

The Importance of Non-Agricultural Income Sources for the Rural Poor in Africa and Implications for Food and Nutrition Policy

Joachim von Braun

Reprinted from
PEW/Cornell Lecture Series on Food and Nutrition Policy
November 1989

INTERNATIONAL
FOOD
POLICY
RESEARCH
INSTITUTE

1776 Massachusetts Avenue, N.W.
Washington, D.C. 20036-1998 U.S.A.

FOREWORD

Rural poverty and malnutrition in most African countries can probably be successfully alleviated only with accelerated agricultural growth. However, agricultural growth alone cannot assure higher living standards for the rural poor, because a large share of this population's income is derived from outside the agricultural sector (although demand for non-agricultural goods and services may be influenced by changes in agricultural sector incomes).

In this lecture, Joachim von Braun addresses Africa's food security, poverty, and nutrition problems, with particular emphasis on the importance of non-agricultural incomes. He identifies and discusses the opportunities and limitations for solving Africa's rural poverty problem through both the agricultural and non-agricultural sectors. Related issues are discussed in other lectures of this series (see the list of lectures in the back of this publication).

Per Pinstrup-Andersen

Director, CFNPP

THE IMPORTANCE OF NON-AGRICULTURAL INCOME SOURCES FOR THE RURAL POOR IN AFRICA AND IMPLICATIONS FOR FOOD AND NUTRITION POLICY

by

Joachim von Braun

1. ISSUES FOR ANALYSIS

A Changing Setting

Africa's food and nutrition problems are rooted in low and unstable incomes and highly deficient rural health and sanitation services.¹ Low incomes in Africa are closely related to lack of labor. The structural poor of pre-colonial Africa were poor because of lack of access to labor to exploit available land, either their own labor (when disabled, too old, or too young) or that of others (when they were bereft of family or other support) (Ilfie, 1987). Although this diagnosis of root causes of rural poverty is still valid for many areas, structural poverty resulting from land scarcity is on the rise in Africa today. Other features of the changing setting are:

¹ A comprehensive overview of magnitude and causes of the problem is in Pinstrup-Andersen's 1989 contribution to this lecture series.

- Incomes of the poor are highly unstable because of production, market, and policy risks, the latter two becoming more important. This translates into increased transitory food insecurity.
- Constraints with reference to health and sanitation largely result from deficiencies in quality, but also from their prohibitive cost, particularly in terms of time.²
- Africa's urban population is expected to increase to 43 percent by the year 2000. In addition, "urbanization" in many parts of rural Africa, reflected in changing consumption patterns, is underway (Delgado, 1989).
- High—and, in many countries, increasing—population growth rates generate further pressure on land resources. Besides environmental consequences, this has three profound implications. First, the demand for technological change in agriculture rises rapidly. Secondly, human and physical capital will play a greater role in rural growth, and third, because population growth leads to concentration, demand for services and infrastructure in rural areas rapidly increases.

Are the Rural Poor Subsistence Farmers?

The perception of the African poor as basically subsistence farmers is widespread. Two critical policy implications have been derived from this notion: first, the "subsistence sector" is outside the market arena and not greatly affected by prices; and second, subsistence agricultural growth will take care of the food and nutrition problems. The first task of this paper is to correct the above misperception and thereby refute the two derived policy implications.

Income sources of the malnourished poor in rural Africa are highly diversified. This diversification is not only inter-regional, which in fact could mean regional specialization, and inter-household at a location, which could mean community specialization—both of which are increasingly significant—but diversification of income sources of individual households.

Targeting the Poor's Food or Their Income Sources?

Much more is known about poor people's consumption patterns and behavior than about their income sources and strategies. Food and nutrition policy

² In long-term study, Greenwood et al. find that opening a bus line might have reduced child mortality in an area in the Gambia to an extent which at least paralleled the effect of a primary health care intervention program (Greenwood et al., forthcoming).

interventions have been largely driven by the consumption side of the household level equation:

$$\text{Consumption} = \text{Income} - \text{Savings}$$

Identification of “poor people’s” food, for instance, can be a viable point of entry for self-targeting food subsidies (Pinstrup-Andersen, ed., 1988). Consumption side targeting of the malnourished rural poor in Africa, however, has so far been limited compared to, for example, Asia and the Near East, partly because of institutional constraints. An alternative option may be to target the poor’s income sources. That would require more research into their income strategies and savings and investment behavior (monetary and non-monetary)

Policy implications would be with regard to targeting of technology and human capital and access to services and credit in support of a sustained effect on the poor’s consumption equation driven by impacts on its right hand side. Thus, the second task of this paper will be to point out that knowledge about the relative importance and sectoral structures of income sources of the poor, characteristics of these income sources (sustainability, fluctuations) and the poor’s responses to these characteristics are critical for effective design of poverty alleviation policies.

