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Famine Analysis: A Study of Entitlements in Sudan, 1984 - 1985*

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Famine Analysis: A Study of Entitlements in Sudan, 1984 - 1985

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The famine of 1984-1985 in Sudan affected more than ten million people. Many national and international aid agencies shipped millions of tonnes of food to Sudan, targeted on the basis of the level of aggregate food supply. However, it is unclear whether the food availability decline experienced in Sudan was sufficient to have caused starvation. This paper seeks to test the food availability decline and entitlement hypotheses with respect to famines using Sudanese data. It is shown that a low or declining aggregate food supply does not necessarily imply famine and, conversely, that high or rising food supplies do not indicate the absence of a famine. The policy implications of the study are also analysed.

The abundance in the land will not be remembered, because the famine that follows will be so severe. [Genesis 41:31]

1.Introduction

News of the famine of 1984 first reached the Western world with moving documentaries about the plight of Ethiopian refugees in Sudan and, later in the following year, with the establishment of Live Aid projects. In 1985 the journalistic spotlight shifted its attention to the domestic situation and the plight of the more than ten million affected Sudanese[1]. Many national and international aid agencies, including the U.S. Agency for International Development, shipped millions of tons of food to Sudan, targeted on the basis of the level of aggregate food supply. However, even though food supply levels did decline, it is unclear whether the food availability decline experienced in Sudan was sufficient to have caused starvation. It may be fair to say that this situation was exacerbated by a drought, but to claim that people starved because of the drought would be missing the real cause of the famine. Tony Barnett identifies famines as a "problem of distribution which reflects the purchasing power of different social groups in the struggle over available resources"[2]. Amartya Sen's theories of food entitlement may provide a useful approach to the distributional problem of famines[3].

The main purpose of this article is to test the food availability decline (FAD) and entitlement hypotheses with respect to famines. Sudanese data will be used to illustrate that a low or declining

aggregate food supply does not necessarily imply famine and, conversely, that high or rising food supplies do not indicate the absence of a famine. It will be argued that famine affects different groups in the same region differently and that it is essential to focus on the changes in entitlements of different groups and to design remedies appropriate for each group.

II.Economics of Famine

Famine economics originated in the works of Smith (1776) and Thomas Malthus (1798). Smith argued that "invisible hands" were responsible for protecting people from famines and that only if these hands were bound by government intervention might they fail[4]. Malthus was more concerned with a form of aggregate warning system, which alarmed impending famines by looking for food supply in the face of population growth. He argued that as long as food output grew as fast as or faster than population growth, famines could not realistically occur.

A closer look at the laisse*z*-faire approach developed by Smith indicates that he had ignored the crucial aspect of the market failure that occurs in famines. This failure, according to Rashid, is based on imperfect information within the food markets. In a dearth this problem will produce exactly the same effects as a monopoly (ie , high prices and restricted supply), which Smith had hypothesized his free market approach would avoid[5] Relying on marketing systems to protect the poor is a consequence of Smith's work. The function of the market, however, is not to feed people It can feed only those with sufficient purchasing power. In other words, the free market is not an equity or welfare tool by nature, as Smith had intended

The Malthusian approach has been the basis for the bulk of the literature on global food supply and for the FAD approach[6] The FAD looks at food production statistics for evidence of a dramatic decline in food availability and considers this the only cause of a famine. A notable example is the approach of Food and Agriculture Organization (FAO), which operates on a balance sheet system, relying on food and crop production and availability statistics to forewarn of food deficits[7] Its limitation is that it ignores the crucial element of starvation in a famine, which refers to a relationship between people and food, not countries and food. Even with more accurate balance sheets this "people factor" cannot be ignored, as no matter how much food exists at a macro or country level, of more importance is the response to this food at a micro or household level[8]. Some of the "Great Famines" - so called due to their staggeringly high mortality figures- such as in Bengal (1943), Wollo (1973), and Bangladesh (1974), actually occurred while aggregate food supply was not falling, and was often even increasing[9] Thus the FAD approach cannot provide conclusive clues to what causes a famine, when the event is just as likely a poverty, as a food availability, problem[10].

