOBF) ministries, NGOs, international organizations and FEWS.

IDENTIFICATION OF SOCIOECONOMIC GROUPS

The major socioeconomic groups in Burkina are wage earners/artisans, agropastoralists, largeholder agriculturalists and smallholder agriculturalists. The number of people in each of these groups for each department (Burkina has 300 departments with an average population of 30,000) was determined in the following way:

- The number of wage earners/artisans is a function of the percent of the population living in or near settlements of more than 10,000 people. This is 18 percent of the total population of Burkina.
- The number of agropastoralists is a function of the total number of Tropical Livestock Units per capita in that department. Agropastoralists make up 15 percent of the total population.
- Agriculturalists are the rest of the population. They were divided into smallholder and largeholder agriculturalists as a function of the percent of households with less than 7 hectares and more than 7 hectares, respectively (Ministry of Agriculture, *Resultats de l'enquete permanente agricole: Campagne 1990/91 1991/92*). Smallholders are 49 percent and largeholders are 18 percent of the total population of Burkina.

VULNERABILITY OF SOCIOECONOMIC GROUPS

People in all four socioeconomic groups are vulnerable to famine. However, largeholders and wage earners/artisans are usually slightly vulnerable because they have stable sources of household income, and they have more opportunities and more flexibility for exploiting their economic and physical environments. Smallholder agriculturalists and agropastoralists, who make up 64 percent of the population, are usually poor and very dependent on the quality of the agricultural season. For these reasons the FEWS/Burkina assessment of vulnerability focuses on smallholder agriculturalists and agropastoralists.

The FEWS model of vulnerability is based on a household income model (Reardon *et al.*, 1988) that identifies the major sources of household income and the temporal variability of those sources. To assess the relative differences in vulnerability to famine for each of Burkina's 300 departments, this

assessment uses three groups of indicators: 1) quality of the agricultural resource base, 2) access to important economic resources, and 3) economic shocks. Grouping indicators this way captures the temporal aspect of famine vulnerability and famine development. The three temporal groups and corresponding indicators are summarized below.

QUALITY OF THE AGRICULTURAL RESOURCE BASE

(very slow changing, more than 10 years)

In Burkina, famines have rarely occurred in areas where the quality of the agricultural resource base is good, or where people have other economic opportunities. NDVI data provide a synoptic source for the quantity of the vegetation each year. The quantity of vegetation is a good indicator of rainfall and quality of agriculture. Demographic data shows where people have economic opportunities. The indicators, calculated the same way as in the Mali assessment, used in this section were:

- Average length of the growing season (1982-93)
- Coefficient of Variation of NDVI annual cumulative for July-August
- Physical access to market towns (infrastructure)

ACCESS TO ECONOMIC RESOURCES

(slow changing, 3-10 years)

Major sources of household income for the most vulnerable groups in Burkina are livestock production, remittances from family members working in Côte d'Ivoire, cereal production, other crops, market gardening, and gold mining.

Tropical Livestock Units per capita—Livestock production contributes about half of what rainfed crop production contributes to the national economy (World Bank, 1989). FEWS/Burkina determined the importance of this source of income as a function of the total number of Tropical Livestock Units per capita in each department (MAE/DSAP, 1990 and Klaver, 1993).

Remittance income—Burkina has from 2 to 3 million people working in the Côte d'Ivoire. They send money back to families living in Burkina. The value of these remittances was estimated to be about 45,000 million FCFA (Jeune Afrique Economie, 1992). The importance of remittances was determined as a function of the percent of the population out of the country in 1985. This data are only available at the provincial level, so all departments within a province were given the provincial percent.

Cereal production per capita—This is a major source of food and income for the poorest groups in Burkina. Average annual cereal production from 1984 through 1992 shows production "surplus" and "deficit" regions. Within any given province, the southern departments usually have a longer growing season, and thus more potential for cereal production, than northern departments. MARA/DSAP figures for total of all cereals and for each province were disaggregated to the department level as a function of the length of the growing season as determined by NDVI.

Market gardening—Data on the distribution of gardens comes from MARA/DSAP. Products include potatoes, onions, peppers, cabbage, etc. The contribution to total income of mar-

ket gardens is a function of the number of square meters of irrigated gardens per capita.

Other crops--The values of other crops were found by multiplying the 1992 production in metric tons times the value to the producer for each crop, and totaling the value of production for all the crops for each province. Values to the producer of other crops are as follows (in FCFA/MT): cotton, 30,000; peanuts, 100,000; Bambara groundnuts, 200,000; cowpeas, 120,000; yams, 116,000; and sweet potatoes, 148,000. The indicator is FCFA per capita.

Gold mining--Data on gold mining comes from the *Comptoir Burkinabe des Metaux Precieux* (CBMP). Data are available by department. Due to the imprecision in this highly informal sector, the data from departments were summed to the provincial level. The indicator is the number of grams of gold per capita purchased by the CBMP in 1991.

ECONOMIC SHOCKS (fast changing, 1-3 years)

Large scale economic shocks in the Sahel are most often caused by drought, agricultural pests, disruptions of remittances, and civil unrest. In Burkina, historical evidence suggests that there is a high probability of drought and pests, but a low probability of civil unrest and disruptions of remittances. The most vulnerable socioeconomic groups depend on rainfed agriculture and cereal market performance after the harvest. (The devaluation of the FCFA may have some impact on remittances from, and migration to, Côte d'Ivoire but the full extent of this impact is not yet fully understood.) The cumulative NDVI for the six 10-day periods of July and August is a good indicator of the quality of the agricultural season. There is a good correlation between this indicator and both millet yields (Groten, 1993) and biomass production (Rasmussen, 1992). Famines are slow onset disasters, and a view over several years can help identify potential problem areas resulting from the cumulative effects of several consecutive crop failures. In addition to the quality of the current year, this assessment uses the differences from average for the past three years, or:

- NDVI z-score of cumulative July-August 1993
- NDVI z-score of cumulative July-August 1992
- NDVI z-score of cumulative July-August 1991

THE MODEL OF VULNERABILITY

Value Summary

Each indicator was standardized across the 300 departments by finding the difference from its national average and dividing that difference by the standard deviation for that indicator (z-score, or the number of standard deviations each department is away from the national average for the indicator). A negative z-score for a department means that the department is below the national average for that indicator. The magnitude of the z-score indicates you how far from the

mean, or how anomalous, that department is for that indicator. The z-scores for the indicators in each temporal category (long-term, medium-term, short-term) were averaged to give an index of vulnerability for that category. Within each temporal category all indicators are weighted equally. These category indices were then again averaged to provide an overall index of vulnerability.

RESULTS AND DISCUSSION

In terms of an agricultural resource base, the northern Sahelian departments scored low, and the southern and urban departments scored high. This pattern is consistent with the historical record of famines in Burkina, and consistent with current GOBF food and nutrition policies. Because of the variety of indicators chosen for the access to economic resources, there was no discernible geographic pattern to the distribution of sources of household income. Each department receives income, and cereal production tends to balance livestock production. For the short-term category, the agricultural seasons have been of above average quality over the northern part of country for each of the past three years. In 1991, the quality of the season was poor in southeastern Burkina. In 1992, there were pockets of poor quality in the southwest. In 1993, quality of the season was above average everywhere. These estimates of quality of the seasons show results that are similar to cereal production results from MARA/DSAP, which show Burkina has been "cereal surplus" for the past three years.

The average of the three temporal groups of indicators are presented in Map 4. Note that no departments scored below the long-term average in 1994. This is due to the good quality of the growing seasons of 1991-93, and that the fact that there have been no significant changes in household income sources.

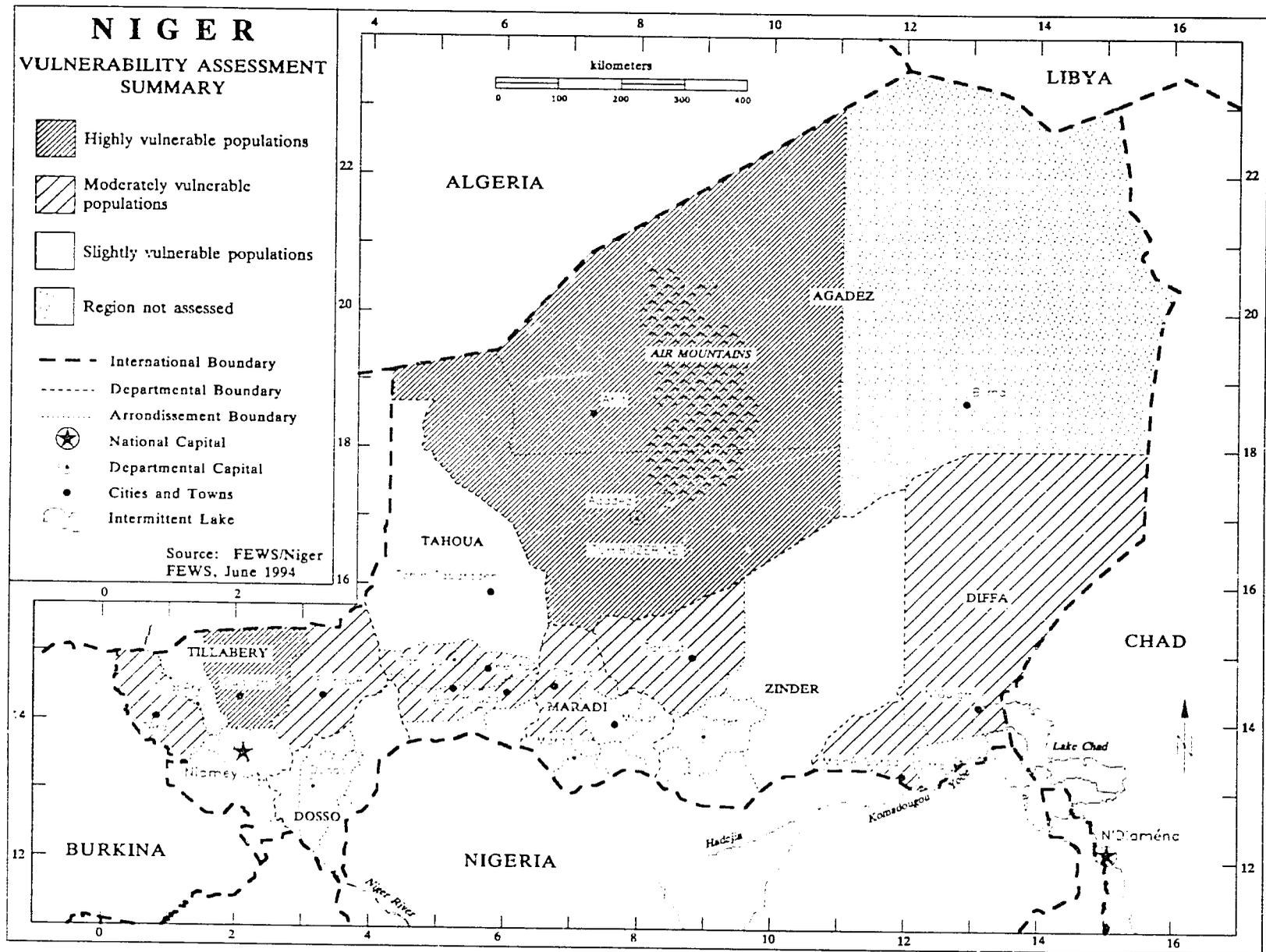
CONCLUSIONS

Smallholder agriculturalists are only slightly vulnerable in 1994 due to the above-average quality of the agricultural seasons for the past three years. The good agricultural seasons, especially in the northern, Sahelian regions, have provided some income to help people continue recovering from the severe crop failures of 1990.

An indicator that could be explored in conjunction with access to markets is the effect of good roads. In addition, work still needs to be done to better identify and quantify sources of income that the current group of indicators miss. Results from the forthcoming Agricultural Census will provide much more, and more accurate, data on these sources.

Lastly, the weighting of indicators should be explored. This could be done using multiple regression analysis or other means. The goal would be to limit the number of indicators necessary for identifying groups and levels of vulnerability. Too many indicators, all weighted the same, tend to muddy the water rather than clarify vulnerability.

