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EMPLOYMENT PROGRAMS FOR FOOD SECURITY IN RURAL AND URBAN AFRICA: EXPERIENCES IN NIGER AND ZIMBABWE

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The food security and poverty-targeting potential of employment-based income transfers has long been recognized in many African countries, not least in Niger and Zimbabwe. Niger's experience with public works dates from the 1930s. Beginning with the great drought of the 1970s, the Nigerien government has increasingly emphasized small-scale programs to generate labor for soil and water conservation and to minimize the effects of future droughts. These programs have been supported by donors and nongovernmental organizations (NGOs) with close government collaboration, and they have a growing focus on urban food security problems. Zimbabwe's history of employment programs is even older, dating back to 1903 (Iliffe 1990). It, too, has shown an increasing reliance on public works in recent years, both in urban and rural settings. However, in contrast to Niger, Zimbabwe has implemented two major public programs of its own, based primarily on domestic food and budgetary resources.

This chapter examines some of the public works experiences of these two countries, particularly with regard to their short-term impact on food insecurity. Three major questions are addressed in relation to projects in both rural and urban areas. First, who participates in labor-based works projects, and why? Second, what is the impact of the project on household employment and income? Third, what obstacles do employment programs face in alleviating food insecurity and lifting long-term constraints on growth in semi-arid environments?

Few in-depth evaluations of the effects of participation on food-insecure households have been undertaken in either country. Noting the scarcity of in-depth evaluations, Drèze (1989) argues for "paying greater attention to . . . important 'success stories,' because serious studies of costs and benefits are not available." Such information is urgently needed, according to Rukuni and Eicher (1991), so that researchers can turn their "attention to converting grain to calories via food-for-work . . . to combat hunger and

malnutrition.” Without such information, the debate on the effectiveness of projects is waged in an informational vacuum. The two studies described in this chapter were designed to fill a few of the identified information gaps, and thereby contribute to the improved design of interventions to create employment and enhance food security.¹

Programs and Settings: Why Contrast Niger’s and Zimbabwe’s Experience?

The semi-arid zone of Zimbabwe has been called the “Sahel of the South”—an area in which rainfed cultivation is often possible but never fully guaranteed (Iliffe 1990). The comparison is not without merit. As in the Sahel, Zimbabwe’s dry regions are landlocked, their average rainfall is low,² and a large share of the population is chronically food-insecure. Yet, Zimbabwe differs from Sahelian countries like Niger in that it possesses large tracts of higher-altitude land (600 to 1,300 meters above sea level) that are fertile and generally very productive.

Why then are these two seemingly different countries brought together here as case studies? A number of factors make it appropriate to compare and contrast Niger and Zimbabwe. First, both have dynamic labor markets and their economies rely heavily on international migration and remittance flows from absent men to de facto women-headed households. Second, although agricultural economies, both countries have important mining sectors, a fact that distinguishes Niger from most of its neighbors. Third, urban growth in both countries stands at more than 7 percent per year, more than double the national rate of population growth. The fourth reason is that both countries spent much of the 1980s focused on the goal of national self-sufficiency in food production. Since the late 1980s, they have deemphasized national self-sufficiency, shifting toward a more specific policy of food security at the household level. Fifth, until recently, the agricultural policy of both countries was marked by centralized control over the marketing of key commodities through a complex system of price control and trade legislation. Both governments have been changing their approach to food policy since the late 1980s, leading to price deregulation and the progressive withdrawal of public control over the economy. Sixth,

¹For details of the two studies, see Webb 1992 and Webb and Moyo 1992.

²Regularly under 400 millimeters per year, and, in 1991/92, under 200 millimeters.

both countries are prone to drought. Given that food production in both countries is heavily dependent on rainfed agriculture, periodic droughts represent a regular threat to domestic food supply. The 1973/74 drought resulted in a 50 percent decline in food supply and the loss of 33 percent of the national livestock herd in Niger (Somerville 1986). In 1984, rainfall was again 40 percent below the long-term average at a national level, resulting in a 50 percent shortfall in cereal harvest (Niger 1991; Borton and Nicholds 1992). More recently, drought has devastated Zimbabwe. In 1991/92, rainfall was barely 50 percent of the average, resulting in a national harvest that was just 20 percent of the normal (USAID 1992; FAO 1992). By 1993, 5 to 6 million people were registered for food assistance (USAID 1992; Webb and Moyo 1992).

Drought years aside, Niger has a remarkable record of balancing aggregate food supply with demand over the past 30 years. Between 1960 and 1990, domestic production delivered an average of 2,300–2,500 kilocalories per capita, above minimum requirements (SBW 1987; FAO 1990a; CARE 1990). Unfortunately, even in good harvest years, average food-availability figures tend to mask problems of severe malnutrition. The prevalence of chronic malnutrition in Niger ranges from 20 to 40 percent, with wasting ranging from 10 to 38 percent. These are among the worst figures in Africa (UNDP 1990; Bread for the World 1992). Similarly, Zimbabwe is known for its “agricultural miracle” of the 1980s (Drèze and Sen 1989). Between 1980 and 1985, output of maize almost doubled, with production in the smallholder sector rising threefold. However, stunting is recorded at 29 percent (37 percent in some areas), with wasting at 16 percent (Zimbabwe 1989; Mason 1990; World Bank 1992).

Finally, interest in employment programs in these countries shows little sign of abating. Donors, NGOs, and the governments continue to line up to invest in public works activities. But there are differences in approaches taken by the countries that are spelled out in more detail below.

