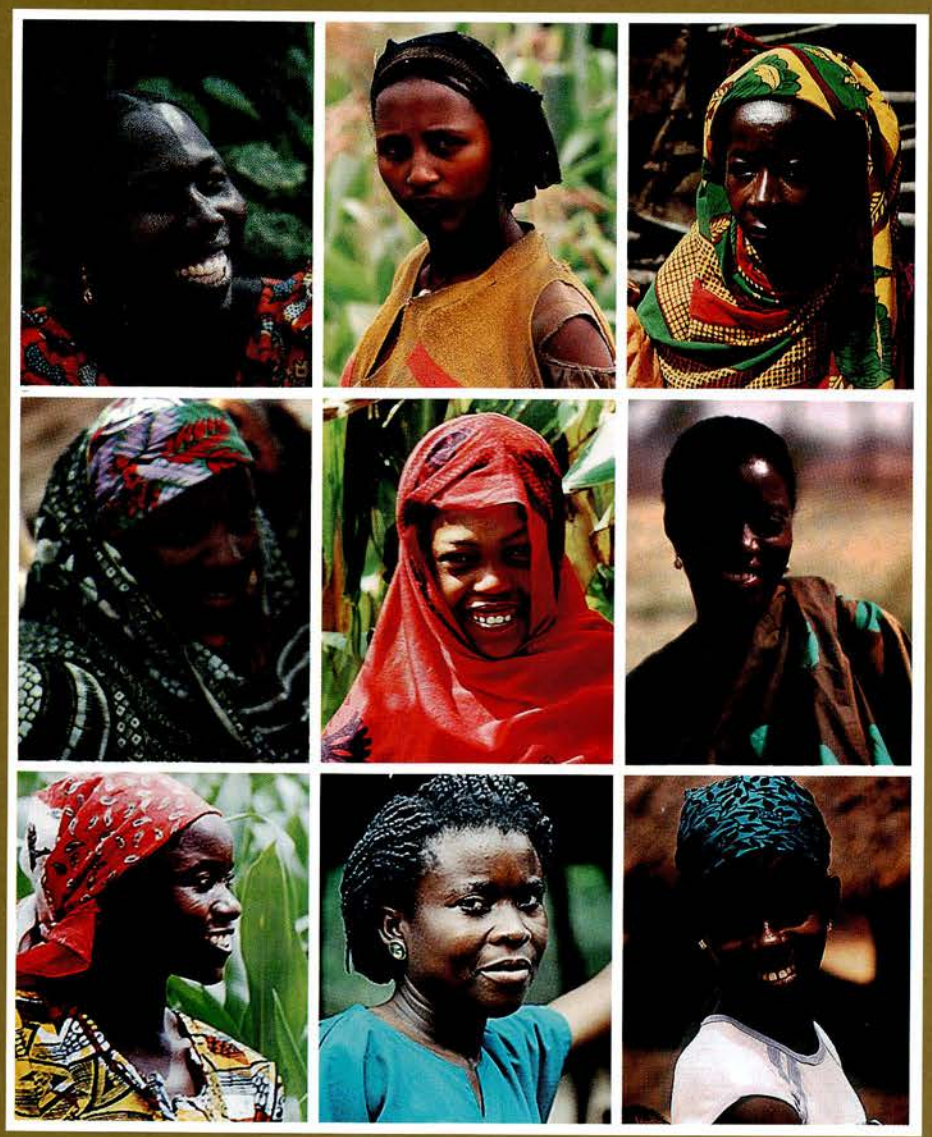
Women, Agricultural Intensification, and Household Food Security

Sasakawa Global 2000



Women, Agricultural Intensification, and Household Food Security

Proceedings of the workshop Women, Agricultural Intensification and Household Food Security, held at the Sasakawa Centre, University of Cape Coast, Ghana, 25–28 June 1996

Steven A. Breth, editor

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Abstract: This publication is based on papers presented at a workshop held at the University of Cape Coast, Ghana, in June 1996, which examined ways to develop gender-sensitive training programs for policy makers, researchers, and extension workers in sub-Saharan Africa. The papers explore why gender matters, women and sustainable agricultural production, income-generating options for women farmers, and the interrelationships of women's roles, food security, and nutrition.

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Contents

Abbreviations

¢	cedi (Ghana)
FAO	Food and Agriculture Organization of the United Nations
GDP	gross domestic product
IFAD	International Fund for Agricultural Development
IITA	International Institute of Tropical Agriculture
ILO	International Labour Organisation
NGO	nongovernmental organization
SG 2000	Sasakawa-Global 2000
t	tonne (metric ton)
UNDP	United Nations Development Programme
UNICEF	United Nations Children's Fund
WID	women in development

Foreword

The important role of women in agricultural production and agribusiness enterprise systems in sub-Saharan countries is widely recognized. Yet too little is being done to help women in rural Africa overcome the numerous problems that limit their productivity as the principal producers of food that ensures household food security.

Problems associated with food security are both socio-cultural and economic. Most women have limited access to land, and the land they cultivate tends to be marginal with low soil fertility. In the household, decision making is controlled by men, except in households headed by women.

The male-female division of labor also is disadvantageous to women. Women have multiple roles as mothers, homemakers, producers, farm laborers, and processors and marketers of agricultural produce. They are overburdened and time-short.

The problem of inadequate food production, low food intake, and malnutrition must be addressed appropriately through an extension delivery system that targets women. The intensification of agriculture in sub-Saharan Africa therefore should ensure that women as key food producers have adequate access to resources, technology, information, and education.

This workshop has come at an opportune time. It addressed some of these problems to generate information for training on women, the household, and agricultural intensification. I hope these proceedings will sensitize those responsible for the design and implementation of agricultural research and extension programs to gender issues.

A multi-disciplinary approach was adopted for organizing the workshop. Agricultural research scientists, university lecturers, extension officers, women farmers, nutritionists, food technologists, and social scientists were invited to the workshop to help provide solutions to women's problems. There were 75 participants from 18 countries.

These proceedings will serve as source of information for policy makers, researchers, and extension workers when developing gender-sensitizing training programs for agriculture intensification and household food security.

Thanks deserve to be given to the organizing committee, especially Vicky Quinn, Docea Fianu, Franklin Donkor, J. A. Kwarteng, Toshiro Mado, Deola Naibakelao, Tareke Berhe, and Moses Zinnah in Ghana and Margaret Grieco and Christina Gladwin in the USA. We are grateful to the IITA Postharvest Development Unit for organizing a demonstration of agroprocessing equipment and to the Sasakawa Centre for Continuing Education in Agriculture at the University of Cape Coast for providing facilities for the workshop. Finally, thanks goes to the Sasakawa Africa Association for funding this event, to Chris Dowswell for promoting this initiative, and to Steven Breth for editing the proceedings.

Rosetta Tetebo
Acting director, Women in Agricultural Development
Ministry of Food and Agriculture
Accra, Ghana

Welcoming Addresses

Patience Mensah, World Bank

The objective of this workshop, to develop gender-sensitive training programs for policy makers, researchers, and extension workers, is central to tackling the problems of agriculture and food security. The issue of low agricultural production and food security are of great concern not only to Ghanaians but all of sub-Saharan Africa.

We all know that poverty in Ghana is essentially, although not exclusively, a rural phenomenon, where the majority of the population live and derive their livelihood mainly from an agriculture that is highly feminized. We know that women contribute about 70 percent of the food production, under farming systems with low level of technology. Women also have the additional responsibility for ensuring food security of the household, with its implications for nutritional health, particularly of children. Any meaningful effort to increase agricultural growth and raise rural incomes and improve food security must pay sufficient attention to gender issues.

The World Bank has been a partner with Ghana in its ambitious effort to develop all sectors of the economy, especially agriculture. This effort intensified following the Economic Recovery Program in 1983. The bank has supported Ghana in financing a number of projects, including those from the Medium-term Agricultural Development Strategy (MTADS), in institutional strengthening, efficient provision of agricultural services, investment in rural infrastructure, biodiversity, and efficient management of natural resources, and promotion of market-oriented agriculture. Specific gender support, as in the Women in Agriculture Development program of the National Agricultural Extension Project, has established an extension network to disseminate technical messages to farmers. The bank is also supporting the National Agricultural Research Project to generate improved technologies in agriculture, while maintaining strong linkage with the Ministry of Food and Agriculture and farmers.

The World Bank has initiated a dialogue with the government to help support the preparation of an accelerated growth strategy for Ghana's agriculture, bearing in mind that the projects developed from the MTADS will be completed within the next 3 years. Out of this effort, the bank will contribute to an agricultural growth strategy document for use in Ghana in which gender will undoubtedly be one of the key issues.

The bank participated actively in the Fourth World Conference on Women in Beijing and has committed itself to highlighting gender issues in its lending programs and to ensuring the inclusion of a gender perspective in them. In Ghana, the bank is collaborating in the development of a gender strategy along with key stakeholders as we move into the post-Beijing implementation phase. After consultation with women, government officials, the private sector, and NGOs, the bank's gender-and-development facilitators have identified four key areas needing attention: (1) high degree of

Patience Mensah is a project officer, World Bank, Accra.

feminization of agriculture with low productivity, (2) unequal access to financial services between men and women, (3) gender disparities in education and training, and (4) low representation of women in policy formulation and decision making.

As one who is concerned with agricultural development, I would like to state a few basic principles. The key to reaching women farmers with the knowledge of improved technologies for agricultural production and food security lies in education, research, and extension. There is a need to promote girls' education in general and to enhance their performance in science and mathematics to facilitate the entry of more women into agriculture extension as a profession. Research must pay more attention to developing technologies to reduce the considerable time women spend on household chores and agro-processing, in addition to farm work. Extension in itself should aim at reaching more women than it does now, through appropriate delivery methods. We must also recognize that women, as recipients of extension messages, face certain constraints in their dual role as home managers and agricultural producers, as well as being members of the larger society. We believe that women have unequal access to financial services and land, in most cases, and need to be empowered to take up decision-making roles. For these reasons, let us take a holistic view of women in agriculture as we deliberate about improving the lot of the many women farmers out there and about attaining sustainable growth in agriculture and satisfactory food security situation in Ghana.

Juichi Sato, Japan International Cooperation Agency

Women in both developed and developing countries have been playing very important roles in our daily lives. For example, the part women play in every family in Ghana is well known. They are also playing important roles in the economic development of this country. And in some cases, the running of the home is left entirely to women. However, in the past, women did not receive appropriate attention from decision makers. Fortunately, countries have now come to realize the importance of women in society, and they are making efforts to improve the status of women by involving them in decisions that affect them. JICA has six priority areas under women in development:

1. *Promotion of the economic participation of women.* JICA recognizes that, before a country can be economically independent, women have to have an important role, hence JICA renders cooperation to women's groups through dissemination of appropriate technologies as well as managerial skills.
2. *Promotion of education for women.* It is the policy of JICA to support basic education for schoolgirls and expand nonformal education for adult women because increased access to basic education will bring about empowerment to women, to their families, and to the society as a whole.
3. *Promotion of health, medical care, and family planning for women.* Recognizing the reproductive as well as the often invisible productive roles played by women and their negative effects on women's health,

Juichi Sato is program officer, Japan International Cooperation Agency, Accra.

JICA renders cooperation to upgrade the institutional capacity of maternal and child health, family planning, primary health care, and other regional medical services from which the female population can benefit.

4. *Participation of women in environmental conservation.* Recognizing the reproductive and often invisible roles played by women in their natural environment (water and fuel collection) and the negative repercussions experienced by women in the event of environmental degradation, JICA renders cooperation in the areas of environmental protection and sustainable environment management and encourages women in the recipient countries to participate in such projects.
5. *Institutional strengthening for national machinery and focal points.* JICA recognizes that mainstreaming gender issues can only be undertaken effectively through solid and capable institutional arrangement in the recipient countries. JICA therefore helps strengthen government institutions (national machinery and focal points alike) through the dissemination of skills to develop gender-disaggregated statistics, management of human resource exchange programs, and networking with concerned institutions.
6. *Expansion of access to, and improvement of, information on women.* JICA recognizes that mainstreaming gender issues is more effectively undertaken if consolidated gender-disaggregated data is available and taken seriously by decision makers. JICA renders cooperation to collect, analyze, and disseminate information about women and to create information networks so that they can be effectively utilized by decision makers and planners alike.

To promote these areas, JICA supports group training courses, project-type technical cooperation, development surveys and research, dispatch of experts and volunteers, and recruitment and training of local experts. For example, JICA's Ghana Office is undertaking a technical cooperation project at the Ashiaman Irrigation Center of the Irrigation Development Authority. We have JICA experts and Japan Overseas Cooperation volunteers assigned to this project. They are involved in rice cultivation and agroforestry. The Ashiaman Irrigation Center recognizes the important role women play in rice cultivation, and as result they organize seminars regularly for women in the community who are involved in rice cultivation. We attach special importance to the participation of women because we believe after acquiring new technology in rice cultivation, they will be able to increase rice production, which will make food security a reality.

Also, we are involved in the provision of portable water for some communities in Ghana. This helps to cut the long hours women spend searching for drinking water especially during the dry season. Though this is not directly related to agriculture, it is our belief that the availability of drinking water in each community will enable women to have more time for economic activities like agriculture.

To conclude, I would like to state that, for a nation to escape from poverty, it is essential to improve the status of women, and the JICA Ghana Office is willing to collaborate with any institution that is interested in WID activities in Ghana.

Florence A. Dolphyne, University of Ghana

I am not an agriculturist, but after being involved with various programs that were meant to help women improve upon their level of education, their social standing, their professional career, and their various economic activities during and after the United Nations Decade for Women, I am very much aware of the vital role that women play in ensuring food security in this country, especially at the village level.

In Ghana women are active at all the various stages of the food chain. They are the farmers who grow the staple foods for feeding our ever-growing population, and they are the ones who transport the food from the farming areas to the urban markets, thus providing vital services in food distribution, an activity in which they have been able to hold their own in spite of stiff competition from parastatal organizations set up to provide this service. When it comes to the processing and preservation of food, be it farm or marine produce, it is women who predominate in these activities, while the preparation of food for consumption within the home is the sole preserve of women. I believe this situation is not too different in other parts of Africa.

For several years now, there have been reports of shortfalls in food production in many countries in sub-Saharan Africa, to the extent that we have almost come to accept food aid as a necessary part of our nations' food plans, without which we cannot expect to achieve food security in our countries.

Florence A. Dolphyne is pro-vice-chancellor, University of Ghana.

It has been estimated that in sub-Saharan Africa, women account for 70 to 80 percent of household food production. We are all aware that men farmers usually busy themselves with high income-earning export crops, which, because of their foreign-exchange earning potential, attract the right level of credit from the banks. Moreover, because of traditional attitudes, it is men who engage in mechanized agriculture, which helps to increase production and incomes. It is therefore not surprising that by leaving 70 to 80 percent of the food production to women farmers, who often not have access to land or credit or mechanization, we in Africa cannot produce enough food to feed our ever-increasing population.

What is even more disturbing is the fact that after working so hard on the farm, the woman farmer has to contend with the frustrations arising from postharvest losses, which effectively reduce her ability to provide adequate and nutritional food for her family at certain times of the year. If she happens to be a nursing mother, this affects her health and that of her child.

Since the Fourth World Conference on Women in Beijing, quite a number of people, both men and women, have tried to trivialize the emphasis that is being put on gender issues. There are many who say that, at least in Ghana, women should have nothing to complain about because they have equal access to education, jobs, and property. They remind those of us with a certain level of education that rural women have no problems and are perfectly happy with their way of life. They point out that it is those of us with Beijing Conference attitudes who are imagining nonexistent problems for the majority of perfectly happy women in our African society. My response has always been

that I agree the women do not have a problem. It is our society, the whole country that has a problem—the problem being that we have this rich human resource that is terribly underutilized. If indeed our rural women, using outdated traditional methods of farming, are producing 70 to 80 percent of food consumed in the country, how much better will our food security be if these women were exposed to improved farming methods so that they can have higher yields? If all our rural women had basic education that would make them appreciate the value of proper nutrition for their children and other members of the family, we would be well on the road to eradicating malnutrition and related health problems.

When African women at the Beijing Conference insisted on focusing attention on the girl child, they were fully aware of the fact that without proper education to ensure that she grows up fully conscious of her own potential and the valuable contribution that she can make as a mother and homemaker, as well as an intelligent member of her society, our nations will continue to lag behind the developed world, and we will continue to be marginalized. This indeed is the import of the message of the empowerment of women.

For me therefore, it is very refreshing that this workshop is tackling the problem of food security in Africa by addressing the concerns of women in agriculture and by trying to develop gender-sensitizing training programs for policy makers, researchers, and extension workers. I congratulate the organizers for bringing together agricultural researchers, extension workers, women farmers, nutritionists, food technologists, social scientists, as well as representatives of NGOs and some international organizations, for we do need a multidisciplinary approach to the problem and a well-coordinated program if we are to make a change for the better, with regard to sustainable food production, economic access to available food, and better nutritional security for the whole population. I do hope that an effective coordinating unit or some such machinery will be set up to ensure that at the village level the message to the woman farmer makes clear the line between the issues of increasing food production, who has access to that food, and whether nutritional conditions are improved as a result of the increased food production.

We are all aware of the multiple roles that women in Africa, especially rural women, perform—fetching water, working on the farm, selling farm product, collecting firewood, cooking the family meal, and caring for the children, the elderly, and the sick. All these put a great deal of stress on women's energy and their health. I hope that in our efforts to help the rural woman to increase food production, we find ways of easing the burden of work on the farm so that we do not end up making more demands on women's time and energy. I also hope that programs designed for the rural woman will ensure an improved social and legal status that will have a salutary effect on women's sense of self worth.

What needs to be done to help women to discharge their multiple roles effectively is to give them greater access to education, information, credit, appropriate technology, and other resources that will ease their existing labor burden and ensure the welfare of their families and themselves. There is the need for appropriate policies and programs that will empower women and elevate their status educationally, economically, socially,

and legally. Apart from appropriate policies and programs, there must be the political will of governments, opinion leaders, traditional rulers, and the society as a whole to redress the injustices that tradition and cultural norms have subjected women to over the years.

Rosetta Tetebo, Ministry of Food and Agriculture

We are gathered here to examine the need to intensify agricultural production and the interventions by women so we can improve household food security through production and access. The immense role that women play in agriculture in sub-Saharan Africa is well documented. Women in sub-Saharan Africa, and Ghana in particular, shoulder the great responsibility of ensuring the food security and nutritional well-being of their households as well as that of their extended families through production, processing, marketing, and storage.

Production technologies, income-generating techniques, processing, utilization, and storage technologies, nutrition, and other home management techniques, and marketing and management skills need the attention of research and extension in order to address the problem of increased productivity for additional income.

Women's added indispensable role as mothers—caring for babies, children, and the elderly and managing the entire family puts a time constraint on women, keeping them from participating effectively in agricultural extension demonstrations and adaptive research work.

Rosetta Tetebo is acting director, Women in Agricultural Development Department, Ministry of Food and Agriculture, Accra.

In examining how to make agriculture the prime mover of African economies, we have to address the constraints faced by women and document whether those constraints are real, fantasy, imaginary, or anticipated wishes. Do these constraints—land, credit, social status, technologies, and extension—as stated by women farmers, pose challenges for researchers and trainers? Do the unstated problems of women, which are governed by tradition and culture—nutritional needs, including water, transportation of farm produce, and care of household members, especially the elderly—pose challenges to researchers?

In 1994 a workshop on strategies for attracting and maintaining women in agricultural training programs in faculties and schools of agriculture in Ghana was organized at the University of Cape Coast. At that workshop, it was realized that the schools of agriculture and the universities must make deliberate efforts to attract female students and maintain them in their programs if developmental needs of women farmers were to be improved.

In several publications, international agencies (such as FAO, UNICEF, UNDP, ILO) have recognized the constraints women encounter in relation to agricultural development and that:

- Women have limited access to resources—credit, land, and other operating inputs—research and extension; and marketing services.
- Women are affected by technological bias, i.e., technology delivery targets male farmers because most extension staff are males.
- Women suffer from cultural and social structural bias as a result of practices on ownership and inheritance of agricultural land.

- Formal and informal education of women is limiting.

The Sasakawa-Global 2000 workshop held in Addis Ababa last year brought out the need for gender considerations in agriculture.

All these meetings have been organized to bring into perspective commitments to help develop women and agriculture. The mother of all conferences on women—the Fourth World Conference on Women in Beijing—produced several points for action by governments and NGOs to address rural women's constraints:

- Develop agricultural and fishing sectors, where and as necessary, to ensure household and national food security and food self-sufficiency by allocating the necessary financial, technical, and human resources.
- Develop policies and programs to promote equitable distribution of food within the household.
- Formulate and implement, when necessary, specific economic, social, agricultural, and related policies in support of female-headed households.
- Formulate and implement anti-poverty programs, including employment schemes, that improve access to food for women living in poverty, including the use of appropriate pricing and distribution mechanisms.
- Enable women to obtain affordable housing and access to land by, among other things, removing all obstacles to access, with special emphasis on meeting the needs of women, especially those living in poverty and female heads of households.
- Formulate and implement policies and programs that enhance the access of women agricultural and fisheries producers (including subsistence farmers and producers, especially in rural areas) to financial, technical, extension, and marketing services. Provide access to and control of land, appropriate infrastructure, and technology to increase women's incomes, and promote household food security, and development of producer-owned, market-based cooperatives.
- Promote women's central role in food and agricultural research, extension, and education programs.
- Increase training in technical, managerial, agricultural extension, and marketing areas for women in agriculture, fisheries, industry and business, and arts and crafts to increase income-generating opportunities, women's participation in economic decision making, in particular through women's organizations at the grass-roots level, and their contribution to production, marketing, business, and science and technology.
- Promote education, training, and relevant information programs for rural and farming women through the use of affordable and appropriate technologies and the mass media—for example, radio programs, cassettes, and mobile units.
- Provide nonformal education, especially for rural women, so that women can realize their potential with regard to health, micro-enterprise, agriculture, and mobile units.

Because women's problems in agriculture are many and varied, the expected solutions in my estimation need multisectoral approach. I hope this workshop will focus on systems that will in future empower the rural women financially and so improve the quality of life for Africans, the majority of whom are rural and for whom agriculture is their livelihood.

Beyond the Policy Table: Gender, Agriculture, and the African Rural Household

Margaret Grieco

Introduction: Getting beyond the Policy Table

The arguments I am about to make are simple ones. They are arguments I have been making for the last year within the World Bank and in other venues. They are arguments that have tireless champions in the World Bank such as Katrine Saito and Daphne Spurling (Saito and Spurling 1992; IFPRI/World Bank 1992). Nevertheless, they are the arguments that are routinely neglected, discarded, or sidelined—left on the policy discussion table and rarely implemented in operations (World Bank 1996, 9). They are arguments concerned with gender and its relationship to the organization of African agriculture. I am not the first to make these arguments (Quisumbing et al. 1995), nor the first to understand their importance. I am certainly among those constituting the elite of the most frustrated—frustrated by the resistance and reluctance of Africa's key policy circles, donors and governments alike, to engage with the centrality of gender in achieving growth in Africa's agricultural sector.

The key policy agencies have both mischaracterized and misunderstood the African household, rural and urban.[1] Through the extensive and systematic propagation of survey methodologies that force African reality into the data mold of Western society, the real structure of the contemporary African household is obscured. The customary exchange of resources within African households, the corresponding gender division of responsibilities, and accompanying inheritance structures, as documented by a multitude of ethnographic studies, do not readily fit Western models. To provide a simple but clear indicator, the matrilineal descent structure of many African societies has no corresponding Western equivalent. Despite the potency of this benchmark and despite the abundance of African anthropology that documents the differences between the Western and African household (Abu 1983; Goody 1978) and the respective kinship arrangements in which each is embedded, formal statistical inquiries have paid little attention to the centrality of gender in African social and economic organization. Yet these differences between Western and African household organization appear to have real consequences for the arrangement of agriculture in Africa as compared with other parts of the world—agriculture in Africa is, by all accounts, highly feminized

[1] Key evidence on rural households is to be found in Bukh 1979; Fortes 1974; Imam 1988; ODA 1994; Woodford-Berger 1981; IFPRI 1992. Key evidence on urban households is to be found in Abu 1983; Ardayfio-Schandorf 1994; Clark 1989; Goody 1978; Grieco, Apt, and Turner 1996; Kilson 1974; Lloyd and Brandon 1993.

Margaret Grieco is a professor at the Centre for the Study of African Economies, University of Oxford.

(World Bank 1996; CGIAR n.d.). However, as yet, there has been no systematic Africa-wide study of the relationship between household organization and the agricultural division of labor. The time for such a study has arrived. There is a need to document the many different forms that household organization takes within Africa and to explore the relationship between these forms and the different modes of agricultural organization that exist. Understanding this relationship is critical to the appropriate delivery of extension services and to combating the present neglect of gender in the design and delivery of extension services by both policy agencies and African governments.