Map 5. Niger: Vulnerability Assessment Summary



NIGER

26



Regional Pockets Remain Vulnerable Despite Near-average Cereal Production

Based on a report released by USAID/Niger on May 20, 1994

SUMMARY

Despite an average 1993/94 national cereals harvest (rain-fed millet and sorghum), there are localized areas of food insecurity. Highly vulnerable populations exist in Ouallam Arrondissement (Tillabéry Department) as well as most of Agadez Department (Tchirozérine and Arlit arrondissements, and the city of Agadez). Other areas that contain populations rated as moderately vulnerable include: northern Tillabéry Department (Téra and Filingué arrondissements), central Tahoua Department (Tahoua, Bouza, Illéla, and Keïta arrondissements), Dakoro and Timout arrondissements (Maradi and Zinder departments respectively), and most of the department of Diffa (see Map 5 and Table 4).

The vulnerability in these areas is due to a combination of: poor cereal and niébé (cowpea) production, reduced terms of trade between livestock and millet (relative to previous years), inadequate rangeland production, civil insecurity, and the cumulative effects of several bad agricultural seasons. Devaluation of the franc Communauté Financière Africaine (FCFA) and resulting changes in import and export policies will continue to affect the purchasing power of the local population, although prices seem to be stabilizing as of mid-May.

METHODOLOGY

The vulnerability assessment (VA) identifies socioeconomic groups vulnerable to famine at the onset of the 1994 agricultural season. The approach used for FEWS/Niger's vulnerability assessment methodology is based on a household income model, that estimates the various sources of income available to these different socioeconomic groups. Our understanding of the structure of incomes in Niger, allows us to draw conclusions about relative changes in vulnerability to food insecurity through the measurement of changes in individual income sources over the long-term (past five years) and short-term (past year).

Niger has three major socioeconomic groups, as identified by the 1988 census—farmers/agropastoralists, herders, and urban dwellers. Farmers and agropastoralists make up 80 percent of the population, herders comprise only 2 percent, and the urban population makes up the remaining 18 percent. This assessment focuses primarily on the farmer/agropastoralist and herder groups. (Note: For this report, farmers includes sedentary, subsistence farmers, as well as recently sedentarized agropastoralists). The VA model is driven by income sources related to agricultural production (e.g., millet, sorghum, cow-

peas), livestock production, and the terms of trade between these components. The five income components used include: cereal crop income, livestock production income, cash crop income, off-season crop income, and seasonal migration income. Other income sources (e.g., off-season crop production, migration income, remittance income, etc.), as well as the urban group, are assessed in a more qualitative manner due to incomplete or inadequate quantitative data.

Two ranking systems are used to establish levels of vulnerability: a Chronic Vulnerability Index and a Current Vulnerability Index. The Chronic Vulnerability Index is determined by averaging the weighted income components for the past five years. These five-year averages represent the baseline level and are computed only for those income components where adequate historical data exist. The Current Vulnerability Index represents the percent change from average of the current year values for the same weighted income components. This difference from average can be thought of as the "relative economic shock" to the household income system.

ANALYSIS OF SOCIOECONOMIC GROUPS

The groups are presented by geographic region since the majority of Niger's population falls into the farmers group, and the variation in their coping strategies are as much a function of geographic location as socioeconomic status (e.g. rainfall zone, proximity to Nigeria, civil insecurity in the north, etc.). Because of the way the methodology combines the income sources, farmers and herders are treated in a similar fashion, with different weights applied to the income shares. The urban populations were not quantitatively assessed for this report, but are discussed within their corresponding geographic subgroups where applicable.

In general, as reported in the *1994 FEWS Harvest Report*, the 1993/94 cereal production (rainfed millet and sorghum) was about average despite several regional shortfalls. The most dramatic regional deficits were in the Tillabéry, Tahoua, and Diffa departments. Only Dosso Department registered millet and sorghum production above the 1986-92 average. Helping to balance the cereal production deficit, at least in terms of available income, was the above-average production of the principal cash crop, *niébé* (cowpeas), in many areas of the country, especially in Dosso, Maradi, and Zinder departments. Although the departmental averages of terms of trade between livestock (goats and bulls) and millet was below the long-term average nation-

wide (from the perspective of livestock sellers). The trend since October shows the terms of trade has improved (for livestock sellers) in most of the country except Agadez and Diffa (where it declined) and Tillabéry (little change). Livestock prices were lowest, and millet prices were highest, in these three departments when compared to their respective five-year averages (1989–93), as of March 1994. Table 4 provides a summary of those areas which were rated as moderately and highly vulnerable.

Table 4. Niger: Highly and moderately vulnerable populations

Departments/ Arrondissement Other	Vulnerable farmers		Vulnerable herders	
	Moderately	Highly	Moderately	Highly
Tillabéry				
Oualla.1		97,000	3,000	
Filingué	36,000		2,000	
Téra	90,000		8,000	
Tahoua				
Tahoua	82,000		2,000	
Bouza	92,000		1,000	
Illéla	28,000		1,000	
Keita	32,000		500	
Diffa				
Mainé Soroa	26,000		3,000	
N'Guimi	4,000		10,000	
Maradi				
Dakoro	26,000			
Zinder				
Tanout	20,000			
Agadez				
Tchirozérine		13,000		8,000
Arlit		20,000		13,000
Agadez City		30,000		
Total	436,000	160,000	30,500	21,000

Source: FEWS/Niger

Tillabéry Department

Agropastoral populations in Ouallam were rated as highly vulnerable due to a 1993/94 poor harvest, below-average livestock and cowpea terms of trade with millet (from the perspective of livestock and cowpea sellers), and the ongoing civil unrest that has disrupted the movement of herders and goods and services to the north. In addition, the arrondissement

entered the 1993/94 growing season in a fairly fragile state.¹ Per capita cereal and cowpea production was below average by 40 and 80 percent, respectively, and livestock income was 26 percent lower than average. The Current Vulnerability Index, representing a combination of cereal, livestock, and cowpea income for the current year, was 45 percent below average. There are 97,000 highly vulnerable farmers in this arrondissement.

Filingué and Téra farmers were rated as moderately vulnerable. The problems faced by these populations were the same as Ouallam, but less dramatic, and the population entered the 1993/94 growing season less vulnerable to famine. Filingué had an above-average cereal production year (20 percent) in 1993/94, but cowpea production was below average by 45 percent, and livestock income by 23 percent. Téra had a below-average year in cereal crop production, was 58 percent below average in cowpea production, and 23 percent below average in livestock income. Also, throughout the department, the terms of trade between goats and millet have continued on a downward trend over the past several months. The sale of one goat would be equivalent to 70 kg of millet in Filingué, and 100 kg of millet in Téra, compared to 170 kg in Maradi or Zinder. As a result, 126,000 farmers are rated as moderately vulnerable in the two former arrondissements.

Herders are concentrated primarily in the northern parts of Tillabéry Department and represent about five percent of the total population. Their livelihood was disrupted by generally poor rains and poor pasture production, poor livestock-to-millet terms of trade, and civil insecurity. Most herders remained in the central and southern parts of the arrondissements instead of moving north. As a result, approximately 13,000 herders in northern Ouallam, Téra, and Filingué arrondissements are rated as moderately vulnerable.

Tahoua Department

The 1993/94 outcome of income indicators for the central part of the Tahoua Department were similar to Tillabéry: reduced income from cereal and cowpea harvests, below-average livestock-to-millet terms of trade, and the continued threat of civil insecurity, especially in the northern zones. For these reasons, farmers and herders in central Tahoua Department (Tahoua, Bouza, Illéla, and Keita arrondissements) are rated moderately vulnerable. Herders comprise only two percent of the population in these areas.

Income from both cereal and cowpea production was below average by 30 to 50 percent in Tahoua and Bouza arrondissements. The livestock terms of trade with millet in these areas were approximately 15 percent lower than average. Since August, however, the situation has dramatically improved. It is expected that improving terms of trade, off-season crop production, migration income, and other income not covered quantitatively in this report will help offset the income reductions that were encountered in these areas. However, the combined effects of reduced income from poor harvests and less-than-average terms of trade, coupled with continued risk from banditry, makes over 200,000 farmers and herders moderately vulnerable in the central part of Tahoua Department. These areas are also considered highly deficit and vulnerable by the SAP.²

1. Niger's National Early Warning System (SAP-Système d'Alerte Précoce) rated Ouallam as the most vulnerable area in the country going into the 1993/94 growing season.

Diffa Department

Farmers and herders in Diffa Department were rated moderately vulnerable in Mainé Soroa and N'Guigmi arrondissements. Both regions experienced cereal and cowpea production significantly below the five-year average (cereals down by 60 percent and cowpea production only 15 percent of the average). Although the terms of trade values used in this report were above-average for the department of Diffa (above 100 kg of millet per goat), since October, values have declined to the lowest in the country at about 70 kg of millet per goat (see Figure 3). The declining terms of trade will particularly affect the herders in N'Guigmi, which comprise over 50 percent of the arrondissement's population compared to only nine percent in Mainé Soroa. For these reasons, approximately 43,000 farmers and herders are considered moderately vulnerable going into the 1994 agricultural season.

Maradi and Zinder Departments

In general, these two departments had an average or above-average year in terms of cereal and cowpea production, and favorable livestock-to-cereal terms of trade for the herder population. Two arrondissements were notable exceptions to this trend: Dakoro and Tanout.

Dakoro had an average year in cowpea production, but

cereal and livestock incomes were down by five percent relative to the rest of the department. Nutritional and socioeconomic surveys funded by USAID/Niger in Dakoro and Mayahi arrondissements indicate that Dakoro is more vulnerable than neighboring Mayahi—with higher malnutrition rates and a higher than usual percentage of the population leaving for seasonal work. More surveys are underway for other regions of the country, and will be used along with information from the health sector (e.g. malnutrition rates) to update vulnerability levels throughout the season. There are approximately 26,000 moderately vulnerable people in Dakoro Arrondissement.

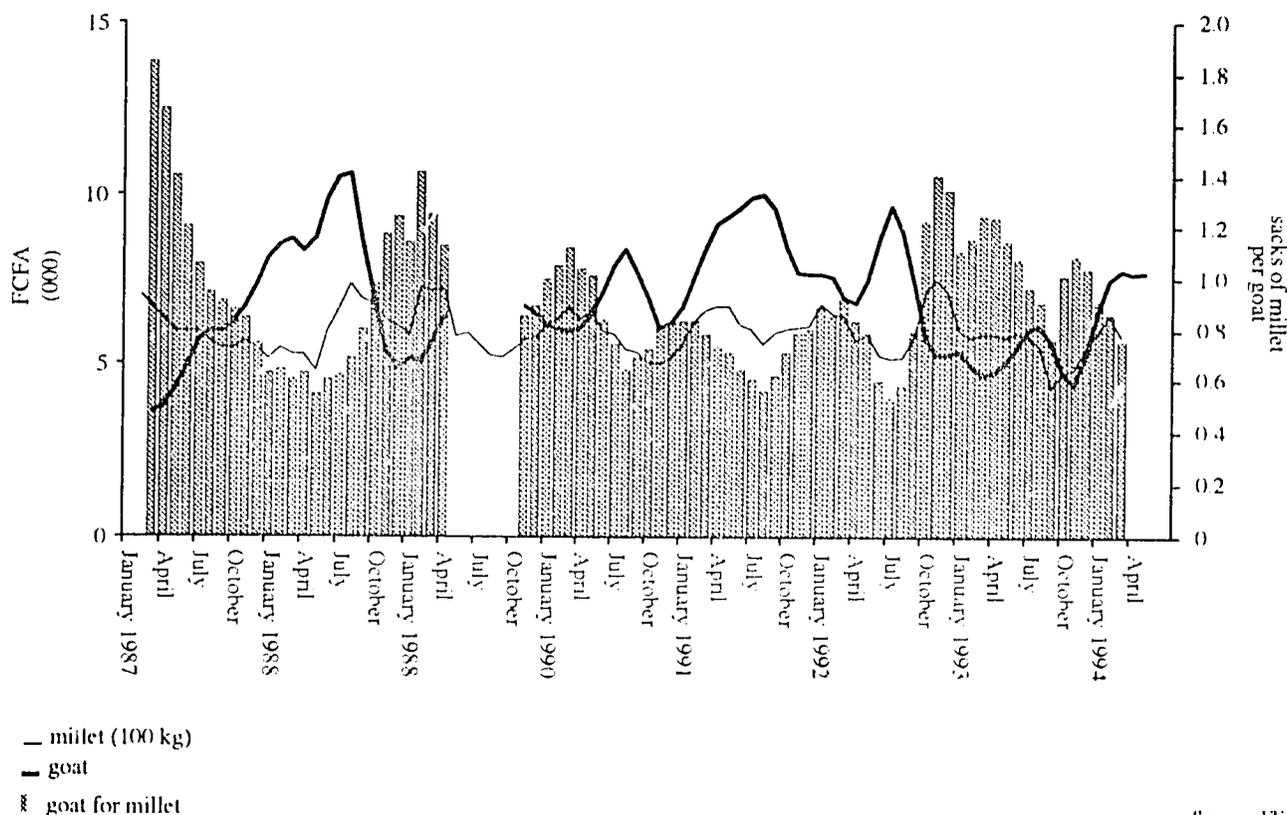
Tanout had an above-average year for cowpea production, but cereal production was less than 50 percent of the five-year average for the second year in a row, and livestock income was down by 16 percent. Tanout was also rated the most vulnerable in 1993 and received the largest share of emergency food aid distributions in 1993. Although the final index for Tanout was above average, another 20,000 people will be considered moderately vulnerable in Tanout Arrondissement because of poor cereal production and the cumulative effects of two consecutive bad years.