In the following three sections, I will provide some aggregate information on the role of agriculture in rural Africa in the context of economic growth and deterioration, discuss household issues regarding income sources and strategies of the malnourished poor on the basis of a simple household model and selected survey results, and, finally, summarize policy implications.

2. ECONOMIC GROWTH AND DETERIORATION AND AGRICULTURAL INCOME SHARES IN AFRICA

Economic growth throughout sub-Saharan Africa in the past three decades was rather mixed across countries and regions. Agricultural growth in particular was disappointing for complex reasons that are well documented (Mellor, Delgado, and Blackie, 1987 and Lele, 1989).

Agriculture's Economic Position

Agricultural sector shares in GDP now range mostly around 30 to 40 percent (Table 1). Service sectors account for a higher GDP share than does agriculture in many African countries. A weak relationship between per capita income and the agricultural sector's economic weight appears in a cross-country comparison (col. 1,3 in Table 1). However, the relationship between economic growth and agriculture sector share decline is strong (col. 2,4, Table 1). This relationship is found in countries with overall economic growth and countries with economic deterioration. Zaire, Tanzania, Madagascar, and Ghana show

Table 1 — Growth, Position of the Agricultural Sector and Agricultural Income in Rural Areas: Selected African Countries, 1965 - 1987

| | GDP per capita | Economic growth (GNP, per capita) | Agriculture's share in GDP | Change in agricultural sector share | Agricultural income share of rural population ^a |
|---------------|----------------|-----------------------------------|----------------------------|-------------------------------------|--|
| | 1987 (US\$) | 1965-1987 (percent) | 1987 (percent share) | 1965-1987 (percentage points) | 1987 (percent share) |
| Ethiopia | 130 | 0.1 | 42 | -16 | 48 - 58 |
| Zaire | 150 | -2.4 | 32 | +11 | 52 - 77 |
| Malawi | 160 | 1.4 | 37 | -13 | 43 - 52 |
| Tanzania | 180 | -0.4 | 61 | +15 | 86 - 93 |
| Burkina Faso | 190 | 1.6 | 38 | -15 | 41 - 55 |
| Madagascar | 210 | -1.8 | 43 | +12 | 56 - 66 |
| Zambia | 250 | -2.1 | 12 | -2 | 26 - 40 |
| Rwanda | 300 | 1.6 | 37 | -38 | 40 - 52 |
| Kenya | 330 | 1.9 | 31 | -4 | 40 - 49 |
| Sudan | 330 | -0.5 | 37 | -17 | 47 - 55 |
| Nigeria | 370 | 1.1 | 30 | -24 | 45 - 79 |
| Ghana | 390 | -1.6 | 51 | +7 | 75 - 89 |
| Senegal | 520 | -0.6 | 22 | -3 | 35 - 48 |
| Zimbabwe | 580 | 0.9 | 11 | -7 | 15 - 26 |
| Cote d'Ivoire | 740 | 1.0 | 36 | -11 | 64 - 86 |
| Cameroon | 970 | 3.8 | 24 | -9 | 44 - 64 |

Sources: The World Bank Development Reports (various volumes)

^aThis is a rough estimate of the range. The lower bound is based on the assumption that all agricultural incomes are earned by the rural population and that total (agricultural and non-agricultural) rural incomes are equal to total urban incomes on a per capita basis. The upper bound assumes that the rural population earns no income from industry and manufacturing.

this "normal" pattern of an increased relative agricultural position and general economic decline. Agriculture grew in Zaire, but it contracted in Tanzania, Madagascar, and Ghana on a per capita basis. The decline, however, was less than that of the overall economy; thus, the relative weight of the agricultural sector increased. In view of the concentration of rural poverty, countries that combined overall economic stagnation or deterioration with declining agricultural sector shares are even more unfortunate. Accelerated agricultural sector deterioration coincided with and probably fostered overall economic decline in these cases. Zambia, Sudan, Senegal, and Ethiopia, all of which are known for particularly serious food security and nutrition problems, are in this group.