In Africa, to understand the constraints experienced by the agricultural sector, we have to understand the constraints experienced by women. Household organization determines the economic roles to be played by women, of which, in rural households, participation in agriculture is one. It also determines the constraints in time, mobility, and resources that they experience in performing this role (Jones 1989). Over and above the simple household constraints experienced by women in many communities are their lineage obligations, which extend beyond the bounded concept of the household propagated by Western surveys (Goody 1978).

Yet, when we look at the design of extension services (CGIAR n.d.), with some noticeable exceptions, gender frequently disappears from view. Asked in Washington, D.C., about provisions for women farmers within the training and visit system (T&V) and the corresponding need for female extension officers, Danny Benor, the doyen of T&V had this to say, "There is no such thing as a woman farmer, there are simply farmers."

But it is clear to me and many others working in Africa that there are indeed women farmers (Boserup 1970; Quisumbing et al. 1995) and that these farmers have special needs (Quisumbing et al. 1995), which emerge from the interaction between household organization and agricultural organization. In Ghana, Rosetta Tetebo and Patience Mensah have generated strong and substantial arguments on the importance of ensuring that adequate attention is paid to women's roles in delivering food security in the design of extension services and to achieving better gender-disaggregated data in the agricultural sector. Those arguments guided and assisted us this year in inserting the gender and agriculture issue into the World Bank's country assistance strategy and its gender strategy for Ghana.

In Ghana, within the context of the Medium-Term Agricultural Development Strategy, the government has formally recognized the importance of gender in the development of agriculture, but the measures to make this recognition a reality are still slow to arrive. The very first requirement must be the setting up of a gender-sensitive data collection and analysis system.

The recent suite of "quick" household surveys currently under design at the World Bank and expected to be put in place within the next year offer little hope of a more refined and appropriate understanding of African household structures and their implications for agricultural organization. Despite over a decade of literature that documents the significance of agriculture for Africa and the significance of gender within agricultural organization (Boserup 1970; Cleaver and Schreiber 1994; Elson 1991; Saito and Spurling 1992; World Bank 1996), the basic gender questions on access to land, to

the labor of other members of the household, and to the other necessary resources for agricultural production remain absent.

Both survey designers and policy makers continue in the stubborn pattern of viewing the African agricultural household as unitary and simply male-governed, although the overwhelming burden of the evidence is of a complex negotiated structure in which males and females often operate separate income and expenditure streams within the same household. Nowhere is this separation more evident than in the distinctive gendered cropping patterns found in numerous African communities (Quisumbing et al. 1995; World Bank 1996, 11). Iman (1988) observes:

> Despite the many critiques of the underestimation of women's economic significance. . .and despite the increasing lip service paid to African women's importance in agricultural production development, projects continue to be formulated without considering (never mind consulting) what women do and how women and men interact in household maintenance and reproduction (see Palmer 1977, Dey 1981, Knowles 1985). This premise of a production unit controlled by a male head is one of the reasons why agricultural extension workers (largely male) frequently ignore women even in areas where women not only do much on-field labor but may be managing farms completely on their own whether customarily or due to male migration (see FAO 1974, Spiro 1977, Okonjo 1980).

Almost a decade after this summary was generated from within Africa itself, the pattern unfortunately continues among major policy agencies of either neglecting gender altogether or handling the issue in a piecemeal fashion. From this workshop, and in the epoch of Beijing, it is my hope a set of recommendations can be addressed to the agricultural policy-making environment that require and produce the mainstreaming of gender into African agricultural development policies and programs.

Discovering the Centrality of Household Organization: An Array of African Domestic Arrangements

The critique of planners' and policy makers' indiscriminate application of the inappropriate Western household model[2] to the African reality is well developed (IFPRI\World Bank 1992). African academics and specialists on Africa have long noted the inadequacy of the existing model, and its fundamental assumptions, in describing patterns of household maintenance and agricultural activity in rural Africa. Imam (1988) provides a synthesis of this substantial, if currently fragmented, literature:

> Conceptions of the household frequently encapsulate a number of (implicit or explicit) premises: that the household/family is in some way a universally existing institution having co-residence; that [it] is based on some biological reproductive requirement; that it is a unit of production (at least until capitalism); that it is a unit of consumption; that it is a bounded unit, responding to changes external to it, but retaining a specific logic of its own; that within it goods and services are pooled and redistributed; and that the division of tasks by gender within it is natural, with women being concerned essentially with reproductive activities (basically child care and cooking) and men with productive activities; and that relations within it are characterized by generosity and egalitarianism and the authority of a male head.

[2] Indeed, there are now abundant critiques that stress the limited applicability of this model even to Western society (Chinn 1988; Hareven 1982; Ross 1983; Roberts 1984; Grieco 1996; Whipp and Grieco 1989).

Taken in varying combinations these assumptions form a kind of generic concept of household common in much writing in "scientific" disciplines. . . . As Evans (1987) points out it is used as a basic unit in censuses and surveys, in the diagnoses of farming problems and the recommendation and extension of solutions, in the planning and targeting of nutrition and health interventions, and in the study of poverty, labor supply, migration and other demographic behavior. As such it is basic to development planning. . .on issues varying from housing, to education, to fringe benefits and taxation structures.

The assumption that the family/household is a combined unit of production, consumption and reproduction with corporate access to resources and a common dwelling unit, or indeed that it has any one of these as a universal characteristic, have been demonstrated to be empirically inaccurate, and most particularly in Africa. . . .

Iman (1988) gives a list of examples that indicate that, in Africa, "patterns of spousal separation or non co-resident marriage, the separation of male and female income and expenditure streams, and the division of lands into separate male and female lots" are common. Women have a major economic role, which has often been missed by the historical and contemporary recording of African agriculture. Although no systematic study has been undertaken in respect of the mapping of matrilineality onto the heightened economic role of women and the enhanced property rights of women across Africa, there does appear to be an association, at least for the Akan of Ghana, between these lineage arrangements (*abusua*) and relative spousal autonomy. The Akan figure among the examples given by Imam (1988):

Men and women in Mafia Island in Tanzania have individual and separate access to resources (land and coconut trees) and do not combine all their resources to produce, even if married to each other and residing in the same dwelling unit (Caplan 1981, 1984).

Among the Hausa in Northern Nigeria husbands' and wives' economic activities are so distinct that a woman may well pay her husband for groundnuts he has grown and sell him back the oil she has processed from them (which may then be consumed by themselves and their children). Furthermore each keeps separate accounts of their money to pay for their different responsibilities to the household so that it is not uncommon to find husbands and wives with quite different economic statuses (Bashir 1971; Longhurst 1982; Pittin 1985; M. G. Smith 1952, 1955).

Among societies tracing matrilineal descent in Ghana husbands and wives may live in separate dwellings with wives visiting their husbands (Fortes 1970; see also Guyer 1980; Yanagisako 1979).

The most scathing attack has been made on the assumption that the family/household necessarily involves pooling, sharing, generosity or egalitarianism between its members. . . . Among many peoples (like the Niger Hausa, the Kusasi in Northern Ghana, or the Mandika in the Gambia) where some plots of land are cultivated jointly, but individuals also cultivate individual plots, women (or junior men) are allocated (by their husbands or the senior man) plots inferior in both quality and quantity to the senior men's individual plots, and women also have lesser rights to mobilize the labor (especially if unremunerated) of others in the household (Dey 1981, Roberts 1984, Whitehead 1984).

The most recent work in the field (Cleaver and Schreiber 1994; Quisumbing et al. 1995; IFPRI/World Bank 1992; Grieco, Apt, and Turner 1996) continues to confirm that the structure of the African rural household is greatly at variance with the form and assumptions of the classic household model of national surveys. Indeed, there is no one form of African rural household but a great variety of different forms of rural household organization that relate to ethnicity, inheritance structures, matrilineality, and

lineage obligations, among many other dimensions. The range of forms and their relationship to agriculture has never been systematically charted, but the evidence that exists clearly indicates the simple Western template does not adequately capture the range and importance of the social arrangements around household maintenance and agricultural involvement in Africa.

The failure to appreciate local household organization and its implications for agriculture can lead to agricultural development schemes having damaging or disastrous effects on food security. Imam (1988) writes:

> Considering the household as managed through a common fund and assuming generosity and egalitarianism in distribution within it has also had deleterious consequences in development schemes. As Guyer points out in many parts of Africa income is not pooled but women and men have separate responsibilities for different factors in household maintenance. Quintessentially mothers are responsible for feeding their children beyond the provision of basic staple from fathers (and crucially in its absence or inadequate provision for whatever reason). Targeting projects at men has frequently meant that women have had lesser access to resources (particularly land and labor time) with which to fulfill these responsibilities than previously (Hanger and Moris 1973, Kandiyoti n.d).

However even where schemes have resulted in men getting higher cash incomes numerous studies have demonstrated that this does not necessarily translate into better (or even more adequate) nutrition and living standards for women and children—and sometimes higher cash incomes in men's control has meant poorer nutritional adequacy for other household members (Palmer 1977, Tripp 1978—cited in Whitehead 1986). Treating households as units in development policies thus ignores differential (and inegalitarian) relations of distribution within them—which has crucial impact on wives and children.

It has been suggested that where men provided food through food staples grown themselves there was not only physical evidence of the crops in granaries, but also the strength of ideologies about communal use to constrain individual appropriation. However the increase in cash cropping (a major objective in many agricultural development schemes) has meant both that it is difficult for wives to know how much their husbands have on which they can make a claim for household food and that there are less ideological constraints on men as to how to dispose of cash than there are on food crops (Dey 1981; Whitehead 1981 and 1986).

Assumptions about household structure have often led development agencies to target men as the recipients of agricultural development assistance, to the exclusion of women, either intentionally or simply as a consequence of the failure to recognize women's active agricultural role in Africa, as the following three examples show.

Iman (1988) gives an example from the Gambia of agricultural developments targeted on the wrong gender:

> Because of the premise that the household is a production unit managed and controlled by a male it is assumed that development projects need only target men. In the Gambia, for instance, irrigated rice projects were introduced to men which the government intended as a means of achieving food self-sufficiency. Not only was this aim not realized but the importation of rice has increased 250 percent. Dey's (1981) analysis of the projects demonstrated that the major reason for this (were) costly divisions in farming in which women and men cultivate different crops and women were the major rice cultivators, and, the gender allocations in household labor whereby women were not obliged to work for their husbands, and assumed instead the corporate model of the household. Consequently although women were excluded from clearing land for

irrigation and from access to credit and other inputs their skilled labor is crucial (particularly in transporting and weeding) and men have to pay for this. And although women are a cheap source of labor (having few other alternatives) frequently men cannot afford the cost of their labor inputs, especially in the rainy season when women can cultivate their independent rainfed crops (while men are cultivating theirs, usually groundnuts). Furthermore the technique of line transplanting and weeding introduced requires 5–10 people at once, which few men can afford in the rains. Since women have access to reciprocal working groups (whose cost is limited to providing a meal for the workers) if women had had access to land they could have expanded cultivation in these plots which now often lay idle.

In a second example, Iman (1988) describes how Africa's women farmers are stripped of their stake and demotivated:

Women generally have less access to resources (whether through inheritance, land clearing, purchase or state allocation, training or job opportunities) than do men. In very many areas of Africa women's access to land, for example, must be mediated through men, i.e., it depends on their being a wife/mother (with obvious consequences for nonmarried women—never married, widows, divorcees). But even as wives women have lesser access to resources of which they can control the products than do their husbands. Consequently women generally have more difficulty in making livelihoods for themselves and their children, and too often development projects tend to exacerbate this. In Tanzania, for example, the villagisation policy of the late 1960s allocated land to men as household heads (even where settlers came from matrilineal groups where women had independent property rights)—divorced women had to leave villages, or, start clearing new plots with no compensation for the labor already put into their ex-husbands' plots (see Brain 1976). A similar situation obtained in the Ilora farm settlement scheme in Nigeria in the early 60s (Spiro 1985), and the Zimbabwean government is also following the practice in its land reform policies even in the 1980s (Jacobs 1983).

Where projects have left women with higher workloads, fewer resources, and less control over the products of their labor there has frequently been resistance to them. In the Ilora, Mwean and Upper Volta settlement schemes there has been high turnover and marital instability (Hanger and Moris 1973; Conti 1979; Spiro 1985). Women have refused to give free labor to cash crops (Hanger and Moris 1973; Dey 1981). As Staudt notes: "While the question of an identifiable women's stake is often moot at economically marginal levels (among the landless and land poor both women and men must make every possible effort for survival), at other levels, an imbalance in stake will adversely affect family relations, productivity, initiative and incentive" (Staudt 1979:47).

The third example (World Bank 1996) shows how amplifying the power of males in the household is an unintended consequences of agricultural development projects:

Ignoring gender can lead to project failure. It can result in projects that are technically successful but that have negative effects on both women and children. IDA funded cotton projects in three francophone African countries (Burkina Faso, Côte d'Ivoire, and Togo) achieved their production objectives and farmers had benefited. But the impact evaluation showed the projects had affected women and children adversely, reinforced the power of male household heads and increased social and economic stratification. In households growing cotton, women's labor input increased, polygamy increased and some women became financially less self-sufficient.

Apart from the separation of male and female income and expenditure streams, which is found in many African communities, Africa has experienced substantial increases in the percentage of female-headed households (Iman 1988):

The insistence on seeing households as under the dominion of male heads for a long time also meant the nonrecognition of female-headed households, whether de facto (as in the case of absentee husbands who have migrated) or de jure (widows and divorcees). More recently in some regions of Africa (eastern and southern) a concern with

poverty has led to recognition of the fact that not only is the incidence of female-headed households increasing but that they are most likely to be extremely poor (Youssef and Hetler 1984). Nonetheless even where the existence of large numbers of poor female-headed households is admitted it continues to be treated as a special and anomalous phenomenon. This is because households are also viewed in isolation from each other without considering the relations and processes which cut across households, one of which is gendered access to productive resources, particularly land (see WIN 1985; Whitehead 1986). The relative poverty of women (and their children) vis-à-vis men, whether as wives in male-headed households or as household heads, can both be seen partly as effects of this.

Once again, after over a decade of awareness of the increasing incidence of rural female-headed households and the associated increasing feminization of agriculture in Africa (Cleaver and Schreiber 1994), the accurate recording of these phenomena still lags. At the heart of the failure to record this "missing data" is the social statisticians' reluctance to abandon traditional household survey tools and instruments: ". . . household data often underestimate the proportion of de facto female-headed households. The identification of female-headed households depends to a large extent on how surveys are designed and administered. Most households are traditionally described as male-headed but further questioning reveals that many male heads are very young, very old, or absent" (World Bank 1996, 18).

As the World Bank's agricultural toolkit,[3] currently under development, recognizes, the under-recording of women as heads of household results in their being under-recorded as farmers. Two key elements that are frequently left out of the discussion of the structure of the African rural family and that relate to de facto female-headed households are the link between rural and urban members of the same household and the resultant fluctuations in household size that occur in both locations as members migrate in both directions. Labor circulation is a long-established migratory practice in Africa (Grieco 1996); it is a practice that militates against the drawing of simple boundaries around either the urban or rural component of the household. Urban migrants directing remittances to rural households are not outside of the social membership of the rural household but within it (Grieco, Apt, and Turner 1996); rural dwellers who join their kin for short periods of employment in the city in order to obtain the cash income necessary for investment in the rural sector are not outside the urban household but are the social weave of its changing composition and fluctuating size. Drawing simple boundaries around rural households and communities results in an under-recording of the resources that they call upon in their investment in agriculture.

At present, substantial progress is being made on the development of agricultural toolkits designed to improve both sensitivity to and performance on gender issues in the agricultural sector. However, still neglected in these toolkits is the recognition of the need for detailed ethnographic studies of how household organization maps onto agricultural organization. Generating inventories of women's resources and constraints relative to men's does not of itself provide an understanding of how power and negotiating dynamics play out in any society at the household level, the

[3] A package of technical materials designed to guide an operational manager through key issues in a given technical area.

lineage level, or the community level. For gender-and-agriculture toolkits to be effective in Africa, all three of these levels must be addressed. As Iman (1988) observes, "The source of authority of the household head (or men generally) is not intrinsic to households but is located in wider structures." Thus agriculture toolkits must encompass the wider social structure of any specific location.

There is a need for a holistic understanding of the local agro-gender systems of Africa; it is time for economic anthropology and ethnography to be harnessed to the goal of Africa's agricultural growth.

Detailing the Relationship between Gender and Time

Clearly there are women farmers, and these women farmers are subject to different constraints and opportunities than are the men farmers of the same communities. But the precise character of these constraints and opportunities has to be detailed case by case and locality by locality. There is no one picture of the gendered cropping of the African community; there is no one picture of the exchange of time and other resources as between males and females either within the household, within the lineage, or within the community. The implication is that gender-and-agriculture toolkits can give guidance on the information to collect to understand the working of the local socio-agro system, but no toolkit can precisely specify what is appropriate.

Among the key issues that need to be considered in any assessment of women's access to resources is that of time. Women's time poverty is not simply an African phenomenon but is also a Western experience, as Iman (1988) notes: "Time budget studies show that women have far longer hours of labor and therefore less leisure than do men in their households in both the West and the Third World. Despite women's longer hours of work they receive much smaller incomes than do their husbands among the Yoruba in Nigeria and the Beti in Cameroon (Galetti, Baldwin, and Kina 1966; Guyer 1980) . . . husbands in Northern Nigeria far more frequently owned personal luxury items (like watches and radios) than did their wives (Abell 1982)."

But in Africa, women's time poverty has many elaborations and ramifications (Quisumbing et al. 1995). The customary use of women's time on men's fields without appropriate remuneration restricts the availability of women's labor on their own fields. The diversion of women's labor and time to men's fields is often associated with the recording of a higher level of male than female productivity in agriculture. Thus in time-allocation studies, it is not sufficient to investigate the amount of time women spend on agriculture as compared with men; it is also necessary to record on whose fields this time is spent.

Similarly, in Africa, women and girls frequently have the responsibility for water and fuel provisioning. These tasks impose not only a heavy physical burden on the females but also significant time burdens. Such time burdens reduce both the time available to women for working in their own fields and associated agro-processing activities, as well as their mobility to search for the information necessary to improve their productivity or to explore alternative and better markets for their produce.

Addressing the time poverty of women is critical to the success of agricultural development projects. Increasingly, there is a recognition that the reduced mobility of women, which is frequently an outcome of time constraints rather than the product of simple seclusionary customs, necessitates that extension services, including savings and credit, must come to the woman farmer—if Fatima cannot go to the mountain, then the mountain must come to Fatima. But this recognition has been slow to be made a practical reality. At the same time, solutions that are assumed to solve the time problems of African rural women but that do not necessarily do so, such as feeder roads, are being put in place at considerable expense. In Ghana, for example, there is no evidence that the construction of feeder roads reduces headload carrying by women—one of the initial justifications for the program. In the absence of the appropriate delivery of extension services, including credit to rural women, the existing mechanisms of combined credit provision and transport provided by middlewomen and middlemen militate against the development of an active rural transport market. In the absence of an active rural transport market, headloading persists and so does women's time burden. Measures designed to reduce the time burden of women and improve their agricultural productivity require appropriate evaluation—a project stage that is frequently not reached.

To be effective, agricultural development projects may have to address rural water supply and energy provision in order to release women's time for increased agricultural productivity.

Within the extension framework, selecting and marketing crops suited to women's time horizons is a key issue. Indeed, even the height of crops can be important. Mothers who have babies on their backs may prefer to work tall rice varieties rather than short (World Bank 1996). The time constraint of being both producer and mother is expressed through women's preference for the rice in Côte d'Ivoire. Similarly, improved agro-processing equipment and facilities become a critical component of designing agricultural projects that are sensitive to women's time constraints.

The evidence is that, historically, African women farmers frequently developed female work-sharing groups to help ease the time constraints they faced in the planting and harvesting seasons. Although, there is no systematic information on how extensive such groupings were, work-sharing arrangements between women are still to be found in Ethiopia, the Gambia, and other African locations. In documenting the relationship between gender and time, policy agencies should take care to identify and build upon these indigenous institutions when designing projects, and they should seek to avoid establishing individually based remuneration systems that destroy this important source of locally developed seasonal social capital.

The time spent by women is often under-rewarded, with the consequence their labor is frequently under-recorded and their productivity under-measured. The perception that women's household and economic productivity is low has repeatedly been proven to be mistaken (World Bank 1996). This perception of low productivity typically results from the under-recording of women's contribution to the household economy as a consequence of the classical household assumptions discussed earlier,

Yet, the inadequate remuneration received by the African woman farmer has undoubtedly had a negative impact on African agricultural growth: "The common descriptions of women's farming as 'helping' or 'gardening' despite evidence that they may actually spend a larger proportion of their time in on-field labor (not to mention crop processing and retailing) than on cooking and child care was documented in Adeyokunnu's study of three communities in Nigeria (1981)" (Imam 1988).

Resolving women farmers' time poverty and the other constraints they face is not simply a matter of equity, for African agriculture it is a matter of growth.

Documenting the Reality: Gender Disaggregated Data

There is an increasing consensus that Africa's women farmers have been badly served by the existing statistical tools and instruments. The initial disservice of the under-recording of their numbers and productivity has been compounded by a bombardment of agricultural development projects and programs that have amplified and accentuated the social and economic distance between men and women to the benefit of men. Such projects and programs have frequently eroded the customary agricultural property possessed by women and, through erroneous land-titling schemes, formalized and fortified these new disparities into obstacles to women's equitable and more productive participation in agriculture.

The goal must now be to recover and preserve those parts of the customary systems that benefit women's participation in agriculture, to rectify or dismantle the newly developed arrangements that disadvantage women, and to seek more creative and effective ways of serving Africa's women farmers.

As a first step, there is a need for more systematic charting of what was, what is, and what needs to be. The local variations in Africa render this a substantial task, but this task can be more easily accomplished in the present than was the case in the past. We come to workshops like this to talk to one another and to pass papers around, and this is important, but there is another medium that we should explore and develop—an African gender/agriculture home page located on the Internet. The Consultative Group on International Agricultural Research and the International Food Policy Research Institute already operate an electronic network[4] to link researchers working on gender and intra-household issues in the area of agriculture. Among others, however, there is a case to be made for a Africa-focused facility to guard against the distinctive patterns of Africa being once more subsumed in the overall global pattern. USAID is currently in the process of funding Internet development in 20 African countries. On Internet we can more accurately and interactively record the African agricultural reality with Africans sitting at the heart of this web able to confirm or reject the perceptions of the external world, which has so far robbed them of the progressive aspects

[4] In collaboration with the gender program of the Consultative Group on International Agricultural Research, the International Food Policy Research Institute has initiated an electronic network to link researchers working on gender and intra-household issues in the areas of agriculture, natural resource management, food security and nutrition. To subscribe to GENDER_CG, send a message to LISTSERV CGNET.COM with one text line: SUBSCRIBE GENDER-CG.

of their indigenous arrangements and preserved the erroneous perceptions of outsiders as a development truth.

At Beijing, the women of Africa requested improved access to the new world of communications. The data collected on Africa sits largely in the repositories of government statistical offices receiving little use. Frequently, it has not been designed to capture the gender and agriculture dimension. Interacting on the World Wide Web could help compensate for this sealed-away or missing data: interacting through new technology allows the ready integration of the piecemeal into systematic knowledge. And as new surveys are conducted on agriculture and Africa, the pressure from the policy community should be to place this on the web. Africa's agricultural structure would thus become more apparent to Africans, both farmers and policy makers.

On-line access to survey databases would permit readier gender disaggregation of existing data—currently there is something of a black market in African survey data—and agencies such as the UN Economic Commission for Africa and the African Economic Research Consortium have already expressed interest in such a notion. Beyond the gender disaggregation of existing databases—and many of these were poorly designed from a gender perspective and have a limited amount to give back—lies the issue of designing new gender-sensitive instruments. As I have suggested, although there is a gender awareness in the policy domain, the battle is far from won, and new surveys are coming on stream without even the most basic gender dimensions being incorporated. Placing draft survey designs on the web, or on some other on-line form, for comment would help to slice through the existing gender stubbornness and result in better quality and better informed survey designs.

On the ground, and in Africa in particular, we have to find more participatory ways of delivering project design and development. Often within agencies such as the World Bank, the term "participatory" is used without any specific attention to women being incorporated. Frequently women feature as a "vulnerable group" despite the weight of their demographic presence and the strength of their economic contribution. The collection of gender-disaggregated data should automatically contain a strong participatory dimension as should project evaluation. The conduct of participatory operations should automatically include a strong gender component. These seem simple and self-evident rules, but in the main they are badly violated.