Agadez Department

Farmers in both Téra, Zéridje and Arlit were rated highly vulnerable in the *FEWS 1993 Vulnerability Assessment* and remain highly vulnerable going into the 1994 rainy season. The farmers in these areas are sedentarized herders who depend more heavily upon small scale, irrigated crops and alternative sources of income for their subsistence than cereal crop production. Higher millet prices, low and declining

2. The income components for the arrondissement of Tchintabaraden/Abalak show an above-average year in terms of cereal and cowpea production and livestock income, but this area will also be closely monitored due to the civil security situation.

Figure 3. Niger: Diffa—goat for millet terms of trade—1/87-4/94



Source: FEWS/Niger

animal-to-millet terms of trade (about 70 kg of millet per goat), and civil insecurity make approximately 50,000 farmers and herders in Tehirozérine and Arlit in the highly vulnerable.

Civil strife continues to cause the closure of many projects and inhibit income generating activities. According to the Ministry of Commerce, Transport and Tourism, civil insecurity has drastically reduced the capital flows from tourism and dependent activities (e.g. hotels, travel agencies, local cooperatives, etc.). The decrease in gardening activities (due to the high cost of electrical pumping), the lack of donor projects to subsidize these and other costs, and transportation problems caused by insecurity, have led to a dramatic decline in the economy of Agadez. Income losses, higher cereal prices, and civil strife have caused approximately 30,000 people (or 50 percent of the estimated population) in the city of Agadez to be highly vulnerable.

Urban Population of Niamey³

After the devaluation of the FCFA on January 11, 1994, there was a general increase in prices of over 40 percent. Prices have now stabilized at the higher level. Increases in the prices of daily consumer items, such as food, medicine, and transportation, have led to a decrease in the purchasing power for the

local population. Disputes over pay increases, a new strike law, and other issues continue to disrupt daily operations at local ministries and businesses.

Several projects and agencies are monitoring the effects of devaluation on the economic situation in Niger, e.g. PASPE (Projet d'Analyse et de Suivi de la Politique Economique), Ministry of Plan, USAID/Niger Program Office, and U.S. Embassy Economics Office. As of mid-May, it appears that prices are stabilizing, however, the urban poor as a whole remain moderately vulnerable.

CONCLUSIONS

Over 600,000 people are estimated to be at least moderately vulnerable at the onset of the 1994 rainy season. The most vulnerable populations in Niger are located in the departments of Agadez, Diffa, northern Tillabery, and central Tahoua. These areas are considered vulnerable due to a combination of factors: low values for both the Chronic Vulnerability Index and Current Vulnerability Index, poor cereal and cash crop harvests, below-average livestock-to-millet terms of trade, poor rangeland conditions, and disruptions in normal activities due to civil unrest.

3. The population of Niamey is approximately 600,000 people, or about 7.5 percent of Niger's total population.

METHODOLOGY APPENDIX

The Niger vulnerability methodology focuses on the analysis of changes over both the long and short term income potential of important sectors of the Nigerien economy, and their implications for the incomes and food access of vulnerable population groups. The impact of those changes were interpreted for farmers/agropastoralists, herders, and urban groups within each *arrondissement* in Niger according to the extent to which those groups depend on a given sector for a share of their total income (based on a 1990 study by the United Nations Food and Agriculture Organization). Urban groups were not covered by the formal model in this report. The model utilizes relevant secondary data which is currently available at the *arrondissement*-level for five key sectors of economic activity in Niger: cereal crops, cash crops, off-season crops, livestock, and seasonal labor migration. The data used include production statistics, producer prices for the commodities in question, demographic statistics, and wage labor statistics. Information on the income shares of population groups was also cross checked with key informants.

The model first derives a Chronic Vulnerability Index based on a five-year average of the estimated value of per capita output in the cereal, cash crop, and livestock sectors—the only sectors for which a full set of price and output data were available. To reflect implied differences in food purchasing power, the results were placed in millet price equivalents by utilizing cereal-to-cash crop and cereal-to-livestock terms of trade data. The average values of output for each sector were then weighted according to their share in the incomes of each socioeconomic group, then totalled to provide a baseline indicator of relative food access across groups and *arrondissements*.

The Current Vulnerability Index represents the current year's conditions in each sector as a percentage change from the previous five-year average, again weighted according to the relative income shares of each population group. In addition to changes in the value of output in the cereal, cash crop, and livestock sectors, this index includes indicators that reflect changes in the output of off-season crops and changes in seasonal employment opportunities. The last two income sources were computed using estimates, but were not included in the final index due to incomplete data. The resulting weighted average of changes across sectors provides an estimate of the overall magnitude of recent shocks to the food access of each population group in each *arrondissement* of Niger.

The Chronic and Current Vulnerability indices were reconciled in a final rating such that populations which had higher

chronic levels of vulnerability, and which experienced more severe short-term shocks were considered to be the more vulnerable. The results of this model were assessed in light of other sources of information, observations from field trips by FEWS/Niger, and discussions with key informants prior to the formulation of conclusions on the final vulnerability status of populations in Niger.

The income components used in the Niger 1994 Vulnerability Assessment are:

- Cereal crop income: This component was calculated by multiplying the per capita cereal production (rainfed millet and sorghum only) times price of rainfed millet and sorghum.
- Livestock production income: This component was derived from the Tropical Livestock Unit (TLU)-to-millet terms of trade (where 1.0 TLU = 1.0 bull, 10.0 goats, 1.2 camels, 1.0 horse, 2.0 donkeys, or 6.7 sheep).
- Cash crop income: This component was calculated by multiplying *mébé* (cowpeas) production by *mébé* terms of trade with millet.
- Off-season crop income: This component was comprised of total off-season crop production (including tomatoes, peppers, onions, etc.) but was not converted to millet equivalents because of incomplete price information.
- Seasonal migration income: This component was calculated by multiplying the number of adult males (ages 15 to 44) who have left for seasonal migration times an average wage rate (estimated at 25,000 FCFA per month).

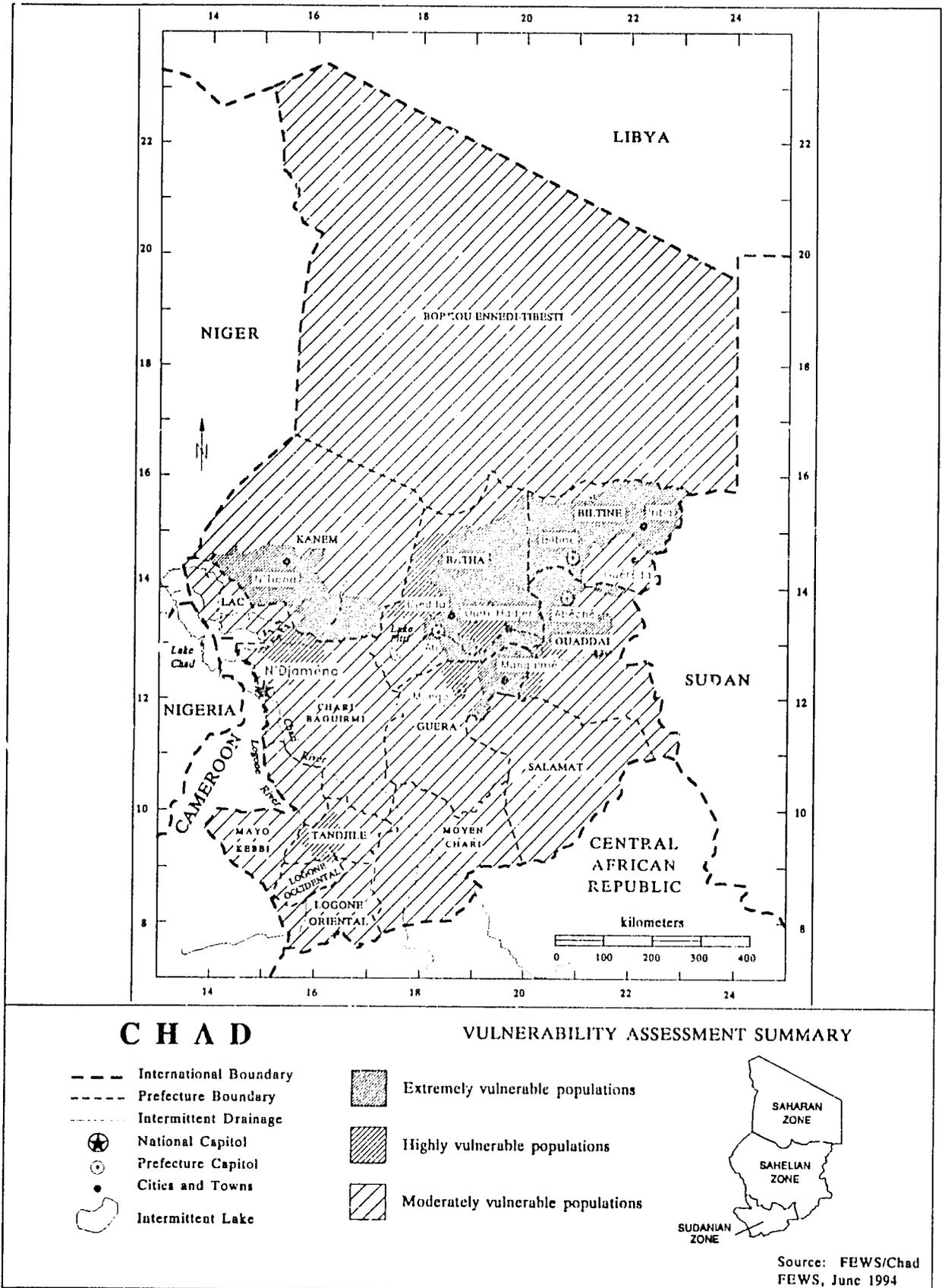
Notes

The percentages of adult, working age males from each *arrondissement* who seasonally migrate for additional income were obtained from the 1990 FAO report cited above. Relative income weights for the different types of crop production were derived from values in the same report. Other weights for income components were derived from discussions with key informants and/or specific knowledge of the areas' production systems.

FEWS 1994 population projections are based on *arrondissement*-level growth rates published in 1992 by the Government of Niger (GON) Census Bureau applied to population statistics from the 1988 General Census. All crop production figures are from the GON Agricultural Statistics Service. Data on malnutrition levels are from the National Health Information System (SNIS), which obtains data from health clinics nationwide.

Insufficient data were available to perform a comprehensive assessment of the vulnerability of populations in Bilma *Arrondissement* (Agadez Department).