Sen's entitlement approach accounts for both an individual's exchange abilities and distributional effects, thus avoiding some of the shortfalls of the free market and Malthusian

perspectives. This approach highlights each person's entitlement to commodity bundles including food, and views starvation as resulting from a failure of entitlement to enough food. It is not uncommon for a person to have a choice of possible commodity bundles, with all the alternatives represented by an entitlement set. The size of this entitlement set depends on two characteristics, namely, the person's ownership bundle and the function that specifies the person's set of alternative commodity bundles, which can be traded for each endowment (exchange entitlement mapping). The exchange entitlement map of an individual depends not only on production but also on a host of legal, political, and social characteristics of his society[11].

The entitlement approach suffers from several limitations. The first is the problem of accurately defining entitlement sets. It is important to note, however, that this approach seeks to study shifts in the main ingredients of entitlements rather than quantitative accuracy. Accordingly, it uses indicies rather than the actual figures. The second is that it cannot take into account the possibilities of illegal transactions, such as smuggling or looting, since it focuses primarily on legal markets. In doing so, it highlights the fact that it is often the legal structure or the institutional factors that stand between food availability and food entitlement. As Sen noted, under constraint "starvation deaths can reflect legality with a vengeance"[12]. The third limitation of this approach is that it assumes that people will consume all the food they are entitled to. However, the phenomenon of people consuming much less than this amount, even in the case of a severe shortage, is widely supported[13]. A further limitation of Sen's approach is that each group will have only one type of endowment. However, it is maintained that in the rural sector of a less developed country, where endowment vectors are at their simplest, this is an acceptable constraint[14].

III. Models, Data and Procedures

To test empirically the hypotheses, both the FAD and food entitlements were calculated. The FAD is simply the decline in regional food supply with respect to a normal year. The usual application of this is to a country level; however, an attempt was made to determine this statistic at a less-aggregated regional level. As no index of food availability was available at this level, and data are extremely scarce, figures for production were often used.

Equating supply with production may give rise to an inherent problem in the FAD measurement as any contribution from the market to this amount is ignored. However, this can be justified on several grounds. First, the famine was spread nationwide, so the national market was experiencing a downturn, and as a result the level of trading would have been reduced. Second, presumably the market would have had some positive effect on aggregate food levels in a region, so it would mean that the calculated FAD's were overestimated, and thus we are probably attributing to it more rather than less sensitivity. Third, as we do not need to reject the FAD hypothesis to exhibit that

entitlement criteria are important, accurate FAD figures, while desirable, are not essential for our analysis.

Food entitlement was calculated using the deterministic equation developed by Sen, that is,

$$F_j = Q_j \cdot \frac{P_j}{P_f}$$

or,

$$F_j = FER_j \cdot Q_j$$

where F_j is the amount of food that an individual group j is entitled to, Q_j is the size of group j's output, P_j is the price of output, P_f is the price of food, and $FER_j = P_j/P_f$.

Variable Q_j was drawn from crop production levels, livestock ownership, or available labour, P_f was calculated varyingly as the price of a mixed bundle of grains, depending on data availability, and P_j was taken as the market price for the group's crops, labour or livestock. For a population cluster that produces its own food, for example, millet growers, FER is obviously unity. Thus, any group j loses its food supply if Q_j decreases. For a cluster involved in trade, for example, agricultural labourers, their entitlement to food can fail by a fall in Q_j, their labour output, or by a shift in their FER.

This very simple model is useful for enhancing the information flow on what happens in a famine, as it allows us to focus on the more important parameters. For any group j to begin starvation because of an entitlement failure, F_j must decline, since it represents the maximum food entitlement. The Sen approach allows a distinction between a decline in food availability and a decline in entitlement to food. On the basis of this distinction, the approach serves to provide a method of analyzing famines, not necessarily isolating their cause.