The combination of the local focus and the Internet may seem juxtapositional to those hearing it for the first time, but new technology can enhance participation by providing direct feedback to the centers of funding power, and it can enable local communities to more readily understand the options that have been exercised elsewhere and are now available to them. The poor women of Bawku, Ghana, have gained themselves Internet visibility in their search for resources to help them combat the hungry season in conjunction with an American partner; the making of videos that can accurately portray the African experience in an African voice has assisted FAWE (Forum of African Women Educationalists) to obtain resources for girls' education in Africa; the showing of videos to African women where the experience of other

African female agricultural researchers and women farmers are portrayed helps African women envisage a reality beyond their own locality. In the absence of adequate numbers of female extension workers, amplifying the gender message through videos becomes an important tool in the T&V package.

In sending the message of the importance of collecting gender-disaggregated data, we should not close ourselves up too much in the old mold of mammoth national surveys that never see the light of interpretation or analysis but should rather focus on generating appropriate data for the purpose of well-designed agricultural development projects. For this purpose, participatory rapid appraisal may be even more useful than a national household survey. Identifying the necessary steps to be taken to ensure that women benefit in any particular locality may deliver more effective projects than a crude portrait of regional agricultural differences drawn from a national survey: "Evidence shows that women usually do not benefit automatically from agricultural development projects. Special steps to include women and overcome constraints to their participation are usually needed" (World Bank 1996, 11).

To leave the argument with the insights of Imam (1988) on the types of data required for an accurate understanding of the position of the rural woman, gender-disaggregated data are a starting point but not the end of the process. Without a holistic understanding of kinship systems, breaking agricultural reality down into male and female roles will still leave a piece of the jigsaw puzzle missing. Iman (1988) observes that gender-disaggregated data must be accompanied by a knowledge of local institutional forms:

> Attention must also be paid to methodology within research. It has to be recognized that investigations of such things as divisions of labor and household relations, which are bound up with ideological constructions, surveys of men/household heads (or even of women) are often inadequate but need to be linked with material from more open methodologies and anthropological techniques. Furthermore pre project research should be participatory to enhance accuracy, relevance and project utilization (see also Roberts 1979; Staudt 1979; Guyer 1986). A further point many of the critiques cited above make is the importance of building into policy making and projects continuous (participatory) evaluation and a degree of flexibility, in order to take account of initial oversights and/or changing conditions.
>
> While no single alternative framework has emerged to dominate the analysis of households there are some common themes and broad areas of agreement about factors that need to be integrated into analysis. There is a recognition of the variety of ways in which households may be organized. Intra-household relations therefore must be investigated: the divisions of labor (by gender, by age/family status) involved in production, maintenance, and reproduction; the control and allocation of labor, resources, and products of labor, the areas of separate or common responsibilities of different household members, and the resources available to each. Households, however, are not isolated units but part of broader processes and an analysis sensitive to gender and class needs to consider the inter-relations among households, and between households and other structures and processes, including kinship systems. . . .

The demand for studies of intra-household allocation of resources and time is developing within the donor community, but the large statistical survey teams remain reluctant. The argument against its routine inclusion as part of the poverty-monitoring system is that the exercise would be costly without providing any major alteration in the

recording of levels of poverty. The corresponding argument for its inclusion is the more powerful: without adequate knowledge of the interior workings of the household, project design will be faulty and project implementation fail (World Bank 1996). Though the argument is powerful, intra-household studies remain rare on the ground and outside of the poverty-monitoring apparatus of the World Bank.

Conclusion

The conclusions are simple but important.

- We need to know more about patterns of household organization and their impact on agriculture.
- The existing evidence needs to be integrated so as to provide an overview rather than a collection of case studies.
- There is a need to collect case study data so as to understand the social dynamics involved in gender-agro systems as well as survey data to establish the parameters of feminized agriculture in Africa.
- The significance of lineage systems, and their associated inheritance structures, for gender relations in agriculture should not be underestimated.
- Small-scale, participatory rapid appraisal can be useful as a tool for agricultural data collection: such data is more rapidly available for policy use than large-scale statistical sources.
- Undertaking interventions in the agricultural sector without due attention to gender can result in adverse outcomes for women and children.
- New technologies provide new mechanisms for gaining better overviews of the African agricultural scene and provide new points of intervention in survey and project design. They also provide new mechanisms for communicating and amplifying messages both in respect of donor agencies and of beneficiaries.
- Thought should be given to how an African gender/agriculture home page could be established and financed as a way of lessening the existing barriers to the full incorporation of gender into agricultural project design.

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Household Structure and Rural Food Security in Africa

Elizabeth Ardayfio-Schandorf

Changing Structure of the African Household

For some years, scholars have critiqued the concept of the household as a unit. Though the African concept of the household and family contrasts with that of the West, a cohesion is recognized to a large degree in the organization and structure of the African household. Households may be considered on the basis of arrangements people make either individually or in groups to provide themselves with food and other essentials for living. Studies have also shown that households are more than just people. They are settings in which membership roles vary, even for persons of similar age-sex status and kinship affiliations. These households are locations where the universal activities of production, social reproduction, consumption, sexual union, and socialization of children may or may not occur. The degree to which these activities are performed in the household varies cross-culturally and intra-culturally. Members of the household may be considered political actors with particular relations to the control of production. Thus three kinds of domestic groups may be distinguished: the dwelling unit, the reproductive unit, and the economic unit. In rural areas, most households constitute an economic unit with sexual division of labor to ensure economic and social sustenance of the household.

In many rural areas, the type of household to which a woman belongs and the nature of her economic resources, responsibilities, and rights within the household largely determine the characteristics of her economic activities. It has been shown that women are economically important members of their households, and they usually have multiple economic roles within them. Though they normally contribute to household agricultural production as unpaid family labor, they may also work independently.

In Ghana the proportion of women farmers has been increasing. In the intercensal period of 1970 and 1984, the number of women farmers increased by 102 percent as compared with 72 percent for men. As farmers, women may have separate access to land and other resources to farm or to engage in other income-earning activities. A balance between the amount of time a woman spends on this dependent work for other household members and the independent work for herself differs from one African society to another. Within this framework, the combination of dependent and independent work is guided by a complex set of rights that household members have in relation to assets and labor and also to income and subsistence. Joint resources and funds are not the rule among married couples in most societies in Africa.

Elizabeth Ardayfio-Schandorf is associate professor in geography and the national project coordinator of the Family and Development Programme of the University of Ghana.

In some ethnic groups in Northern Ghana, households were organized in a complex manner with co-residing married men, who might also be polygamous. Each household had a head, who supervised the work of the men and women who cultivated most of the subsistence crops. They also grew commercial crops as a source of income to meet other needs of the household. Alongside this arrangement, men and women might develop land for their own private farms. The produce from the latter belonged to the individual farmer. The disposal of the farm products was, however, mediated by sex differences in the responsibilities for family needs. Men were responsible for providing staples and women for providing "soup ingredients." The area of land cultivated by men was much larger than that of women. They were also in a position to use their income in a more varied and individualistic manner than their womenfolk.

This traditional picture is being transformed as a result of economic changes that have improved the production capacities of rural farming households. The transformation has also brought in its wake profound changes in the capacity for income generation and resource accumulation. Largely for these reasons, the inter-relationship between the various components of women's domestic and economic roles has been radically altered.

With modernization and urbanization, household organization and structure are changing throughout Africa. Naturally these changes vary from one region to another. Even though we do not have adequate data on rural households, many scholars agree that female-headed households are increasing. About 30 percent of women fall into this category, which has implications for improving agriculture.

Roles of Women and the Division of Labor in Households

Boserup (1970) described African women as farmers "par excellence." Her observation sparked debate on the role of women in agricultural production in sub-Saharan Africa. In spite of this debate and given the cultural and economic variety in the various regions of the continent, the role of women in agricultural production in Africa is generally acknowledged. Women contribute in their capacity as farm owners, farm partners, and farm laborers. They are involved in crop production to feed the family and also to generate cash.

There is a division of labor in the production of crops. In Ghana, for instance, men are responsible for the arduous work like initial land clearing and land preparation. Women are mainly responsible for planting, weeding, fertilizer application, harvesting, and transportation. In livestock production, they are more engaged in raising poultry and small ruminants for consumption and for sale. Food processing, preservation, and marketing, which are important aspects in agriculture, are mainly the responsibility of women.

Women's reproductive role in the household also has to be recognized. Rural women have higher fertility with more children than their urban counterparts. But in addition to their maternal role, women play an important role as housekeepers. They are responsible for the domestic chores and feeding, child care, and collecting water and fuel. They are also responsible for clothing the children and providing them with other essentials. This implies that women need more cash than

their farming activities can provide. They are thus compelled to engage in other occupations to earn more cash.

In spite of the important roles women play in agriculture and the household, their contributions have not been acknowledged for a number of reasons:

- the small size and fragmented nature of their farms
- the nature of their working tools and equipment
- the considerable distance of their farms from the village
- the numerous domestic chores the women have to perform
- the heavy time budget of women
- the land tenure system
- limited labor
- lack of education, information, and technical skills
- neglect and lack of interest among planners on the role of women
- societal attitudes, traditions, and customs in African society

These constraints can best be appreciated within the context of resource allocation within the household.

Household Resource Allocation

Among agricultural communities in sub-Saharan Africa, land is the most important productive resource. It is the major form of wealth and the main source of livelihood for the majority of people. Ownership of land also facilitates access to credit, membership in cooperatives, and access to new farm technology. Thus, control and ownership of land have significant implications for women's incomes, long-term security, and social status. Taking Ghana as an example, land belongs to the lineage, and traditional rules of land tenure entitle both men and women to occupy any unappropriated portion of communal land. In practice, however, the situation has not been particularly favorable for women. They are generally allocated smaller, less fertile, less accessible plots, which are less suitable for cash-crop production than are men's plots. In limited circumstances this may be different.

In most of Africa, a plural system of land tenure is maintained. Access to land may be through inheritance, marriage, sharecropping or renting, buying, or begging. It may also be acquired as a gift. Access to land also depends on the use to which it will be put. In patrilineal societies, women have access to land basically through marriage and for as long as the marriage lasts. Women tend to have better access to land in matrilineal societies, however. For example, in the northern region of Ghana where patrilineage prevails, only 2 percent of landholders are women, whereas in matrilineal Ashanti, 54 percent of landholders are women (World Bank 1991). Whether societies are matrilineal or not, women nationwide tend to have less access to land than men.

The advent of individual title to land, which has occurred in recent times, is ending the principle of inalienable lineage holdings. In Kenya, for instance, women had rights to lineage land before the colonial period. Women managed the land, and they farmed and controlled the distribution and use of crops they grew. Following European traditions of land ownership and title, land titles were nearly always registered to the male "head of household." All other claims to land, especially women's usufruct rights were consequently suppressed. In the 1970s it was estimated that only 4 to 5 percent of registered landholders in Kenya were

women. Now Kenya's women no longer have an independent claim to the land apart from their marital ties.

Women's Access to Labor

In agricultural production, men operate as compound and household heads. As such they have much greater access to household labor because they can more readily appropriate the labor of their wife and children. In addition, they have access to nonhousehold labor to increase the area they cultivate and to perform operations at the optimum time to maximize yields. Nonhousehold labor through community networks is also available to them. Because males generally earn more cash, they are able to recruit seasonal labor to assist them during the critical farming operations.

In contrast, women rely mainly on their own labor and that of their children. In certain cases, women have access to plowing and planting through varied nonmarket relations based on kinship, affinity, co-residence, and friendship, normally in an exchange of labor. Generally, households composed only of women and children are smaller and poorer than others with a mixed population.

Access to Technological Inputs and Extension Services

Despite women's central role in Africa's food production, there has been persistent underinvestment in increasing their productivity. Women's contributions to agriculture remain underacknowledged and undersupported. In most parts of Africa, the obsolete technology rural women still use makes their farm work labor extensive and time consuming. This limits their productive capacity and ability to cultivate large tracts of land.

Male farmers have greater contact with extension services than do female farmers. Unfortunately extension advice to one member of the family is usually not passed on to other people. In Zambia in 1986, for instance, extension personnel visited only 19 percent of the females as against 60 percent of the males. But in 1982, 29 percent of the females, as against 57 percent of the males, obtained extension services. So it can be seen that women's access to technology is declining, while men's is being enhanced. Given such differential access to technology, women's agricultural output will continue to be low. With low output, little income can be realized from whatever is marketed, and with little income women will have virtually nothing to plow back into their economic activity.

Effect on Food Security and Nutrition

Women, men, and children in the household have different time allocation patterns, constraints, and opportunities. A major factor that constrains women's contribution in the household is fuel scarcity. Without fuel, food cannot be prepared. In the Sahelian countries of West Africa, it is a common knowledge that food self-sufficiency is pointless if there is not enough fuel to cook the food. Women have the central responsibility for providing fuel and allocating children's labor to this and other tasks. In addition, their participation in fuel production is frequent and continuous and therefore has a constant impact on their daily activities, unlike the participation of men, which tends to be more concentrated and sporadic. Women's other activities like water collection are of key importance to meeting family basic needs and food production. Hence increases in their workload affects their ability to

undertake these other activities (Ardayfio-Schandorf 1986).

Time-budget studies among rural households demonstrate how different demands on time conflict with one another, how the labor allocation of family members is inter-related, and how women optimize their use of labor for survival in the household.

Changes that occur in women's work burden, therefore, affect food production and nutrition. It is believed that with agricultural modernization, cash-crop farming, loss of land rights with privatization, and male migration, women in some regions have suffered increases in workload and reductions in their economic and social status. This to a large measure brings about low levels of food production since women are the main producers of subsistence crops.

Apart from direct productive work, women spend about 6 hours daily on essential survival tasks, like water and fuel provisioning, cooking, and child care. When time spent on these activities is reduced, it has immediate impact on family nutrition and health, particularly that of children. In some instances, women may shorten breast feeding, leading to changes in weaning patterns with earlier weaning and bottle feeding.

Heavy time and work burdens also affect women's and children's health directly by reducing calorie availabilities. The calories used by a woman in relation to those expended will affect her own nutritional status directly and also the health of unborn or nursing babies. Overwork also affects the health of women, leading to malaria, physical debility, and other related ailments.

Among the many factors that affect nutrition, the most important are food supplies and incomes. However, increasing food supplies will not raise nutritional status of low-income groups, unless their incomes rise without a corresponding increase in food prices. In most households, additional income may not necessarily be spent on food, particularly if women do not control the increased income. In the intra-household distribution of food, men tend to have the best of the calories the household purchases. Women and children, who are the most vulnerable, eat last and least. Besides, nutrients consumed may be lost to disease and dehydration and also as a result of pregnancy and lactation.

Conclusion

Concrete attempts should be made to enhance understanding of the structure of the African rural households and the critical role women play in them. Women's productive, reproductive, and other social and political roles should be fully understood in the context of the changing African household and family.

Beyond this, the issue of agricultural intensification and household food security needs immediate and serious attention from policy makers and researchers. The state of African agriculture has suffered a great setback from governmental policies that are more geared toward export-oriented production to satisfy the international market. Equally, important is the need for food self-sufficiency in Africa. The time has therefore come to design policies to promote food self-sufficiency that is equitable, fair, and sustainable. This could be done by providing adequate and critical resources to farmers based on their actual technical needs

as farmers within the context of the household, bearing in mind the differential needs of men and women. Small-scale agricultural production is likely to be more sustainable if there are adequate and accurate statistics on women's work in the rural household economy.

In addition, more research is needed on household organization in Africa as a basis for developing an appropriate agricultural self-sufficiency policy for Africa. To do so, appropriate modes of statistics, disaggregated by sex, on rural farming households in Africa must be generated on systematic basis.

In the interim, women's access to critical resources like credit, land, labor, technology, education, information, and technical skills should also be improved. Women's productive enterprises need to be promoted to enable them to earn adequate cash to purchase food when necessary. This calls for labor-saving technology including alternative sources of energy to save women's time and reduce drudgery. Provision of safe potable water in rural areas will improve environmental sanitation and health of women, children and, indeed, the entire household.

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The Multiple Roles of Rural African Women: Some Implications for Agricultural Production, Family Nutrition and Survival, and Women's Well-being

Christine Oppong

Rural women in farms and households throughout Africa play undisputedly critical roles in the cycles of food production, food processing, and feeding families, as well as bearing, breastfeeding, and raising the next generation. Moreover in many countries, there is evidence that their responsibilities and tasks associated with both production and reproduction are increasing. As male labor migrants move to towns in search of incomes, more and more women, and their children, are left alone to shoulder the majority of agricultural and domestic tasks.

In view of the crucial roles they play and the constraints they face in reaching the productive and reproductive goals of adequate nutrition and child survival and development, women have often become unwarranted scapegoats for the failure of attempts to raise levels of agricultural production or to lower fertility and mortality. In fact they are frequently maintaining families of dependent infants and children, keeping them nourished and alive through continuous, backbreaking, unpaid subsistence work and precarious survival strategies. The latter are often undertaken in the most difficult and deprived circumstances—without benefit of effective access to fuel, water, sanitation, or improved tools and technologies and without energy sources other than their own stressed selves and child labor, which they themselves produce from their own bodies. As a result of increasing mobility, migration, and fragility of social bonds, growing numbers of rural women confront their numerous responsibilities without the support customarily forthcoming from their female kin and menfolk, including the fathers of their children.

This paper highlights the need for agricultural policy makers, at both the international and national levels, as well as planners and project personnel, including extension workers, to seriously consider, in their policies, plans, and project designs and implementation, the multiple roles of women and the responsibilities, tasks, expectations, and constraints associated with these multiple roles, for they profoundly affect the time and energy available to women for both productive and reproductive activities and their ability and readiness to engage in them. These roles also affect women's opportunities and access to resources of various kinds.

Yet there is evidence that key players in the agricultural field still refuse to accept the prime significance to farming and food production of women's multiple roles as mothers, wives, housewives, kin, and so on. Conversely there is evidence that health and population experts often pay insufficient

Christine Oppong is a consultant based in Accra.

attention to women's occupational roles, including farming, with detrimental effects on their attempts to understand and influence processes of change and resistance to change in the population, health, and development field. At the same time there is the fear that nutritionists, concerned with enhancing breastfeeding and food security in rural homes, may give misplaced precedence to information, education, and communication campaigns and strategies, omitting the programming and interventions required to address and relieve the time and energy constraints to adequate child feeding that are posed by women's harsh work schedules.

Problems, Concepts, and Biases

Among the main conceptual problems to be overcome in the design and execution of studies and technical assistance programs, in the formulation of policies, and in the development of teaching modules and training courses relevant to the needs of women farmers in Africa is that each discipline concerned, or its devotees and trainees, tend to adhere to their own carefully designated areas of expertise—crop science, nutrition, economics, demography, mass communications, etc.

Another problem is that, in spite of all the rhetoric, advocacy, awareness raising, and hectoring, as well as a multitude of studies of "gender issues" in agriculture and the dissemination of various frameworks for gender analysis, gender biases and blind spots still creep into the designs developed and work carried out. These blind spots include disregard of both sex (the biological differences of pregnancy, parturition, and lactation) and gender (the culturally prescribed roles of females and males in society), as well as lack of attention to the several different roles of women and men and how they are articulated. Often, for simplicity, a same-but-unequal model of female and male roles and statuses is adopted. In other words, people often think and act as if women and men farmers, or workers in general, are basically the same human beings, except that the former are discriminated against in several ways by "society," that is, they enjoy less access to credit, farm inputs, extension services, and training places. There is a tendency to ignore both the obvious biological differences of females and males—in particular their complementary and different parts played in reproduction and infant feeding—and their important socio-cultural differences in role expectations, obligations, and constraints, as spouses, parents, and so on. Such neglect is apparent even among those who have been loudest in calling for statistics disaggregated by "gender" (actually sex) and more equal treatment. Indeed a number of serious problems persist regarding concepts and the way most databases are collected, despite concerted efforts by statistical bodies to be more "gender sensitive" (e.g., Boateng 1994 on statistics in Ghana).

Such conceptual problems, and the lack of relevant information that would help us to better document and understand socio-economic processes, are particularly apparent when we simultaneously try to grasp dimensions of changes occurring in agricultural production and in human reproduction and child development in the family. A variety of data sets are available. These alert us to several problems regarding lowering of outputs, such as food and cash crops, or rising demographic and health problems, such as morbidity, malnutrition,

and mortality rates. But often there is little capacity to grasp how economic and demographic processes and systems are changing and interlinked, how or why gender issues are relevant, and how macro changes are linked to changes at the individual and household levels.

Such problems, which are often apparent in the databases, reflect the serious deficiencies in economic and demographic models and theory building. There are deep-seated flaws in current assumptions, which are embedded in pervasive economic thinking and theories that underpin much national policy formulation, international development planning advice, and local agricultural program design. The flaws concern assumptions about how individual farmers and workers will react to changes in wages, incomes, and prices, as well as about their primary motivation for economic activity (often assumed to be self-interest). The models tend to be based on suppositions about an acquisitive male individual in industrialized economies. Yet in Africa and other regions, a significant proportion of workers, particularly females, provide products, labor, and services as part of their family obligations, reciprocal household responsibilities, and mutual aid. Parental altruism is often a guiding force (as it is in industrial countries such as the United Kingdom when women chose part-time jobs without security, social security benefits, or pensions in order to be available to care for their children.)

In Africa employed wage and salary earners do not form a larger category than disabled workers (1 in 10). The majority of workers are subsistence workers (unpaid), family laborers, or self-employed in micro-enterprises using the labor of family members—children and others. Yet in pervasive current planning paradigms, activities that do not have a market price are assumed to have no economic value, while in fact most economic activity is actually unpaid, nonmarket subsistence labor, much of it in agriculture, on which the majority of people depend for their livelihoods.

Moreover neoclassical economic theory treats human beings as a nonproduced input like land. This again means that much of women's work—bearing and raising children, household activities to maintain and care for the family, and so forth—become invisible and are considered irrelevant with respect to how economies work. A number of feminist economic analysts have pointed out how this assumption is central to structural adjustment (e.g., Sparr 1994). Meanwhile, discounting women's heavy loads of reproductive activities, which are vital to human survival and development, policy makers, economic planners, and agricultural program managers have often assumed that women's time is of no value and that there is plenty of it available, which can be reallocated if needed to new tasks on farms and elsewhere such as in public works. In fact women's time and energy may be stretched to a breaking point as they try to accomplish all the tasks needed to maintain their dependent children. These tasks may not be considered part of the market economy, but they are necessary for family survival. What economists view as increased efficiency in the system may be simply a reallocation of an activity or a cost from the paid economy to the unpaid economy, to be undertaken by women.

Similarly blindness to social prescriptions and practices regarding male and female roles and to male-female power dynamics

can undermine the successfulness of agricultural programs and projects. For example, male power may result in innovations targeted at women ending up in the hands of men and boys. Nor can the domestic group be viewed as a harmonious unit with a set of common resources, interests, and goals. Conjugal resources are not necessarily or widely held in common in the African region, particularly in West Africa. Degrees of conjugal autonomy vary widely. Males and females have different spending patterns and targets with regard to child development, expenditure on sexual partners, and so forth. There is evidence that women are more likely to allocate a greater proportion of their incomes directly to their offspring than do males. A further factor confounding the functioning of planning models is that traditional norms and practices may severely restrict the types of economic activity that females or males may adopt. Strict sexual divisions of labor often die hard.

These critical and often ignored facts about gender roles have serious implications for planning, policies, and programs at both macro and micro levels. In the case of attempts to speed up the processes of transfer and adoption of new technologies, they underline the importance of such endeavors if women's energy stresses and time strains are to be alleviated.

Blindness of Macroeconomic Adjustment Policies

Adjustment of macro-level social and economic structures, or adaptation to change, can be viewed as a continuous process that has both unfavorable and favorable impacts and social costs, and the transitions involved in moving from one type of economic strategy or system to another are admittedly poorly understood by economists and others. An important macroeconomic element of the back-cloth to transformations taking place in agriculture in Africa is the impact of "adjustment" policies on crop production, crop producers, and availability of food. Syntheses of available evidence have called attention to patterns of deterioration in the nutritional status of pre-school children, which if not caused by adjustment policies, have certainly not been alleviated by them (Pinstrup-Anderson 1989).

In general, in past discussions of structural change and structural adjustment policies, there has been a "conceptual silence" and a failure to acknowledge that economic restructuring is occurring on a "gendered terrain" (Bakker 1994). However a fact now increasingly discussed and demonstrated is that gender—sexual divisions of labor and resources and responsibilities—is a highly significant factor in the adjustment of African economies, both in the influence of gender factors on the effectiveness of market reform policies and in the differential impacts of reforms on women and men (Palmer 1991). As Palmer has discussed at length, in no other region is making the distinction between women's and men's contributions to the family and national economies as important to successful policy formulation. Moreover just as economic transformations at the national level are likely to be linked to change or absence of change in demographic variables such as fertility or mortality, so at the household level the role of women (and men) in agriculture is closely linked to reproduction and motherhood: numbers and outcomes of pregnancies and child numbers, child survival, and ultimately child development. Given that the productive and reproductive roles of women interlock so

closely, it does not make sense for economic planners or agricultural policy makers to "ignore those roles that happen not to be commoditized" (Palmer 1991, 5).

