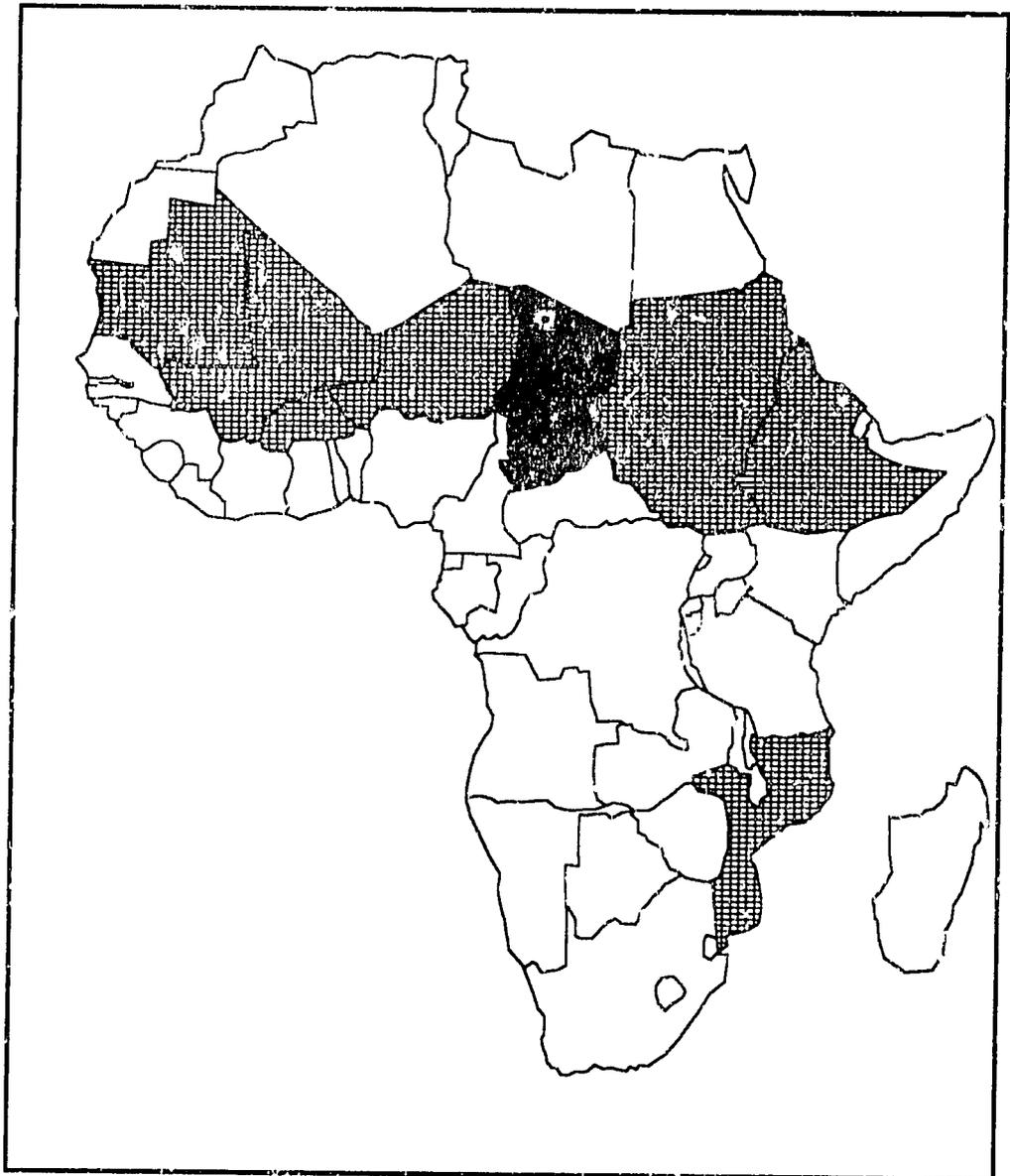


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June 1987

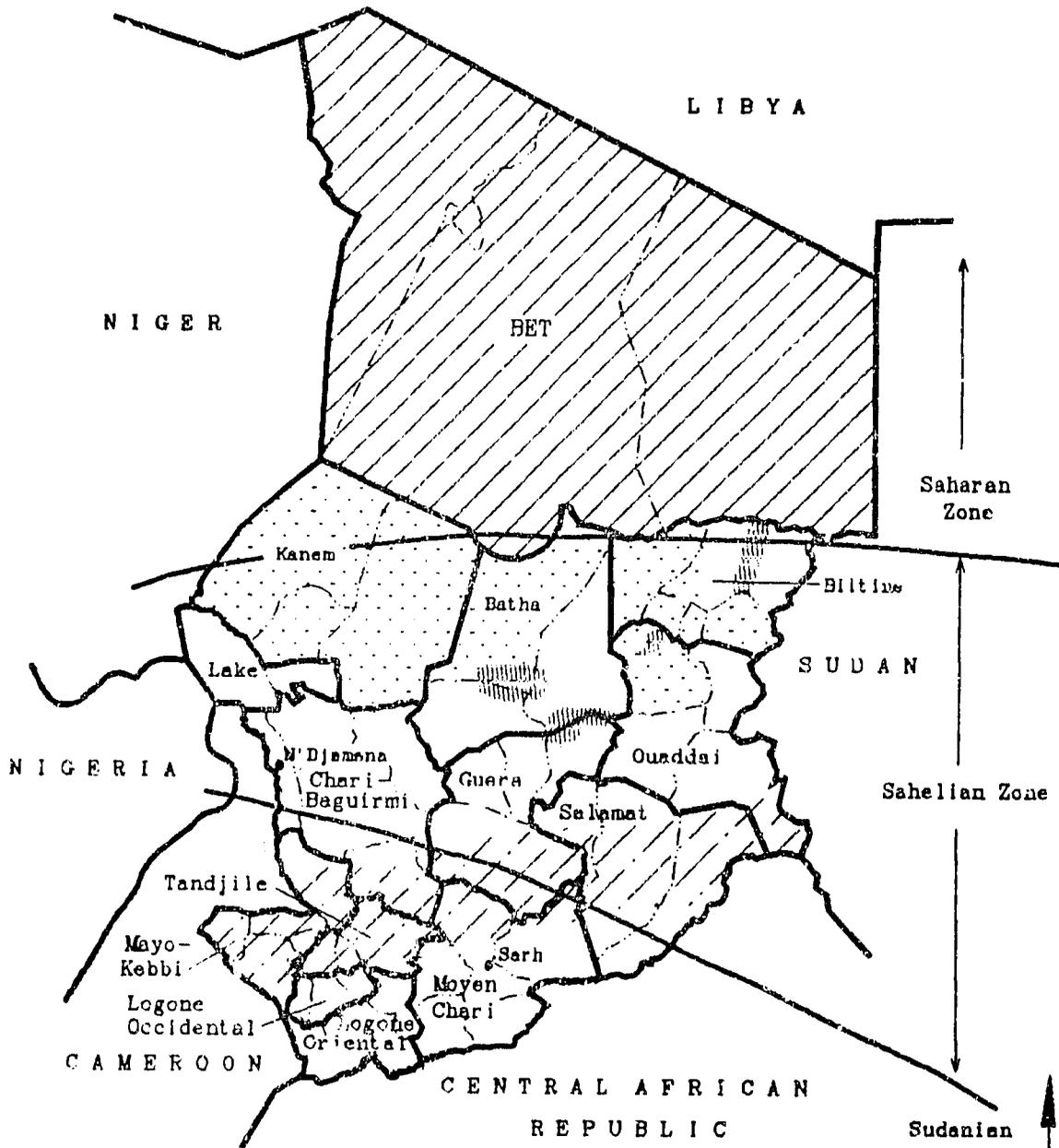
## FEWS Country Report

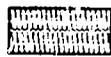
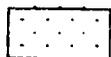
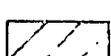
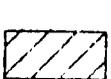
# CHAD



Africa Bureau  
U.S. Agency  
for International  
Development

# Summary Map



-  Areas currently or soon to require food aid
-  Areas with least dependable greening patterns
-  Rains less than 30 year norm for month of May
-  Aid needed several months more

# CHAD

## Vulnerable Areas in a Year of Relative Plenty

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Prepared for the  
Africa Bureau of the  
U.S. Agency for  
International Development

Prepared by  
Price, Williams & Associates, Inc.  
June 1987

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## INTRODUCTION

This is the twelfth in a series of monthly country reports issued by the Famine Early Warning System (FEWS) on Chad. These reports are designed to provide decision-makers with current information and analysis on existing and potential nutritional emergency situations. Each situation identified is described in terms of geographical extent, the number of people involved, or at-risk, and the proximate causes insofar as they have been discerned. Information sources are cited in the text. Information has, whenever possible, been presented in the form of quantified data. When quantified data do not exist, qualitative data are used.

