

1

**SHIFT TO NON-TRADITIONAL GRAINS IN THE DIETS OF EAST AND WEST
AFRICA: ROLE OF WOMEN'S OPPORTUNITY COST OF TIME**

by

Eileen Kennedy (*)

and

Thomas Reardon ()**

(*) Research Fellow, International Food Policy Research Institute
1200 17th Street, N.W.
Washington, D.C. 20036

(**) Associate Professor, Department of Agricultural Economics, Michigan State
University.

Forthcoming: Food Policy, 1994 Feb

Acknowledgements: We thank May Peters, Ellen Payongayong, and Alison Slack for research assistance. Reardon thanks USAID/ARTS/FARA/FSP (via the Food Security II Project, Food Access Add-on, at MSU) for support for write-up, and USAID/Ouagadougou for funding of urban Burkina Faso data collection, and ICRISAT (via Peter Matlon) for use of rural Burkina Faso data. Our thanks to the two anonymous reviewers for useful comments.

SHIFT TO NON-TRADITIONAL GRAINS IN THE DIETS OF EAST AND WEST AFRICA: ROLE OF WOMEN'S OPPORTUNITY COST OF TIME

INTRODUCTION

Sub-Saharan Africa is one of the few areas of the world where per capita food production has been steadily declining (Paulino, 1986). Cereal production, which provides the bulk of the diet, has had a negative per capita growth rate in each region of Sub-Saharan Africa. Concurrent with decline in production has been a shift from traditional coarse grains (primarily sorghum, millet, and maize) to non-traditional grains (mainly wheat and rice) in the diets. The aggregate-level shift has been occurring rapidly in West Africa, documented for example in Delgado and Reardon (1987).

This trend in substitution of coarse grains for non-traditional grains is worrisome because: (i) it is occurring most rapidly in areas where the production of wheat and of rice is costly or infeasible. The rising demand for these products must then be met by commercial imports or food aid or both. Neither of these options is an attractive long-term solution to this problem; (ii) it is occurring in some of the poorest countries of the world, countries with severe foreign exchange constraints that can ill afford rising food imports.

Moreover, work has been done in West Africa examining the hypothesis that, over time, price factors have been driving the substitution in consumption toward rice. However, recent research for urban Burkina Faso (Reardon, Thiombiano, and Delgado 1988) does not support the notion that Sahel rice consumption is driven by price; the study showed that own-price elasticities for rice expenditures were not significant. At the aggregate, country-level, Delgado (1989) used country-level data from five countries (Burkina Faso, Cote d'Ivoire, Mali, Niger, and Senegal), and regressed the share of rice in national cereals consumption for the period 1966 to 1986, against the relative price of rice to millet, the GDP per capita, and the share of urban population in total population (degree of urbanization). In all countries but Senegal, the

price effect was not significant. By contrast, the degree of urbanization was strongly significant and positive in Burkina and Mali. Hence, these West African studies point to urbanization rather than price in driving substitution over time toward imported cereals.¹

The recent West African work has pointed in some interesting directions, but left some important gaps to be filled. This brief article aims to make two contributions to that end: (i) There has been relatively little research on the differences among regions in Africa at the aggregate level as regards this shift in diets; herein we compare aggregate regional-level trends in cereal consumption using secondary data. (ii) There is a need to explore in more depth the link between urbanization and the shift to 'convenience foods,' especially prepared cereals sold outside the home, which form an important component of the consumption of non-traditional cereals. To this end, we examine household-level determinants of consumption of non-traditional cereals in processed and prepared form (the latter is sold by restaurants and street vendors). We focus on women's opportunity cost of time as a potential influence in the changing dietary patterns. Our assumption is that this factor is a proxy for the economic structural changes that occur with urbanization, such as women entering the labor force. This focus is inspired by work elsewhere in the developing world that identifies women's opportunity cost of time as a key determinant in the shift to non-traditional grains and convenience foods that take less preparation time or that can be purchased already prepared (e.g. Senauer, Sahn, and Alderman [1986] for the case of Sri Lanka). To explore this issue we use primary household-level data from field surveys in Kenya and Burkina Faso.

