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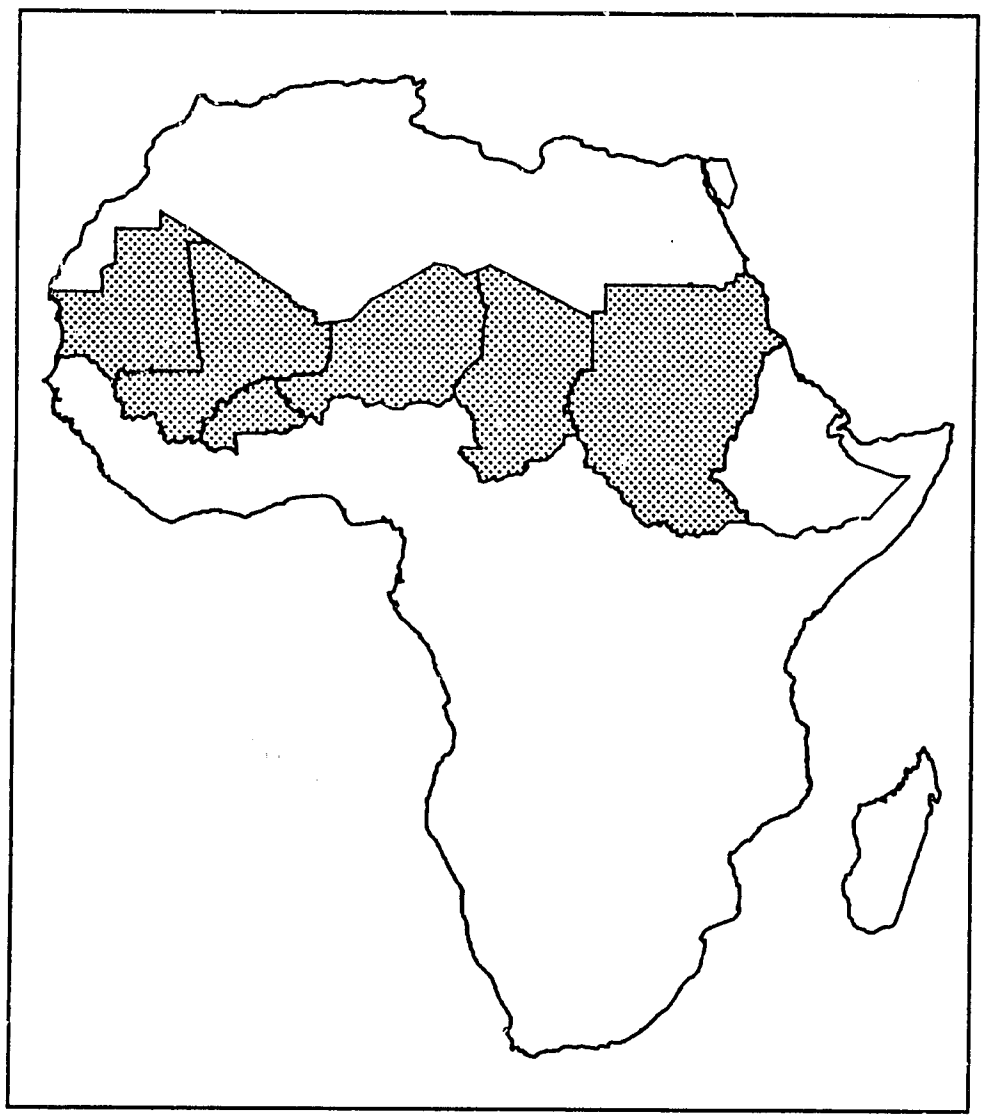
Famine Early Warning System **June**

FEWS **1992**

Vulnerability Assessment



Contains reports on:

Mauritania

Mali

Burkina

Niger

Chad

Sudan

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Vulnerability Assessment

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EXECUTIVE SUMMARY

Mauritania

Agropastoralists, pastoralists and Malian refugees are the most vulnerable socioeconomic groups entering Mauritania's 1992/93 growing season. Mauritania's late and sporadic 1991 rainy season resulted in mediocre to poor pasture conditions and a third consecutive year of disastrous harvests. However, large quantities of commercial and food aid cereal imports in 1991 and probably repeated substantial commercial cereal imports in 1992 are expected to cover the bulk of the global food deficit, circumventing any severe food emergencies within the country.

Mali

Good harvests have reduced vulnerability for Malian agriculturalists who were highly vulnerable in 1991. Civil unrest in the North has disrupted production systems and exchange mechanisms and has caused significant population displacement. This has resulted in high vulnerability for approximately 400,000 pastoralists, agropastoralists, and urban poor in Tombouctou and Gao regions. Another 164,000 in the two regions are extremely vulnerable and require assistance. Resource mechanisms are in place to begin addressing the problem, but are dependent upon the successful implementation of peace accords.

Burkina

Burkina had an excellent cereal production year in 1991/92. Emergency food aid from external sources will not be necessary. The good year greatly reduced the vulnerability of large numbers of people in northwestern Burkina. Even so, below average cereal production in seven poor provinces has made 81,000 people extremely vulnerable (just under one percent of Burkina's total population). Poor pastures and pockets of below average cereal production in poorer parts of the country have made 321,000 people highly vulnerable and another 580,000 people moderately vulnerable.

Niger

Following the near-record harvest of 1991, the general level of food security in Niger for the pre-agricutlural period is the best since 1989. While vulnerability for herders has increased since January, a normal start to the rains should improve conditions.

Chad

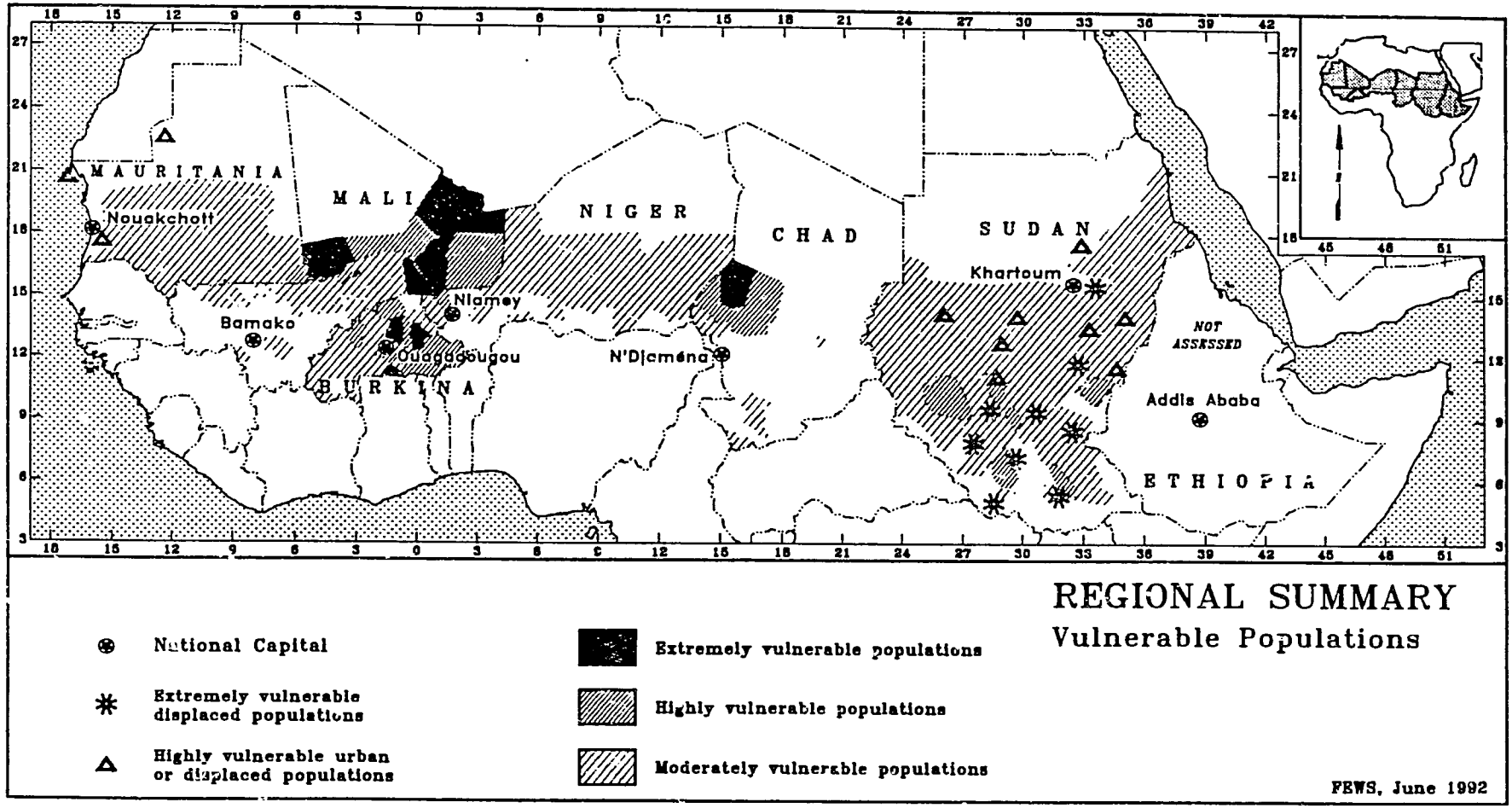
A record 1991/92 national cereal harvest lessened vulnerability levels of most socioeconomic groups in Chad. Localized problems remain in Kanem, Lac, Tandjilé, Logone Oriental and Logone Occidental prefectures. Chad's overall food security situation is good as the 1992 agricultural season begins.

Sudan

Large portions of the Sudan's population remain seriously food insecure in spite of 1991/92 harvests that were sufficient to meet aggregate food needs, improve overall national food security and reduce food prices. Millions of displaced people throughout the country are at-risk due to destitution and limited assistance. Refugee populations will continue to require assistance. Subsistence farmers in western and central Sudan are moderately to highly vulnerable because of very poor regional food production, while urban poor are moderately vulnerable because of low wages, poor income opportunities, and high prices.

PLEASE NOTE: Ethiopia was not included in the FEWS June 1992 Vulnerability Assessment. It is hoped that a FEWS analysis of vulnerability in Ethiopia will be carried out in the July to August time frame.

Map 1: Regional Summary of Vulnerable Populations



FEWS Region

Sahel Much Improved, Horn Less So

Washington, D.C., June 30, 1992

Vulnerability levels across the Sahel and the Horn rose steadily from 1990 through 1991, with large areas of the Horn experiencing extreme levels of vulnerability (see Appendix G for FEWS' definitions of vulnerability levels). Excellent 1991/92 cereal harvests reversed this trend sharply in most of Mali, Burkina, Niger and Chad. Vulnerability levels in Mauritania dropped also, in spite of a dismal 1991/92 harvest, through food aid imports, a strong improvement in commercial cereal imports, and the re-opening of cross-border trade with Senegal. For the most part, the highly and extremely vulnerable groups in the Sahel are a small percentage of national populations, although some cover large territories (see Table 1 and Map 1). While the Sudan 1991/92 harvest was strong, producing enough to meet the country's aggregate cereal needs, most of the production was concentrated in the East and in mechanized and irrigated schemes. Mediocre production in western and central Sudan, combined with reduced cereal prices and ongoing relief deliveries, did reduce area vulnerability levels somewhat from those of 1991.

Economically marginal populations remain highly or extremely vulnerable even in countries where the 1991/92 harvests were good, although their numbers are greatly reduced from 1990 and 1991 levels. While good, indeed exceptional in some cases, the 1991/92 harvest still has not eliminated the effects of the mediocre 1989/90 and the poor 1990/91 harvests. In the case of Sudan, with its frail economy and multi-year history of poor crops, large portions of the population exist in economically marginal conditions that appear intractable for the near future.

Strife and political dysfunction are the most proximate causes of food insecurity in the areas with substantial numbers of extremely vulnerable people. In the north of Mali, civil unrest has disrupted pastoral production, agricultural production and market systems. Much of the population from the affected areas has sought refuge in neighboring countries. Peace accords between the Government of the Republic of Mali and dissident groups were signed in May, but continued banditry and mistrust still prevent relief efforts in that zone. In Sudan, civil war has driven many from the South to seek refuge in urban areas of the South and North. In many areas of Sudan's South, food insecurity has been critical and people forced into famine conditions because of Government and rebel restrictions on relief deliveries. At Khartoum, the GOS is shifting from 700,000 to 1.4 million displaced people from the city outskirts to camps several miles from the town. The new camps lack basic infrastructure. In spite of the fact that residents have few other means of obtaining sustenance, the GOS is severely restricting international relief groups from providing aid.

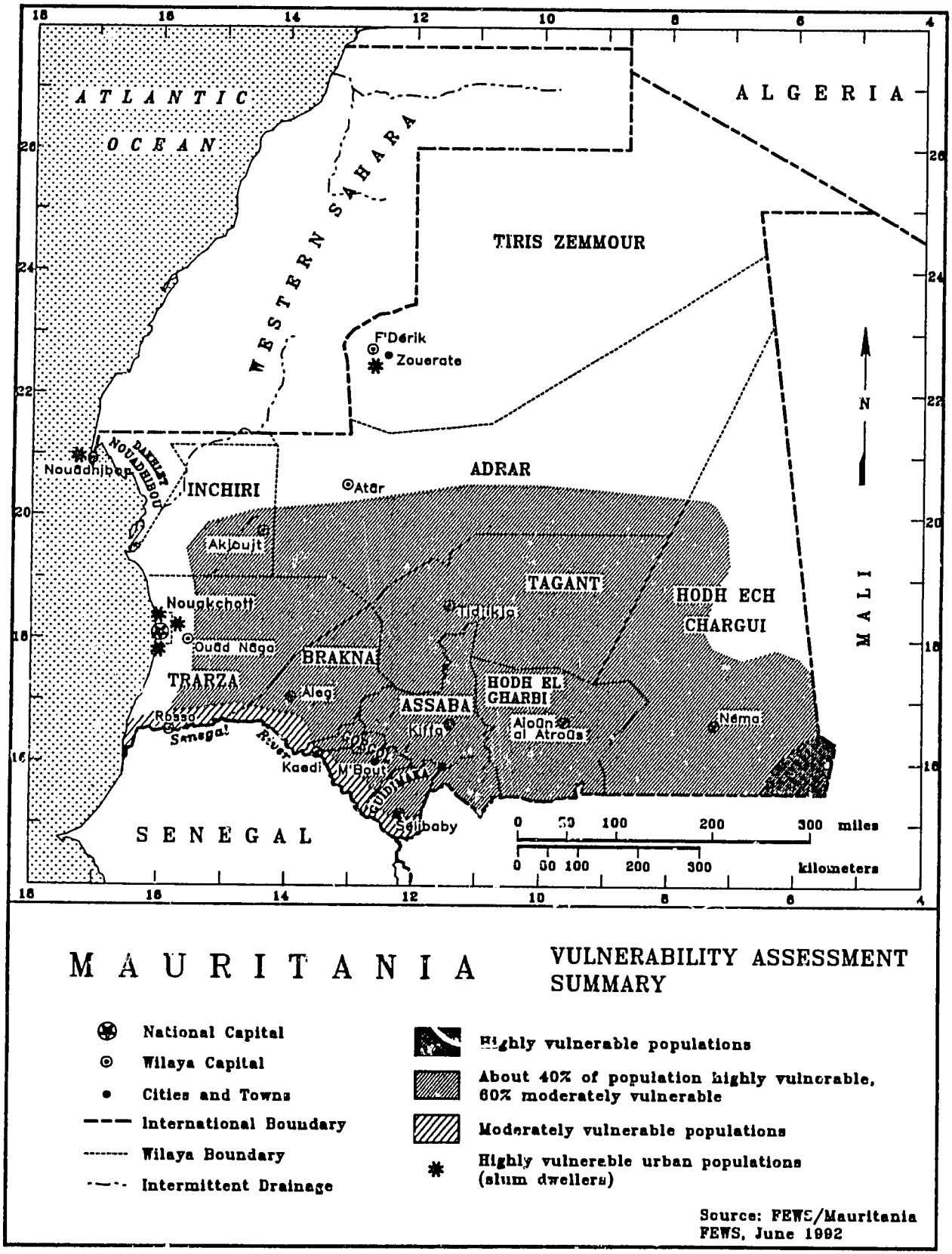
Table 1: FEWS Region, 1992 Highly and Extremely Vulnerable Populations (000)

Country	Total 1992 Population	Extremely Vulnerable Populations		Highly Vulnerable Populations	
Mauritania	2,065	0	0.0%	603	29.2%
Mali	8,719	164	1.9%	370	4.2%
Burkina	9,462	81	0.9%	321	3.4%
Niger	8,160	18	0.2%	686	8.4%
Chad	5,613	5	0.1%	10	0.2%
Sudan	26,215	2,313	8.8%	2,706	10.3%

Sources: Mauritania population equals the FEWS population estimate from the 1992 Harvest Assessment plus 30,000, to account for the influx of Malian refugees. Total population statistics for other countries are from the FEWS 1992 Harvest Assessment. Vulnerable population statistics are from country chapters within this report.

If the 1992/93 harvest and pasture were poor in any of the Sahelian countries, farmers and herders would be in a difficult position toward the end of the 1993 lean season and the 1993/94 harvest would be critical for preventing food crises in 1994. In Sudan, a poor harvest would increase greatly the number of people who are extremely vulnerable to famine.

Although not included in this report, Ethiopia still contains large numbers of extremely vulnerable people. Drought in the Ogaden and strife in neighboring Somalia have wreaked havoc on the populations of Ethiopia's southeast. In addition, the recent elections (boycotted by major ethnic groups) and the subsequent withdrawal of the Oromo Liberation Front from the government do not bode well for the fragile recovery following the 1991 end of Ethiopia's civil war.



Map 2: Mauritania Vulnerability Assessment Summary

MAURITANIA

Severe Food Emergencies Not Anticipated, Even Among the Most Vulnerable

Report released by USAID/Mauritania on May 15, 1992

SUMMARY

Poor climatic conditions in 1991 resulted in a third consecutive year of dismal cereal production for Mauritania. Pasture green-up was also below average in many areas. Although no official estimates of production have been released to date, FEWS estimates that cereal production was at a six-year low of approximately 67,623 metric tons (MT), which covers less than 20% of projected 1992 food needs. Since June of last year, political tensions and conflict in Mali have brought up to 30,000 highly vulnerable refugees and thousands of animals into the southeastern corner of Mauritania (see Appendix G for FEWS' definitions of levels of vulnerability). Large commercial imports by the private sector, combined with 1991 donor contributions, are expected to cover the bulk of the projected 1992 food deficit (approximately 46,000 MT). Distribution of free food aid will be needed for specifically targeted areas. The Government of the Islamic Republic of Mauritania (GIRM) has requested donors to pledge 40,897 MT of cereals and 19,092 MT of supplemental food stuffs for free distributions during 1992. Given large stocks remaining from 1991 and unresolved issues concerning taxation on commercial imports, it is still not clear what percentage of this request donors will cover. Nonetheless, refugee food needs will be met until the end of the summer, at least, and donors will most likely pledge enough food aid to meet emergency food needs for the most vulnerable populations in 1992 (see Map 2).

METHODOLOGY

Mauritania;s population of approximately two million is primarily composed of agriculturalists, agropastoralists, pastoralists, and small businessmen. Recent political and social events have created displaced and refugee populations. Other small, distinct Mauritanian socioeconomic groups include coastal fishermen and miners. It is within this framework that FEWS/Mauritania addresses vulnerability for 1992.

The 1992 vulnerability assessment focused on both long- and short-term indicators in order to assess current vulnerability among socioeconomic groups. The exercise utilized secondary "hard" data sources, even though quantitative data in Mauritania are insufficient or irregular. Private stock levels, incomes, interior market data, and even global production data are currently unavailable. Therefore, this analysis (as in the past) is heavily supplemented with qualitative information coming from informal sources, field trips, and personal observations. A detailed breakdown of vulnerable populations by socioeconomic group resulting from this analysis is shown in Appendix A.