Public Works Programs in Niger

Most of Niger’s labor-based work programs grew out of emergency projects initiated in response to the 1973/74 drought and famine. These programs did not emphasize the sustainability of assets generated and few were ever properly evaluated. By the late 1970s, most projects had gained a development focus. In 1985, 180 small projects, primarily under NGO management, were being implemented, most using food as an incentive for mobilizing labor (World Bank 1988). In addition to this, a large number of projects were funded by international donors, such as the World Food Programme (WFP) and the World Bank, operating in collaboration with

government ministries. At least 14 donors and NGOs were supporting labor-based works programs at more than 100 sites in Niger during 1992.

Table 7.1 presents a profile of some of the programs implemented in Niger since the early 1980s. This incomplete list indicates that more than US\$150 million has been invested in projects with a high labor content between the early 1980s and 1990s. This investment has generated more than 22 million days of work, which has mostly been applied to halting erosion and improving soil and water management in the semi-arid zones. This represents a significant development input via a single instrument. WFP alone supported 8.3 million workdays between 1989 and 1992 at a cost of more than US\$19 million, 71 percent of which was dedicated to erosion-control activities (WFP/Niamey, unpublished records).

A number of important points emerge from Table 7.1. First, there is a distinct rural bias. Nine out of 10 projects are located in more remote, usually semi-arid, parts of the country. This pattern is partly the result of historical inertia: organizations that responded to previous famines have remained in areas likely to be vulnerable again (FAO 1990a, 1990b; WFP 1991). But the preponderance of rural projects also reflects the fact that urban food security has only recently become a public concern. More recently, the balance has shifted in favor of urban activities.

The second point is that most rural projects focus on natural resource conservation, rather than on road building, livestock projects, or irrigation development. Environmental degradation is one of Niger's greatest constraints and Lipton (1989) has argued that "public works programs have probably the best capacity for mitigating environmental degradation." This is because the most common, and most effective, measures against degradation cannot be implemented by machinery alone. The techniques employed for soil and water management require from 50 to 300 person-days of labor per hectare of "recovered" land (Derrier 1991). It is, therefore, these types of activity that dominate Niger's portfolio of labor-based projects.

The third point is that the mode and level of payment for project participants vary across projects. It is clear that food-for-work (FFW) predominates in the rural areas, while cash-for-work (CFW) has so far been associated with the urban projects. Voluntary labor inputs are universally wished for by project managers, and sometimes written into donor-community contracts.

The fourth point to be highlighted is that a large share of rural participants are women (60–80 percent). Most rural projects try to avoid direct competition with agricultural operations and, therefore, concentrate activities during the dry season. Since this is the season of male emigration, projects offering a low (usually food) wage are attractive to the poorest of the remaining workforce, namely women.

Table 7.1—Profiles of selected labor-intensive public works programs in Niger in the 1980s and early 1990s

Primary Task	Years of Operation	Area Covered	Participation	Work-days Created	Salary Type ^a	Female Involvement ^b (1,000)	Project Costs		Main Donors (US\$ million) ^c
							Donor	Government (percent)	
Soil works, trees	1976-84 1985-2005	Tahoua	1,500 households	?	F V	50	0.02 0.3 ^e	...	SWISSAID, Tahoua Catholic Mission, WFP KFW, GTZ, WFP, DED
Terracing, gullying	1981-87 1988-92	Tahoua	148 villages	?	F, V	80	3.3 4.7	...	Italy, FAO, WFP, UNDP
Terracing, soil works	1984-91 1992-96	Keita	5,000 households 22,000 households	4,200 5,700	F, C F, V	65 50	33.0 28.3	1.2 0.7	UNSO, Holland, UNDP SNV, Holland, WFP KFW, GTZ, WFP, DED
Trees, soil works	1984-88 1989-92	Tahoua	1,000 households	30 50 ^d	F	70	?	...	
Terracing, gullying	1986-90 1991-95	Tillaberi Tahoua	150 villages	6	F, V	50	3.3 10.5	?	CARE, WFP, USAID
Terracing, gullying	1987-90	Galmi	11 villages	80	F	85	0.6	?	
Roads, wells, trees	1990-93			70			0.5	?	
Trees, soil works	1987-89 1987-93	Maradi Dosso	300 households 40 villages	36	F, C V, FI	5 20	0.4 2.0	...	ILO, UNDP, UNCDF UNSO, UNDP
Irrigation, soil works, pastoral	1988-92	Tahoua	7,000 households	?	F, V	50	27.6	0.7	IFAD, WFP, UNDP
Irrigation, trees	1989-95	Dosso	7,000 households	?	C	40	17.1	0.9	World Bank, KFW, EEC
Urban sanitation, soil works, roads	1990-94		?	10,000	C	10	25.0	2.7	World Bank, EEC, KFW, UNDP

Source: Data obtained from the offices listed under "Main Donors" and from the Office of NIGETIP.

Notes: The list of programs is not exhaustive. The full names of the acronyms for donors are as follows: SWISSAID, Swiss Agency for International Development; WFP, World Food Programme; KFW, German Bank for Reconstruction; GTZ, German Agency for Technical Cooperation; DED, German Development Service; FAO, Food and Agriculture Organization of the United Nations; UNDP, United Nations Development Programme; UNSO, United Nations Sudano-Sahelian Office; SNV, Dutch Volunteer Service; USAID, United States Agency for International Development; ILO, International Labour Office; UNCDF, United Nations Capital Development Funds; IFAD, International Fund for Agricultural Development; EEC, European Economic Community.

^aF = Food wage; V = Voluntary participation (no wage); FI = Food Incentive; C = Cash wage.

^bEstimates based on project reports.

^cCFA franc converted at a rate of 285/US\$ (the rate for April 1991).

^dEstimates based on averages for 1989-91.