The article proceeds as follows: (i) regional aggregate trends are examined; (ii) the regional picture is disaggregated by presenting household-level rural and urban patterns; (iii) the household cross-section determinants of consumption patterns are explored; and (iv) the effects of women's opportunity cost of time is analyzed as to how it relates to household consumption. The policy implications are discussed in the concluding section.

AGGREGATE TRENDS IN DIETS: EAST VERSUS WEST AFRICA²

During the period from the early 1960s to the early 1980s, cereal production per capita in Africa has been declining at the alarming rate of 1.2 percent annually. This was very uneven regionally, with a 1.9 percent decline in West Africa but only 0.8 percent decline in Central and 0.9 percent decline in Eastern/Southern Africa.

However, cereal consumption per capita declined at only 0.6 percent annually for Africa as a whole. The lower rate of decline for consumption (as opposed to production) was due to rapid increase in cereal imports, which rose by 8.5 percent annually during the last two decades. By the early 1980's, imports accounted for 20 percent of cereal availability in Africa; 80 percent of these imports were commercial, and 20 percent were food aid.

During the last several decades, the composition of consumption was also changing markedly, with a general shift from coarse grains to rice and wheat. Comparing the composition of cereals consumption in the early 1960's with that of the early 1980's, we find the following:

(i) Sub-Saharan Africa: rice and wheat from all sources rose from 20 percent of the diet in the early 1960's to nearly 30 percent in the early 1980's. The share of rice and wheat consumption from imports rose from 4 percent to 13 percent. Very little of the coarse grains consumed were imported, and that did not change appreciably over the period. Rice and wheat imports constituted 75 percent of cereal imports, although those products only composed 15 percent of cereals production.

(ii) Eastern/Southern region: The share of coarse grains in total cereals consumption did not change much, but maize was rapidly replacing millet and sorghum. The share in cereal consumption of rice and wheat (mainly imports) rose from 3 to 7 percent.

(iii) Central African region: the share of domestic coarse grains in the diet dropped much more rapidly than in the Eastern/Southern region, from 87 percent to 68 percent of the total cereal consumption. The share of wheat imports in the cereal diet nearly doubled (with rice imports nearly unchanging). Maize imports rose sharply, as did the production of rice.

(iv) West African region: consumption loss was greatest in this region over the period, and gains in the share of imported rice and wheat are the most marked. While the share of coarse grains in cereal consumption dropped almost 20 percent over the period, the share of imported rice increased from only 2.5 to 8.7 percent, and wheat's share rose even more, from 2.5 to 9.8 percent. Thus, rice and wheat rose from around one-twentieth to almost one-fifth of cereal consumption in only two decades.³

In sum, rice and wheat imports formed the lion's share of cereal imports, but their relative weights between these two differed by region. Nowhere in Africa did production of wheat increase significantly, but there were small gains in domestic rice production in Central and West Africa. In all regions, except Eastern/Southern, coarse grains lost ground to rice and wheat in the diet, with the phenomenon most striking in West and Central Africa.

CLOSE-UP VIEW: HOUSEHOLD DIETS IN EAST VERSUS WEST AFRICA

Data

The Kenya data come from a representative sample of 617 farm and non-farm households in South Nyanza; the data were collected from June 1984 to March 1987.⁴ The sample is primarily rural, but does include a sample of non-agricultural households in the local township in the rural area. The latter are classed as quasi-urban, but for purposes of presentation, the Kenya sample is split into 'agricultural households' and 'urban households'.

The data for rural Burkina Faso come from an ICRISAT survey of a representative sample of 150 households in three zones: the Sahelian zone (agroclimatically very poor, in the northwest), the Sudanian zone (agroclimatically poor-moderate, in the Mossi Plateau), and the Guinean zone (agroclimatically moderate-good, in the southwest).⁵ Data for harvest-years 1983/84 and 1984/85 are used. The survey was administered fortnightly and covered all aspects of the farm household economy -- production, consumption, prices, transactions, and other household characteristics.

The rural household observations for both Burkina Faso and Kenya cover a good and a poor year. In Burkina Faso, 1983/84 started with a 'normal' harvest, while 1984/85 started with a poor harvest due to drought. Similarly in Kenya, 1984/85 was a drought period, while 1986/87 was a normal production year.