Map 6. Chad: Vulnerability Assessment Summary



Perilous Food Situation Before the 1994 Rainy Season

Based on a report released by USAID/Chad on June 30, 1994

SUMMARY

There is a high level of food insecurity among large numbers of Chadians following drought and low 1993/94 cereal production. Migration, wild plant consumption, and collection of wild grains from termite hills are widely adopted survival strategies and were initiated earlier and more intensively than is usual following this year's harvest (this was especially true for Biltine, Ouaddaï, southern Borkou-Ennedi-Tibesti, Batha, and northern Guéra prefectures). Severe malnutrition¹ among children under five has been reported in some highly vulnerable and food insecure areas. Monetary devaluation, nonpayment of civil servant salaries, banditry, and public sector strikes have exacerbated food insecurity throughout Chad. General levels of vulnerability to famine have increased significantly in the last year.

Extremely and highly vulnerable populations are shown in Map 6. FEWSI/Chad estimates that 451,000 Sahelians—of the 718,000 people receiving food assistance this year—are extremely vulnerable to famine. The rains in 1993 were quite poor in many parts of the Sahel, particularly in the northern agricultural zones of Batha, Biltine, Ouaddaï, and Guéra prefectures. In general agriculture in these areas suffers from a short growing season and less rainfall, which limits agricultural potential.

FEWSI/Chad estimates that an additional 415,000 sedentary farmers and nomads found in both the Sahelian and Sudanian zones currently receiving food assistance are somewhat less vulnerable. This is due to a greater potential for a satisfactory growing season and stronger coping strategies following the poor 1993/94 harvest season.

METHODOLOGY

The objective of the 1994 vulnerability assessment was to provide a rationale for estimating numbers and locations of Chadians who might require food assistance during the coming year. Populations currently receiving food assistance were considered highly vulnerable to famine during early 1994. These populations were divided into extremely and highly vulnerable populations. In 1991, it was assumed that 30 percent of the population receiving food assistance in all regions were extremely vulnerable and the remainder were highly vulnerable.

1. Severe malnutrition is defined in this case as a child of five or under having an upper arm circumference of less than 12 centimeters.

Because the predominant means of livelihood in Chad are farming and herding, people's vulnerability to famine this year primarily depends on the development of the rainy season. For this reason, the 1994 assessment spacially combined the 1982-93 average length of the vegetation-based growing season (see the Methodology Appendix for an explanation of growing season) with 1994 food aid recipients to delineate the locations of the extremely and highly vulnerable populations. Cereal prices, terms of trade of livestock for cereal, general insecurity, and inaccessibility of medicines following the franc Communauté Financière Africaine (FCFA) devaluation were also used as criteria for establishing baseline levels of vulnerability.

ANALYSIS OF SOCIOECONOMIC GROUPS

Sahelio-Saharan Zone Agropastoralists, Farmers, and Herders

Most Sahelians receiving food assistance live in zones with a short growing season. Extremely vulnerable populations are found throughout southwestern Kanem Prefecture, in the eastern half of Batha Prefecture, in the northeastern corner of Guéra Prefecture, in the northwestern part of Ouaddaï Prefecture, and in the eastern half and northwestern part of Biltine Prefecture. Insufficient and erratic rainfall during the 1993/94 season led to poor cereal production in most of the extremely vulnerable zones. Final 1993 gross cereal production estimates for the country as a whole were released in mid-May, fixing production at 617,562 MT (17 percent less than predicted). People living in N'Tiona Canton (Kanem Prefecture) and in Mangalmé Subprefecture of Guéra Prefecture, were added to the extremely vulnerable group based on their long history of receiving food assistance and reports of especially poor food security conditions. The total number of people considered extremely vulnerable to famine is 451,700 (see Table 5).

Although some 77,090 Sahelian farmers and agropastoralists received food assistance in 1993, they live in agricultural zones with a longer expected growing season. These people are found in north-central Chari Baguirmi, northwestern Gozra, western Batha, and southwestern Ouaddaï prefectures. Because they have a better chance for a successful harvest in 1994 than those living further north, they are considered highly vulnerable. In addition, nomadic people living in Ouaddaï, Biltine, Guéra, and Batha prefectures (estimated at 137,316 people), and southeastern Borkou-Ennedi-Tibesti Prefecture (B.E.T. —

Table 5. Chad: Location of Vulnerable Populations

Prefecture	Vulnerability level			
	Extremely	Highly	Moderately	Slightly
Sahelian zone				
Kanem	141,367	0	108,695	30,742
Chari Baguirmi	0	13,582	633,700	604,837
Guéra	28,419	48,792	185,483	43,959
Batha	108,931	84,683	58,443	36,017
Ouaddaï	92,505	63,819	322,662	70,946
Biltine	80,480	17,112	73,994	15,529
Lac	0	0	236,271	1,955
Salamat	0	0	156,697	29,284
Total	451,702	227,988	1,775,945	843,311
Sudanian zone				
Tandilè	0	128,398	272,503	57,339
Logone Occidental	0	41,308	294,691	119,141
Logone Oriental	0	0	394,749	45,593
Mayo Kebbi	0	0	726,248	94,001
Moyen Chari	0	0	594,825	149,916
Total	0	169,706	2,283,016	465,990
B.E.T.	0	17,409	34,925	18,269
Total	451,702	415,103	4,093,886	1,327,570

Sources: SAP/Chad, FEWS/Chad, Ministère du Plan et de la Coopération-Direction Générale-Direction de la statistique, des Études Économiques et démographiques

6,285 people) are also considered highly vulnerable. The sale of one sheep will procure only 20-25 kg of millet, down from 90-160 kg millet from the sale of a sheep in the same areas just one year ago (see Figure 4). This is the lowest the terms of trade have fallen in the past five years in these areas, although the pattern is similar to 1991.

Sudanian Zone Rice Farmers

Rice-growing, sedentary farmers on the banks of the Logone and Chari rivers were found to be highly vulnerable. Rainfall was deficient in the Logone and Chari watershed basins and throughout the rice fields of Tandilè and Logone Occidental prefectures, where there was no flooding in 1993. The *FEWS 1993 Preharvest Assessment* report detected lower-than-normal vegetation in these regions and predicted below average crop production. Cereal production in the two prefectures was 47 percent of average and cotton production was only 40 percent of normal. Large numbers of farm traction animals are reported to have been sold to obtain cereal. The sale of

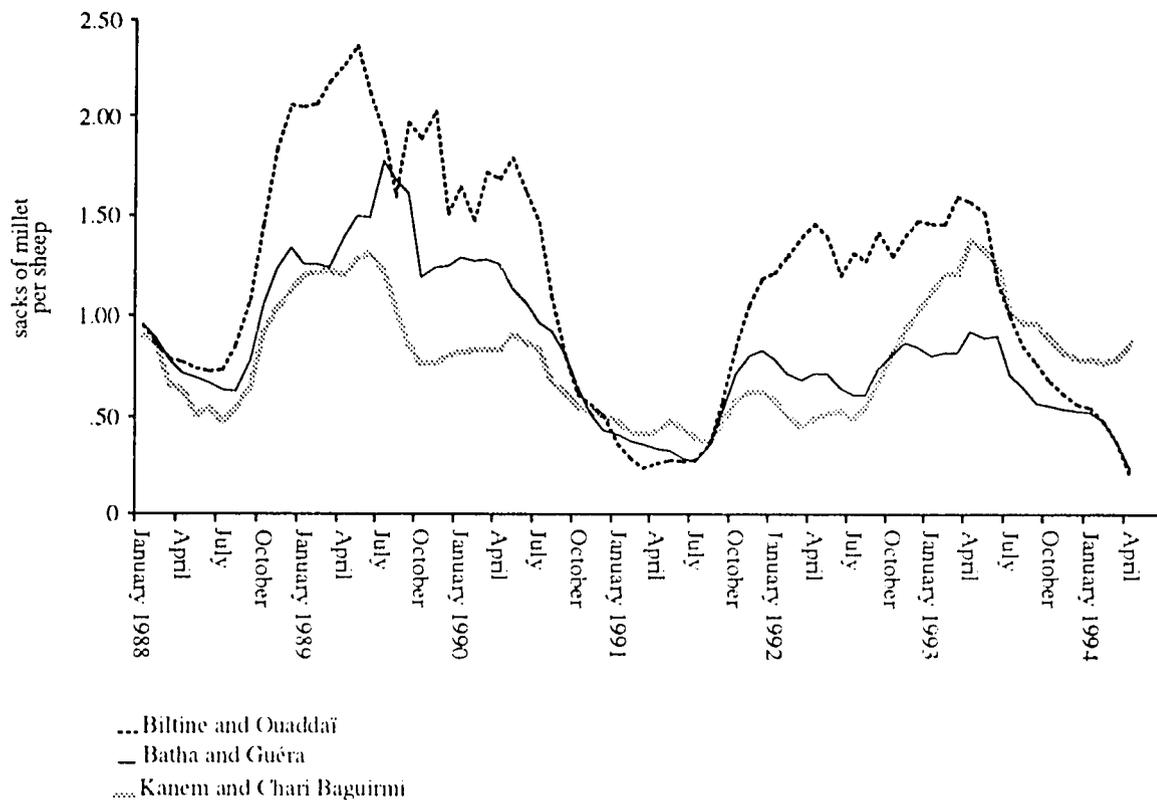
these productive assets will result in reduced cereal and cotton production even if the region receives average rainfall and rice growing conditions stabilize.

Urban Dwellers and Remainder of Rural Population

The remainder of Chad's rural farmers, agropastoralists, and herders found in the Sudanian, Sahelian, and Saharan zones, plus the urban dwellers, are moderately vulnerable. Their food insecurity results from the extreme economic pressures of high cereal prices, inflated prices for consumer goods and services following the recent devaluation, declining accessibility of medicines, and general civil insecurity. Cereal prices throughout the country are at the highest levels since 1991 and 1988 (see Figure 5). Now, as in 1991, regional differences in cereal prices are disappearing and price differences among cereals are less remarkable than in years following strong harvests.

It happened that the 1988 and 1991 harvests were excellent and millet prices dropped accordingly going into 1989 and 1992, respectively. Following the 1987/88 and 1990/91 food

Figure 4. Chad: Terms of trade—sack of millet per sheep—1/88–4/94



Source: SAP/Chad

insecurity alerts, the good harvests in each case helped improve food security in Chad's Sahelian region to manageable levels. If the 1994 harvest is above-average this pattern could happen again. If the harvest is mediocre or poor however, prices should continue to increase through the end of the year, reaching their highest levels since *Système d'Alerte Précoce* (SAP) began collecting cereal price data in July of 1988.

Nomadic populations in the Sudanian zone benefit from a more stable and productive environment, and are considered only moderately vulnerable. Urban dwellers throughout Chad suffer from high levels of socioeconomic pressure similar to those of the general rural population, but improved access to urban infrastructure (markets, roads, health care, etc.) improves their food security. These groups were only slightly vulnerable in early 1993. Their food insecurity arises from of poor 1993 harvests, devaluation of the FCFA in January 1994, and public sector strikes following devaluation.

General civil insecurity is difficult to quantify and compare. Nonpayment of civil servant salaries for approximately eight months during 1993 created noticeable tension in N'Djaména by the end of the year, and resulted in civil servants strike in December and January (1994). Civil servants returned to work in February and March 1994 but went on strike again at the end of April to force a government agreement on a social pact providing higher salaries and new recruitment. General political uncertainty was created by the failure of the provisional government to organize elections for a transfer of power to a constitutional government.