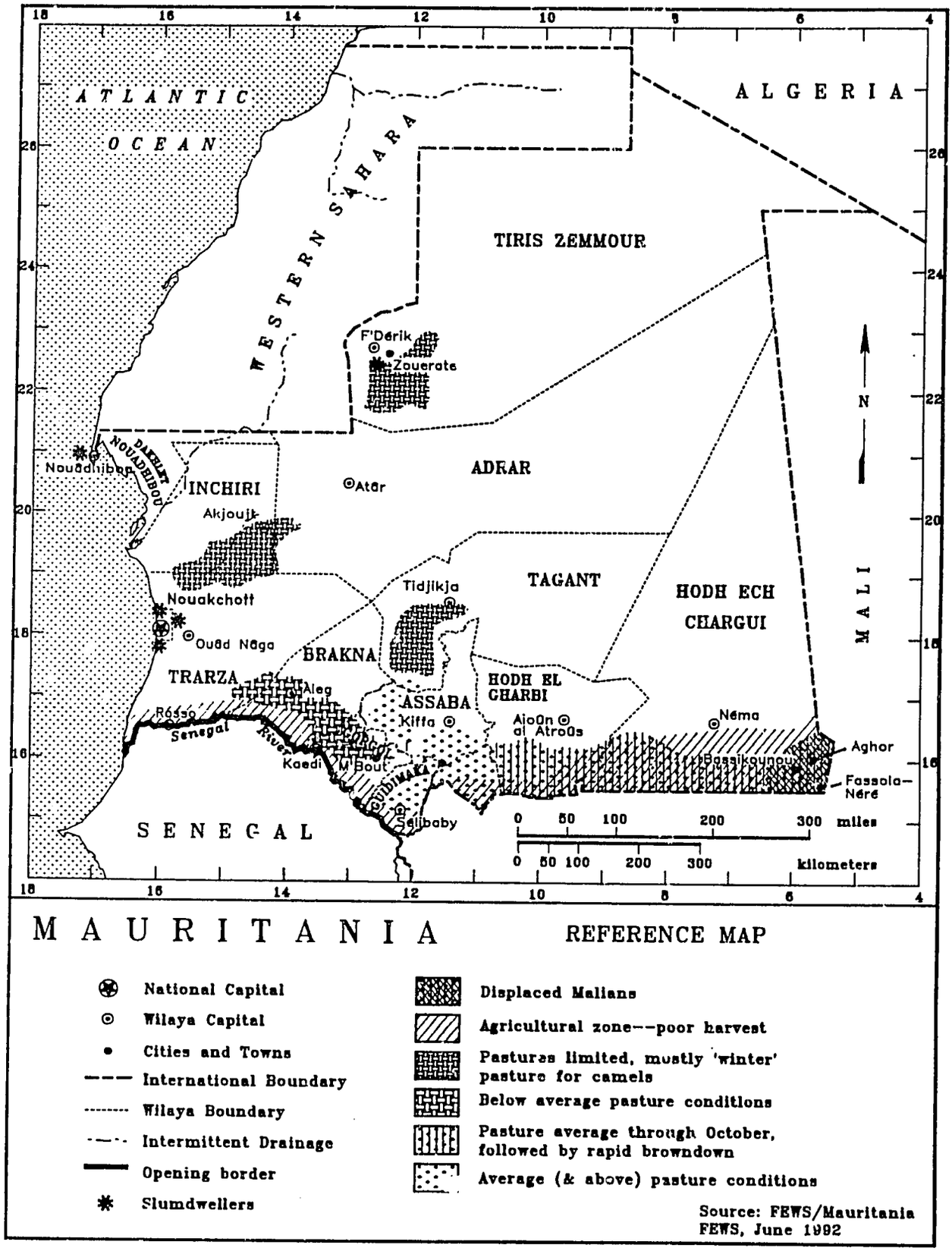
SOCIOECONOMIC GROUPS AND SUB-GROUPS

Malian Refugees

By early June 1991, political tensions and civil unrest in Mali caused many Malians to flee into the southeastern corner of Mauritania, where they now occupy specific sites. The number of refugees has continued to rise steadily over the past year. Although the United Nations High Commission on Refugees (UNHCR)-sponsored census is nearing completion, the exact number is still not known. The latest estimates put the refugee population at approximately 30,000, residing in three principal camps: Aghor, Fassala-Néré and Bassikounou (see Map 3).

Despite the agreement officially signed between the Tuaregs and the Malian government in early April, the UNHCR does not believe large numbers of refugees will voluntarily return to Mali before September or October. Small groups may decide to return before then, but the majority will most likely remain in Mauritania for several months, waiting for demonstrated security back home. UNHCR is currently arranging a contingency plan for voluntary repatriation to Mali after the rainy season, when it again becomes logistically possible to travel overland by vehicle.

Health, water supply and food aid are the three vital areas of identified need. Each is being addressed systematically under the direction of the UNHCR and in conjunction with the GIRM's



Map 3: Mauritania Reference Map

Food Security Commission (CSA). The UNHCR plans to continue food distributions of cereals, beans, milk powder, oil, tea and sugar until at least the end of the summer. The current distribution plan will transport and place adequate food stocks in all camps before mid-July, when heavy rains may impede delivery.

Because the refugees are completely dependant on outside help, they are considered highly vulnerable. Were they not receiving the current support and active monitoring, they would be considered at-risk of famine in 1992.

Agropastoralists and Pastoralists

Going into the 1992/93 growing season, vulnerability is moderate to high for agropastoralists and pastoralists throughout the country. Below-average to poor pasture green-up, in combination with low cereal production, raised the level of vulnerability of populations in the south-central and western *wilayas* (Gorgol, Brakna, Trarza). Biomass development was average to above-average until October in the southern and eastern *wilayas* (the two Hodh *wilayas*, Assaba, and Guidimaka), but populations in these areas are considered moderately to highly vulnerable for a second year because of severe disruptions in their normal migration patterns, restricted market access and trading over the Malian border, and falling livestock prices.

Rains came earliest and were better spaced in the southeast than in any other part of the country. This allowed some of the population in Hodh el Chargui, Hodh el Gharbi, and Assaba *wilayas* to harvest a slightly better cereal crop than in 1991 (see Table 2, see also Appendix B for harvest assessment details). Unfortunately, poor conditions in the western and northern pasture zones and civil unrest in Mali forced the arrival of an abnormally high concentration of livestock and small ruminants into a relatively small area that contains extremely limited resources. This competition for limited resources has quickly strained the already fragile ecosystem and resulted in an insufficient water supply and severe overgrazing.

Table 2: Mauritania, Net Cereal Production by Wilaya (MT)

Wilaya	Net 1989/90 Production	Net 1990/91 Production	Net 1991/92 Production
Hodh ech Chargui	17,818	4,621	7,462
Hodh el Gharbi	17,518	2,893	5,439
Assaba	2,929	3,004	3,281
Gorgol	12,978	17,192	15,238
Brakna	25,786	9,998	7,467
Trarza	20,393	25,838	16,720
Guidimaka	7,976	11,457	5,013
Tagant	—	—	7,003
Total	105,398	75,003	67,623

Sources: FEWS/Mauritania; USAID/Mauritania
Note: No statistics were collected in Tagant Wilaya for the 1989/90 and 1990/91 harvests.

Satellite data and field observations confirmed the rapid drying out, or "brown down," of all pasture zones in Mauritania at the end of October (see inside back cover for explanation of NDVI and METEOSAT imagery). Limited pastures and water supply have weakened the herds almost uniformly across the country. The national livestock service has reported falling livestock prices and an abnormal increase in sales of productive livestock by agropastoral and pastoral populations throughout the country. The UNHCR has confirmed these reports for markets in the southeastern portion of country and all along the Malian border.

Rains should begin within the next two months. If rainfall is good, current vulnerability for all agropastoralist populations in Mauritania should decline. Agropastoralists living in the central and western parts of the country are expected to benefit from the reopening of the Senegalese-Mauritanian border by once again having access to markets and traditional cross-border trade. Conditions for populations living near the Malian border should also improve, now that a peace accord was signed between the Tuaregs and the Malian government. Food aid distributions in the late fall helped cover the needs of those populations hit hardest by the conditions in late 1991 and early 1992. Both FEWS/Mauritania and the national livestock service believe that approximately 40% (379,165) of the agropastoralist population are highly vulnerable because of the severe disruptions in their "normal" lifestyles and the forced liquidation of important assets (e.g., livestock). The remaining 60% are considered moderately vulnerable (568,749). No severe food emergencies are expected during 1992.

Shantytown Dwellers

Mauritania's urban population has been growing at an alarming rate. Many social changes and economic and environmental hardships over the past two decades have resulted in accelerated urban migration. It is estimated that more than half of Nouakchott's total population (438,861) resides in shantytowns that encircle the city center. Other urban centers, such as Nouadhibou and Zouerate, have similar situations. As stated in past assessments, these shantytown dwellers are considered chronically vulnerable.

For the past two years, one specific group of shantytown dwellers (Ryiad) has been considered extremely vulnerable to ("at-risk" of) famine, due to a decrease in economic resources brought about by relocation. This population lives along the

road to Rosso, south of Nouakchott. Although no census has been taken, the Préfet of Ryiad believes that the population, estimated to be around 50,000 last year, continues to expand.

Slowly but surely, basic infrastructure is being put into place, including piped water, a medical dispensary, new schools, and improved transportation. Another sign of improvement is decreasing rates of low birthweight deliveries (less than 2.5 kilograms). This was noted by Terre Des Hommes (TDH), a Swiss non-governmental organization (NGO) supplying basic medical and nutritional services to Ryiad. Low birthweight is the single most important determinant of infant mortality and is often regarded as an indicator of the social and economic situation. In early 1991, TDH reported that over 30% of the deliveries recorded were low birthweight. This year, monthly reports of low birthweight deliveries have been fluctuating between 15 and 25%. Living conditions in Ryiad remain very difficult and include high unemployment, extremely low wages, limited assets, little or no savings, and constant increases in the prices of common food stuffs. However, these conditions are very similar to other shantytowns on the outskirts of Nouakchott (Arafat and Dar El Nain), and no longer stand apart.

There has been no census and no organized nutritional survey conducted in any of the Mauritanian shantytowns. It is therefore very difficult to estimate an exact percentage of the shantytown population vulnerable to famine in 1992. Free food distributions kept the most vulnerable populations from experiencing widespread famine in 1990 and 1991. The 1992 food aid plan targets up to 30% of Nouakchott's population (131,000). Distribution of 4,000 MT of Spanish wheat recently began for the most vulnerable populations (most recipients being shantytown dwellers). These people are highly vulnerable.

Agriculturalists in the Senegal River Valley

In 1991, approximately one third of the River Valley population (100,000) was considered extremely vulnerable to (at-risk of) famine, while a quarter of the population was considered highly vulnerable (75,000). Despite a third disastrous cereal harvest in as many years, several recent and key events have significantly reduced vulnerability levels in the River Valley.

After almost three years of severed relations, Mauritania and Senegal have resumed diplomatic ties. The border, which lies along the Senegal river, officially opened in early May. With the border open and security restrictions being lifted, travel, trade, commerce, market access and artisanal fishing are expected to be rapidly reestablished. These factors should have a direct and positive impact on "food access," vastly improving relative food security for the Senegal River Valley population.

The Senegal River Valley covers the southern portion of Trarza, Brakna, and Gorgol *wilayas*, and the southwest of Guidimaka Wilaya. The River Valley encompasses the most fertile land in the country, but late rains resulted in another uniformly poor traditional cereal harvest in 1991. Many farmers and organized cooperatives, however, had exceptionally good results with their other crops such as *niébé* (cowpeas), melons, potatoes and off-season garden vegetables. Furthermore, many villages decided to plant maize in their small irrigated perimeters instead of rice (which demands a longer growing season and higher temperatures) and produced enough to sustain their families until the next harvest.

Although on-farm stocks have been totally exhausted throughout the valley for more than two years, substantial food aid distributions took place during summer 1991 and into the late fall, alleviating the most severe food stress. Past distributions, relatively good "other" crop and off-season harvests, and key improvements in surrounding conditions are expected to reduce the overall vulnerability level of the approximately 308,000 farmers in the Senegal River Valley to moderately vulnerable.[1]

Populations in the North-central Wilayas

Last year, all children in Tagant Wilaya under five years of age were considered highly vulnerable because a nutritional survey found very high levels of malnutrition in the area. UNICEF's last report (February 1992) notes a significant drop in infant malnutrition levels throughout Tagant Wilaya since 1991 (global malnutrition down from 72% to 33.6%).[2] Because of these findings, pregnant women and children under five are no longer being considered as a separate group in the north-central *wilayas*. Vulnerability in these *wilayas* is comparable to vulnerability among other agropastoralist and pastoralist populations, with approximately 40% of the population considered highly vulnerable and 60% moderately vulnerable in 1992.

The majority of the inhabitants in these areas rely mainly on pastoral-based activities with the addition of some date harvesting, commerce, and localized cereal production behind small earthen dams, in dry river beds (wadis), and around oases. Although populations in all three of the north-central *wilayas* (Tagant, Inchiri and Adrar) plant and harvest at least some cereal crop every year, production was not previously included in national figures. Tagant Wilaya was included for the first time this year. National production figures have not been officially released for 1991/92, but reports from the Tagant's regional agricultural inspector confirm that approximately 7,000 MT were harvested, covering close to 57% of the cereal food needs for the modest population of 74,000. Ironically, this would make Tagant the *wilaya* with the highest per-capita cereal

[1] *Up to 60,000 Mauritanian refugees currently reside in Senegal. Territorial disputes may become a problem upon their return to Mauritania. For the remainder of 1992, however, the majority of these refugees will most likely choose to remain in Senegal because of ongoing support projects and food distributions scheduled there through December 1992.*

[2] *A child experiences global malnutrition when its weight is less than 85% of the standard weight for a child of its height.*

production in-country for 1991/92. Production in the Inchiri and oases areas of the Adrar probably witnessed similar results.

Modest cereal harvests and recent food aid distributions had a positive effect on the current food availability in these three *wilayas*. However, poor pasture conditions in the northern zones had a significantly negative impact on the overall vulnerability in the area. Many herders were forced to move their animals into the southern and southeastern pasture zones. Because these zones were already drying out and experiencing severe water supply problems, herders were forced to reduce their herds by selling off much of their productive livestock (despite the falling prices) before disease, dehydration or starvation killed them off.

Populations in all three of the north-central *wilayas* suffer from chronic, or "structural," food stress because of the harsh environment in which they live. This situation makes them highly visible. The CSA's 1992 food aid distribution plan targets 20% of the most needy populations in Inchiri, Adrar and Tagant *wilayas*. These deliveries, along with local production and imported goods, should prevent the possibility of any widespread food stress in 1992.

Displaced and Refugee Populations

Last year there were 23,100 registered repatriates in 54 distinct sites throughout the River Valley as a result of the Mauritanian-Senegalese disruption in April 1989. This group was being monitored and assisted on a regular basis by UNHCR and the GIRM through June 1991. Since July 1991, direct monitoring has ceased and the majority of the 54 sites have disappeared. It is believed that most of these people have either been assimilated by their families, adjusted to the environment in which they were placed, or migrated into the bigger towns and cities of Mauritania. Some of the repatriate "sites" are now well established villages that face the same conditions as neighboring towns in the area. Therefore, repatriates are no longer considered a separate vulnerable group in 1992, nor are they considered distinct from other groups residing in the River Valley.

Iron Ore Miners

Mining has once again become the primary export and source of revenue for Mauritania (surpassing commercial fishing). Iron ore is produced in the northern portion of the country in the towns of F'Derik and Zouerate and is then transported to the coastal port of Nouadhibou by train and exported. In 1991, international prices rose and the Societe Nationale Industrielle et Miniere (SNIM) turned a reasonable profit. The 1992 calendar year is expected to follow last year's trend. Employment remains stable for the third consecutive year at approximately 4,700 full-time employees. Therefore, this group is still considered only slightly vulnerable in 1992.

Coastal Fisherman

Commercial fishing suffered a second year of declining catch volumes (recorded volume in 1990 and 1991 was around 450,000 MT, down from an average of 50-75,000 MT from catches in the late 1980s), with total earnings falling slightly below those of the mining sector. As noted in previous assessments, Mauritanian participation in the industrial fishing sector is small (about two-thirds of participants are Korean, and another twenty percent are a cominbation of Russian, Italian, and Eastern European nationalities). However, the GIRM is adamant about expanding the Mauritanian role in the industrial fishing sector and continues actively to support training programs for the improvement of current commercial fishing skills.

Mauritania's artisanal fishing sector is significantly smaller than the commercial fishing sector, employing between 7,000 and 8,000 people. The Ministry of Fish and Maritime Economy's main emphasis has been on growth and improvement in this sector. In Mauritania artisanal fishing has traditionally been undertaken by three main social groups: the Imragen (a Maur group), the Wolof (with Mauritanian citizenship), and Senegalese fishermen. After diplomatic ties were severed between Senegal and Mauritania in August 1989, Senegalese participation in artisanal fishing decreased by approximately 60%, which led to a major decline in the volume of catch. However, several hundred Mauritanian repatriates were trained during the two years following August 1989 and are now fully autonomous. The Senegalese-Mauritanian border opening is expected to provide another boost to the artisanal fishing sector in 1992. Consequently, coastal fishermen are considered to be only slightly vulnerable in 1992.

FOOD AID PLANS

The donor community is re-evaluating its role in cereal assistance to Mauritania. The previous rationale that Mauritania's private sector was incapable (both financially and logistically) of importing enough cereal to cover the yearly deficit has proved false. Before 1991/92, yearly commercial imports were limited to finite amounts of rice and wheat flour. Donors covered (or nearly covered) the remaining deficit after domestic production by pledging the rest in food aid (most of which was sold and the funds therefrom used for development in-country).

Early last year, for various reasons, the GIRM permitted the private sector (a monopoly mainly comprised of two influential families) to import unprecedented quantities of wheat. This was accomplished with surprising speed and efficiency. However, no significant import taxes have been levied on commercial arrivals and the private sector continues to undersell and block

the sale of food aid (which has been set at a fixed price in order to protect domestic production). As a consequence, there are over 50,000 MT of food aid remaining from 1991 pledges sitting in Nouakchott warehouses that currently cannot be sold.

This situation is clearly disturbing for the donors, who are now insisting on changes in the current import policy and a firm resolution to the existing problem before pledging any further cereal food aid destined for sale. Meanwhile, the GIRM's Food Security Commission (CSA) has requested almost 41,000 MT of cereal to cover emergency food needs for the most vulnerable populations in 1992. Donors have still not responded formally to this request.

The first cereal balance exercise for the 1991/92 year indicated a provisional 45,933 MT deficit. These estimates of Mauritania's cereal deficit are not nearly as alarming as those projected for 1990/91, despite a third year of decline in domestic production. There is approximately 50,000 MT of food aid already in-country this year. These stocks could be used for emergencies if the donors authorize the transfer and deem it necessary to target free distributions to especially vulnerable groups. Because of this and the obvious capabilities of the private sector to import sufficient cereal supplies, FEWS does not consider the 1992 global cereal deficit to be abnormally severe.

CONCLUSION

The overall number of people facing elevated vulnerability in 1992 is higher than in 1991. Nonetheless, the extreme levels of vulnerability that threatened several socioeconomic groups outlined in last year's assessment have decreased over the last twelve months. Even though national production hit an all time low and climatic conditions in 1991 spawned less than adequate pastures in the majority of Mauritania, no socioeconomic group is considered at-risk of famine going into the 1992/93 growing season.

All Malian refugees (approximately 30,000), 40% of the country's agropastoralist and pastoralist populations (approximately 442,313), and 30% of Nouakchott's shantytown inhabitants (approximately 131,000) are considered highly vulnerable in 1992. At present, these groups have liquidated their more important assets and disrupted their preferred production strategies.

UNHCR (with donor contributions) plans to meet all the immediate needs of the current refugee population until they voluntarily repatriate back to Mali, or through the remainder of 1992. The onset of the rains should begin within the next month, which will ease water supply problems and increase biomass availability for the high animal concentrations currently in the southeastern pasture zones. Other disruptions caused by the tensions and conflict along the Malian border should cease to be a problem once security is assured, thus reducing the current vulnerability for the Mauritanian agropastoralist and pastoral populations.

A certain percentage of Nouakchott's (and other urban centers such as Nouadhibou and Zouerate) shantytown dwellers will always be highly vulnerable. Tens of thousands have completely exhausted their economic base and liquidated their means of production. Significant quantities of food aid were distributed through the summer and fall of 1991 to the most indigent populations, and 4,000 MT of wheat are currently being distributed to the most vulnerable populations in Nouakchott.

Farmers in the Senegal River Valley are only moderately vulnerable in 1992, despite a third year of catastrophic cereal harvests, because of key events and changes in the area. Both the rainfed and river recessional (*walo*) cereal harvests were uniformly disastrous throughout the valley, but many farmers had exceptional results with off-season gardens and other crops such as *niébé*, melons and potatoes. The single most important factor helping to reduce their vulnerability to famine in 1992, is the opening of the Senegalese-Mauritanian border. FEWS/Mauritania and USAID/Mauritania expect traditional trade links and normal market activities with Senegal to resume over the course of the summer. Lifted restrictions on both travel and river access will also allow for supplemental activities such as petty commerce and river fishing. If these expectations are realized and there is no renewed conflict over territory, then vulnerability should be reduced to normal levels, provided that the 1992 cereal harvest is good.

All highly as well as moderately vulnerable groups identified in this report need to be closely monitored throughout the forthcoming season. Even if climatic conditions are optimal this year, recovery from previous bad harvests, herd reductions, and depleted household stock levels may take more than one year. Food security for the most vulnerable populations will depend on the timeliness of food distributions through September.

FEWS/Mauritania will use satellite imagery, both the Normalized Difference Vegetation Index (NDVI) and METEOSAT-based rainfall estimates, to follow the progress of the 1992/93 agricultural and pastoral season. Station rainfall data from the local AGRHYMET project and periodic field trips will be used to confirm and verify resulting information. As soon as interior cereal or livestock data is accessible, prices will be monitored on a regular basis to watch market performance and reaction to the evolution of the growing season.