The urban Burkina data are from an IFPRI/University of Ouagadougou survey done in 1984/5 (October 1984-September 1985); it covered a representative sample of 125 households in the capital city, Ouagadougou.⁶ The survey was administered weekly and covered all household transactions, as well as household characteristics.

Rural Patterns

Table 1 shows that in rural areas in both East and West Africa, food expenditures represent the largest share of the total budget (includes purchases plus home consumption), typically 80 percent or more (Table 1). This varies very little from the lowest to the highest income tercile of the samples. In addition, by far the largest share of food expenditures is on cereals (typically 75 percent or more in Burkina, and only nearly half in Kenya).

Table 2 shows that in rural areas the bulk of cereal expenditure is allocated to traditional coarse grains (millet, sorghum, and maize). In both countries, wheat and rice play a minor role in the rural diets in both countries. Rural Kenya has the most varied diet of the four rural

study areas; yet rice represents only about 3 percent of cereal expenditures and wheat (apart from bread) only about 1 percent. Where wheat is consumed in South Nyanza, it is mainly in the form of bread which constitutes about 5 percent of cereal consumption. One interpretation is that wheat consumption probably reflects a preference for convenience rather than a taste for wheat per se. This will be taken up again in a later section of the paper.

Similarly in the three study zones of rural Burkina, rice and wheat constitute only a small portion of cereal expenditures. The share of wheat products is around 1 percent in the cereal diet in all zones. The wheat consumed in the Sahelian zone was mainly from food aid (Reardon and Matlon 1989) and in the Guinean zone is mainly bread consumed at market. The share of rice is very small in the Sahelian (1 percent) and Sudanian zone (negligible). Rice is more important in the diet of the Guinean zone (6 percent), but there is very little production of rice in this area. Consumption of rice rises with income and is thus a luxury food in this area. Almost no prepared rice is purchased from vendors in the rural areas.

Urban Patterns

First, in both Kenya and Burkina, urban diets are very different from rural diets. Table 1 shows that in urban Burkina, food has a much lower share in total expenditure than in rural areas. The difference is less pronounced in Kenya, although still present; one would expect the food share to be higher in a small rural town than in a large city.

Table 2 shows for urban Burkina that the share of wheat in the cereal budget increases with income and hence can be considered a luxury food. The share for the overall sample is about one-fifth of the cereal diet, but this ranges from only one tenth for the lower tercile to a third for the upper.

By contrast, in urban Burkina, rice has the largest share of expenditure; it is striking that this does not differ much by income tercile. In fact, the share declines as one goes from the

lower to the upper tercile of the sample. The evidence thus contradicts the conventional wisdom that says that rice is a luxury food in the urban Sahel.

To highlight the major role of prepared foods (bought from street vendors) in consumption of non-traditional cereals in urban Burkina Faso, Table 3 shows the shares of consumption of rice in raw grain form and in prepared form (bought from street vendors) in total rice consumption (in cash terms and in physical terms), and similarly for millet. Note that in all terciles there is a strong preference to buy millet in prepared form from street vendors (at breakfast as gruel), and that this tendency increases with income.

It appears that the strong preference for rice by lower tercile households is a function of the opportunity cost of time for women in these households. The wives in lower tercile households are heavily involved in work outside the home: 64 percent for the lowest tercile households compared to 53 percent and 41 percent for the middle tercile and upper terciles respectively. Three-quarters of lower tercile households have at least one woman who works outside of the household; 98 percent of the lower tercile households' working-women work in petty commerce. More than half of the lower tercile households' heads are principally involved in commerce, transport, guard and domestic service, and other jobs in the service sector (as workmen). This kind of job usually requires the employee to stay near the work place during lunch time. It also often means buying breakfast on the road. This problem is aggravated by insufficient access to transport (either by bus or by own vehicle). Only 15 percent of household heads in the upper tercile, who are not workmen, but rather salaried, are employed in commerce, transport, and services. Thus, they can return home at noon instead of staying at the work place and eating at the street vendor's stall. Only 15 percent of women in upper tercile households work in commerce, and many hold salaried posts, so they too can return home at noon. (Reardon, Thiombiano, and Delgado 1988).