Use of the term "at-risk" to identify vulnerable populations is problematical since no generally agreed upon definition exists. Yet it is necessary to identify or "target" populations in-need or "at-risk" in order to determine appropriate forms and levels of intervention. Thus, FEWS reports will employ the term "at-risk" to mean...

...those persons lacking sufficient food, or resources to acquire sufficient food, to avert a nutritional crisis (i.e., a progressive deterioration in their health or nutritional condition below the status quo) and who, as a result, require specific intervention to avoid a life-threatening situation.

Perhaps of most importance to decisionmakers, the process underlying the deteriorating situation is highlighted by the FEWS effort, hopefully with enough specificity and forewarning to permit alternative intervention strategies to be examined and implemented. Food assistance strategies are key to famine avoidance. Other types of intervention, however, can be of major importance both in the short-term and in the long-run, including medical, transport, storage, economic development policy change, etc.

Where possible, estimates of food needs are included in the FEWS reports. It is important to understand, however, that no direct *a priori* relationship exists between numbers of persons at-risk and the quantity of food assistance that may be needed. This is because famines are the culmination of slow-onset disaster processes which can be extremely complex.

The food needs of individual populations at-risk depend upon when in the disaster process they are identified, and the extent of the cumulative impact on the individuals concerned. Furthermore, the amount of food assistance required, whether from internal or external sources, depends upon a great number of considerations. Thus the food needs estimates presented periodically in FEWS reports should not be interpreted to mean food aid needs, (e.g., as under PL 480 or other donor programs).

FEWS does not collect primary data. Rather, it receives information from various domestic U.S. and international agencies and private voluntary organizations, and from government agencies in the countries under study via in-country FEWS Public Health Advisors. The information is then examined, compiled and analyzed for its predictive potential. Without the ongoing cooperation of all these organizations, FEWS could not function.

In particular, this report owes a debt to various offices of the US Agency for International Development (AID), Department of Agriculture (USDA), National Oceanic and Atmospheric Administration's National Environment Satellite, Data, and Information Service's Assessment and Information Services Center (NOAA/NESDIS/AISC), and USAID/N'Djamena; the Government of Chad (GOC) Ministry of Food Security and Displaced Persons (MSAPS) and the multi-ministry-donor-PVO Food Action Committee (CASAD); the Government of the Niger (GON) Office of Food Products (OPVN); the multi-donor funded Agro-Hydro-Meteorological Center in Niger (AGRHYMET); the European Agency for Development and Health (AEDES); the UN World Food Program (WFP); and CARE.

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FEWS is operated by AID's Office of Technical Resources in the Bureau for Africa (AFR/TR) in cooperation with numerous USG and other organizations. The FEWS Country Reports are working documents of AFR/TR and should not be construed as official pronouncements of the U.S. Agency for International Development.

## SUMMARY

The number of Chadians at risk of nutritional crisis during the 1987 lean season\* is on the order of 50,000 people (about 1% of Chad's population). About half of these people are at-risk for agro-economic reasons, and half are at-risk following Libyan occupation (now over) of Borkou-Ennedi-Tibesti Prefecture\*\* (BET). Food assistance is being provided in the most acute areas, including BET. With two 20-year record harvests in succession (1985 and 1986), there is quite sufficient food within Chad to provide for the needs of all the at-risk people. Transportation of that food to needy areas, however, is a problem that will worsen once the rainy season makes roads impassable. In this report, the relative vulnerability of Chad's sub-prefectures is mapped, based on recent information from Chad and historical vegetation data from satellite imagery.

### Issues

- Cereal prices in N'Djamena and the Nigerien towns of Diffa, Niamey, and Agadez reached a seven-year low following the 1986 harvest. Farmers may plant less acreage in 1987 in grains for sale in the hope of bringing prices back up. This would have a negative impact on final production.

### Key Events

- Chad's first rain of the season was reported in Sarh Town, Moyen-Chari Prefecture, in early May (see Summary Map for location). The zone north of Sarh experienced below normal rainfall for May, indicating a slower than average start to the 1987 rainy season.

## POPULATIONS AT-RISK

This year, the areas of Chad most vulnerable to food shortfall because of poor harvests combined with low food reserves (hatched areas in Map 2) are northeast Biltine Prefecture, and adjoining areas of: northwestern Ouaddai and Biltine Prefectures; southeastern Batha and Guera Prefectures; and southeastern Lake and Kanem Prefectures. The European Agency for Health and Development's early warning team in Chad (AEDES) studied these areas thoroughly during this dry season, identifying specific villages that require assistance this year. These vulnerable populations must be viewed, however, within the context of 20-year record harvests in 1985 and 1986. The 1986 harvest, now estimated at 714,000 metric tons

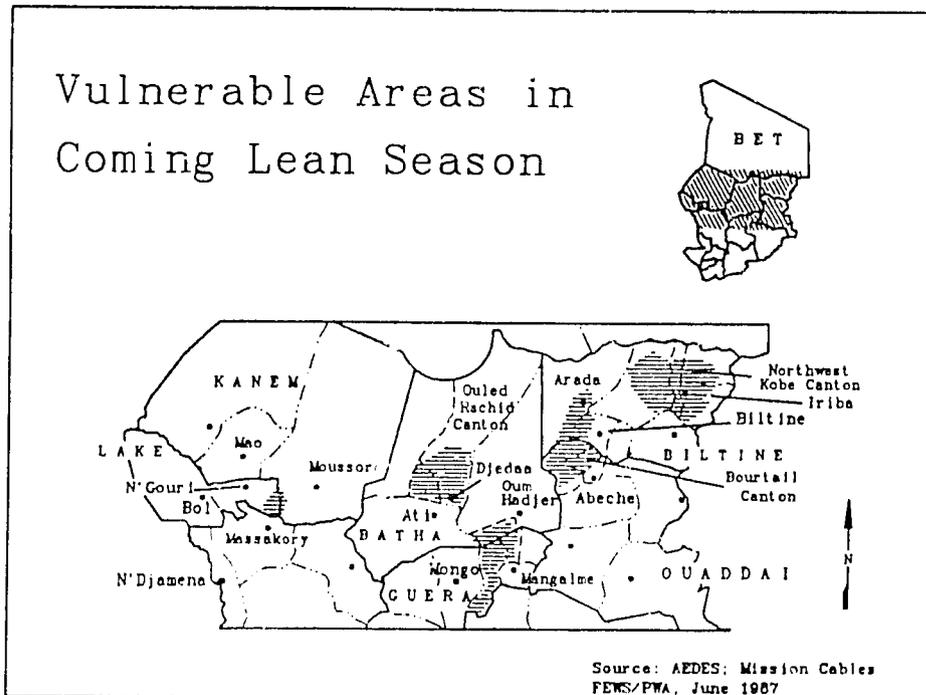
\* The lean season, or soudure, is the two to three month period before the harvest. During this period, when farmers must work the hardest (in terms of calories burned), food reserves from the previous harvest run low and transport to outside markets is often blocked by floods.

