# Millet Prices, Public Policy and Child Malnutrition: the Case of Niger in 2005

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**Abstract:** Between March and August 2005 Niger was hit by a doubling of millet prices and a sharp rise in the number of severely malnourished children admitted to feeding centres. The extent and causes of such crisis remain controversial. The paper reviews the evidence in this regard in the light of the main famine theories. It concludes that the decline in food output recorded at the end of 2004 explains little of the food crisis which was due to the entitlements failure of several household groups, the malfunctioning of the regional and domestic millet markets, and policy mistakes in the fields of food security, food relief and health financing.

**Keywords**: child malnutrition, food prices, famine, food security, public policy failure
**JEL:** I 38, O 10, Q 10, Q 18

## 1. Introduction and purpose of the paper

In 2004 Niger suffered a drought and locust infestation that caused a 9 percent drop in cereal production in relation to the prior year, though it was higher than the average harvest of the prior five years. Cereal imports failed to offset the 2004 production shortfall, as they declined by two thirds in comparison to the past. As a result, between March and September 2005, more than 2.5 million low income people were affected by a severe food crisis characterized by a doubling of millet prices and a sharp rise in the number of severely malnourished children admitted to feeding centres. For several months the government of President Tandja minimized the gravity of the crisis, which in selected areas bordered famine conditions, arguing that such rise in malnutrition was part of a cruel seasonal cycle affecting the Sahelian countries, and later suggested that the emergency appeals issues by a few international NGOs were misplaced. Other analysts argued that the crisis was mainly due to the 2004 decline in food production, while others suggested the famine was due to the limited scope of relief measures, or to the high population growth characterizing the country. The causes of Niger's 2005 food crisis thus remain controversial.

The paper reviews the empirical evidence on the sources of food availability decline in 2005 and tries to disentangle the causes of rising child malnutrition on the basis of the main famine theories and of data on changes in millet prices and food entitlements, surveys on the incidence of severe and acute child malnutrition, longitudinal data compiled by Médécins Sans Frontières (MSF) France over 2002-2005 on the number of severely malnourished children admitted to its feeding centres, and of an econometric analysis of weekly data for these variables. An interpretation of the causes of the 2005 food crisis concludes the analysis.

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## 2. Literature on famines

Though attempts to explain why famines occur go back much farther than Malthus, at the beginning of the 21*st* century there is still no consensus as to why famines take place. Actually, the consensus is that famines are too complex to be explained by a single factor, and that all famines have multiple causes (Devereux et al. 2002). From essentially natural and economic, famines have become a political phenomenon, while a steady environmental degradation has intensified the frequency of harvest failures and the vulnerability of households to a single bad harvest. Depending on the main causes emphasized, famine models can be grouped into six categories, all of which but the latter one are helpful to explain Niger's 2005 food crisis.

**- *Malthusian and neo-Malthusian approaches (M-NM)*.** This approach, which dominated famine analysis until not long ago, emphasizes the inability of food supply to keep up with food demand. Malthus (1798) argued that population growth increases food demand which is satisfied by cultivating marginal lands or increasing the intensity of exploitation of cultivated lands, leading in this way to a drop in yields. Due to this, at a certain point, the average worker productivity falls below the subsistence wage. The equilibrium will be restored by famines, epidemic diseases, and a reduction in nuptiality and fertility. In this model, famine acts as a natural check on population growth, equilibrating the demand and supply of food. Such approach has been criticized for not considering technology-driven increases of land yields and food supply, the possibility of mass migration and demographic transition, and the fact that famines seldom acted as a population leveller. Malthus's ideas were revived in the 1970s when – due to the work of Meadows et al. (1974) and other authors - the perception was that the world was running out of food not because of lack of additional farmable land, but due to declining availability of water, energy, and raw materials, and due to land and air pollution.

**- *Food Availability Decline (FAD).*** The FAD approach argues that famines occur because of a sudden reduction in average per capita food production which is usually triggered by droughts, floods, pests infestation, and so on. As a consequence, food prices go up and people reduce food consumption below the survival level. Thus, this model emphasizes insufficient food production and availability as the main cause of starvation. In focusing on these two aspects, the FAD approach implicitly assumes that an adequate average food supply assures sufficient nutrition for all. This approach thus implies that food security is essentially a matter of expanding food output and imports and promoting sanitary improvements. Such approach has been criticized by Sen (1981) who argued that famines happen also in regions that have not experienced a decline in food production or availability, as in Bengal in 1943, Ethiopia in 1973 and Bangladesh in 1974.

**- *Food Intervention Decline (FID)***. According to this model, people starve because food policies and programmes of the institutions (governments, international and agencies, and NGOs) deputed to ensure food security fail to protect the population from natural or economic shocks. The policy response proposed by the FID model entails *ex-ante* policies to prevent malnutrition such as better early warning systems (EWS); a reduction of inequality; the introduction of safety nets in periods of food price volatility, and long-term measures such as rural credit and insurance. It proposes also *ex-post* measures to tackle on-going crises, including injecting food into the market at low prices, raise imports, introduce price controls, reduce food exports, and increase aid programs. The FID approach still lacks a well structured formulation. In fact, it is often seen as a complement to other explanations rather

as a unique cause of famines. Its advantage is its focus on policy interventions, as its proponents consider more useful to address famines rather than to explain why they happen.

***- Market failure (MF)***. Failures in the markets for labour, credit, insurance and, especially, food have often been blamed for causing or exacerbating famines (Ravallion 1987). In famine-prone countries, markets are almost always incomplete. In the food market, current trading decisions are conditional on expectations about the prices which will prevail in future spot markets. This expectations formation – that depends on how well food wholesalers predict future scarcities and prices - influences markedly the allocation of consumption over time and hence current starvation and mortality. Ravallion (1987, Chapter 6) has shown that expectations of grain wholesalers in Bangladesh exhibited little sign of informational efficiency, and that similar failures were observed during other famines. Often, hoarding prior to an anticipated food-availability decline tends to be excessive when compared to the likely outcome under conditions with informationally efficient expectations. Concerns have also been raised about the performance of markets in getting food from surplus to deficit areas, as often signalled by unjustified rises in trade margins.

The poor functioning of credit and insurance markets also matter to the transmission of aggregate shocks to the household level. The limited scope of the credit market exacerbates the pressure on interest rates and the poor's borrowing constraints during crises. In turn, vastly incomplete risk markets force rural residents to sell their assets at distress prices to buy food-grains, a well-documented phenomenon in poor pastoral economies (Ravallion 1997).

***- Entitlement failures (EF)***. In contrast to FAD, the EF approach does not focus on total food supply but on the food entitlements of the most vulnerable groups. Entitlements are the set of commodity bundles that a person can command in a society using the totality of her rights and opportunities (Sen, 1981). The legal food entitlements are grouped into production-based, trade-based, labor-based and transfer-based entitlements. As emphasized by Devereux (1993 and 2001), Sen's work does not provide a general theory of famines but an analytical framework for examining all of them. Indeed, in this model a failure to be entitled to any bundle with enough food may derive from either FID, MF, FAD or EF type of shocks.

Sen's EF approach has been criticized by Edkins (2000) who argued that this approach privileges the economic aspects and ignores the fact that famines are often a political and social process. Sen himself recognized that the EF approach is incomplete. Indeed, the specification of entitlements can be ambiguous (as in the case of communal property), or when they involve a violation of rights (as in the case of raiding cattle), or when people deliberately chose to starve as they are unwilling to exchange their productive assets for food. Moreover, the EF focuses on starvation while most famine mortality is caused by epidemics.

***- Complex Humanitarian Emergencies (CHE)***. While all five famine models discussed above may be relevant to the analysis of Niger's 2005 food crisis, this brief literature survey would be incomplete without mentioning the recent shift of famine analysis towards CHE which focus on political and social strains which, by breaking up of relations of cooperation, trust and peace among people, lead to fighting, mass population displacement and epidemics, while hampering access to food resources and causing their destruction (Nafziger et al 2000). These new famines are characterized by social, political and religious and inter-ethnic tensions, and the response to these new emergencies and of their effects on starvation requires to place the famine models examined above in a political context.