From this evidence we hypothesize that time constraints of women appear to be a major factor in the choice of coarse grains versus non-traditional grains, and in the choice of prepared street-vendor dishes versus home-cooked dishes. Thus, one would expect that as the cost of women's time increases as they enter the work force, the opportunity cost of processing and cooking cereals would also rise. Apart from the issue of prepared (street vendor) versus grain-form (home-cooked), rice appears to be favored in Burkina Faso simply from the preparation time viewpoint of women entering the work force. Rice processing and cooking time is substantially less than that for millet and sorghum (Thiombiano 1985).

The same argument explains the higher bread versus other wheat consumption in rural Kenya. In rural Kenya, whether in agricultural or non-agricultural households, wheat is consumed primarily as bread. Bread consumption is approximately three times higher in the quasi-urban households than in the rural Kenyan sample.

CROSS-SECTION DETERMINANTS OF CONSUMPTION OF NON-TRADITIONAL CEREALS IN EAST AND WEST AFRICA

Approach and Hypotheses

The reason for differences in prepared rice and wheat products consumption across households in rural and urban areas of Burkina and Kenya are explored in the multi-variate analyses presented in Tables 4 and 5. The basic regression model used is a modified Engle function, where product expenditures are a function of income (total expenditures used as a proxy); and household characteristics including those reflecting household structure and demographics and proxies for the opportunity cost of women's time. In the Burkina case, the regressors shown are in share form.

The products treated in the urban Burkina case are: (i) wheat products (bread and noodles) as a share of all-cereals; (ii) prepared rice as a share of all-cereals; and (iii) prepared millet as a share of all-cereals. Rural Burkina regressions were not done because of the small amounts of non-traditional grains consumed, and the small amounts of prepared/processed foods consumed, as noted above. For the Kenya case, the products treated are: (i) wheat flour; and (ii) wheat bread. The non-agricultural and agricultural households were pooled for the regressions.

The basic model is expenditure on product i (deflated by expenditure on product group j) as a function of: (i) total expenditure per adult equivalent (AE) (this is a proxy for income, and includes consumption of own production plus purchases plus transfers consumed); (ii) the latter squared; (iii) household size in AE's; (iv) the dependency ratio (number of children over number of household members); (v) number of conjugal units, or "consumption units," in the household (such as the household heads and oldest sons together and the women and children together); and (vi) percentage of wives working, or percentage of household income earned by women.

Note that conjugal structure (v), and women's employment or income contribution (vi), are the proxies for women's opportunity cost of labor. We hypothesize an unambiguous effect of women's employment on prepared and non-traditional cereals consumption, as such employment increases the opportunity cost of food preparation time, perhaps increases the cash for such purposes, and takes the women away from home (raising the chance that they eat breakfast or lunch or both outside the home).

By contrast, there is no unambiguous hypothesis for the impact of the conjugal structure on such consumption. On one hand, we expect that an increase in number of conjugal units per household would lead to an increase in household labor supply to process and to cook cereals, and hence would have a negative effect on the purchase of non-traditional grains,

particularly prepared/processed grains. On the other hand, an increase in the number of conjugal units in a household has been empirically associated with income diversification and greater women's employment in Burkina rural households; the reason, apparently, is that with more wives in the household, there can be some specialization of labor with some staying at home to assure "z good production" while others can work outside the home (see Gabre-Madhin and Reardon, 1989; and Reardon, Delgado, and Matlon, 1992).

There are two measurement issues with respect to the opportunity cost of women's time. (i) Ideally we would have also included the wage to women's work, but these data were not available and indeed the wage is quite difficult to calculate and to interpret given that much of the employment is in the informal sector. (ii) In the urban Burkina case, we chose the share of wives working outside the home (rather than the share of women's income in total household income) as the measure or proxy for opportunity cost, for the following reason. In one household, the women can have a low share of household income, but because of low daily (implicit) wage, might work long hours. In another household, the women might have a high share of household income, but have a higher daily wage, and might work fewer hours. Given, in the Burkina Faso case, that the tradeoff at issue is between time preparing/processing cereals on one hand, and working outside the home on the other hand, it appears that the time burden of working rather than the income contribution is the issue. On the other hand, in rural Kenya the variation in implicit wage is very probably less marked, and time spent working and income share are probably more correlated.