Agriculture and the Rural Economy

Regarding sectoral priorities for poverty alleviation and economic growth, we are very interested in the relative position of economic sectors in the rural economy and their linkages (Mellor, 1986). A rough estimate of agricultural income's relative weight in the rural economy suggests that the agricultural income share falls below 50 percent in the economies of 7 of the 16 countries studied, while it is above 60 percent in the economies of 6 (using means of lower and upper bounds calculated in col. 5, Table 1). Agriculture shares in most of the big countries (Ethiopia, Sudan, Nigeria, Kenya, Zaire) fall roughly in the range of 50 to 60 percent in the rural sector of their economies.³ Thus, in general, agriculture growth continues to directly affect rural Africa's economy.

The agricultural income shares of the rural population give only an approximate indication of the role of agriculture for employment and rural income, because other sectors in the rural economy closely relate to agriculture sector performance through forward and backward linkages and consumption multipliers. A review of the farm/non-farm linkages in rural sub-Saharan Africa

³ These calculations are very rough estimates based on simple assumptions (see Table 1) and, in many of the countries, a weak database regarding rural population shares.

suggests that agricultural growth multipliers appear to be significant though somewhat lower than in some Asian countries (Haggblade, Hazell, and Brown, 1987, p. 35).

Policy Implication

Although the aggregate overview suggests a key role for agriculture in the economy, particularly the rural economy, the agriculture income shares for the rural population in a number of African countries is already surprisingly low. The increased weight of the rural non-agricultural sector requires attention by policy and research. The reduced weight of agriculture is partly a function of anti-agricultural priorities of economic strategies during the 1960s, '70s, and early '80s, not simply the outcome of resource allocation due to comparative advantages of agriculture over other sectors. To the extent low agriculture sector shares result from distortions, the current structures should not provide guidance for future policy thereby further directing the course away from agriculture. This would only amplify the adverse effects of policy distortions that led to current patterns.

Agriculture's role in Africa's economic growth attracted much attention during the mid-1980s, but concrete policy action has yet to be followed up in many of the countries with deteriorating agriculture growth records (UN-ECA, 1989). A viable set of priorities, in which rural infrastructure expansion, improved agricultural research and extension systems, and functioning input supply systems play a key role and are tailored to the specific country's economic and ecological environments, is of central relevance (Mellor, Deigado, and Blackie, 1987).

3. INCOME SOURCES AND STRATEGIES OF THE MALNOURISHED RURAL POOR

I turn now to household-level assessments and especially to the malnourished rural poor's sectoral income patterns and their income strategies.

Theoretical Aspects

A comprehensive model of the rural household would be helpful in deriving hypotheses about its transition from subsistence to income source diversification and towards full market integration with specialization.

According to Tschajanow (1923), a peasant family does not try to maximize a monetary profit but a subjective utility. Maximum utility is reached when the marginal drudgery of family labor in various activities is equal to the marginal goods and services gained from the labor input. Stimulated by Tschajanow, Nakajima (1970) developed a set of subjective equilibrium models which basically postulate the same behavioral rules, with and without exchange with the external labor market. Nakajima's models trace the consequences of external changes, such as variations in wages, prices, and productivities of the household's labor allocation and describe the decision of household members to be engaged in wage employment or to employ hired labor in the farm household. Yet they do not influence a household's decision concerning resource allocation between subsistence and market production.