APPENDIX A: Chart of Vulnerable Groups in Mauritania

Separate Populations in Mauritania	Population Total	(approximate) Breakout	Current Vulnerability	Reason for Vulnerability	Using Which Indicators	Geographic Location	Traditional Coping Mechanisms	Mitigation Strategies	Possible Improvement of Vulnerability Level (w/in one season)
FARMERS									
Senegal River Valley	308,000		Moderate	2 to 3 years of poor traditional harvests, household level stock depletion, drawdown on assets	Rainfall, NDVI/Meteosat, cereal stocks, relative price data, qualitative information, cereal production statistics	Southern portion of Mauritania along border with Senegal (parts of Trarza, Brakna, Gorgol, Guidimaka)	Fishing in river trade, wage labor, farming marginal land, making charcoal, drawdown on assets, exploitation of famine foods	Free food distributions to most needy, FFWprojects, food security projects, agricultural development, cooperative support etc.	Remain moderately vulnerable, or, possibly, return to normal (slight vulnerability)
Other southern areas (Guidimaka)	77,025		Slight to moderate	Mediocre growing season, high cereal prices	Same as River Valley	Southern *wilayas* (Brakna, Trarza, Gorgol, Assaba, Hodh ech Chargui, Hodh el Gharbi), majority found in Guidimaka	Trade with Mali and Senegal drawdown on assets, sell animals/reduce herds, wage labor, river fishing	Agricultural developement projects, livestock development	Slightly vulnerable
AGROPASTORALIST/SMALL BUSINESS/DATE HARVESTER									
Adrar, Inchiri, Tagant	157,869	63,148	High	High market prices, low cereal stocks, abnormal migration, forced herd reduction	Rainfall, NDVI, production statistics, informal price data, cereal stock data	Adrar, Tagant and Inchiri *wilayas*	Farm millet near oases, gardening, transhumance, migration of some family members, wage labor	Food distributions for most needy, supplemental feedings for children (ongoing support by UNICEF), nutritional surveys in all *wilayas*	Moderately vulnerable
		94,721	Moderate	Limited transportation, mediocre harvest, good 1991 date harvest	NDVI, Meteosat, rainfall. pasture information, nutrition statistics			Village cereal banks, improved gardening projects, FFW projects, well projects	Moderately to slightly vulnerable

Separate Populations in Mauritania	Population (approximate) Total	Breakout	Current Vulnerability	Reason for Vulnerability	Using Which Indicators	Geographic Location	Traditional Coping Mechanisms	Mitigation Strategies	Possible Improvement of Vulnerability Level (w/in one season)
AGROPASTORALIST/PASTORALIST									
Eastern *wilayas* (Hodh ech Chargui, Hodh el Gharbi)	371,688	148,675	High	2 to 3 years of poor harvest, insecurity near Malian border, disruption of "normal" trade	Rainfall, NDVI, METEOSAT, qualitative cereal and livestock price data, food stock and cereal production statistics, transhumance information, water point information	Eastern Mauritania (Hodh ech Chargui, Hodh el Gharbi)	Trade with Mali, zonal migration, reduction of herds, wage labor	Free food distributions for most needy populations, FFW projects	Moderately vulnerable
		223,013	Moderate	1 to 2 years mediocre harvest, mediocre pasture conditions, overcrowding				Agricultural development projects	Slightly vulnerable
Guidimaka, Assaba	193,360	77,344	High	Poor harvest, poor pastures	Rainfall, NDVI, METEOSAT, qualitative cereal and livestock price data, food stock and cereal production statistics, transhumance information, water point information	South-central Guidimaka, southern Assaba	Trade w/ Mali, reduction of herds, wage labor, trade of dairy products for cereals, transhumance across borders	Food aid for most needy	Moderately vulnerable
		116,016	Moderate	High cereal prices, limited pastures and water supply				Agricultural and livestock development projects, cereal grain banks	Slightly vulnerable
Trarza, Brakna, northern Gorgol	382,866	153,146	High	Poor harvest, poor pastures	Rainfall, NDVI, METEOSAT, qualitative cereal and livestock price data, food stock and cereal production statistics, transhumance information, water point information	Northern Gorgol, SW and SE Trarza, south-central Brakna	River fishing, trade with Senegal, transhumance across borders, trade of dairy products for cereals	Food aid for most needy	Moderately vulnerable
		229,720	Moderate	High market prices, limited resources, below average pasture				Agricultural and pastoral development projects	Slightly vulnerable

Separate Populations in Mauritania	Total Population (approximate)	Current Vulnerability	Reason for Vulnerability	Using Which Indicators	Geographic Location	Traditional Coping Mechanisms	Mitigation Strategies	Possible Improvement of Vulnerability Level (w/in one season)
MALIAN REFUGEES								
In camps (Aghor, Fassala-néré and Bassikounou	30,000	High	Regularly monitored assistance (food,supplies), but dependent on this aid	Nutrition statistics, food aid deliveries	Southeastern corner of Mauritania	N/A	Ongoing monitoring, food distributions, logistic support, support in voluntary repatriation	Remain highly vulnerable
SHANTYTOWN DWELLERS								
Nouakchott (Ryiad, Dar el Nain, Arafat)	131,000	High	Lost all means of production, liquidated most assets, unstable day to day jobs, dependent on food aid	Price data health & nutrition statistics, qualitative reports	Ryiad (9-17 km south of Nouakchott, on road to Rosso) Dar el Nain (north of Nouakchott on road to Akjoujt) Arafat (west of Nouakchott)		Free food distributions, surveys, nutritional rehabilitation, FFW	Highly vulnerable, possible reduction to moderate vulnerability
	125,750	Moderate to high	Menial jobs in town, lack of security				FFW projects, surveys	Moderately vulnerable
OTHER SHANTYTOWNS								
Nouadhibou, Zouerate	21,214	Moderate to high	Menial labor (wage), lack of food security	Qualitative reports, price data	Environs of Nouadhibou and Zouerate		FFW projects, nutritional rehabilitation	Moderately vulnerable
Iron ore miners	4,700	Slight	Fairly stable incomes, annual Increase in production	Iron ore statistics	F'derick, Zouerate			Slightly vulnerable
FISHERMEN								
Industrial	10,000	Slight	Stable income (wages), needed skill	Catch statistics from Ministry of Fish Expotrs, etc.	Fishing boats off coast of Nouadihbou			Slightly vulnerable
Artisanal (some repatriates)	8,000		Support by GIRM, high demand	Market prices, repatriate monitoring	All along the coast, Nouakchott, Cap Timiris		More training, continued support by GIRM	

Separate Populations in Mauritania	Total Population (approximate)	Current Vulnerability	Reason for Vulnerability	Using Which Indicators	Geographic Location	Traditional Coping Mechanisms	Mitigation Strategies	Possible Improvement of Vulnerability Level (w/in one season)
ASSIMILATED REPATRIATES								
	50,000	Slight, moderate, high	Some remain in River Valley, some have moved to cities, some have left country, little other information	N/A	River Valley, bigger cities, some assimilated in all *wilayas*			N/A
SALARIED EMPLOYEES/COMMERCE								
	194,271	Slight to moderate	Wages not keeping up w/ buying power of the Ouguiya	Price indices, private sector imports	Throughout country, mostly in Nouakchott and other *wilaya* capitals	Return to traditional farming, national wage increases, pastoral activities, etc..	National wage increase	Slightly Vulnerable
Total	2,065,743							

APPENDIX B: Final Mauritania Cereal Production Estimates for 1991/92

Wilaya	Dieri	Walo	Bas-fonds	Decrue SONADER	Irrigated Rice	Other Irrigated	Off Season	Gross Total Production	Net Total Production
Hodh ech Chargui	3,418	0	5,361	0	0	0	0	8,779	7,462
Hodh el Gharbi	3,816	0	2,582	0	0	0	0	6,398	5,439
Assaba	2,117	0	1,743	0	0	0	0	3,860	3,281
Gorgol	2,903	3,800	0	0	12,639	0	3,261	22,603	15,238
Guidimaka	5,109	113	0	0	724	32	187	6,165	5,013
Brakna	1,575	1,139	3,132	0	3,306	0	858	10,010	7,467
Tagant	1,134	0	0	7,105	0	0	0	8,239	7,003
Trarza	0	1,665	0	2,055	17,962	0	4,635	26,317	16,720
Gross Total	20,072	6,717	12,818	9,160	34,631	32	8,941	92,371	—
Net Total	17,061	5,710	10,895	7,786	20,779	27	5,365	—	67,623
Total of Traditional Cereals (net)									41,479
Total Rice (net)									26,144

Sources: FEWS/Mauritania and USAID/Mauritania, based on original estimates made by CILSS/FAO in October of 1991. Updated information on specific schemes came from SONADER and regional agricultural inspectors during April and May.

Notes: This analysis was undertaken because, as of mid-May, the National Agricultural Statistics Service had not published any official results regarding 1991/92 production.

FEWS' figures were derived as follows:

Dieri (rainfed)—Definitive rainfed statistics adopted from FAO/CILSS annual Agricultural Assessment in October.

Walo (Senegal River recessional)—FEWS participated on a field trip to the Senegal River Valley in March, where updated statistics on actual planted surface area and yield by *wilaya* was obtained through the regional agricultural inspector. As a result, reductions were made by *wilaya* as follows:

Wilaya	Preliminary	Current	Percent Reduction
Gorgol	10,876	3,800	65
Guidimaka	225	113	50
Brakna	4,554	1,139	75
Trarza	3,230	1,665	48.5
Total	18,884	6,717	
Total Net	16,051	5,710	

Bas-fonds (lowland recessional)—During that same field trip the regional inspector updated *bas-fonds* estimates. The only changes since the February 1992 FEWS Harvest Assessment Report were made in Brakna Wilaya:

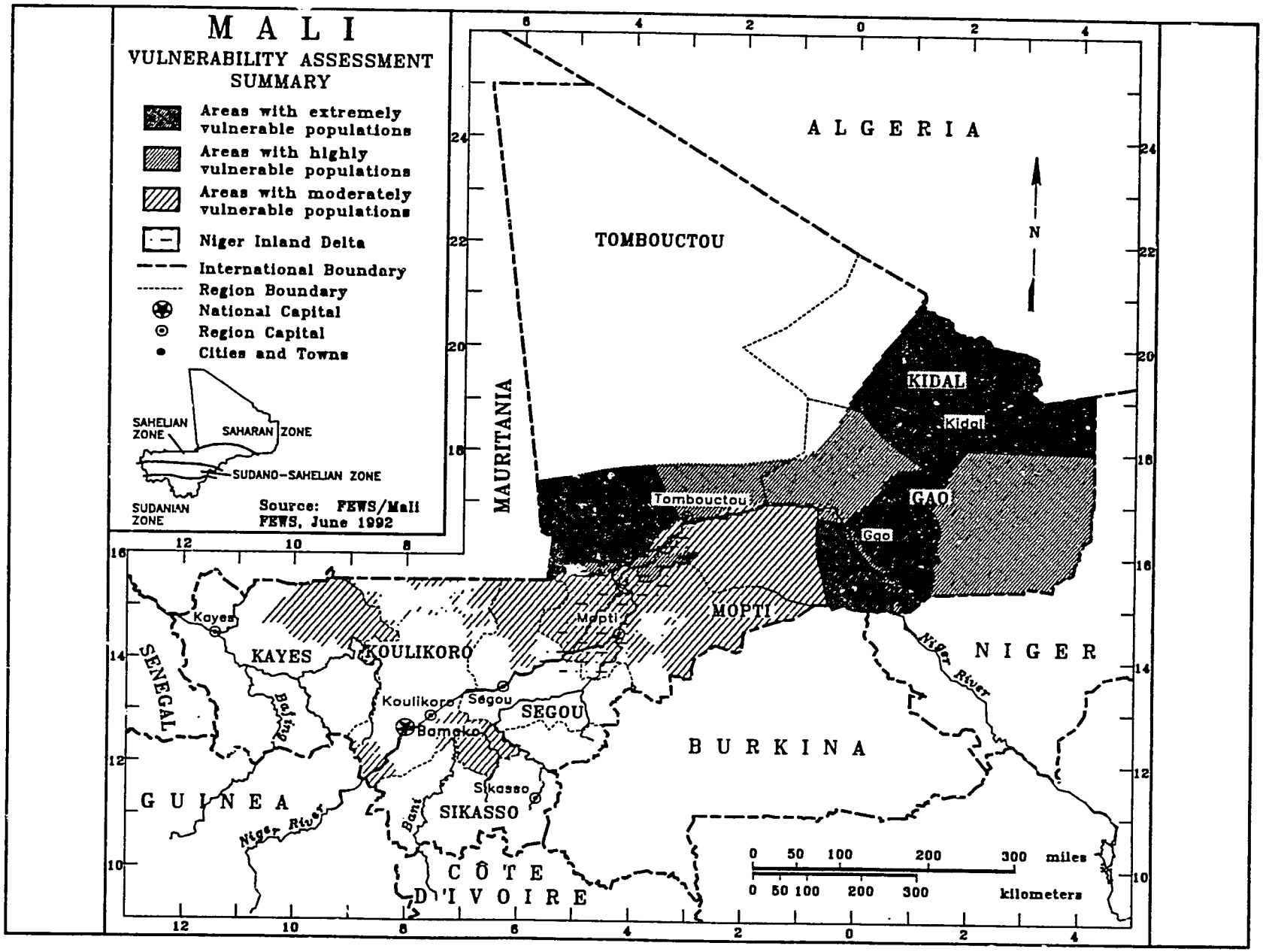
Wilaya	Preliminary	Current	Percent Reduction
Brakna	6,264	3,132	50

Décrue (wadi recessional)—No changes were made since the FAO/CILSS estimates.

Irrigated (SONADER and private)—No changes were made since the February 1992 FEWS Harvest Assessment Report.

Irrigated (off-season)—The agricultural inspector and SONADER helped FEWS update the figures on the off-season rice harvest. Changes by *wilaya* were as follows:

Wilaya	Preliminary	Current	Percent Reduction
Gorgol	4,348	3,261	25
Guidimakha	249	187	25
Brakna	1,144	858	25
Trarza	6,180	4,635	25
Total	11,921	8,941	
Total Net	7,153	5,365	



Map 4: Mali Vulnerability Assessment Summary

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MALI

Northern Strife Sparks Famine Vulnerability

Report released by USAID/Mali on June 1, 1992

SUMMARY

Good harvests have reduced vulnerability for all populations in the south and east of Mali. Civil unrest has affected all populations in the North. The civil unrest has caused large concentrations of herds in certain areas, disruption of pastoral and agricultural production systems, the breakdown of traditional exchange mechanisms between ethnic groups, market failure, and high cereal prices. Most severely affected are approximately 98,000 nomads, 66,000 agropastoralists, and a portion of the 56,000 nomads living in urban areas of Tombouctou, Gao and newly formed Kidal regions (see Map 4). Approximately 100,000 of these have fled to neighboring countries, while many more have left their lands for safe havens elsewhere in Mali.

Programs and plans are either in place or in process to address these needs. Their success depends on the implementation of recently signed peace accords between the Government of the Republic of Mali (GRM) and dissident groups. Although the accords have resulted in the reduced frequency of attacks, persistent banditry and mistrust continue to foster vulnerability.

METHODOLOGY

Vulnerability has a long-term as well as a short-term component. Long-term vulnerability for each *cercle* was evaluated in terms of its ranking relative to the other 46 *cercles* in the country. FEWS/Mali developed a set of 10 indicators to determine short-term vulnerability at the *cercle* level.[1] Short-term indicators were grouped into supply, access, and well-being categories. Each indicator was evaluated in terms of current levels relative to a base period. The values derived were then normalized by dividing the indicator value for each *cercle* by the sum of values for that indicator over all *cercles*.

This vulnerability assessment categorizes the population into six general groups: pastoralists, agropastoralists, dry-land farmers, irrigated farmers, riverine populations, and the urban poor. FEWS recognizes that the systems of production found in Mali are considerably more complex and varied than the categories presented here. Without further analysis, however, a more precise definition of population groups and comparisons across groups are not possible. Vulnerability of the urban poor was evaluated separately from the other five groups.

The relative importance of each indicator was then determined for the five production categories. Weights were assigned to the indicators at the *cercle* level for each of the five population groups to determine the relative vulnerability of each population group within each *cercle*. The values of the ten short-term indicators and long-term vulnerability were then summed to provide a measure of total vulnerability for the population groups. These values were then grouped into four categories of vulnerability (slight, moderate, high, and extreme—see Appendix G for FEWS'definitions of levels of vulnerability) based on the distribution of total vulnerability values for all population groups in all *cercles*. Estimates of the number of persons affected were then made. This was based on population figures from the 1987 census adjusted for growth rates for each *cercle*.[2]

VULNERABILITY OF SOCIOECONOMIC GROUPS

Analysis has shown that one factor alone is usually not sufficient to move a particular population group into high levels of vulnerability to famine. Normally, factors combine to induce high levels of vulnerability. In 1992, high vulnerability is not as dependent upon drought as it is on disruptions in production systems and market structures brought on by civil unrest. Thus, the most vulnerable populations are found in the North (Tombouctou and Gao regions).

Pastoralists

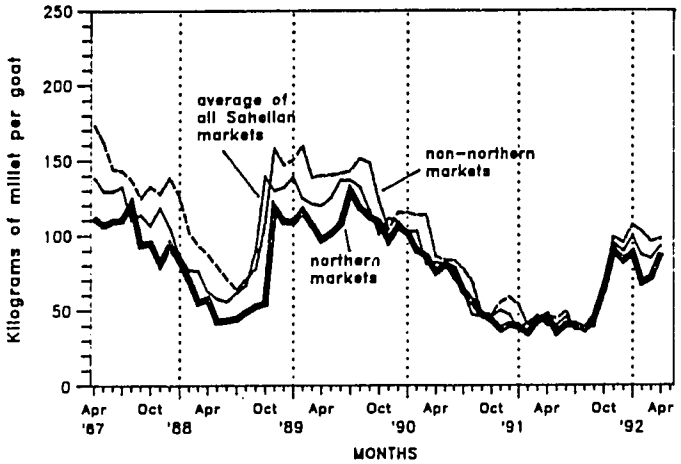
Pastoralists' vulnerability (livestock producers primarily practicing trans-humance[3]) has generally fallen since 1991 in southern and eastern zones of the country. This is primarily due to good pasture conditions and improvements in terms of livestock prices as compared to cereal prices (see Figure 1).

[1] *Administrative units in Mali are regions, cercles and arrondissements, in that order.*

[2] *A more detailed summary of this process and a breakdown of the groups and their classifications are presented in Appendix C.*

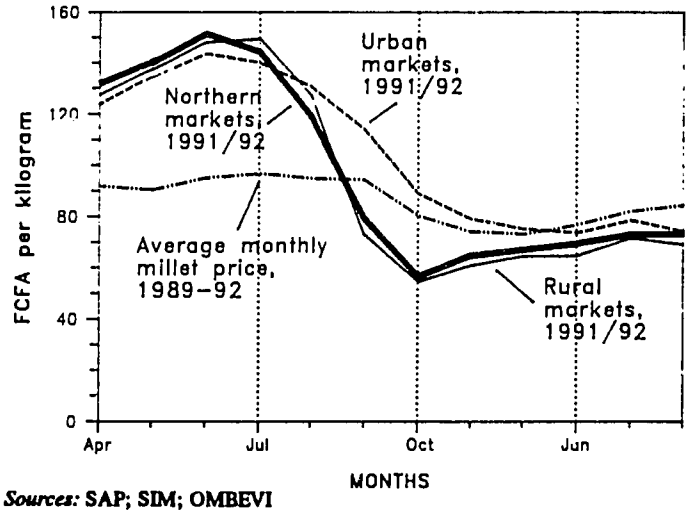
[3] *Transhumance is the seasonal and alternating movement of livestock, together with the persons who tend the herds, between two regions (Webster's New orld Dictionary, Second College Edition).*

Figure 1: Mali, Terms of Trade (Goat for Millet) Since 1991



Sources: SAP; SIM; OMBEVI
Note: Prices used are nominal prices.

Figure 2: Mali, Millet Price Trends Since 1992



Sources: SAP; SIM; OMBEVI
Note: Prices used are nominal prices.

Pastoralists in the North and in parts of the Inland Delta of the Niger River, however are highly to extremely vulnerable. Disruption of seasonal transhumance patterns and the threat of livestock thefts have resulted in large herd concentrations. Rebel attacks and reprisals by the military and civilian populations have forced many to flee the country or seek refuge farther south, away from the zone of conflict. The traditional exchange structures between pastoralists and sedentary populations have also broken down, denying opportunities to counter the effects of disruptions in their normal livelihoods. Approximately 60,300 nomads are considered to be highly vulnerable and 98,000 extremely vulnerable; all are in Tombouctou and Gao regions. This estimated population includes those who have sought refuge in Mauritania, Algeria, and Burkina.

Agropastoralists

In all zones outside of the North, agropastoralists (those practicing crop production and also owning herds) are slightly vulnerable. Excellent harvests, good pasture conditions and improved terms of trade have lowered their vulnerability from 1991 levels. Agropastoralists in the North, however have remained highly vulnerable, owing to civil unrest. They have been the victims of cattle raids by bandits. In the area around Lake Faguibine, they have abandoned many of their settlements and have been unable to fully exploit their agricultural lands. Among these, are recently sedentarized nomads, many of whom have been forced to leave the area entirely to avoid reprisals.

Farmers Practicing Rainfed Agriculture

Dry-land farmers, among the most vulnerable in 1991, have generally improved their food security as a result of excellent harvests. The good harvests of the 1991/92 agricultural season enabled them to begin rebuilding on-farm stocks, although their gains have been hampered somewhat by the fall in cereal prices and a continuing debt load (see Figure 2). Except for those in the North, all are judged to be slightly vulnerable in 1992.

Riverine Farmers and Fisherfolk

Good floods and adequate rain enabled riverine farmers to harvest an excellent crop in 1991. This has served to keep them only slightly vulnerable to famine. The good floods were countered somewhat by low catches for fisherfolk. The fisherfolk's situation was exacerbated by low access to credit for fishing equipment and boat motors. Notwithstanding, they are only slightly to moderately vulnerable in 1992.

Farmers on Irrigated Perimeters

For the most part, farmers with access to irrigated land are only slightly to moderately vulnerable in 1992. Early 1992 crop production on irrigated land was excellent. The subsequent fall in rice prices, however, has moderated their gains.

Due to the risk of attack and the closing of some development projects on irrigated perimeters in the North, farmers on irrigated land in Goundam and Niafunké *cercles* of Tombouctou Region are highly vulnerable. They have had their system of production disrupted and have suffered from the decline in market activity. Further, they cannot depend upon the exchange relationships with pastoralists whose herds graze the fields following harvest, and supply them with milk.

Urban Poor

Though not explicitly addressed in the 1992 vulnerability assessment methodology, significant numbers of urban poor have been rendered highly to extremely vulnerable. The primary cause of this has been civil unrest in the North. Maur and Tuareg residents of urban centers in Tombouctou and Gao regions have been the victims of reprisal for rebel attacks. Many

of these have had to flee towns and cities with few resources. The wealthier Tuaregs and Maurs have been able to resume their activities in cities in the South of the country and in neighboring countries. Others have had to join their rural counterparts in refugee camps. Should they seek to return, they will be highly vulnerable until they are able to resume normal activities. An estimated 55,600 urban Maurs and Tuaregs have been affected to some extent by civil unrest (see Table 3 and Map 5). The urban poor of other ethnic groups have suffered an increase in vulnerability due to high commodity prices in urban centers of the North.