In urban areas, by contrast, male participants predominate by more than 99 percent. The urban schemes were initiated on a pilot basis in 1990. They represent an attempt to organize private implementation of publicly funded projects. The Agence Nigerienne de Travaux d'Interet Public pour l'Emploi (NIGETIP) was created as a private NGO (supported by donors such as the World Bank and the European Community as well as the Nigerien government) to disburse funds through a bidding process to private agencies for public works. It is a small agency with less than 30 staff, organized into four departments: a director general's office, a finance and accounts department, a department for economic analysis and public relations, and a management and technical supervision department.

NIGETIP's three main objectives are to generate short-term jobs; to stimulate the private sector by funding the implementation of projects through small local enterprises; and to generate public goods and services through labor-intensive technology (World Bank 1990; Niger 1990). Private construction, architecture, and engineering firms make closed bids for the contract—the lowest bid by an accredited firm making a commitment to allocate at least 20 percent of total costs to salaried labor wins the contract.

In 1991, six pilot projects were implemented in the capital, Niamey. During their test operation, they generated 3,500 workdays, mostly in road construction, drain clearing, refuse collection, and soil conservation works. In 1992, NIGETIP went into full operation and expanded its coverage to all urban centers in the country. Over 200 firms have been accredited for placing bids for over 100 contracts during the year. For example, 27,000 workdays were generated by a dozen projects during the month of April alone (NIGETIP 1992).

At their outset, the urban schemes were overwhelmed by demand for work from the city's long-term unemployed males. Since the projects registered participants on a "first come, first served" basis, unemployed male household heads were usually first in line. Many women (nonhousehold heads) have expressed a desire to participate, but their involvement is constrained by the volume of male demand.

Public Works in Zimbabwe

Zimbabwe's rich public works experience is long and unusually rich. Labor-intensive public works programs have always played a major role in Zimbabwe's food security interventions through short-term employment provision and longer-term infrastructure development. Unlike Niger, Zimbabwe conceived two of its own large-scale programs based on interministerial cooperation for the disbursement of (largely) indigenous resources. The

coverage of these programs has been considerable: between 1984/85 and 1991/92, more than 400 million in Zimbabwe dollars (Z\$) has been spent by the government on wages, generating some 47 million days of work.

Food-for-Work Program. Initiated in 1989, this program was designed to supplant large-scale distributions of free food that had taken place annually since the 1981/82 drought (Bratton 1987). Over 2 million people depended on relief food for survival during the 1982–1984 period. A decade later, during the 1992 crisis, the number of people dependent on free food distribution had risen to 6 million. The government decided to suspend free food because of three problems: first, household targeting was thought to be inadequate, thereby spreading scarce resources too thinly; second, there was sometimes poor targeting at a regional level; and third, criticism of the perceived dependency of recipients on free food (Takavarasha and Rukovo 1990; Lenneiyi 1991; Rukuni, Mudimu, and Jayne 1990; Moyo 1992).

The idea of basing drought relief on employment rather than on free food was implemented in October 1989. The program was designed to operate from the bottom up, with projects identified by villagers themselves and provincial technicians assessing, approving, and supervising appropriate plans. Appropriateness is measured in terms of community benefit, technical feasibility, and labor intensity. The latter is important because the government's budget allocation for the program only covers the purchase of food, its transportation, and the salaries of program staff. In other words, projects cannot require substantial material inputs. The largest number of projects in 1991, therefore, involved brick molding and small building construction, activities generally completed without additional material inputs. Other activities included water control projects (dam and weir construction or rehabilitation) and construction and maintenance of feeder roads.

Wages, initially set at 10 kilograms of maize per capita per month (supplemented where possible by beans and dried meat or fish), have varied since 1989, according to supply and demand constraints. Prior to 1992, only households that did not own livestock were eligible to be registered. In late 1992, this screening criterion was removed because of the danger of households selling animals at severely depressed prices solely in order to be accepted as participants.

The program has been both praised and criticized. Although proponents highlighted the "self-reliance" of the new program in contrast to the "dependency" of the earlier handouts, most praise is directed toward the program's food security impact during drought years (*Zimbabwe News* 1989; *The Herald* 1990). Sachikonye (1992), for example, argues that "what stopped [food shortages in 1990] from escalating into a widespread famine in the rural districts was the availability of 'food-for-work.'"

Table 7.2 shows the coverage and some of the costs of the program. Part of the large expansion in 1992 was supported by a US\$23 million grant from the World Bank. This grant, and other donor support, is not fully reflected in the costs reported in Table 7.2. Thus, while nominal costs per capita of the food-for-work scheme appear to fall into the same range as those for the free food system, real costs are certainly higher and were still rising in 1993.

It should be underscored that the food-for-work program has reached more people than the free food system, both in absolute and relative terms. However, there are three important shortcomings in the program. First, less than two-thirds of officially recognized need is met by the food-for-work program. Second, productivity-enhancement based on structural output of the program is minimal. Third, it has proved difficult to expand the scale of the program to meet emergency needs. The 1991/92 drought exposed the static nature of the program.

Key constraints in all three cases can be traced to a lack of funding. For example, only 60 percent of the Z\$25 million required for activities in May 1991 was released by central accounts—due to a shortage of funds for all programs because of structural adjustment effects either “compounded by” or “combined with” the drought. This lack of funding affects all levels of program operation, from staffing to transportation of equipment (Lenneiyé 1991; Sachikonye 1992; Berg 1992).

Planning and operational constraints were clearly exposed by the 1991/92 drought. As the number of people who registered to participate rose from an average of 800,000 per month in 1991 to almost 3 million per month in mid-1992, the program had to expand rapidly to five times its

Table 7.2—Characteristics of Zimbabwe’s food-for-work program, selected months between 1989 and 1992

	1989 ^a	1990 ^b	1991	1992 ^c
			(1,000)	
People employed ^d	612	1,130	1,128	2,242
Food wages paid (tons)	5,973	9,938	10,983	20,761
Total cost (Z\$) ^e	1,661	3,412	3,733	n.a.
Cost per capita (Z\$)	4	3	3	n.a.