## 3. Background to the 2005 famine: long term trend in food insecurity

Niger is a vast Sahelian country with a population of 12.5 million in 2005 (15.2 in 2010). 65 per cent of the country is occupied by the Sahara Desert. At 3.4 per cent, population growth is one of the highest in the world. The country is landlocked and the closest port, Cotonou, is over 1000 km away, a fact that makes imports from outside the region difficult and expensive. At around PPP US$ 900, in 2005 Niger's GDP per capita was among the ten lowest in the world.

### 3.1. Trends in food availability

Niger can be divided in four agro-climatic zones. Below the desert lies the Sahel. With a rainfall of 100-300 mm per year and sub-desert climate, it can be used only for transhumant cattle herding. However, as illustrated by the Malthusian model illustrated above, growing population pressure has led to an encroachment of agriculture along its southern part, and 70-80,000 new hectares of fragile land subject to wind and water erosion are being farmed every year. Second, the agro-pastoral zone receives 300-600 mm of rain per year and is suitable for the extensive farming of millet. Yet, due to low yields, most households do not produce enough food to feed themselves throughout the whole year, and thus engage in goat rearing, casual labour, small trade and seasonal migration. The third rain-fed area (the Maradi and Zinder region) is characterized by semi-intensive agricultural practices, and livestock rearing. Finally, irrigated cash crops are grown in small oasis along the Niger river.

Food production is dominated by the subsistence farming of millet and sorghum which account for 78 and 19 per cent of cereal output (Beekhuis 2005). Despite attempts at confronting the deep seated weakness of agriculture during the 1980s and 1990s, Niger's dependence on climatic shocks, backward farming techniques and extreme price fluctuations has not decreased, while yields and output per capita have stagnated (Table 1).

**Table 1**. Trends in farmland, output and net food availability per capita, and in land yields

| Years | Farm Land per capita (ha) | Food output per Capita (kg) | Net Domestic Food availability per capita (kg) | Land yields (Kg/ha) |
|---|---|---|---|---|
| Average 1980-84 | 0.7 | 260 | | 375 |
| Average 1985-89 | 0.7 | 256 | 218 | 388 |
| Average 1990-94 | 0.8 | 259 | 205 | 313 |
| Average 1995-1999 | 0.7 | 239 | 208 | 322 |
| Average 2000-2004 | 0.7 | 254 | 225 | 372 |

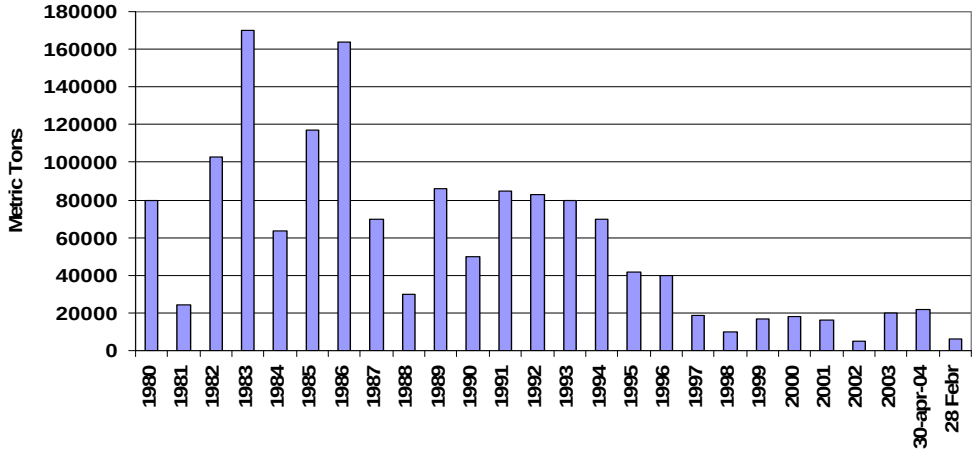
Source: Population: Annuaires Statistiques 1991 et 2003 DSCN, RGP/H 1998 et 2001. Production and surface: Rapport techniques SSA/DCV/MDA. Table from CFSVA (2005b).

The rapid growth of rural population has eroded food security. Indeed, the expansion of the agricultural frontier towards the fragile lands of the Sahel and overexploitation of Southern areas have heightened the vulnerability of Niger's agriculture to climatic shocks. Prior to the 1980s bad harvests happened every ten years, while between 1998 and 2005 they occurred every 2-3 years. Secondly, as argued by Ravallion (1997), also in Niger lack of insurance, rural credit and safety nets force farmers affected by production shortfalls to mortgage or sell their land at distress prices or to borrow at usury interest rates (Amadou 2003-4). Ever more frequent crises have thus led to the formation of a class of medium farmers who acquire land

from distressed peasants (Abdoulaye and Ibro 2006), and of a class of landless or near-landless labourers depending on casual work (CFSVA 2005a).

Since the 1970s, food imports from Nigeria and the Sahelian countries became permanent and constitute an increasingly more important component of total food supply, a third of marketed output and a key determinant of domestic prices. However, the Sahelian countries are often hit by co-variant climatic shocks which reduce the extent to which regional trade can cover food shortfalls and cap domestic prices. Access to food has also been affected by changes in food security policies. As stressed by the FID model, public provisions to ensure an adequate nutrition have diminished constantly as public policy emphasized that eventual shortfalls were be covered by food imports. As a result of this policy shift, the National Food Security Reserve declined markedly since the signature of the 1983 IMF standby agreement, and the task of stabilizing food prices and covering shortfalls shifted from holding a food reserve to relying on imports. As a result, the food security reserve dwindled from 170.000 tons in 1983 to 5.000 in 2005 (Figure 1).

**Figure 1:** Level of the National Food Security Reserve (tons), 1980–2005




*Source*: For 1980-90 Gromotka and Bendow (1992); for 1991–2005, CCA-SAP quoted in FEWS NET monthly report of 29 September 2005.

## 4. Food availability and prices during the 2005 food crisis

Between March and September 2005, 2.5–3 million people from low income families were affected by a severe food crisis. What were the features and causes of such crisis? In 2004 agricultural output fell by 3.9 per cent, while between end 2004 and August 2005 cereal prices rose 28 per cent. 2005 witnessed also a record trade deficit which was offset by a doubling of unrequited transfers, remittances and cancellation of part of the external debt. Meanwhile the budget deficit fell to the lowest level in years, despite a fall in tax revenue of 0.7 per cent of GDP (IMF 2007). This suggests that the government attached greater importance to the deficit reduction agreed with the IMF than to increasing spending on food relief. In addition, while minimal resources were allocated to this activity, sizeable funds were used for the Francophone Games which the Niger's authorities were committed to host in December 2005.

### 4.1 Changes in food production, imports, stocks and availability

As noted, the 2004 drought and locust infestation caused a 9 percent fall in cereal production in relation to the prior year. However, the September 2004 harvest exceeded the average of the prior five-year by 11 per cent, and was 28 per cent higher than that of 2000, when a much greater harvest failure did not lead to a food crisis (Table 2). However, unlike during prior crises, cereal imports failed to offset the 2004 production shortfall**.** Official imports decreased by 65 per cent in comparison to the average of the prior five years (CFSVA 2005b) and were only 16 per cent of the 2000–2001 level (Table 2). As only about 20 per cent of the cereal harvest is marketed, the import decline contributed in a major way to the drop in food supply and rise in domestic food prices. Official imports from Nigeria dropped by 65 percent between the first 5 months of 2004 and 2005 and those from Benin, Burkina Faso and Mali fell by similar amounts. In addition, according to CILSS et al. (2006) significant amounts of grains were exported to Nigeria and other neighbouring countries.