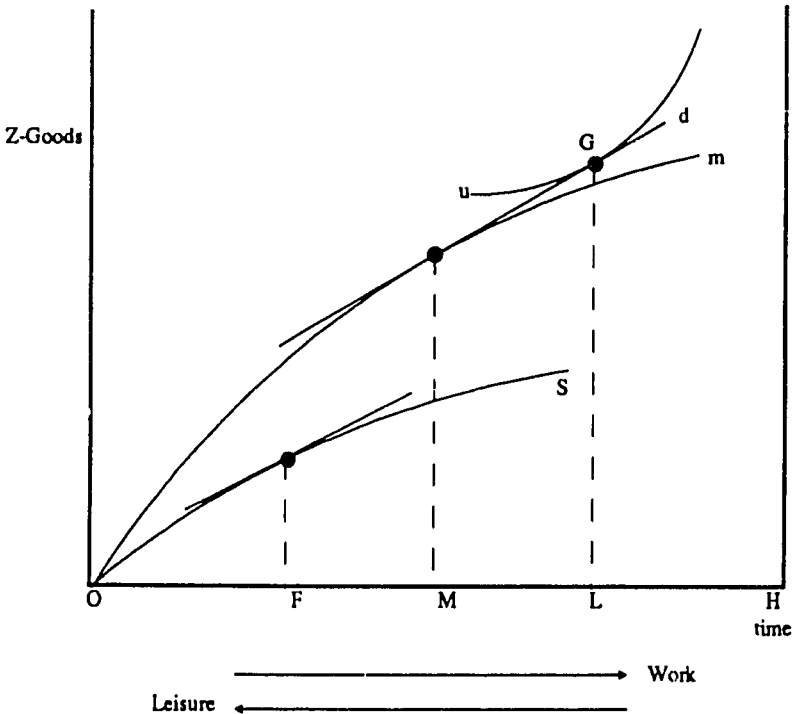
In order to model the commodity side of the process, it would be necessary to introduce the distinction of subsistence and market production at a given level of resource use and to specify the underlying determinants, such as risk aversion, and preferences that may motivate a household to maintain a certain degree of diversification even at the cost of lost market income. Moreover, nonmarketable household goods and services and market goods would require a common nonmonetary utility index.

The specification of a household's utility function in nonmonetary terms (Z-goods) is one strength of the modern theory of household economics. Z-goods are produced by market or home-produced physical commodities and the time input of household members. Maximizing a household's utility subject to a full-income constraint is then equal to minimizing the costs of producing a set of Z-goods including leisure.

Using Evenson's (1978) application of this theory to a model of a peasant household, it is possible to include the subsistence production of a household's resources not used for market goods. This would normally include house, shelter, and cooking facilities but may be also a small home garden.

Figure 1 portrays the basic model. The composite Z-good is measured along the vertical axis, whereas the horizontal axis measures time. The s curve traces the production function for home goods and the m-curve describes the combined production function of the household, where agricultural production is added to the home production function. The composite Z-good can presumably be produced at home or purchased in the market. Purchased goods may not be identical but close substitutes of home-produced Z-goods. Thus the d curve

Figure 1 — Allocation of Household Time Between Subsistence, Market Production, and Off-farm Work



measures the opportunities in terms of Z-goods offered by the labor market. Its slope is defined as the wage rate divided by the goods price, thus indicating the purchasing power of the off-farm wage in terms of Z-goods. Finally, u shows the indifference curve in terms of Z-goods and leisure.

At equilibrium the household would have LH leisure time and LG Z-goods for consumption. It would spend OF time units (and corresponding household resources) for subsistence, FM time units for farm production, and ML time units for wage earning. Some hypotheses regarding income diversification can be derived from this simple model when resources and/or relative prices change:

1. Increasing the wage rate raises the opportunity costs and, hence, reduces home and farm production.
2. Increasing the productivity of farm work causes an upward shift of the overall production function. It increases farm work and reduces off-farm work.
3. Increasing the productivity of home work will not only shift the combined production curve upwards, but it will increase the time spent in the household and, depending on the shape of the home production curve, reduce either farm or off-farm work and possibly increase leisure.
4. Increasing the family size relative to the land—an inherent demographic feature of the African rural poor—has complex implications for the household. Provided there is a perfect labor market, this essentially increases the family's demand for off-farm work but will not affect the internal time allocation. Yet, if additional employment cannot be found or can only be found at a reduced wage, the household would perceive reduced opportunity costs of labor and intensify the time spent in home and farm production.

The above simple model does not depict intra-household resource control and allocation decisions, which affect nutritional welfare in many African settings. Risks associated with individual income sources and insurance and credit limitations also encourage individual and household income source diversification. Gains from specialization—not explicitly accounted for in the model—are thereby lost. The poor avoid specialization because of such risk. Although a substantial number of effectively functioning community-based social security systems are found throughout Africa, private mechanisms for

income source diversification are required to supplement them (von Braun, 1990).

Income Sources of the Poor

Here I attempt to compile empirical information on the income sources of the malnourished poor and how the poor choose their income sources. The "malnourished poor" here are defined as households that either consume substantially less than their food energy requirements or have malnourished children.

Information on income sources of Africa's malnourished poor is not readily available. Detailed nutritional status or food consumption surveys have been undertaken too frequently without a comprehensive income module. Similarly, income, employment, and farming systems surveys have seldom reached out comprehensively into the consumption and nutrition sphere of household resource allocation and welfare determination.