Female and Male Roles

Complementarity, Cooperation, and Conflict

Numerous studies in the African region have documented in some ethnographic detail the ways in which women's and men's productive and reproductive roles have traditionally been interlinked and the ways in which the social and cultural roles of females and males differ, the ways in which they vary in different ethnic groups and regions and the ways in which they are complementary, and the ways in which cooperation is at a premium and the areas and issues over which conflicts are most likely to develop[5] (Oppong 1983). Many of these studies have been carried out among farmers and have described sexual divisions of labor and responsibilities. The data, however, often are relatively sparse and unsystematic, and women's and men's time use and energy expenditure in various roles cannot really be compared nor can values be imputed (Goldschmidt-Clermont 1987).

Female Life Cycles

Although the high fertility levels that drive the momentum of population growth are universally recognized in macro-demographic analyses and although teenage pregnancy—birth timing and spacing—appears by now on many family welfare and women's agendas, insufficient attention has been given to the ways in which the biological facts of high fertility and early and continuous childbearing affect women's lives as farmers, traders, and housewives (Ware 1983). Yet nearly 20 years ago, Harrington (1978) found a majority of mothers in several Nigerian samples had spent most of their lives either pregnant or breastfeeding. A quarter or more had spent 80 percent of their adult lives under this kind of physical stress.

On the social level, a variety of studies have indicated how, through cooperation over the life cycle, women manage to cope with the demands of such reproductive life histories and the amount of productive labor and agricultural outputs achieved. Grandmothers, aunts, and big sisters and brothers have been critical to the ability of mothers of infants and toddlers to remain fully engaged in economic activities of various kinds. Schooling has however has diminished the army of older siblings available for child care, and the importance of the grandmothers has scarcely begun to be documented.

Clearly, as scholars have stressed for a long time, the conceptual frameworks of women's and men's roles that underpin data collection and modeling of economic and demographic processes need to incorporate not only more flexible and realistic conceptualizations of women's time allocation in relation to productive and reproductive outcomes (e.g., Mueller 1982) but also of family systems and how they are changing (e.g., Oppong 1982) and of individual life and domestic group cycle effects (e.g., Epstein 1982).

[5] Note Fortes (1980, 363): "It must not be forgotten that there is no known society in which the interdependence and complementarity of the sexes is not embodied in custom and sanctioned by law and morality. To consider the status of either sex without reference to the other, is to distort the reality we are trying to understand."

The Seven Roles Framework for Data Collection and Analysis

A framework developed to make possible the deconstruction, analysis, and study of difference and change in women's roles in the contexts of local institutions and of the effects of migration, education, and employment among several ethnic groups in Ghana and elsewhere in West Africa provides us with a needed, useful tool (Oppong and Abu 1985). A monograph describing a field study of Ga and Dagomba women's roles in Tamale and Accra, in relation to family size and family planning, provides us with a detailed example of the kinds of use to which this framework can be put (Oppong and Abu 1987).

The framework uses role theory to provide modes of documenting, analyzing, and comparing various attributes of several roles. These include the parental, occupational, conjugal, domestic, kin, community, and individual roles played by women and men. Each has associated status attributes—material (pertaining to possession and control of resources), political (referring to ability to make decisions and control people), and social (in terms of prestige shown through admiration, deference, imitation, influence, and attraction). Each role has associated behaviors (including activities, time use, knowledge, material resources, wielding of power, decision making, and behavior in relations with others). Each role has associated expectations, including prescriptions (norms, rules, and laws), values (preferences and perceptions), assessments, descriptions, beliefs, and representations. Collecting information in these categories makes possible identification of needs and areas in which innovation and change are desired. It also facilitates documentation of role strain and role conflicts, which in turn calls attention to areas in which there may be individual or systemic breakdown or innovation in future. The framework also facilitates assessment of role salience, relative importance, and priority. Methods of data collection adopted in using the framework have included focused biographies from which comparative codable items have been extracted.

The approach demonstrably allows the emergence, development, and testing of new hypotheses regarding the functioning of systems of productive and reproductive roles. For example in the study of Ga and Dagomba mothers from Accra and Tamale, qualities of maternal consciousness and innovation in child rearing emerged. These were found to be statistically correlated with family-size preferences. Similarly aspects of role strain and conflict between occupational and domestic roles were observed to correlate with systematic contraceptive use, as did perceptions regarding availability of time for child care.

Such evidence show that this framework has great potential for assessing needs for labor-saving technologies on the farm as well as in the home and for assessing the effects of their introduction on increasing the time women have available to allocate to various purposes. It also has potential for guiding the collection of economic and demographic data sets, which would allow a clearer picture to emerge of the ways in which the two kinds of events and processes interact. Such efforts are required given the lacunae in the existing research findings.

Multiple Female Roles: What Do We Know?

A recent overview of evidence on women's roles in the African region(Oppong 1993) has highlighted several issues. The first is that there are important biases in the way information on female (and male) roles has been collected. These biases reflect inadequacies in the conceptual underpinning of the major survey instruments. Women's economic activities remain partly or wholly invisible because of the ways in which labor force surveys, censuses, and household surveys have been carried out (Goldschmidt-Clermont 1987). Also it is almost impossible to relate economic activities and domestic systems to demographic events. The main case in point is that although there is some information about women's childbearing on the one hand and their agricultural work on the other, little is known about the effects of women's productive and reproductive activities, preferences, and aspirations on each other.

With regard to childbearing, several facts are clear. Completed family sizes in Africa are among the largest in the world. Childbearing commences early and continues throughout the reproductive span, and at the same time women farmers are recognized to suffer severe unmet needs with regard to ability to plan the timing of births. Most national family planning programs in the region are unable to provide adequate services in the rural areas. With the breakdown of postpartum sexual taboos, this leaves intense breastfeeding as the only remaining inhibitor of conception soon after birth. Farming women do not simply have frequent births throughout the reproductive span from the age of 15 to 50 because they "value children" but because there is no effective alternative. Contraception is not generally available, nor is it accessible.

Nursing Babies and Work

Given the crucial importance of breastfeeding for both child survival and development and its implications for women's work, the two-way effects of breastfeeding—its intensity, duration, extent of supplementary feeding—and women's work have been surprisingly poorly studied. The demographic and health survey data collected for a number of countries in the region provide considerable information on breastfeeding behavior and infant-survival outcomes and nutrition status. However in general the related information on mother's work—its location, duration, and level of compatibility with breastfeeding and infant care—is so poor that there is still inadequate data for analysis on this topic.

A recent review of evidence (Robinson 1995) has summarized the problem. On the one hand, research that supports and accentuates the vital nature of breastfeeding for healthy human development is expanding. Accordingly studies focusing on child survival and development and women's health have highlighted it. On the other hand, studies focusing on women's work and their part in economic development tend to ignore breastfeeding and infant care.[6] Thus for many women farmers their

[6] For example Robinson (1995) cites Leslie and Paolisso (1989) on the first point and Greiner (1993) on the second point. The latter writes, "Already in 1752 there was concern in Sweden that burdensome work was preventing breastfeeding adequately." The question then arises why it has taken the rest of the world so long to even acknowledge that it is an important issue.

socioeconomic conditions are becoming worse, but the policy makers and program designers considering their plight are by and large taking into account neither the breastfeeding demands of their nursing infants nor the care of their preschool children.

For Africa, Robinson (1995) stated that it is imperative to carry out more studies of the work/breastfeeding relationship to make the situation apparent and indicate what actions need to be taken. The needs of rural women were particularly highlighted. The result of serious role conflict and stress for women farmers is that thousands of rural infants and toddlers die annually. Demographic and health surveys have shown the extent of such mortality rates and also of toddlers' malnutrition. For the mother and the rest of the household, truncation of breastfeeding may also be linked to badly spaced, frequent births, which drain the mother's health and deplete her economic resources. Breastfeeding provides a much-needed natural contraception. Yet poor women are likely to satisfy work demands first out of necessity and breastfeed when convenient or possible.

In some cases the incompatibility of work and breastfeeding of infants left in the house is being aggravated by the increasing distances between farm and home as population pressures build up and environmental degradation takes its toll. Assumptions that women farmers have no difficulties integrating work and breastfeeding are inaccurate or oversimplified at best. These women may face even greater difficulties because day-care facilities are seldom available (Robinson 1995).

So we need to ask, are there any agricultural surveys that document what proportion of female farmers are lactating at any one time and how they are coping with the multiple demands of their farms and infants? In view of the lack of information on farming and nursing, and how they affect each other, studies are needed that would be relevant to various types of policies and programs. They would need to include more detailed indicators of both types of behavior and the changes they undergo over time.[7] Some programs rely on educating women about breastfeeding benefits. Studies of constraints and choices that have to be made would demonstrate whether education alone is enough. Research could illuminate what sort of supports are most effective for nursing mothers who are farming, including the part, if any, played by the father of the child. Time use and activity data would have to be collected in different seasons, due to seasonal differences in labor demands and inputs (Oppong 1991).

Women's Roles and Adoption of New Technologies

Past experience and studies on rural women and adoption and use of appropriate technologies have indicated why it is vital to collect, analyze, and understand information about women and men's multiple roles (e.g., Whitehead 1985). Several country studies

[7] Information on breastfeeding should include exclusive or combined, initiation rates, duration of exclusive or partial breastfeeding, reasons for cessation, use of supplementary foods, and timing of their introduction. Work information needed would include type of activity, number of hours daily, weekly, monthly; hours of separation from infant; distance from workplace to residence; length of time not economically active after birth; availability of child care (on farm/at home), etc.

and multi-country syntheses have confirmed the need to take due account of the "social organization of work" (Ahmed 1985). This includes factors of location, particularly the simultaneous supervision and performance of child care, cooking, and food processing. This means that important areas for research identified have included not only time and duration of activities but also the types of cooperation and control, which occur between different family members, and the types of rewards and benefits enjoyed by different categories of participants—children, kin, spouses, community members, and so forth. Clearly ethnic variations in such arrangements need to be investigated in a multicultural contexts.

At the same time, important differences exist between situations in which agricultural transformations are moving toward creating a paid female (and male) agricultural labor force, or the withdrawal of women into work for household consumption, or the diversion of women to other types of income-earning activities such as trade and tourism. An important differentiating factor for women as well as men farmers will be access to and ownership of land and access to and control over new kinds of machines that reduce labor and energy needs. One issue that much research and debate has underlined is that studies of the impacts of technological change and adoption of new technologies cannot use a solidary household model as a unit for research, in view of the empirically established pervasiveness of sex-based intra-household differences in the allocations of resources, responsibilities, and decision-making power. At the same time anthropological studies in Africa have highlighted the need to take into account descent groups as owners, managers, producers, and allocators of resources, as well as systems of social security. All these facts support the contention that a multiple-role approach to the study of the needs and situations of women farmers with regard to new technologies is inevitable to gain understanding of processes of innovation and continuing lack of innovation and to design and implement plans, programs, and projects that enhance women's roles as farmers and mothers, further promoting levels of living of rural households and nation-states and further enhancing chances for sustainable human development in rural areas of Africa.

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Social and Legal Status of Women in Ghana: Special Implications for Female-Headed Households

Victoria Addy

Discrimination against women is an age-old phenomenon. Women have been marginalized socially and politically for centuries and have been socialized to accept the situation:

- The political assemblies of the very first Greek democracy in Athens admitted only male adults. Females had no citizenship and were classified with foreigners and slaves.
- Early Roman law barred women from holding public office or becoming bankers because it was believed that women were naturally unable to understand matters regarding public policy and money.
- Until the nineteenth century, English common law gave husbands the right to control their wives' property because wives were considered incapable of managing property, but a widow immediately gained control over her property when her husband died.

Many positive changes have occurred since then, predominantly in the area of legal rights, but much remains to be done before women will be on a level with their male counterparts in the social and public spheres of life.

Legal Rights Women Under the Constitution of 1992

All four constitutions promulgated in Ghana since independence in 1957 grant equal legal and constitutional rights to men and women. The 1992 Constitution is the most forward looking in regard to gender rights. It includes provisions on fundamental human rights and freedoms, education, economic and property rights, integration into the mainstream of public office, female reproductive rights and facilities for pre-school children, and control over traditional practices injurious to women.

Fundamental Human Rights and Freedoms

The 1992 Constitution affords the same fundamental human rights and freedoms to all Ghanaians male and female. These enshrined rights, contained in chapter 5 of the Constitution, provide for freedom of speech and expression; freedom of thought, religion, and conscience; and freedom of assembly, association, and movement. The provisions of this chapter also afford women protection of the right to life and personal liberty as well as protection from slavery and forced labor.

Education

In the area of education, Article 25 provides that all persons including women shall have the right to equal educational opportunities and practices. In addition, Article 27(3) specifically adds that women shall be guaranteed equal rights to training and promotion without impediment from any person.

Victoria Addy is vice-president of International Federation of Women Lawyers, Accra.

Economic and Property Rights

Article 24 safeguards the economic rights of all Ghanaians including women. Under this article, women have the legal and constitutional right to expect and demand equal pay for equal work done with men, and they have the same rights as men to work under satisfactory and safe conditions. Furthermore, under Article 18, every Ghanaian has the right to own and administer property either alone or in association with other persons. Specifically, and in the interest of women, Article 22 provides that spouses shall have equal access to property jointly acquired during marriage, and upon dissolution of the marriage, assets that have been jointly acquired must be shared equitably between the spouses.

Full Integration into the Mainstream of Public Office

Under the Directive Principles of State Policy contained in articles 35(6)b and 36(6), the state is enjoined to take appropriate measures to achieve reasonable regional and gender balance in recruitment and appointment to public offices and is also enjoined to take steps to ensure that women are fully integrated into the mainstream of the economic development of Ghana.

Female Reproductive Rights

Both the Constitution and the labor laws of Ghana recognize that women, who have the biological function of bearing and delivering children, require some modification in the labor laws to enable them to carry out this function effectively. Therefore, although the labor laws in the country provide equal conditions of employment and remuneration for both men and women, they nevertheless recognize the privilege of maternity leave for women. Article 29(1) provides that special care shall be accorded to mothers for a reasonable period before and after childbirth, and during those periods, working mothers shall be accorded paid leave.

Unfortunately, only 8 percent of Ghanaian women work in the formal sector and earn wages, and of this number, only 4 percent work in the public sector where provisions for maternity leave are enforced. Therefore the majority of Ghanaian women do not enjoy this legal provision.

Facilities for Pre-school Children

Article 27(2) of the Constitution provides for the establishment of facilities for the care of children below school age to enable women, who traditionally care for children, to realize their full potential. Although the effort of the 31st December Women's Organization in this regard is commendable, industrial concerns, banks, and businesses have not done enough and need to be encouraged to do more. The importance of this provision cannot be overemphasized. Some women have lost their jobs or businesses simply because they were compelled to stay home and take care of pre-school children in the absence of an alternative means of obtaining such care.

Control over Traditional Practices Injurious to Women

Article 26 gives women the legal right to say no to all the customary practices that enslave or dehumanize women or are injurious to physical and mental well-being. Included in these dreadful practices are female genital mutilation, child marriage, female religious bondage or *trokosi*, intestate inheritance, bride price, and widowhood rites. These practices and many others clearly discriminate against women and undermine their self confidence.

Other Laws and International Conventions on the Legal Rights of Women

Several other laws, such as the Intestate Succession Law, PNDC Law 111, as amended by PNDC Law 264, and the Matrimonial Causes Act 1971, Act 367, can operate in the interest of women.

Intestate Succession Law

Under customary law, little protection is afforded the widow and children of a deceased spouse. The widow and her children are usually driven out of the matrimonial house before the funeral rites are completed. In some areas in Ghana, the widow must consent to marrying, for example, a brother of the deceased husband to enable her obtain support from her deceased husband's estate. The Intestate Succession Law was promulgated in 1985 to rectify that anomalous situation. Its aims are (1) to provide a uniform system of inheritance in intestacy throughout the country, regardless of the type of marriage, the customary mode of succession, or the religion of the parties, and (2) to give the bulk of the deceased person's estate to the surviving spouse and children and a smaller share to the deceased spouse's extended family.

The Matrimonial Causes Act

The Matrimonial Causes Act regulates divorce and ancillary reliefs in marriages. Under this act, the courts are empowered, using natural justice, equity, and good conscience, to distribute properties belonging to spouses upon dissolution of the marriage. This requirement sounds fair, but in practice women find this task almost impossible to fulfill, especially if the widow is illiterate. A large proportion of women's contributions to marriage take the form of services to the family for which no receipts are demanded or kept. Article 22 of the Constitution provides for equitable distribution of property in such cases.

International Conventions and Instruments

Ghana has been a signatory to a number of international instruments aimed at eliminating discrimination against women in all its forms. The instruments include the African Charter on Human and People's Rights and the Convention on the Elimination of All Forms of Discrimination against Women. By ratifying these international instruments, Ghana accepts the obligation to adapt them and where necessary to introduce new legislation to translate the rights contained in those instruments into national rights for the women of Ghana. There are now concrete efforts being made to enact the requisite laws that will help bring out legal provisions affecting the status of women in line with the international conventions.

Social Status of Women

Despite all the legal provisions, the Ghanaian woman is identified with the home and the family and the Ghanaian man with public, political, and economic life. The majority of Ghanaian women are socialized to believe in earnest that their economic and physical security is tied men—husbands, fathers, uncles, sons, boyfriends, etc. In Ghana, women's social life to a large extent revolves around families, church, local communities, and the socialization of children. The girl child is brought up in Ghana to regard marriage and child rearing as the peak of female achievement. In contrast the boy child is socialized for public life.

Politics

Politics is associated with power and control, and the popular Ghanaian attitude is the women should not be seen to want and seek this power. As a result, women who could be active and effective in politics in Ghana shrink back and remain inactive because they fear loss of family support, ridicule, and slander from friends and the community. Women are torn between the private arena in the home and social, political, and public life. We often hear women in responsible public office asked how they reconcile their family life with their professional responsibilities. Men in Ghana are not "torn" and are not asked such questions. Social and professional success increase the prestige of the Ghanaian man in society while a women's success in life still has a great deal to do with the kind of marriage she contracts and the children she has.

In rural Ghana, women have lesser rights to land and labor. They have lesser rights even over the control of income from their own labor. Ministry of Agriculture data indicate the acquisition and ownership of agricultural land by women is lowest in the Northern and Upper regions—as low as 2 percent in some areas.

Marriage

Polygamy is lawful and is widely practiced. It is not only accepted, it is encouraged. Ghana lacks a uniform system of marriage. Since colonial times, through independence, and up to the present, Ghana has maintained three systems of marriage, two of which are potentially polygamous.

Statistics

When we look at some of the statistics on the political and public- and private-sector participation of women in Ghana, we find that women are underrepresented in several areas:

- Women constitute only 11 percent of the judiciary.
- Women constitute only 8 percent of total parliamentarians.
- Only 13 percent of administrators are women.
- Only 20 percent of enrollment in the universities are women.
- Only 6 percent of managing directors are women.

These statistics are the direct result of the low income status of women, their lower levels of literacy and formal education, their lack of skilled training, lack of access to productive resources, and the heavy, time-consuming family responsibilities placed on them, which leave them little time for self actualization.

In this scenario, men and women in the Ghanaian family have specific responsibilities and expectations. The man is regarded as the head of the family, the breadwinner, and the person who should make the important decisions affecting the lives of members of the household. The woman is expected to carry out the domestic chores, put food on the table, do the laundry, fetch water and firewood, take care of the husband and children, clean the house, and in general "manage" the resources provided by the husband no matter how inadequate and insufficient. In fact a great number of Ghanaian men do not know and do not want to know their budgets.

Conclusions

Although men are regarded as the heads of families in Ghana, a national study on the status of women in Ghana, carried out by the National Council on Women and

Development (NCWD) in collaboration with the Friedrich Ebert Foundation, found that the proportion of female-headed households in rural Ghana is increasing. In 1984, 40 percent of households in rural areas were female-headed. By 1995, 47 percent were female-headed, and the percentage in urban centers may be higher. This change means that more and more women are being required to take decisions that affect themselves, the maintenance and education of their children, the health and nutrition of the family, and resource acquisition and allocation with the household relative to the contribution that must come from the fathers living elsewhere. These functions are performed against the background of the social constraints on women. To improve the social status of women and to strengthen the family unit, a holistic approach is needed in which the activities of members of the family complement each other. Efforts must be made to

- put into place a legal framework to protect women's rights to land and their inheritance of productive assets, e.g., access to land through the cooperative system
- increase women's awareness of their legal and constitutional rights and the logistics available for enforcing those rights
- increase their knowledge of local government to enable them to participate in policy making
- make health care available and accessible, particularly female reproductive health care
- improve the level of formal education, with emphasis on the girl child
- increase women's access to improved technologies and labor-saving interventions for domestic chores to release time for productive work and at the same time ensure that development interventions, particularly those aimed at promoting agriculture do not lead to increased male control over female labor

It is now generally agreed that women need to empower themselves, and they need to tackle the matter of empowerment from several fronts simultaneously and in partnership with men. The problem of legal and political enfranchisement of women must be considered, so must education, reproductive health rights, access to credit, and rights to land and property, among others. Women need to network among themselves and to make use not only of the official policy-making bodies, but to take advantage of the several innovative approaches to women's empowerment developed by NGOs. It is also important that in our efforts to empower women, we make sure that our activities do not reinforce existing inequalities in gender relations.

Linking Women, Household Food Security, and Nutrition: A Conceptual Approach

Olivia Yambi

Although the pivotal role of women in household food security has been recognized (Quisumbing et al. 1995), programs focusing on increasing food production in areas where women play a key role do not always take into account the potential consequences on health and nutrition. Women's health and nutrition is central to the successful development of the community. Poor nutrition affects growth, health, learning ability, activity, work performance, and overall quality of life. In children, poor nutrition is associated with increased risk of morbidity and even death. It is now estimated that over half of all deaths in children under the age of 5 years are associated with malnutrition (Pelletier, Frongillo, and Habicht 1995).

There are many examples of successful approaches to reducing malnutrition, and several of these are from Africa (ACC/SCN 1996). The common features of successful programs include

- use of a clear conceptual framework, which facilitates assessment and analysis of causes and identification of priority actions
- strengthening the capacity of communities to assess and analyze their nutrition problems and undertake resource-relevant actions
- articulation of nutrition as a development concern, and adequately reflecting nutrition objectives in development programs of different sectors

The first part of this paper briefly discusses the rationale for investing in nutrition and why agricultural programs would benefit from including nutrition objectives. It also summarizes the provisions of the United Nations Convention on the Right of the Child and the Convention on the Elimination of All Forms of Discrimination Against Women that relate to nutrition. Following the structure of the conceptual framework, data is presented on outcomes of women's and children's nutrition, growth, and survival, followed by a discussion of the immediate and underlying causes influencing these outcomes. Finally, the role of women and the different opportunities that exist to ensure optimal nutrition outcomes is examined.

Investing in Nutrition

Economic Rationale

Why should agricultural production programs focus on nutrition? Nutrition is a measure of development. The primary reason for addressing malnutrition is ethical. Malnutrition in society is unacceptable because it violates individuals' right to adequate nutrition. There is also sound economic basis for investing in nutrition. The course and pace of economic development is governed by the quality of human resources, and that quality is itself determined by the health and nutritional status of the population. There is a large body of evidence (Martorell 1996) suggesting that poor

Olivia Yambi is chief of child development and nutrition in the UNICEF India Country Office, New Delhi.

nutrition during intrauterine life and early years leads to impaired behavioral development including

- delayed physical growth and motor development
- poor cognitive development with lower IQs—15 points or more in severely malnourished children
- greater degree of behavioral problems and deficient social skills at school age
- decreased attention, deficient learning, and lower educational achievement

Nutrition therefore contributes indirectly to economic development through improved cognitive achievement, which leads to increased labor productivity (Behrman 1992). That nutrition contributes significantly to economic growth and development directly through increased labor productivity should be of concern to agricultural programs. Economic losses due to reduced productivity are significant. On the basis of studies done in the Philippines, it has been estimated that a worldwide economic loss of US$8.7 billion occurs annually as a result of stunting (short stature) due to malnutrition. At the time of the estimate, this was equivalent to 25 percent of the health budgets of developing countries. In Bangladesh, reducing iron deficiency anemia, which affects productivity, would increase agricultural GDP by an estimated US$3.2 million over a 7-year period (USAID n.d.). Undoubtedly, preventing malnutrition would lead to higher benefits from education, reduced health costs, lower cost of social programs designed to alleviate malnutrition, and enhanced income opportunities in households due to time saved from the care of malnourished children.

Agricultural programs can contribute to better nutrition through improving availability of food at the household level and generating income to meet food and nonfood needs of the households. This will be possible if such programs pay attention to preventing the negative consequences on women's health and nutrition, partly by minimizing the energy and time demands of women, and if they create appropriate linkages with programs that promote care of women and improved access to health services.