Table 2: Cereal Imports by marketing year (October–June), estimated marketed cereal output* and total marketed cereals, selected years.

| | Average of the five farm years 1999-2000/ 2003-2004 | 2000-2001 | 2004-2005 | 2004-2005 as a share of average over 1999-2000/ 2003-2004 % | 2004-2005 as a share of 2000-2001 % | Sources of decline in total food supply btw 2004-2005 and average of prior 5 years(% changes in parenthesis) | Sources of decline in total food supply btw 2004-2005 and 2000-2001 (% changes in parenthesis) |
|---|---|---|---|---|---|---|---|
| **A. Cereal imports** | | | | | | | |
| Imports of Millet | 27884 | 79190 | 12016 | 43.0 | 15.1 | ……. | ……. |
| Imports of Sorghum | 5904 | 16459 | 695 | 11.7 | 4.2 | …… | …… |
| Imports of Maize | 37146 | 61135 | 12016 | 32.3 | 19.6 | ……. | …… |
| Total Imports | 70934 | 156784 | 24728 | 34.8 | 16.0 | ……. | …… |
| **B. Sources of decline in total marketed cereals** | | | | | | | |
| Total Imports | 70934 | 156784 | 24728 | 34.8 | 15.8 | -46206 (48.7) | -132056 (-385.4) |
| Marketed Net Output* | 507680 | 361200 | 459000 | 90.4 | 127.1 | -48680 (51.3) | 98700 (285.4) |
| Total Market Supply** | 578614 | 517984 | 483728 | 83.6 | 93.3 | -94886 (100.0) | -34356 (-100.0) |

*Source:* Authors' calculations on data from DPP, Ministry of Agriculture (production data) and Beekhuis 2005 (import data). Notes: *the marketed net domestic output is assumed here to be equal to 20 per cent of national net production.** the total marketed food supply is the sum of imports and marketed net output.

Niger's import collapse was due to covariant bad harvests in its traditional suppliers (CILSS 2005). All this raised their demand for cereal imports and pushed up prices region-wide, including in surplus countries (Cornia and Deotti 2008, Table 6). In addition, the Government of Nigeria reinforced border controls to reduce unofficial exports, while Burkina Faso imposed a ban on cereal exports. Finally, between January and October 2005 the naira appreciated by between 5 and 7.5 per cent, thus reducing the incentives to export cereals unofficially to Niger (Terpend et al. 2006).

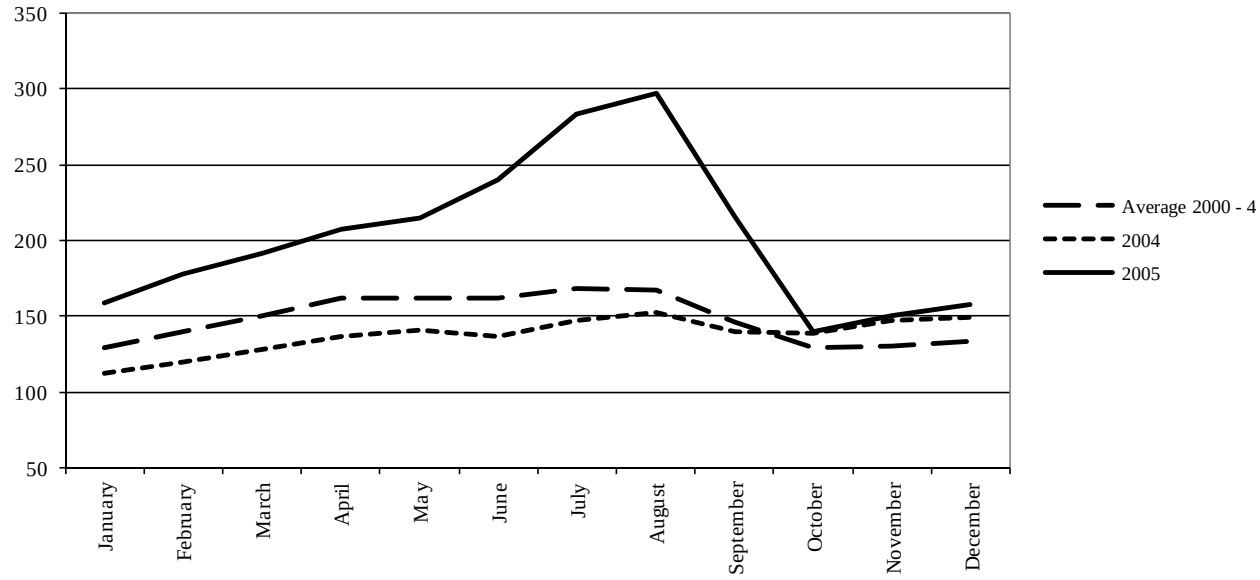
No food aid arrived to Niger before July 2005, despite a November 2004 joint appeal by the government and WFP and the launch of some emergency operations in February 2005. Only after the BBC broadcast in late July 2005 images of children dying at feeding centres there

was an increase in foreign aid (Egg et al 2006). Furthermore, during the first seven months of 2005 the Government did not permit WFP to carry out free food distributions, but only allowed subsidized sales of millet at 100 CFA per kg. However, the quantities sold were too small to stabilize prices (MSF 2005a, WFP 2006). Only in August 2005, WFP was allowed to carry out a free food distribution that gradually reached 3 million people.

### 4.2 Changes in food prices

Price tensions started emerging already between January and June 2005 as the price of millet rose by between 5 and 12 per cent a month. In July and August the millet price was 80 per cent higher than the average of the prior five years and twice that of 2004 (Figure 2). After the good harvest of September 2005, it gradually returned to normal levels.

Figure 2: Monthly consumer price of millet (CFAF/Kg): 2005 vs. 2004 and average 2000 – 4




*Source:* SIMA, National Dataset. Note: a one-tail t test of the significance of the monthly variations (year on year) confirms at the 10.9 per cent probability level the hypothesis that the 2005 prices were significantly higher than those recorded over 1994–2004. The significance rises sharply if the test is restricted to May–October.

The rise in consumer prices was accompanied by a growing divergence between the producer prices paid in small versus large collector markets, and between producer and consumer prices. This trend suggest a surge in wholesalers' profits not justified by efficiency improvements. Indeed, during the crucial weeks from October 2004 to January 2005 producers in small markets received on average 82 per cent of the price paid in large collector markets, against an average of 91 per cent during 2000–2004 (Cornia and Deotti 2008, Table 6). In addition, the 2005 rise in consumer prices was due also to the growing divergence between producer and consumer prices. Their average nationwide difference over July–September 2005 (27.4 per cent) was in fact considerably higher than during the same period of 2000–2004 (12.5 per cent) (*ibid*).

Speculation may have also exacerbated food price rises during the summer 2005, though lack of data does not allow to test formally this hypothesis. As noted by Ravallion (1987), during famines food-stock holders do not behave necessarily in an informationally efficient way, and

hoarding prior to anticipated decline in food-availability tends to be excessive when compared to the same outcome under conditions of informationally efficient expectations. In Niger fewer than twenty wholesalers control the millet marketing chain (Beekhuis 2005), and it is possible they stocked up more than usual in anticipation of growing purchases by aid agencies. In support of this view, an econometric analysis for the years 1997–2005 (Michiels et al. 2006) suggests that the 2005 price rise was exacerbated by expectations of further rises, the procurement policies of aid agencies and speculation by wholesalers. On a more anecdotal basis, some of them admitted they bought large quantities of millet when the crisis was announced and stocked up until August, when they resold them for double the price (Le Nouvel Observateur 2005). However, a July 2005 WFP survey concluded there was no evidence of millet hoarding.