Results

For Kenya (Table 4), the proportion of total income controlled by women does not influence the percent of the cereal budget spent on either wheat (model 1) or bread (model 3).

The percent of non-farm wage income controlled by women, however, does have a significant

positive effect on bread expenditures (model 4), but not on other wheat products (model 2). This finding is consistent with the hypothesis that increasing opportunity cost of women's time leads to preference for bread and other wheat products because of convenience of preparation (Senauer, Sahn, and Alderman 1986). In the Kenya case, non-farm wage income implies that women spend longer hours working away from home and hence less time and/or less flexible scheduling is available to devote to home production activities including meal preparation. It is also interesting to note that in none of the four models for Kenya is household income per capita a consistent, major determinant (not significant at 5% level) of either wheat products or bread consumption. In all models, however, the years of women's schooling is a positive, significant determinant of both bread and total wheat product consumption. The movement toward increased bread consumption in the Kenya case appears to be influenced more by women level factors than by household variables per se.

Table 5 presents results for urban Burkina Faso. The results indicate that wheat products (bread and cereal) are a luxury food in Burkina Faso and that prepared rice is not: bread consumption increases significantly with an increase in total expenditure, whereas prepared rice consumption decreases as incomes increase. A part of the explanation for the rice/income finding relates to the employment patterns that were discussed earlier. Controlling for other household characteristics (such as demographics and women's employment), a decrease in household income is associated with an increase in the probability that the household head will work in manual employment, with the attendant need to eat at the work place at noon. We point to this relationship as the most plausible explanation of the negative (although non-significant) relationship between income and prepared rice consumption (the latter being almost exclusively a lunchtime meal at street restaurants). This explanation is further strengthened by the positive relation between prepared rice consumption and the household head being a merchant, and thus working away from home.

Controlling for the number of conjugal units in the household, an increase in the women's opportunity cost of time (proxied by percent of wives within the household that work away from home) leads to an increase in the consumption of prepared millet. This coincides with our observation that women on the way to work in petty commerce in the mornings buy millet gruel from vendors (or cook and sell it, and take their family's share from the sale stock).

As expected, the results for the effect of multiple conjugal units are mixed, but one result stands out. Having controlled for the share of working wives, increasing the number of conjugal units increases prepared rice expenditures. This may mean that some wives can stay at home at midday to prepare food but the balance of wives are freed to stay at work sites and thus need to buy prepared dishes at midday. Moreover, a wife's being salaried tends to increase luxury food consumption (bread consumption rises) but decreases prepared rice consumption (as salaried work allows wives to return home at midday).

Finally, as the household's dependency ratio increases (children per total household size), the share of bread and prepared rice in cereal consumption declines. Partly, this indicates that families tend to feed children food cooked at home (with the exception of prepared millet dishes purchased from street vendors), and it also indicates that there are economies of scale in home food preparation. By contrast, there is a positive relationship (non-significant) between dependency ratio and prepared millet purchase; this coincides with our observation that in the mornings, families buy millet gruel from street corner vendors and feed the family with it so as to free the parents to go to work early.

CONCLUSIONS AND SUMMARY

The shift from coarse grains to non-traditional grains has been occurring throughout developing countries, but has been under-explored in sub-Saharan Africa. Consumption

patterns do change, but what is important from a policy point of view is to identify the key factors influencing the transformation from one type of diet to another.

The food patterns in rural areas, whether Burkina Faso or Kenya, are fairly homogeneous within a given area. For example, in Kenya, despite a more than fourfold increase in income per adult equivalent between the lowest and highest income group, food expenditure patterns are similar. This is also true for the other Burkina rural areas.

In each of the rural areas studied, food takes the largest share of the budget, and cereals dominate the food budget. The major share of the cereal budget in each of the four rural areas, in each of the three tercile income groups, is accounted for by coarse grains; the cereal budget share for the coarse grains ranges from 79 to 93 percent in the rural areas.