\*\* Chad's administrative units are Prefectures, Sub-prefectures, and Cantons. See Map 8 (Appendix) for the names and locations of Prefectures and Sub-prefectures.

(MT), is sufficient for the USAID/Chad Mission to consider 10,000 MT to be an exportable grain surplus that could be made available for emergency assistance in southern Sudan (with accompanying caveats regarding the inaccessibility of much of the grain stock, especially once the rains start).

North of the 16th parallel (all of BET Prefecture), people are vulnerable to food shortages following the recent fighting with Libyan forces -- many people have been displaced by the fighting, and there is little food available for purchase. The number of people at-risk is

**Map 2:**



probably on the order of 25,000 (based on the amount of food being distributed and the grain consumption rate used for this Saharan area by the USAID Mission in its November 1986 crop and food needs assessment). This is about 73% of BET's pre-liberation population\* as estimated by the AID Mission. Food aid has reached the major towns, but transport to outlying areas has been difficult. Aid will be necessary for the next several

months. There is sufficient grain in Chad to meet the area's needs, but further transport assistance may be necessary to get the grain there.

The population of the areas south of BET Prefecture most vulnerable to nutritional problems during this year's lean season is on the order of 80,000 people (about 1.7% of Chad's estimated 1987 population). The actual number at-risk in most of these areas is not known. In the vulnerable area with the worst food access conditions (Ouled Rachid Canton), however, about 30% of the total population was found to be at-risk and has been given

\*The Government of Chad estimate for BET's Prefecture's 1987 population is 120,000 people, and probably is an estimate of BET's potential population, projected from estimates made before population displacements induced by drought and strife. If the Mission's BET estimate is accurate for the time of liberation, it is highly unlikely that the Prefecture's population will reach its full potential before the end of the year.

food aid. It is unlikely that any of the other vulnerable areas will have a higher proportion of at-risk population. Extrapolating from the case in Ouled Rachid Canton, then, the number of Chadians living south of BET Prefecture who are actually at-risk of nutritional crisis this year is probably no higher than 20,000 to 25,000 people (0.4% - 0.5% of Chad's population).

It is not the absence of food that has put people south of BET at-risk this year, but rather the shortage of purchasing power with which to buy scarce food (a problem not helped by the rise in food prices that comes with the annual lean period). When grain production is down and income is low, one common strategy for coping is to produce small goods for sale in local markets. In the areas currently at-risk, this strategy is not working. In some cases, the markets for cottage industry products are too far away; in other cases, the markets are flooded with such products. Both situations limit the amount of revenue cottage industries can bring in. Another strategy used for raising money is the sale of capital assets (livestock). The herds in Chad are still recovering from the effects of the drought of the early eighties, however. It is to keep this recovery from slowing down that the AEDDES team has recommended pre-positioning or distributing food aid for certain areas (villages in Ouled Rachid Canton, Batha Prefecture; Northwest (NW) Kobe Canton, Biltine Prefecture; and Bourtail Canton, Ouaddai Prefecture -- Map 2).

Food aid was delivered to Ouled Rachid Canton by CARE in February this year, and again in May. German Agro-Action, a private voluntary organization that works with refugee rehabilitation and agricultural projects in Ouaddai Prefecture, has begun distributing locally purchased grains as food aid to those in Bourtail Canton identified as in-need. No action has been taken as yet regarding the situation in NW Kobe Canton.

#### **CHRONICALLY VULNERABLE AREAS**

While the above areas are vulnerable in 1987, their situations could improve in 1988, and other areas could be put on the vulnerable list. For this report, the expected chronic vulnerability of Chad's sub-prefectures for the next several years has been analyzed\* on the basis of several risk factors: the 1987 food shortage

\* Because the historical data cover only six years, long-term projection is chancy. The analysis is also limited, in part, by the precision of the data used. The data used are sparse and carry with them all of the problems of estimation in a world of high uncertainty. They are the best data available, however, and do show a meaningful picture.

areas, recent experience of strife, rates of and variations in vegetative vigor over the past six years, the current threat to crops from rats and grasshoppers (as a proxy for endemic pest problems), and the behavior of millet prices since the most recent harvest. Food shortages will not necessarily occur in chronically vulnerable areas, but the probability of a food shortage occurring in these places is higher than in the rest of Chad. From the analysis, the areas that will most often be vulnerable to food shortages, highlighted in Map 3, are within Batha, BET, Biltine, Chari-Baguirmi, Kanem, and Ouaddai Prefectures.

The people of the 1987 food shortage areas (hatched in Map 2) and the area which has recently experienced strife (BET Prefecture) have fewer food and wealth reserves this year than do people in the rest of Chad's Sahelian zone and those in Chad's Sudanian zone. Because of the low reserves, they are at a relative disadvantage should they have to deal with further crop deficits or strife.\* For purposes of this analysis, these areas have been extrapolated to the sub-prefecture level, and rated on the basis of actual (or planned) food aid distribution.

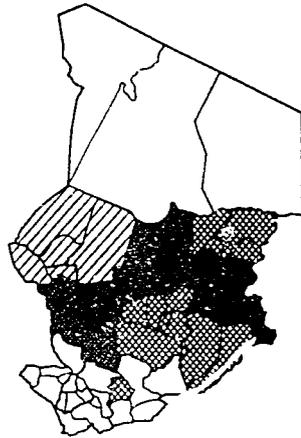
Rates of and variations in vegetative vigor over the past six years are described in detail below. These are indicative of the degree to which sufficient rain can be expected in any one area. Maps 4, 5, and 6 display the information that has gone into this vulnerability calculation.

The threat to 1987 crops from grasshoppers and rats were described in FEWS Country Report 11. A summary of that description is shown in the left hand sub-map of Map 3. The threat from pests to this year's crop is somewhat higher than that seen last year, and could be higher or lower next year, depending on rains, food availability to the pests, and the effectiveness of this year's control measures. Even with changes in degree of threat, however, the relative threat among the sub-prefectures shown in the sub-map will probably remain over the next few years.

Finally, the Sahelian sub-prefectures that AEDDES is monitoring have been scored according to the rate of increase seen in millet prices that AEDDES reported for

\* There is still territory in the far north of BET that is in dispute between Chad and Libya. Until that dispute is settled, there will be a possibility of fighting, which could spill back to more populated areas in the south of the prefecture.

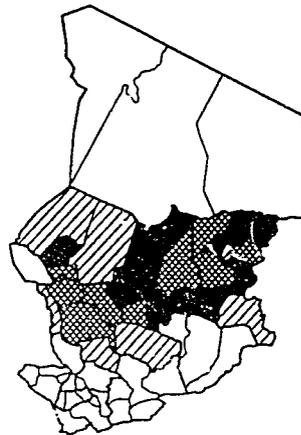
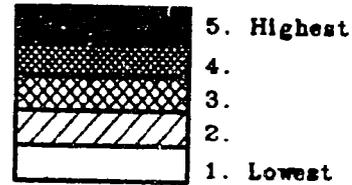
# Zones of Chronic Vulnerability