## 5. Theoretical framework to analyse the impact of the 2005 food crisis

Following Sen (1981), the entitlements bundle of households group h (h=1,..k) can be formalized as follows:

(1) $$Qf_h = Qf\text{-}sc_h + Qj_h\, Pj_h/Pf + Qw_h\, Pw/Pf + T_h/Pf + |-\Delta A|_h/Pf$$

where $Qf_h$, $Qf\text{-}sc_h$, $Qj_h$ and $Qw_h$ are respectively the total amount of food available to household group h, the amount of food produced for self-consumption, the amount of goods (such as goats, cash crops, firewood, etc.) sold to purchase food and the amount of casual labour performed. In turn, Pf, Pj and Pw are the prices of food and goods sold on the market and the wage rate, while $T_h$ is the nominal value of transfers received and $|-\Delta A|_h$ the income obtained from the sale of household assets. Pj/Pf and Pw/Pf are the 'terms of trade' between the prices of goods exchanged and the price of food, and between the wage rate and the price of food. The volume of market demand of food of households group h is $Qf_h$ - $Qf\text{-}sc_h$, while total food demand is equal to $\Sigma_h$ ($Qf_h$ - $Qf\text{-}sc_h$).

In Niger food entitlements vary across household groups. The food-deficient agro-pastoralists sell part of their food output after the harvest (when food prices are at their lowest) to cover various expenses and repay debts contracted during the lean season. They buy food after exhausting their food stocks starting in January-March with cash obtained from the sale of small animals, casual work, migrant remittances, borrowing, or getting enrolled in food aid programs. In turn, the control over food of cash-crop farmers depends on the demand and prices of the crops they produce and the price of millet ($Pj_h$/Pf). Third, a growing rural proletariat buys food with the cash earned through casual work. For this group, control over food thus depends on labour demand ($Qw_h$) and the terms of trade 'daily wage/millet price' (Pw/Pf). Fourth, the food entitlements of pastoralists depend on the price of animals ($Pj_h$) and the price of millet (Pf). Finally, vulnerable households depend for their survival on small trade, remittances and transfers relative to the food price (Th/Pf).

While remaining broadly unchanged in urban areas, food demand rose in rural areas owing to a drop in production for self-consumption (CFSVA 2005a). The extent to which this demand was actually satisfied depended, however, on the value of the food entitlements of various household groups. The food-deficient agro-pastoralists were hit by both a drop in food self–

provisioning and in the price of the goats they sold due to a fall in meat demand and a decline in animal quality. As in other Sahelian famines (Sen 1981), such distress sales drove goat prices further down and by July 2005, the goat/millet terms of trade had fallen by 50 per cent in relation to 2003-2004 (Table 3).

Table 3: Terms of trade between millet and different goods and services, 2003–2004, 2004–5

| | **Quintals of millet per female goat** | | | **Quintals of millet per cow** | | | **Quintals of millet per100 kg of onions** | | | **Quintals of millet per 20 days rural wage°** | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **03/04** | **04/05** | **% change** | **03/04** | **04/05** | **% change** | **03/04** | **04/05** | **% change** | **03/04** | **04/05** | **% Change** |
| October | 1.5 | 1.0 | -33.3 | 12.6 | 7.8 | -38.1 | 3.4 | 2.1 | -37.6 | 2.45 | 0.97 | -60.3 |
| November | 1.4 | 1.0 | -28.6 | 12.1 | 7.7 | -36.4 | 3.7 | 2.2 | -40.6 | 2.39 | 0.92 | -61.5 |
| December | 1.5 | 1.1 | -26.7 | 11.9 | 7.4 | -37.8 | 3.6 | 1.8 | -50.2 | 2.37 | 0.91 | -61.5 |
| January | 1.5 | 1.0 | -33.3 | 11.0 | 6.6 | -40.0 | 3.0 | 1.2 | **-59.8** | 2.25 | 0.86 | -61.7 |
| February | 1.4 | 0.9 | -35.7 | 10.3 | 6.2 | -39.8 | 2.2 | 1.1 | **-51.4** | 2.05 | 0.77 | -62.4 |
| March | 1.2 | 0.8 | -33,3 | 9.6 | 5.6 | -41.7 | 1.5 | 0.9 | -43.8 | 1.88 | 0.70 | -62.4 |
| April | 1.2 | 0.7 | -41.7 | 9.1 | 5.0 | -45.1 | 1.3 | 0.9 | -31.1 | 1.81 | 0.68 | -62.7 |
| May | 1.1 | 0.7 | -36.4 | 8.5 | 4.5 | -47.1 | 1.2 | 0.9 | -25.2 | 1.75 | 0.65 | -62.7 |
| June | 1.1 | 0.6 | -45.5 | 8.8 | 3.7 | **-58.0** | 1.4 | 0.9 | -31.0 | 1.78 | 0.58 | -67.6 |
| July | 1.0 | 0.5 | **-50.0** | 8.1 | 3.5 | **-56.8** | 1.3 | 1.0 | -22.5 | 1.68 | 0.47 | **-71.9** |
| August | 1.0 | 0.5 | **-50.0** | 7.8 | 3.6 | -53.8 | 1.,3 | 1.2 | -11.1 | 1.62 | 0.47 | **-71.0** |
| September | 1.2 | 1.0 | -16.7 | 8.5 | 5.4 | -36.5 | 1.7 | 2.0 | 17.6 | 1.78 | 0.68 | -61.6 |

*Source*: Authors' calculation based on SIMA, SIMB and EPAD-Niger data. Notes: the terms of trade are expressed as the number of 100 kg sacks of millet obtainable per female goat, cow, 100kg of onions, and 20 days of agricultural work. The EPAD-Niger data suggest a constant average daily wage of CFA Francs 625 and 1125 for 2004–2005 and 2003–2004 respectively.

In turn, the pastoralists were affected by the deterioration of the cow/millet price ratio (Table 3). Despite this, they suffered less acute nutritional problems than the agro-pastoralists as they owned larger herds. Cash crop farmers were affected by the decrease in the price of their crops relative to that of millet. For instance, the nationwide price of onions fell by 60 per cent between March 2004 and March 2005 because of weakening demand (FEWS-NET, March 2005). Finally, the terms of trade of casual labourers were severely affected (Table 3) by a surge in the supply of casual labour and a drop in labour demand (as part of the harvest had been lost due to the drought), while their daily wage fell by June–August 2005 to 500-750 CFA Francs in the villages and 750–1000 in urban areas (communication of EPAD Niger, July 2007).

There are only scattered data on the entitlements erosion suffered by problem households and household relying on remittances. During the 2005 crisis, more and more households increased their demands for food assistance to less affected households. Some of the latter remained in the villages but avoided to exhibit their resources while others left to enjoy the anonymity of city life (Koné and Touré 2006). As shown by EFSA (2005), 60 percent of households were forced to pawn their durables, sell their land at distress prices, or get into debt. In turn, in 2005 a growing number of them migrated in search of work (Koné and Touré 2006). World Bank (2006) estimates indicate that in 2005 official remittances reached US$60 million (1.8% of GDP), about the same as in 2004, despite the increase in the number of

migrants. Nigeria, which receives seasonal migrants from Niger, reported a ten-fold increase in the number of Sahelian labourers seeking work, with the result that the job done in the past by one person was shared among three people (Harragin 2006).

## 6. Access to basic health services during the 2005 crisis

Health services in Niger are organized according to a three-tier system comprising national hospitals in the main cities, district hospitals at the departmental level, and village level Integrated Health Centres (CSI) and Health Homes. Until the mid 1980s, health services were financed by the state budget. Yet, due to the fiscal crisis of 1983–1984, in 1986 the government introduced a cost recovery system for hospital care which was extended to primary health care in 1995. However, a 1998 survey conducted in 11 health care centres of the Tillaberi region showed that attendance to CSI declined by 40 per cent following the introduction of user fees (Meuwissen 2002). In spite of this and of a Unicef and World Bank appeal to freeze user fees (which offered to finance the related revenue shortfall), cost recovery was not suspended in 2005. Patients attending public health facilities continued to be charged 300-600 FCFA per consultation and to bear the full cost of drugs (MSF 2005b).