Table 3: Mali, Highly Vulnerable Nomadic Populations in Urban Areas

Cercle	Population
Youvarou	125
Tombouctou	14,570
Diré	3,075
Goundam	6,070
Gourma-Rharous	10,210
Niafunké	430
Gao	12,940
Ansongo	2,220
Bourem	1,250
Kidal	3,330
Ménaka	1,385
Total	55,575

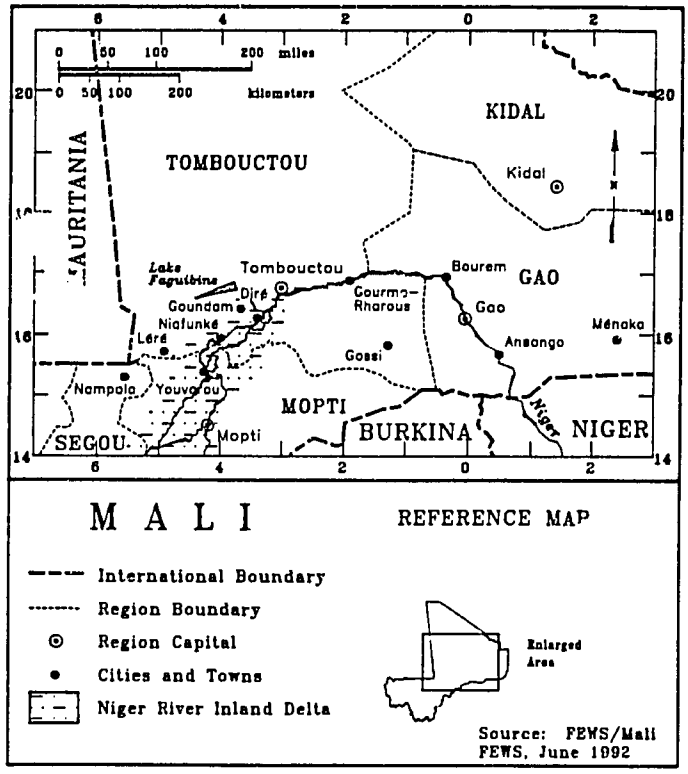
Source: FEWS/ Mali

INTERVENING FACTORS

Recently Signed Peace Accords

A peace accord was signed between the GRM and the Unified Azaouad Movements and Fronts (MUFA) on April 11, 1992. The accord offers greater autonomy and involvement of the local population in regional government. It also calls for the establishment of police and military units combining GRM and MUFA elements in June. Following the signing of the accords, rebel attacks ceased, though banditry continued. Some Tuaregs and Maurs began to return to their homelands. In May, an attack on a transport vehicle between Nampala and Léré, and an attack on the Norwegian Church Aid compound in Gossi were followed by military reprisals (see Map 5 for locations). The effect of these later actions cannot yet be judged, but should serve to maintain current vulnerability at high levels for the affected populations.

Map 5: Mali Reference Map



Food Aid Plans

Monthly meetings of non-governmental organizations (NGOs) operating in the North began in June 1991 under the coordination of Cooperation Suisse. These meetings have evolved into a working group by which information on the current situation is discussed. It also serves as a means of coordinating NGO relief action.

The International Committee of the Red Cross (ICRC) has carried out food distributions to populations around Lake Faguibine that it have found to be in need. This is an activity that is secondary to their primary purpose of fostering a return to normal exchange and interactions between the several ethnic groups.

In February, initial plans for stocking cereal along the banks of the Niger River in Tombouctou Region were presented. The action involves Cooperation Suisse, Africare, AEN, Euro-Accord, and OEMES (a Malian private voluntary organization), and is coordinated by CARE. Initial purchase or provision of 1,000 metric tons (MT) of grain has come from Cooperation Francaise and USAID/Mali, though several NGOs have provided their own funding. CARE has employed a logistics expert for an initial period of one year and has drawn up plans for the stocking of a maximum of approximately 3,000 MT of cereals. These stores will be managed by the collaborating NGOs and used for direct, free distributions; food for work; or the establishment of cereal banks as the situation requires.

World Vision has expressed its interest in undertaking similar activities in Gao Region.

USAID/Mali has informal approval from AID/Washington for 4,000 MT of emergency sorghum, under the U.S. Section 416, for use in the North. USAID/Mali is awaiting formal approval. Discussions are currently underway between GRM and USAID/Mali to finalize the disposition of the grain.

The GRM Early Warning System (SAP) has recommended the distribution of 760 MT of grain in four arrondissements of Niafunké Cercle (Tombouctou Region), and in two arrondissements of Youvarou Cercle (Mopti Region). They have placed Goundam Cercle and Kidal Region in a special status, pending their confirmation of conditions there. Given the continued absence of personnel in these areas who would ordinarily provide information to the SAP, the SAP is making no quantitative recommendations for the majority of vulnerable areas,.

GRM and several UN organizations are planning assessment missions to Tombouctou and Gao regions, which should enable the planning of relief and re-insertion programs in the next few months. GRM has conducted missions to Mauritania and Burkina to contact refugees in those countries. These missions will be followed up in June by joint GRM and UN missions to Mauritania, Burkina and Algeria.

Due to the high level of ethnic tension, in order to successfully address the needs of the most vulnerable populations, all residents of the area will need to receive some assistance. This will serve to avoid the perception that one group is being favored over another. Failure to do this may make food distributions and relief efforts counter productive.

CONCLUSIONS

Good harvests and the resulting fall in cereal prices have improved access to food for most of the country. Civil unrest in the northern regions of Mali, however, has combined with disruptions in production systems and exchange mechanisms to make approximately 400,000 persons highly vulnerable and 150,000 extremely vulnerable to famine. The recovery of these vulnerable populations is highly dependent upon the successful implementation of the peace accord between GRM and dissident groups.

In forthcoming months, FEWS/Mali will follow population movements, market activity, and pasture conditions to monitor the status of highly and extremely vulnerable populations. In addition, agroclimatic conditions will be monitored for the slightly to moderately vulnerable populations.

APPENDIX C: Methodology for Mali Vulnerability Assessment, May 1992

INTRODUCTION

Overall vulnerability to famine is a function of long-term factors as well as current production, access, and well-being factors. Sets of indicators were identified for each of these four areas. Initial analysis of indicators was carried out at the *cercle* level. For those indicators with data that extended back three or more years, indices were calculated for each *cercle* using the current value divided by a base period average. These indices were normalized by dividing the index value for a given *cercle* by the sum of values across all *cercles* for each indicator, thus each indicator took a value of between zero and one for each *cercle*.

A spatial definition of coverage by six production system classes was used to evaluate the relative importance of each indicator for each class. A weight between zero and one was assigned to each class for each indicator. This was then associated with a digital map of production system class coverage. The weighted values were then multiplied by the *cercle*-level indicator values. A map of the resulting values was then developed using IDRISI (a Geographic Information System software package) to give a representation of the occurrence of vulnerability classes in geographic space by production system and by *cercle*.

Estimates of the population affected were achieved through use of *cercle*-level census data, which identify urban, rural sedentary, and nomadic populations. By assigning distributions of these populations through the use of the map of production system classifications, the estimates of the number of people in each vulnerability category by production system class was developed for each *cercle*.

LONG-TERM INDICATORS

Five long-term indicators were selected: physical quality of life, riskiness of cereals production, livestock wealth, cash crop income potential, and the potential for cash income or remittances. This set of indicators establishes a "baseline" level of vulnerability for each *cercle*.

Physical quality of life is a function of six health and education factors. Every attempt was made to collect data at the *cercle* level. Where *cercle*-level data were unavailable, levels for the region were assigned uniformly across *cercles*. The factors are the following:

- doctors per 100,000 patients at the *cercle* level in 1986,
- square kilometers per clinic at the *cercle* level in 1976,
- gross mortality rate at the regional level in 1986,
- infant mortality rate at the regional level in 1986 (number of deaths within the first year of life per thousand live births), and
- literacy rate for population over six years of age at the regional level in 1976.

Riskiness of cereal production depends on average millet and sorghum yields, average surface area planted to millet and sorghum, and gross average per capita cereal production. Data from the DNSI agricultural surveys for the years 1985-89 were used. Rice production was not considered in the calculation because of insufficient data.

In addition to inter-annual averages, inter-annual variation was considered. The Coefficient of Variation (CV) was calculated for each of the preceding variables (CV is the standard deviation divided by the mean). A high CV for average yields, average area planted, and average per capita production connotes greater risk.

Relative livestock wealth is the number of tropical livestock units (TLU) per capita based on livestock estimates for each *cercle* in 1984. One TLU equals 1.5 cattle or 12 small ruminants (sheep or goats).

Cash crop income potential is based on the average percentage of total surface area in each *cercle* that was devoted to cotton or ground nut production during the period from 1985 to 1989.

Cash income and remittance potential is based on access to wage labor opportunities and remittances. A *cercle* was assigned a value of 0.5 if there were mining or major irrigated perimeters in the *cercle* or a value of 0.25 if such a facility was located in an adjacent *cercle*. Remittance potential was based on the percentage of the adult male population that was absent during the 1976 census. The cash income and remittance potential was calculated as the rank of the summed scores across all *cercles*.

PRODUCTION INDICATORS

Relative cereal production (millet, sorghum, rice, and maize) was evaluated using the 1991/92 *cercle*-level cereal production estimate as a percentage of the 1985-91 average. A high relative cereal production ratio indicates low vulnerability with regard to crop production.

Range/livestock quality was assessed based on the incidence of disrupted transhumance and unusual concentrations in dry- and wet-season pastures at the *cercle* level. A high incidence of disruptions and concentrations indicates high vulnerability in livestock production.

ACCESS INDICATORS

Access to cereals was based on the 1991/92 average per-kilogram consumer price of millet in major *cercle* markets compared to 1990/91 for the period May through April. A high index value for cereal prices indicates low vulnerability to food access.

Asset liquidity was evaluated using 1991/92 goat prices relative to the average over the period 1987-91. A high goat price index indicates high liquidity, and, therefore, low vulnerability to market access.

The *riskiness of access* to cereals was based on the CV of monthly average cereal prices over the period 1989 through 1992. A high CV indicates high levels of uncertainty in the cereals market and therefore high vulnerability to food access.

The *riskiness of livestock markets* was based on the CV of monthly average goat prices over the period 1987-92. A high CV indicates high levels of uncertainty in the livestock market and, consequently, high vulnerability for those who depend on livestock as liquid assets for food access.

WELL-BEING INDICATORS

The *physical effects of food stress* are indicated by deaths from diseases that are otherwise not life-threatening. High rates of death from measles and meningitis during 1991 at the *cercle* level indicate high vulnerability.

During periods of high vulnerability, *extensive use of labor resources and reductions in expenditures which have no immediate return* occur at the household level. This is indicated by drops in the school enrollment rate at the primary (first cycle) level. Primary school enrollment rates for October 1991 were compared to 1987 levels. Low relative enrollment rates indicate higher levels of vulnerability.

Civil unrest increases vulnerability to famine, because of its disruptive effect on production and market behavior. Deaths due to civil unrest were estimated for all *cercles*. Each *cercle* value was evaluated in terms of the national total. Relatively high death rates indicates increased vulnerability from civil unrest.

Civil unrest is further indicated by the displacements of the resident population. Relative intensity of population displacements for each *cercle* were estimated. High relative rates of displacement indicate increased vulnerability to the inability to pursue normal livelihoods among the affected population.

Table C-1: Mali, Population of Groups per Vulnerability Category, by Cercle (000)

	Slight		Moderate		High		Extreme	
Cercle	Rural	Nomad	Rural	Nomad	Rural	Nomad	Rural	Nomad
Kayes	219	10	0	0	0	0	0	0
Bafoulabé	138	1	0	0	0	0	0	0
Diéma	0	0	0	0	101	0	0	0
Kéniéba	98	1	0	0	0	0	0	0
Kita	233	0	0	0	0	0	0	0
Nioro	0	0	121	2	0	0	0	0
Yélimané	89	2	0	0	0	0	0	0
Koulikoro	117	1	0	0	0	0	0	0
Banamba	1,331	0	0	0	0	0	0	0
Dioila	200	1	49	0	0	0	0	0
Kangaba	0	0	60	0	0	0	0	0
Kati	240	0	0	0	0	0	0	0
Kolokani	162	2	0	0	0	0	0	0
Nara	148	4	0	12	0	0	0	0
Sikasso	309	0	0	0	0	0	0	0
Bougouni	209	0	0	0	0	0	0	0
Kadiolo	94	0	0	0	0	0	0	0
Kolondiéba	95	0	0	0	0	0	0	0
Koutiala	251	0	0	0	0	0	0	0
Yanfolila	133	0	0	0	0	0	0	0
Yorosso	99	0	0	0	0	0	0	0
Ségou	211	1	0	0	0	0	0	0
Baraouéli	131	0	0	0	0	0	0	0
Bla	141	0	0	0	0	0	0	0
Macina	152	2	0	0	0	0	0	0
Niono	8	0	123	4	0	0	0	0
San	187	0	0	0	0	0	0	0
Tominian	135	1	0	0	0	0	0	0
Mopti	24	0	142	10	0	0	0	0
Bandiagara	184	0	2	2	0	0	0	0
Bankass	150	4	0	0	0	0	0	0

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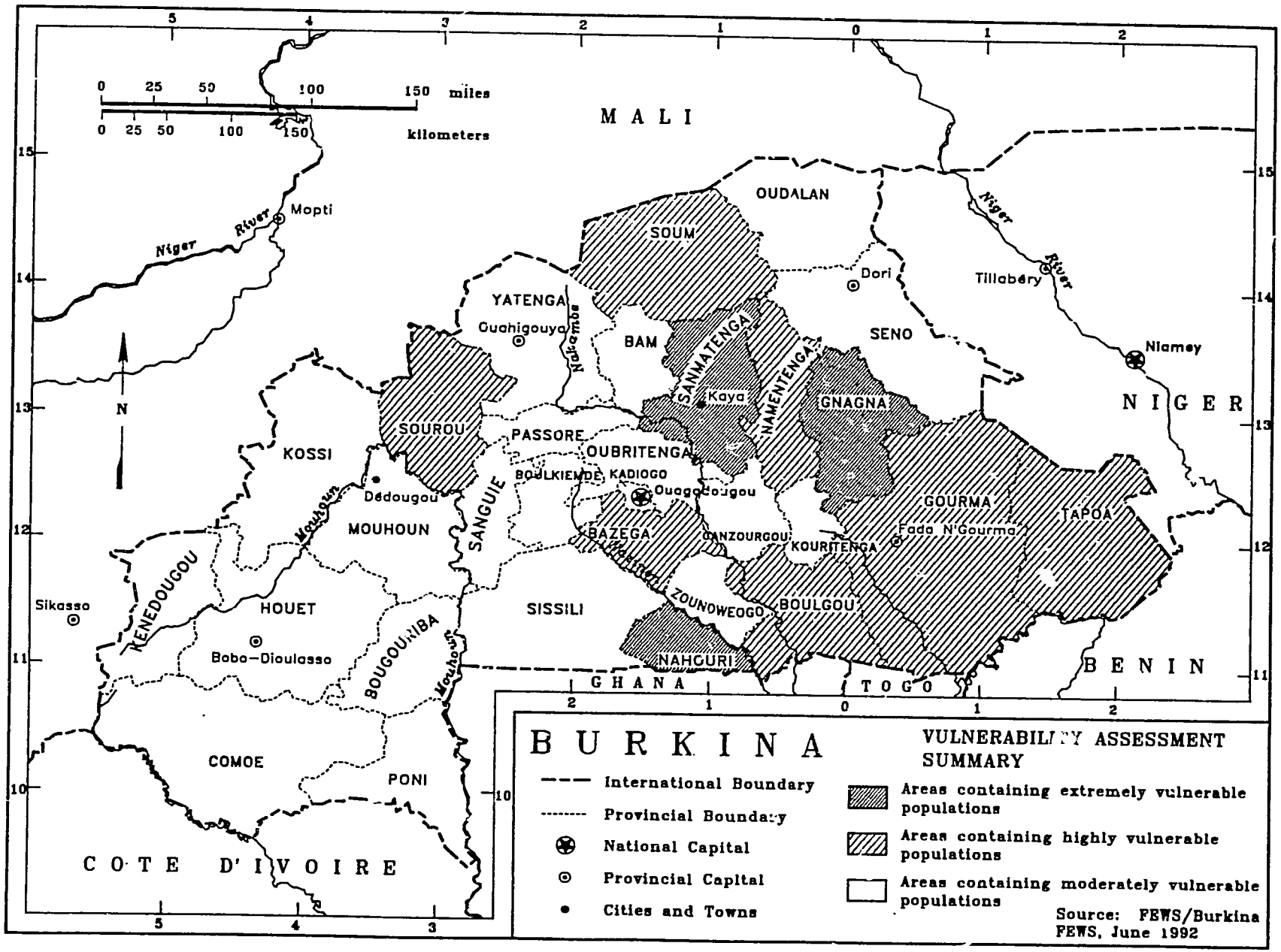
	Slight		Moderate		High		Extreme	
Cercle	Rural	Nomad	Rural	Nomad	Rural	Nomad	Rural	Nomad
Djenné	112	2	0	0	0	0	0	0
Douentza	0	0	130	12	0	0	0	0
Koro	0	0	216	8	0	0	0	0
Ténénkou	0	0	103	9	0	0	0	0
Youvarou	0	0	66	5	0	0	0	0
Tombouctou	0	0	51	0	0	11	0	0
Diré	0	0	128	13	0	0	0	0
Goundam	0	0	7	0	0	0	66	20
Gourma Rharous	0	0	33	35	0	0	0	0
Niafunké	0	0	0	0	88	0	0	6
Gao	0	0	8	0	73	0	0	17
Ansongo	0	0	0	0	42	0	0	27
Bourem	0	0	47	0	0	11	0	0
Kidal	0	0	0	0	6	0	0	28
Ménaka	0	0	16	0	0	35	0	0
Total	4,358	26	1,302	123	310	60	66	98

Source: FEWS/Mali

Map 6: Burkina Vulnerability Assessment Summmary



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BURKINA

Bumper Crop Saves Northwest

Report released by USAID/Burkina on May 22, 1992

SUMMARY

Burkina's cereal production was excellent at the national level and in areas that were identified as extremely vulnerable in the 1991 FEWS Vulnerability Assessment (see Appendix G for FEWS' definitions of levels of vulnerability). This has significantly reduced overall vulnerability in Burkina for 1992. However, localized crop failures combined with limited opportunities for other income have created economically stressed areas and populations (see Map 6). In addition, Sanmatenga, Boulgou, Nahouri, Bazèga, Tapoa, Boulkiémdé and Gnagna provinces have suffered below-average cereal production for two and three consecutive years, causing 80,000 smallholder agriculturists in these provinces to be extremely vulnerable. A total of 400,000 people are either extremely or highly vulnerable in Burkina.

METHODOLOGY

The 1992 Vulnerability Assessment evaluated long-term components of vulnerability to famine by characterizing the level of development and general economic situation at the provincial level (Burkina has 30 provinces). The assessment combined indicators of economic shocks (including the 1991/92 cereal balance and pasture quality) with long-term components to identify provinces in which economic resources are limited. FEWS/Burkina identified four socioeconomic groups (smallholder agriculturalists, agropastoralists, largeholder agriculturalists and wage earners/artisans). The effects of economic stresses created by the level cereal production and the state of pasture quality were used to assess levels of vulnerability of the two most vulnerable groups (smallholder agriculturists and agropastoralists).

The assessment made four key assumptions:

- Economic insecurity increases vulnerability to famine;
- low levels of development increase vulnerability to famine;
- household income and purchasing power in a province are related to the general economic situation of that province; and
- agricultural production (both crops and livestock) provides the greatest proportion of household income for the most vulnerable socioeconomic groups.

In this Vulnerability Assessment, each province was ranked according to the relative value of five indicators of general level of development, eight indicators for sources of household income and four indicators of economic shocks (see Appendix D for indicator definitions). The general development, household income and economic shocks sets of indicators were weighted as 35, 30 and 35%, respectively, of total vulnerability.

Ranking indicated that the ten most economically stressed provinces are those identified in Map 6. These provinces have a low level of economic development and limited access to sources of household income other than cereal production. In addition, three have had below average cereal production for three years in a row (the average covers production for 1985-90). These 10 provinces have high proportions of smallholder agriculturists and agropastoralists, the groups most affected by a poor agricultural season.

VULNERABILITY OF SOCIOECONOMIC GROUPS

Smallholder Agriculturalists (SHAs)

SHA households make up 49% of the total population of Burkina. They depend mostly on their own cereal production for the bulk of their annual food supply. Livestock and cash crops contribute only a small portion of household income. SHAs may engage in off-season market gardening, gold mining or seasonal wage labor if the opportunities exist.

Due to below-average cereal production for two and three consecutive years, SHAs in Sanmatenga, Boulgou, Tapoa, Bazèga, Nahouri, Boulkiémdé and Gnagna provinces have had to purchase most of their cereal, seriously depleting household resources. There are approximately 80,000 SHAs who are extremely vulnerable in these provinces, where there are very few other sources of income to replace that lost to below-average cereal production. Provincial Drought Commissions in Gnagna and Tapoa provinces noted that farmers abandoned cereal

production in August of 1991, when it was too late to plant and able-bodied men left for southern Gourma Province. Many families left for good. The exodus continues. Another 241,000 SHAs are highly vulnerable and 483,000 SHAs moderately vulnerable in these economically poor provinces.

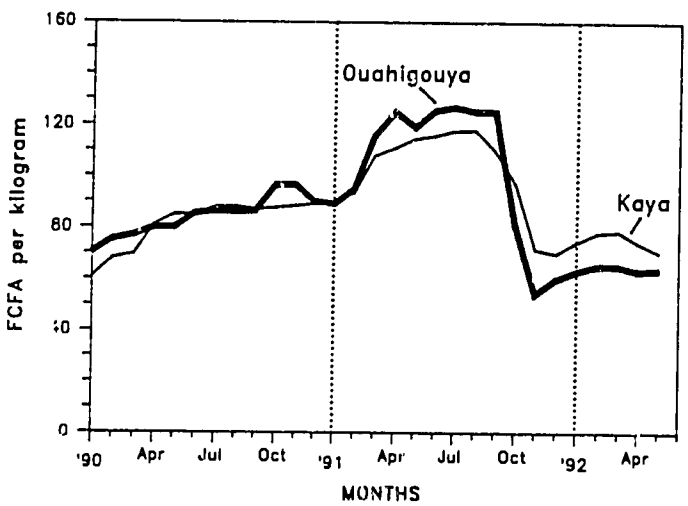
On the whole, the marketed cereal surplus from the 1991/92 season was high because of the excellent cereal production year. This resulted in a significant drop in cereal prices during the harvest period (October through December), especially in provinces where cereal production was above average in 1991/92. Zoundwèogo, Bougouriba, Yatenga, Soum, Kossi and Kénédougou provinces experienced per capita production more than two standard deviations above average.