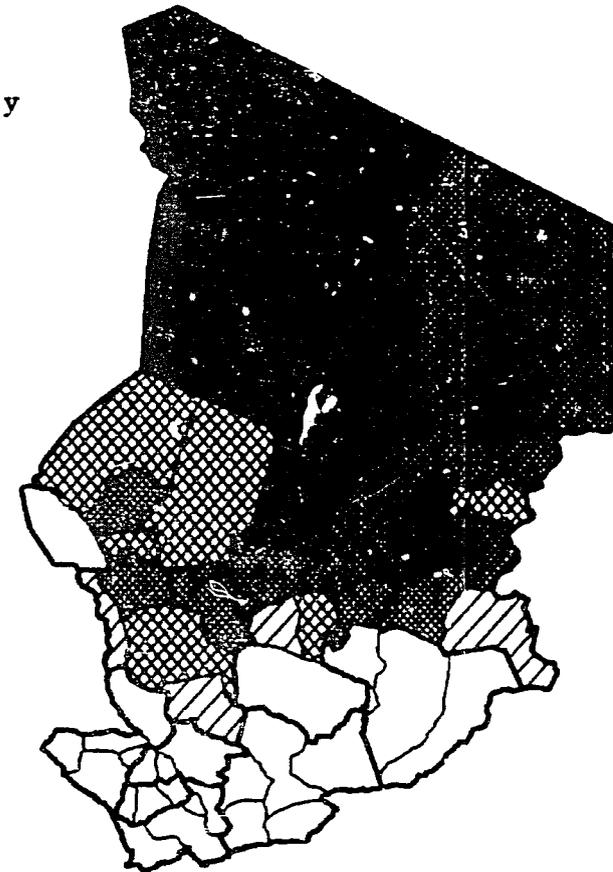
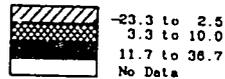
Threat from Grasshoppers and Rats



Relative Vulnerability



Rate of Millet Price Increase, Dec 86 to Mar 87



Source: NOAA/NASA/USGS;  
 AEDES; Mission Cables  
 FEWS/PWA, June 1987

the period from December 1986 through March 1987\* (lower sub-map, Map 3). Such increases can be caused by a perception of scarcity of grain, indicating that reserves in the area are getting low. If prices in an area are consistently high over the year, high prices after the harvest may not be difficult to cope with. A relatively rapid increase in price, on the other hand, may put commercial food out of the reach of those most in need.

### Vegetative Vigor

Figure 1a shows the overall growing season vegetative vigor,\*\* measured in NVI, for each of Chad's sub-prefectures from 1981 through 1986 (arranged in ascending order, based on the growing season NVI for 1986). Figure 1b shows the same data as Figure 1a, with the values for 1984, 1985, and 1986 strung together to aid in picking them out. The NVI for 1986 (a record crop year) is strikingly higher than that for 1984 (the worst year of the recent drought). Equally striking is the fact that the NVI for 1985, also a record crop year for Chad (with an estimated 690,000 MT gross production), for the most part runs about midway between the 1984 and 1986 values. It could be that the 1985 NVI represents a level of rainfall that is a threshold for a good growing season, although one would then ask why production in 1982 and 1983 was as indifferent as it was (466,000 MT and 490,000 MT respectively, according to the US Department of Agriculture). It may be that the timing of the rains in 1985 was more beneficial for crops than was the timing in the earlier years -- crop production is as much a result of the spacing of the rains (not shown by NVI aggregated over the growing season) and how much, where, and when seed is planted, as it is of the total amount of rainfall experienced.

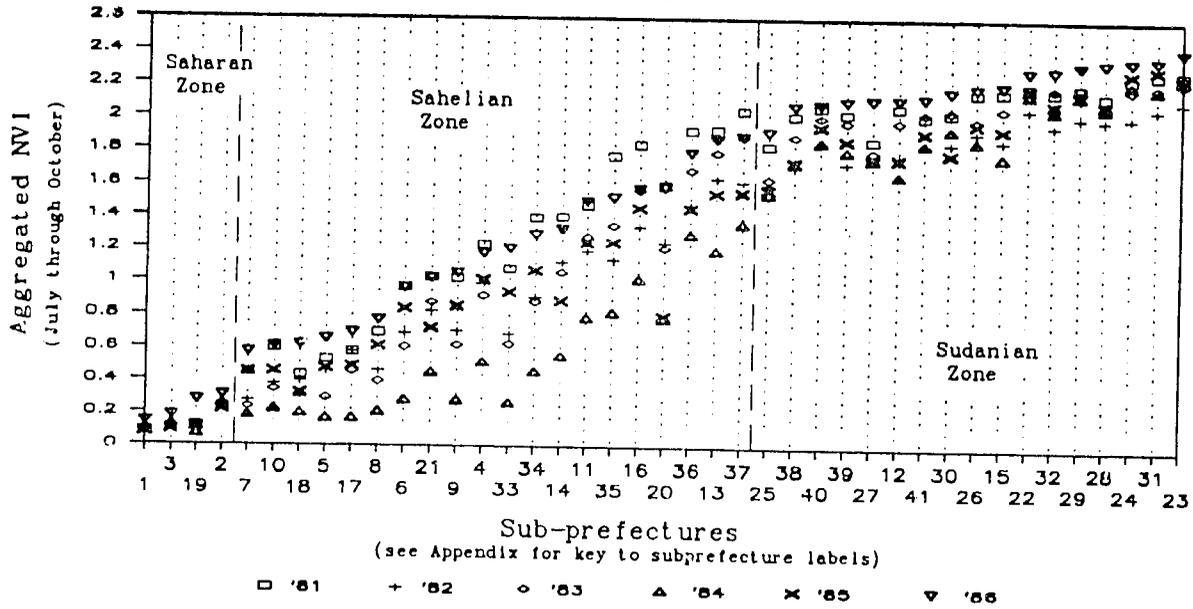
An interesting feature of Figures 1a and 1b is the geographic pattern of variability in NVI. The widest ranges are seen in the Sahelian zone, the least variation in the Saharan zone, and only moderate variation in the Sudanian zone. Map 4 also shows this geographically central tendency of higher variability in NVI. The sub-prefectures with the greatest range in NVI form a belt just below the northern boundary of Chad's cropping zone.

\*The degree to which these rates are usual is not clear, because of a lack of historical data for these areas.

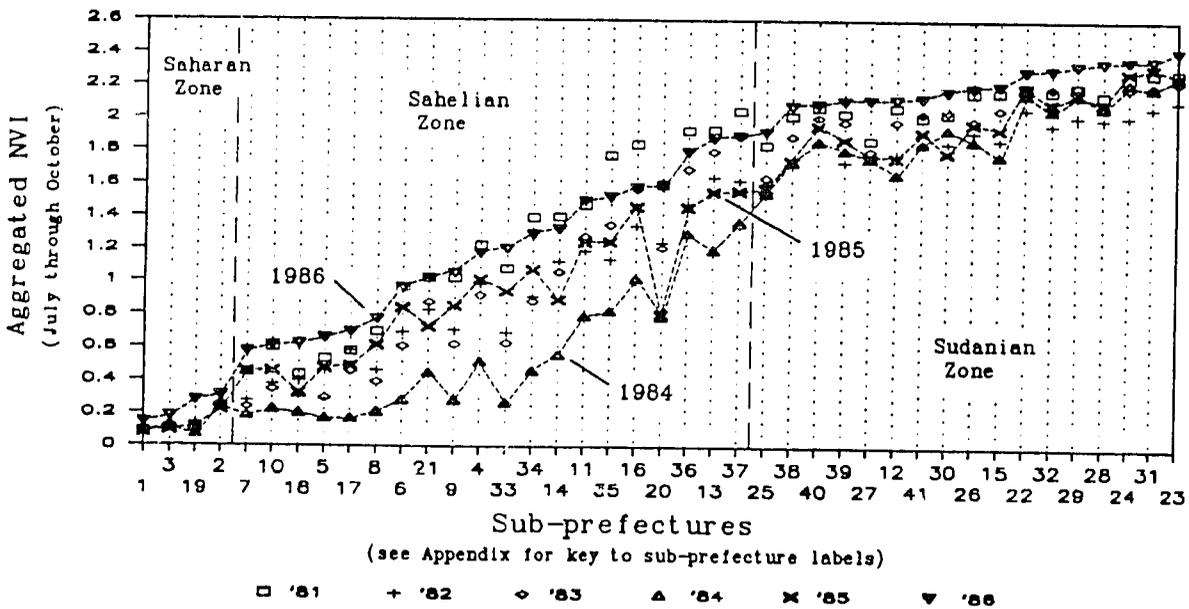
\*\*Vegetative vigor is assessed using the Normalized Vegetation Index (NVI), a measure of greenness reflected off the Earth's surface. Vegetative vigor shows, in 50 square kilometer lumps, where the vegetation cover is doing well and where poorly. A proxy for the effects of rainfall, this information can be used to infer how vegetation in an area (including crops and pasturage) might be faring at a given point in time, how it is doing compared to another point in time, and how well it usually does.