Wheat and rice play a very minor role in the diet in rural areas of Burkina Faso. Rice, however, is a large share of expenditures in urban Burkina Faso. Rice accounts for 46 percent of the cereal budget share for the lowest tercile and 35 percent for the highest tercile in Ouagadougou. Much of this rice is consumed in prepared form, purchased from 'street vendors' -- and the importance of this varies inversely with household income.

The shift to rice in urban Burkina Faso and to wheat in the form of bread for non-agricultural households in rural Kenya is related in part to the extent of women working away from home. In general, urbanization and the associated increase in women's work force participation has more of an effect on rice and wheat consumption than does household income alone. Interestingly, in the case of Burkina, the key shift induced by women's employment was toward street vendor food in general, and the cheapest source of this is prepared millet dishes, which are mainly consumed in the morning. On the other hand, both men's and women's opportunity cost of time to return to the home at midday appears to be important in driving prepared rice consumption in urban Burkina. In general, then, working women have less time for food preparation and have a tendency toward higher-priced, "convenience"

sources of calories; the higher purchase price is counterbalanced by savings in time and transport.

Hence, to the extent that rural-urban migration, as well as increased insertion of women in the work force continue, increased demand for non-traditional grains specifically, and prepared/processed grain dishes will continue and perhaps grow. Given the general desire of policymakers to reduce cereal imports to correct dangerous balance of trade deficits, policy attention needs to be paid to the following; (i) promotion of cheaper and more effective means of processing local coarse grains so as to make them attractive alternatives to imported rice and wheat as base ingredients for urban "fast food" vendors that are becoming so important in Africa; (ii) promotion via education and advertising of these coarse grain prepared foods; (iii) the possible harm to poor urban and rural workers of increased protection on rice and wheat imports, or devaluation, or both, given a dearth of coarse grain alternatives in the short-run. If these policies are pursued, immediate attention to (i) and (ii) is called for, as are compensatory measures.

REFERENCES

- von Braun, J. and L. Paulino. "Food in sub-Saharan Africa: trends and policy challenges for the 1990s", Food Policy, Vol. 15, No. 6, Dec. 1990.
- Delgado, C., "Why is rice and wheat consumption increasing in West Africa?" Paper presented to the European Seminar of Agricultural Economists, (Montpellier: 1989).
- Delgado, C., and T. Reardon. "Policy issues raised by changing food patterns in the Sahel" in CILSS/Club de Sahel, Cereals Policies in Sahel Countries: Acts of the Mindelo Conference, Paris, 1987.
- Gabre-Madhin, E.Z. and T. Reardon. "The Importance and Determinants of Women's Non-Agricultural Income Strategies in Rural Burkina Faso", Select Paper, 1989 AAEA Meetings. Abstract in American Journal of Agricultural Economics.
- Kennedy, E. The effects of sugar cane production on food security, health, and nutrition in Kenya: a longitudinal analysis, IFPRI Research Report no. 78, 1989, Washington.
- Kennedy, E. and B. Cogill. Income and nutritional effects of the commercialization of agriculture in southwestern Kenya, IFPRI Research Report no. 63, Washington, Nov. 1987.
- Matlon, P.J. The ICRISAT Burkina Faso Farm-Level Studies: Survey Methods and Data Files, ICRISAT, August 1988.
- Paulino, L. Food in the Third World: Past trends and projections to 2000, IFPRI Research Report no. 52, Washington, June 1986.
- Pearce, R. "Traditional food crops in sub-Saharan Africa: Potential and constraints", Food Policy, Oct. 1990.
- Reardon, T. "Cereal Imports in West Africa and the Potential Impacts of Sahelian Regional Protection", World Development, Vol. 21, No. 1, January, 1993.
- Reardon, T., C. Delgado, and P. Matlon. "Determinants and Effects of Income Diversification Amongst Farm Households in Burkina Faso", Journal of Development Studies, January, 1992.
- Reardon, T., and P. Matlon. "Seasonal food insecurity and vulnerability in drought-affected regions of Burkina Faso" in D. Sahn (ed.) Seasonal Variability in Third World Agriculture: The Consequences for Food Security, Johns Hopkins University Press, 1989.
- Reardon, T., T. Thiombiano, C. Delgado. La Substitution des céréales locales par les céréales importées: la consommation alimentaire des ménages à Ouagadougou, Burkina Faso, Research Report for IFPRI/CEDRES project, published by CEDRES, Université de Ouagadougou, Série des Résultats de Recherche, no. 002, June 1988.
- Senauer, B., D. Sahn, and H. Alderman. "The effect of the value of time on food consumption patterns in developing countries: evidence from Sri Lanka", American Journal of Agricultural Economics, Vol. 68, No. 4, Nov. 1986.