The presence of rebel groups in the south, and a rebel attack on Abéché in January, increased insecurity in these regions. Attacks by armed bandits have been reported throughout the

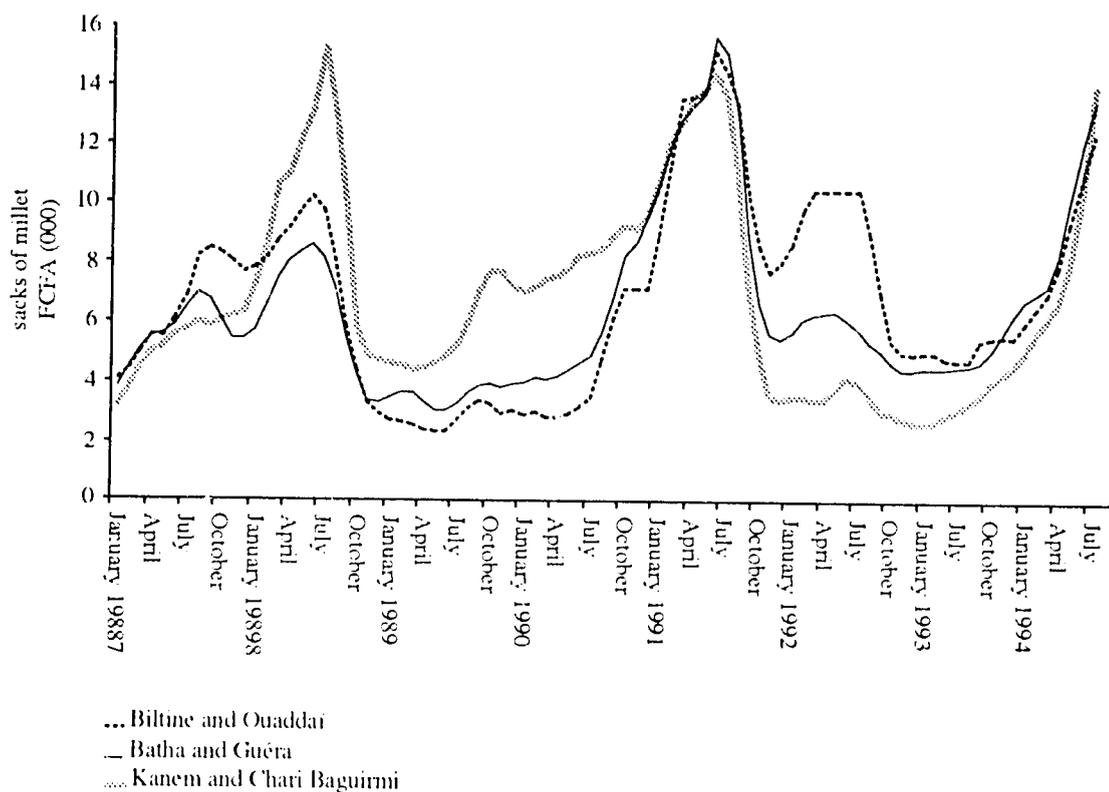
country, making daytime travel in convoys advisable in some regions, and travel at night highly inadvisable. Armed attacks on herders and merchants have inhibited normal commercial and subsistence activities in some regions.

CONCLUSIONS

Parts of Chad's Sahelian zone are structurally deficit in cereal production. The average length of the agriculture season can be used to identify these deficient zones. Based on an estimate of extremely and highly vulnerable populations (451,000 and 415,000 people, respectively), and assuming that extremely vulnerable populations in the Sahelian zone will require four to eight months of food assistance and highly vulnerable populations will require two to four months of assistance, between 19,000 to 38,000 MT of cereal will be required to avert famine during 1994. If 1994 rainfall is above average, only limited amounts of food assistance will be necessary. However, if rainfall is average or below average, much larger amounts may be required. The national food security stock has been depleted to approximately 2,000 MT by food distributions through mid-May 1994. Pledges for food aid have been received from France, the European Union, and the World Bank.

Chadians living in zones currently receiving assistance and living in zones with a short average growing season are considered extremely vulnerable, and those receiving assistance but living in zones with a longer average growing season are considered highly vulnerable. Nomadic populations in four prefectures are considered highly vulnerable due to poor 1993

Figure 5. Chad: Averaged millet prices for three Sahelian markets—1/87-4/94



Source: SAP/Chad

pasture conditions and unfavorable cereal exchange conditions for livestock sellers. Based on a long history of recurrent famine conditions and resultant food distributions, the people of two areas (N'Tiona Canton of Kanem Prefecture and Mangalmé Subprefecture of Guera Prefecture) were moved from the highly to extremely vulnerable category.

Moderately vulnerable populations include rural Chadians in all zones not receiving food assistance and living in zones with a longer expected growing season. This is due to the poor results of the 1993/94 growing season and current levels of civil security.

Even urban dwellers, normally the least vulnerable socio-economic group in Chad, are considered moderately vulnerable this year due to general civil and economic instability and uniformly high cereal prices throughout the country.

Rainfall in the Sahelian zone will remain the most important indicator of changing vulnerability in the coming months. If rainfall is satisfactory and harvest prospects in the Sahel are generally good, cereal prices should decrease sharply during August and September.

METHODOLOGY APPENDIX

This assessment was based on two principal criteria: location of people currently receiving food assistance and identification of zones in the Sahel with short growing seasons (where populations are less likely to have satisfactory growing conditions in 1994). In addition, validating factors were also explored including: cereal price trends, terms of trade of live-stock for cereal, general civil insecurity, and inaccessibility of medicines following the devaluation of the FCFA.²

Identification of Shorter Expected Length of Growing Season in the Sahel Using Long-term NDVI Data.

Normalized Difference Vegetation Index (NDVI) data (see inside back cover) for the past 12 years were used to calculate the average length of the growing season for each canton in Chad. The initiation of the growing period is the dekad (10-day period) in which the NDVI value first becomes distinctly and consistently larger than NDVI values of previous dekads, as part of an upward trend of increasingly large NDVI values. The peak vegetative period is the point in time when the maximum NDVI value is first observed. The number of dekads from initiation to peak vegetation is a relative length of a specific growing period, and defined as the length of the growing season in this assessment. The actual crop emergence may have been observed earlier than the initiation of consistently positive NDVI values and the peak vegetative period is expected to occur earlier than actual crop maturity. Graphic interpretation of average length of season values in a GIS environment was used to determine the unique value (5.8 dekads, or an average of 58 days from initiation to peak vegetation) that best separated the Sahelian zones into two domains hypothesized to have predictably different probabilities of satisfactory growing seasons.

Cantons with average NDVI season lengths less than 58 days were deemed less likely to have an adequate growth period for crops to reach maturity in 1994. There is variation on both ends of this measure of the length of season. In a year with timely and consistent rainfall, one would expect that crops will have been planted well before they register NDVI values, although at times, greenup of native vegetation could occur at about the same time as planting. Alternatively, if there are early rains followed by a dry spell, greenup of native vegetation could occur before planting. At the end of the season (vegetative peak), one would expect maximum NDVI to occur before the physiological maturity of the majority of the cereal crop.

2. The major importer of medicine in Chad (the parastatal organization PHARMAT) was prohibited from increasing medicine prices following devaluation. Stocks were liquidated at pre-devaluation prices and replacement stocks have not arrived. With the exception of those individuals who can go to Cameroon and purchase medicines, most medicines are simply unavailable at any price.

Numbers and locations of people receiving food assistance in 1994

- Sudanian zone: Three food distributions in the Sudanian zone were carried out from February through June 1994 by the Comité d'Action pour la Sécurité Alimentaire et les Urgences (CASAU), and a famine relief committee in Moundou (Logone Oriental Prefecture) composed of local authorities and nongovernmental organizations (NGOs). The CASAU, responsible for the national food security system and chaired by the Minister of Agriculture and Environment, is composed of donor agencies (U.S., France, European Union, United Nations Food and Agriculture Organization, World Bank, etc.), representatives of different GOC agencies, and NGOs. The Moundou-based famine relief committee included OXFAM, Catholic Relief Services, Catholic church officials in the field, and Medical and Environmental Development with Air assistance (MEDAIR). The CASAU sent evaluation teams to four prefectures in the Sudanian zone in December 1993 and January 1994. They found significant numbers of people in need of food assistance in Tandjilé and Logone Occidental prefectures. Their reports resulted in the CASAU decision to distribute 2,024 MT of cereal to populations in the most needy cantons. Funding was provided to the Red Cross of Tchad (RCT) for the distribution, which occurred during March and April 1994. The food distribution agreement with the Red Cross, provided the numbers and locations of people to receive food. The famine relief committee, using funds obtained from parent organizations and local donations, distributed food in Tandjilé and Logone Occidental prefectures in February and March. After some initial confusion concerning which organization was going to distribute to which populations, the affected zone was divided into distribution spheres to avoid missing needy populations and double distributions. A second distribution by the famine relief committee is planned for May-June 1994 in the same areas as the first distribution. The numbers and locations of populations who received food in February and March via the famine relief committee, and of populations who received relief in March and April via the RCT, are used in this assessment.
- Saïef and B.E.T.: The European Union-financed famine early warning unit, Systeme d'Alerte Précoce (SAP), conducts vulnerability assessments in the Sahelian zone which estimate the number and location of people in urgent need of food assistance (eight months of food assistance) and those who will require food assistance for four months during the 'hungry' period. SAP estimates of needy populations are normally the basis for official food distribution decisions in the Sahelian zone. In February 1994, the SAP modified their initial, December 1993 assessment. These are the numbers and locations of populations in need of food assistance (under the categories of urgent, and hungry period) used in this assessment. In February, the most urgent food needs of populations in Oum Hadjer and Djedda subprefectures

of Batha Prefecture were met by a RCT cereal distribution from national food security stocks. In March, the GOC borrowed 1,000 MT of food from the national food security stocks to begin immediate distribution of food to needy populations in 29 cantons of eight subprefectures in Kanem, Batha, Ouaddai, and B.E.T. prefectures. The numbers of people receiving assistance were estimated by dividing the amount of food by 28.8 kilograms per person, which is a standard relief ration. By March it was clear that the national food security stock would not suffice to meet all the outstanding planned food distribution requirements. A unilateral decision of the CASAU-mandated distribution of two-month rations to the bulk of the population still requiring food assistance instead of the four-month ration recommended by SAP.

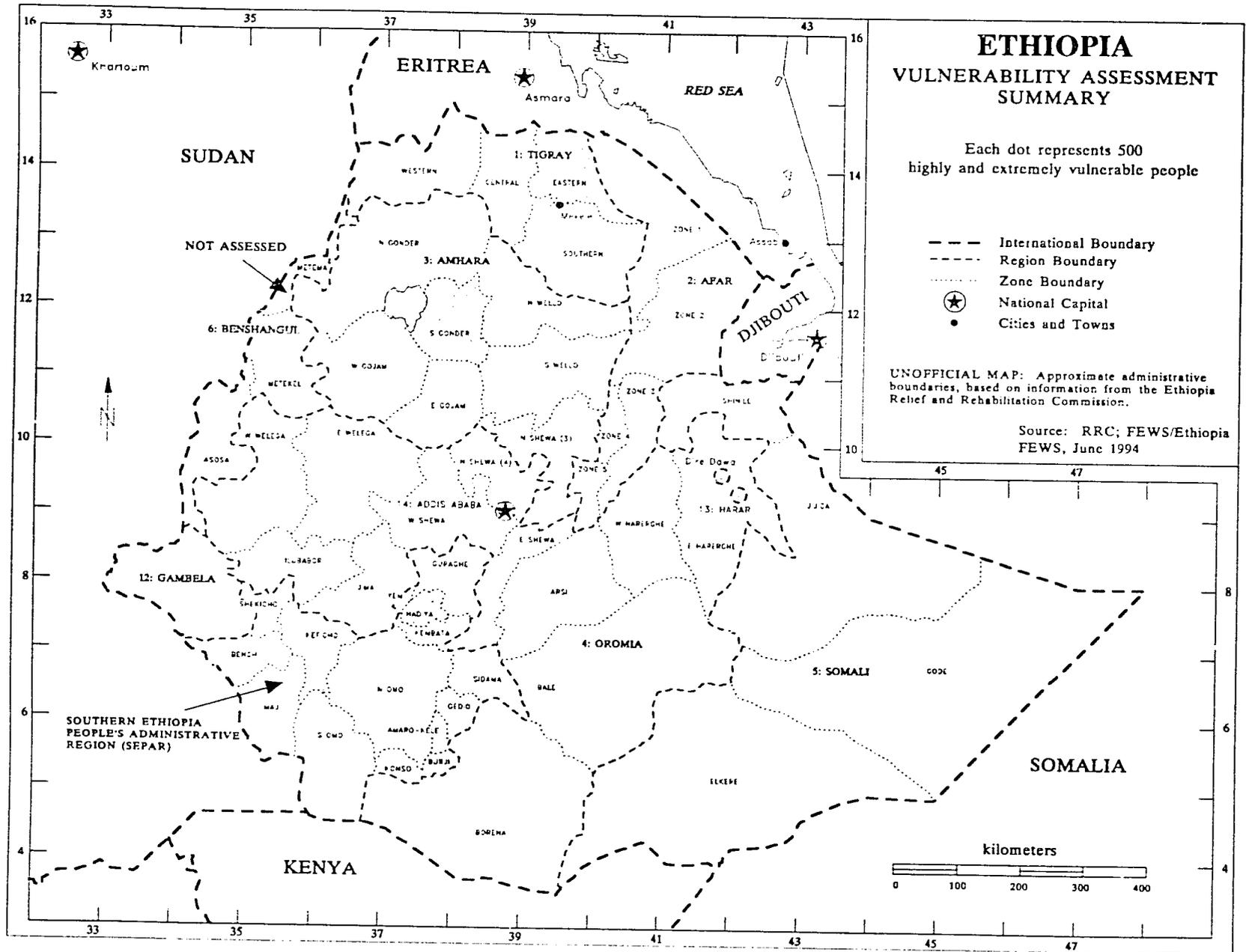
Estimation of food needs that might be required in the coming year

Theoretical and actual food distribution in 1994 provided the basis for estimating potential food requirements in the com-

ing year. Assuming that extremely vulnerable populations might be in urgent need of food assistance in February 1995, eight months of cereal rations would theoretically be distributed. Highly vulnerable populations would require food assistance to survive the hungry period and theoretically receive four months of cereal rations. Monthly cereal rations are based on 60 percent of 144 kilograms of cereal per person per year. It is assumed that famine stricken populations can manage through traditional survival strategies to obtain the remaining 40 percent of the cereal component required for survival.