The surveys referred to below were generally undertaken for a specific purpose and can only provide some insights. They are not representative. They are points of observation in Africa's widely varying socio-economic and agro-climatic environments. Nevertheless, we have observation from low population density (the Gambia, Burkina Faso, Sudan) and high population density settings (Rwanda). We also have uni-modal versus bi-modal rainfall patterns, which result in different seasonal patterns. Moreover, a great variety of socio-cultural patterns distinguishes the five settings (religion, household organization, community organization, etc.).

Subsistence production in these settings contributes between 10 and 50 percent of income and marketed agricultural production (including livestock) contributes between 10 and 40 percent (Table 2). Only in Burkina Faso are agricultural wage incomes at a significant level for the malnourished poor. Total agricultural income contributes 40 to 65 percent to total income except in the Gambia, where it contributes 84 percent of earnings for the malnourished poor.

Thus, while agriculture directly provides earnings for the malnourished poor, this group's non-agricultural income is frequently at a similar level to their agriculture income shares.

Wages comprise one quarter of malnourished rural poor's non-agricultural income in Rwanda and Sudan. Services and trading provide a substantial level, too. Transfers and remittances are significant in Rwanda, Kenya, and Burkina

Table 2 - Income Sources of the Poor (calorie deficient households)¹ at Selected Survey Sites in Africa.

| | The Gambia ² (South Bank) | Rwanda ³ (Northwest) | Kenya ⁴ (Southwest) | Burkina ⁵ Faso (Sudanian Zone) | Sudan ⁶ (North Kor- dofan) |
|---------------------------|---|------------------------------------|-----------------------------------|--|---|
| Non-marketed crops | 54.9 | 28.1 | 38.1 | 29.2 | 9.2 |
| Marketed crops | 26.8 | 10.8 | 11.7 | 7 | 24.8 |
| Livestock | 1.3 | 8 | 8 | 6.0 | 22.9 |
| Agric. wages | 0.8 | 2.0 | 2.2 | 26.3 | 8.0 |
| Total ag. | 83.8 | 40.9 | 52.0 | 61.5 | 64.9 |
| Non-ag. wages | 1.7 | 24.6 | 13.8 | 17.4 ⁹ | 24.8 |
| Craftswork | 3.2 | 10 | -11 | 4.3 | 12 |
| Services, trad- ing | 8.0 | 23.3 | 26.2 | 8.7 | 9.7 |
| Transfers, remittances | 3.3 | 11.2 | 8.0 | 8.0 | 0.6 |
| Total non-ag. | 16.2 | 59.1 | 48.0 | 38.5 | 35.1 |
| Total | 100.0 | 100.0 | 100.0 | 1—0 | 100.0 |

¹ Households which consume less than 80 percent of recommended dietary allowance (adjusted for household composition) in the case of the Gambia, Rwanda, Kenya, Burkina Faso; the Sudan figures refer to the bottom income tercile.

² Source: IPPRI/PPMU surveys 1985/86

³ Source: IPPRI surveys 1985/1986

⁴ Source: Eileen Kennedy, *Income Sources of the Rural Poor: The Case of Southwestern Kenya* (mimeo, IPPRI, 1989)

⁵ Source: T. Reardon, P. Matton, C. Delgado: *Coping with Household-level Food Insecurity in Drought-Affected Areas of Burkina Faso*; *World Development*, Vol. 16, No. 9, p. 1069, 1988 (Sudanian Zone)

⁶ Source: Department of Statistics, Sudan, *Household Income and Expenditure Survey 1978/80*

⁷ Included in non-marketed

⁸ Included in "marketed crops"

⁹ Included any income earned outside the region

¹⁰ Included in non-marketed

¹¹ Included in services and trading

¹² Included in non-agricultural wages

Faso, but a closer look at distributions among households reveals a far less spread of remittances than that of most other income sources.

Frequency distributions of income sources among the malnourished rural poor households suggest diversification among at least three major income sources: subsistence foods, marketed crops including food and non-food crops, and wages or income from self-employment in non-agricultural jobs. This diversification may entail a fair amount of specialization within the household according to gender or age. In the Gambia, for instance, most subsistence crops are produced by the males, and most income from craftswork and services is generated by specialized individuals in the extended household system (the compound economy). Women cultivate about 30 percent of the cash crop fields (groundnuts). In Rwanda, subsistence crops are produced mostly by women, whereas non-agricultural wages are generated mostly by males. Services and trading incomes are substantially generated by women. These divisions of labor by gender are, however, becoming less clearcut in the process of rural change.