Thiombiano, A. Modèle socio-économique de comportement alimentaire en milieu urbain.
Mémoire de DEA, ESSEC, Université de Ouagadougou, Burkina Faso. February, 1985.

Table 1: Household Food Expenditure Patterns in Burkina Faso and Kenya

Food Expenditures on:							
Zone and Stratum	Total Expenditure Per AE ¹⁾ (in dollars)	Mean Budget Share to Food in total expenditure (%)	Cereals: Share in food expenditure (%)	Pulses/Tubers: share in food expenditure (%)	Meats/Fish/Dairy: share in food expend. (%)	Other: share in food expend. (%)	Total: food expend. (%)
1984/85							
Burkina Faso - Rural							
- Sahelian Zone Overall	52	93	97	*	1	2	100
Lower tercile	34	93	98	*	1	1	100
Middle tercile	56	93	97	*	*	3	100
Upper tercile	80	92	96	*	1	3	100
- Sudanian Zone Overall	50	82	84	10	4	2	100
Lower tercile	31	80	85	8	4	3	100
Middle tercile	53	79	84	10	4	2	100
Upper tercile	70	86	84	12	3	1	100
- Guinean Zone Overall	64	79	73	10	6	11	100
Lower tercile	33	79	73	8	6	11	100
Middle tercile	56	79	71	10	6	13	100
Upper tercile	96	79	75	12	5	8	100
1984/85							
Burkina Faso - Urban							
Ouagadougou Overall	251	46	44	2	17	37	100
Lower tercile	139	41	52	2	14	32	100
Middle tercile	251	47	42	4	17	37	100
Upper tercile	427	51	32	4	22	42	100
1984/1987							
South Nyanza, Kenya							
- Agric. Households							
Lower tercile	97	83	47	8	8	37	100
Middle tercile	170	84	45	8	9	38	100
Upper tercile	338	80	41	8	9	42	100
South Nyanza - Kenya							
- Quasi-Urban Households							
Lower tercile							
Middle tercile	97	71	39	4	10	47	100
Upper tercile	170	81	38	5	11	46	100
	443	66	36	3	13	48	100

* = insignificant (rounds to 0)

AE is adult equivalents

1) Total household expenditure in cash and in kind, on food and on non-food, is used as a proxy for income in Burkina Faso and Kenya. FCFA 480 = 1 U.S. dollar in 1984; 378 FCFA = 1 U.S. dollar in 1985; Kenyan Shillings for period 1984 to 1987, 20 Kenyan Shillings = 1 U.S. dollar

Table 2: Household Cereal Expenditure Patterns for Burkina Faso and Kenya

Percentage of Cereal Expenditures on:						
Zone and Stratum	Millet/ Sorghum	Maize	Rice	Wheat products ^{a)}	Bread Alone ^{b)}	Total
1984/5						
Burkina Faso - <u>Rural</u>						
- <u>Sahelian Zone</u> Overall	76	21	1	1	*	100
Lower tercile	71	26	*	2	*	100
Middle tercile	77	21	*	1	*	100
Upper tercile	81	16	2	*	*	100
- <u>Sudanian Zone</u> Overall	83	16	*	1	*	100
Lower tercile	87	12	*	0	*	100
Middle tercile	77	22	*	1	*	100
Upper tercile	85	13	*	1	*	100
- <u>Guinean Zone</u> Overall	78	14	6	1	*	100
Lower tercile	79	14	5	1	*	100
Middle tercile	77	15	7	1	*	100
Upper tercile	79	13	7	1	*	100
1984/85						
Burkina Faso - <u>Urban</u>						
Ouagadougou Overall	27	15	41	19	*	100
Lower tercile	30	15	46	9	*	100
Middle tercile	29	16	42	15	*	100
Upper tercile	21	13	35	32	*	100
1984/1987						
South Nyanza, Kenya						
- <u>Agric.</u> Households						
Lower tercile	1	81	2	1	4	100
Middle tercile	8	78	2	1	5	100
Upper tercile	7	74	4	2	6	100
South Nyanza - Kenya						
- <u>Quasi-Urban</u> Households						
Lower tercile	3	78	3	1	9	100
Middle tercile	4	71	3	1	14	100
Upper tercile	1	69	5	3	13	100