FIGURE 1: CHAD

1a Variation in Growing Season NVI, 1981 - 1986  
Chadian Sub-prefectures



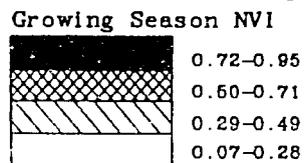
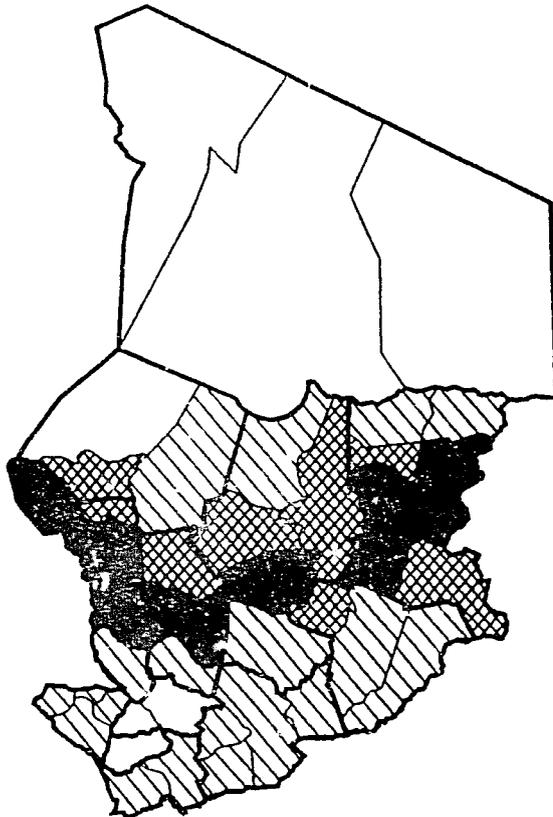
1b Variation in Growing Season NVI, 1981 - 1986  
Chadian Sub-prefectures



Source: NOAA/NASA/USGS  
FEWS/PWA, June 1987

MAP 4: CHAD

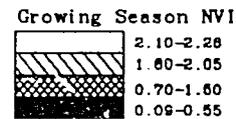
# Range In Vegetation Levels From 1981 Through 1986



Source: NOAA/NASA/USGS  
FEWS/PWA, June 1987

MAP 5: CHAD

# Average Vegetation Levels From 1981 Through 1986



Source: NOAA/NASA/USGS  
FEWS/PWA, June 1987

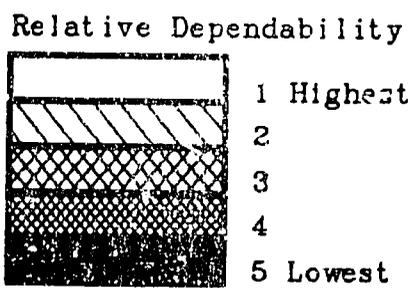
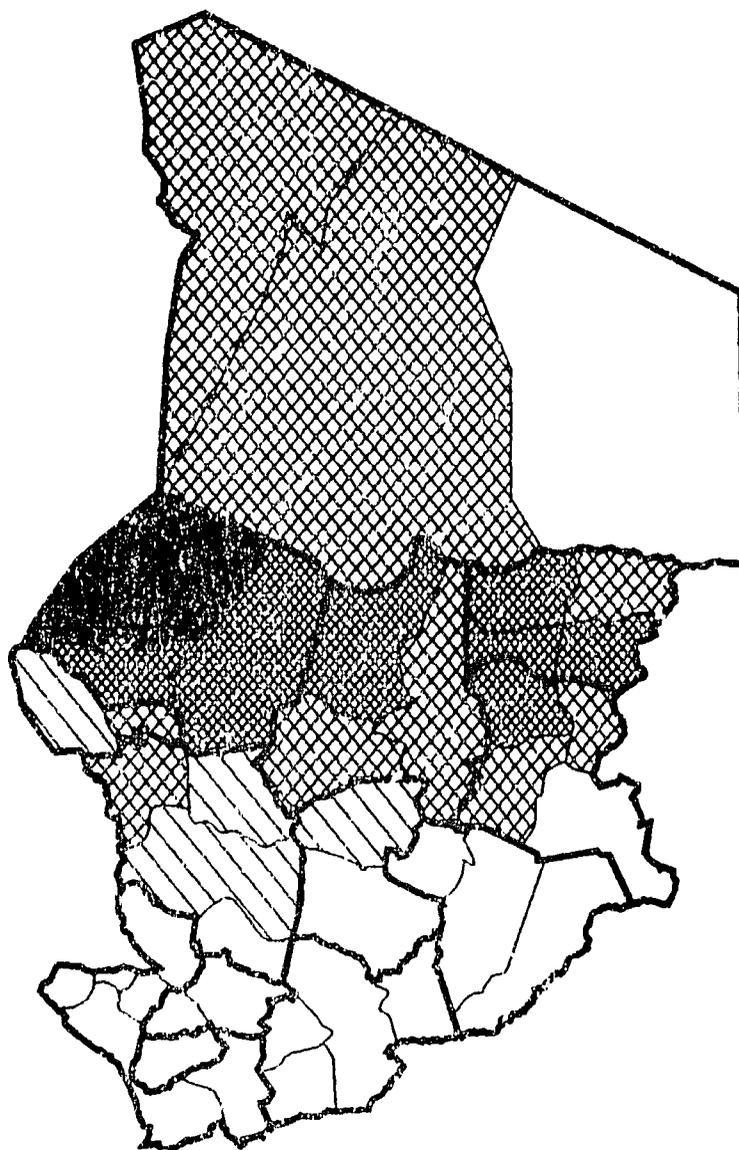
In spite of the inter-annual variation in growing season NVI for a given sub-prefecture, the ordering of the sub-prefectures remains fairly consistent when based on each of the several years' NVIs, with Saharan sub-prefectures having the lowest NVI and Sudanian sub-prefectures tending to have the highest. This is seen again in Map 5, which shows the 1981 to 1986 average aggregated sub-prefectural NVI, and closely resembles Chad's climate zones (see the Summary Map).

Combining the concepts shown in the preceding two maps (range and average), Map 6 displays the dependability with which each sub-prefecture's growing season NVI will be close to its 1981 through 1986 norm (the average).<sup>\*</sup> Those sub-prefectures with a higher degree of vegetative dependability can be better counted on to either have strong agriculture or weak agriculture. The populations in these areas can develop (and have developed) an economic strategy (e.g., a balance of farming versus herding) that will perform well the majority of the time. People in those sub-prefectures with a low degree of vegetative dependability will not know from year to year whether crops will do well or poorly, and so must have a greater repertoire of economic strategies to get by. Based on NVI data, these areas are marginal for depending on farming, and so merit the closest surveillance. If crops fail yet other income generating tactics remain successful, there will be few nutritional problems. If the other strategies also fail for a large portion of the people, however, the area will require assistance.