Sources: Compiled from data supplied by the Ministry of Labour, Manpower Planning, and Social Welfare.

^aFor October through December (the first three months of the program).

^bFor January through March and August through December (April to July was suspended).

^cFor January through September (provisional).

^dAverage number of workers per month.

^eAveraged per month of operation.

predrought scale of operation—in essence, to convert from a prototype employment program back to a huge emergency relief program, but without the necessary resources.

The Public Works Program (PWP). This is Zimbabwe's second major national program. The program differs from food-for-work in several important ways. First, in contrast to the welfare orientation of the food-for-work program, Zimbabwe's national cash-for-work program was originally designed to accomplish development objectives. Although the government launched the program in 1984, when drought relief—not job creation—was high on the political agenda, the PWP is based on popular participation in labor-intensive activities.

Second, it relies less on participant selection of activities and more on a cadre of technicians to develop projects with high priority in national and regional development plans. Third, construction materials and tools are provided, including heavy equipment for digging, moving earth, and laying roads. Fourth, wages are paid in cash, originally at Z\$44 per month but rising to Z\$88 per month in 1989. Despite the program's emphasis on development, rather than relief, criteria for participation are the same as those for receiving free food: (1) no regular income, (2) no food stocks, and (3) no more than 10 head of cattle per household. Once participants are registered for the PWP, their names are removed from the free food or food-for-work registers.

The most recent phase was initiated in 1991, with plans for continuation into 1996. The 1991/92 national budget allocated Z\$10 million to start the first phase of a "production-oriented Z\$50 million Public Works Programme" (Chidzero 1991). At least 200,000 people are expected to benefit from the program. Moreover, these benefits are realized at a lower cost to the state than if the same activities had been implemented by the private sector (Zimbabwe 1990). In the first year (1991/92), work was pursued on 290 projects, 85 of which were completed.

There has been a clear emphasis since inception of the PWP on infrastructure creation, particularly the provision of water (irrigation as well as piped water and wells) and the development of roads and bridges. These two categories have accounted for more than 60 percent of program expenditure between 1988 and 1991, and will continue to represent more than half of the PWP's investments up to 1996. By contrast, no investments have been made in environment works (soil and water conservation) since 1988, and only minimal work has been done on projects designed to boost agricultural productivity.

In all cases, however, labor has constituted a relatively small component of project budgets, representing only 11 percent of the total in

1987/88, 24 percent the following year, and 17 percent for the 1991–96 phase. Materials take the lion’s share of funds. This unequal allocation underlines the PMP’s emphasis on infrastructure—and not employment creation objectives. But, it also points to a major obstacle to rapid expansion of the program as a mechanism for drought relief.

Household Participation and Household and Intrahousehold Effects

A question mark continues to hang over the issue of how best to measure success and failure in public works. The strength of well-designed public works—simultaneous action on several fronts—is also its weakness in evaluation terms.

The effect of a program on food security (a transfer of calories to vulnerable households) can be measured in terms of how effectively it delivered calories to target populations. The employment effect (how many jobs created, and with what income benefit) can be measured not just in costs per job, but also as a distributional outcome—how many of the poor received employment and to what extent has the distribution of jobs mitigated local poverty? And, asset creation (physical structures generated and resources enhanced) can be evaluated in costs per kilometer or costs per hectare, and also in regional economic multiplier effects and national-level food security. Few projects clearly specify their highest priority, although approaches to project design and implementation vary considerably according to these priorities. The result is uncertainty over which indicators of success need to be collected or represent the brunt of the project’s effort.

The findings presented in the following section, based on surveys of five projects in Niger and surveys of each national program in Zimbabwe, relate primarily to one indicator, short-term food security. The surveys were done by IFPRI in cooperation with the Institut National de Recherches Agronomiques du Niger (INRAN) and with the Zimbabwe Institute for Development Studies (ZIDS).

Who Participates and Why?

The projects surveyed in both countries were highly effective in targeting poverty. For example, Table 7.3 compares selected demographic and income characteristics of participants heavily involved in the scheme versus those

Table 7.3—Selected demographic, income, and wealth characteristics of households in Niger and Zimbabwe with low or high participation in public works projects, 1990/91

Indicator	Zimbabwe Participation Groups		Niger Participation Groups	
	Low	High	Low	High
Demographics				
Attended primary school (percent)	83.0	65.0	10.0	0.5
Mean household size ^a	5.0	3.0	6.0	3.0
Wealth indicators				
Index of income per capita	100.0	67.0	100.0	48.0
Livestock assets (TLU per capita) ^b	1.2	2.0	1.1	0.7
Area cultivated (hectare per capita)	0.4	0.6	0.3	0.1
Crop income (US\$ per capita)	160.4	120.2	128.0	139.0
Participation				
Days of project work per household per year	4.0	30.0	27.0	210.0
Project wages as share of income (percent)	8.0	33.0	4.0	20.0

Sources: IFPRI/ZIDS 1991 survey, IFPRI/INRAN 1991/92 survey.

^aMembers actually present during the previous six months.

^bTLU refers to tropical livestock units, where small animals are expressed in cattle equivalents according to feed utilization.

less involved.³ The table shows a strong correspondence between degree of participation and selected indicators of poverty. In Zimbabwe, the households that participate the most in public works tend to be smaller than richer households (three members versus five), the household heads are less well educated, and they are more dependent on agriculture. Dependence on agriculture is demonstrated by higher livestock holdings and greater area cultivated per capita, but lower productivity (measured in terms of income) and less land cultivated. Public works participants have an income that is only 67 percent of that of nonparticipant households.