No study has quantified the health effect of such decision, but consumer theory suggests that it contributed to the 2005 rise of child malnutrition which, also in Niger, is due to the perverse interaction between infection and inadequate food intake. According to EDSN/MICS III (2006), in 2005 78 per cent of the women interviewed faced problems in obtaining the health care they needed for their children. Had user fees been reduced or frozen, households would have been able to acquire a greater quantity of both health services and food, compensating in this way part of their income fall and increase in millet prices caused by the crisis (see Figure 6 in Cornia and Deotti 2008)

## 7. Evidence of changes in child malnutrition and mortality during the 2004-5 crisis

Due to the lack of a permanent monitoring system, evidence about the 2005 changes in child malnutrition was derived from the *ad hoc* surveys summarized in Table 4 and listed in detail in the bibliographical references in Cornia and Deotti (2008). These surveys are not fully comparable, a fact that limits the inference that can be drawn on their basis (Delpeuch 2005) as they suffer from self-selection bias, often refer to different regions, and focus alternatively on the 0–59 or the 6–29 months old children. In addition, some were conducted between October-January (when malnutrition is lowest) and others during the hunger season of May-August. The CDC-UNICEF survey overcomes several of these difficulties but was carried out right after the September 2005 bumper harvest.

Despite these limitations, in all but one of these surveys, the ‘global-acute’ and ‘severe-acute’ malnutrition rates among the 6–59 months old were above the thresholds (of respectively 15 and 2 percent) used by the WHO to identify emergency situations, with peaks of 4.1 and 5.4 per cent in agricultural and agro-pastoral zones. Second, the high malnutrition rates recorded for the 6–29 months old in almost all surveys are suggestive of a nutritional crisis. Third, the

May and September 2005 malnutrition rates for the 6–29 months old were consistently 50-100 per cent higher than those recorded by the DHS of 1998 (a bad harvest year). Finally, the evolution over 2005 of rates of acute-severe child malnutrition in Maradi and Zinder points to a steady rise, though lack of data for prior years does not allow to establish whether such rise was due to seasonal factors, the 2005 crisis, or both.

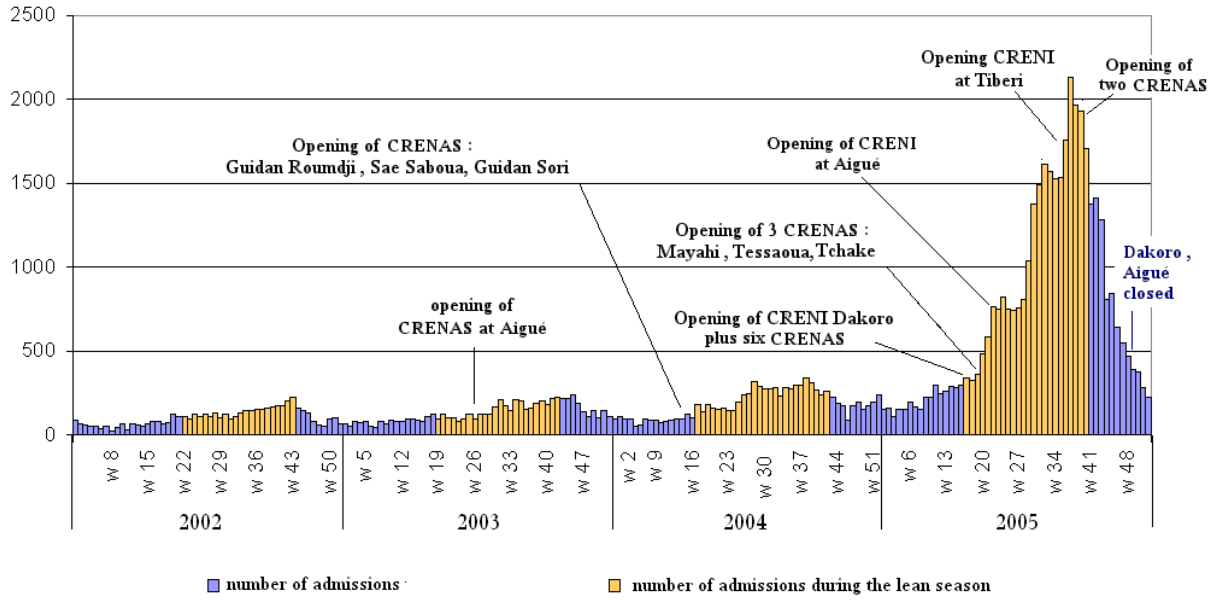
Table 4. Child malnutrition (weight for height) and mortality from 2005 ad hoc surveys, in relation to those of DHS 1998 and MICS 2000

| **Survey** | | **DHS 1998*** | **MICS 2000 **** | **KHI –WFP** | | **MSF – EPICENTRE** | | | | | **ACF Spain** | | | **CDC UNICEF** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area covered** | | Nation | Nation | Maradi | Zinder | Maradi Dakoro Mayahi, Tessaoua | Tahoua Keita | Zinder Mirriah | Tahoua Keita | Tillaberi Ouallam | Maradi Tahoua Agricul zone | Maradi Tahoua Agropast zone | Maradi Tahoua Pastoral zone | Entire country |
| **Surveying Period** | | March July 1998 | Apr – Aug 2000 | 4-16 Jan 2005 | 4-16 Jan 2005 | 28 Apr 3 May 2005 | 28 Apr 3 May 2005 | Aug 2005 | 24 - 28 Aug 2005 | 15-20 Sept 2005 | 17 Sept - 6 Oct 2005 | 21 Sept- 15 Oct 2005 | 14- 25 Oct 2005 | 17 Sept 14 Oct 2005 |
| **N. of children surveyed** | | 4403 | 4948 | 901 | 907 | 951 | 906 | 908 | 941 | 888 | 1061 | 1040 | 746 | 5324 |
| **% of severe acute malnutrition** | 6 – 59 months | - | 3.2 | **2.2** | **2.7** | **2.4** | 2.9 | **3.0** | 1.8 | 1.8 | **4.1** | 5.4 | 2.8 | 1,8 |
| | 6 – 29 months | 3.7 | - | - | - | 4.4 | 4.1 | 5.6 | 3.7 | 3.7 | 6.6 | 8.1 | 2.2 | - |
| | 30- 59 months | - | - | - | - | 0.9 | 1.9 | 0.8 | 0.5 | 0.4 | 0.2 | 1.5 | 0.7 | - |
| **% of global acute malnutrition** | 6 – 59 months | - | 14.1 | 13.4 | 13.5 | 19.3 | 19.5 | 18.6 | 15.6 | 15.3 | 19.2 | 24.7 | 16.4 | 15,3 |
| | 6 – 29 months | 20.7 | - | - | - | 28.5 | 28.2 | 32.6 | 25.3 | 24.5 | 32.0 | 33.9 | 19.8 | - |
| | 30- 59 months | - | - | - | - | 12.4 | 13.0 | 7.2 | 9.1 | 8.6 | 7.0 | 15.2 | 11.7 | - |
| **Crude mortality rate (deaths/10000/day)** | | - | - | - | - | 0.80 | 1.0 | 1.50 | 0.30 | 0.50 | 0.54 | 0.45 | 0.54 | 0.40 |
| **Under 5 mortality rate (deaths/10000/day)** | | - | - | - | - | 2.20 | 2.40 | 4.10 | 0.30 | 1.40 | 1.97 | 1.63 | 1.73 | - |

*Source*: see the bibliographical references in Cornia and Deotti( 2008) . Notes: * the September 1998 harvest was 24 percent lower than that of 1996; ** MICS 2000 covers children aged 0-59 months.