Nutrition Rights

The health and well-being of children cannot be seen in isolation from that of women and mothers. Women have the right to education, to rest, to adequate food and health care, to special care during pregnancy and childbirth, and to resources. All these are essential for ensuring the nutritional well-being of women. Realizing these rights for women is part of any permanent solution to the problem of nutrition and are a mechanism for promoting social and economic development.

Following United Nations ratification of the Convention on the Rights of the Child (CRC), there has been considerable effort to articulate the right to food and the right to nutrition (Jonsson 1996; Kratch and Huq 1996). These rights are stipulated in various articles of the CRC. Article 24 relating to the right of the child to enjoy the highest standard of health contains elements of the conceptual framework for nutrition:

> Article 24.2. State Parties shall pursue full implementation of this right and in particular shall take appropriate measures . . .
>
> (c) to combat disease and malnutrition, including within the framework of primary health care, through inter alia the application of readily available technology and through the provision of adequate nutritious foods and clean drinking

water, taking into consideration the dangers of environmental pollution

(d) to ensure appropriate prenatal and postnatal care for mothers

(e) to ensure that all segments of society, in particular parents and children are informed, have access to education, and are supported in the use of basic knowledge of child health and nutrition, the advantages of breastfeeding, hygiene, and environmental sanitation. . . .

As discussed by Jonsson (1996), the CRC becomes a powerful instrument to protect nutrition rights if nutrition is conceptualized in a broader sense with food, health, and care as three necessary conditions for nutritional security. Each of these conditions are recognized as rights in the CRC.

Work toward realization of nutrition rights has been advanced following the adoption of nutrition goals in the World Declaration and Plan of Action endorsed at the World Summit for Children 1990 and the National Plans of Action for Nutrition following the International Conference on Nutrition held in Rome in 1992, which endorsed the world summit goals. In 1996 at the 23rd Session of the Administrative and Coordinating Committee/Sub-Committee on Nutrition (ACC/SCN) held in Ghana, 14 African countries presented case studies showing how programs could be appropriately implemented to bring about rapid improvements in nutrition. These case studies emphasized:

- community participation with nutrition as a core for integrated community development
- capacity building for nutrition including training of facilitators and mobilizers
- nutrition-friendly, macro-policy environment with partnerships between communities, governments, NGOs, private sector, and donors
- reaching an increasingly larger number of poor people through "scaling up" of successes, using a clearly defined set of process indicators
- advocacy and raising awareness on nutrition issues at all levels

Several articles of the Convention on the Elimination of All Forms of Discrimination against Women reflect the concern for the centrality of women's roles in household food security. Csete and Maxwell (1996) have identified the following articles that reflect measures relevant to household food security:

Article 13—Women's right to have the same access to loans and credit as men.

Article 14—The same access to extension services and formal and nonformal education.

Article 15—Equality of men and women with respect to administration of property, including land.

Programming within the rights-based strategy requires that good nutrition outcomes (goals) be achieved through a process that emphasizes poor peoples' participation and involvement, respect for gender balance, and aiming at equity. These are important considerations in the design of programs aimed at increasing agricultural production and promoting household food security. Some of the questions that need to be asked include: Who benefits from increasing production? Is it all women or certain groups of women? Do we understand social stratification in proposed program areas? Who accesses credit for agriculture? Who receives support through extension services?

Reduction of malnutrition is regarded as a "complex goal" because malnutrition is caused by a variety of factors operating at

different levels. Addressing the problem requires actions in different sectors and all levels of society—household, community, national, and international.

Nutrition Status of Women and Children in Africa

The rate of malnutrition (proportion of children under 5 years who are two standard deviations below the median weight-for-age of the international reference standard) for countries of Africa south of the Sahara was 31 percent in 1995, half the rate reported for South Asia (UNICEF 1996a). However, this may be the only region of the world where the situation is deteriorating. Malnutrition is projected to have increased from 29 percent in 1990 to 31 percent in 1995. Thus, approximately 32 million of sub-Saharan Africa's children are malnourished. Of the 38 countries in the world with recent data on nutrition trends, 9 countries show a rise in the prevalence of malnutrition, and 6 of these—Zimbabwe, Senegal, Malawi, Lesotho, Kenya, and Ethiopia—are in this region. Strategies to prevent malnutrition are known, and countries are investing resources in the name of nutrition with less than desirable results. Part of this is due to a lack of clear understanding of the nutrition problem among those responsible for the design of programs, resulting in inability to adequately catalyze and strengthen appropriate actions at household and community level.

The picture of child malnutrition is inseparable from that of the conditions of women and their position in society. For example, in sub-Saharan Africa, the maternal mortality rate (MMR) is 980; thus almost one of every 100 women die during childbirth. Only six countries of the region have MMRs less than 500, and 15 countries have MMRs over 1,000. There are 219,000 maternal deaths a year in sub-Saharan Africa. Micronutrient deficiencies are common, and anemia affects about 40 percent of women, posing increased risk of low birthweight and maternal deaths. Reflecting the health and nutrition of their mothers before and during pregnancy, one out of six children are born with low birthweight, which gives them a poor prognosis for survival and development during childhood.

Nutrition Outcomes and Their Causes

A conceptual framework for understanding the causes of malnutrition and the necessary linkages for attaining good nutrition is shown in figure 1.

Inadequate Dietary Intake and Disease or Infection

In figure 1, the main *outcomes* on which information has been presented above, i.e., nutrition status and poor survival (measured by mortality rates) are a manifestation of the problem and in and of themselves do not facilitate specific action. It is only when the potential causes of the problem are understood in a particular context that it becomes possible for relevant actions to be pursued. Malnutrition does not simply derive from a lack of food. Inadequate dietary intake and disease or infection are the immediate causes of malnutrition. Measures of dietary adequacy may include the degree to which energy and other nutrient requirements are met. There are standard procedures for assessing food intakes including 24-hour recalls, observations, and direct records. Simple measures, like the number of times a day a child is fed, present actionable information and can be easily collected. The total dietary intake is

dependent on frequency of feeding, the amount of food per meal, the energy and nutrient density of the food, and utilization of energy and nutrients in the body. Diarrheal diseases, measles, and acute respiratory infection are common diseases of children interacting with malnutrition. In several parts of Africa, malaria is also important in understanding the picture of malnutrition. Diseases and low dietary intake are synergistically linked in a vicious cycle (Tomkins and Watson 1989). For example, a child who is sick may eat less due to lack of appetite, in addition to losing nutrients. This is a time when energy demands due to fever are high. On the other hand if a child is not eating enough, his immune system will eventually be compromised, leading to more serious effects from disease. Dietary intake and disease or infection are the *immediate causes* of malnutrition. Improving dietary intake and preventing disease promotes good growth and survival.

The role of women is critical in protecting children from an environment likely to cause disease. Women usually initiate the first action in response to disease and take overall

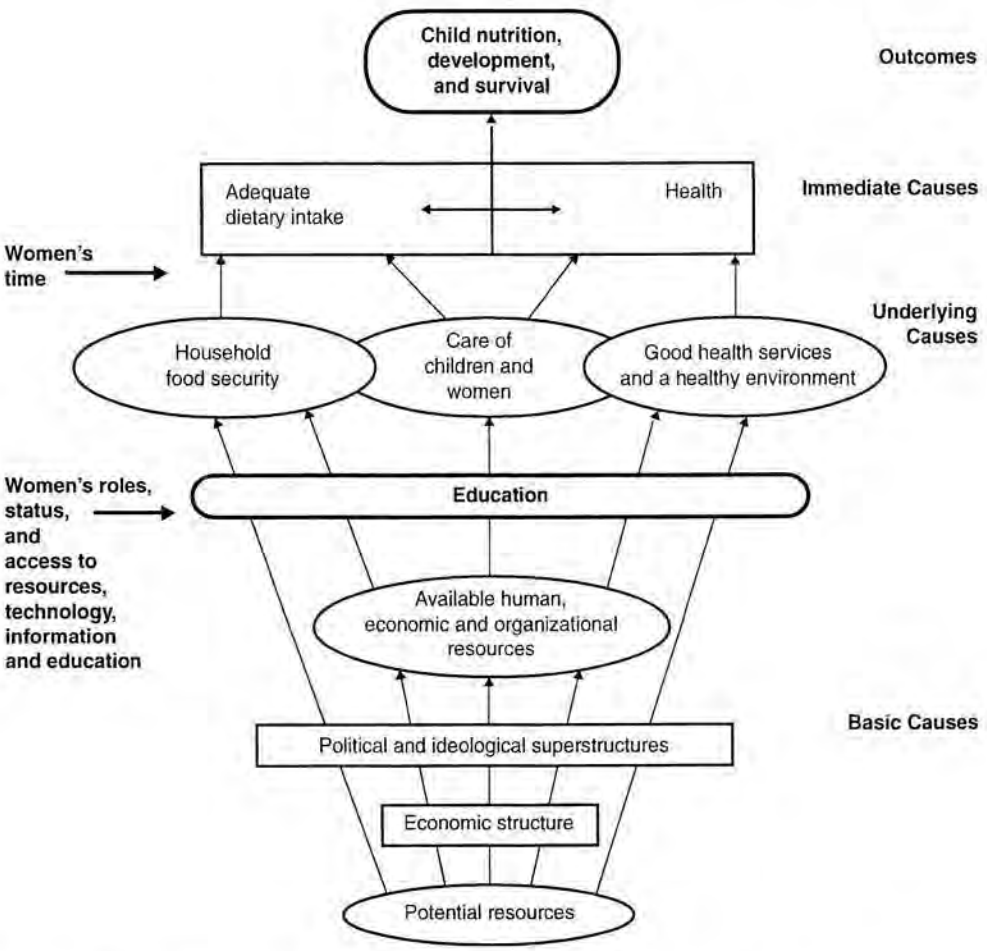

Fig. 1. Conceptual framework for linking women, household food security, and nutrition.

care of the child. Their knowledge about adequacy of diets relative to the needs of the child is an important factor in improving dietary intake. Women's own diets may be inadequate partly because cultural factors prevent them from deciding their own food intake. Kavishe, Ljungqvist, and Ballart (1987) reported that in southern Tanzania women's food intake during pregnancy was on average only 66 percent of the recommended intake. During this time women maintained normal levels of activity, especially in agriculture, with the consequence that weight gain during pregnancy averaged 6 kilograms, half the recommended gain. Low dietary intake, high energy expenditure, and morbidity during pregnancy explain this outcome.

Food, Health and Care: The Necessary Conditions

The three necessary conditions for nutritional security are

- access to food (household food security)
- access to basic heath services and a healthy environment
- care of children and women

The absence of any of these conditions contributes to malnutrition.

Household Food Security. The impressive increases in food production by many countries since the late 1960s have demonstrated that supply alone is not a sufficient response to malnutrition.

Nutrition programs in Africa and elsewhere have been faulted for their food bias, and even then without necessarily addressing all concerns about household food security. Gross availability of food in itself does not guarantee access to food by all, and those most likely to suffer from shortfalls are not always protected. Jonsson and Toole (1991) have drawn attention to the relationship between attainment of household food security and use of household resources. If households attain food security by having to use most of the resources available to meet their livelihood needs (table 1), they are at high risk of either losing their food security or compromising the satisfaction of other basic needs, i.e., households can have access to sufficient food but still be food-insecure in terms of risks or vulnerability.

Table 1. Relation of household resources to food insecurity.

Share of household resources used for food security	Household	
	Food-secure	Food-insecure
Small	Best off	Relatively easy to improve
Large	At risk	Worst off

Source: Adapted from Jonsson and Toole 1991.

Table 2 illustrates that gross food availability does not automatically translate into improved nutrition. With 1 percentage point difference in calorie availability, the rate of malnutrition (percentage of children under 5 moderately and severely underweight) in Zimbabwe is one-third that of Nigeria. Ghana and Nigeria have equal food availability but malnutrition in Ghana is lower than in Nigeria. Ethiopia is an example of a country with extremely high levels of malnutrition and among the lowest per capita calorie availability. Within-country differences also exist. In Tanzania, for example, information disaggregated at regional and district level shows no clear relationship between food production and child malnutrition and mortality. Areas regarded as grain baskets in the country also suffer from high levels of malnutrition.

Obviously, translation of food availability into household food security and nutrition outcomes is mediated through other factors including health and caring practices. In many countries food production is also the main source of income for meeting nonfood needs of the household, which also partly explains the lack of significant correlation between food production and nutrition status.

Table 2. Nutrition status of children under 5 and per capita calorie availability in 11 countries.

Country	Underweight[a] (%)	Calorie availability (% of requirement)
Zimbabwe	12	94
Lesotho	16	93
Senegal	20	98
Kenya	22	89
Zambia	25	87
Ghana	27	93
Malawi	27	88
Tanzania	29	95
Niger	36	95
Nigeria	36	93
Ethiopia	48	73

a\ Moderate and severe.
Source: UNICEF 1996b.

Women play a key role in ensuring household food security—through their role in food production and through both farm and nonfarm activities that bring in income for food purchases. If women are overburdened in the process of ensuring that the food needs of their families are met, there is an obvious risk that:

- They will not have the time to make use of health services for themselves.
- They will not get the necessary rest that they often require over periods of repeated pregnancies.
- They will not have the time to extend appropriate care for the young children.

Such conditions may increase the risk of malnutrition even in households where food is plentiful because very young children are dependent on being fed. Moreover the problem is not just about the object *food*, but the *process of feeding* so essential to the care of young children. Interventions that will lead to time and energy savings for women should therefore be an important consideration in agricultural programs. Sometimes introduction of simple technologies results in better sharing of workloads between men and women. For example, in Tanzania, I observed that the introduction of simple handcarts in the Iringa nutrition program resulted in greater participation of men in moving the crop harvest from the farm to the house where it is stored. When produce has to be carried on the head, it is invariably the women who do it. A study in Tanzania (Wandel 1995) shows a complex relationship between men's work and women's work. In households where men did not contribute anything to agricultural work, the women had a higher workload than in households where men did some work. However in households where men put in a substantial amount of labor in the field, women also had longer working days than women in households where men did some work. This has to be taken into account in the design of monitoring systems that look at time expenditure and workload sharing in the context of agricultural programs. Another implication that has to be considered is that adult women's workload often means that girls are withheld from schooling to care for siblings. The education of girls and women is an important determinant of nutrition outcomes.

Health Services and Healthy Environment. Access to health services plays an important role in both preventive and curative care.

Where services are far away, women may not be able to participate in antenatal care including immunization services for themselves and their children. Given the competing demands on their time, women can hardly afford the long hours of waiting at health facilities. Access to water sources has implications for the time and energy expenditure of women. Time released by improving access to water often means women have more time available for food-production activities, income generation, leisure, and self development. This has potential impact on health and nutrition of women and children. Studies have shown that women save up to 3 hours a day when water sources are provided close to their homes. Energy savings in the range of more than 300 kilocalories have been documented (UNICEF 1993), an amount that may equal the daily food supplements provided in feeding programs. Because many of these programs are faced with administrative constraints linked to food distribution, bringing water close to people's homes may often be a better nutrition intervention than distributing supplementary foods. Extensive reviews summarized by Burger and Esrey (1995) show that better water and sanitation is associated with reduction in diarrhea morbidity and improved nutrition status. Where provision of water is done in conjunction with hygiene education and improved sanitation, the impact on health and nutrition is likely to be high. A clean environment is necessary for breaking the cycle of disease transmission, to conserve energy, and to release time for other caring activities.

Care of Women and Children. Care has been one of the neglected and less well-defined areas in understanding the causes of malnutrition. Care for women and children refers to behaviors in the household that translate food security, health, and a healthy environment into a child's growth and development and the well-being of women. Important care behaviors mainly relating to care of children include

- *breastfeeding and complementary feeding*—including exclusive breastfeeding of a newborn child for its first 6 months
- *hygiene behavior*—like hand washing, which influences the risk of infection
- *health-seeking behavior*—including early diagnosis of illness and treatment and care for the sick child
- *psychosocial behavior*—including responsiveness, attention, affection, involvement, and overall emotional support

Care for women includes social support to relieve women of heavy workloads and competing demands on their time; postponement of age of marriage and first pregnancy; and health care.

The ability of women to provide care for their children is closely linked to time availability dictated by work demands outside the home, family demands, child demands, and other economic demands. Results of nutrition surveys done in Iringa region, Tanzania, during the preparatory phase of the Iringa Nutrition Programme showed relatively higher levels of malnutrition in the tea estate areas compared with the rest of the region (Ljungqvist 1981). Most women in this area worked in the estates picking tea and also cultivated their own food crop farms. They had access to both food from their farms and cash income from tea picking. An analysis of the causes of malnutrition in this area pointed to the lack of time to extend care to children, including

feeding, as a key constraint. In this as well as other areas of the region, shortage of food in the household was not the main reason for malnutrition. A key intervention that emerged was community-organized feeding of children while parents work in their own fields or hire out as agricultural labor. The food used was contributed by the households.

Women who return to work shortly after delivery due to economic necessity are unable to breastfeed exclusively, and their children may be exposed to infection with consequences for time and financial resources to treat and care for children during illness. Stress and anxiety related to fulfilling multiple roles in the household may also affect the quality of care and women's own health. The knowledge, including education, and beliefs of the mother affect her ability to provide care for the child.

There are several other influences on the care women give children. These include the age of marriage of the mother, frequency of pregnancies, decisions over the use of the mother's time, being allowed to transfer knowledge and information on appropriate practices like rest and diet during pregnancy into actual behavior, and the support structure the mother has in the household to relieve her of extra burdens. Addressing these concerns promotes better care for women. Figure 2 summarizes the linkages between food, health, care, and existing constraints and opportunities for intervention to improve the care of women, which is important for improving both the conditions and position of women in society. Both the condition and position of women

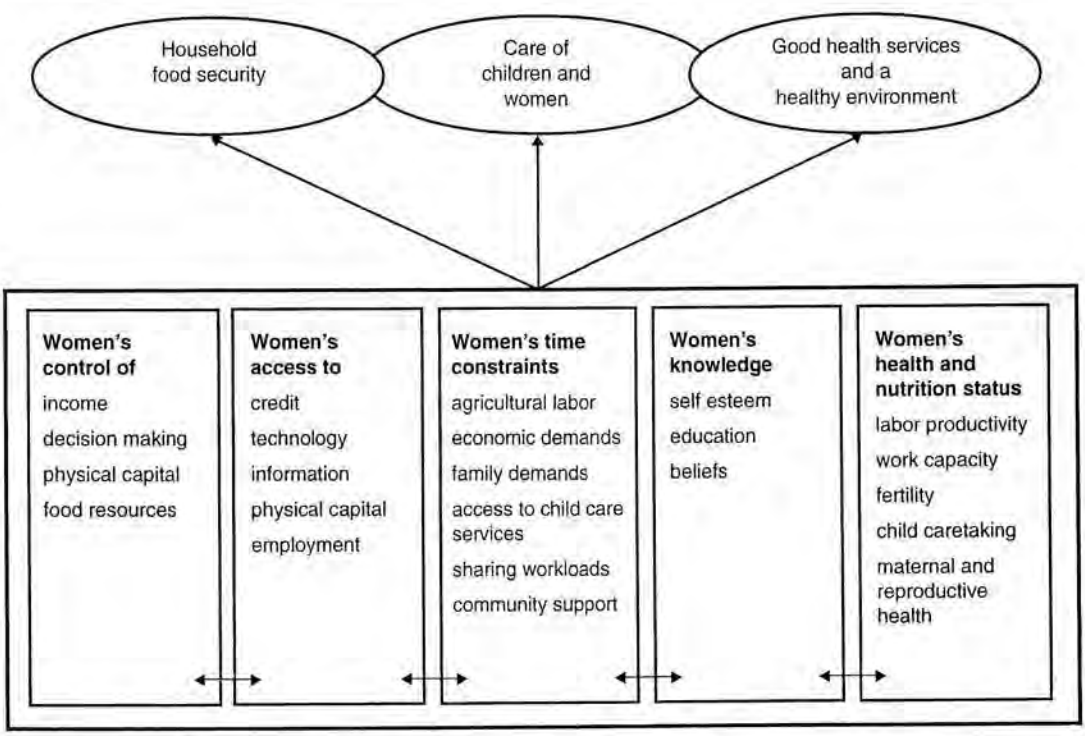

Fig. 2. Food, health, and care: Opportunities for enhancing nutrition outcomes.

are important in determining their role relative to food security and access to health services, which have been discussed above.

The three underlying causes of malnutrition discussed above are determined by a number of basic causes including human resources (people, their knowledge skills, and time), economic resources (assets, land, income), and organizational resources (formal and nonformal institutions, child care organizations, family support groups). Education plays a particularly important role in determining how resources are utilized to ensure food, health, and care for women and children. How these resources will be used is determined by the political and ideological superstructure.

Lessons of Experience

Two examples provide lessons for agricultural and household food security programs.—O. Y.

Badulla Integrated Rural Development Project

In 1990 I was part of a IFAD mission to Sri Lanka for pre-appraisal of phase II of the Badulla Integrated Rural Development Project. The project's main objective was to raise agricultural productivity and incomes. Phase I, which had run for 5 years, failed to show a demonstrable effect on nutrition, which had been assumed would be an automatic outcome of increased production and incomes.

Nutrition objectives had not been part of the Phase I design, and as such the communications component of the program did not focus on nutrition. Targeting criteria for loan beneficiaries were not always adhered to and income benefits did not necessarily accrue to the poor whose conditions the project was supposed to improve. Income increases were used to meet other needs of the households.

The appraisal mission recommended a strong nutrition component including building the capacity of communities to assess and analyze their nutrition problems. Nutrition objectives were included and indicators to assess changes in nutrition status have become part of the monitoring and evaluation of the program. IFAD has been promoting the inclusion of nutrition objectives in all agricultural programs it supports.

Orissa Household Food Security Project

In 1992 the government of Orissa (India) requested UNICEF to support a household food security project in drought-prone districts. These areas are largely characterized by a high degree of deprivation, exploitation by money lenders, and dependence on landlords. While the focus was on helping communities to set up grain banks to meet the immediate food needs of the people, the design of the project kept a multisectoral focus and had clear objectives for reducing malnutrition. Project components therefore included rejuvenation of defunct water sources, health and nutrition education, promotion of diarrhea disease management, and use of oral-rehydration salt.

Community mobilization has been a key thrust. Communities borrow from the grain banks according to norms set by the community, and decisions on who should receive grain loans are made by village committees. The project has been a success to the extent that the grain banks are functioning well and starvation has been averted.

A mid-term review of the project suggested however that the nutrition status of women and children had not yet improved significantly. Strengthening the training of community mobilizers to focus on behavioral change especially related to young child feeding and disease management has been identified as a priority. If the project did not include nutrition objectives, it could have been ticked off as having succeeded because of the functioning grain banks, but there is recognition that the job is far from done, and efforts will continue to ensure that nutrition objectives are met.

Operationalizing the Conceptual Framework and Sustaining Triple-A Processes

The conceptual framework described above emphasizes the multisectoral nature of the problem and the different levels of causation, and it helps to focus on the most important causes. In essence it helps identify what to look for and guides analysis. The use of this framework in decision making constitutes an important part of a strategy aimed at preventing and reducing malnutrition. Such an operationalization is done through an iterative process of problem *assessment, analysis,* and identification of potential *action*—the Triple-A process. In programs promoting people's empowerment, it is important that households and communities are themselves involved in the new Triple-A process. It should be recognized that such processes are already in place as individuals, families, and communities are trying to survive and achieve improved living conditions. An understanding of existing sources of information that guide nutrition-relevant actions at this level is important. The assessment of the nutrition situation can be carried out by the mother who assesses the growth of her child (in many countries this informal system has been replaced by growth monitoring and promotion activities through the health system). Assessment involves measuring the nature, extent, and severity of the nutrition problem. The decision to make an assessment requires awareness, which should be a part of the social mobilization component of programs. The assessment can also be done at community level where information is aggregated for all children or women.

Following an initial assessment of the problem, an analysis of the causes is undertaken. The conceptual framework serves as a guide for what causes to look for in a particular situation. A causal analysis has to be accompanied by an analysis of available resources to address the problem. Action is the next logical step on the basis of identified causes. Some of the problems may be amenable to action at household level, but there will be areas for which community-level action is necessary. Having that information helps communities to articulate demands for support from the next administrative level.

The impact of actions has to be re-assessed and the situation re-analyzed. This process requires an information system that constantly generates information on the nutrition situation and its causes such that subsequent actions become more focused. Jonsson (1993) recommended that to sustain the Triple-A process, the following conditions have to be fulfilled:

- Correct perception and understanding of the nature of the nutrition problem. This influences in particular the choice of what is assessed, how it is analyzed, and what actions are regarded as feasible.
- Effective demand for nutrition-related information and motivation to act. Decision makers need information for designing actions as well as for convincing others that actions are necessary and feasible.
- Capabilities to obtain information in assessment and to use information in analysis and design of actions.
- Resources for action—when there are inadequate human, economic, or organizational resources available to implement potential actions, resource mobilization is necessary.