The instability of the Nimeiri regime has meant that official statistics were often not collected. As a result, we decided to use a source of data that seemed rarely tapped by famine analysts: namely, data collected as an addendum to the wide range of nutritional surveys that are run in association with nearly all famines. Oxfam has been particularly active in this regard in Sudan, and it is largely on their efforts that this article relies[15]. Although these data are obviously susceptible to vagaries, their real advantage lies in the fact that they reflect prices as the individuals in the population perceive them. Of particular significance were the works of Alex De Waal, Malcolm McLean, and Roy Cole, which provided much of the specifics of this article[16]. The data collected included prices for livestock and nonfood crops, wage rates, and animal and crop production statistics. We used this information to determine both FADs and food entitlements for different population groups.

Food entitlements were calculated for four occupational groupings in three key regions: Darfur, Kordofan, and Red Sea Province. These regions were selected for their size, because of data

availability, and due to the fact that they represent three out of four of Sudan's "hunger danger regions"[17]. Entitlements were determined over time so that shifts in their main ingredients could be discerned. Where information was limited, a comparison was made with a "normal year" (in most areas 1980) so that deviations from when there was no famine could be detected.[18] Where endowment levels, Q_j, were not available, FER's alone were determined so at least the effects of changes in exchange abilities could be quantified. All of these figures were converted to indexes, based on departure from a normal year.

IV. Empirical Analysis

Since the famine was clearly initiated by a drought and there was evidence of widespread crop failures and livestock deaths, it would be easy to verify the FAD hypothesis. According to the FAO, the aggregate food supply fell 13% between 1980 and 1984[19]. On the basis of this information, we certainly cannot reject the FAD hypothesis. However, the FAD explanation still leaves several issues unanswered. Was this decline sufficient to have caused starvation? Were there any changes in purchasing power which limited access to food? Were some segments of the population affected differently from others? Was the decline supply or demand driven? Why are there some apparent anomalies in the FAO production data, for example, animal production appears to increase, which seems contrary to the idea of falling grain levels?[20] The entitlement analysis should go some way in addressing these issues not only by dissolving some of the aggregation problems but also by avoiding the assumption that food levels equal command. The following discussion will deal with the FAD and entitlement analyses on a regional basis.

Darfur is the westernmost region of Sudan and is divided into two, fairly distinct, northern and southern regions. Its largely rural inhabitants can be categorized into one of four population clusters: small sedentary farmers producing food grains, sedentary cash crop producers, nomadic pastoralists (herding cattle and goats), and agricultural labourers. Livestock, which exists mainly as an economic asset, is traded for cash, which is used to buy food, primarily asida, or directly for millet[21]. The main results for this region are presented in table 1.

TABLE 1

ENTITLEMENT LOSSES IN DARFUR

	Entitlement Loss (E)		E:FAD Loss	
	North(%)	South(%)	North	South
Grain Producers	80	50	1.00	1.00
Cash Croppers	65	...	0.81	1.30
Pastoralists	82	...	1.03	1.64
Agricultural Labourers	75	...	0.93	1.50

SOURCE.- Calculations were made using FAD = 80% in north, and 50% in south. For pastoralists, the calculation was based on a herd with equal endowments of goats and cattle. Declines are for the famine peak in early 1985 with respect to a "normal year" of 1980-81.