It should be noted that, in those areas of Chad with the lowest aggregate NVI, the predominant source of food and income is herding, not farming. Herders, who are mobile and whose endeavors require less rainfall than do those of farmers, are more adaptable to adverse rainfall patterns and hence less likely to suffer food shortages from short-term dry spells. At the same time, their recovery from a series of poor years is much slower than that of farmers. Even with good pasturage, it takes several years to build up herds decimated by previous drought, while good rainfall quickly brings a strong return to farmers, assuming they have seed to plant. Thus, interpretations of patterns seen in a given year's NVI data will be more ambiguous regarding conditions for herders than for farmers.

<sup>\*</sup> Sub-prefectures in levels four and five have a range in growing season NVI that is more than 100 percent of their six year average NVI.

# Dependability Of Vegetation Levels



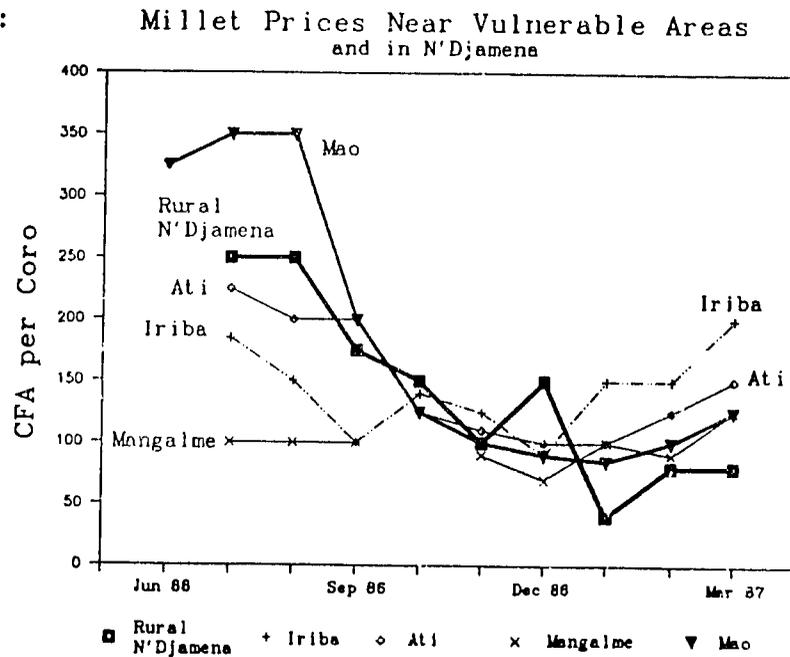
Source: NOAA/NASA/USGS  
FEWS/PWA, June 1987

## MARKET PRICES

Currently, FEWS has access to two sets of cereal price data for Chad: monthly prices of a *coro* (about 2.5 kg) of various food grains, collected by AEDES from the AEDES Project's sentinel towns' markets (all in Sahelian prefectures); and monthly prices of 100 kg sacks of various grains (and other foods) in N'Djamena, from the USAID/N'Djamena Food for Peace Office. The first set, collected since June of 1986, shows a retail cost of grains in several sub-prefectures. The second set, collected from mid-1979 to early 1980, and again from 1982 on, shows a wholesale cereal cost in one location.

AEDES data show that local prices changed from a falling to a rising pattern by January 1987, as would be expected several months after harvest completion. The price increase has been sharpest near those areas that are currently most vulnerable (Map 2). Figure 2 shows millet prices from four towns near currently vulnerable areas, along with prices from the rural sections of N'Djamena

Figure 2:



Sub-prefecture. (N'Djamena prices should reflect the most stable conditions found in the towns monitored by AEDES. Because it surrounds the capital, Chad's major port of entry, the people of N'Djamena should have the best access to food grains among Chad's Sahelian areas.) In March 1987, Iriba (the sub-prefecture town nearest to the vulnerable NW Kobe Canton) showed the highest millet price

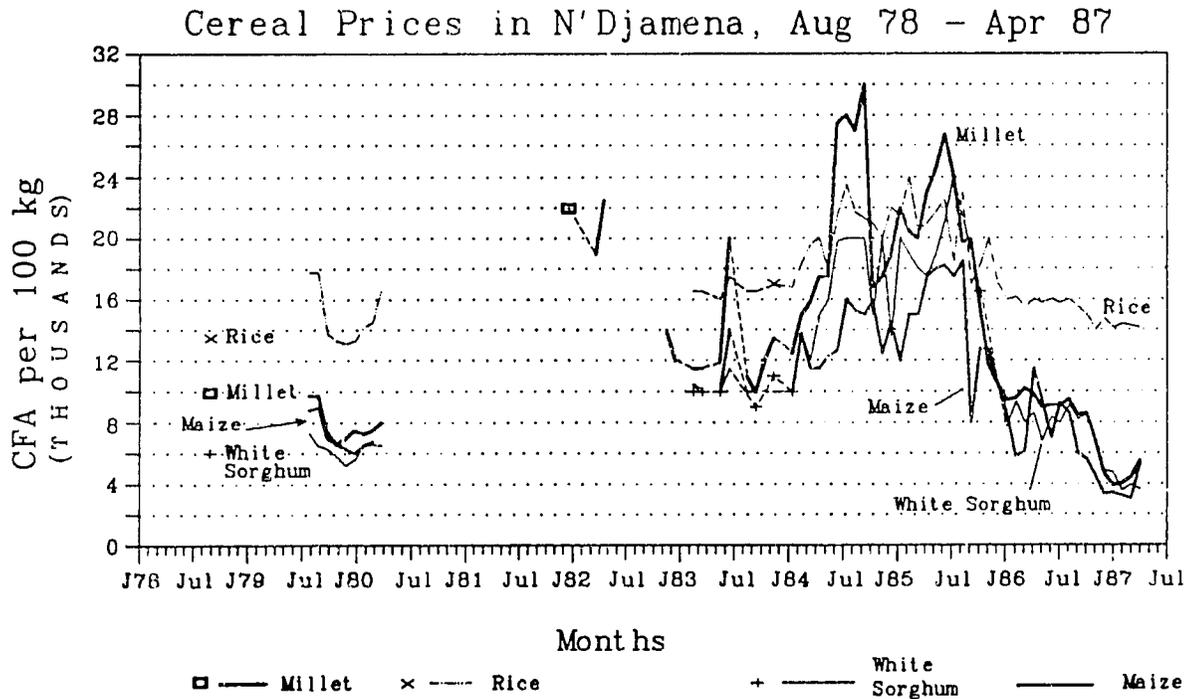
for Chad's Sahelian sub-prefectures. In contrast, although prices were high in Mao (near the vulnerable area in southeastern Lake Prefecture and southwestern Kanem Prefecture), they were much lower than during the end of last year's lean season (June through September). This reflects the decrease in vulnerability noted previously (of the vulnerable areas shaded in Map 2, this area is in the best shape).