This year, due to the shortage of cereal in national stocks, highly vulnerable populations only received about two months of cereal rations, and extremely vulnerable populations received approximately three months of cereal rations. Using the predicted numbers of extremely and highly vulnerable people in this assessment, it was assumed that extremely vulnerable people might need and receive four to eight months of cereal rations, while highly vulnerable people might need and receive two to four months of cereal rations. These calculations provide the range of expected cereal requirements for the coming year, 19,000-38,000 MT.

Map 7. Ethiopia: Vulnerability Assessment Summary



ETHIOPIA

40

ETHIOPIA

The Edge of Disaster: Poor Rains Could Mean Major Famine

Based on a report released by USAID/Ethiopia on June 10, 1994

SUMMARY

Half of Ethiopia's 55 million people are thought to be food-insecure. During the past decade, grain production has fallen below consumption requirements every year, with an average national production deficit of nearly 958,000 MT. Agricultural yields have been stagnant in some areas and continue to decline in others. Meanwhile the population continues to grow at about 2.3 percent. Chronic malnutrition and poverty make millions of people more vulnerable to famine with few, if any, resources to use in a crisis.

In 1993/94, a poor main harvest, a prolonged and severe dry season, and late 1994 *belg* (secondary season) rains have highlighted Ethiopia's dependence on unreliable rainfall conditions and the dwindling capacity of its people to cope with continued shocks to their food supply. As a result of these events, 6.7 million people are considered highly or extremely vulnerable (see Map 7 and Table 6). These groups are already in need of food aid. Poor farmers account for 71 percent, and pastoralists 12 percent of the population in need of food aid having suffered through drought, inadequate rainfall, pest attacks. In addition displaced citizens and demobilized troops (17 percent of the needy population) suffer from man-made food problems.

During the 1994/95 season, the progress of the *kiremt* (main season) rains will be monitored closely (although pest attacks, crop diseases, and fertilizer use in the surplus areas will also influence potential harvest production), as the rains are critical for alleviating the growing food insecurity and potential for famine. In the longer term, the need to address chronic underlying determinants of poverty, and the burgeoning national shortfall in food production, cannot be overemphasized.

Ethiopia will need food aid in 1994/95, though final needs cannot yet be estimated. Scenarios for total food aid needs range from a best-possible case of a 500,000 MT deficit to a worst case of close to 3,000,000 MT if the *kiremt* rains fail during the *meher* (main harvest) season of 1994.

COUNTRY BACKGROUND

Ethiopia's chronic child malnutrition rates are among the worst in the world. The national rural nutrition survey of 1992 found that the overall rate of stunting¹ among children under

five years old had risen from a shocking 59.8 percent in 1983 to 64 percent in 1992.

The underlying dynamics of the national food deficit are graphically shown in Figure 6. The direction of change is stark. In 1983, national grain production fell below consumption needs and has never recovered. Even the 1992/93 record harvest of nearly 8,600,000 MT fell 330,000 MT short of needs. As the graph shows, production has grown in the last decade, but the population continues to grow even faster.

Following a disappointing 1993/94 harvest, the government estimates that 6.7 million people (around 13 percent of the population) need emergency food aid. This figure rose by 51 percent between December 1993 and April 1994, due to:

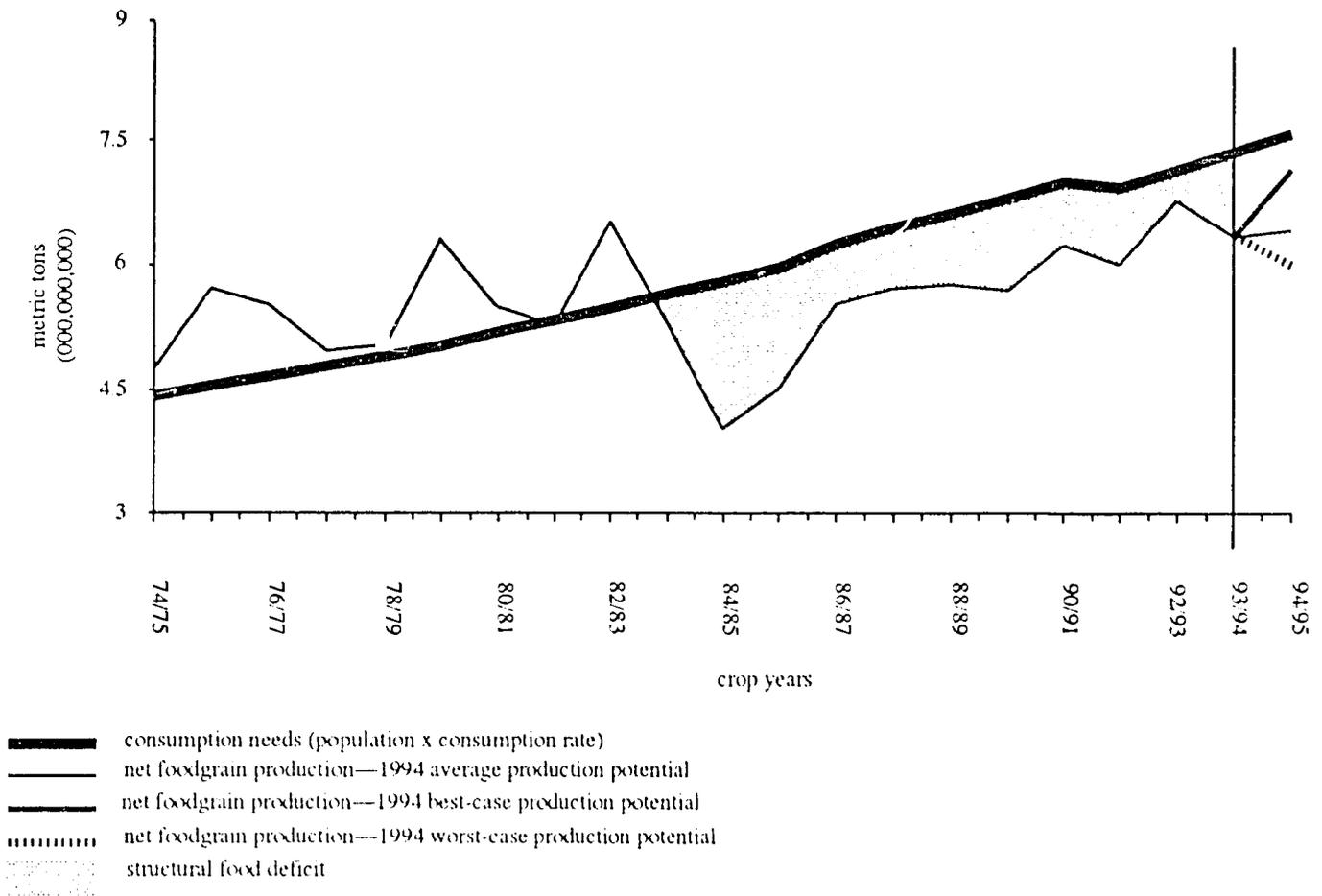
- the addition of pastoral areas, which had not been assessed previously;
- the effects of an unusually severe dry season (October to January) and late *belg* rains—normally between February and May—see Map 8 for location of major and minor *belg* areas); and
- the apparent inadequacy of traditional coping mechanisms among those hit by crop losses and stressed livestock conditions.

The past year's events—a patchy 1993 *meher* (main) harvest, followed by unfavorable weather from November to March, a steep rise in estimated food aid needs, and widespread reports of malnutrition-related deaths have sharply emphasized both the high dependence of Ethiopia's food economy on unreliable rains and the extreme vulnerability of a large portion of the population (the population has grown by nearly 12 million since 1984) due to a lack of assets and income raising alternatives.

There is generally a high risk of drought in Ethiopia. In fact, there is almost certain to be drought somewhere in the country in any given year, causing hardship and localized food insecurity. However, the danger of generalized famine depends on how widespread the drought is and the availability of family resources to cope with vulnerability to famine. It is too early to talk of a 1994 drought although the *belg* (secondary) rains have already been very late and inadequate in many areas. Some observers believe that a severe drought (in whichever year it may come) could tip as many as half the Ethiopian population into food-aid dependency or, alternatively, starvation.

1. The threshold for stunting (low height-for-age) used here is minus two z-score deviations from the mean.

Figure 6. Ethiopia: Long term trends in food production and consumption needs 1974–94



Note: estimated population growth rate 1992–2000 = 2.7

Sources: FEWS/Ethiopia, The World Bank

ANALYSIS OF SOCIOECONOMIC GROUPS

Table 6 shows the distribution of people considered by the RRC to be in need of food aid during 1994. These figures are taken as a proxy measure of highly and extremely vulnerable populations by FEWS definitions (see page 47). The following sections consider the underlying (long-term) vulnerability of each main group, recent shocks affecting them, and their current vulnerability.

Resource-poor and drought-prone farming communities

Resource-poor and drought-prone farming communities (located mainly in Tigray, Amhara, Oromia, and the SIAR regions) are by far the largest famine-prone group in Ethiopia. Table 6 shows that 4,785,000 people in the agricultural areas are considered in need of food aid during 1994 due to natural factors (i.e. crop and livestock loss due to drought, floods, hail, pests, and diseases). This is 71 percent of the total highly and extremely vulnerable population. Given the background outlined above, the impact of these short-term (1993/94) natural