A second source of information on 2005 changes in child malnutrition is the number of child admissions to the CRENI and CRENAS feeding centres of MSF-France in the Maradi region which have been in operation since 2002 (Figure 3).

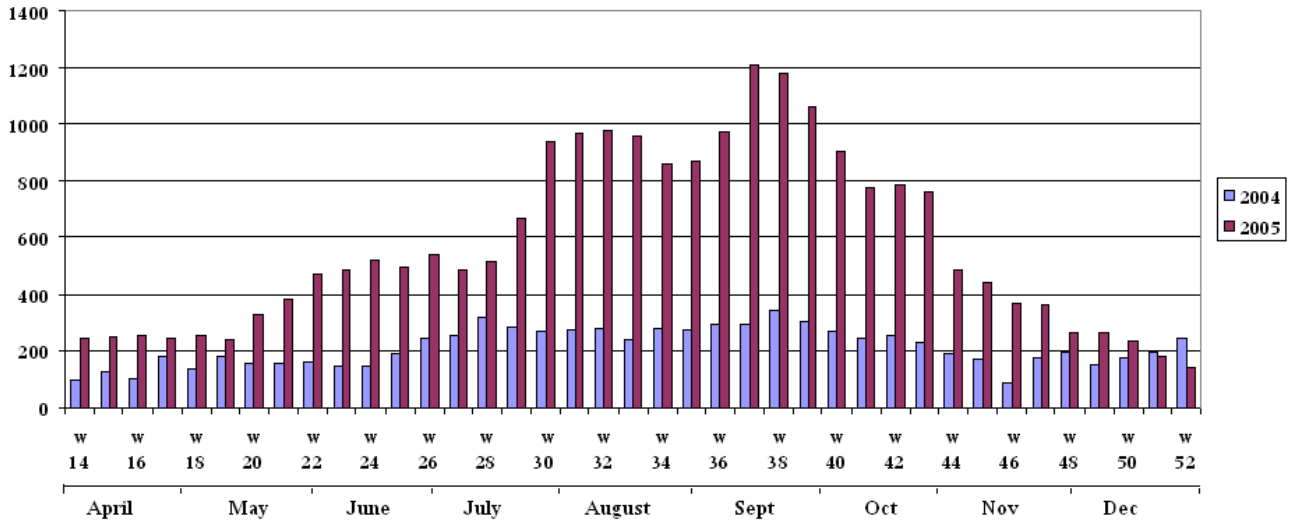
Figure 3: Number of weekly child admissions to MSF feeding centres in Maradi region,




***Source:*** Moonen et al. (2006)

Though not population-based, these data show a sharp rise in admissions in 2005. However, it could be argued that such rise was due to the growth in the number of feeding centers from four in 2002 to 22 in August 2005. One way to disentangle the relative effect of falling food entitlements and the increase in the number of feeding centres is to compare child admissions data for eight feeding centers in operation in both 2004 and 2005. This is done in Figure 4 which shows that between July and October 2005 child admissions more than doubled in relation to 2004.

Figure 4: Weekly admissions of malnourished children to eight MSF feeding centers in Maradi region, 2004 and 2005.

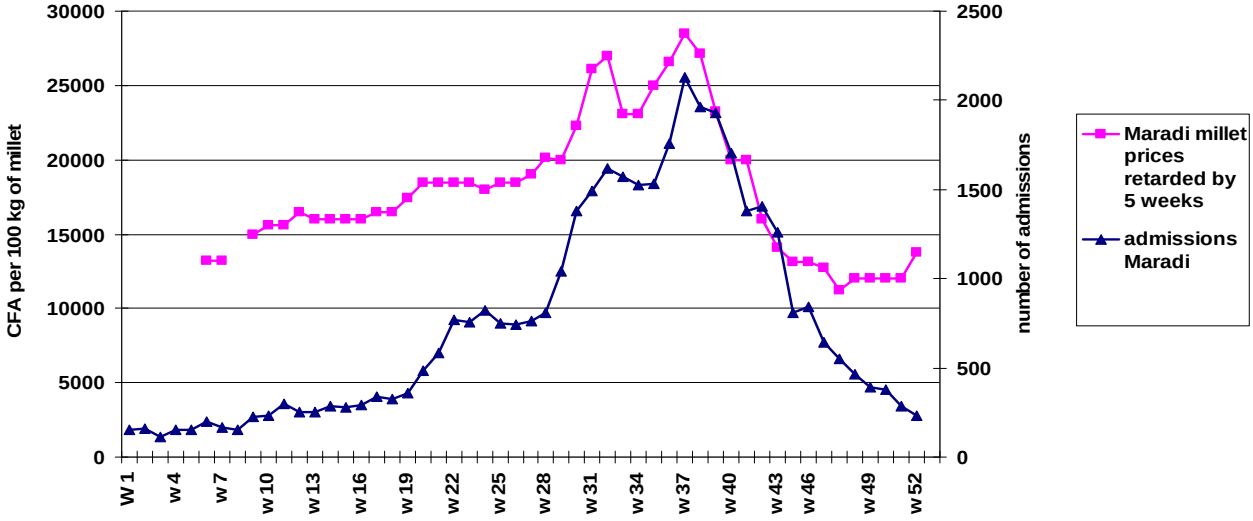



*Source*: Moonen et al. (2006).

A second objection to the use of the data from the MSF feeding centers in Maradi is that the rise in admissions was due to the opportunistic behavior of mothers who took their children to the feeding centers to receive the food rations distributed by MSF to relatives of malnourished children sent home after their conditions improved. Yet, this hypothesis is inconsistent with the sharp fall in admissions recorded immediately after the good harvest of September 2005 (Figure 3). Why should have these supposedly opportunistic mothers forfeited the opportunity of receiving free food rations? The most plausible answer is that the bountiful September 2005 harvest, fall in millet prices and recovery in the price of goats, cows and other entitlements reduced the need to do so[2].

The international literature on the relation between rapid increases in food prices and child malnutrition in low income countries further confirms the hypothesis that the millet price changes recorded in Niger between April and September 2005 (Figure 3) did impact child malnutrition. For instance, an analysis of the 1974–1975 Bangladesh famine (Mc Cord et al. 1980) shows that sudden hikes in rice prices led to a statistically significant increase in malnutrition and death rates with only a two months lag. A similar lag between millet prices and anthropometric indexes was found for 1981–1986 in Niamey (Khan et al. 1992). And a strong correlation between food prices and the incidence of underweight children was observed in Bangladesh (Bloem et al.1994), Ghana, Togo, Botswana and Madagascar (ACC/SCN, 1992). Alderman (1986) reviewed fifteen studies conducted in the 1970s. In all of them, the impact of sharp food price hikes was most marked among the poor, who had little room for sacrificing the consumption of other items to sustain food intake. For instance, in India, a one per cent rise in food prices over 1952-1971 cut food consumption by 0.7–0.8 per cent for the poor and 0.1–0.2 per cent for the non-poor (Radhakrishna 1983). Inspired by this literature, we plot the relation between weekly millet prices and lagged child admissions to MSF feeding centres in Maradi (Figure 5).

**Figure 5**: Lagged weekly millet price and admissions to MSF feeding centers in Maradi, 200[illegible]




*Source*: MSF-France 2005 for weekly admissions to nutritional centres; SIMA for millet prices.

[2] It could also be argued that the value of MSF's food ration dropped in line with the fall in millet prices below the opportunity cost of the mothers' time to take children to the feeding centres. Yet, while the price of millet declined, that of other items part of the food ration, such as vegetable oil and high energy biscuits, did not.