The entitlement for food-grain producers is the same as the FAD measure, due to the fact that the level of food grain supply that was used as a proxy for food availability[22]. If the accuracy of the FAD measure were to improve, we might expect that the ratio of E:FAD, and hence the importance of using the entitlement analysis, would increase. The producers of Darfur's major cash crops (mainly groundnuts and sesame) suffered a similar decline in output similar to that of the food producers, yet they were also subject to FER movements which on average for Darfur served to compound the effects of the drop in production[23] As the entitlement figures could only be obtained from an average of the two regions, it becomes difficult to determine whether the two regions are in fact different. The pastoralists in this region are shown to have a substantially higher entitlement loss than the average FAD level To understand why this is so, it is important to note that the animals are not treated as a source of food but, rather, as an economic asset[24]. It is likely that when the dearth arose, livestock owners began to sell their animal assets to buy grains, thus depressing the animal prices and giving rise to misleadingly high production figures[25]. In fact, it can easily be shown that the loss in FER was much higher than the actual loss in livestock. The 75% figure shown for the loss in entitlement of labourers must be treated with some degree of caution as it only represents the decline in exchange-ability entitlement for labourers who found employment[26]. Unemployment was widespread, however, exact data were difficult to find. It could be assumed though that those who were unemployed would have had an entitlement loss close to 100%

Kordofan is located on the eastern side of Darfur, and in essence the two regions are very similar The population in Kordofan can be divided into three main rural groups: the first consists of mainly sedentary farmers dependent on small scale, rain-fed cultivation of food crops or cash crops. These farmers can further be divided into northern and southern regions to allow for their different production conditions. The second group are sedentary pastoralists or livestock owners, who can be similarly divided according to their location. The final group, representing about a

quarter of Kordofan's population, are the nomads. They are constantly on the move, driving their camels or cattle along the north-south stock routes.[27] The main analysis results for this province can be found in table 2.

TABLE 2

ENTITLEMENT LOSSES IN KORDOFAN

	Entitlement Loss (D)		EFAD Loss	
	North(%)	South(%)	North	South
Grain producers	80	60	1.00	1.00
Cash croppers	95	90	1.19	1.50
Sedentary pastoralists	99	92	1.24	1.53
Nomadic Herdsmen	96		1.20	1.60

SOURCE - Calculations were made using FAD = 80% in north and 60% in south. Declines are for the famine peak with respect to a "normal year" of 1980-81

For the same reasons outlined earlier, the FAD is analogous to the entitlement decline for those who were producing the two main food crops, *dura* (sorghum) and *dukhan* (millet). As an alternative to growing food crops, cash crop production involves cultivation of mainly *simsim* (sesame) or *fool* (groundnuts)[28] The entitlement decline is much higher here than in Darfur primarily because there was a far greater increase in the price of the food crops, which exacerbated the falling exchange problems[29] Oxfam surveys taken during the famine period provide a good insight into why the entitlement loss was so unusually high.[30] Livestock losses were high, however losses due to FER falls were in most cases even greater, as herd values plummeted in the face of rising food prices[31] The Northern Sedentary was the most severely hit, with its livestock for food entitlement all but totally gone

The Red Sea Province is located on the eastern side of Sudan, where Port Sudan encounters the sea Its main inhabitants are the semi-nomadic Beja, chiefly herders and farmers[32]. There are four main crops grown in the Red Sea Province region the food crops sorghum and millet, and the cash crops cotton and vegetables The main livestock activities, nomadic or other, involve goats and sheep; however, the study of livestock and cropping activities is quite incomplete as it lacks data on herd sizes and distribution[33] The main results of the analysis of this region are presented in table 3.

TABLE 3

ENTITLEMENT LOSSES IN RED SEA PROVINCE

	Entitlement Loss (F),(%)	F:FAD Loss
Grain producers	60	1.00
Cash croppers	84	1.40
Herdsmen (Beja)	99	1.65
Agricultural labourers	48	0.80

SOURCE:- Calculations were made using FAD = 60%. Declines are for the famine peak with respect to the "normal year" of 1980-81.