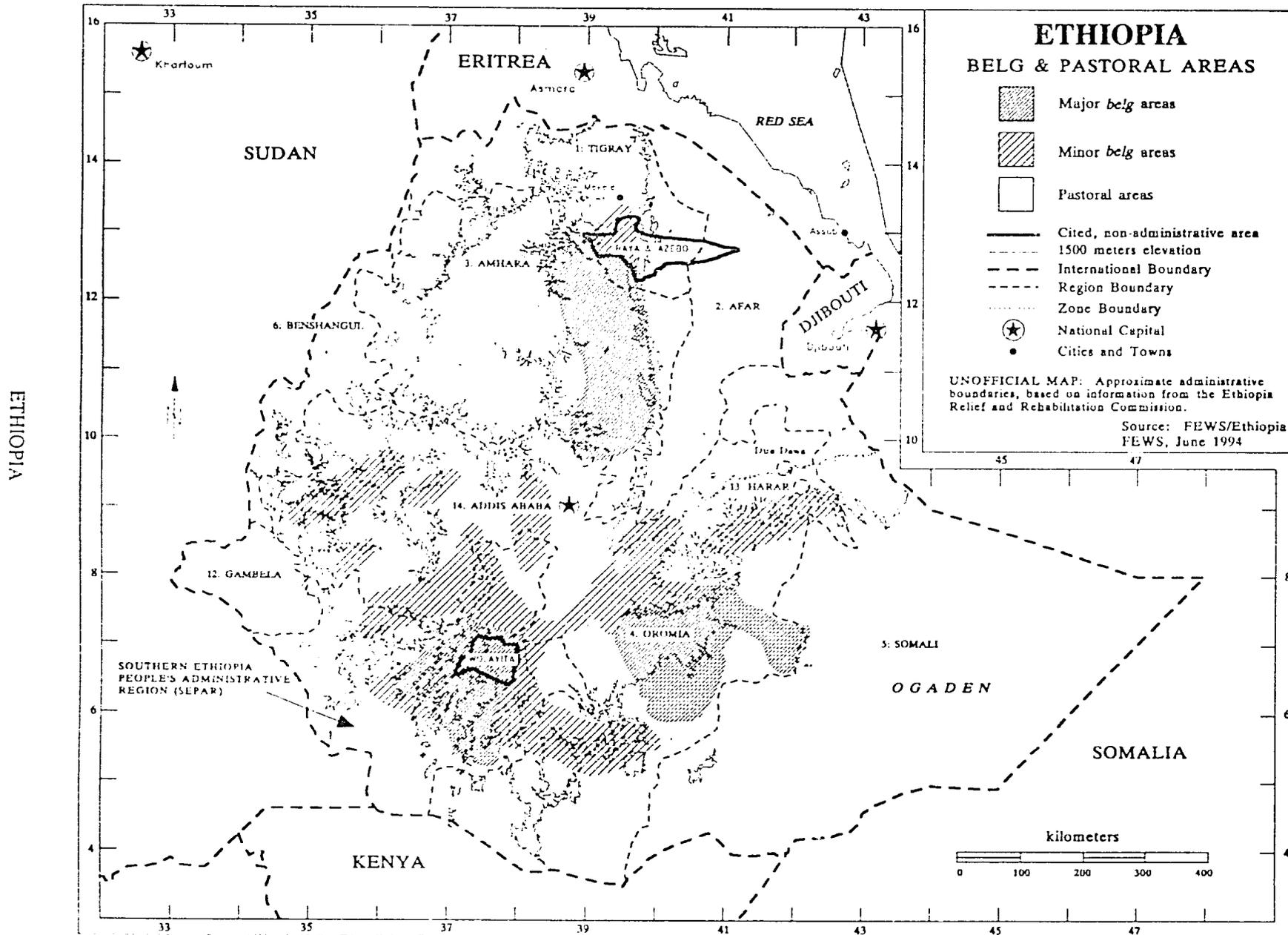
factors must be interpreted in the context of a decreasing capacity to cope with the ongoing impacts of drought. This decreasing coping capacity is due to the progressive erosion of assets (both for production and for liquidation in times of need), a general failure of the agricultural economy to produce enough food, lack of diversification both within and outside the agriculture sector, and an absolute shortage of essential resources (most fundamentally, land) in relation to the growing population. It is striking that the short-term shocks that have produced the high level food insecurity and the rise in food aid needs for 1994 have been almost entirely climate related.

In Tigray, the Southern and Eastern zones were particularly badly hit by drought during the 1993 *meher* and the following dry season. Pests caused further significant crop losses. The late *belg* rains have prolonged the current problems and threaten a failure of the *belg* harvest in the south. Relief needs in Tigray were initially underestimated and food distributions are reported to have been inadequate.

North and South Wello also suffered from a poor 1993 main harvest (due to drought and pests), followed by late 1994 *belg* season rains and questionable production outcome. Major migrations and deaths have been forestalled by actual or expected relief distributions, but the situation is precarious.

North and South Gonder remain seriously affected by

Map 8. Ethiopia: *belg* and pastoral areas



drought. In South Gonder Zone, there have been reports of unusual human and animal migrations in recent months, and of high malnutrition rates. As in Wello, migrations have been limited by food distributions.

In East and West Harerghe, the late *belg* rains have caused serious delay to the 1994 *meher* harvest preparations. Meanwhile, alarming malnutrition levels and trends were found in parts of East Harerghe Zone during March and April. Conditions in North and South Omo zones of the Southern Ethiopia People's Administrative Region (SEPAR) have deteriorated rapidly in the last six months. The Wolayita area (the northeast of North Omo Zone) has in particular been seen as a microcosm of the wider situation. Its underlying vulnerability due to population density, resource poverty, and weather-dependent production is so high that relatively small shocks have rapidly produced a crisis.

Drought is again the main factor this year—a poor 1993 *meher* harvest followed by a very dry *bega* (dry season), and now a poor *belg*. Early May rains were good in both Omo zones, following the late start in March. *Belg* crops were then widely planted and reported to be doing well, but the harvest will be late and may have interfered with *meher* planting. Meanwhile, child nutritional status has been falling sharply, substantiating widespread reports of malnutrition-related deaths. There are fears the situation may be even worse in remote areas which are not being monitored or assisted by nongovernmental organizations.

The delay in the 1994 *belg*, and the poor distribution and quantity of rainfall, are likely to affect food security in the *belg*-producing areas of N. Omo, N. and S. Wello, N. Shewa, and southern Tigray (Raya & Azebo). Some sowing has taken place in all these areas, but the risks are high and the harvest outlook is generally poor. A failure of the *belg* harvest in these areas would intensify and lengthen the July–November hungry season. The *belg* rains are also important for the preparation and sowing of *meher* crops, and for the feeding and sustenance of livestock (pasture and water). The 1994 *belg* rains may have a significant impact on the main season. A more detailed assessment of *belg* production will be available by mid-September.

Resource-poor and drought-prone pastoralists

While most rural households depend to some extent on livestock, Ethiopia's pastoralists are concentrated in the lowland and semiarid areas of the south, southeast and northeast (see Table 6 and Map 8). They are a relatively small proportion of the rural population, but many are vulnerable to food insecurity. Approximately 12 percent (794,500) of the people currently reported to be in need of food aid are nomadic pastoralists.

The underlying vulnerability of pastoralist groups is determined by uncertain climate, lack of assets, and an inadequate diversification of income options when their main production system fails. Many communities have still never fully recovered from the droughts of the last decade. In all livestock dependent areas, the lack of veterinary services and drugs is a constant impediment to productivity, and adds to livestock losses.

In Afar Region (Region 2), both rainy seasons in 1993 were very poor, resulting in severe livestock stress and some ethnic clashes over scarce resources. The 1994 spring rains were late, but good rainfall in April and May has helped revive some pasture areas.

In Borena (where the economy was just beginning to recover from a devastating drought in 1990/91), the main 1993 spring rains were good, but were followed by virtually no rain during the secondary (October/November) season, a very dry *bega* season, and late spring rains in 1994. The impacts of this sequence are alarming. Extreme physical stress on livestock quickly produced acute food shortages, as milk production virtually ceased, and the exchange of animals (and animal products) for grain collapsed. Acute child malnutrition was evident, although no systematic survey was made. Conditions have improved following rains from late March onwards, though livestock losses have not been quantified.

South Omo had poor 1993 rains, and food shortages have been escalating in both pastoralist and agricultural areas since October 1993. The Ogaden, by contrast, had excellent rains in 1993. The food situation in most parts of Region 5 (Somali) is reported to be better than in previous years, and the lateness of the 1994 spring rains (which started in April) should not cause major problems.

As of mid-May, all four of the major pastoralist areas were receiving adequate rainfall. This should improve pasture and water conditions and should reduce the short-term vulnerability to food shortages. However, even if the current rains continue, the rapid deterioration of conditions in Borena earlier this year showed clearly how vital the secondary rains and usual dry season showers are in maintaining the viability of livestock in semiarid zones.

Urban poor and destitute

The total urban population in 1992 was estimated at 6.9 million, with over a third living in Addis Ababa. Townspeople are a relatively low proportion of the Ethiopian population compared to other more rapidly urbanizing countries, but the depth of poverty and destitution in Ethiopia's towns is a serious, long-term concern.

The risk of individual starvation or generalized famine is lower in towns than in remote rural areas, and the characteristics of vulnerability are different. The main issue for urban groups is access to food, rather than its general availability. Urban dwellers' food security is determined almost entirely by the relationship between their incomes and the price of food. An International Food Policy Research Institute (IFPRI) sample survey of Addis Ababa in 1990/91 found that 43 percent of households were living in "food poverty"—that is, their combined household income was insufficient to buy a basket of foodstuffs which met a minimum nutritional standard. While the most vulnerable and most visible groups are the absolute destitute—beggars, street children, the disabled—this finding gives shocking confirmation of the extent of absolute poverty in the city, painting a grim picture of the urban poor in Addis Ababa. Comparable data are not available for other towns.

The current vulnerability of the urban population is moderate but increasing. Grain prices (maize, sorghum and *teff*) were relatively stable compared to those in the drought affected rural areas, until February. In March and April prices began to climb sharply (see Figure 7). This trend appears to be continuing in May. If the next main harvest is poor, the urban, moderately vulnerable groups will be adversely affected by fur-

Table 6. Ethiopia: Distribution of population in need of food aid in 1994—highly and extremely vulnerable categories

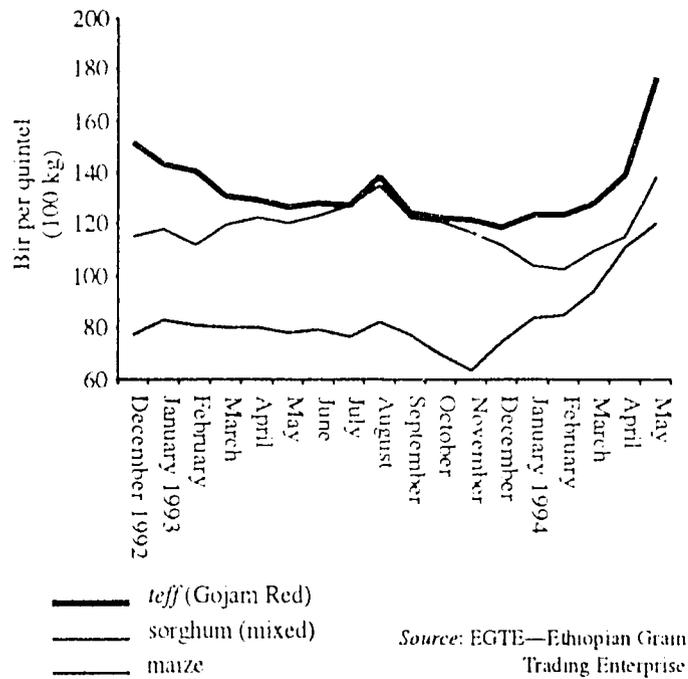
Region	Zone	Agriculturalists	Nomadic pastoralists	Displaced, ex-soldiers returnees	Total
Tigray (Region 1)	Western	66,000	—	20,000	85,000
	Central	197,000	—	37,000	234,000
	Eastern	431,000	—	54,000	485,000
	Southern	228,000	—	35,000	263,000
	Mekele	—	—	—	—
	Regional total	92,000	—	163,000	1,085,000
Afar (Region 2)	Zone 1	—	35,000	—	35,000
	Zone 2	—	55,000	—	55,000
	Zone 3	—	33,000	—	33,000
	Zone 4	—	58,000	—	58,000
	Zone 5	—	33,000	—	33,000
	Regional Total	—	215,000	—	215,000
Amhara (Region 3)	N. Wello	509,000	—	91,000	600,000
	S. Wello	271,000	—	185,000	466,000
	N. Gonder	226,000	—	14,000	240,000
	S. Gonder	424,000	—	4,500	428,500
	N. Shewa	299,000	—	12,000	311,000
	W. Gojam	—	—	10,300	10,300
	E. Gojam	47,000	—	4,000	51,000
	Regional total	1,776,000	276,000	232,000	2,095,800
Oromia (Region 4)	Arsi	123,000	—	13,000	138,000
	Bale	166,000	—	10,000	176,000
	E. Harerghe	529,000	—	76,000	505,000
	W. Harerghe	217,000	—	26,000	243,000
	Dire Dawa	52,000	—	8,000	60,000
	N. Shewa	58,000	—	—	58,000
	W. Welega	7,000	—	—	7,000
	E. Welega	130,000	—	3,000	133,000
	W. Shewa	30,000	—	2,000	3,000
	E. Shewa	78,000	—	2,000	80,000
	Ilubabor	46,000	—	6,000	52,000
	Jima	53,000	—	2,000	55,000
Borena	—	—	84,000	360,000	
	Regional total	1,487,000	—	232,000	1,995,000
Somali (Region 5)	Jiga	—	30,000	—	30,000
	Degehabur	—	18,000	—	18,000
	Nagob/Fikre	—	45,000	—	45,000
	Warder	—	6,000	—	6,000
	Kabridehar	—	30,000	—	30,000
	Gode	—	15,000	—	15,000
	Afder	—	50,000	—	50,000
	Liben	—	6,000	—	6,000
	Shinile	—	50,000	—	50,000
	Regional total	—	250,000	—	250,000
Benshangul (Region 6)	Asosa	—	—	44,000	44,000
	Metekel	—	—	39,000	39,000
	Regional total	—	—	83,000	83,000
Southern People's Administrative Region	Sidama	—	—	3,500	3,500
	Gedio	—	—	10,000	10,000
	N. Omo	373,000	—	800	800
	S. Omo	—	53,000	1,300	54,800
	Hadiya	43,000	—	93,000	141,000
	Gurage	—	—	20,500	20,500
	AKT *	20,000	—	108,000	128,000
	Shekicho	—	—	300	300
	Maji	20,000	—	—	20,000
	Special weredas **	91,000	—	—	91,000
	Regional totals	547,000	53,500	240,200	840,700
Gambela (Region 12)		27,000	—	500	27,500
Harar (Region 13)		26,000	—	—	26,000
Addis Ababa (Region 14)		—	—	81,000	81,000
National total		4,765,000	794,500	1,120,500	6,700,000

Notes: * = Alaba, Kembata & Tembro.