³The degree of project involvement per household was assessed after the survey according to the total number of days worked on the project during the preceding 12-month period. For the cash-for-work participants, recall data were obtained on participation during the last six months of project operation (since these particular projects were suspended in March 1991). "Participant groups" were then divided equally from a ranking of all sample households. The "low participation" group includes households that did not participate in project work at all.

Some of these findings are similar in Niger. For example, heads of households most active in employment projects tend to be less well educated, even at a primary school level. Thus, they are at a disadvantage in the job market. This disadvantage is compounded by the fact that households with high participation in project work are half as large as those less involved. Smaller household size restricts nonfarm activities, thereby resulting in a lower income per capita and fewer livestock. The income index of project participants is, therefore, less than one-half that of households with little or no involvement in public works.

Other characteristics confirm the association between high participation and poverty. Table 7.4 shows the results of a dichotomous logit decision model for Niger. The estimated (log) odd-ratio parameters and associated mean-level probabilities provide preliminary predictions of whether a person is likely to participate in project work or not. The model, which explains 95 percent of 4,000 cases, indicates the following:

- The likelihood of participation increases with age (starting at six years), but, as would be expected, only up to a certain age; beyond this, the probability of participation decreases.

Table 7.4—Maximum likelihood estimates for project participation, logit model for Niger

Explanatory Variable	Parameter Estimate ^a	t-Ratio
Age (of individual)	0.68	0.10
Age squared	-0.40	-0.43
Household size	0.39	4.95
Own education (primary)	-0.25	-5.65
Head's education (secondary)	-0.41	-7.13
Gender of head (if male)	-1.78	-1.96
Child dependency ratio ^b	0.92	4.68
Female ratio ^c	2.23	2.45
Farm income ^d	1.83	3.23
Remittance income ^{e,f}	-1.84	-3.25
Body Mass Index ^f	-0.52	14.40
Log likelihood	-644.42	

Source: IFPRI/INRAN 1991/92 survey.

^aCalculated for 3,810 individuals over 6 years old, of both genders.

^bNumber of children in household divided by household size.

^cRatio of adult women to total adults.

^dShare of own crop and livestock income in total household income.

^eShare of remittance and transfer income to total household income.

^fFurther estimations have to be run to determine the degree of exogeneity of this variable.

- Larger poor households with many adults are more likely to participate than smaller poor households, because there are more hands to earn an income and more mouths to feed.
- Education lowers participation: the more years spent in primary education by the individual and the higher the level of secondary education of the head of that individual's household, the less likely the person is to participate in the project. This aversion stems from the wage levels or wage expectations associated with having an education.
- The odds of participation are high for households that have a narrow or restricted income base and who are, therefore, heavily dependent on agriculture for most of their income. Where income is more diversified (for example, when it comes largely from outside remittances), households are less likely to participate.
- Individuals with a low nutritional status (low Body Mass Index) typically have the greatest need for employment income and are, therefore, very likely to participate in project activities.
- Households with a high child-dependency ratio and a high share of female adults and those that are headed by a woman (typically the poorest households) are more likely to participate than other households. This is driven by the strong need for income to compensate for that not provided by male adults.

Women-headed households are defined here as those in which no adult males have lived during the previous year. Households left without a male tend to be disadvantaged and poor. As a result, public works that target the poor also often target women. In the present survey, a larger share of households were headed by women in the high-participation group (22 percent) than in the low-participation group (10 percent).

In the urban projects, by contrast, few women participated. This was because the offer of a cash wage in an environment of high unemployment brought men into competition with women for limited work places. (Spaces are limited because projects are small and cash wages are supplied on a "first come, first served" basis.) Unemployed men quickly filled the available positions, squeezing women out of these projects.

In the rural projects, some of the poorest households sent up to five people to the same project to draw salaries. This nonscreened approach to participation probably improved the food security impact of employment on the larger households involved. However, given that scarce resources impose a limit on the size of each project, multiple salaries to the same household raise two problems: (1) they restrict overall coverage of the intervention, and (2) they encourage households to take advantage of

salaries by sending elderly and child participants, thereby lowering the average productivity of project participants.

While children did not participate at all in projects in Zimbabwe, their participation was high in Niger (Table 7.5). Although most workers in high-participation households in Niger were women in the age group of 16-55 years (38 percent), the second largest group comprised children between the ages of 5 and 15 (25 percent). Of these children, more than 6 percent were aged 5 to 9. The youngest child working a full day and receiving a salary was only 6 years old. In the low-participation group, the share of children was somewhat lower, at roughly 18 percent. The largest share of workers in the low-participation households were men in the category of 16-55 years (67 percent of total workers).

There is great potential for making the exploitation of children (and women) a serious issue. More than 65 percent of the sample individuals were aged less than 15 years at the time of the survey, with 50 percent aged less than 25. This means that the pool of child labor is large. And, children are often more active and effective than the elderly men and women present at project sites (those aged more than 56 years). The latter slowly gather gravel and soil for filling holes between stones in bunds, or dig shallow pits for seedling planting. With explicit physical targets to be

Table 7.5—Involvement in public works by age, gender, and participation groups, Zimbabwe and Niger

Project Participants	Zimbabwe Participation Groups ^a		Niger Participation Groups ^a	
	High	Low	High	Low
	(percent of households)			
Males				
5-8 years	...	...	4.1	7.7
9-15 years	...	...	11.9	2.6
16-35 years	42.0	33.0	16.2	38.5
36-55 years	...	1.0	8.9	29.5
56-80 years	58.0	41.0	1.6	1.3
Females				
5-8 years	...	...	2.4	1.3
9-15 years	...	...	15.1	5.1
16-35 years	...	...	22.7	7.7
36-55 years	100.0	...	15.4	5.1
56-80 years	...	...	1.6	1.3

Source: IFPRI/INRAN 1991/92 survey.

Note: The ellipses (...) indicate a nil or negligible number.