The low prices continued into the beginning of 1992 (see Figure 3). Unfortunately, these low prices are hurting SHAs in Yatenga, Sourou and Soum, where sales of surplus cereal at a good price would help replenish some of the household income lost during the past two consecutive bad years. The low to average prices may be reducing vulnerability of SHAs in provinces that had production below average this year and past years. The cereal prices will probably rise significantly only if the cereal production season starts looking bad.

Agropastoralists (AGPs)

AGPs make up 16% of the population. They have more diversified sources of household income than SHAs but are more dependant on pasture quality and market prices of cereals and livestock. Pasture quality was below average in nine of the poorer provinces of eastern Burkina this year. For this reason, 79,000 AGPs are highly vulnerable and another 92,000 AGPs are moderately vulnerable. They have had to migrate to greener pastures in northern and western Burkina and liquidate livestock.

Figure 3: Burkina, Millet Prices at Two Representative Markets



Source: FEWS/Burkina; National Cereals Office (OFNACER); Market Information System (SIM)

Pastures in northern Burkina were excellent in 1991/92 which reduced the vulnerability of northern AGPs who had suffered greatly in 1990/91. Livestock prices have continued to be strong since late 1991. For AGPs the low to moderate cereal prices and good animal prices are providing good terms of trade throughout the country. The vulnerability levels for these groups are summarized in Appendix D.

Wage Earners and Artisans

This group includes public and private employees, mechanics, weavers, metalworkers and all other service-oriented occupations. They make up 18% of the population. Most of people in this group are associated with urban areas (settlements with a population of more than 10,000). There have been no changes in the Burkina economy that would increase their vulnerability. They remain slightly vulnerable. The *urban poor* are a subset of this group. FEWS/Burkina estimates the urban poor to be about 10% of the urban population of each province. These 164,000 people are moderately vulnerable.

Largeholder Agriculturalists (LHAs)

LHA households contain 18% of the total population of Burkina. They have more diversified cropping possibilities than SHAs owing to their larger farms and favorable locations (southwestern Burkina, and the best land in other parts of the country). They also engage in cash cropping of cotton and cereal. Because of their diversified income sources and high level of annual cereal production, these households can more easily adjust to occasional crop failures. They are only slightly vulnerable in 1992, because they benefitted most from the excellent 1991/92 cereal and cotton production year.

CONCLUSIONS

An excellent crop year for the 1991/92 production season has relieved stress on people living in Yatenga, Sourou and Soum provinces. Imports of emergency food aid will not be required in Burkina this year. However, 13 provinces which have had below average cereal production for the past three years or have poor pastures this year have a total of 400,000 people who are extremely or highly vulnerable. These provinces will need far above average cereal production in 1992/93 to begin the process of rebuilding household wealth.

Unfortunately, none of these provinces are being monitored by the Government of Burkina (GOB) Zones at Risk Project or the Save The Children (United Kingdom)/OXFAM Famine Early Warning System. However, the National and Provincial

Drought Commissions have been assessing food aid needs for these provinces via frequent field trips.

Other monitoring efforts will focus on SHAs. Using its traditional tools of NDVI data and METEOSAT rainfall estimates, FEWS/Burkina will estimate the quality of the planting season, planting dates and the quality of pastures as the rainy season develops (see inside back cover for explanation of NDVI and METEOSAT). The GOB National Drought Commission, Meteorological Service and Regional Centers for Agropastoral Production will be monitoring the evolution of the 1992/93 agricultural season using point rainfall data and surveys that estimate area planted and yield. The National Cereals Marketing Board/Market Information System will follow cereal prices and flows. As was the case in 1990/91, increasing cereal prices in November and December (before the usual end of harvest) would signal a poor production season.

APPENDIX D: Methodology for Burkina Vulnerability Assessment, May 1992

INTRODUCTION

Vulnerability to famine in Burkina is a function of the economic conditions in a province and specific shocks to vulnerable socioeconomic groups living in that province. To assess the relative differences in vulnerability to famine for each of the 30 provinces (with an average of 300,000 people), the assessment uses three groups of indicators:

- general level of development (very slow changing, more than 10 years),
- access to economic resources (slow changing, from three to 10 years), and
- economic shocks (fast changing, from one to three years).

Socioeconomic groups are then identified and a level of vulnerability is assigned to each group based on economic shocks through cereal production and pasture quality and the overall economic situation in the province (economic buffers).

ECONOMIC CONDITIONS BY PROVINCE

General Level of Development

The indicators of general overall development within a province are: the crude death rate, infant mortality rate, literacy rate, school attendance of 7- to 13-year old children (National Institute for Statistics and Demography—INSD, 1989), and percent births attended by a professional (Ministry of Health/Division for Studies and Planning—MOH/DEP, 1991).

Access to Economic Resources

The most important sources of household income for Burkina are cereal production, other food crop production, wages, remittances from Côte d'Ivoire, livestock production, artisinal gold production, cotton production, and irrigated gardening (of vegetables). The contribution of each source to the national economy is given in millions of French West African Francs (FCFA) and as the tons of millet that to which it is equal (millet equivalents—MEQ) at a millet price of 40,000 FCFA per metric ton (MT). All MEQs were converted to MEQ per capita by dividing by the estimated provincial population of June 1992 (INSD, 1989) and the MEQs per capita were summed. The provinces were then ranked by this sum.

Average Cereal Production

Average annual cereal production (1985-90) contributes 20% to the national economy. The contribution of this source of income was distributed to the provinces using agricultural statistics from the Ministry of Agriculture and Animal Husbandry/Division for Studies and Planning (MAE/DEP).

Wages

Wages come from three sectors: public (34,000 million FCFA), military (20,700 million FCFA—wage estimates are from *Jeune Afrique Economie*, 1992) and private. FEWS/Burkina estimated the private sector contribution as equal to that of the public and military sector combined. The total of 109,400 million FCFA is 2,735,000 MEQs. This household income source was distributed to provinces as a function of the percentage of population in towns of more than 10,000 people and of the distance of the province's geographic center to urban areas.

Remittances from Cote d'Ivoire

There are two to three million Burkinabè living in Côte d'Ivoire. They send money back to families living Burkina. The value of these remittances is estimated to be about 45,000 million FCFA (*Jeune Afrique Economie*, 1992), or 1.125

million MEQs. These MEQs were distributed to provinces as a function of the percent of the population out of the country in 1985.

Livestock Production

Livestock production contributes about half the FCFA that rainfed agriculture contributes to the national economy (World Bank, 1989). FEWS estimated the contribution of livestock at 40,000 million FCFA, or 1 million MEQs. FEWS/Burkina distributed this source of income to provinces as a function of the total number of cattle, sheep and goats per capita in each province. (Animal Census, MAE/DEP, 1989).

Other Crops

The value of other crops (peanuts, Bambara ground nuts, cowpeas and tubers, etc.) were found by multiplying the 1991 production in MT times the value to the farmer for each crop and totaling the value of all the crops for each province.

Gold Production

The quantity of artisanal gold production for each province was the official figure from GOB gold purchases in 1990, provided by Comptoir Burkinabè des Métaux Précieux (CBMP), multiplied times two to account for clandestine trade. FEWS/Burkina assigned a value of 2,500 FCFA per gram to the gold.

Cotton Production

Data on cotton production comes from agricultural statistics (MAE/DEP). FEWS/Burkina assigned a value of 45,000 FCFA per ton to farmers.

Irrigated Vegetable Gardens

FEWS/Burkina estimated that irrigated gardens have a value of 2,000,000 FCFA per hectare. Data on the distribution of gardens come from MAE/DEP.

Economic Shocks

Cereal Balance

The most vulnerable households depend on annual cereal production and pasture quality. The important considerations when looking at the cereal balance for any year is to compare it with the average cereal balance and the difference from average for the past three years. The ranks of the differences from average (normalized by dividing by the standard deviation) for the years 1989, 1990 and 1991 were themselves averaged using weights of 4, 10 and 15% for 1989, 1990 and 1991, respectively, reflecting the importance of the most recent year.

Pasture Quality

The other major component of short-term vulnerability is pasture quality and water availability for livestock. To assess this component, maximum NDVI values for the season in each province in 1991 were compared with the average maximum (in this case, over the period from 1984 to 1989). Maximum NDVI gives an indication of biomass production for the year. Further explanation of NDVI is on the inside back cover.

Conclusion, Provincial Economic Conditions

The values of each indicator were ranked and the ranks were averaged based on weights shown in Table D-1. The three groups of indicators were given equal importance.

The advantages of ranking are that the absolute values of data points are less important than their relationship with other data points (Kahn, 1989). In Burkina, this is important because the absolute values of most of the data related to food security are not reliable. By averaging ranks, combinations of different data can be presented in a simple, straightforward manner. Finally, ranking indicates regional priorities for development assistance and food aid within Burkina.

This methodology allows new information to be assimilated into indicators and old information to be revised and updated easily. The more economic information that becomes available through household income studies the more accurate the assessment will be.

SOCIOECONOMIC GROUPS

Vulnerable socioeconomic groups in Burkina are agropastoralists, smallholder agriculturist, largeholder agriculturists, and wage earners/artisans. The number of wage earners and artisans in each province was determined as a function of the percentage of the provincial population living in or near settlements of more than 10,000 people. This is 18% of the total population of Burkina.

The number of agropastoralists in a province was estimated as a function of the total number of cattle, sheep and goats per capita in that province. They make up 16% of the total population.

Agriculturalists are the rest of the population. They were divided into smallholder and largeholder agriculturalists as a function of the percentage of households with less than six hectares and more than six hectares, respectively (Ministry of Agriculture, *Resultats de l'enquete permanente agricole: Campagne 1990/91-1991/92*). Smallholders and largeholders are 49 and 18%, respectively, of the total population of Burkina.

VULNERABILITY OF SOCIOECONOMIC GROUPS

The level of vulnerability for smallholders was determined as a function of per capita cereal production difference from average for the past three years and value of other economic resources. If total economic resources were greater than the equivalent of 1,000 kilograms (kg) of cereal per capita, there were only slightly vulnerable SHAs in the province. Thus, the relatively rich provinces of Comoé and Passoré have had below average cereal production for the past three years, yet SHAs in these provinces are only slightly vulnerable because they have access to some of the other sources of income present in these provinces.

If total economic resources were less than the equivalent of 1,000 kg of cereal per capita, standard deviations below average cereal production for the past three years was used as the percent of the total smallholders who were more than slightly vulnerable. Sanmatenga and Nahouri provinces had a 3-year standard-deviation-below-average cereal production. These were arbitrarily changed to -0.95. Thus, 95% of the SHAs in these provinces are at least moderately vulnerable. Similarly, in Gnagna Province, where cereal production was -0.91 of a standard deviation below average for three years, 91% of the SHAs are more than slightly vulnerable. In Boulgou Province, 66% are more than slightly vulnerable, etc. The levels of vulnerability were distributed in the following manner: 10% were extremely, 30% were highly and 60% moderately vulnerable.

The levels of vulnerability for agropastoralists were a function of the difference from average (in standard deviations) of maximum NDVI for the third dekad of July. As with the analysis for SHAs, the standard deviation was used as an index and converted to a percent. If NDVI was better than average, then all agropastoralist were slightly vulnerable. If it were less than average, it was used as the percent of total number of agropastoralists who are highly vulnerable in a province. Twenty-five percent of the remaining agropatoralists were considered moderately vulnerable and those not in the first two categories were considered slightly vulnerable. Results are in Table D-2.

Table D-1: Burkina, Relative Weighting of Indicators Used

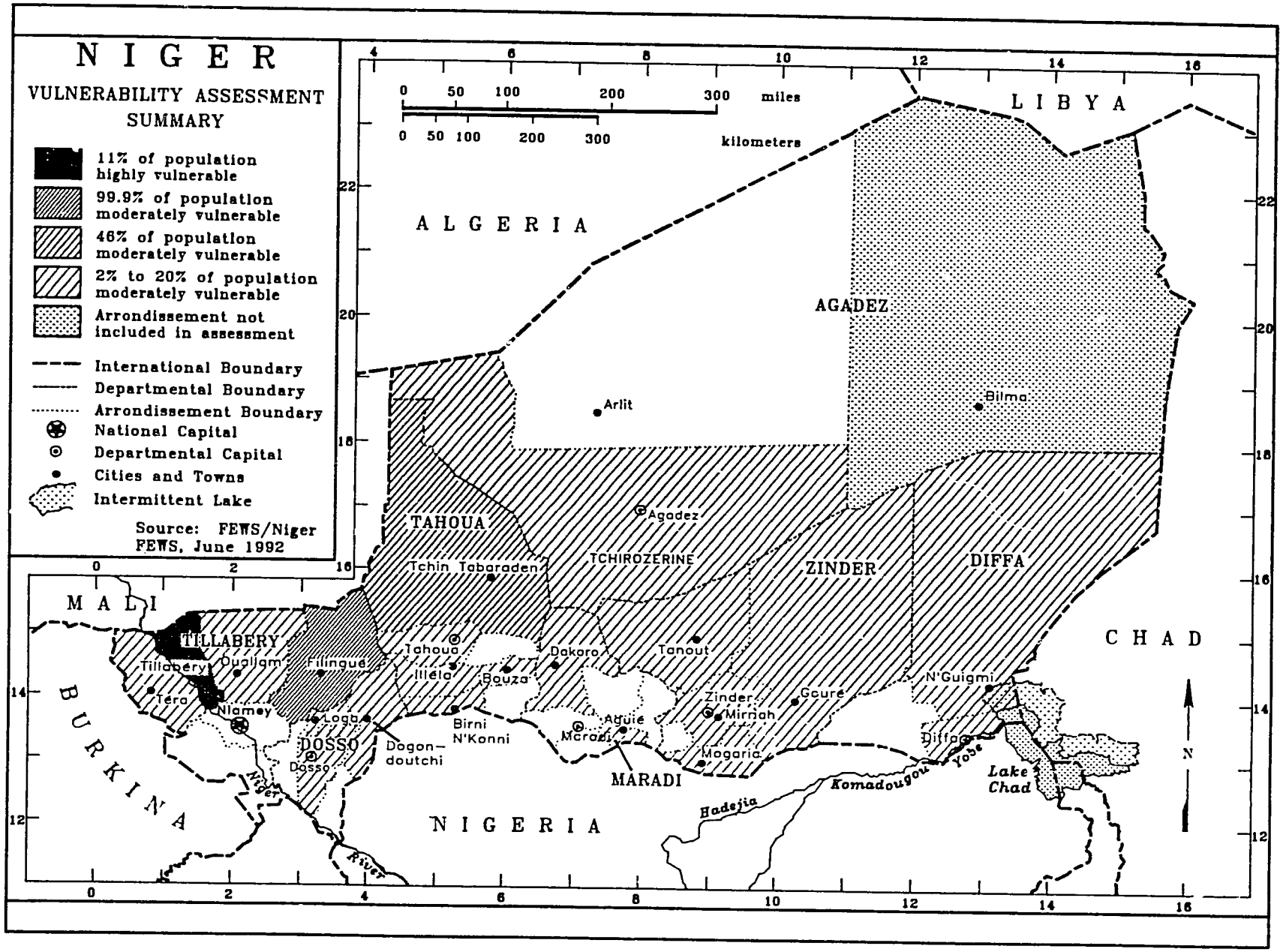
Indicator	Weight (%)	
General Development		
Sub-total		35
Crude death rate	7	
Infant mortality rate	7	
Literacy rate	7	
School attendence rate	7	
Percent of births attended by professional health care provider	7	
Economic Access		
Sub-total (MEQ summed for each province)		30
Average cereal production from 1985 to 1990		
Distance to towns of more than 10,000 population		
Percentage of population out of the country in 1985		
Livestock production		
Production of other food crops		
Gold mining		
Cotton production		
Irrigated vegetable gardening		
Economic Shocks		
Sub-total		35
Per capita production standard deviations below average—1989 Final	5	
Per capita production standard deviations below average—1990 Final	10	
Per capita production standard deviations below average—1991 Final	15	
1991 Pasture Quality	5	
Total		100

Source: FEWS/Burkina

Table D-2: Population and Levels of Vulnerability for Socioeconomic Groups of Burkina in 1992

	Agropastoralists			Smallholder Agriculturalists				Total, Extreme & High
Province	High	Moderate	Slight	Extreme	High	Moderate	Slight	
Sanmatenga	0	0	85,402	21,165	63,495	126,989	11,139	84,659
Boulgou	0	0	70,537	20,984	62,953	125,907	109,799	83,938
Gnagna	0	0	95,456	15,654	46,962	93,924	14,695	62,616
Boulkiémdé	0	0	37,968	13,596	40,788	81,575	35,867	54,384
Nahouri	1,350	3,715	11,145	7,498	22,495	44,990	3,947	31,343
Tapoa	22,927	5,373	16,118	952	2,855	5,711	88,762	26,734
Bazèga	17,400	15,663	46,989	761	2,282	4,563	198,897	20,442
Gourma	11,275	21,053	63,160	0	0	0	208,963	11,275
Zoundwéogo	10,294	4,633	13,898	0	0	0	118,314	10,294
Poni	6,141	6,334	19,001	0	0	0	172,995	6,141
Bougouriba	3,999	6,543	19,628	0	0	0	136,539	3,999
Sissili	3,381	11,622	34,867	0	0	0	128,746	3,381
Sourou	2,135	16,965	50,894	0	0	0	154,572	2,135
Oubritenga	0	0	55,793	0	0	0	199,004	0
Kossi	0	0	30,670	0	0	0	117,705	0
Mouhoun	0	0	28,477	0	0	0	117,896	0
Séno	0	0	111,722	0	0	0	124,266	0
Namentenga	0	0	76,487	0	0	0	118,163	0
Kénédougou	0	0	6,536	0	0	0	87,953	0
Oudalan	0	0	25,140	0	0	0	59,752	0
Soum	0	0	83,387	0	0	0	95,260	0
Kouritenga	0	0	48,380	0	0	0	138,667	0
Kadiogo	0	0	2,830	0	0	0	24,236	0
Bam	0	0	26,089	0	0	0	98,407	0
Hout	0	0	20,568	0	0	0	225,950	0
Passoré	0	0	18,728	0	0	0	187,118	0
Comoé	0	0	13,192	0	0	0	136,930	0
Sanguié	0	0	23,344	0	0	0	127,295	0
Yatenga	0	0	78,831	0	0	0	363,257	0
Ganzourgou	0	0	60,816	0	0	0	123,179	0
Total	78,902	91,899	1,276,053	80,610	241,830	483,661	3,728,273	401,342

Sources: FEWS/Burkina; MOH/DEP; MAE/DEP; INSD; CBMP; *Jeune Afrique Economie* (see Appendix D text)



Map 7: Niger Vulnerability Assessment Summary

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NIGER

Overall Food Security Best in Three Years

Report released by USAID/Niger on June 1, 1992

SUMMARY

Vulnerability conditions for Nigerien herders have increased since January, but a normal start of the rainy season (i.e., before the end of June) should markedly improve this group's food security. Food security for other groups in Niger is probably the best since 1989 (for this time of year). No special monitoring or relief operations are foreseen as of mid-May, except for farmers in Filingué Arrondissement.

METHODOLOGY

This assessment identifies socioeconomic groups vulnerable to food insecurity at the onset of the 1992/93 agricultural season (see Appendix G for FEWS' definitions of levels of vulnerability). Niger's three major socioeconomic groups are farmers, herders and urban dwellers. Only farmers and herders, who make up 85% of the population, are covered in this assessment. The lack of a functional urban vulnerability methodology precludes an accurate assessment of vulnerability within that geographically defined group. We assume the vulnerability of urban populations is slightly less than that of the surrounding rural populations. Also note that sufficient data were not available to assess vulnerability in Bilma Arrondissement (Agadez Department—see Map 7).

An initial screening for vulnerability was based on the sufficiency of cereal production for farmers and both pasture production and cereal-to-livestock terms of trade for herders. This screening indicated that populations in 24 of Niger's 35 arrondissements are at least slightly vulnerable to food insecurity going into the 1992 rainy season.

Relative levels of vulnerability among the 24 arrondissements were identified based on a rating of farmers and herders using quantitative (production, prices, health and nutritional status) and qualitative (alternative income sources) information from Government of Niger (GON) databases and reports. The results of this arrondissement-level rating are discussed below. Table E-1 provides a summary of the numbers of moderately and highly vulnerable populations in Niger by occupation and location (see Appendix E).

ANALYSIS OF SOCIOECONOMIC GROUPS AND SUBGROUPS

Farmers and Agropastoralists

In this assessment the farming group consists of sedentary subsistence farmers and the more recently sedentarized agropastoralists. These groups are evaluated together because of the similarity in the method used to assess their vulnerability.

Cereal production in 1991 or average cereal production (from 1985 through 1991) did not cover local needs in 13 of the 34 arrondissements where farming normally takes place. Self-sufficient farmers are defined as those producing a minimum of 220 kilograms (kg) per capita per year. After assessing the 13 deficit arrondissements on production, cereal prices and alternative income criteria, farmers in N'Guigmi, and Filingué arrondissements were found to be moderately vulnerable. Details on these areas, and others where vulnerability levels have changed since the 1991 assessment, are provided below.

Agropastoralists in Northern Tillabéry Department

Agropastoralists in Filingué Arrondissement are rated as moderately vulnerable going into the 1992 rainy season. Their vulnerability level, while lower than last year, continues to be elevated due to deficit cereal production for the third year in a row, relatively high cereal prices during both 1991 and 1992, and low rates of return on other agricultural production.