Malnutrition, Off-farm Income, and Subsistence Orientation

An examination of households with malnourished children (children below 80 percent of weight-for-age according to WHO/NCHS standards) in the Gambia and Rwanda reveals a U-shaped relationship between non-agricultural income sources and malnutrition: malnutrition is least likely to be found in households with 10 to 30 percent of their income from non-agriculture sources (Table 3).

This, of course, is not driven by a mono-causal relationship. Households with better nourished children tend to command more resources (land, capital) in addition to greater income diversification. A model explaining subsistence orientation as one key aspect of diversification in land-scarce Rwanda is telling in this respect: subsistence orientation is reduced when the person-to-land ratio (resource constraint), capital assets (collateral), and wage employment in-

Table 3 - Non-farm Income Share of Households with Malnourished Children: The Gambia and Rwanda (1985/86)

| Non-farm income share in percent | The Gambia | | Rwanda | |
|----------------------------------|---------------------------|--|---------------------------|--|
| | Percent of all households | Percent of households with malnourished children < 80% of standard W/A | Percent of all households | Percent of all households with malnourished children < 80% of standard W/A |
| <10 | 38 | 63 | 17 | 44 |
| 10-30 | 38 | 56 | 20 | 39 |
| 30-60 | 19 | 62 | 29 | 44 |
| >60 | 5 | 70 | 33 | 47 |

Source: IFPRI-PPMU survey, The Gambia and IFPRI survey, Rwanda

crease.⁴ It is also driven by individual household members' risk attitudes and by the child/adult ratio (Table 4).

Home Goods and Children's Work Burden

Risks lead to income diversification at the lowest income levels and may entail increased transaction and time costs. Costs for off-farm employment searches are relevant components here. Increased time constraints of adults in malnourished poor households may be passed on to the children, who contribute to income generation especially in home goods production. Water and wood-fetching, for instance, are key home production activities and compete with other activities for time in Rwanda. On the average, water fetching takes about four hours per week and is performed almost exclusively by women and children. Wood collecting consumes about nine hours per week. Calorie deficient households spend significantly more time on water and wood fetching than do households above the calorie deficiency cut-off point (+ 41 percent and + 22 percent, respectively). Compared with the non-malnourished households, the percentage of malnourished households in which only children fetch water is

⁴ This is mainly reasonably secure wage employment in projects.

Table 4 - Determinants of the Degree of Subsistence Orientation

| Dependent variable: | Value of own-produced food consumed by the household in percent of total food and non-food consumption value (including own-produced) | | | |
|-----------------------|---|----------|--------|--------------------|
| Explanatory variables | Parameters | T-Values | Means | Standard deviation |
| MANLANR | -0.5737 | -4.40 | 11.16 | 8.25 |
| CAPITAL | -0.0101 | -2.13 | 219.50 | 220.08 |
| WAGES | 7.8941 | -2.85 | 0.48 | 0.37 |
| RISKPER | -13.9794 | -5.47 | 2.35 | 0.40 |
| CHSHARE | 15.7188 | 2.99 | 0.29 | 0.20 |
| CONSTANT | 24.2187 | 3.62 | | |
| R ² | .250 | | | |
| F-Value | 13.11 | | | |
| Degrees of Freedom | 177 | | | |

Sources: von Braun, de Haen, Blanken, (1990)

Variables

| | |
|---------|---|
| MANLANR | man-land ratio, in persons per hectare |
| CAPITAL | household capital stock per capita |
| WAGES | wage income over total cash income in current year |
| RISKPER | index of household head's perception about crop risks (derived from a specific crop choice survey; index is the mean of stated level of importance of (crop specific risk on a scale of 1 to 3) |
| CHSHARE | share of children <5 in persons household |

substantially higher (from 27 to 45 percent); wood fetching has similar percentages (from 11 to 19 percent). Women's involvement in these activities is reduced. Women in calorie-deficient households, obviously, are under severe time constraints. Clearly, diversification of income sources (home goods) that increases the children's work burden is a symptom of poverty.

SCOPE FOR TARGETING BY INCOME SOURCE?