Implications for Agricultural Intensification Programs

The conceptual approach and the process of its operationalization dictate a different way in which programs are designed and implemented. If indeed these programs intend to improve household food security and nutrition, then production cannot be an end in itself but rather a means toward realization of nutritional security.

First, those involved in the design of programs need to be informed of the nature of the nutrition problem in the program area. The conceptual framework is a good tool to promote such an understanding.

Second, programmers should understand the strengths and constraints of on-going processes related to household food security to enable them to select a combination of interventions directed at defined actors rather than blanket solutions for everyone everywhere.

Third, agricultural programs should play a role in promoting nutritional security, and thus they need to include nutrition objectives in the design of programs. Also changes in nutrition status of both women and children should be monitored, using some of the indicators shown in figure 3. This figure shows averages values of different indicators for sub-Saharan Africa, and it provides a guideline on how information can be structured according to the conceptual framework. Of the outcome indicators, at least the nutrition status of children under the age of 2 years (when malnutrition develops) should form part of the monitoring system. Weight-for-age data are normally available as part of the maternal and child health system in many African countries. Agricultural programs need not set up parallel information systems for each of the indicators, although scope should be provided for sample surveys for baselines and evaluations. Because agricultural programs should contribute to empowerment of communities, there is need for participatory methods of information generation and use at the community level. Monitoring systems should ensure community ownership of information.

Fourth, to protect the health and nutrition of women, it is important to monitor changes in work patterns, resource allocation, and household responsibilities. Particular attention should be given to ensuring that programs enhance the position of women in their households and communities. Where men's labor potential is underutilized and at the same time women are overworked, programs ought to monitor the differential use of time by men and women.

Finally, given the multisectoral nature of the nutrition problem and the need to create an environment of support between the community and front-line extension workers of different sectors, programs should promote joint orientation to understand the nutrition problem in communities where programs are implemented. Training toward effective teamwork should be encouraged as well as correct presentation of the nutrition problem in information, education, and communication activities.

Fig. 3. Framework of maternal and child nutrition in sub-Saharan Africa (values shown are averages for Africa).

OUTCOMES

Maternal nutrition		Young child nutrition	
% height < 150 cm	n.a.	% low birth weight	16
% chronic energy deficiency (BMI[a] < 20)	n.a.	% underweight	31
% anemia	n.a.	% stunted	41
		% wasted	7
		Infant mortality (no./1000)	107
		Under 5 mortality (no./1000)	177

IMMEDIATE CAUSES

Dietary intake		Diseases
% meal frequency <3	n.a.	diarrhea
% < 80% requirements	n.a.	measles
		acute respiratory infection
		malaria

UNDERLYING CAUSES

Household food security		Care		Access to services	
Calorie supply (% of requirement)	93	Mean age marriage	n.a.	% safe water	45
% below poverty line (rural)	62	Female literacy (%)	42	% sanitation	56
		Rest during pregnancy (h/day)	n.a.	% health services	57
		Extra food during pregnancy	n.a.	% measles immunization	51
		Immunized tetanus toxoid (%)	35		
		Attended birth (%)	38		
		Fertility rate (no.)	6.2		
		Exclusive breastfeeding (%)	26		
		Complementary feeding (%)	64		

BASIC CAUSES

Financial resources		Human resources	
Health expenditure (% of govt. budget)	4	Trained health workers (no.)	n.a.
Education expenditure (% of govt. budget)	12	Trained female extension workers (no.)	n.a.
		Empowered women's groups (no.)	n.a.

Source: Data from UNICEF 1996b.
a/ Body mass Index
n.a. = not available.

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Targeting Women Farmers to Increase Food Production in Africa

Christina H. Gladwin

An understanding of the African rural household is a necessary condition for an understanding of African farming systems and the design of new appropriate technology for African farmers, the majority of whom are women, as well as the design of extension programs capable of reaching this majority. In Africa, there are just too many women farming to ignore their role as producers of food and provisioners of the rural household (Boserup 1970; Dixon 1982; Goheen 1991, 1996) because African women provide an average of 46 percent of the labor inputs and produce up to 80 percent of domestic food production in some societies (Gladwin and McMillan 1989). In addition, the African rural household is too different to treat it as if it were a typical Western nuclear family that maximizes a jointly held, single-utility function (Cloud 1983; Folbre 1988).

The special features of the African rural household must be acknowledged and understood before successful research and extension programs can be designed to their benefit. Here I focus on three. First, the African household is an *extended rather than nuclear family with individual production and consumption units embedded within it.* These units tend to be semi-autonomous and are often headed by women such as the wife or wives (in polygamous societies) of the household head or his daughters-in-law or sisters-in-law (in societies with substantial male out-migration of adult sons or younger brothers who would normally live in the same rural compound with the household head). Autonomy of the unit comes from two sources. First, the woman in each unit has some responsibilities independent of the household head to feed, clothe, or educate the children in her unit. Depending on the cultural rules, she may be responsible for certain foods or all the food during a certain period, e.g., the hunger months. Second, she fulfills this responsibility with an income stream she generates independently of the household head and her husband.

These *separate income streams* are the second unique feature of the African household and have been well documented in the literature, e.g., Mossi women who own private fields in Burkina Faso (Gladwin and McMillan 1989), husbands and wives who lend each other money at rates slightly less than the prevailing market rate, the payment of wages inside households, wives who sell water to husbands in the fields, husbands who sell firewood to wives, and both who sell animals to each other on festive occasions (Koenig 1980). In each of these exchanges, the best interests of the household may not coincide with those of particular members, so that it makes more sense to model the household as a collective firm—rather than a unitary entity—in which a wife's budget is delinked from her husband's, and wives respond to

Christina H. Gladwin is a professor in the Department of Food and Resource Economics, University of Florida.

changes in their husbands' allocation decisions solely according to their own needs (Alderman et al. 1995; Jones 1983).

Usually, separate income streams give some autonomy to the women in the household; but they do not necessarily give power to the women heading the unit. Women are relatively powerless compared with the household head, e.g., Mossi women with private fields must also supply labor upon demand to cooperative fields managed by the household head. These *asymmetric power relationships* within the African household are its third special feature we must understand before designing successful rural development programs. A lack of such understanding in the past meant that Western development projects usually failed to include women and had the effect of decreasing their autonomy, production, and incomes, and worsening their quality of life (Tinker 1976; Gladwin and McMillan 1989). Study after study has revealed that men rather than women were given access to the basic yield-increasing inputs (land, labor, capital or credit, fertilizer or manure, high-yielding seeds, extension training), plus access to education, the market, and the political arena (Bukh 1979; Due 1991; Due and Summary 1982; Elabor-Idemudia 1991; Elson 1989; Gladwin, Staudt, and McMillan 1986; Goheen 1991; Guyer 1991; Quisumbing forthcoming; Saito 1994; Staudt 1975). This is because who gets access to productive inputs is a political question—the result of a power negotiation—and not just an economic question (Bates 1983); and in a power negotiation, women in asymmetric power relationships lose out to men with greater power, status, and prestige.

Goals of Sasakawa-Global 2000

We should keep these features of the African household in mind while we examine the questions of why and how to improve women farmers' access to production-raising inputs such as land, labor, credit, new technology, organic and inorganic fertilizer, and training. To answer the why question, I articulate the overall goals of Sasakawa-Global 2000, both the more-abstract *higher-ordered goals* and the more-concrete *instrumental goals*, which generate the strategies and norms that guide the program on a day-to-day basis.[8] Because the higher-ordered, more abstract goals generate the lower-ordered instrumental goals, I start with them. I assume they are:

> *Goal 1. Improve food security in sub-Saharan Africa in a sustainable way, and soon.*
> *Goal 2. Alleviate poverty and improve the standard of living in rural areas.*

The first goal is taken from the words of Norman Borlaug, president of the Sasakawa Africa Association, who says *there's a new sense of urgency* about achieving food security for sub-Saharan Africa. The evidence to support his claim is overwhelming. Africa currently imports a large share of its food grains, e.g., one-third of its rice consumption and two-thirds of its wheat consumption (Eicher 1995). Whether it can continue to do so is questionable. Within the past year, world prices of major food commodities have skyrocketed. In 1995–96, due to a fall in the world's stock of rice, wheat, maize, and other grains to their lowest levels in 20 years, the world price of maize jumped from US$89/t to over $145/t, and wheat prices jumped from $128/t to over $225/t. Because Africa's population will increase by 100 million over

[8] This discussion relies on the work of the cognitive psychologists Schank and Abelson (1977).

the next 6 to 7 years, there is intense pressure to increase food supplies from domestic production (Eicher 1995, 805). Yet after 10 years of structural adjustment programs that removed fertilizer subsidies, prices are now so high that fertilizer use on food crops is unaffordable in many African countries.[9] When one adds in other factors affecting the world's supply of food—such as the increasing environmental degradation of soils and other natural resources (Sanchez et al. 1996), climatic change, the loss of cropland to nonfarm uses, falling water tables in major food-producing regions, the depletion of 17 major oceanic fisheries, and the loss of labor productivity due to AIDS—experts like Brown (1995) claim that food abundance is a thing of the past and the politics of food scarcity is here to stay. He is not alone. *Business Week*, May 20, 1996, reports that "both haves and have-nots are in for a shock because global demand outpaces supply." The ability of Africa to realize anything remotely describable as food security is increasingly called into question by respected Africanists such as Eicher (1995, 805): "Sub-Saharan Africa is staggering under the weight of its horrendous failure in food and agriculture, the sector that employs two out of every three people on the continent. After 35 years of independence, the region faces a growing food production gap. . . ."

Is it wishful thinking to talk about increasing food production in Africa? Sasakawa-Global 2000 says, no. To back up their claims, SG 2000 employs instrumental goals that guide the program by generating both strategies and norms to be followed by program participants. The most accepted of its instrumental goals is:

> *Goal 3. Promote growth in African agriculture through technology-transfer programs based on the diffusion of modern yield-increasing inputs of production that are well known: high-yielding varieties of seeds, fertilizer, pesticides, and improved farming practices.*

This goal assumes, as Borlaug clearly states, that the technology is there. But is it? I agree, it was there in the 1970s and early 1980s for men farmers, before fertilizer subsidies were removed under structural adjustment programs in the 1980s and prices of fertilizer skyrocketed. But now, in Malawi for example, even though maize prices were deregulated and allowed to double in 1995, it is doubtful that fertilizer use on maize is profitable at current relative prices (A. Thomson, personal communication).

For women farmers, it is questionable whether the technology was ever "there." Due to a lack of cash, capital, or credit, African women farmers in the 1980s used little or no fertilizer on fertilizer-responsive crops like maize, beans, millet, or sorghum; and those women who grew cash crops grew only those that required little or no fertilizer (e.g., groundnuts, certain vegetables). Most women were purely subsistence farmers and had low yields—lower even than the men growing the same crop in the same region and often in the same household. For these women, the green revolution technology was unattainable because it required "either higher prices, unavailable inputs, additional knowledge, lumpy capital, a nonexistent marketing system, or some other requirement beyond farmers' means" (Herdt 1988, 20). But as Eicher (1995, 807) wisely points out, rather than debating whether the technology is on the shelf or in the pipeline

[9] Kelly et al. (1995) report this for maize, millet, sorghum in Senegal, while Anne Thomson (personal communication) reports the same for maize in Malawi in 1996.

in Africa, the more relevant question is, what is the mix of policies and institutional support needed to promote widespread adoption today?

I argue that SG 2000 should clearly articulate one such policy and claim as an important instrumental goal:

> *Goal 4. Improve African women farmers' access to the basic inputs of production they need to increase their yields, and include them in the process of technology transfer.*

Women come into the picture because they produce most of the food in most African countries. To enhance African food security, we must address the issue of women's lack of access to productive inputs and new technology. Because women farmers are essential for increasing Africa's food production, at least in the short run,[10] and because of the large numbers of women farmers, this goal should be clearly articulated by the SG 2000 program. SG 2000's higher-ordered goals to improve food security in Africa will not be accomplished until the instrumental goal of including African women in the process of technology transfer is accepted.

Are Women Farmers as Productive as Men Farmers?

Why have women not been included in the past? Why has women's access to productive inputs been blocked? One rationale often given is that men farmers are more productive than women. It is true that the raw, unanalyzed data show that female-headed households have less labor and smaller crop areas planted, have less access to credit, and plant more subsistence crops than male-headed households (Due 1991; Due and Gladwin 1991).[11] Female-headed households are therefore not as productive as male-headed households. An analysis of productive efficiencies, however, requires the proper estimation of a production function that controls for explanatory variables other than gender, such as land, labor, capital, extension advice, and education (Alderman et al. 1995; Bindlish and Evenson 1993; Quisumbing forthcoming). If that is done, most studies show that men and women are equally efficient farm managers (Bindlish

[10] In previous papers, I have argued that in the long run, African women farmers may be displaced from farming by men—just as black farmers in the southeastern United States were displaced by white farmers from the 1950s to 1970s (Gladwin and McMillan 1989; Gladwin 1996). The reasons are threefold. First, intensification of agricultural production causes women's participation in farming to decrease relative to men's (Boserup 1970). Female farming systems were prevalent in African societies with shifting cultivation, but decline with intensification and are replaced by male farming systems as the plow is introduced (Boserup 1970, 16-36). Female farming systems only predominate in societies with low population densities and an ample land/person ratio, such that families can produce their food with small inputs of labor and no fertilization but a fallow system. Second, women farmers have already been replaced in many parts of rural Africa because development planners failed to recognize women as semi-autonomous production/consumption units within the larger extended family household. Despite all the hoopla about WID, development planning has failed and still fails to include women. Third, women still lack access to basic agricultural inputs, capital, the market, and the political arena.

[11] In Africa, women are the de facto or de jure heads of 25 percent to 35 percent of rural and urban households. A de facto female-headed household is one in which the husband is away for long periods, making it necessary for the wife to do the agricultural decision making and support the family, although there may be remittances coming from the husband. A de jure female-headed household is one in which the head is divorced, widowed, or a single parent and must make all decisions and support the family.

and Evenson 1993; Moock 1976; Saito 1994).[12] When the other explanatory variables are held constant while an independent gender variable is allowed to vary in a multiple regression analysis, researchers usually find that the independent gender variable, expressed either as a dummy variable or intercept shifter, is insignificant (Quisumbing forthcoming). This means that gender differences per se do not explain the productivity differences. Rather, gender disparities and women's lack of access to the basic yield-increasing inputs of production result in their lower yields. Quisumbing (forthcoming) concludes that the policy solution in this case is to give women greater access to yield-increasing inputs and that addressing gender disparities in input use could be an untapped source of productivity gains for the country as a whole.

Recent studies by Udry (1994) and Alderman et al. (1995) reinforce these conclusions. They compare the productivity on plots controlled by men with that of plots controlled by women (including both women household heads and married women) and find that the yield differences reflect differences in the intensity with which inputs are applied. They show that plots controlled by women receive much less male labor per hectare, as well as much smaller labor inputs by children and unpaid exchange labor. More female labor is devoted to women's plots than to men's plots, but the difference is not significant. Much more fertilizer—in fact, virtually all—is concentrated on plots controlled by men. When Alderman et al. (1995) included these explanatory variables in the production function, the coefficient on gender became insignificant except in sorghum production. What this means is that "the gender yield differential is caused by the difference in the intensity with which measured inputs of labor, manure, and fertilizer are applied on plots controlled by men and women rather than by differences in the efficiency with which these inputs are used" by men and women (Alderman et al. 1995, 22). They conclude that household output could be increased 10 to 20 percent by reallocating the inputs (e.g., moving some fertilizer) from plots controlled by men to plots controlled by women. This estimate agrees with the 22 percent increase found by Saito (1994) in her simulation of the gains from increasing women's input levels to men's input levels on maize, bean, and cowpea plots in Kenya; but is higher than the 7 to 9 percent yield increases estimated by Moock (1976) also with Kenya data. Quisumbing (forthcoming) observes, however, that these simulation results need to be interpreted with caution because they do not reveal *how* levels of inputs may be raised and also assume constant elasticities, i.e., they presuppose that changing the levels of one input does not change the elasticities with respect to other inputs.

The moral is that if women had the same access to yield-increasing inputs as men, then the smallholder agricultural sector would achieve significant increases in agricultural productivity. African countries that address

[12] A typical form of Cobb-Douglas production function would be estimated by ordinary least squares by taking logarithms on both sides:

$$\ln Y = a_0 + a_1 \ln L + a_2 \ln T + b \ln E + c\,\mathrm{EXT} + d\,\mathrm{Gender} + e,$$

where Y is output, L is labor input (hired or family), and T is a vector of land, capital, and other inputs; E is educational attainment; EXT is an index of extension services; Gender is the gender of the household head or farm manager, and e is the error term. The coefficient that indicates gender differences here is d, an intercept shifter (Quisumbing forthcoming).

these gender disparities in input use and remove these barriers to women's productivity would increase their agricultural productivity in the aggregate.

Have Structural Adjustment Programs Improved Women Farmers' Access to Inputs?

During the 1980s, macroeconomists claimed that structural adjustment programs, which provided African countries with capital infusions from the World Bank, the International Monetary Fund, and bilateral donors if countries agreed to undertake macro-level "structural" reforms, would improve the situation of women farmers because previously they were adversely affected by distorted prices (e.g., artificially low food prices, overvalued exchange rates) that implicitly taxed farmers (Timmer, Falcon, and Pearson 1983). When price distortions were removed and food prices allowed to increase, women farmers would benefit. Pauline Peters (Hyden and Peters 1991) pointed out that this ignored the fact that rural women and especially female-headed households are net buyers and not net sellers of food, and so they suffer when food prices rise. She estimates that less than 15 percent of Malawi's smallholders are fully self-sufficient in maize production; while in Tanzania and western Kenya 40 to 50 percent of households depend on purchased food to a significant extent (Hyden and Peters 1991). Women farmers' ability to respond to improved price incentives and trade liberalization mandated by structural adjustment programs was limited because they lacked access to the basic inputs of production that men farmers had a right to—land (Goheen 1991), credit, fertilizer (Gladwin 1991, 1992), and even women's own labor (Due 1991) and, in many societies, the right to grow export crops (Lele 1990). Because structural adjustment programs failed to give explicit consideration to gender inequities in access to inputs and resources, women's access was not improved by structural adjustment programs but often worsened.

What Constrains Women's Fertilizer Use?

Fertilizer subsidy removal programs were also imposed on many African countries during the 1980s as part of a structural adjustment package of reforms. Donors' goals were to get African governments out of the fertilizer industry. Yet the resulting increases in fertilizer prices decreased access to inorganic fertilizers for all smallholders, but especially for cash-poor women. Data collected in Malawi and Cameroon in the late 1980s showed that the majority of women farmers used no chemical fertilizer because they had neither the cash nor the credit to acquire it (Gladwin 1991, 1992). In Malawi, female-headed households used an average of 34 kg/ha of fertilizer—significantly less than the 51 kg/ha of the male-headed households—but the median use by women was zero. Data I collected from 36 households in Cameroon in 1989 agreed: average fertilizer use was 52 kg/ha, and still lower on maize (30 kg/ha) because two-thirds of the anglophone women farmers used no fertilizer at all.

Nevertheless, African women realize the need for fertilizer, as witnessed by their interplanting their food crops in the same fields with men's cash crops (e.g., women's maize and beans with men's coffee in francophone Cameroon, woman's tomato interplanted with men's yam). They do this

to capture some of the nitrogen fertilizer applied to men's crops (M. Langham, personal communication). In Cameroon, after the crops are interplanted, and while weeding their maize, women scrape off some of the nitrogen fertilizer still undissolved in the topsoil around the men's coffee and push it nearer to their maize plants.

The main reason women do not use chemical fertilizer is their lack of cash, capital or credit to acquire it, not their belief in organic fertilizers or a fear of dependency on chemical fertilizers. Both of the latter criteria were included in a decision "tree" model of men's and women's decisions to use both organic and chemical fertilizer, either of them, or neither of them on maize in Malawi and Cameroon (Gladwin 1991, 199–203). Among 75 farmers used to test the model, 17 (12 of them women) eliminated both organic and chemical fertilizers due to lack of cash or credit. Only five farmers did not use chemicals because of the perceived risk that their land would becoming dependent on chemical fertilizer. And although more than half (44) of the farmers believed organic fertilizer was needed on maize in addition to chemical fertilizers, almost half (20) of those farmers did not use it due to their lack of animals and cash to provide the manure or compost.

Complementing these results is regression analysis in which the dependent variable was the quantity of fertilizer used by a sample of 498 male- and female-headed households in Malawi in 1986–87. These results also show that membership in a credit club and use of manure or compost significantly increase the quantity of fertilizer per hectare applied ($p = 0.0001$ and 0.01, respectively), whereas the variables of farm size and lack of cash significantly decrease the quantity of fertilizer per hectare applied ($p = 0.0001$). When these variables are included in the equation, the gender variable is not significant (Gladwin 1991, 199–203).

The moral of this story? Just as in the productivity studies cited above, gender per se has no direct effect on fertilizer use: although female household heads apply less fertilizer than male heads, gender does not matter when one holds constant access to cash and credit. It is the access to cash and credit that explains fertilizer use; and without access to credit or cash, women apply less fertilizer than men—and get lower yields and incomes as a result.

How Constraints for Women Can Be Overcome

How can this situation be turned around? How can women farmers be included in the process of SG 2000's technology transfer? First I outline three strategies SG 2000 should use to accomplish the goal of including women:

1. *Give every SG 2000 staff member training in collecting and reporting gender-disaggregated data.* This strategy has been recommended by one WID consultant after another since the 1970s (see for example the World Bank's *Africa Region News*, April 22, 1996), but too often the advice falls on deaf ears. Too many agricultural experts never mention that many smallholders are women (and never report women's yields, women's adoption, women's use of inputs), yet they correctly argue that development strategies need to reach African smallholders to be effective. They blissfully ignore the fact that the constraints facing women smallholders may be the source of the problem. Eicher (1995), for example, is consistent with Eicher (1982)

in never mentioning that 45 percent of the smallholders responsible for Zimbabwe's "second green revolution" were women, nor does he mention what percentage of hybrid maize was adopted by women or what percentage of fertilizer subsidies went to women. Smale (1995) in an otherwise excellent report on Malawi's "delayed" green revolution does the same—she does not tell us how much of hybrid maize adoption is by women, who were responsible for the production of local maize, which was 95 percent of the maize crop in 1987 and was usually unfertilized, while their men produced hybrid maize, fertilized, as a cash crop. Similarly, SG 2000 reports have had little gender-disaggregated data, although Galiba 1996 is an exception.

2. *Dedicate an appropriate percentage of SG 2000 farmers' test plots to women's fields and to women's food crops.* The justification is that if SG 2000 wants to increase food production, it must have its test plots on the food producers' fields, i.e., the women's fields. If the test plots are not on women's fields, then women farmers will be displaced from their means of production and eventually disappear from farming. This in turn will affect the productivity of African agriculture, at least in the short run, because the displacement of women food producers may slow or stymie the desired increases in food production. To avoid this, SG 2000 staff, for example in Ethiopia, while designing test plot placement, should ask themselves, how many of the 400,000 farmers' plots are in women's gardens? Certainly a high proportion of the maize plots should be in women's maize gardens around the house, cultivated for home consumption.

3. *Target green revolution inputs, especially organic and inorganic fertilizers, at women farmers.* The justification for this is that green revolution technology depends on improving farmers' access to fertilizers of either organic or inorganic origin, as the history of Asia's green revolution in the 1960s and 1970s; and in Africa, the vast majority of the farmers are women not using fertilizer at all. The term itself—green revolution—refers to the widespread adoption by millions of smallholders of a package of innovations, including fertilizer, seeds of fertilizer-responsive varieties, increased plant populations, improved farming practices, and better marketing structures, that transforms the productivity of smallholder agriculture and hence rural economies (Goldman and Smith 1995). Rather than being limited just to the introduction of new seeds, the Asian green revolution consisted of a "broad set of changes that fundamentally altered most aspects of the local agricultural economy, and occurred in an extraordinary short span of time (Goldman and Smith 1995, 1). As Eicher (1995) points out, these broad transformations depended on four preconditions being met: political leadership for a smallholder road to development, appropriate technology, efficient public and private farmer-support institutions, and a favorable macroeconomic environment for agriculture. He gives the credit for Zimbabwe's second green revolution, which doubled smallholder maize production between 1980 and 1986, and is evidence of "a maize-based green revolution slowly emerging in Africa,"[13] to fertilizer subsidies

[13] "Maize-based green revolutions in Zimbabwe, Malawi, Zambia, Kenya, Nigeria, Ghana, and southern Burkina Faso provide a laboratory for examining how various countries have tackled the basic scientific, political, economic, and institutional pre-conditions for a green revolution" (Eicher 1995, 805).

coupled with a backlog of short-season maize hybrids, a sharp increase in guaranteed producer prices, removal of racial and institutional barriers to credit, which enabled smallholders to purchase seed and nitrogen fertilizer, and expansion of subsidized government marketing services in rural areas (Eicher 1995, 808).