Although Filingué's reported 1991/92 cereal production was 10% higher than the average (1985-91), per capita production was only 179 kg. Field reports indicate that the official 1991/92 production estimates for Filingué may be considerably inflated. In addition, average 1991/92 mi'let prices in Filingué are among the highest in the country (at 81 West African francs per kg).

The major alternative revenue sources for Filingué are animal sales, *niébé* sales, and remittances from seasonal migrants in Niamey and Coastal West Africa. The animal to millet terms of trade have been declining since harvest (for male reproductive goats and bulls). The average terms of trade for *niébé* (how much millet the sale of one kilogram of *niébé* will buy) following the 1991 harvest are the lowest for a *niébé* producing area in the country. In addition, unemployment for seasonal workers

continues to increase and a recent report indicates that remittances sent via postal mandate (a high percentage) are not arriving in Filingué. The net result is that agropastoralists in Filingué Arrondissement have very few means with which to buy the cereal that they require to feed themselves until the next harvest.

Agropastoral populations in Téra, Tillabéry, Ouallam and Filingué arrondissements were all rated as extremely vulnerable in last year's vulnerability assessment. All but Filingué reported surplus cereal production in 1991/92. This, combined with lower than average millet prices, has caused agropastoralists in Tillabéry, Ouallam and Téra arrondissements to be no more than slightly vulnerable in 1992.

Agropastoralists in Diffa Department

Agropastoralists in both Diffa and N'Guigmi arrondissements were rated as highly vulnerable in the 1991 vulnerability assessment. This year, agropastoralists in N'Guigmi Arrondissement are only moderately vulnerable going into the 1992 rainy season. Although cereal production in 1991 was only 34 kg per capita, 33% below average, early 1992 millet prices are well below average. The low prices imply an ample supply of millet in local markets. Households have been depleting their immediately available assets, but because of the relatively low price of millet and over 1,000 metric tons of food aid during 1991, households are not yet liquidating resources required for food production. This and relatively high returns on animal sales have helped keep these populations from becoming more vulnerable. Agropastoral populations in Diffa are rated as only slightly vulnerable in this assessment. Lower millet prices and increased 1991 production in Diffa have been crucial in diminishing their vulnerability from the high 1990/91 level.

Agropastoralists in Western Agadez Department

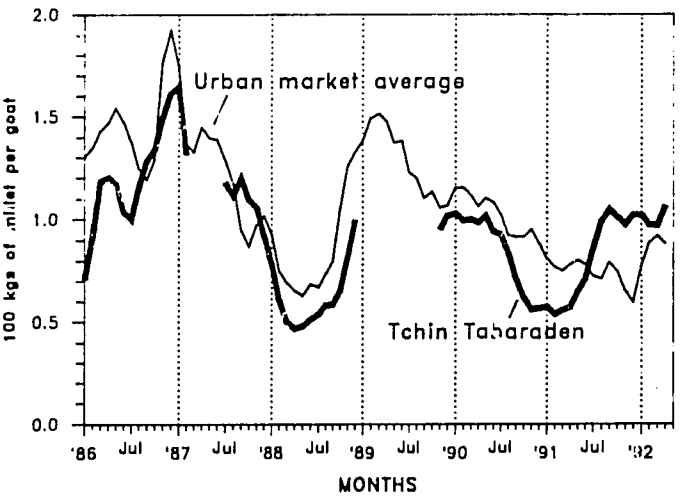
A slightly different rating system was used for sedentary populations in Arlit and Tchirozérine arrondissements. The agropastoralists in these areas are sedentarized herders and depend on small-scale irrigated crops and alternative sources of income rather than rainfed millet production for their subsistence (including tourism and artisanal work). Because of this difference, the rating system excluded the cereal production index and weighed the alternative income index twice as heavily.

Both Arlit and Tchirozérine arrondissements were found to be highly vulnerable in the 1991 FEWS Vulnerability Assessment. In 1992, these areas appear to be no more than slightly vulnerable. This is primarily due to low millet prices—18 and 10% lower than average in Tchirozérine and Arlit, respectively.

Farmers and Agropastoralists in Dosso and Tahoua Departments

In the 1991 FEWS Vulnerability Assessment, farmers and agropastoralists in Tchin Tabaraden Arrondissement were rated highly vulnerable. While still deficit, Tchin Tabaraden's 1991 harvest was almost 35% better than that of 1990. Millet prices during 1991/92 have also been among the lowest in the country, permitting some of the highest terms of trade for animals in Niger (see Figure 4). Farmers and agropastoralists in Tchin Tabaraden are now rated as being no more than slightly vulnerable.

Figure 4: Niger, Tchin Tabarden Terms of Trade versus Average of All Urban Markets



Source: OPVN/SIM
Note: Prices used are nominal prices.

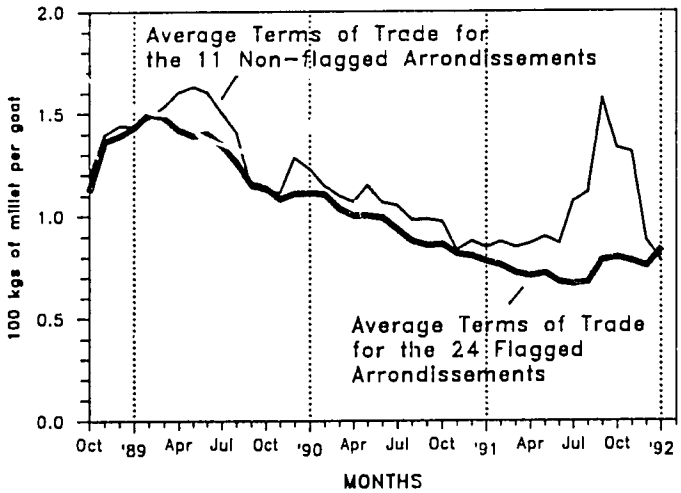
In Loga and Bouza arrondissements, farmers and agropastoralists were found to be moderately vulnerable in the 1991 assessment because of deficit and below average harvests and somewhat elevated millet prices. After the 1991 harvest, both arrondissements reported surplus and above average production. In addition, millet prices have been considerably lower than the average. As a result, both areas are now rated as no more than slightly vulnerable.

Nomadic Herders

Herder vulnerability was assessed via a two stage process. The first stage was to identify potential problem areas based on terms of trade and pasture production. The second stage involved refining understanding of the status of potential problem areas based on historical (past three years) terms of trade, pasture production and alternative income sources.

All 35 arrondissements in Niger have some herding activity. Of these, 24 have been experiencing low animal-to-millet terms of trade this year, with two (Tillabéry and Arlit) also having insufficient pasture production in 1991 (see Figure 5). The second stage assessment revealed one arrondissement (Tillabéry) as highly vulnerable and 19 as moderately vulnerable to food insecurity at the beginning of the 1992 rainy season.

Figure 5: Niger, Terms of Trade—24 Flagged Arrondissements versus the Remaining 11



Source: OPVN/SIM
Note: Prices used are nominal prices.

The most vulnerable herders are in northern Tillabéry Department, where herders in Tillabéry Arrondissement are highly vulnerable and herders in Téra, Ouallam and Filingué arrondissements are moderately vulnerable. Most herders in Tahoua Department (Tahoua, Bouza, Illéla, Birni N'Konni and Tchin Tabaraden arrondissements) are also rated as moderately vulnerable. Other moderately vulnerable areas for herders include all arrondissements in Zinder Department but Matameye (Gouré, Tanout, Magaria and Mirriah), and Tchirozérine, Diffa, Dosso, Dogondoutchi, Loga, Aguié and Dakoro arrondissements.

Herders across the country have been hurt by worsening terms of trade since harvest. Although millet prices are considerably lower than the average, even lower animal prices have resulted in reduced rates of return for herders when selling animals to buy millet. This has led to increased vulnerability for herders, particularly in Tillabéry, Bouza, Diffa, Filingué, Dogondoutchi, Birni N'Konni and Aguié arrondissements. Twenty-one out of the 24 arrondissements in this analysis received the lowest possible rating for animal terms of trade (the exceptions are Illéla, N'Guigmi and Arlit arrondissements). The people of many of these arrondissements also have limited alternative sources of income (Dosso, Dogondoutchi, Loga, Illéla, Bouza, Tchin Tabaraden, Aguié, Dakoro, Ouallam, Filingué, Magaria, Mirriah and Tanout).

Of the 15 arrondissements determined to have vulnerable herding populations in the 1991 FEWS Vulnerability Assessment, six have reduced levels of vulnerability (Tillabéry, Téra, Ouallam, Bouza, Tahoua, N'Guigmi), six remain moderately vulnerable (Filingué, Illéla, Tchirozérine, Mirriah, Tanout, Gouré) and two (Tchin Tabaraden and Dosso) have deteriorated from slight to moderate vulnerability this year.

CONCLUSIONS

Preagricultural-season food security conditions appear to be better this year than in either 1990 or 1991. Our assessment does indicate, however, that herder vulnerability has increased since January (the FEWS Harvest Assessment Report). While herder vulnerability will need to be monitored regularly, a good start to the rainy season (i.e., before the end of June) should result in a significant decrease in the overall vulnerability for this group. Food supply conditions for herders normally improve earlier in the rainy season than for farmers.

Our assessment indicates that farmers and agropastoralists are well off relative to the previous two years. The assessment also indicates that, with the exception of the Filingué and N'Guigmi areas, sedentary groups in Niger should require no special monitoring until the harvest outcome is clear. Nonetheless, our assessment process is sensitive only to the arrondissement level. There can be, and probably are, localized pockets of moderate to high vulnerability in areas that appear in our assessment to be slightly vulnerable.

Based on this assessment, rural Niger's ability to cope with a mediocre 1992 harvest should be as good as in any of the past four years. Assistance would be needed after the harvest if the 1992 harvest were poor, either due to late rains delaying planting until mid-July or to dry conditions exceeding 20 days during the period for mid-August through the end of the growing season.

APPENDIX E: Niger Arrondissement Assessment Data and Analysis Caveats

The 1991 vulnerability assessment rated only those arrondissements where cereal production did not cover local cereal consumption requirements during the 1990/91 production year. In the 1992 exercise, arrondissements that are cereal-deficit on average were rated in addition to those that were cereal-deficit during the current (1991/92) production year.

Revenue from alternative sources of income for farmers and herders could not be quantified. Information gathered from GON reports and qualified by current economic conditions was used to estimate the importance of alternative income sources in meeting household level consumption requirements.

Terms of trade are expressed as kilograms of millet purchasable through the sale of one animal (bull or male reproduction goat) instead of a direct ratio expressing kilograms of millet to kilograms live weight of animal. Historical kilogram live weight prices by arrondissement are not available in Niger, which means that seasonal and annual variations in live weight are not reflected in terms of trade patterns of variation over time for this assessment.

Herding productivity is expressed as concentration of animals on available pasture. The GON pasture estimates convert remotely sensed greenness data (NDVI—see inside back cover for explanation) to available edible biomass. This conversion does not take pasture quality or water availability into consideration, which are both important components of herding productivity. In addition, because of a projection problem, the GON estimates that its 1991 NDVI is geographically inaccurate by a factor of plus or minus two to three pixels (the square geographic unit of NDVI data). Because local area coverage (LAC) NDVI data are being used (obtained from the AGRHYMET headquarters in Niamey), plus or minus two to three pixels converts to approximately plus or minus two to three kilometers, squared—each LAC pixel is one square kilometer in size.

Statistics on *numbers of animals per arrondissement* are GON estimates based on vaccination records and newly revised, theoretical herd growth rates. The accuracy of the growth rates is unclear.

Per capita production estimates are calculated using total arrondissement population. This does not take into account seasonal migration. Recent studies indicate that seasonal migration is a regular coping activity in Niger, and that in some areas as much as 30-50% of local populations may not be present for several months out of the year.

Pasture production was evaluated according to available edible dry biomass per tropical livestock unit (TLU), where one TLU is defined as 1.2 camels, 1 cow, 1 horse, 2 donkeys, 6.7 sheep, or 10 goats. The minimum annual requirement for animal weight maintenance is 0.18 metric tons of edible biomass per TLU. Insufficient pasture production was defined as more than 0.18 tropical livestock unit per metric ton of biomass.

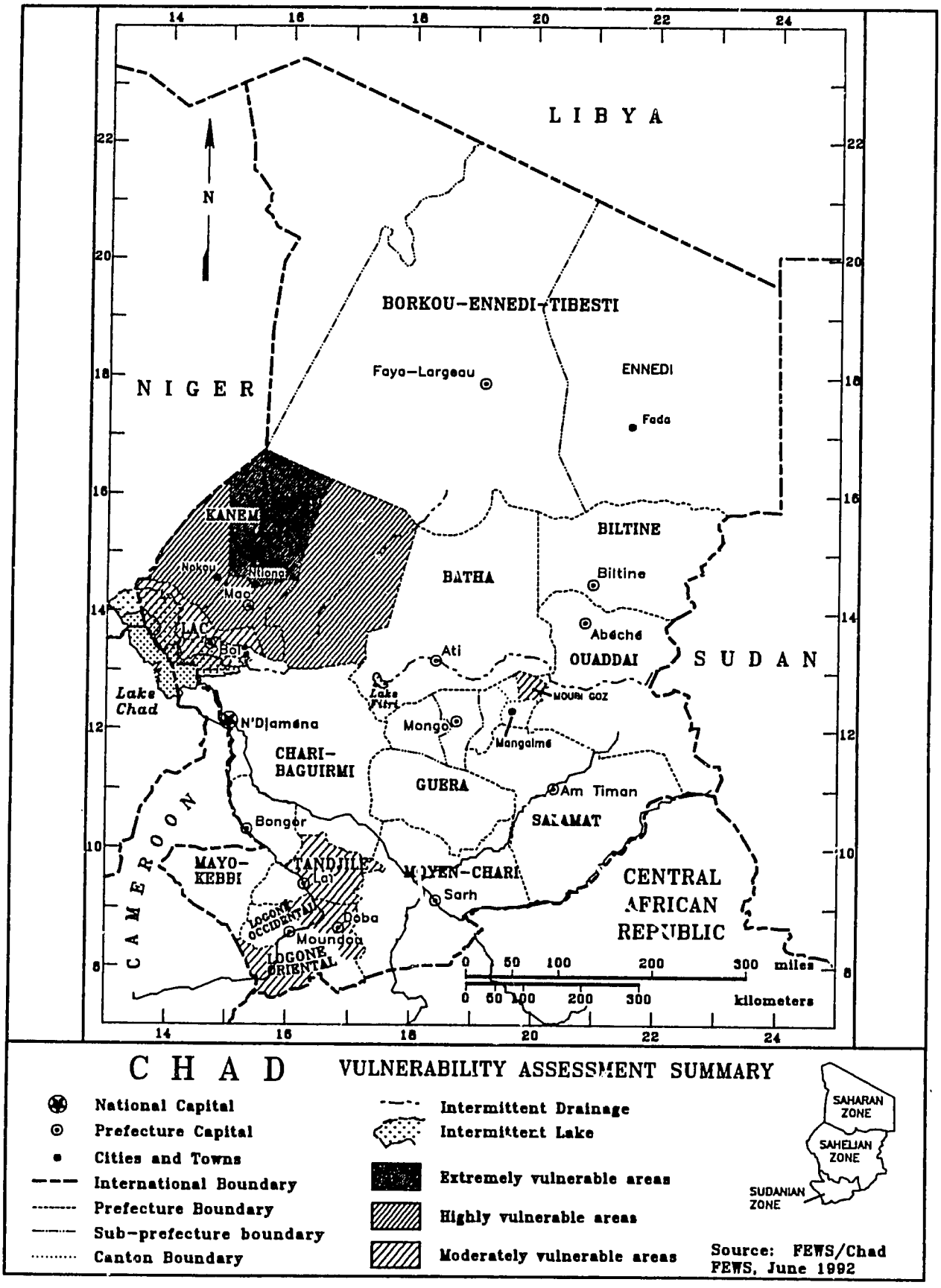
Note on urban vulnerability analysis: In the past it has been assumed that, because of their dependence on wages and trade, urban dwellers' vulnerability did not change significantly from year to year. Although this assumption is being challenged by field reports and a worsening overall economic situation, we currently lack accurate data and a methodological component for an analysis of this group's vulnerability.

Note on herder vulnerability analysis: Animal-to-cereal terms of trade were evaluated according to bull to millet and male reproductive goat to millet price ratios. Terms of trade were considered disadvantageous to herders where the sale of one male reproductive goat or one bull would buy less than 89 kg or 1,000 kg of millet, respectively.

Tabel E-1: Niger, Vulnerable Populations in 1992

Department/Arrondissement	Socioeconomic Group	Vulnerability Level	Affected Population
Tillabéry			
Téra	Herder	Moderate	39,000
Tillabéry	Herder	High	18,000
Ouallam	Herder	Moderate	13,000
Filingué	Farmer	Moderate	294,000
Filingué	Herder	Moderate	26,000
Dosso			
Dosso	Herder	Moderate	5,000
Loga	Herder	Moderate	6,000
Dogondoutchi	Herder	Moderate	30,000
Tahoua			
Tahoua	Herder	Moderate	5,000
Illéla	Herder	Moderate	16,000
Bouza	Herder	Moderate	8,000
Birni N'Konni	Herder	Moderate	36,000
Tchin Tabaraden	Herder	Moderate	36,000
Maradi			
Dakoro	Herder	Moderate	36,000
Aguié	Herder	Moderate	7,000
Zinder			
Myrriah	Herder	Moderate	18,000
Magaria	Herder	Moderate	24,000
Tanout	Herder	Moderate	27,000
Gouré	Herder	Moderate	35,000
Diffa			
Diffa	Herder	Moderate	5,000
N'Guigmi	Farmer	Moderate	4,000
Agadez			
Tchirozérine	Herder	Moderate	16,000
Sub-total	Farmer	Moderate	298,000
Sub-total	Herder	Moderate	388,000
Sub-total	Herder	High	18,000
Overall Total			704,000

Source: FEWS/Niger



Map 8: Chad Vulnerability Assessment Summary

CHAD

Vulnerability Levels Low as Season Starts

Report released by USAID/Chad on May 22, 1992

SUMMARY

Near-normal rains fell during the 1991 season in most of Chad's agricultural zone. The official agricultural production estimate for the 1991/92 season sets a new record since data collection activities resumed in 1983. Nonetheless, residents of Kanem and Lac prefectures are experiencing food access problems due to localized drought conditions and grasshopper attacks (see Map 8). Food access problems also persist in areas of Tandjilé, Logone Occidental and Logone Oriental prefectures. This latter situation is due mainly to preference for cash crop cultivation and damage to cereal crops caused by late heavy rains.

Elsewhere, vulnerability levels have decreased significantly from the high level of the 1990/91 (see Appendix G for FEWS' definitions of levels of vulnerability). Since mid-1991, cereal prices have decreased and livestock prices have recovered after hitting bottom. Consequently, terms of trade of herders in the Sahelian zone have improved. Overall food security situation is good as Chad enters the 1992 rainy season.

METHODOLOGY

In 1991, FEWS/Chad employed a ranking system in its vulnerability analysis that is especially designed to allow the evaluation of data that do not (or may not) fit a statistically normal (Gaussian) distribution. The analysis was performed at the sub-prefecture level and was weighted according to agroclimatic zones. Associating data solely with administrative boundaries is not always appropriate, however. In the case of such spatial data as satellite imagery, a more generalized geographic approach is needed. For this reason, the 1992 Chad Vulnerability Assessment employed geographic information system (GIS) methods in the analysis, allowing data that are tabulated at the sub-prefecture level to be combined with data that do not align with sub-prefecture boundaries.

GIS methods were applied to satellite imagery and point data to arrive at indicators such as planting date, season length, cumulative NDVI (see inside back cover), rainfall variation, and the risk of crop damage due to late heavy rains. These indicators provide input for evaluating the cereal production, livestock and climate components. Other data associated with administrative boundaries are then overlaid with the results of the GIS analysis to arrive at a final ranking.

Interpretations of the Vulnerability Assessment analysis were made together with information obtained from field visits and reports from the European Community (EC) funded "Système d'Alerte Précoce" (SAP) Project to identify specific groups that are currently experiencing, or have historically experienced, food acquisition problems.

VULNERABILITY OF SOCIOECONOMIC GROUPS

The three major socioeconomic groups in Chad are agriculturalists, pastoralists and urban dwellers. At the start of the 1991/92 agricultural season, vulnerability levels for the first two groups were high because of the poor harvest of the previous year. Populations of the Sahelian prefectures were especially hard hit by the drought. Since then, near-normal rainfall in 1991 led to a record 1991/92 national harvest. Consequently, vulnerability levels have declined in most localities.

Several problem areas remain in Kanem and Lac prefectures, however, owing to heavy grasshopper infestation and poor regional rainfall. Heavy rains late in the season also caused severe damage to maturing cereal crops in Tandjilé, Logone Oriental and Logone Occidental prefectures. Although the inhabitants of these areas are receiving assistance during 1992, their vulnerability levels will remain higher than populations elsewhere, pending completion of a successful 1992/93 agricultural season.

Agriculturalists

Agriculturalists in Kanem and Lac Prefectures

While 1991 rainfall for most of Chad's agricultural zone was near normal, Kanem prefecture received less than 60% of its normal rainfall amount (based on 1950-79 data). In addition, a major infestation of Senegalese grasshoppers destroyed most

cereal crops in Lac and western Kanem prefectures. As a result, 1991/92 cereal production in Kanem and Lac was poor. For certain localities in Mao and Nokou sub-prefectures of Kanem, this represents a third successive poor harvest. Even so, as diversified income strategies in these regions continue to ensure access to grain on the local markets, the problem is essentially one of supply. Consequently, a subsidized cereal sales program using government of Chad food security stocks is being implemented in the region.

Approximately 15,000 persons are affected in Kanem prefecture (see Table 4). Within this group, 5,000 women and children are at risk of (extremely vulnerable to) famine if the 1992 agricultural season fails again. They are located in and around the north Kanem town of Ntiona. The remaining 10,000 persons are highly vulnerable to famine, having experienced three successive crops failures.