Critically important for any income source targeting with the objective of nutritional improvement are three aspects: fluctuations in and out of absolute poverty (the moving of the target); fluctuations of individual income sources; and household responses to fluctuations in and compositions of income (i.e., in kind, cash).

Fluctuations In and Out of Poverty

We know little about fluctuations in and out of absolute poverty in Africa. Some evidence, however, suggests that a much greater share of the rural population is at times faced with food insecurity risk than is revealed in cross-sectional surveys. For instance, only 31 percent of households in the Gambia that consumed less than 80 percent of food requirements in year one remained in that category in year two. Similarly in Rwanda, 46 percent of households were in the malnourished poor category between two surveys conducted 11 months apart. Some portion of these fluctuations (transitory food insecurity) may be attributed to common measurement problems in consumption surveys. However, persistent absolute poverty as well as large fluctuations in and out of basic food insufficiency co-exist. Separation of “chronic” from “transitory” food insecurity poses a problem in many African settings. Transitory food insecurity is frequently chronic.

Fluctuations of Income Sources at the Extreme: Famine

Famine remains critical in Africa. In such crises, income source diversification appears to increase as a coping strategy (Dréze, 1988). After the mid-1980s drought in Western Sudan (Kordofan), agriculture income sources deteriorated causing the collapse of the already large rural service wage earning sectors, which in Kordofan in a normal year accounts for about 40 percent of the income share.

Reduced agricultural production in 1984 in the same region diminished off-farm rural employment opportunities, eroding nearly one-third of average income. Whole families or working members moved out of their villages as early as August 1984, much earlier than the normal January-May dry season migration. In North Kordofan, the percentage of entire families who migrated increased from 15 percent in 1980 to 46 percent in 1984. Those accustomed to agricultural work continued to seek employment in central and south Kordofan, albeit with diminished opportunities. Those without prior experience and

resource base moved to areas near relatives or with access to casual work, or they moved to famine relief camps (Teklu and von Braun, 1989).

In such extreme situations, production-price-real income-nutrition relationships are very tight. Nutritional status (weight-for-height) can deteriorate rather rapidly and targeted intervention strategies tend to fail without prior preparation. After such a crisis, the at-risk population shifts further into the non-agricultural sector for income, because much of their asset base was destroyed and capital to re-establish farm enterprises is limited. This underlines that snapshots of nutritional status information and of income sources do not provide sufficient information to target the malnourished poor. Dynamics in both nutrition and income sources must be considered.

Targeting Women's Income Sources

Targeting poor households' income sources on the basis of long-term structural information is an increasingly common approach in sub-Saharan Africa. For instance, women farmers are sometimes targeted through technical assistance for "women's crops." This strategy is pursued on the basis of two assumptions: that an incremental direct income effect for women, a disadvantaged group in their own right, will result; and that women have a higher preference for resource allocation to food security and child welfare.

An example from the Gambia suggests that this approach has potential, but it also has constraints. Double-cropped irrigated rice was introduced to replace the earlier, women-controlled swamp rice. To the project planners' surprise, crop responsibilities for this crop shifted almost entirely from women to men with the introduction of new technology (von Braun, Puetz, and Webb, 1989). Women, however, did obtain to a great extent control over a lower-yielding crop, also somewhat improved by new technology—partly water controlled rice irrigation. The new double crop production technology drastically increased labor demand; incremental labor had to come from men, and this changed the basic fabric of production relationships along gender lines in the complex

household production-consumption system and implied a major change in intra-household command over rice land.

Although the attempt to target women had partly failed, the increased income and employment that resulted from the technological change improved the food consumption and nutritional status of preschoolers and women. The large household system at the Gambian setting with much sharing of benefits from resources probably plays a positive role. This suggests complex trade-offs between narrowly defined targeting objectives and general welfare improvement.

Income Sources and Consumption Response

Increased income source diversification means increased participation in the cash economy. It entails cash crop production as well as cash earnings in other sectors. Implications of these changes for food consumption and nutrition relate to the methods by which income streams are mediated through the household decision-making process (Pinstrup-Andersen, 1983).