Due to the measure used for FAD, we note that food grain (mainly sorghum) producers have experienced a fall in entitlement analogous to the 60% as in table 3[34]. Perhaps more curious is the 84% figure for cash crop (mainly cotton) producers. Cotton is grown almost exclusively for the export market, so as its price is determined exogenously, and was fairly constant over the famine period, we would expect that the FER decline would not be so great[35]. One of the interesting observations is that the decline in FER still outweighed the decline in production, serving to highlight the importance of this exchange effect.[36] The decline in entitlement for the livestock-owning Beja was one of the greatest calculated so far. Its departure from the nondescript FAD level helps to explain some of the severity of the famine in this region. The reason for this decline is twofold: herds were dying in droves due to lack of nutrition and owners' unwillingness to sell their livestock, and FERs had fallen to almost 4% of normal, with the market for animals almost disappearing.[37] As a result, the food entitlement of this group dropped to practically zero, even though the FAD was approximately 60%. For the final group, the agricultural labourers in this area, it has been noted that they were normally paid by a fixed cash wage in times of surplus labour, such as in 1984 - 1985, when there was widespread destitution[38]. The 48% decline is superficially less than the FAD, but it must be stressed that this figure is based on FERs of labourers who found employment[39]. It is important to realise that the labour market had substantially collapsed in the drought, particularly due to the migration to the district by famine refugees[40]. In the absence of more accurate figures, we can only assume that the entitlement of the destitute dropped to nearly zero.

Looking at the whole of Sudan we can compare the extent to which groups were affected by examining their comparative entitlement losses. The worst affected groups had entitlement losses of about 99% or 100%. They included the Northern Sedentary pastoralists of Kordofan, the unemployed agricultural labourers, and the Beja nomads of Red Sea Province. The next most affected groups were found in Kordofan where the cash croppers and other livestock owners experienced entitlement losses of 19%-60% higher than the FADs experienced, followed by the employed agricultural labourers of Darfur and the grain producers.

The general application of the FAD analysis to a country level suggests that food availability fell 13% from normal prior to the onset of the famine. Accordingly, food supply restrictions, caused by the onset of a particularly savage drought, appear to have been the instigators of starvation. The empirical results revealed FADs ranging from 50% to 80% (see tables 1, 2 and 3). That the decline across the whole of Sudan was inconsistent with the decline in the three regions is hardly surprising, as one of the reasons that these areas were chosen was because of their identification as the worst affected areas of Sudan. We cannot explain with certainty the cause of differences in FADs between regions due to the inherent weaknesses in using local production as a measure of food availability. Theoretically, however, differences between the regions could be explained by differences in supply and demand and/or by anomalies in trade policy. As our measurement has excluded the possibility of the market influencing the FAD, we cannot determine which of these was the causal factor. The contrast, however, does serve to illustrate the fact that the application of the FAD approach at a national level seems rather misleading.

The FAD approach, just as the entitlement approach, does not provide any "cut-off" point for a decline that indicates the onset of starvation. Obviously, starvation is more complex than that, and any attempt to quantify such a point must be treated with a great deal of suspicion. It is more plausible, however, that people would undergo some form of severe deprivation with these regional declines ranging from 50% to 80%, than with the simple 13% fall in food availability. Therefore, the FAD hypothesis for explaining the famine could be supported in this case, and the famine may not have been overlooked by a balance sheet system, particularly if applied at a regional level. It might also be indicated that the worst hit areas were the northern reaches of Darfur and Kordofan, with south Darfur the least affected, and south Kordofan and the Red Sea Province lying somewhere in between. This, however, appears to be the limit of the FAD's perspective, and it becomes obvious how little information has actually been generated.

The entitlement approach does not allow the more general statement about the state of the nation that the FAD affords. It only acknowledges that there were significant declines in entitlements throughout the country. It is even difficult to distinctly list the regions in order of effect, as it realises that different groups were affected in different ways within regions. However, it appears that the worst affected region was probably Kordofan, closely followed by Darfur and Red Sea Province. However it should be noted that the purpose of this analysis was not primarily to identify what *regions* experienced shortage but to identify what *groups* starved.

The preceding observations are obviously more detailed than those made based on the FAD analysis; additionally, the approach yields two other important pieces of information the - first being the answer to the question, when was the famine?