In Lac prefecture, 120,000 persons are affected by the poor 1991 harvest. Given the proximity of Lake Chad and the presence of recessional and depression farmland, however, most members of this group have access to off-season market gardening to supplement their income. These 120,000 persons are moderately vulnerable at this time. Nonetheless, another major grasshopper outbreak in 1992 could rapidly increase the vulnerable status of this population.

Smallholder Agriculturalists in Guéra Prefecture

The good cereal harvest of 1992 has led to significantly decreased vulnerability levels for the population of Guéra, compared to a year ago. One exception is Canton Moubi Goz in Mangalmé sub-prefecture, where localized pest damage was observed. Good harvests in surrounding areas are keeping cereal prices low in this area, however. SAP reports normal availability and demand of cereal on local markets. Consequently, the estimated 8,000 villagers affected by pest damage in Canton Moubi Goz are moderately vulnerable to famine, having liquidated some of their assets for food purchases.

Southern Agriculturalists

The 1990 and 1991 FEWS Vulnerability Assessment identified southern agriculturalists as slightly vulnerable due to the lack of a diversified income base, leading to reduced coping strategies. Rainfall in 1991 was abundant in this area, with exceptionally heavy and late rains in parts of three southwestern prefectures: Tandjilé, Logone Occidental, and Logone Oriental. Ironically, the heavy late rains damaged the pollination process and resulted in greatly reduced grain formation.

Late heavy rains, pest damage, and predilection for cash crop production have resulted in cereal production shortfalls in these three prefectures. In additional, the slow process of cotton commercialization further limits the purchasing power of the local populations, reducing their access to cereal. With reduced demand, cereal prices in these areas remained relatively high during the dry season, surpassing price levels in the Sahelian zone. An assessment team, visiting the area in February 1992, observed evidence of wild roots consumption. Some of these wild roots contain toxins. Map 8 shows the localities most affected by the current shortfalls.

An estimated 219,000 persons are affected in these three prefectures. Closely-targeted food-for-work programs are being implemented in these areas. Purchasing power for most of the affected persons are expected to improve, pending cotton commercialization. Nonetheless, this group remains moderately vulnerable to famine.

Table 4: Chad, Vulnerablility Levels and Locations

Prefecture	Extremely Vulnerable	Highly Vulnerable	Moderately Vulnerable	Total
Kanem	5,000	10,000	—	15,000
LAC	—	—	120,000	120,000
Guéra (Moubi Goz Canton)	—	—	8,000	8,000
Tandjilé	—	—	55,000	55,000
Logone Occidental	—	—	78,000	78,000
Logone Oriental	—	—	86,000	86,000
Total	5,000	10,000	347,000	362,000

Source: FEWS/Chad

Pastoralists

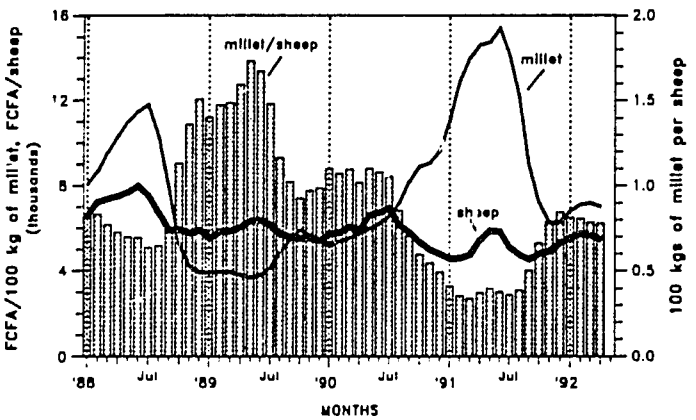
Nomadic Pastoralists

Transhumance and nomadic cattle-raising are common in the northern Sahelian zone, with herders migrating south and west towards Lake Chad at the end of the rainy season. These populations depend mainly on animal products for their income. Due to their mobility, herders are able to leave drought-affected areas for better pastures. With good rainfall during 1991, pasture conditions were much improved in most areas. Cereal prices have also declined from the high levels of early 1991. Therefore, nomadic herders remain only slightly vulnerable.

Agropastoralists

Most pastoralists in the Sahelian zone maintain a few head of cattle and a small herd of goat or sheep, but also engage in small scale agricultural production. The 1991 FEWS Vulnerability Assessment placed most of this group in the highly vulnerable to at-risk categories due to prior-year crop failure. With a near normal rainy season in 1991, cereal prices began to decrease in July and have remained consistently low. At the same time, livestock prices have been recovering. Figure 6 shows that recovering animal prices and falling cereal prices resulted in significantly improved terms of trade for agropastoralist population. Consequently, the vulnerability status of agropastoralists has decreased from its high level a year ago to being slightly vulnerable.

Figure 6: Chad, Terms of Trade Between Millet and Sheep —Average of Eight Sahelian Markets

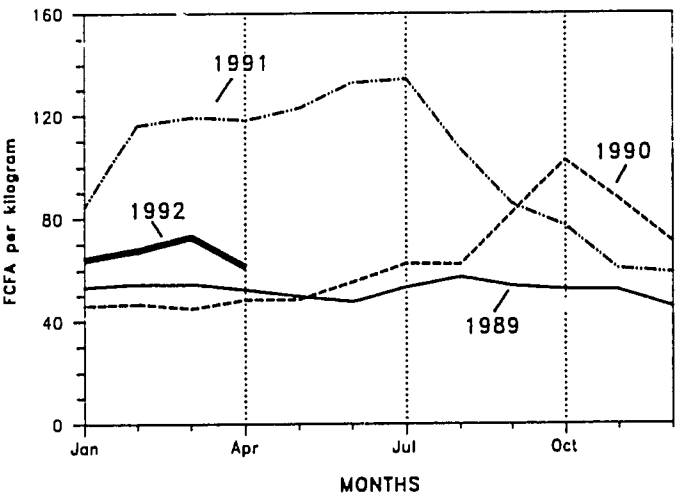


Sources: Sap/Chad; FEWS/Chad
Note: Prices used are nominal prices.

Urban Dwellers

Urban population in Chad is concentrated in N'Djaména, Sarh, Moundou, and Abéché. Most urban dwellers rely on income from salaried employment in the private and public sectors, commerce, occasional wage labor, and remittances. A portion of urban residents depart for their respective villages at the onset of the rainy season to cultivate. The vulnerability level of urban dwellers corresponds closely to their purchasing power. All of the urban population, especially urban poor, are slightly to moderately vulnerable to the impact of changes in cereal prices and supplies. Figure 7 shows that, since July 1991, millet prices in major urban centers have decreased significantly, benefitting most urban groups.

Figure 7: Chad, Monthly Millet Prices, 1989-92—Average of Four Urban Markets



Sources: Sap/Chad; FEWS/Chad
Note: Prices used are nominal prices. Markets included are N'Djaména, Sarh, Moundou and Abéché.

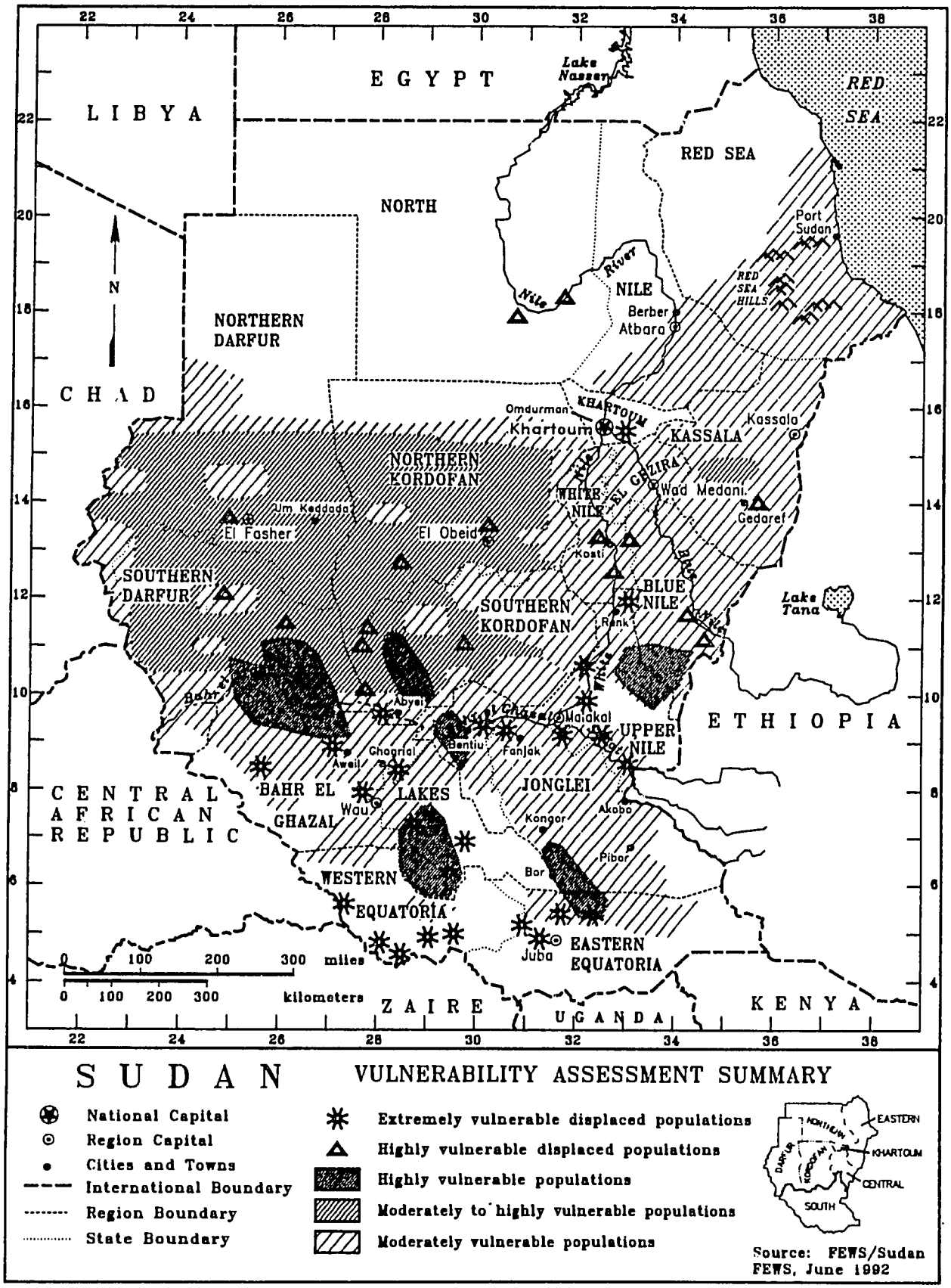
The purchasing power of certain urban groups has also declined since the beginning of 1992, however. These groups include civil servants and students, whose salaries and scholarships have not been paid for several months. Previously, these late payments happened mostly in rural areas, where those affected have developed supplementary means of income. In contrast, urban dwellers have limited opportunities to make up for late payments because the general economic situation is weak. As a result, incidence of threatened and actual evictions from rented quarters is on the rise and many among these groups are cutting back on consumption of foodstuffs. If this situation continues, the vulnerability levels of these urban subgroups will increase rapidly.

CONCLUSION

The food security situation in Chad has improved significantly since the FEWS Vulnerability Assessment of May/June 1991. Food stocks are returning to normal levels, cereal prices are relatively low, and livestock prices have recovered from their low levels of a year ago. However, localized problems persist in certain areas of the country. Given the prevalence of subsistence rainfed agriculture and the consequent high level of dependency on rainfall that is erratic both spatially and tem-

porally, Chad's food security situation remains fragile. One bad rainy season can spell hardship in the Sahelian zone, where the population has diversified somewhat its economic activities, or it can spell disaster in the south, where they have not. Therefore, a close monitoring of the rainy season is essential.

Monitoring of the agricultural situation and food availability in the Sahelian zone is performed by the SAP project. The National Meteorological Service publishes updated information on the agroclimatologic situation through the AGRHYMET dekadal (every 10 days) meetings. Within USAID/Chad, the Food Security Operations Group (FSOG) will closely monitor satellite imagery, both NDVI and METEOSAT (see inside back cover), to follow the progress of the 1992/93 agricultural and pastoral season. This information will be confirmed by station rainfall data from the National Meteorological Service and field trips. Cereal and livestock prices will be monitored throughout the year, through the Market Information System and SAP reports. All these items will be factored into a convergence of indicators approach that should, at the time of the Pre-Harvest Assessment Report in September 1992, allow an update on the anticipated outcome of the 1992/93 agricultural and pastoral season as it affects Chad's vulnerable populations.



Map 9: Sudan Vulnerability Assessment Summary

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SUDAN

Improved Harvests; Serious Food Needs

Report released by USAID/Sudan on June **, 1992

SUMMARY

Sudan's overall vulnerability is less in 1992 than in 1991, but is still quite serious. The aggregate agricultural production for 1991/92 was sufficient to satisfy consumption requirements in 1992. Nonetheless, displaced persons throughout Sudan, rural drought victims in western and central Sudan, and refugees in the east will require food assistance (see Map 9). Millions of relief-dependant displaced persons in northern and southern Sudan are at-risk. Some may be in a condition of famine, due to war- and drought-induced destitution, and, particularly, government restrictions on relief deliveries (see Appendix G for FEWS' definitions of levels of vulnerability). Short-term vulnerability can only be decreased by government cooperation with, and contribution to, relief efforts. Serious food insecurity and large relief needs will be a permanent, annual occurrence until the government takes serious steps to end civil strife and to appropriately repatriate and resettle displaced populations. Subsistence farmers who were at-risk last year are now moderately to highly vulnerable. Subsistence crop production was very poor, but reduced cereal prices, cash crop production, improved terms of trade, and ongoing relief deliveries have decreased vulnerability. Good climate and sufficient seeds for the 1992 season, as well as continued cash crop and livestock income, could further decrease vulnerability. For poor urban populations who are now moderately vulnerable, reduced cereal prices are offset by increased general food prices, low wages, and limited alternate resources.

METHODOLOGY

In Sudan, large portions of the population always require food assistance. Therefore, vulnerability is determined not only by a need for assistance, but also by access to assistance when needed. For consistency and comparison, socioeconomic groups listed in previous vulnerability assessments are included here. These groups are farmers, nomads and pastoralists, agropastoralists, agricultural laborers, urban residents, displaced persons and refugees (see Map 10 for locations of farmers, nomads and pastoralists, and agropastorlists).

GENERAL BACKGROUND CONDITIONS

Production and Deficits

National aggregate and per capita agricultural production for 1991/92 was significantly better than in the previous year, and slightly greater than average (see Table 5). Original FEWS/Sudan harvest estimates of 3.465 million metric tons (MT) have been increased to 4.031 million MT, based on new information about the mechanized and irrigated sectors.[1]

Table 5: Sudan, National Per Capita Cereal Production (kilograms)

Location	1991/92	Average (1985-89)
All of Sudan	154	145
Northern Sudan	182	180

Source: FEWS/Sudan, Ministry of Agriculture

Although current production should satisfy national consumption needs, poor production in subsistence areas of western, central, and southern Sudan have resulted in abnormally high regional food deficits (see Table 6, column 4). Unusually large quantities of food must enter these regions to satisfy needs.

Regional per capita production (see Table 7) confirms that, even though harvests are normally insufficient to meet individual cereal needs of about 146 kilograms per year (kg/yr), 1991/92 deficits in some areas were greater than normal. The inclusion, however, of urban non-producers who can buy their food on the market from non-local production may misrepresent rural household food security.

Examination of rural per capita cereal production (see Table 8), which represents groups directly dependent on local production (i.e., excluding urban populations), indicates that household deficits are significantly greater than normal. Households will have to allocate far greater resources than usual to balance deficits.

[1] *This is still considerably less than Government of Sudan (GOS)/United Nations Food and Agriculture Organization (FAO) production estimates.*

Table 6: Sudan, Regional Agricultural Production (000 MT), 1991/92 Difference From Average

Region	Estimated Production	1991/92 Balance	Average Balance	Difference, '91/92 vs Average
Abnormal deficit areas:				
Northern Kordofan	53	-257	-140	-117
Southern Kordofan	89	-135	34	-169
Northern Darfur	26	-229	-157	-72
Khartoum	0	-502	-471	-31
Close to normal deficits:				
Southern Darfur	198	-134	-152	18
Red Sea	36	-98	-101	3
South Sudan	155	-342	-336	-6
Above average production balance:				
Kassala	1,255	979	764	206
Northern	215	45	-88	133
Central	2,080	1,300	896	404
Total	**4,107**	**617**	**249**	**368**

Source: FEWS/Sudan, Ministry of Agriculture
Notes: The 1991/92 production was estimated by FEWS/Sudan. The 1991/92 balance is production minus consumption at 146 per capita per annum using FEWS population projections. The period from 1985/86-1989/90 was chosen as best balanced time frame for the average balance.

Table 7: Sudan, Cereal Per Capita Production (PCP) In Deficit Areas, Total Regional Population

Region	Population (000)	'91/92 PCP	Average PCP	Difference, '91/92 vs Average
Northern Kordofan	2,122	25	74	-49
Southern Kordofan	1,538	58	170	-112
Northern Darfur	1,749	15	44	-29
Southern Darfur	2,270	87	69	+18
Red Sea	919	39	22	+17
South Sudan	4,968	31	N\A	N\A

Source: FEWS/Sudan, Ministry of Agriculture

Table 8: Sudan, Cereal Per Capita Production (PCP) In Deficit Areas, Rural Regional Population

Region	Population (000)	'91/92 PCP	Average PCP	Difference, '91/92 vs Average
Northern Kordofan	1,846	42	125	-83
Southern Kordofan	1,355	88	259	-171
Northern Darfur	1,546	20	59	- 39
Southern Darfur	2,061	117	93	+24
Red Sea	597	380	217	+163
South Sudan	4,590	34	N\A	N\A

Source: FEWS/Sudan, Ministry of Agriculture

Production-deficit households satisfy additional needs through market purchase, using secondary income sources such as cash crops, livestock sales and migrant employment. Three seasons of above average deficits have worn down assets and strained resources. Only a portion of current deficits can be satisfied through customary market mechanisms.

Economic Factors

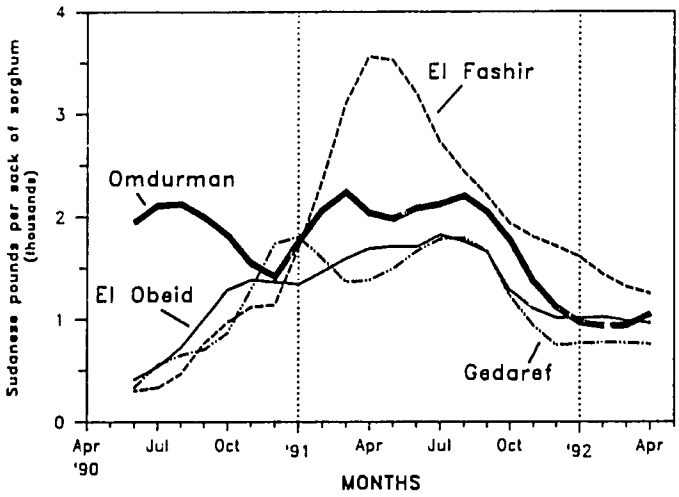
Food security for many will depend on redistribution from surplus to production deficit areas. Market prices and terms of trade between livestock and grain will be particularly important in determining access to food.

Cereal prices show an overall national decrease and indicate increased food availability. Cereal prices are about half what prices were at the same time in 1991 and are the lowest they have been since September of 1990, but will likely never again return to pre-1990 levels. As of April, prices are holding steady, but mild seasonal increases are expected. These should not become severe in light of the reasonable 1991/92 harvest. Although trends are similar, prices differ with region, with those

in surplus areas being lowest and prices in Darfur, the farthest from surplus production, being consistently higher than elsewhere in northern Sudan (represented, respectively, by Gedaref and El Fasher in Figure 8).

Government economic restructuring, which devalued local currency by 200% in early 1992, has raised basic non-cereal food prices dramatically (by as much as five times for bread) while salaries and wages have not increased significantly.

Figure 8: Sudan, Sorghum Prices for 1990-92 in El Fashir, El Obeid, Gedaref and Omdurman



Source: GOS/Agricultural Statistics and Economics Department/Marketing Section

Interventions

Where market redistribution is inadequate due to insufficient purchasing power or lack of access, the entire burden of emergency assistance once again lies on the international community alone, in light of unmet Government of Sudan (GOS) responsibilities to provide assistance to its people. Anticipated GOS assistance through relief distributions and markets subsidies have not occurred. The GOS has also prohibited purchase of relief commodities from the private sector. Meanwhile the GOS plans to export large quantities of cereal, including 300,000 MT to Libya.

SOCIOECONOMIC GROUPS AND SUB-GROUPS

Farmers

Subsistence Farmers

Subsistence farmers throughout northern Sudan are moderately to highly vulnerable, depending on the area, and some groups may be at-risk (extremely vulnerable). Current vulnerability is due to very poor cereal production caused by poor rains and a lack of seeds; to weakened household resources after two years of food insecurity; and, in some areas, to limited access to relief. About 15% of children under five years of age are malnourished in some areas, such as Um Keddada in Northern Darfur.[1] Emergency food relief operations are ongoing since last year and will continue in 1992 in Kordofan, Darfur, and White Nile.