Although FEWS does not currently have data with which to place the above prices in their historical contexts, there are historical data available for wholesale grain

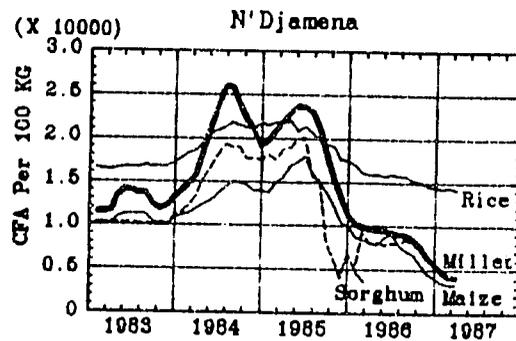
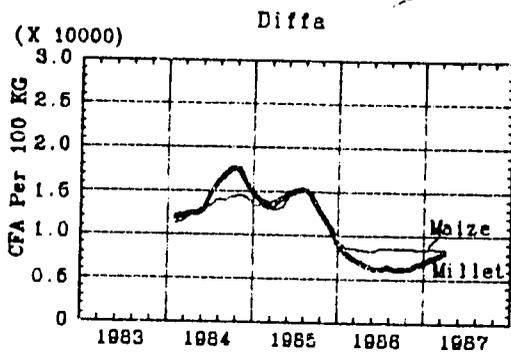
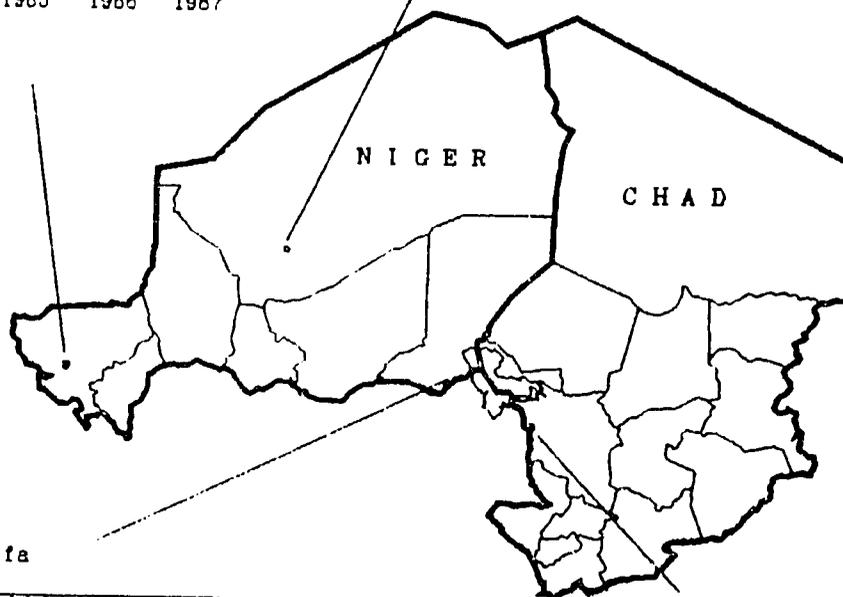
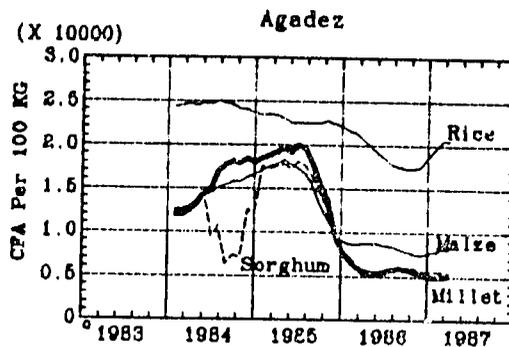
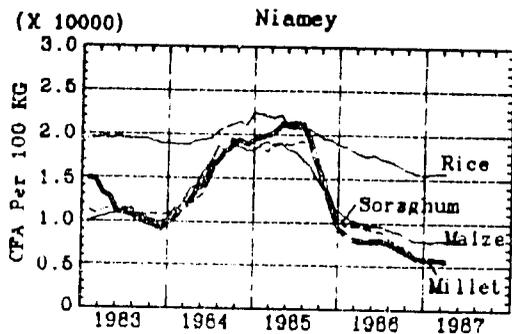
prices in N'Djamena Town (Figure 3). Wholesale and retail prices tend not to behave in exactly the same manner, but one might expect similar reactions from the wholesale and retail markets to such catastrophic events as the 1984 drought. Even with the data gaps, it is possible to see that prices of millet were highest in 1984 and that since 1985 there has been a precipitous drop in millet, maize, and sorghum prices to levels below those seen in August 1978 and late 1979/early 1980.

The drop in prices is not unique to N'Djamena (Map 7). Recent cereal price trends for three towns in Niger (Agadez, Diffa, and Niamey) also display the sharp decline after mid-1985. There are distinct differences among the shapes of the price decline for the four towns, however, supporting the theory that it would be difficult to predict short-term price trends throughout Chad based on information from one city. One possibility to watch out for in areas of Chad where the steep drop in prices has been experienced, is that the relatively low prices could induce farmers to plant less acreage in crops for sale than they would plant in a higher price environment, in the hope of forcing prices back up. If this happens, the 1987 harvest could be significantly smaller than that of 1986, regardless of the rains.

Figure 3:



# Cereal Prices\*, January 1983–March 1987



\* Five month moving average

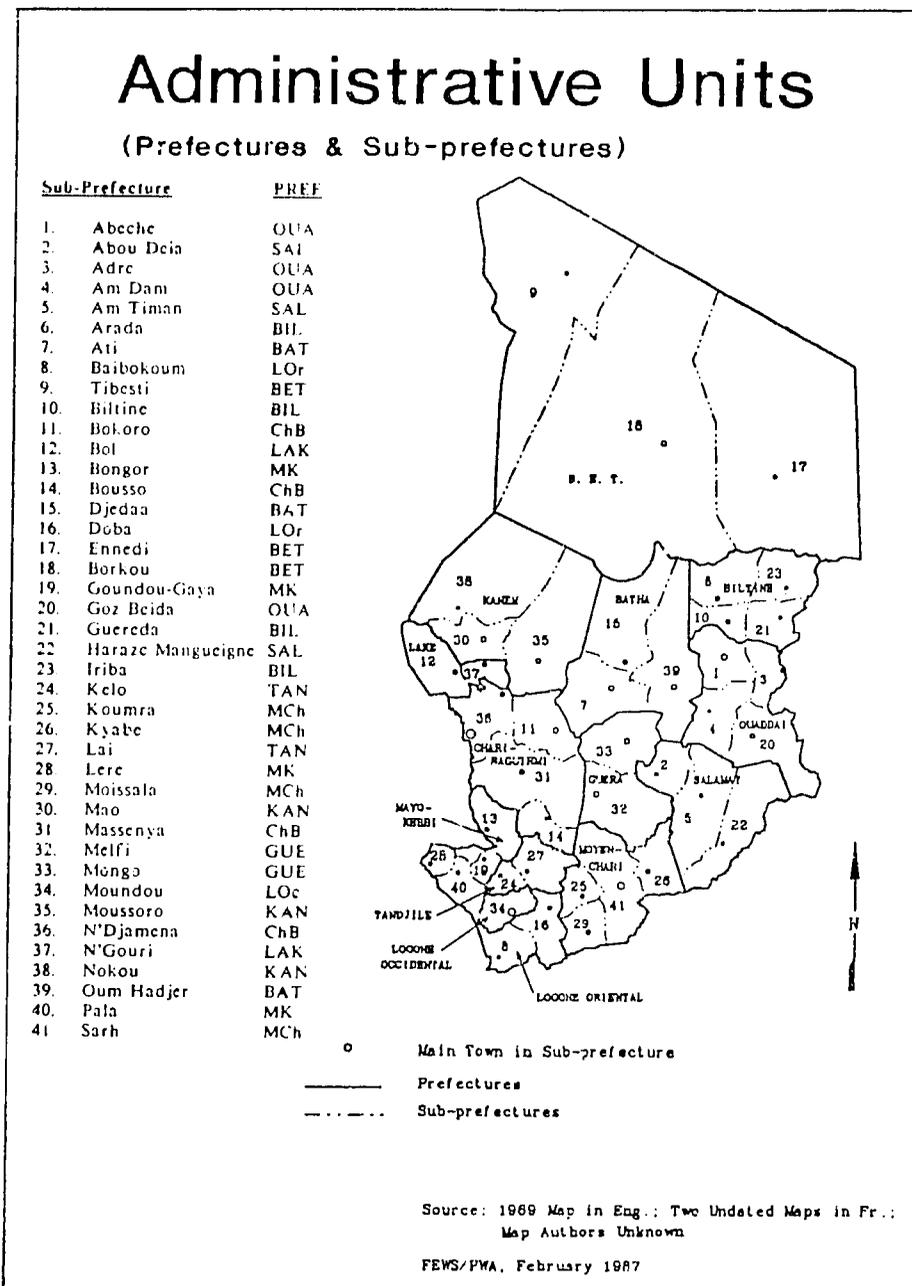
Source: USAID/CHAD; Niger Ministry of Planning  
FEWS/PWA, June 1987