^aEach of the participation groups is divided into 133 households.

achieved, the advantages of younger (often more manageable) workers are obvious.

However, children were not hired in order to make up work quotas, to meet productivity deadlines, or to save capital. It should be noted that child participants were only found at the rural survey sites. Since there were no women participants in the urban projects, children were not to be found there either. The converse was true of the rural sites—the more women present, the more children present. In other words, most children were following their mothers and, if able, were working alongside them. It appeared that most children were hired for work only if their mother was present, only if household need was perceived to be great, and only if the child was deemed fit. These children are working for a salary when they should generally be attending school. But, there are few rural schools and the alternative to paid public works is usually unpaid household or farm-based chores.

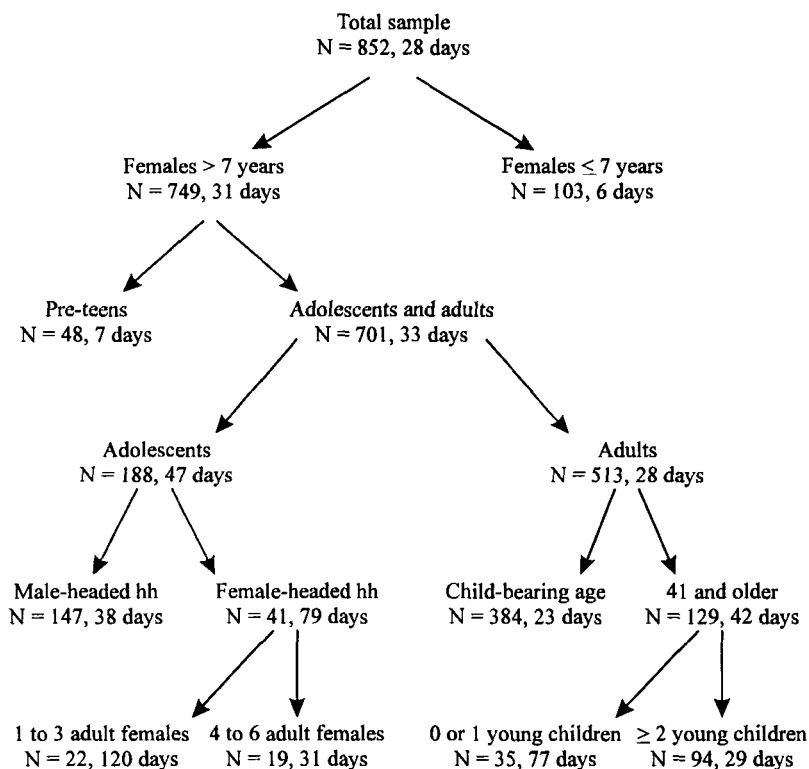
It is clear that adult women make up a sizable share of adult workers—60 percent of the sample if urban sites are excluded. The women work long and hard even after walking 8 kilometers from the village to the work site.

Figure 7.1 shows the characteristics of female workers during the dry season, broken down by regression tree analysis into clusters according to various demographic features. This figure demonstrates that, contrary to what many planners assume, the bulk of women participants are not of child-bearing age. The groups with the highest average number of days of participation are, first, adolescents (aged 10 to 17) in female-headed households with few adult women; and, second, older women (over age 41) from households with few young children and therefore no need for the attention of a grandmother. Child-bearing women aged 17 to 41 are apparently doing other things.

According to the figure, more than 220 girls less than 17 years old were working in these projects. (And that does not count the boys.) This means that the pool of child labor is large. More than 65 percent of the sample individuals were less than 25 at the time of the survey, with 50 percent less than 25.

A recent World Food Programme report (WFP 1991) recommends setting a lower age limit of 12 in order to reduce the number of children found at public works sites. Preventing small children from working for a wage at the site is certainly desirable. But, preventing children from coming to a site with their mothers may not be the best alternative. One benefit of such facilities would be to ensure that mothers with children retained access to jobs. The income earned from public works is substantial for the workers from the poorest households; preventing their access to such income must be carefully considered in the light of other income-earning opportunities for such households.

Figure 7.1—Regression tree analysis of days worked in public works by rural girls and women in Niger during the dry season of 1990



Variables used in the analysis:

- Number of adult females in household
- Age of the individual
- Number of young children (less than 10 years of age) in household
- Female-headed households? (Yes/No)
- Number of adult males in household
- Number of old people (more than 65 years of age) in household
- Individual's years of formal education
- Anyone in household migrated for work? (Yes/No)

Source: IFPRI/INRAN 1991/92 survey.

The provision of child-care facilities at the work site would also benefit most households, by reducing the risk to newborn infants (carried on their mothers' back) of dehydration or a fall. Such facilities could serve as the focus for nonwage, resource transfers to the self-selected participants. These resources might include literacy training, general health care, supplementation and monitoring of child nutrition, adult education and training, and the provision of investment or consumption credit.

Income Effects

High levels of participation by poor households in public works can lift their salaries above those received by wealthier households. The public works income, which arrives in regular and small quantities, also serves to ease potential food shortages when household food reserves become depleted.

Project income represented 20 percent of total household income for the poor in Niger, while wealthier households earned only 4 percent of their income from project participation. Two-thirds of poor households' total income from the project was earned during the dry season. Thus, the poor, who have fewer nonfarm income sources, are far more dependent on public works for their short-term food security than are wealthier households. For the poor households in Zimbabwe, project income represented a significant 33 percent of total household income (total income here excludes unearned income, such as transfers and remittances). Richer households, by contrast, participate only minimally and so they derive a much smaller share of total income from public works employment.

It should be stressed that public works represent but one income-earning option among many. When income is broken down by farm and nonfarm sources (Table 7.6), nonfarm income plays a more important role among the poorer, high-participant households than among the richer, low-participant households in studies of both countries.