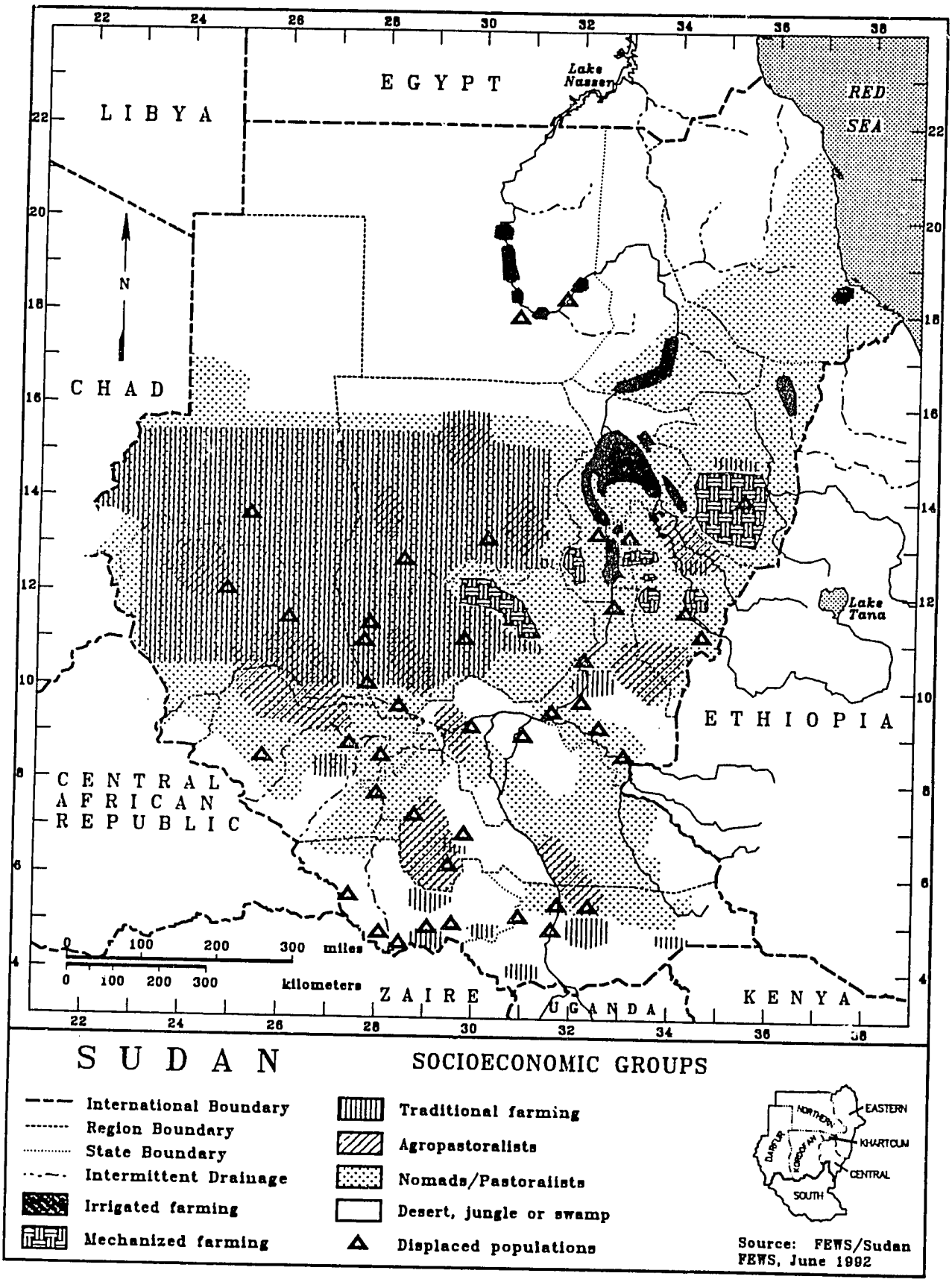
Vulnerability in Northern Kordofan is moderate. Farmers are continuing traditional production activities while also drawing down some assets. A 64% food crop production deficit occurred and 82% of the households produced only enough food for less than three months consumption. Average 1991/92 household deficits were about 800 kg, in contrast to normal annual deficits of about 150 kg. With an average household income in 1991 of £S28,800 from cash crops and livestock and reserve assets in livestock averaging £S17,500 (and reaching £S135,000), many households in Northern Kordofan should be able to purchase sufficient food if prices maintain current trends. Where household resources are insufficient, food assistance has been effective and can be expected to again mitigate serious food insecurity.

Very poor agricultural production, high market prices, commodity scarcity, lack of household resources, and increasing displacement complicated by limited access make Southern Kordofan one of the most vulnerable areas in Sudan. Farmers in Southern Kordofan could be currently at-risk of famine.

Farmers in Northern Darfur (70% of whom received some relief in 1991) are now highly vulnerable, with production deficits estimated by non-governmental organizations (NGOs) at 140,000 MT. In Darfur, farmers rely more heavily on subsistence food production and have far less income from cash crops, livestock, and employment than farmers in Kordofan, while market prices are consistently and significantly higher than elsewhere.

In recent months there have been high malnutrition rates, consumption of wild foods, decreased remittances, and increased family migration out of villages in search of food, water, and employment. By March many households in Darfur had one sack of food stocks and were selling livestock to buy grain. In some, areas no grain at all is available and residents are totally dependent on relief. Nonetheless, an NGO working in Darfur notes that, while food insecurity is severe, well developed local emergency coping mechanisms will mitigate a famine. The NGO has also pointed out that significant deficits are not abnormal. Relief will continue to flow into the area, although persistent logistical difficulties have resulted in deliveries of 8,000 MT by April, while Kordofan received 39,000 MT during the same period. Large-scale government commandeering of trucks has further delayed and constrained relief deliveries.

[1] *A child is considered "malnourished" when it weighs less than 80% of the standard weight for its height.*



Map 10: Sudan Socioeconomic Groups

Farmers in southern White Nile Province are highly vulnerable, with conditions similar to those in western Sudan. Crops failed because of climate and pests. Some villages have been abandoned for lack of water. Benefits from agricultural labor have declined. Four months of relief delivery restrictions have resulted in increased malnutrition rates. Relief distributions resumed in April 1992.

Mechanized Farmers

Food security is assured for mechanized farmers. Their vulnerability is slight, which is an improvement from their moderate vulnerability last year. Mechanized production in 1991 was considerably greater than production of the previous season and will supply the majority of surplus cereals to urban areas in the coming year.

Irrigated Farmers

Irrigated farmers are, as usual, only slightly vulnerable. Irrigated production was greater than the previous season. In the coming year, vulnerability will remain slight if the government continues to insure that sufficient agricultural inputs are available.

Pastoralists and Nomads

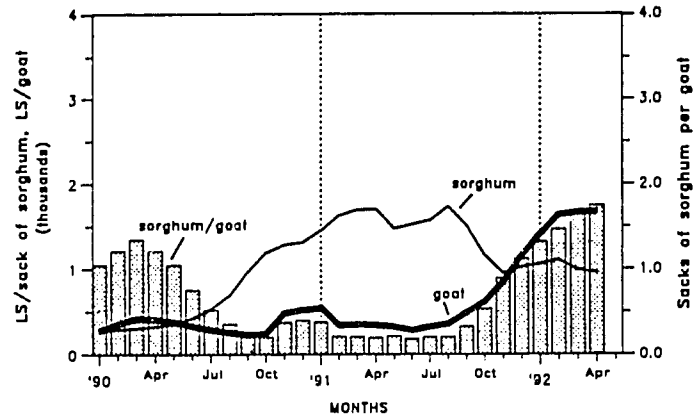
Pastoralists and nomads who depend on livestock are moderately vulnerable in 1992. In 1991, they were at-risk due to large stock losses, high cereal prices and disastrous terms of trade. Although pastures in 1991 were only fair to poor (but somewhat better than in 1990), livestock prices have been excellent in recent months due to large-scale export. Terms of trade have improved dramatically since September of 1991 and are the most favorable they have been since before 1990 (see Figure 9). In April, they were at least four times better than at the same time last year. In some areas, such as Red Sea Hills, high malnutrition rates exist (about 14%), but this is a considerable improvement over last year, when rates were often over 20%.

Agropastoralists

Agropastoralists in northern Sudan, a semi-sedentary group that practices both seasonal agriculture and seasonal animal migration throughout western and central Sudan, are subject to the same climatic and market conditions as are farmers and nomads. Improved animal terms of trade have decreased vulnerability since last year from at-risk to moderate.

Throughout southern Sudan, vulnerability for agropastoralists is high. There is continuing insecurity from civil and tribal strife and continuing livestock losses. Also, in the Aweil and Ghogrial areas of Bahr el Ghazal, total crop failure from floods and pests is causing substantial displacement to Southern Kordofan and Southern Darfur. Similar problems in Bentiu are causing displacement to Upper Nile Province.

Figure 9: Sudan, Terms of Trade in Between Goats and Sorghum in Kordofan



Sources: GOS/Agricultural Statistics and Economics Department/Marketing Section; Livestock and Meat Marketing Corporation

Agricultural Laborers

Last year, this group ranged from at-risk to moderate vulnerability. In 1992, they are moderately vulnerable because seasonal employment on mechanized and irrigated schemes has been available to them during 1991 and 1992. Increased farmer production costs, however, have changed migrant labor benefits. Previously, in addition to wages, laborers and their families were fed during the period of employment. Now, laborers are not permitted to bring their families. This significantly increases household food expenses and effectively reduces wages considerably.

Urban Residents

Poor and Unskilled Laborers

The urban poor in Khartoum and other towns throughout northern Sudan are moderately to highly vulnerable, which is better than last year when they were highly vulnerable to at-risk. In 1992, greater food availability and reduced prices are balanced by a significant loss of purchasing power caused by dramatic currency devaluations, static wages, and high inflation. This population does not have the variety of resources and options for cash crop and livestock production available to rural groups. Household expenditures, often hundreds of Sudanese pounds per day, far outstrip income, which averages £S2,000 per month. Liquidation of household assets continues. For many, survival has meant changes and reductions in food consumption patterns. Nutritional stability is being threatened, although no nutritional data are collected.

Employed, Middle Income and Civil Servants

Vulnerability is slight among this group, compared to moderate in 1991. Inflation, devaluation, and increased staple food and transportation prices have been mitigated somewhat by lower

cereal food prices, greater food availability, and, for civil servants, government food distribution. However, economic stress is evident and changes in consumption patterns are occurring.

Southern Sudan

Vulnerability is high due to war-induced resource-, food-, and economic isolation. Southern towns are totally dependant on relief and commercial commodities from outside the region, often delivered by air. Local production has been inadequate since the start of the civil war. Limited commercial commodities arrive, but these are three to four times the prices in northern Sudan. Household assets and wages have not withstood years of food scarcity and extreme prices.

Displaced Persons

About 3.5 to 4.5 million people have been displaced from their homes in Sudan by persistent war and drought. Some long-term displaced have become economically integrated and re-established in new locations and can be grouped with the populations among which they now live, such as urban poor or agricultural laborers, when assessing vulnerability.

Perhaps two to three million displaced persons are not economically self-sufficient and are dependent on assistance. The size of this group is growing rapidly. This population of displaced are at-risk, primarily due to exceptional difficulties in delivering assistance. Self-sufficiency will only come with resettlement or return home.

Khartoum

There are 700,000 to 1.4 million people in the Khartoum area, displaced from elsewhere in Sudan, who are at-risk as a result of their lack of resources, a general lack of access to relief assistance, and an imminent threat of forced relocation. Since late 1991, GOS has demolished hundreds of thousands of homes (many of which were well established permanent structures), forcibly evicting over 425,000 displaced people. Many have been moved to desolate, isolated camps miles from the city, where there are inadequate services and no prospects for employment, while others have moved themselves to locations within Khartoum. Hundreds of thousands more people are currently threatened with the same fate, as the GOS has vowed to relocate all displaced persons. Although those at old and new camps are destitute and almost entirely dependent on emergency relief, the GOS has severely restricted international NGOs from providing assistance.

Northern Sudan

Elsewhere in northern Sudan, the displaced are highly vulnerable and many may be at-risk. Many of them are destitute and desperate. In Kosti, in March, 50,000 people were forcibly relocated, increasing mortality among vulnerable individuals such as the elderly and malnourished children. In Southern Darfur, tribal conflict has created additional displaced people.

Large numbers of displaced persons have recently arrived in northern Sudan due to crop failures, food shortages, and insecurity in southern Sudan. About 64,000 people have arrived in Southern Kordofan, and another 25,000 in Southern Darfur. Many children among this group are in very poor condition, are severely malnourished (no figures available), and could well be at-risk. Relief food and assistance reaches some of these groups, but persistent logistical, security and political problems make relief delivery difficult and irregular.

Southern Sudan

Displaced persons throughout southern Sudan are at-risk. Problems of access to relief plague hundreds of thousands of destitute and relief-dependent displaced people, who have collected around towns or are traveling between towns in search of food and security.

Around many towns, such as Wau, Fanjak, Bor, Kongor, Renk, and Abyei, there are as many as 20,000-80,000 displaced at each location. In some areas, there are many thousands of malnourished children and minors separated from their families. Malnutrition rates of up to 50% among children have been recorded.

In many areas, food insecurity has been critical and people forced into famine conditions, unnecessarily, by GOS and Sudanese People's Liberation Army (SPLA) restrictions on relief deliveries. Emergency operations of the United Nations World Food Program (WFP) and the International Committee of the Red Cross (ICRC) have been continually obstructed. As a result, in Fanjak (south of Malakal) 63,000 displaced persons were reported in April to be experiencing starvation conditions and mortality was occurring. Also in April, daily mortality was occurring in Akobo and Pibor because of GOS restrictions on emergency relief flights.

Food insecurity has been further increased by GOS military actions, which have taken over some southern towns. The potential for an influx of Sudanese refugees into Kenya and Uganda is increasing. In spite of all of these constraints and through exceptional efforts, WFP and NGOs have managed to deliver sufficient food to prevent large-scale mortality—just barely in many cases.

Refugees

There are an estimated 729,000 refugees in Sudan (as of late May), about 700,000 of whom are Ethiopians and Eritreans living in central and eastern Sudan; another 20,700 Chadians are in Darfur and small numbers of Ugandans and Zairians are in Equatoria. The United Nations High Commission on

Refugees (UNHCR) assists 428,000 refugees in settlements and reception centers in eastern Sudan and in Darfur. The remaining 300,000 are integrated into the economy, receive no assistance, and are generally long-term residents of ten or more years. Voluntary repatriation of Ethiopians and Eritreans may be underway by late 1992, which would greatly reduce the vulnerable population, although the process is expected to go more slowly than originally anticpated; additional resources have been requested.

Settlements and Reception Camps

Many settlement residents have access to some agricultural land for share-cropping and livestock raising. Others find urban or agricultural employment and many receive remittances. The balance of needs is met by relief. Reception center residents have similar, but fewer, resources, and depend more on assistance. Chadians in Darfur are highly dependant on relief.

Adequate flows of relief and generally improved food security conditions indicate moderate vulnerability for settlement residents and high vulnerability for reception center residents, as compared to both groups having been at-risk in the previous year. In 1993, vulnerability could again increase if poor national food securitycontinues or relief delivery problems occur. Child malnutrition rates, last measured in late 1991, averaged 13.5 to 17.5% for reception centers and 9.8 to 11.8% for settlements. Although better than the 28% average malnutrition recorded in 1990, current rates are high enough that "the health status of these populations is still precarious" (UNHCR).

Economically integrated

Current vulnerability is moderate to high, compared to high vulnerability in 1992. Most integrated refugees live in larger cities in central and eastern Sudan, such as Khartoum and Port Sudan, and in smaller eastern Sudan towns. This group depends on wage labor and market prices and is subject to the same economic pressures as its counterpart urban population.

CONCLUSIONS

The most vulnerable population in Sudan is the 3.5 to 4.5 million displaced persons throughout the country who are at-risk due to war and drought, which has left them destitute. In many cases, this population is without access to assistance for logistical and political reasons. Monitoring of access to relief and the level of relief received, movements and relocations, and nutritional status should continue. To decrease vulnerability for displaced persons, the Government of Sudan will be required to accept basic principles of humanitarian behavior in not obstructing, but rather facilitating, the provision of emergency relief. However, this is unlikely.

Subsistence farmers throughout Sudan, particularly in Northern Darfur, are moderately to highly vulnerable because of poor food crop production and limited resources. Growing conditions, including climate and inputs, cash and food crop production, and crop and livestock market prices should all be monitored. As a proxy threshold, indicators which start to resemble conditions in early 1990 should be considered danger signals. Vulnerability will decrease for subsistence farmers if both favorable climatic conditions and access to seeds occur. The FAO estimates that, in 1992, 60% of all subsistence farmers can satisfy only 50% of their seed requirements themselves and that in Darfur and Kordofan 5,157 MT of donated seeds are needed. The GOS has no plans to supply any part of these needs. Some NGOs are already procuring and distributing seeds, however, with considerable donor funding.

Urban poor throughout Sudan, particularly in the South, are moderately to highly vulnerable because of high prices, low wages, and limited alternative resources. Prices, wages, and food availability should be monitored.

Pastoralists and nomadic groups should also be carefully monitored. Although now only moderately vulnerable, their condition is fragile and could easily return to at-risk, as in 1991. Pasture conditions, livestock sales, livestock prices and food prices must be monitored to identify signs of a recurrence of the poor terms of trade seen in 1991.

APPENDIX F: 1992 Sudan Vulnerability Assessment

Groups/ Sub-groups	Population (millions)	Place	Current Vulnerability	Reasons	Indicators	Base Vulnerability	1991 Vulnerability
FARMERS							
Traditional	4.48	West	Moderate to high	Poor production, low resources, low reserves, household income	Agricultural production, Prices, migration, nutrition	Moderate	At-risk (extreme)
	0.40	Central					
	0.87	East					
	2.40	South					
Mechanized	0.020	East	Slight	Production assets	Production	Slight	Moderate
	0.022	Central					
	0.014	West					
	0.003	South					
Irrigated	1.200	East, Central, Northern	Slight	Production, assets	Production	Slight	Slight
AGROPASTORALISTS							
	0.92	West	Moderate	Same as farmers and pastoralists		Moderate	At-risk (extreme)
	0.77	South	High	Civil strife		High	High
PASTORALISTS							
	1.20	West	Moderate	Good terms of trade, fair pastures	Pastures, terms of trade	Moderate	At-risk (extreme)
	0.47	East					
	0.94	South					At-risk (extreme)
AGRICULTURAL LABORERS							
	0.28	East	Moderate	Employment, reduced prices, increased costs	Employment, food prices	Slight to moderate	Moderate to at-risk (extreme)
	0.50	Central					
	0.15	West					
	0.05	South					

Groups/ Sub-groups	Population (millions)	Place	Current Vulnerability	Reasons	Indicators	Base Vulnerability	1991 Vulnerability
URBAN							
Poor	3.58	North	Moderate to high	Inflation, devaluation, prices	Income, prices, economic policies	Moderate	High to at-risk (extreme)
	0.426	South	High	Scarcity, prices, war			
Middle Income	1.8	North	Slight to moderate	Assets, savings, inflations		Slight	Moderate
	0.21	South	High	Lack of access, prices, reduced resources	Prices	Moderate	High
DISPLACED							
Integrated	0.4	Khartoum	High	Low resources, prices	Malnutrition	Moderate	High
Camps	1.4	Khartoum	At-risk (extreme)	Lack resources	Malnutrition	Moderate to high	High to at-risk (extreme)
	0.90	North	High to at-risk (extreme)				
	0.91	South	At-risk (extreme)	Civil strife, relief delays, shortages, restrictions	Government policies, nutrition	At-risk (extreme)	At-risk (extreme)
Rural	Several thousand	South	At-risk (extreme)	No access	Migration, relief deliveries	At-risk (extreme)	At-risk (extreme)
Women/ Children		All	At-risk (extreme)		Malnutrition	At-risk (extreme)	At-risk (extreme)
REFUGEES							
Integrated	0.30	Khartoum East	Moderate to high	Prices, employment		Slight	High
Camps	0.43	East West	Moderate to high	Relief, resources, prices	Malnutrition	Moderate	At-risk (extreme)

Sources: There are no official census figures which cover the division of groups and geographic zones represented. All figures are estimates based on FEWS/Sudan's extrapolation and projections from the 1983 Sudan census. *Pastoralists:* Proportionate estimate of nomadic population *Agropastoralists:* Proportionate estimate of rural Western and Southern population *Mechanized farmers:* Number of farmers registered at Mechanized Farming Corporation this season plus those who work in the undemarcated areas *Irrigated farmers:* Mission estimate *Agricultural laborers:* Estimated from numbers of schemes in the mechanized and irrigated sectors in different states. *Urban poor:* 60% of urban population *Urban middle class:* 30% of urban population *Displaced:* Commission on Displaced/RRC figures *Refugees:* UNHCR

Notes: Not all members of each group necessarily have the same level of vulnerability. Designations refer to the majority of the group.

APPENDIX G: FEWS Matrix of Vulnerability

Level of Vulnerability	Conditions of Vulnerability	Typical Coping Strategies and/or Behaviors	Interventions to Consider
SLIGHTLY VULNERABLE	Maintaining or Accumulating Assets and Maintaining Preferred Production Strategy	**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. **Production Strategy:** any changes in production strategy are largely volitional for perceived gain, and not stress-related.	**Developmental Programs**
MODERATELY VULNERABLE	Drawing-down Assets and Maintaining Preferred Production Strategy	**Assets/resources/wealth:** coping measures include drawing down or liquidating less important assets, husbanding resources, minimizing rate of expenditure of wealth, unseasonal "belt-tightening" (e.g., drawing down food stores, reducing amount of food consumed, sale of goats or sheep). **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.).	**Mitigation and/or Development: Asset Support** (release food price stabilization stocks, sell animal fodder at "social prices", community grain bank etc.)
HIGHLY VULNERABLE	Depleting Assets and Disrupting Preferred Production Strategy	**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). **Production Strategy:** coping measures being used have a significantly costly or disruptive character to the usual/preferred household and individual lifestyles, 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).	**Mitigation and/or Relief: Income and Asset Support** (Food-for-Work, Cash-for Work, etc.)
EXTREMELY VULNERABLE or AT-RISK	Liquidating Means of Production and Abandoning Preferred Production Strategy	**Assets/resources/wealth:** liquidating "production" resources (e.g., sale of planting seed, hoes, oxen, land, prime breeding animals, whole herds). **Production Strategy:** Seeking non-traditional sources of income, employment, or production that preclude continuing with preferred/usual ones (e.g., migration of whole families).	**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)

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Key Terms

At Risk - FEWS Reports employ 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 depends upon 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 orbiter 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% (based on a comparison with ground data). At a dekadal (ten-day) scale, 80% 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.