## 8. Econometric analysis of the causes of the rise in child malnutrition

We now test the impact of all the factors illustrated above on the basis of the theoretical model illustrated in equation (1) which describes the determinants of control over food and the related risk of child malnutrition and admission to MSF feeding centres:

(2) Child admissions to MSF feeding centres = $\alpha$ + $\beta$ millet prices + $\chi$ food entitlements prices[3] + $\delta$ number of feeding centres + $\phi$ hunger season dummy + $\varepsilon$

Five increasingly more comprehensive econometric models were tested in a step-wise mode using the OLS estimator with robust standard errors to assess the impact of the above factors on the number of admissions of malnourished children to MSF feeding centres on the basis of 202 weekly observations covering the years 2002–2005 (see models 4a and 5a). However, in models 1 to 5 the 202 weekly observations were transformed into 48 monthly observations to avoid the problems of autocorrelation of residuals which emerged when carrying out the analysis on weekly data (which exhibit a highly inertial behaviour within a month), as illustrated for example by the DW statistics of models 4a and 5a (estimated on 202 weekly data). Indeed, the parameters and significance levels of models 4a and 5a are very similar to those of models 4 and 5, but exhibit DW coefficients below the acceptable level (1.55).

Model 1 in Table 5 explores the log-log relation between the price of millet and the number of admissions of malnourished children to feeding centres lagged five weeks while controlling for the 'hunger season dummy'[4] and the price of goats (a main food entitlement for the agro-pastoralists) and cows (the main food entitlement of pastoralists). Lack of data did not allow to include the prices of cash-crops and rural wages (the main food entitlement of commercial farmers and rural labourers – as suggested by equation (1) and as illustrated in Table 3 for the years 2003-5).

As for the log of millet prices lagged five weeks, we allowed for the non-linearity of the relation 'millet price-lagged child admissions' by carrying out a spline regression on 202 weekly observations whose elasticity is allowed to vary over different price ranges (defined in footnote b of Table 5). Unsurprisingly, the results show that the millet price-child admission elasticity is not significantly different from zero in price ranges 1 and 2 (when millet prices were lower than 180 CFA Francs per kilo and child admissions were broadly constant, see Figure 3) but that it is significantly different from zero in price range 3 (when prices exceeded 180 CFA Francs).

[3] It has been suggested to use as an explanatory variable proxying the food entitlements included in equation (1) the ratio of the price of the various entitlements (cows, goats, rural wages, etc.) to the price of millet. While consistent with equation (1), such approach entails a loss of information on the relative importance of the price of millet versus the value of food entitlements in affecting child malnutrition.

[4] Food security, body weight, and child malnutrition worsen systematically during the hunger season which spans May/June-October, i.e. weeks 20/22 to 44. To start with, just before the onset of the rainy season (which marks the beginning of the hunger season) the households exhaust their grain stocks and have to buy food on the market at high prices. In addition, water quality deteriorates as rains cause surface contamination of water sources and raise the risk of waterborne diseases, while stagnant water increase the risk of malaria transmission. Finally, the hunger season coincides with the onset of the labour intense planting season. Parents thus often leave their infants with grandparents or older children, exposing them to poor feeding and caring practices.

**Table 5**: Regression analysis of admissions of children to MSF feeding centres, Maradi 2002–2005 (dependent variable: log child admissions lagged 5 weeks)

| | Model 1 | Model 2 | Model 3 | Model 4 | Model 4a | Model 5 | Model 5a |
|---|---|---|---|---|---|---|---|
| Constant | 79.169*** | 40.674*** | 46.416*** | 58.385*** | 57.850*** | 71.555*** | 84.310 *** |
| Log admission $_{-2}$ | | | | 0.2646*** | 0.313*** | | |
| Log admission $_{-2}$*Dummy3 | | | | | | 0.131*** | 0.096*** |
| Hunger_season dummy | 0.289* | 0.273** | 0.320** | 0.284** | 0.400*** | 0.299** | 0.369*** |
| Log millet price range 1 | - 0.221 | - 0.388 | - 0.662 | -0.063 | -0.235 | -0.291 | -0.314* |
| Log millet price range 2 | 0.650 | 0.511 | 0.566 | 0.814* | 0.747*** | 0.577 | 0.502*** |
| Log millet price range 3 | 3.806*** | 2.606*** | 2.680*** | 2.690*** | 1.795*** | 1.650** | 1.151*** |
| Log cow price | - 3.284*** | - 0.416 | - 0.747 | -2.247*** | -2.967*** | -2.733*** | -3.079*** |
| Log goat price | - 3.567** | - 3.016** | - 2.824** | -2.945** | -1.883** | -3.376** | -4.270*** |
| Dummy 1 | | | 0.064 | | | | |
| Dummy 2 | | | 0.487*** | | | | |
| Dummy 3 | | | 1.111*** | | | | |
| Dummy 4 | | | 1.400*** | | | | |
| Log number MSF centres | | 0.831*** | | | | | |
| Observations | 48 | 48 | 48 | 46 | **202** | 46 | **202** |
| R-squared | 0.868 | 0.917 | 0.918 | 0.884 | 0.909 | 0.904 | 0.908 |
| F-Statistic | 109.34 | 219.71 | 133.73 | 97.07 | 342.64 | 166.16 | 297.28 |
| Durbin Watson | 1.55 | 2.01 | 2.02 | 1.63 | 1.22 | 1.76 | 1.37 |

*Source:* authors' calculations. *Notes*: *, **, *** indicate that the parameters are significantly different from zero at the 1, 5 and 10 per cent probability level; /[b] The three price ranges were identified on the basis of a Chow test which shows ( 0.0006 which is significant at 1 % level on the weekly time series, and at the 5% level on the monthly time series) which shows that the slope of the relation between millet prices and lagged child admissions is characterized by two threshold effects. The analysis of the 202 millet price observations allowed therefore to identify three statistically different price ranges: in the first the log millet price is smaller than 9.4 (or 120 CFA Francs a Kilo), the second when it was between 9.4 and 9.8 (120-180 CFA Francs a Kilo), and the third when it is bigger than 9. 8 (180 CFA Francs a Kilo).

The inclusion of the price of cows and goats is also highly significant, suggesting – as argued shown by equation 1 – that acute malnutrition is due not only to a failure of production entitlements and rising food prices but also to a failure of exchange and labour entitlements. As expected, the hunger season dummy is highly significant, for the reasons explained in footnote 4.

Model 1 assumes that the unobserved 'demand for admission' of children to feeding centres is due entirely to changes in the prices of millet, cows and goats, and to the onset of the hunger season. Yet, as noted in section 7, it is possible that the actual number of admissions was influenced by the increase in the number of feeding centres, particularly during the difficult months of May-August 2005. To capture this effect we followed two approaches[5]. Model 2 introduces in regression the variable 'number of MSF feeding centres' in operation.

[5] In an attempt to endogenize the number of centres, we also tested a model by using as dependent variable the 'number of child admissions per feeding centre' but this approach produced unsatisfactory results (not shown here for reasons of space) and was therefore abandoned. This is likely due to the fact that MSF responded to the crisis by both increasing the number of child admissions per existing centre (see figure 4), and – even more so - by increasing the number of feeding centres in the area (which rose from 5 to 22). The poor empirical results of this approach (not shown for reasons of space) suggests that the increase in number of centres dominated over the increase in number of admissions per centre.

In Model 3 four time dummy variables were instead added: Dummy1 (equal to 1 from July 2003 to March 2004 – when 5 centres were in operation – and 0 otherwise), Dummy 2 (equal to 1 from April 2004 to April 2005 – when 8 centres were in operation – and 0 otherwise), Dummy 3 (equal to 1 from May 2005 to September 2005 - when 18 centres were in operation and millet prices rose sharply – and 0 otherwise), and Dummy 4 (equal to 1 when 22 centres were in operation – i.e. from October 2005 to December 2005 – and 0 otherwise).

Both models show that the rise in the number of MSF feeding centres contributed in a statistically significant way to the number of child admissions. In both models, the parameters of millet and goat prices remained stable and significant though that of cow prices lost statistical significance. At the same time, models 2 and 3 reject the hypothesis (prevalent in Government circles in 2005) that the rise in the number of MSF feeding centres was the main factor explaining the increase in child admissions. In fact, in model 2 the elasticity of the number of MSF centres is substantially lower than that of the prices of millet and goats, while in model 3 the coefficients of period dummies 3 and 4 are substantially lower than the coefficient of goat prices and of millet prices in price range 3[6].