Two aspects of change must be clearly distinguished here: the role of cash versus kind (the form of income), and the role of income control (for instance, male versus female income control). Findings were different in the Gambia and Rwanda with regard to cash income versus kind income. In the Gambia, cash income was converted to consumed calories as effectively as, and in an amount equal, to own produced food. This was not so in Rwanda (once income levels and income control differences were accounted for in multivariate analyses). A small but significant positive effect of subsistence income on calories was identified in Rwanda, possibly because transaction costs are very high there. However, in both cases, results were consistent in that female income control, as measured by relative income share of women-controlled income sources, had a positive effect on the level of food energy consumption over and above income at household level (von Braun, Puetz, and Webb, 1989 and von Braun, de Haen, and Blanken, 1990). Thus, income targeting of women can increase nutritional

impact and probably more so in settings with small households (Rwanda) than in cases where large extended families form household systems (for example, the compounds in the Gambia). This can be achieved through very different modes. Though largely determined by location-specific circumstances, options may include assisting women into the mainstream of agriculture growth by cash crop promotion (credit, market co-ops, etc.) or technological change in staple crops.

Women-targeted public works programs, little implemented in sub-Saharan Africa, appear to be an option given generally flexible participation of women in the non-agricultural labor market (with few regional exceptions).

Targeting Non-agricultural Income

“Targeting” non-agricultural income sources of Africa’s rural poor entails a broadening of the agenda and a move “upstream” toward the sources of these income streams. In the final assessment, this probably means—curiously enough—first, a heavy emphasis on agricultural technology to foster agricultural growth and thereby growth in the non-agricultural rural economy as a by-product. Second, it means an emphasis on infrastructure and rural services. Thirdly, central to easing poor households’ food insecurity stress is to protect them from forced disinvestment of production resources during seasonal stress or crises. Rural financial systems, such as consumption credit for the poorest—explicitly open to women—preferably building on community level indigenous systems need further consideration. They appear to be of central importance for policy research in Africa.

The largely diversified income sources of Africa’s malnourished rural poor hold disturbing and pleasant implications for development planning and strategy: disturbing, because the scope for narrow targeting of a subsector or commodity in order to target poor households’ income streams appears at least as complex as targeting “poor people’s food” on the consumption side; pleasant, because broad-based rural growth opens up opportunities for the malnourished

poor. Nevertheless, opportunities for targeting poor people's income streams should be seized, although no general conclusion can be drawn because of the large differences among African countries and the different economic and ecological settings within countries. Regarding the issue of whether to target the poor's food or their income sources, the answer is most likely "do both." The relative emphasis on one or the other depends on location specific circumstances and the nature of poverty.

4. CONCLUSIONS FOR POLICY

The reduced agricultural income shares in Africa today are partly the result of an economic strategy that focused on industry and urban services. Continuous effort is required to change the unhealthy combination of deteriorating agricultural growth and low non-agricultural growth to revitalize agricultural growth which stimulates non-agricultural growth. Given the importance of agriculture in the rural economy and the poverty in rural Africa, poverty alleviation can result from such redirection of strategy.

Policy must note that the poor do diversify their income sources to cope with risks of individual income sources. Current income source patterns and their diversity, however, should not necessarily guide a long-term development strategy, because these patterns are partly symptoms of poverty and results of distortions.

Although not necessarily relevant to long-term strategy, the poor's income source patterns and strategies are important for medium-term targeted rural growth efforts. Policies that target the poor through commodity priorities—which frequently focus on the consumption side—can also be considered for the production and income earnings side. Sectoral structures of poor people's income sources and income earners' characteristics provide some guidance as to where to start.

Africa's rural economy became increasingly market-integrated in the 1980s. The poor are very much involved in market participation and directly

affected by price policies. Subsistence shares in rural income are rapidly declining. Consumer/producer tradeoffs in the "What price food?" issue (Streeten, 1987) matter much more to today's rural African poor than ever. The production-price-poverty relationships found to be so strong in Asia (Mellor and Desai, 1985) are increasingly important in Africa as well.

In sum, key conclusions are:

1) the role of agricultural growth in growth in Africa may in fact increase under a policy where infrastructure and education investments are spreading capital thin rather than concentrate it in industries (Mellor, 1986). Agriculture's multiplier effects, found so powerful in Asia, may begin to play a greater role in Africa;

2) credit with innovative group-based collateral provisions may emerge as a key instrument for overcoming constraints of the resource poor population and to maximize returns to investments in public goods (education, infrastructure, and agricultural technology);

3) similarly, as with targeting the poor's specific consumption items, no panacea can be seen in targeting poor people's income sources. Options are rather location specific. Still, opportunities for targeting should be seized wherever possible in well-defined program settings.

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