### Key to Figure 1

Province and Sub-Prefecture*	ID #
B.E.T.	Tibesti 1
B.E.T.	Ennedi 2
B.E.T.	Borkou 3
Batha	Ati 4
Batha	Djedaa 6
Batha	Oum Hadjer 8
Biltine	Arada 7
Biltine	Biltine 8
Biltine	Guereda 9
Biltine	Iriba 10
Chari-Baguirmi	Bokoro 11
Chari-Baguirmi	Bouso 12
Chari-Baguirmi	Massenya 13
Chari-Baguirmi	N'Djamena 14
Guera	Melfi 16
Guera	Mongo 19
Kanem	Mao 17
Kanem	Moussoro 18
Kanem	Nokou 19
Lake	Bol 20
Lake	N'Gouri 21
Legone Occidental	Moundou 22
Legone Oriental	Balbakoum 23
Legone Oriental	Doba 24
Mayo Kebbi	Bongor 26
Mayo Kebbi	Goundou-Gaya 28
Mayo Kebbi	Lere 27
Mayo Kebbi	Pala 28
Moyen Chari	Koumra 29
Moyen Chari	Kyabe 30
Moyen Chari	Massenya 31
Moyen Chari	Melfi 32
Moyen Chari	Mongo 33
Moyen Chari	Moundou 34
Moyen Chari	Moussoro 35
Moyen Chari	N'Djamena 36
Moyen Chari	N'Gouri 37
Moyen Chari	Nokou 38
Moyen Chari	Oum Hadjer 39
Moyen Chari	Pala 40
Moyen Chari	Sarh 41
Quaddal	Abeche 33
Quaddal	Adre 34
Quaddal	Am Dam 36
Quaddal	Goz Beida 36
Salamat	Abou Dela 37
Salamat	Am Timan 38
Salamat	Harate Manguaigne 39
Tandjile	Kelo 40
Tandjile	Lai 41

\* Please note that this HVI data, abstracted in 1986, is tied to a previous reference map (opposite).

### Previous Reference Map



# Administrative Units

## (Prefectures & Sub-prefectures)

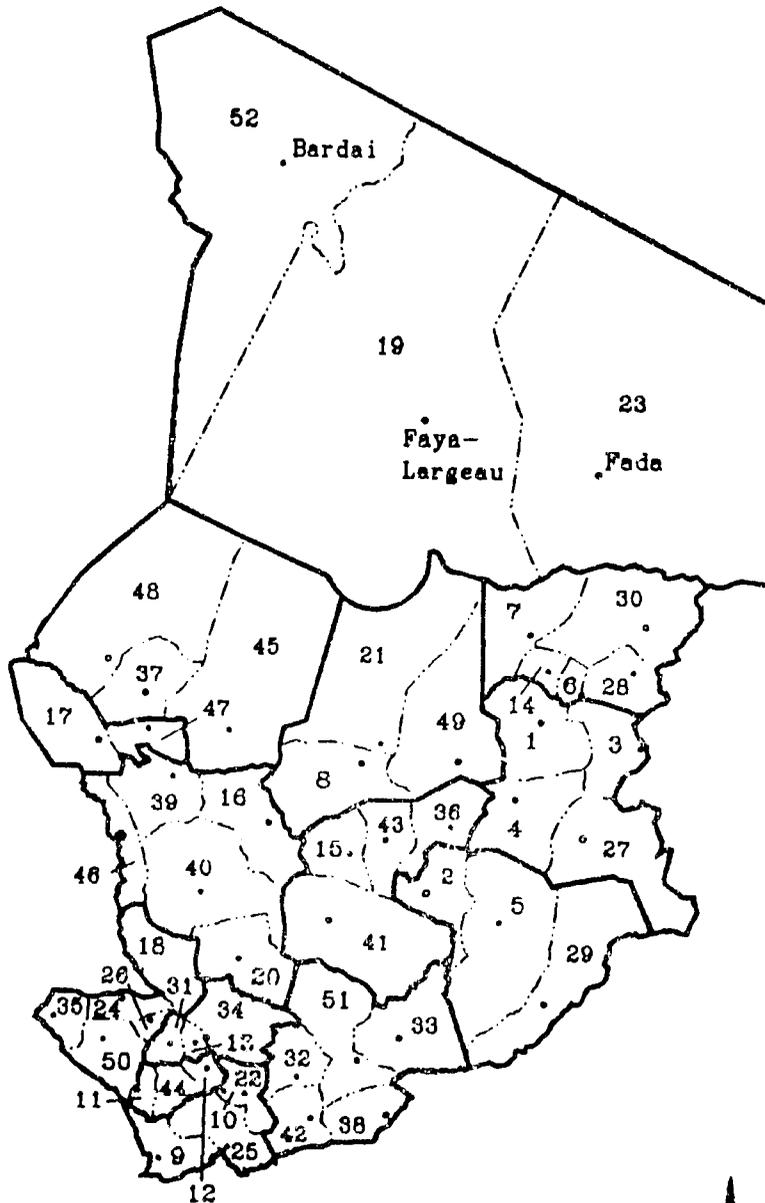
Sub-Prefecture

PREF

1.	Abeche	OUA
2.	Abou Deia	SAL
3.	Adre	OUA
4.	Am Dam	OUA
5.	Am Timan	SAL
6.	Am Zoer	BIL
7.	Arada	BIL
8.	Ati	BAT
9.	Baibokoum	LOr
10.	Bebedjia	LOr
11.	Beinamar	LOc
12.	Benoye	LOc
13.	Bere	TAN
14.	Biltine	BIL
15.	Bitkine	GUE
16.	Bokoro	ChB
17.	Bol	LAK
18.	Bongor	MK
19.	Borkou	BET
20.	Bouso	ChB
21.	Djedaa	BAT
22.	Doba	LOr
23.	Ennedi	BET
24.	Fianga	MK
25.	Gore	LOr
26.	Goundo-Gaya	MK
27.	Gor Beida	OUA
28.	Guerda	BIL
29.	Haraze Manguaigne	SAL
30.	Iriba	BIL
31.	Kelo	TAN
32.	Koumra	MCh
33.	Kyabe	MCh
34.	Lai	TAN
35.	Lere	MK
36.	Mangalme	GUE
37.	Mao	KAN
38.	Maro	MCh
39.	Massakory	ChB
40.	Massenya	ChB
41.	Melfi	GUE
42.	Moissala	MCh
43.	Mongo	GUE
44.	Moundou	LOc
45.	Moussoro	KAN
46.	N'Djamena	ChB
47.	N'Gouri	LAK
48.	Nokou	KAN
49.	Oum Hadjer	BAT
50.	Palu	MK
51.	Sarh	MCh
52.	Tibesti	BET

PREF    Prefecture

BAT	Batha
BET	Borkou-Ennedi-Tibesti
BIL	Biltine
ChB	Chari-Baguirmi
GUE	Guera
KAN	Kanem
LAK	Lake
LOc	Logone Occidental
LOr	Logone Oriental
MCh	Moyen-Chari
MK	Mayo-Kebbi
OUA	Ouaddai
SAL	Salamat
TAN	Tandjile



○ Main Town in Sub-prefecture  
 — Prefectures  
 - - - Sub-prefectures

Source: Prefecture boundaries from 1980  
 IGN-Brazzaville; Sub-prefecture boundaries  
 from undated map in Fr., map author unknown