* = insignificant (rounds to 0)

a. Includes all wheat products for Burkina; includes all wheat products but bread for Kenya

b. For Kenya only

N.B. The expenditures are purchases plus home consumption.

Table 3--Prepared Cereal Expenditures in Ouagadougou

The figures below show distribution of the annual expenditure per AE on rice and millet between home preparation and purchase from street vendors by stratum (in shares)

Tercile	Lower		Middle		Upper	
	Physical Quantity (% of Total)	Cash (% of Total)	Physical Quantity (% of Total)	Cash (% of Total)	Physical Quantity (% of Total)	Cash (% of Total)
RICE						
Home (grain)	66	54	74	68	92	90
Street vendor (prepared form)	34	46	26	32	8	10
Total	100	100	100	100	100	100
MILLET						
Home	43	37	37	31	22	19
Street vendor (gruel)	42	46	48	51	49	51
Street vendor (non gruel)	15	18	16	18	29	30
Total	100	100	100	100	100	100

Source: Translated and adapted from Reardon, Thiombiano, and Delgado (1988)

Table 4--Effect on women's income and women's wage income on consumption of wheat and bread in Kenya

Independent Variables	Model 1 Wheat (excluding bread)		Model 2 Wheat (excluding bread)	
	B	T-Statistics	B	T-Statistics
Income/capita	7.3-06	1.47	9.45-06	1.91
Schooling head of household	.04	1.49	.04	1.54
Percent of female income	-5.9-03	-1.79		
Woman's schooling (in yrs)	.11	3.3	.11	3.3
Adult equivalent units	-.04	-1.42	-.05	-1.75
Percent female wage income			-5.7-03	-.72

1.96 is significant (at 5%)
1.76 for 10 percent

Independent Variables	Model 3 Bread (only)		Model 4 Bread (only)	
	B	T-Statistics	B	T-Statistics
Income/capita	1.3-05	1.1	9.1-06	.80
Schooling head of household	.15	2.48	.15	2.4
Percent of female income	-3.8-03	-.50		
Woman's schooling (in yrs)	.20	2.73	.21	2.9
Adult equivalent units	-.10	-1.55	-.11	-1.75
Percent female wage income			.05	2.8

Table 5--Urban Burkina Faso regressions

	Bread/Cereal	Prepared Rice/Cereal	Prepared Millet/Cereal
Total expenditure/AE	7.6e-7**	-3.5e-7	8.6e-8
Total expenditure/AE, squared	-1.0e-12**	1.3e-12	-1.4e-13
AE's (household size)	-.002	.009**	.001
Dependency ratio	-.09*	-.16*	.03
Head of household = merchant	-.03	.03	-.02
Conjugal unit (eating unit)	-.04*	.03	-.003
Percent of wives 'working'	-.03	-.03	.02*
Adjusted R squared	.20	.11	.01
Constant	.18	.07	.02

Note: 1. *Purchased at restaurants/street vendors.
 2. AE's are adult equivalents.
 3. * is significant at 10% or less, and ** is significant at 5% or less; significance was computed on the basis of T-statistics.

ENDNOTES

1. See Reardon (1993) for review of Sahel consumption studies and evidence of price influence on consumption shifts.
2. The figures for regions other than West Africa are drawn from Reardon and Pinckney; the latter was based on calculations from FAO data, as were the West African calculations, based on Delgado and Reardon (1987).
3. The West Africa trends are drawn from Delgado and Reardon (1987).
4. The research design and sampling methods for the Kenya research are described in Kennedy and Cogill (1987) and Kennedy (1989).
5. The research design and sampling methods for the rural research are described in Matlon (1988).
6. Details concerning survey and sampling methods can be found in Reardon, Thiombiano, and Delgado (1988).