One of the criticisms that has been leveled against the FAD approach is that it can disguise the identification of when a famine takes place[41]. The FAD analysis may not be confirmed until harvest, yet it was the case that malnutrition peaked earlier than this. Nutritional surveys indicate

that the movement in entitlement closely followed the changes in protein energy malnutrition, as changes in exchange reflect growing scarcity of food prior to harvest.[42] The consequences of this in human terms do not need elucidation.

The second piece of information involves the fate of livestock herders. It was already noted that these groups experienced heavy entitlement losses, always above simple availability loss. This implies that the food entitlements of these groups will not recover nearly as quickly as the other groups, and substantial aid (in the form of immediate food relief and further herd reconstruction relief) will be needed for a period past the recovery of food supply in 1985.

V.Conclusions and Policy Implications

The evidence provided indicates that entitlement approach may be superior to the FAD methodologies that have dominated famine analysis to date. The overriding conclusion of the analysis is that there was a greater fall in entitlement than simple food supply in Sudan. As there was also a significant fall in exchange, the simple inclusion of endowments only, in a more accurate form of balance sheet, would still not cover the true extent of the loss in food entitlement. Thus, as we cannot escape the conceptual validity of Sen's model in application to the analysis of famine in Sudan, to ignore endowment and exchange would be to ignore some of the principal causes of deprivation.

As Sen's entitlement approach has served to differentiate a person's ability to command food from the food supply itself, it is useful to distinguish between two forms of aid, that is, aid that provides purchasing power and aid that provides food[43]. Food aid was the approach of donor countries to this problem, and it is doubtless that this action saved many lives. However, if food supply were higher than realized, aid aimed at improving purchasing power could also be used to avoid starvation. This type of aid may include, for example, cash handouts, food for work programs, and public works schemes. However, whether public policy should focus on the conveyance of food or entitlements depends on many other considerations and particularly on the efficiency of food markets.

Long-run policies should be geared to enhancing, securing and guaranteeing entitlements, not to simply increasing food output. This involves securing the efficiency of market structures including legal, political, social, and physical structures. The difference here is that one of the reasons for Sudan's falling food supply was not only drought but also declining incomes (even though for rural people income will still be drought dependent). This broader-based form of economic support is becoming more widely accepted by Western agencies as the key to tackling the Third World poverty problem. The 1990 World Development Report focuses on this poverty issue and the World Bank Policy Research Unit findings declare that this situation must be challenged on two fronts. The first, as suggested above, is that new economic activities for the poor must be created

using labour-intensive growth in any sector. And second is that the poor must be enabled to grasp these opportunities, through the provision of a more suitable infrastructure of social services[44]. Both of these recommendations are more consistent with the idea of command over food, establishing purchasing power, better exchange opportunities and the way entitlements reflect legal, political, and social constraints, rather than pursuing higher food supplies. It is also likely that Sudan's comparative advantage may no longer lie in agriculture but in the restructuring of the industrial sector[45].

In this study we commented on the adequacy of the FAO's use of the FAD methodology as a basis for famine early warning system (EWS). Food production and availability calculations are defective with regard to anticipating mass starvation. The simplest indicators that would need to be considered by an EWS are those that theory maintains as possible factors of starvation. They include the basics of food output, nonfood outputs, employment levels, wages, and prices *inter alia*. However, even if these are combined in some form of model, it seems that there is no invariable economic indicator into which all these parameters could be collapsed. This is because of the problem of forming any aggregates, for example, where changes in relative prices may harm one group while benefiting another. The Sudanese government is striving to design such a system at present, however, its development is slow and still a long way off[46]. There appear to be no substitutes for economic analysis of the entitlements of individual groups.