Models 2 and 3 implicitly assume that the opening of new centres was unrelated to the number of child admissions in prior months. However, it could reasonably be argued that the opening of new feeding centres was determined by the increase in the number of admissions in the prior periods, causing in this way a problem of endogeneity[7]. A Wu-Hausman test carried out on model 2 in fact rejects the null hypothesis that the number of centres is exogenous at the one percent probability level. To deal with this bias, we introduce the instrumental variable (IV) 'lagged child admissions'. To choose the optimal lag of such IV we run the following regression:

(3) $\text{number feeding centers}_t = \zeta + \gamma \text{ child admissions}_{t-x} + \eta$

where x is the number of weekly lags which we let vary between one and ten weeks. The results show that the $\gamma$ coefficient is always significant at the one percent level but that the R-square reaches its maximum (0.7) for a six weeks lag (broadly equivalent to two months when using monthly data, as in Models 4 and 5). This suggests that a rise in the number of admissions leads with a two months lag to an increase in the number of feeding centres, which in turn instantaneously permits to increase the current number of admissions. This circular relation can be simplified by substituting relation (3) in relation (2) obtaining a new formulation (equation 4) which is the reduced form of the two equation system (2) and (3), i.e.

(4) $\text{child admissions} = (\alpha+\delta\zeta) + \beta \text{ millet price} - \chi \text{ entitlements' prices} + \delta\gamma \text{ child admissions}_{t-2} + (\delta\eta + \varepsilon)$

[6] A good estimate of the percentage impact of each dummy variable on the number of admissions is given by g = 100(exp (b - V(b)/2) - 1) where b is the estimated coefficient on a dummy variable and V(b) is the estimated variance of b (Halvorsen and Palmquist, 1980).

[7] The hypothesis that the number of feeding centres closely depends on that of admissions six weeks earlier assumes adaptive expectations, absence of MSF budget constraint, and absence of unexpected shocks. If these hypotheses are abandoned, the number of feeding centres becomes a random variable and no problem of endogeneity would arise from a theoretical perspective.

Thus the introduction of the IV lagged admissions to feeding centres in place of the number of centres in operation eliminates the endogeneity problem, as confirmed by the tests carried out on Model 5 to find out possible problems of non-normality of the distribution of the error term, heteroschedasticity, and omitted variables. The tests indicate that none of such problems exist and that the parameters of Model 5 are unbiased and efficient.

Model 4 thus tests relation (4) in log-log terms, while Model 5 adopts a slightly different specification by interacting the number of child admissions lagged two months with the 'time dummy 3', which takes the value of 1 from May 2005 to September 2005, when 18 centres were in operation, and millet prices rose the fastest. Model 4 shows that the parameter of the lagged number of admissions is significantly different from zero, the R2 remains high, the DW is within the normal range and the parameters of the other variables remain significant and stable. Model 5 generates similar results while the fit slightly improves, suggesting it is marginally preferable to Model 4. Also in this case, the parameters of the other variables retain stable, significant and with meaningful values.

In conclusion, the regression analysis confirms that the rise in child admissions to MSF feeding centres during 2005 in the Maradi area was explained to a considerable extent by an abnormal rise of millet prices and parallel drop in the price of goats and cows and - likely - of cash crops and rural wages, though lack of data did not allow to test fully the impact of these two variables. While the lagged opening of new feeding centres contributed to the rise in admissions, its impact was less important than the changes in the food entitlements, particularly during the difficult months of May-August.

**9. An interpretation of the 2005 food crisis**

As noted in the introduction, the extent and causes of the 2005 rise in child malnutrition remain controversial. Some observers suggested that the 2005 was a FAD crisis caused by the 2004 drought and locust infestation and the ensuing September 2004 harvest failure. Yet, as noted, the 2004 output was higher the average of the prior five years while the 2004 output decline was smaller than that observed in 2000-2001 when no famine was reported. In fact, the 2005 fall in food availability was mainly due to a drop in food imports (Table 2). Furthermore, even when focusing on food availability rather than production, the FAD approach does not capture the effect of the erosion of the food entitlements of agro-pastoralists, pastoralists and casual workers and the delayed food relief response by the government and international community.

A more realistic explanation is provided by the EF model which emphasize also the failure of exchange-based entitlements (due to the fall in the prices of small animals, cattle and cash crops), labour-based entitlements (due to a drop in employment opportunities and wages) and transfer-based entitlements (due to limited public interventions and the erosion of community solidarity).

Despite its richness, the EF approach does not bring to the fore some key aspects of the 2005 crisis, in particular various market failures (MF), some chronic and some specific to 2005. According to this approach, sharp rises in food prices and child malnutrition were due to rising differentials between producer and consumer prices, a chronic lack of credit and insurance (which especially affected the poor in 2005) and, possibly (but lack of data allowed

us to test this hypothesis), excessive food hoarding in relation to the what would have happened under conditions of informationally efficient expectations. Most importantly, the 2005 food crisis was exacerbated by the inability of the Sahelian millet and sorghum market to stabilize Niger's domestic prices through food imports.

Finally, the 2005 nutritional crisis would not have been so severe without a Food Intervention Decline (FID), i.e. the failure of the government and international relief agencies to respond to the crisis in a timely fashion. A first failure was the earlier decision of sharply reducing the National Food Security Reserve (Figure 1) and of relying on volatile imports to stabilize food prices. Given the problems discussed above, public policy should have opted for holding bigger national and regional food security reserves (NEPAD 2004). Moreover, once the famine erupted, there was no attempt at moderating the rise in millet prices by means of free food distributions, the launch of large scale food-and cash-for-work programs that have been shown to be effective in emergency situations (Drèze and Sen 1989) and the freeze of user-fees in primary health care. The FID explanation stresses also the narrow focus of the EWS in use in 2005 as such system monitored food output but not vital information on changes in food imports, stocks, entitlements, and child nutritional status. In conclusions, the food crisis which hit Niger in 2005 appears to be a composite 'EF-MF-FID crisis'.

**10. Epilogue**

This paper cannot end without recalling the food crisis which hit Niger between March and August 2010. While the vulnerability to climatic shocks and failures of the Nigerien and Sahelian millet markets did not go away, the lessons learned on occasion of the 2005 famine led in 2010 to a better public response (de Sardan 2011). While, as noted, in 2005 President Tandja consistently denied the existence of a food crisis, in 2010 the government did not conceal the gravity of the situation and called immediately for international assistance. In addition, by 2010 the EWS included much more information on economic and nutritional indicators, and data on the vulnerability of rural households. In turn, free food distributions were launched right at the beginning of the crisis, while child malnutrition was monitored closely, more effective care protocols were developed, aid programs were designed and implemented at the regional level, and a better coordination between international organizations, ONG and the government was put in place (*ibid*). As a result, the 2010 crisis was tackled more quickly and effectively than that of 2005, despite a far greater decline in millet production. Yet, the underlying causes of food insecurity illustrated in part 3 remained as challenging as ever. With no sign of decline in a very high population growth, the country continues to experience a steady shift towards the fragile lands of the agro-pastoral zone and towards rising land concentration, while domestic food demand is increasingly satisfied by volatile imports. In this sense, Niger seems to be caught in a chronic Malthusian trap. Second, while the NGOs have basically taken charge of the nutritional rehabilitation of children, the high cost of public health services continues to reduce child attendance to clinics and so raises the risk of infection and, through that, of child malnutrition. Finally, the country continues to be extremely dependent on foreign aid. Without tackling these structural imbalances over the medium term, it is likely that Niger will continue to face every few years devastating food crises and rises in child malnutrition.

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