Are there no African examples of adoption of improved varieties without an accompanying use of fertilizer? In her work on Malawi's "delayed" hybrid-maize revolution Smale (1994, 1995) provides a case in which, even when unfertilized, new semi-flint maize hybrids increased yields over unfertilized local maize varieties. Without fertilizer, hybrids yielded 1.6 t/ha in a "normal" season compared with 1.0 t/ha for local varieties; and in a drought year, hybrids yielded 0.8 t/ha compared with 0.4 t/ha for the local varieties. However, Smale documents even more dramatic yield increases with fertilizer. In a normal year, with fertilizer rates of 40-10-0, local-maize yields increased to 1.8 t/ha, while hybrid-maize yields increased to 2.5 t/ha (Smale 1995, 826). It is thus the combination of fertilizer and improved seed that has the best chance of significantly increasing food production and bringing green revolution transformations to Malawi and the rest of Africa, a point long made by economists (Johnston and Kilby 1975; Tomich, Kilby, and Johnston 1995).

Why Especially Target Women?

If all smallholders would benefit from green revolution technologies and they in turn depend upon affordable fertilizers, why especially target women farmers? First, the major portion of food production in Africa is done by women who are operating at a subsistence level and using little or no fertilizer because of their severe cash constraints. Previous studies show women farmers would use fertilizer if it were affordable and available in small packages.

Second, under these conditions, there is a high probability of increased productivity when crops receive even very small amounts of inorganic fertilizer combined with small amounts of high quality organic matter (Kumwenda et al. 1995, 8). The type of fertilizer recommended would depend on the specific cropping system of the women. Where beans (*Phaseolus* spp.) or other legumes are women's primary crop, for example in parts of southern and eastern Africa, low rates of phosphorus (e.g., 25 kg P/ha) would be appropriate because low phosphorus levels in the soils inhibit legume growth. In other cropping systems where maize or other cereals (or tuber crops) are major women's crops and interplanted with various other crops, small amounts of high-analysis nitrogen fertilizer would be appropriate. Even with low rates of nitrogen fertilization (e.g., 25 kg N/ ha), there will be an increase in food production—because nitrogen is almost always the main limiting nutrient. At such low rates, I expect women farmers would adopt fertilizer, if it were available in small, easily transportable packages whose costs were low enough to satisfy the severe cash and credit constraints they face. Because, for many households, the cash requirement needed to buy inorganic fertilizer far exceeds their total annual cash income, "combinations of low rates of several inputs show promise, especially those that combine inorganic and organic fertilizer" (Kumwenda et al. 1995, 25). Therefore, increasing women's use of small amounts of inorganic fertilizer in combination with

organic inputs will be an effective means of increasing food production in the aggregate.[14]

By concentrating on high-analysis nitrogen for cereal crops and phosphorus for beans, we aim to get the "right" kind of fertilizer to resource-poor women for their food crops and, second, help educate policy planners about the needs of women farmers and encourage them to make the right kind of fertilizer available. These are, of course, the basic assumptions behind any kind of fertilizer research; and the only new thing I am saying is that these basics have not yet been applied to women's food crops in Africa.

Why not? The answer lies in the lack of acceptance of our first premise. Until recently, Western-trained biological and social scientists did not realize how greatly food production in Africa depended on women farmers who face severe cash and credit constraints, which affect their adoption of soil-improving technologies. Now there is much more acceptance of these facts. After reviewing soil-improving technologies in Africa, Kumwenda et al. (1995) conclude that soil technologies must take into account farmers' income and cash constraints:

The difficult question which needs to be addressed is how to build up and maintain soil fertility under the income and other constraints faced by smallholders. Improved maizes make better use of available nutrients, but in the absence of added nutrients, the gains from genetic improvement alone are transitory. . . . For many households the cash requirement needed to buy inorganic fertilizer far exceeds their total annual cash income.

How to Target Fertilizers at Women Farmers

I offer eight ways SG 2000 can target organic and inorganic fertilizers at cash-poor women farmers (Gladwin et al. 1996). I start with the

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[14] This is because the decline in soil fertility is the most widespread dominant limitation on yield improvement and the sustainability of the cereal-based cropping systems of Africa (Kumwenda et al. 1995, 3; Sanchez et al. 1996; Osmond and Riha 1996). "Deficiency of N is ubiquitous" on the already highly leached soils of humid and subhumid zones in Africa (Kumwenda et al. 1995, 2); and estimated rates of net nutrient depletion are high, exceeding 30 kg N/ha and 20 kg K/ha in Ethiopia, Kenya, Malawi, Nigeria, Rwanda, and Zimbabwe (Smaling 1993). Decreases in average maize yields cannot be attributed to the increase in maize area in drought-prone semi-arid areas; the greater influence is a decline in soil fertility in the wetter, higher yield potential areas (Gilbert et al. 1993).
In addition to nitrogen deficiency, there are other factors limiting soil fertility and food crop production for subsistence farmers in Africa: too little P, too much soil acidity, poor soil structure, too many weeds given labor constraints, and insufficient moisture in semi-arid zones (Kumwenda et al. 1995, 3). But plants growing in very poor soil will almost always respond to additions of N fertilizer, and the greatest response is found with the first increment of added N. Thus, the simple practice of using small amounts of N fertilizer on women's major food crops (maize, rice, millet, sorghum, beans, and home garden crops)—where none has been used before—has a high probability of increasing cereal yields, even though attention to other production-limiting practices would increase yields even more at higher levels of N. But at very low levels of fertilizer, the first response is to N. While such a single-minded, straightforward approach may be criticized because it does not address the many other yield-limiting factors, it does produce positive results by increasing the food available to subsistence households in poorly developed input markets where buyers have very tight financial constraints. A more modest and workable approach in such a fragile and resource-poor environment is to ask, what is the tightest constraint on the food-production system? At the low levels of fertilizer use consistent with the resource-poor nature of the women farmers who grow most of the local food, it is usually the element nitrogen that is most restrictive and will provide the greatest payoff.

most direct, straightforward way to increase women's food production in the aggregate:

> *Option 1. Target subsidies for small amounts of fertilizer per hectare in the form of vouchers directly at cash-poor women farmers producing food crops, as a temporary measure.*

A voucher system would allow an African government burdened with fiscal deficits to do something about food security, by targeting the subsidy directly at those women farmers who produce the food, and it would encourage healthy competition between private distributors in the fertilizer industry. With a voucher system, women farmers in women's clubs would receive vouchers to bring to private fertilizer distributors, from whom they would buy fertilizer at a discount (similar to the way the poor in the United States buy food with food stamps or pay for housing with housing vouchers). The government would then remunerate distributors for the vouchers. The government's physical presence in the fertilizer distribution system would be minimized, and its total subsidy bill would be less than in the past when fertilizer subsidies were freely extended to all growers of food and cash crops, men and women alike.

After a number of years, the vouchers would be discontinued and women would buy fertilizer from local merchants on the open market, both with and without credit. The temporary program of vouchers would be coupled with a plan for supervising women's application of fertilizer to reduce leakages, defined as the use of vouchers for other than women's crops. The plan would also strengthen women clubs' revolving credit funds—used to bail out individual defaulting members—by giving the clubs a small amount of money when one member supervises the application of vouchered fertilizer on another woman's farm. Women's clubs can thus serve not only to expand credit to women but also to supervise the proper use of fertilizer vouchers.

But, counter critics, donors like the World Bank have spent the last 10 years removing fertilizer subsidies; its policy now is to move to full-market cost of fertilizers (Donovan 1996; Katrine Saito, personal communication). In fact, most food policy analysts recommend entirely eliminating input subsidies, particularly fertilizer subsidies, because they are a common technique used to increase the profitability of intensive agriculture while keeping food prices artificially low. Timmer, Falcon, and Pearson (1983, 288) argue that only when total fertilizer use is low and the ratio of incremental grain yield to fertilizer application is high can such subsidies be cost-effective, relative to higher output prices or greater food imports: "Fertilizer subsidies can also speed the adoption of modern seed varieties. As fertilizer use becomes much more widespread, however, the costs of the program rise dramatically. The production impact per unit of fertilizer subsidy drops for two reasons: declining marginal response rates and few nonusers of fertilizer remain to be converted to users."

African governments burdened with large fiscal deficits should therefore consider whether fertilizer subsidies represent the best use of their limited resources. After all, someone must pay for the subsidy. Timmer, Falcon, and Pearson (1983, 288) thus conclude that "all subsidies tend to distort the intensity of use of inputs from their economically optimal levels, and significant waste is a result. Because not all inputs can be equally subsidized, output price increases

will have a greater impact on productivity than will input subsidies, especially in the long run."

This line of reasoning makes sense when applied to Asia and Latin America where fertilizer was adopted 30 years ago. But for sub-Saharan Africa, where average fertilizer use is 7 to 11 kg/ha, it does not apply. With African women food producers who use no fertilizer, policy makers need to use every tactic available to speed the adoption of modern varieties, and fertilizer subsidies are the most direct policy tool they have at their disposal (Gladwin 1991, 1992). They are preferable to an expansion of credit opportunities to women because women face many constraints to credit use that men do not face: they are too poor, too old, or lack a cash crop with which they can repay a fertilizer loan (Gladwin 1992, 1996). For them, the risk of borrowing is high because they may have to sell some of their subsistence crop in the hunger months when their children are hungry in order to repay the loan. Rather than take that risk, they decide not to get credit, not use fertilizer, and not increase their yields.

Fertilizer subsidies can decrease this risk for resource-poor women farmers, and so can play an important role in increasing their food production. For this reason, Eicher (1995, 807) blames the donor community for failing to present a balanced view (for example in World Bank 1994) of the role of subsidies in Asia's green revolution of the 1960s:

> Currently donors in Africa are focused on a number of policy reforms such as correcting overvalued exchange rates and removing fertilizer subsidies rather than long-term, institution-building activities, the hallmark of donor assistance in Asia in the 1960s and 1970s. In their zeal to remove fertilizer subsidies in Africa, however, some donors are neglecting to inform African policy makers about the role of subsidies in Asian agriculture.

Eicher notes that farm subsidies are still widespread in Asia, e.g., Indonesia's implicit subsidy on fertilizer is still 35 percent and on irrigation 75 percent. He concludes that "a fertilizer subsidy can be justified for farmers who are unfamiliar with it, to offset risk, and to substitute for a weak or nonexistent credit program, especially for resource-poor farmers" (Eicher 1995, 813).

Pinstrup-Anderson (1993, 106) claims that fertilizer subsidies can serve as a temporary measure to compensate for the factors that account for the exceptionally high prices of fertilizer in Africa as compared with Asia.[15] Among the factors are the small volume of fertilizer that most African countries import, which weakens their bargaining position in negotiating for lower prices; high transportation costs within most African countries; high storage costs, which increase the expense of fertilizer distribution; unpredictable government policies and unstable institutions, which scare off private entrepreneurs who might invest in input distribution systems; the relative ease with which government could in the past acquire fertilizer as foreign aid; and the tendency of governments to maintain large fertilizer stocks, which may be released at any time and at any price. All of the above make it difficult for African entrepreneurs to compete freely in an open fertilizer market. Pinstrup-

[15] "The ratio between the price of nitrogen and that of grain varies between 6 and 11 in various African countries, compared to only about 2 or 3 in Asia. The price African farmers pay for fertilizer, relative to the price they receive for their output, is thus much higher than in Asia" (Pinstrup-Anderson 1993, 100).

Anderson (1993, 106) concludes that governments should privatize fertilizer distribution in a way that assures competition, or else the private fertilizer distribution system may be no more efficient than the public-sector system it replaced and may even be more expensive if monopoly profits accrue. He also believes fertilizer prices can only be brought down if in the long run governments invest in the infrastructure to reduce transportation and marketing costs, but until they do, "there is a place for fertilizer subsidies" to compensate for the factors resulting in very high fertilizer prices (Pinstrup-Anderson (1993, 105).

Some Other Solutions

Given the policy climate and the zeal with which donors have eliminated fertilizer subsidies in Africa, however, I also list other strategies SG 2000 might adopt to target fertilizer at women farmers:

> *Option 2. Improve the availability of small amounts of fertilizer in local markets and shops by repackaging fertilizer into smaller bags.*

Traditionally, fertilizer has been sold in 50-kilogram bags. Because most fertilizer for family food production must be carried both to the home and to the crop fields, the cost of transporting fertilizer from the market is a big factor in its use. Having fertilizer available in small packages (complete with pictorial instructions) would make it more affordable for women and easier to carry. This strategy is the favorite of neoclassical economists who believe that access to fertilizer is the main constraint to its increased use. I propose testing the sale of fertilizers in 2-, 5-, and 10-kilogram bags at local markets to determine whether this aspect of accessibility will increase fertilizer use by women farmers, just as Sperling, Scheidegger, and Buruchara (1995) tested women's demand for new bean varieties.

> *Option 3. Expand the fertilizer credit market for women farmers via community banks operating on the Grameen Bank model.*

The Grameen bank targets very small loans to groups of virtually landless women producers (Khandker, Khalily, and Khan 1995; Von Pischke 1991, 233). With 2 million borrowers and a recovery rate of more than 90 percent, it is clearly the model to be followed. By 1994, it served half the villages in Bangladesh, lent about US$385 million, and mobilized another US$306 million as deposits with a cumulative loan outstanding of US$281 million (Khandker, Khalily, and Khan 1995, xi). The bank is unique in that its first priority is to alleviate poverty, what I've called higher-ordered goal 2. To do that, its instrumental goal is to create self-employment opportunities for illiterate people who have never received a loan from the formal financial system and who own less than quarter hectare of land. To better alleviate poverty, since 1985 it has specifically channeled credit to women, who are less empowered among the rural poor. Women increasingly receive the bulk of the loans and are the majority of the members: their share of the total cumulative disbursement rose from a little more than half in 1985 to 91 percent in 1994; female membership grew from 66 percent in 1985 to over 94 percent in 1994 (Khandker, Khalily, and Khan 1995, 25–26). Savings mobilization is a requirement of members "not to provide for on-lending per se, but to overcome market imperfections and promote the financial security of member-borrowers" (Khandker, Khalily, and Khan 1995, 29), and in 1994 women's savings amounted to 74 percent of total savings mobilized (Khandker, Khalily, and Khan 1995, 31).

The Grameen Bank gives new meaning to the concept of solidarity group lending, first used in the 1970s by farming systems programs such as the Plan Puebla in Mexico (Gladwin 1976). In such small groups, individuals band together to cross-guarantee repayment of loans. In Bangladesh, by contrast, Strict observance of the norms—and "the 16 decisions"—forces the group members to be more socially and economically accountable to each other: two women in a five-member group receive a loan; the second two women receive their loans only if the first two repay regularly, and the group leader is customarily the last to receive credit. This creates pressure among group members to enforce the contracts and helps screen out bad borrowers.

What lessons can Africa learn from the Grameen Bank? The first and most important for our purposes is that women are better credit risks than men, because loan recovery rates for general loans have been higher for women (97% in 1992) than for men (89%) (Khandker, Khalily, and Khan 1995, 18).

The second lesson, which the bank soon realized, is that credit alone is not enough to alleviate poverty. Because the poor lack financial discipline, the Grameen Bank began providing social development inputs—the 16 decisions—to help the poor become more productive.

The third lesson is that the rural poor harbor a large unmet demand for institutional credit. In Bangladesh, formal lending agencies including the Grameen Bank make only about 28 percent of the total credit transactions in the rural market. The rest are still provided by informal sources such as relatives and moneylenders (Khandker, Khalily, and Khan 1995, 15).

The fourth lesson is that a bank with poverty-alleviation goals can also be sustainable as a bank by lending at market interest rates and gradually expanding its membership and branches. The Grameen Bank's lending rate has been 20 percent since 1991 (Khandker, Khalily, and Khan 1995, 66), and its subsidy dependency index (SDI) has decreased from 180 percent in the 1980s to 36 percent in 1994 (Jacob Yaron, personal communication, 1996). Whether the Grameen Bank model can be replicated in Africa is now being tested by SG 2000 programs such as Benin's rural savings banks *(caisses rurales d'épargne et de prêt)*, which mobilize savings from member farmers (20% of whom are now women) before lending to them (Galiba 1996).

Option 4. Introduce, for a short time, a system of grants of small bags of fertilizer targeted at the poorest women farmers.

Female-headed households, old women, and handicapped women often have the smallest plots of land. They may not know the value of fertilizer or are not self-sufficient in food production. Kumwenda et al. (1995, 21) estimate that in Malawi they comprise 40 percent of the smallholder population. As with option 1, after the temporary period, this program should be phased out and replaced with local merchants' selling small bags of fertilizer at the market price. The purpose of these grants is to jump-start fertilizer use by the poorest of women farmers. As in option 1, the revolving credit fund of a women's club will be augmented by a small amount when a club member supervises the application of these grants on other women's plots.

Solutions Involving Organic Matter Inputs

Lack of cash and rising real prices of fertilizer may mean that for the majority of African women farmers, organic sources of nutrients—especially legumes that fix atmospheric nitrogen—may be the best strategy for increased soil fertility. At current levels of use, however, "organic inputs are rarely sufficient to maintain soil organic matter" (Kumwenda et al. 1995, 9). Moreover, the efficiency of fertilizer use is often low and declining because of the declining level of soil organic matter (Kumwenda et al. 1995, 24). Therefore the following organic solutions are proposed.

Option 5. Make the inputs of soil organic matter of farm origin more accessible.

Some SG 2000 women farmers' test plots should be devoted to methods involving green and animal manures, legumes as sole crops in rotation with cereals or intercropped (Wortmann and Allen 1994), and improved fallowing. Information can be diffused through extension workshops and field days for women, gender "training of trainers" for extension agents, and small loans for organic inputs from community banks as in option 3.

Option 6. Make biological nitrogen fixation technologies more accessible.

Such nitrogen-fixing crops as velvetbean (*Mucuna pruriens*), pigeonpea, sunnhemp (*Crotalaria juncea*), lablab bean (*Dolicos lablab*), and *Crotalaria ochroleuca* and technologies such as alley cropping could be promoted by making seeds, small loans, and extension education more accessible and devoting some SG 2000 women farmers' test plots to intercroppings or rotations of legumes with cereals. Biological nitrogen fixation by legumes can sustain tropical agriculture at moderate levels of output (Giller, McDonagh, and Cadisch 1994), which are often double those currently achieved (Kumwenda et al. 1995, 9).

In addition, the applicability of inoculation of legume seeds with rhizobia to conditions faced by African women farmers needs to be further tested. Although legume inoculation is simple, inexpensive, and highly successful in increasing crop yield (Meisner and Gross 1980), the African experience is that this invaluable technology is largely unavailable to women subsistence farmers who need it most (Hubbell 1995). Further testing should determine if this is due to women's relative lack of access to extension education (Staudt 1975) or to the many infrastructural constraints to effective use of inoculum facing African women farmers (C. Wortmann, personal communication; G. Elkan, personal communication). These problems include the lack of an inexpensive supply of appropriate inocula for the legume crops being planted (inocula produced by U.S. companies are not very effective on African crops); the ineffectiveness of material such as gum arabic, syrup, or molasses, which work well in many areas but in Africa merely attract hordes of ants that eat the seeds; and farmers' lack of understanding about the specificity of bacteria in peat inoculum—they think it should be possible to use on any crop (G. Elkan, personal communication). At the minimum, good extension programs are needed to teach women farmers how to apply inoculum to the seeds, but they may not be enough to overcome all the infrastructural constraints prevalent in Africa. In Uganda, Mary Silver of Makerere University has prepared large quantities of inocula using native African strains of rhizobia and is testing the applicability of this relatively new technology with groups of women farmers.

Option 7. Make combinations of organic and inorganic inputs more accessible in small amounts.

Kumwenda et al. (1995, 5) argue that organic fertilizers alone rarely provide the productivity boost needed by smallholders—they need to be combined with the judicious use of chemical fertilizers. Note, moreover, that women face many constraints limiting their use of organic inputs. For example, women's lack of land constrains their use of nitrogen-fixing beans as a monocrop (Kumwenda et al. 1995, 9) and even their interplanting of nitrogen-fixing tree crops with maize. Their lack of animals and pasture land limits their access to manure, and their lack of capital constrains them from buying it. Yet Kumwenda et al. (1995, 8) claim "the most promising route to improving inorganic fertilizer efficiency in smallholder cropping systems is through the addition of small amounts of high quality organic matter to tropical soils. This will increase soil microbial activity and nutrient cycling, with reduced nutrient loss from leaching and denitrification." Combining low rates of organic and inorganic fertilizers should be the best way to reach women smallholders (Kumwenda et al. 1995, 25).

Option 8. Introduce a cash crop into women's subsistence farming systems.

This solution assumes that sustainable food production is the ultimate goal of SG 2000, and only when women farmers have cash will they have a sustainable way to either buy inputs or repay loans for cash inputs of either organic or inorganic origin or both (A. Thomson, personal communication; Katrine Saito, personal communication). In Malawi, for example, the government has recently allowed smallholders to grow burley tobacco, a crop five times as profitable as subsistence maize. In conjunction with this policy change, women farmers in southern Malawi are given credit for fertilizer for both tobacco and maize through *tikolore* clubs, and their profits from tobacco production are used to repay their fertilizer loans.

Testing the Efficacy of Proposed Solutions

Given these numerous and diverse solutions, which one should a local SG 2000 program use? How can local staff determine which of the different ways to improve women's access to fertilizer works best? I suggest use of two criteria:

Criterion 1. Do women farmers, once exposed to one or more of these methods to increase fertilizer inputs, continue to use them in the second and third year—i.e., adopt them—and why or why not? (Adoption is defined as continued use.) I thus assume that the women themselves are the experts on whether or not their yields have increased and how they can best increase them, given their constraints. Presumably, if they continue to use one method rather than another (e.g., organic over inorganic, vouchers over credit), they must be benefiting from its use through increased yields, increased incomes, or lower costs.

Criterion 2. With each method, how much leakage from women's to men's use is there? The aim here is to increase women's food production by increasing fertilizer use by women. It may happen, however, that inputs once acquired are allocated within the household to purposes other than food crop production. Because women lack power and money within the African household relative to men, they may end up distributing their fertilizer to men within the (extended-family) household. For example, with option 2, which makes fertilizer available in local markets and shops in more convenient

quantities, men are as free as women to buy it. Although this is beneficial for the local merchant and men farmers, it is not an indicator of success. With option 3, because credit and cash are fungible, women may get credit for fertilizer and apply it to men's cash crops in order to spend the man's cash on children's medicines, school fees, or other pressing necessities. With options 1 and 4, women may choose to sell fertilizer vouchers or grants to men within their households in spite of all efforts to supervise its use, and a black market for vouchers or fertilizer may develop. With each solution, therefore, there is a risk that men's cash crops, not women's food crops, may end up benefiting from fertilizer targeted at women farmers. To determine what works best, staffers should measure the amount of leakage with each method by gathering data on how many women use the targeted fertilizer on their own food crops or in their own fields.

Goal Conflicts?

The psychologists Schank and Abelson (1977, 101–111) remind us that goal formation in real-life decision making is often a messy, complicated business. Whereas most decision models assume one goal, in real life people handle a number of goals, which often conflict with one another; and one goal can quickly be suspended or replaced by another goal during the decision-making process without the decision maker being aware of what is happening. In a program such as SG 2000 with many decision makers, conflicts and ambiguity can arise over which instrumental goals are more important in the technology transfer process. Especially pertinent to our discussion are those goals considered to be gender-neutral, for example:

> *Goal 5. Strengthen efficiency of and access to input and output markets.*

This is an important instrumental goal for SG 2000 because yield-increasing inputs of production cannot diffuse to millions of smallholders until input and output markets function efficiently and are easily accessed by all small farmers. SG 2000 staff spend a great deal of time designing strategies and programs to increase farmers' access to fertilizer and credit markets (Galiba 1996), and so they probably agree that this is an important goal of SG 2000.

Another important goal is:

> *Goal 6. Minimize the damage (in the form of market distortions) from subsidies given to program participants to initiate and speed up technology transfer.*

This goal is critical, economists claim, for the health of the economy as a whole; and "a good project in a bad economy is a bad project" (Sisters in the wood 1992). Yaron (1992, 1996) thus encourages projects like SG 2000 to follow the norm, "The less subsidy per dollar lent in the program, the better." Programs with fewer subsidies will distort the markets less, so input and output markets will be more efficient in the long run. SG 2000, according to the credit experts, is thus distorting the local credit market when it charges no interest to farmers for their inputs on test plots. Institutions like banks and fertilizer distributors (and SG 2000) will be more sustainable in the long run, and will increase food production more, the less subsidy they give out—and have to pay for.