The role of trade policy should also be emphasized. Particularly, if different FADs are associated with unexplained differences in the movement of food prices, the real cause of famine may be faulty trade policy and not a localized drought. It follows that even if the famine is due to lack of food in the market the culprit is often not an act of nature, and the policy response is not necessarily the delivery of food. The implication of the analysis is that irrespective of the cause of the problem, whether there is a decline of purchasing power or a decline of food supply, the best remedy may be a target group oriented and not necessarily a food supply kind of intervention.

In summary, food entitlement data can reveal the existence of a famine, no matter what its cause, whereas food supply data reveal a famine only some of the time. The entitlement approach examines all contributing causes and is more likely to lead to cost-effective public policy than the FAD approach, which tends to prescribe dealing with the symptoms and often fails to recognize the need to focus remedies on particular target groups.

Notes

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1 . See, eg., Nick Cater,*Sudan - The Roots of Famine*, (Oxford: OXFAM ,1986)

2 .Tony Barnett, "Introduction: The Sudanese Crisis and the Future," in *Sudan: State, Capital and Transformation*, ed. T.Barnett and A. Abdelkarim, (University of East Anglia: Croom Helm, 1988),p3.

3 .Outlined mainly in Amartya Sen, *Poverty and Famines: an essay on entitlement and deprivation* (Oxford: Clarendon, 1981)

4 .Salim Rashid, "The policy of Laissez-Faire during Scarcities", *Economic Journal*, 90(September 1980):493-503.

5 .See *ibid;* and A. Sen, "Famines", *World Development* 8 (1979); p.613 to 621

6. See for example, K.O.Campbell, *Food for the Future*, (Lincoln: University of Nebraska Press, 1979)

7. Peter Cutler, "Food Crisis Detection - Going beyond the Balance Sheet", *Food Policy* 9, no 3, (1984):189-192.

8. See *ibid*; or Henry Rempel, *Food Security options for Sub-Saharan Africa*, (Winnipeg: University of Manitoba, Department of Economics, 1985),pp.1-32

9. Sen, *Poverty and Famines*, p.163.

10. Shlomo Reutlinger, "Malnutrition: A Poverty or a Food Problem", *World Development*, 5, no 8 (1977):715-724

11. Sen, *Poverty and Famines*, p.46.

12. *Ibid.*, p.166

13. It is very difficult to generalise how the household or individual will react to shortage, as many authors have observed (see eg., Rempel, pp1-32; or A. De Waal, *Famine That Kills: Darfur, Sudan, 1984-1985* (Oxford: Clarendon, 1989).

14. Amartya Sen, *Poverty and Famines* (n. 3 above), p.47.

15. Oxfam are particularly responsible for M. McLean, "A Report on the Nutritional Status of 4575 Children in Kordofan Region, September/October 1985". *Oxfam, UNICEF & Kordofan Regional; and Government, Nutritional Status and Drought Monitoring Project*, (Kartoum: OXFAM Health Unit, 1985); and Roy Cole, *Measuring Drought and Drought Impacts in Red Sea Province* (Port Sudan: OXFAM December 1989)

16. Mainly De Waal, *Famine That Kills*; McLean, and Cole .

17. In S. Shapouri, A. Dommen, and S. Rosen, *Food Aid and the African Food Crisis*, Foreign Agriculture, Economic Report 221 (Washington D.C.: U.S. Department of Agriculture, Economic Research Service, 1986), a study on four countries in sub-Saharan Africa, four hunger danger regions were identifed in Sudan: Darfur, Kordofan, Red Sea, and Bahr El Ghazal in the south. This latter zone was subject to severe data limitations due to civil unrest.

18. The year 1980 was identified as "normal" in McLean, p.15.

19. Food and Agriculture Organisation (FAO), *FAO Production Year-book* , Vol.41 (Geneva: FAO, 1987). This figure does not just represent production but is an index of actual food supply.

20. McLean, esp. tables 9-13.

21. Natalie Tobert, "The Effect of Drought among the Zaghawa in Northern Darfur", *Disasters*, 9:3(1985): 220 notes that these pastoralists also grew some *asada* (millet)of their own; however, the compact sandy soil (*goz*) on which they planted was more prone to failure, and thus it cannot be considered one of their normal sources of food.