Crop and livestock husbandry represents the single most important source of income in both countries, amounting to roughly 45 percent of total income for all rural households in Niger and 70 percent in Zimbabwe. The latter figure is high because remittances and transfers are excluded from the calculation: if these were included, the relative shares would be quite similar. Other major income sources, aside from public works, include petty commerce such as food stalls in Niger and nonfarm labor wages in both countries. Despite this wide range of options for nonfarm activities, few poor households substitute public works for other activities.

Table 7.6—Income sources in Zimbabwe and Niger, by high and low participation in public works projects, 1990/91

Source of Income	Zimbabwe Participation Groups		Niger Participation Groups	
	High	Low	High	Low
	(percent of total income)			
Own-farm production				
Cropping	61.6	84.6	42.9	39.8
Livestock	1.0	0.1	2.6	4.1
Wage labor				
Public works	33.3	3.9	19.8	4.3
Nonfarm	3.9	5.1	0.8	3.4
Civil service	...	0.1	...	0.1
Trade				
Petty commerce	...	1.6	10.6	17.1
Restaurateuring	n.a.	n.a.	3.2	1.2
Artisanal				
Craft work	...	0.5	1.3	1.7
Small business	n.a.	n.a.	0.1	0.0
Remittances	n.a.	n.a.	11.5	15.2
Other	n.a.	n.a.	7.2	13.2
Total	100.0	100.0	100.0	100.0

Source: IFPRI/INRAN 1991/92 survey; IFPRI/ZIDS 1991 survey.

Note: The ellipses (...) indicate a nil or negligible amount.

Food Consumption and Nutrition Effects

The largest share of project income is spent on food. In Niger, the poor allocate almost 70 percent of total expenditure to food purchases, versus 43 percent for those with higher incomes. More than 90 percent of respondents reported that food consumption was the main reason for participation. In Zimbabwe, 95 percent of the food received by food-for-work participants was consumed at home. However, only 35 percent of the money received by participants in the cash-paying public works program was spent on food. In the wet season, almost 70 percent was reinvested in the farm through purchases of fertilizer and hired labor. In other words, relatively more of the wage is consumed at home if paid in food, but, at the same time, public works can serve to increase longer-term food security through agricultural development via the reinvestment of cash wages. Both outcomes represent important benefits.

Since increasing food consumption is a major reason given for participating in public works, it seems logical that the most malnourished would have the highest rates of participation in public works. Determining whether this is the case is central to the issue of targeting—who should work and what subsistence wage should be provided? However, as Kennedy and Alderman (1987) recognize, “the nutritional effects of [public works] programs . . . have not been studied” and, therefore, “virtually no evidence yet exists to document the effects of food-for-work projects on individuals within families.”

Although it has been shown that caloric intake and nutritional status are not perfectly correlated (since morbidity, genetic, and behavioral factors play an intervening role), inadequate calorie consumption, linked with inadequate nutrient consumption, does play a major role in determining nutritional status (ACC-SCN 1989; Kennedy, Bouis, and von Braun 1992). While the present data are only cross-sectional in nature, they provide some very important insights into nutritional differences in different regions and households in the same year.

The results of anthropometric measurements taken from almost 1,000 children from 6 months to 5 years old in Niger at the time of the household consumption survey (Table 7.7) underscore the persistence of high levels of malnutrition among Nigerien households, even in a good harvest year. For example, there is a tendency for children in high-participation households to be more malnourished than children in low-participation households, and for children in rural households to show more signs of unsatisfactory nutritional status than those in households in towns. The differences between groups are highly significant in terms of weight-for-height for both genders. Differences in weight-for-age (a measure of short-term wasting) are also highly significant for boys, but not for girls.

These results suggest that, without the 20 percent share of total income derived from public works, children in the poorest households might be more severely malnourished—as long as participation itself does not compromise child health and nutrition as a result of reduced care. This possibility must be examined through more complex analysis of the data in the future.

Children may not be the only ones suffering poor nutrition. Men in high-participation households show a significant tendency to have a lower Body Mass Index (BMI) (18.3) than those in low-participation households (19.7) (Table 7.8). (The average BMI of male and female adults was 19.0.) The same holds true, and is statistically significant, for women. Interestingly, when tested against the gender of household head, no significant difference was perceived between the BMI of women in male- and female-headed households.

Table 7.7—Z-scores for height-for-age, weight-for-age, and weight-for-height (all-round average) for preschoolers (6 to 60 months), Niger, 1990/91

Child	Average Z-Score ^a		
	Weight-for-Height	Height-for-Age	Weight-for-Age
Boys			
Participation groups			
High	-1.44**	-2.12	-2.35**
Low	-0.75**	-1.67	-1.66**
Location			
Rural	-1.35*	-2.13	-2.33*
Urban	-0.53*	-1.60	-1.44*
Girls			
Participation groups			
High	-1.48**	-1.19	-1.93
Low	-0.78**	-1.21	-1.41
Location			
Rural	-1.33**	-1.39	-1.94*
Urban	-0.61**	-1.20	-1.30**

Source: IFPRI/INRAN 1991/92 survey.

$$^a \text{ Z-Score} = \frac{(\text{Actual measurement} - 50\text{th percentile standard})}{\text{Standard deviation of the standard}}$$

The standard used is derived from NCHS (1977).

*Significant at the 5 percent level.

**Significant at the 1 percent level.

These findings confirm the successful self-targeting of public works. The poorest and most malnourished make the most use of the employment. But, they also raise the issue of how great is the project's net impact on food security. Nutritional status is the result of net energy balance; it is determined by energy expenditure as well as by consumption. This means that heavy activity in public works programs may fail to improve an individual's nutritional status if the increased labor effort required offsets the positive effect of the wage transferred (Higgins and Alderman 1992). Empirical evidence of this is, however, slim.