** = Amaro-Kele, Konso, Derashi and Bur.

Sources: RRC/EWPS, "Food Situation in 1994 and Assistance Requirements," April 14, 1994; FEWS/Ethiopia

Figure 7. Ethiopia: Addis Ababa—staple cereal prices



ther price increases.

There is a considerable overlap between the urban poor and the next major vulnerable group—the displaced and demobilized. As Table 6 shows, 81,000 highly vulnerable people in this category are currently listed as needing food aid in Addis Ababa, 37,000 in Mekele (Tigray) and 8,000 in Dire Dawa (listed under Region 4, Oromia). These figures undoubtedly underestimate the urban dimension of the “man-made” food-security problems, as many of the displaced and returnees are in towns throughout the country.

Internally displaced, demobilized and returning populations

These categories are by definition transitory, though individuals may move into other chronically vulnerable groups. The numbers classed by the RRC as in need of food aid due to man-made factors have roughly halved over the last 16 months—from 2,211,660 in December 1992 to 1,359,745 in December 1993, and to 1,120,500 in April 1994—despite problems associated with postwar reintegration and continuing displacement due to local conflicts. Nevertheless, these groups still represent nearly 17 percent of the highly and extremely vulnerable people in Ethiopia.

CONCLUSIONS

The overall outlook for national food security in 1994/95 is precarious. With so many people already in need of food aid and with little or no resources to fall back on, a widespread harvest failure could mean disaster in 1994. The largest num-

ber of highly and extremely vulnerable people is again among the poor farming communities of the drought affected regions, particularly in Tigray, N. and S. Wello, E. and W. Gonder, E. and W. Harerghe, and N. and S. Omo. A large number of resource-poor pastoralists in the lowland areas are also highly and extremely vulnerable. Most of the displaced, demobilized, and returnee populations have been reabsorbed, to varying degrees, among the urban and rural populations. Many are still dependent on food aid and should be considered a distinct vulnerable group. The urban poor, living in grinding poverty without adequate access to food, remain chronically moderately vulnerable. Price increases could severely affect them in the event of a widespread harvest failure.

The Ethiopian structural food gap can only be reduced by increased agricultural productivity. There is growing concern among observers that government strategies, slow in formulation, will not be sufficiently focused or coordinated to assure rapid increases in production and declines in food assistance. The structural nature of the food gap, and government actions, suggest that Ethiopia will need substantial short- and medium-term food imports. During the short-term, Ethiopia will need food aid. At this point FEWS/Ethiopia suggests three possible scenarios for 1994/95:

- **Best case:** in its December 1993 analysis, the World Bank projected a foodgrain deficit of 429,000 MT for 1994/95 as the most optimistic scenario imaginable—assuming a repeat of the record rise in production achieved in 1992/93. Already, it is almost impossible that this target can be reached, given the likely impact of the late and poor *belg* rains on the secondary harvest, and on the timing of the main season cultivation.
- **Average production potential:** if the harvest falls within the range of long-term trends, there will be another annual deficit of over a million MT.
- **Worst case:** a widespread failure of the *krant* (main) rains—which cannot be predicted at this point—could double this deficit. As a worst-case scenario, if there were a major drought this year, and production fell by the same proportion as in 1984/85 (i.e., around 24 percent), the implied foodgrain deficit would be in the area of 2.77 million MT (calculated on FAO assumptions, including a very low consumption figure of 134 kg of grain per capita per year).

By far the most important single factor in the coming year's food security will be the *krant* rains and resulting *mehar* harvest. Other factors having an impact on food production will be pest attacks and diseases (also largely influenced by weather conditions), and fertilizer use in surplus production areas. The final outcome and timing of *belg* production will also be important in *belg*-producing areas discussed above.

A catastrophic failure of the main rains could be evident as early as July. On the other hand, a good start to the rains followed by an early end could be equally disastrous, and may not be clear until September or October; while the impact of patchy rains with regional dry spells and variations (a more “normal” pattern) would probably not be fully apparent until crop assessments start in November/December.

FEWS Vulnerability Index

Level of Vulnerability	Conditions of Vulnerability	Typical Coping Strategies and/or Behaviors	Interventions to Consider
SLIGHTLY VULNERABLE	<p>Maintaining or Accumulating Assets</p> <p>and</p> <p>Maintaining Preferred Production Strategy</p>	<p>Assets/resources/wealth: either accumulating additional assets/resources/wealth or only minimal net change (normal "belt-tightening" or seasonal variations in) assets, resources or wealth over a season/year. i.e., coping to minimize risk.</p> <p>Production Strategy: any changes in production strategy are largely volitional for perceived gain, and not stress related.</p>	Developmental Programs
MODERATELY VULNERABLE	<p>Drawing-down Assets</p> <p>and</p> <p>Maintaining Preferred Production Strategy</p>	<p>Assets/resources/wealth: coping measures include drawing down or liquidating less important assets, husbanding resources, minimizing rate of expenditure of wealth, unseasonable "belt-tightening" (e.g., drawing down food stores, reducing amount of food consumed, sale of goats or sheep).</p> <p>Production Strategy: only minor stress-related change in overall production/income strategy (e.g., minor changes in cropping/planting practices, modest gathering of wild food, inter-household transfers and loans, etc.).</p>	Mitigation and/or Development: Asset Support (release food price stabilization stocks, sell animal fodder at "social prices," community grain bank etc.)
HIGHLY VULNERABLE	<p>Depleting Assets</p> <p>and</p> <p>Disrupting Preferred Production Strategy</p>	<p>Assets/resources/wealth: liquidating the more important investment, but not yet "production," assets (e.g., sale of cattle, sale of bicycle, sale of possessions such as jewelry).</p> <p>Production Strategy: coping measures being used have a significantly costly or disruptive character to the usual/preferred household and individual life-styles, to the environment, etc. (e.g., time-consuming wage labor, selling firewood, farming marginal land, labor migration of young adults, borrowing from merchants at high interest rates).</p>	Mitigation and/or Relief: Income and Asset Support (Food-for-Work, Cash-for Work, etc.)
EXTREMELY VULNERABLE or AT-RISK	<p>Liquidating Means of Production</p> <p>and</p> <p>Abandoning Preferred Production Strategy</p>	<p>Assets/resources/wealth: liquidating "production" resources (e.g., sale of planting seed, hoes, oxen, land, prime breeding animals, whole herds).</p> <p>Production Strategy: Seeking nontraditional sources of income, employment, or production that preclude continuing with preferred/usual ones (e.g., migration of whole families).</p>	Relief and/or Mitigation: Nutrition, Income and Asset Support (food relief, seed packs, etc.)
FAMINE	Destitute	Coping Strategies Exhausted: no significant assets, resources, or wealth; no income/production.	Emergency Relief (food, Shelter, medicine)

Key Terms

At Risk — FEWS Reports use the term “at risk” to describe populations either currently, or in the near future, expected to have insufficient food, or resources to acquire food, to avert a nutritional crisis (i.e., progressive deterioration in health or nutritional condition below the status quo). “At risk” populations require specific intervention to avoid a life-threatening situation. Food needs estimates are sometimes included in FEWS reports. Famines are the culmination of a slow-onsetting process, which can be extremely complex. The food needs of specific “at-risk” populations depend on the point in this process when the problem is identified and the extent of its cumulative impact on the individuals concerned. The amount of food assistance required, from either internal or external sources, depends upon many considerations.

Vulnerability — FEWS Reports use the term “vulnerability” to indicate relative susceptibility to food insecurity of groups of people or areas. In FEWS usage, vulnerability is always characterized by its degree: slight, moderate, high, or extreme. Extreme vulnerability is synonymous with “at risk.” Vulnerability is a dynamic concept that incorporates both chronic and current conditions. Chronic vulnerability involves long-term conditions that predispose a particular group or region to food insecurity. Current vulnerability highlights short-term changes in food security status and their implications. Vulnerability analysis involves three levels of concern: food availability, food access, and food utilization. These levels are linked by a common analytical framework that interprets all relevant information for its food security impact on the diversified income generating possibilities of different groups of households.

ITCZ — The Intertropical Convergence Zone (ITCZ) is equivalent to a meteorological equator; a region of general upward air motion and relatively low surface pressure bounded to the north and south by the northeast and southeast Trade Winds, respectively. The upward motion in the ITCZ forms the rising branch of the meridional Hadley Circulation. The ITCZ moves north and south following the apparent movement of the sun. It is at its most northerly position in the summer months. The position of the ITCZ normally defines the northern limits of possible precipitation in the Sahel; rainfall generally occurs 100 to 300 kilometers south of the ITCZ, with local convective activity organized by westward moving “Easterly Waves.”

NDVI — Normalized Difference Vegetation Index (NDVI) images are created at the laboratory of the National Aeronautics and Space Administration (NASA) Global Inventory Modeling and Monitoring System (GIMMS). The images are derived from Global Area Coverage (GAC) imagery (of approximately seven kilometers resolution) received from the Advanced Very High Resolution Radiometer (AVHRR) sensors on board the National Oceanic and Atmospheric Administration (NOAA) Polar Orbiting series of satellites. The polar orbit satellites remotely sense the entire Earth and its atmosphere once each day and once each night, collecting data in five spectral bands. Bands 1 and 2 sense reflected red and infrared wavelengths, respectively, and the remaining three bands sense emitted radiation in three different spectral bands. The NDVI images are created by calculating “(infrared - red)/(infrared + red)” for each pixel from the daytime satellite passes. Since chlorophyll reflects more in the infrared band than in the red band, higher NDVI values indicate the presence of more chlorophyll and, by inference, more live vegetation. A composite of daily NDVI images is created for each 10-day period, using the highest NDVI value for each pixel during that period. This technique minimizes the effects of clouds and other forms of atmospheric interference that tend to reduce NDVI values. NDVI is often referred to as a measure of “greenness” or “vegetative vigor.” The NDVI images are used to monitor the response of vegetation to weather conditions.

METEOSAT — METEOSAT-based Rainfall Estimates. FEWS uses estimates of current rainfall based on cold cloud duration as measured by thermal infrared radiometers on the METEOSAT satellite. The estimates are calculated every 10 days by the Department of Meteorology at the University of Reading in the U.K. Cold cloud duration correlates well with thunderstorm generated rainfall and, thus, is suitable for use in the semi-arid Sahel. The method works best on level terrain; hilly areas may produce local enhancements or rain-shadow areas that are not detected. In level areas the method has an accuracy of “rain/no rain” of at least 85 percent (based on a comparison with ground data). At a dekadal (ten-day) scale, 80 percent of rainfall amounts under 60 millimeters (mm) are accurate to plus or minus 10 mm, while rainfall over 60 mm is accurate to plus or minus 20 mm. This accuracy is acceptable for use in the FEWS-monitored region given that the method provides near-real-time coverage for a large area at a resolution of less than 10 kilometers.