22. In A. De Waal, *Famine that Kills*, pp 110-114,116, and "Famine Mortality: A Case Study of Darfur, Sudan 1984-5", *Population Studies* 43 (1989): 5. A normal, or non famine year in this case was taken as the average of per capita food supply figures for 1978-82. From this data the FADs of 80% and 50% were determined.

23. Most of the data used to find FER effects are found in De Waal, *Famine that Kills*, pp.109, esp. Fig. 4.12.

24. As De Waal observed, "[Pastoralists] have a hard-headed attitude to their animals. They regard herding as an economic venture rather than a cultural imperative. Their staple food is grain, not meat, blood and milk." *Famine that Kills*,pp.51

25. *Ibid*, p.162, esp. Fig. 6.5

26. The FERs were determined using changes in wages in Nakose with the onset of the famine, with changes in food prices (*ibid.*,p.145). High unemployment was observed in *ibid* pp.122, 163-9, 209

27. For an account of the famine in this region see McLean (n. 15 above) , esp. p.22; and Cater (n. 1 above).

28. Statistics used in the FAD calculations and region's background are from McLean,pp.15-16 tables 15 & 16.

29. Prices were unavailable for the cash crops in the Kordofan markets so price data from Darfur were used in an attempt to simulate the price movements (De Waal, *Famine that Kills: Darfur*, chapter 5).

30. The main results of the Oxfam surveys are presented in tables in McLean . The occupational groupings are the same as those presented in the report.

31. Based on *ibid*, tables 10-13.

32. Cole (n. 15 above), p.21.

33. This problem is currently being addressed by Oxfam, with their research on livestock surveys of Red Sea Province soon to be released.

34. The production and population data used in the assessment of FAD are based on those given for the Tokar region, found in Cole, pp. 9, 20-25, 149.
35. See Economist Intelligence Unit, *Country Profile / Sudan - 1986-87* (London: Economist Publications, vol. 3:1986, pp.20-21).
36. Calculations regarding the decline in FER were based on the following data sources: Cotton Liverpool Spot price is from the Economist Intelligence Unit, p.252; the cotton production levels and grain prices come from Cole, pp.136, 252.
37. Livestock loss data mainly from Peter Cutler "The Response to Drought of Beja Famine Refugees in Sudan", *Disasters* 12 no.1 (1988):183-186, esp. table 3. Cutler defines pre-drought in this case as 1980.
38. C. Gibb, "A review of feeding programmes in refugee reception centres in Eastern Sudan, Oct 1985" *Disasters* 10, no.1 (1986):37 and Cole, p.255
39. The FER was calculated assuming a cash wage based on data from the Tokar region (Cole, p.255).
40. Observed in N. Cater: i,2. There are no figures available for the exact number and destination of these refugees, Cater quotes 300,000 by 1985, so obviously the figure was large, especially in comparison to the province's own population of 700,000 !
41. For example in Sen, "Famines", pp 613-621
42. McLean, pp 2-4
43. Amartya Sen, "Food, economics and entitlements", in *Agriculture in a Turbulent World Economy - Proceedings of 19th International Conference of Agricultural Economists*, (Oxford: Clower, 1986), pp.17.
44. In World Bank "Poverty's Back at the Forefront", *World Bank Policy Research Bulletin*, 1(3: May-July 1990): 2-4 , and also Clive Crook "Helping the Poorest of the Poor", *Economist*, (July 21, 1990), p.67.
45. For example, see UNIDO "The Sudan Towards Industrial Revitalisation", *Industrial Development Review Series*, (New York: UNIDO Regional and Country Studies Branch) for a review of industrial development opportunities in Sudan
46. See E. Eldridge, C. Slater, and D. Rydjseki, "Towards an Early Warning System in Sudan", *Disasters* 11, no.2 (1986) 189-196