What is more, at least two other outcomes are also possible: (1) the individual's nutritional status may not improve because of the tax on energy, but children in that person's household may benefit from transfer of calories to them; or (2) the individual's own nutritional status may improve at the expense of other members of the household because of the unequal intrahousehold distribution of the income gained.

Table 7.8—Body Mass Indices for adults aged 15 to 65, by participation group, location, and gender of household head, Niger, 1990/91

Adult	Body Mass Index ^a	
	Males	Females
Participation groups ^b		
High	18.3**	18.7**
Low	19.7**	19.5**
Location		
Rural	18.6**	18.8**
Urban	20.1**	19.7**

Source: IFPRI/INRAN 1991/92 survey.

^aCalculated as Weight (Height)^2 . The "normal" range of the Body Mass Index (BMI) runs from 18.5 to 25.0. Individuals below 18.5 are bordering on undernutrition; those below 17.5 are likely to be considerably malnourished.

^bThe sample was truncated to exclude individuals with a BMI of less than 15 or above 28. Inclusion of these outliers would have unduly biased the sample results. Nevertheless, the number of valid cases used for these calculations was high: 454 men and 530 women.

*Significant at the 5 percent level.

**Significant at the 1 percent level.

It is worth noting at this point that a statistically significant difference (at the 5 percent level) was found in the BMIs of actual project workers and of other nonworking adults in participating households. The average BMI of a female worker in high-participant households was 18.4 compared with an average of 19.3 for women in the same households not participating in project activities. In low-participant households, the difference is greater still, with workers showing a BMI of 17.9 versus 20.2 for nonworkers.

These last findings suggest that it may be the more food-insecure individuals in food-insecure households, possibly junior members of the household, who participate most in public works in order to gain a private income that is not available elsewhere. An alternative reading would argue that workers do indeed gain a valuable income for food-insecure households, but that they themselves do not enjoy a net benefit in incremental calories consumed. Further analysis is required in order to shed light on this problem.

Conclusions

The results from these two case-study countries indicate that the short-term impact of wage employment on food security can be considerable. Households most involved in public works are poorer than households less involved; the heads of these households tend to be less educated than heads

of relatively richer households (and are therefore less able to command higher wages elsewhere); and the poorer participant households have a less diversified income base, which means that income from public works represents a much larger share of total household earned income than it does among richer households.

These results suggest that if more food-insecure households were able to gain regular access to public employment, the short-term income (and food consumption) gains would be substantial. At the same time, if the technical viability of generated assets could be improved through neater dovetailing with regional development plans and a better supply of non-wage inputs, the longer-term food security effect of such programs could also be considerably enhanced.

Richer and poorer households obviously live side by side, but have very different income-earning options and expressed preferences. But in projects that are designed to target them, it is the very poor, urban and rural, who present themselves for work. In Niger, the effectiveness of poverty-targeting can be ascribed to a number of factors: (1) wage rates that are below prevailing market rates in real terms (despite minimum wage legislation); (2) limited administrative screening of prospective participants (that would exclude elderly women and children); (3) targeting public works to regions ranked by severe environmental degradation or food insecurity; and (4) a large coefficient of variation in incomes even in such regions.

In order to maximize food security through future programs, these conditions argue for greater targeting within food-insecure regions, as well as the setting of clearer guidelines for the targeting of individuals. One by-product of successful poverty-targeting is *de facto* age- and gender-targeting. This occurs because (1) women-headed households tend to be poorer than average, and their heads participate in the absence of male adults; (2) even in poor male-headed households, women participate when the husband's time bears higher opportunity costs or when he is temporarily absent from the house (migrating for work); and (3) participating women from poor households bring children with them, either to earn an additional wage or because there is no child care at home.

In Zimbabwe, the poverty effect is determined more by administrative screening and stronger geographical targeting. The national programs considered have succeeded in generating millions of person-days of work. Yet, both could achieve much more. The food-for-work scheme suffers from a distinct welfare bias in that the poverty-targeting effect of a low wage and self-selection mechanism has been diluted by a screening process that spreads scarce resources too thinly to help the large numbers of absolute poor. At the same time, technical and nonwage inputs to individual projects are insufficient and cannot generate productive or sustainable assets.

The Public Works Program, by contrast, has been constrained by its longer-term development orientation. The benefits of the Public Works Program are transferred to a narrow range of households, because the program employs far fewer people, placing greater emphasis on real ability to work for regular wages. The low employment ceiling set by this program (due to its reliance on heavy equipment) necessarily excludes large numbers of food-insecure households. Its own funding deficiencies have led to transportation bottlenecks—spare parts have always been scarce or faulty and the replacement of worn equipment has not been a priority. The potential for a rapid expansion of this program to meet food crises, consequently, is low.

Despite the difficulties outlined, both Niger's and Zimbabwe's employment programs have the potential to strengthen food security at a local level. A closer look should be taken at how to redesign both employment programs in order to maximize their effects on household and regional food security. Such a reorganization must begin with improved interministerial coordination between technical ministries in order to clearly define responsibilities for local participant targeting and supervision, materials transportation, operation-phase monitoring and maintenance, and strategic collaboration with other forms of public intervention.

One complaint often leveled at public works in recent years is that they have only a minor impact on unemployment, poverty, and resource degradation (Guichaoua 1991; Catterson, Wilson, and Gavian 1992). This is true, given the scale of the problems facing us today. However, these studies have shown that (1) at a local level, effects on employment, income, and food security are very high; (2) the scale of activities could be much larger, with greater and more clearly defined involvement of the public sector, donors, and private contractors; and (3) given the successful poverty-targeting of such programs, their effectiveness could be raised further by combining them with complementary activities in other fields. Even in sparsely populated areas such as Niger and southern Zimbabwe, labor-intensive activities are viable.

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