Do these instrumental goals—to strengthen efficiency of, and access to, input and output markets and to minimize subsidies—conflict with the proposed solutions for reaching women farmers and involving them in the technology transfer process? I think not. I

believe increasing access to input and output markets (goal 5) will also open up such access for women. In addition, all of solutions proposed, including vouchers for small amounts of fertilizer targeted at women farmers, will minimize the distortions due to subsidies by minimizing the subsidy itself (goal 6). It will cost SG 2000 *less* money to give fertilizer vouchers to women food producers for use on their test plots than to subsidize credit for all farmers' test plots. It will cost an African government burdened with fiscal deficits *less* scarce capital and foreign exchange to target fertilizer subsidies at women rather than giving them to one and all alike, (men) export producers and (women) food producers. This is the rationale for targeting subsidies precisely at the people who will accomplish the higher-ordered goals of the program (Timmer, Falcon, and Pearson 1983). In this case, the higher-ordered goal is to enhance food security in sub-Saharan Africa, and the people who will accomplish that goal, if access is opened up to them, are women farmers.

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Constraints Limiting the Access of Women to Production Inputs in Ghana

Mansah Prah

Constraints that limit the access of women to production-raising inputs in agriculture have been well documented (Gittinger 1990; Saito 1994; Blumberg 1992; Quisumbing et al. 1995)—mainly weak land rights and lack of access to credit, technology, training, and education. It has been suggested that gender disparities in access to productive resources in agriculture exist and persist because of legal, social, and institutional factors that create barriers for women (Quisumbing et al. 1995). These factors have also been found to prevail in Ghana (NCWD 1994; Acquaah-Harrison et al. 1995).

Women in Ghanaian Agriculture

Agriculture represents a dominant sector of the Ghanaian economy and accounts for roughly 50 percent of the GDP. Ghanaian women constitute about 52 percent of the agricultural labor force and produce about 70 percent of the total crop output. They also process and market nearly all grains and starchy staple foods. They feature prominently in agro-industries such as oil palm processing, oil extraction, and fish preservation. Despite their importance in agricultural activities, only 26 percent of women are farm owners or managers (Manuh 1989).

Women's specific activities in agriculture include land preparation, sowing, planting, weeding, harvesting, threshing, shelling, winnowing, cotton picking, cocoa processing, and transportation of farm produce by head portage. They also assist their husbands in the maintenance of cash-crop farms (Apedey 1996).

A study of four villages in the Tema and Ga districts showed that a growing number of women own personal farms, apart from family farms, producing food for commercial purposes (Apedey 1996). But this is not true for the whole country. The status of women in agriculture varies from region to region.

Generally, Ghanaian women carry a heavier burden than men in food production. In addition, they are responsible for the provision and maintenance of scarce resources of collective consumption such as water, fuel, health care, and education. Despite their high rates of participation in agriculture and in the economy, Ghanaian women farmers have limited access to productive resources such as land, credit, technology, training, and education. Also, adverse legal, economic, or agricultural policies may eventually affect the quality of life and productivity of women farmers.

What constraints limit women's access to productive resources in this country? Rural women generally lack basic literacy skills, skills to enhance income generation, and general awareness or information on correct health practice, family planning, civic rights, and legislation that affects women (Prah 1995).

Mansah Prah is a lecturer in the Department of Sociology, University of Cape Coast.

This situation is maintained by socio-cultural attitudes and belief systems that based on the idea that women are mainly reproducers, whose role is to nurture children, keep the home, and play "feminine" roles determined by society. Men are the productive group, who earn the money and are generally more aggressive. These attitudes prevail even when the reality is different. Such socio-cultural attitudes affect perceptions about the need to effect changes in gender roles and the need to prioritize women's and gender issues. They play an important role in weakening women's confidence and initiative to take action to strengthen their economic roles. Very often, women will internalize traditional views because they are so deeply embedded in the social fabric.

This particular constraint interacts with others, affecting the legal, social, and institutional setting within which women farmers operate. It is important to note that socio-cultural attitudes are slow to change and require strategies that will have to be implemented over a long time. It is necessary to remove this constraint to enable women (and men) to achieve their full potential in development processes.

Access to Land

A recent report on the status of women in Ghana states that there seems to be a gradual removal of the more discriminatory provisions relating to land tenure and more definite efforts to improve the access of women farmers to land formation (NCWD 1994, 48). This notwithstanding, there are regional differences regarding access to land for farming. Only 2 percent of women in Northern Ghana are holders of land as against 50 percent in Ashanti. The situation in Northern Ghana is due to family land tenure practices unfavorable to women, coupled with a system of patrilineal inheritance (Prah 1995).

In parts of the Western Region, there is evidence that land inheritance is gradually favoring sons (Quisumbing et al. 1995), and a similar development has been observed in the Volta Region (Greene 1995). Bortei-Doku (1990) has pointed out that problems can occur when there are barriers to women owning land in their own right, for example in making farm management decisions or gaining access to credit after the death of a husband or when the husband is away for an extended period (Apedey 1996).

In the short term, encouraging the acquisition of land for women's groups might be a useful approach. A long-term strategy would be educating people to change their attitudes and putting in place laws that guarantee women's access to land. It is doubtful, though, that laws alone would bring about the needed change.

Credit

Ghanaian women farmers have identified lack of access to credit as a major constraint in overcoming poverty (Prah 1995). Although women's lack of access to credit is part of a larger problem of inadequate credit to farmers in developing countries, women face further disabilities in the credit markets due to

- lack of knowledge about institutional credit
- inability to meet collateral requirements
- widespread illiteracy and incapacity to meet the application procedures
- the orientation of agricultural extension services mainly to men

Experience from development projects that have provided women with credit (e.g., ENOWID,[16] the UNDP/Department of Social Welfare Rural Business Women's Project, the CUSOWID[17] Maata-N-Tudu Project) shows that women have better repayment rates than men. Yet banks and other formal lending institutions are reluctant to make loans to women because they have no collateral and are generally small and inexperienced borrowers. Bankers complain that administrative costs make small loans is economically unviable.

Today, a range of development projects target the strengthening of women's income-generating capacity and the extension of credit to them. There are also other institutions like the rural banks, the Ghana Cooperative Credit Union, and Women's World Banking that help improve women farmers' access to credit. Yet, these efforts seem like a drop in a bucket. There is need for much greater commitment and investment in such schemes.

Regarding the formation of groups for the purposes of savings mobilization and credit, it has been suggested that the system has drawbacks (Acquaah-Harrison et al. 1995). It is argued that although rural people (including women) are increasingly benefiting from formal credit, group formation for credit has sometimes proved to be problematic because they are not voluntary associations, they are not indigenous and operate only within projects sponsored externally, and unlike the *susu*-type group activity, there is no self-management of savings and loans and no common purpose.

However, the experiences of the ENOWID Project (Abrokwa 1994) show that women's groups for credit and savings mobilization can be successfully established. There is a need for a database on such programs and effective monitoring and evaluation mechanisms to adapt them to Ghanaian conditions and to ensure their sustainability.

Technology

The issue of women farmers and their access to technology is complex. There is no doubt that new agricultural technologies can reduce drudgery and increase productivity. On the other hand, they can sometimes increase women's workloads or lead to the loss of employment or income (Quisumbing et al. 1995).

Planning plays a vital role in technology dissemination because the receiver community will have to be involved in the planning process. Poor planning may lead to the rejection of new technologies. An excerpt from a terminal report of a project that targeted rural women in different parts of the country (Abrokwa 1994) illustrates this point:

Output 2:6 Three hundred and sixty selected groups of women using and maintaining new techniques and technologies relevant to the success of their agriculture and small-scale enterprises.

- The output has been found to be overambitious and not consistent with efforts aimed at supporting women to consolidate and expand economic activities already controlled by them and for which they have management capabilities. Only 28 women's groups have been found to be willing and ready to receive technological inputs. These 28 groups required various sets of machines which were ordered from two local manufacturers. . . .

[16] Enhancing Opportunities for Women in Development Project, under the Programme of Action to Mitigate the Social Cost of Adjustment (PAMSCAD).

[17] Canadian University Services Overseas Women in Development.

- It must be noted that the donor agency (name withheld) also provided a quantity of machines. . . ahead of project implementation and as such, some machines do not meet to the actual requirements of the beneficiaries especially because all machines are given out to the women's groups on hire-purchase credit basis.
- Of the 26 machines installed, only an estimated 18 machines are in good working condition. The relatively poor performance of this output is attributed to (a) resignation of the technology officer in 1992 and the absence of a counterpart to continue, (b) poor quality, defects in design and untimeliness of delivery of machines by the two local manufacturers, (c) delays in construction of shelters to house the machines partly because of the self-help approach used and the sharp increases in prices of building materials. . . .

But there have been success stories. The *chorkor* fish smoker and improved methods for gari[18] processing and oil extraction are examples.

Socio-cultural attitudes often work against women's readiness to associate themselves with technology and machines. Women are generally socialized to believe that technology is a male domain. This problem can be addressed by education and demonstration.

In Ghana, as in many other developing countries, there are basically four primary constraints that limit women's access to extension services (Quisumbing et al. 1995):

- cultural restrictions that prevent male extension officers from meeting with women farmers (corroborated by Apedey 1996)
- domestic responsibilities that limit women's mobility, making it harder for them to attend meetings and courses away from home
- women's inability to speak the lingua franca, which extension agents generally use
- too few female extension agents

Closely related to the last point is the lack of women in agricultural research (currently there is only one woman teaching at the University of Cape Coast School of Agriculture) and in agricultural decision-making bodies. Another issue in Ghana is the unwillingness of extension personnel to transfer to rural areas (*Ghanaian Times*, 11 June 1996).

A number of strategies have been suggested to address these problems:

- Increasing the number of women receiving appropriate training to be agricultural extension agents.
- Giving agricultural training to women trained as community development officers.
- Having extension workers meet with farmers in groups so that cultural constraints against interaction between male extension agents and female farmers are reduced. Also there would be an added benefit of the sharing of information by women in groups.
- Increasing the representation of women in agricultural policy-making bodies (Quisumbing et al. 1995).

Also, young women should be encouraged to study agricultural science. A strategy that has been discussed at some workshops in Ghana is for key women farmers to be trained, so that they can function as facilitators in their communities.

More research is needed in this area, taking into consideration local conditions.

[18] A grated, fermented, and roasted cassava product.

Training

In Ghana, the sex differential in education is high. Female illiteracy was 65 percent in 1981, 57 percent in 1985, and 49 percent in 1990. The figures for males were 44, 36, and 30 percent, respectively (NCWD 1994). The low participation of girls and women in education has been shown to be highly affected by socio-cultural practices, belief systems, poverty, and ignorance (Twumasi 1986; Chinto 1986; Mensah 1992; Sutherland-Addy et al. 1995). The inequitable access to education tends to limit access to employment, especially in higher administration and technical areas. For agricultural productivity, it is likely that better educated people will utilize extension services profitably and adopt new technologies easily. There is a lack of technical skills among women and limited facilities for vocational training. A survey of women farmers' training needs across the country showed that most of them would be interested in simple record keeping, business and financial management, training in soap-making, gari production, and family-planning techniques (Prah 1995). There is a need to strengthen and intensify all training and education programs targeted at women.

Women's Nutritional Status

Poor nutritional status is linked to poverty and socio-cultural practices regarding eating habits. It affects the general well-being of women. A weak and hungry woman is more likely to suffer from a feeling of helplessness, low self-esteem, and apathy. Also, the health of the woman farmer is an important prerequisite for productivity. Here again, studies reveal that there are regional differences (Prah 1995). Malnutrition constitutes a serious constraint for women and children, especially in rural Ghana. In the northern part of the country, it is a major constraint especially in the lean season.

Household food security in the guinea-savanna zone seems to be aggravated by unfavorable socio-cultural practices like the high incidence of polygamy that leads to women's neglect by their husbands, thereby increasing their responsibilities. Family land tenure practices adversely affect women's access to land.

From 1985 to 1994, 65 percent of pregnant women and 45 percent of the nonpregnant were malnourished in the North, as compared with 43 percent and 30 percent in the South (NCWD 1994). Malnutrition among women and children is found also in other ecological zones. For instance, the Ministry of Health regional annual report for Ashanti showed that in 1993, 26 percent of children weighed were malnourished and 21 percent of children under the age of 2 years were at risk of malnutrition.

To combat malnutrition, it will be necessary to intensify health strategies already being implemented and to involve communities by ensuring that each one has a community-based weaning food project. It is also important to ensure that mothers are gainfully occupied in alternative income-generating projects during the lean season, especially in the North.

Policy Environment

There have been consistent efforts to integrate women in development in Ghana. Recent examples are the Ghana-Vision 2020 and F-CUBE plans. There are no legal barriers to women's rights to their separate property, and they are free to enter into transactions of their own. Despite official support, WID

programs have been given relatively low priority in the past. Government expenditure on WID has been estimated at 0.06 percent of the national budget.

Generally, budgetary processes, project cycles, and central organs for planning, reviewing, and evaluating programs and projects have given inadequate attention to women's issues. It is important to mainstream women's concerns into the development process beginning with the budgetary cycle and continuing through the planning and implementation cycle involving sector ministries. Such a strategy would positively affect women in all sectors of the economy, including agriculture.

Policies such as the Economic Recovery Programme/Structural Adjustment Programme have been shown to adversely affect a large proportion of women in agriculture; for food producers the withdrawal of subsidies has raised input prices and inflation has eroded their output prices and incomes. Women traders have had their incomes eroded by continuous devaluation of the cedi and inflation (Dadson 1995). Such policies, which are heavily influenced by external agencies such as the World Trade Organization, need to be examined. There is a need for researchers in countries like Ghana to critically review the effect on their farmers of international policies such as the GATT[19] agreement on agriculture. At the end of the day, the vexing question of food security in Ghana is very much linked with such policies.

Recommendations

Action must be taken to remove the constraints that limit the access of women to production-raising inputs. This objective will be achieved by increasing access to credit, inputs, land, and technology; improving the nutritional status of women and children; encouraging and supporting alternative income-generating activities especially during the lean season; and providing gender-awareness and skills training for all planners, extension workers, and policy makers.

Some specific recommendations:

1. Provide a countrywide network of alternative nontraditional credit facilities like revolving funds, taking into consideration the needs of specific regions and communities.

2. Strengthen and expand programs that provide training in financial management and other income-generating skills to improve productivity and financial self-sufficiency, especially targeting women in the guinea savanna. This should be supported by efficient monitoring and evaluation systems.

3. Encourage the practice of acquiring land for the use of women's farming groups in areas where there are socio-cultural barriers to women owning land.

4. Put in place laws that guarantee women's access to land.

5. With the help of media practitioners, mount a permanent or long-term campaign on local FM radio, national radio, and television to discuss gender issues and create gender awareness.

6. Strengthen and replicate, nationwide, the system of establishing women's demonstration houses for disseminating appropriate technology.

[19] General Agreement on Trade and Tariffs.

7. Improve extension services to women farmers by conducting research to ascertain problems in message delivery; increasing the number of women receiving appropriate training to be agricultural extension agents; giving agricultural training to women trained as community development officers; encouraging young women to study agricultural science by awarding bursaries and giving them other incentives, and at the tertiary level, encouraging promising women students to stay on as teaching and research staff; and training women farmers to function as facilitators in their communities.

8. Provide gender-awareness training for agricultural planners, policy makers, extension workers, and students. Comprehensive WID guidelines, procedures, and manuals for incorporating gender issues into policies and projects are needed. These should be continually upgraded and strengthened with the results of experience in using gender analysis and impact assessment surveys. Funding also must be provided for research into gender issues and for developing valid, gender-disaggregative statistics that will guide planners.

Conclusion

The paper has attempted to show that the major constraints that limit the access of women to production raising inputs such as credit, technology, and training in Ghana are:

- Women's low level of education, which affects their access to information, vocational skills, and training.
- An asymmetric division of labor that leaves women with heavier time burdens and that creates limitations to their self-development.
- Lack of information about institutional credit, inability to meet collateral requirements, and incapacity to meet application procedures for credit (factors that are linked to women's widespread literacy).
- Poor nutritional status, a condition linked to poverty, and cultural conventions related to eating. This condition affects the general well-being of women and contributes to a feeling of helplessness, lack of confidence, and apathy.
- Socio-cultural attitudes that promote a narrow perception of women as mainly reproducers and fail to appreciate their important roles. They affect the legal, institutional, and policy-making environment, influencing the desire to change gender roles and priorities. These attitudes also have the effect of weakening women's initiative and undermining the confidence needed to take advantage of policies to strengthen their economic role.

Over and above all this, and yet closely related to the constraints mentioned here, is the international policy-making environment, which creates policies that are ultimately unfavorable to smallholder farmers (including women).

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Reaching the African Female Farmer with Innovative Extension Approaches

C. Ebun Williams

The enormous contributions of women to the development of agriculture in developing countries have been widely acknowledged. Women's share of food production is 80 percent in Africa, 60 percent in Asia, and 40 percent in Latin America (Huston 1993, 73). Women are responsible for at least 70 percent of food staple production in Africa, and Mijindadi (1993) reported that in Nigeria women are responsible for as much as 70 percent of actual farm work and constitute up to 60 percent of the farming population.

Of the 10 linkages in the food path—clearing and harrowing of fields, planting, weeding, harvesting, transportation, processing, distribution, marketing, storage, and cooking—only the first two are dominated by men. The next two are solely done by women, while 70 percent of other activities are carried out by women along with their usual domestic burden (Ogunleye 1985, 21). It is therefore no exaggeration to say that women in developing countries are the backbone of food security, i.e., agriculture is becoming feminized (Saito and Spurling 1992). This agrees with Boserup's view (1970) that Africa is a region of female farming per excellence. Despite the significant contribution of women to agricultural production, they remain marginalized and have been constrained from contributing fully to development by the scarcity of efficient technologies and production inputs relating to their tasks as well as lack of access to those technologies that do exist.

Events of the recent past have given rise to a new era, in which the true position of the women in the production cycle has begun to be realized. In the last decades of international development, women have been recognized as vital human resources. Any development program that proceeds without women's participation is self-defeating because of the loss of their contribution (James and Trail 1995).

A major approach to the development of agriculture in sub-Saharan Africa is the provision of agricultural extension services. Extension directed at women farmers has generated considerable interest by government, NGOs, private companies, and religious organizations in recent years because of the important contributions it is capable of making to food production.

Governments in many developing countries have started WIA (women in agriculture) programs as a means of reaching women with technical information. The primary objective is to increase the productivity and incomes of women farmers. Other objectives are to identify the constraints faced by women farmers, to source and, where necessary, collaborate with research institutions to develop suitable technologies, to ensure timely extension support to women

C. Ebun Williams is a professor in the Department of Agricultural Extension Services, University of Ibadan.

farmers, to provide advice to women on forming groups so that they can gain access to farm inputs and credit, to encourage diversification of women's farming activities to small-scale production enterprises, and to introduce labor-saving technologies in the activities of women farmers.

The advent of WIA programs has resulted in the recruitment of female extension workers who work with female farmers and the use of women as contact and contract farmers. The incorporation of a WIA component into the extension program has charted a new course for women farmers, even though it is not devoid of certain constraints (Njoku 1990; Chale 1990; Onazi, Williams, and Adwumi 1992, 76).

Organizations that are involved in delivering extension services to women farmers include United National Development Programme, United Nations Children's Fund, Community Women and Development, Christian Rural Development Association of Nigeria, and Evangelical Church of West Africa. Their activities cover areas such as home economics, nutrition, training of leaders, child care, management skills, operation of loan schemes, and extension advice through specialists, and facilitating input supply through linkage to research centers.

Currently there is a widespread adoption of the training and visit extension system (T&V) in many developing countries. In Nigeria it is practiced in a unified version in which the extension agent is expected to disseminate information on different sectors or areas of agriculture. Unfortunately, the empirical research on T&V and other extension systems and their effects has been insufficient. Too little is known about collective as opposed to individual adoption of innovations and the role of groups and group-building through extension. The dynamics of intrahousehold behavior and their implication for extension are also poorly understood (Saito and Weidemann 1990).

Extension services aim to providing farmers skills, education, and technologies to help them make effective farm management decisions. However in many developing countries, the primary focus has been men farmers (Mijindadi 1993). Women farmers are inadequately served by existing extension services. Instead, extension advice directed at women hitherto has been on home economics and related topics that deal with the domestic roles of women. Factors contributing to the neglect of female farmers include

- small, dispersed, and less-secure farm fields
- lack of appropriate technologies for women's activities
- avoidance by formal credit systems
- less mobility and less uncommitted time
- less education
- male dominance of extension services
- cultural norms circumscribing male-female interaction
- the traditional view that men are authority figures responsible for key farm production decisions
- assumption of a trickle-down process of information
- household and domestic burdens and responsibilities
- lack of decision-making ability
- discriminatory customary and statutory laws
- unfavorable research policy environment

For commonality of understanding, it is desirable to define certain important concepts. One dictionary meaning of *reach* is making contact or communicating with a person. Innovation, according to Van den Ban and Hawkins (1988), is "any idea, method, or object which is regarded as new by an individual but which may not always be the result of recent research." These researchers also define *extension* as "involving the conscious use of communication or information to help people form sound opinion and to make good decision." FAO (1988) defines *approach* as "the style of action within a system. It embodies the philosophy of the system."

Given these definitions, reaching the African female farmer with innovative extension approaches means the conscious communication with the African female farmer to help her form sound opinions and make good decisions using ideas, methods, and objects that extension practitioners and individuals consider to have value, regardless of whether these ideas, methods, and objects have existed or been used before. What is worth emphasizing about the definition is that the innovation is not necessarily in the methods or ideas but lies in their conscious use for the first time to reach the African female farmer.

The innovative extension approaches discussed here are by no means exhaustive nor a panacea for the overall improvement of the African female farmer's abject conditions. These approaches are yet in an embryonic stage of development and need time to fully develop sound methodologies. Also their universal applicability is limited by some cultural practices, while their dynamic and interactive nature calls for their combined use to make their effects readily visible. Like any development process, the presence of development-accelerating conduits is a prerequisite for the manifestation of the highest potentials of these approaches.

Given this scenario, how can African female farmers be reached with innovative extension approaches with respect to different production resources?

Overcoming Constraints

Land Matters

To alleviate the effects of cultural limitations on women owning land, several approaches can be adopted. Communal land allocated to women farmers should either be cultivated individually or together by women in groups. Also, educating the populace on inheritance patterns can lower the barriers to women inheriting land. WIA extension agents should located small plot adoption techniques on women's farms. They should also encourage women farmers to embark on farming enterprises that require less land such as poultry and rabbitry. Women extension agents should teach women farmers how to convert refuse dumps (usually found in villages) to compost heaps or pits, as this will generate manure for soil fertility and reduce dependence on government distribution of fertilizer, which has become a racket in developing countries.

Credit

Credit is another constraint to maximizing benefits of extension services to women farmers. The problem may be overcome by:

- Ensuring that loans to women farmers are available in small amounts (large sums require a male co-signer or collateral).
- Establishing women's credit groups to take advantage of small loan packages.

- Increasing the loan period so that repayment is not due before crops with longer growth duration to mature.
- Providing loan facilities for women's agricultural work including processing activities, which are mainly women's work.
- Encouraging banks (agricultural and commercial) to find a niche for women farmers in their operations.
- Establishing formal and informal cooperatives, provided they can be as effective as women-only groups have proved to be.

Labor

Labor is a factor of production with great variability in type and availability and has a pronounced limiting effect on women's production. Women farmers should be provided with appropriate technologies that are less strenuous. Tools and equipment should be easily fabricated with local materials or junk motor parts. The height of equipment such as grinders, shellers, and extractors should not exceed the elbow for easy handling and maintenance. The use of animals either for traction or transportation (i.e., animal carts) can also be explored. The introduction of cheap and nontoxic herbicides will save women's time, in weeding, one of their principal farm tasks.

Technology

As agricultural research to develop improved technologies intensifies, women farmers stand a chance of benefiting. However, the acceptability of these technologies for women's enterprises and the accessibility, affordability, and availability of technological devices including spare parts should be considered. Policy makers should ensure that these technologies are part of the assistance that governments supply.

Education

Education for women farmers is the baseline on which all other resources are predicated. Proper attitude, knowledge, and skills through education will go a long way to enhance women's productivity. Education and training of women farmers should therefore be multidisciplinary in approach, using functional literacy where applicable. There should be flexibility in venues, relevant contents, and teaching aids, ensuring that recommendations are made in visual and oral forms. To provide high quality and timely education for women farmers, women workers in community development, health, and home economics should be redeployed to provide agricultural extension services (WIA).

Energy

Intertwined household responsibilities and farm work is an important determinant of the energy-use patterns and forms by the women. Women devote much time to securing energy supply, which is basically fuelwood and sometimes mineral fuel. The drudgery and time expended can be cut with the establishment of more woodlots and use of sawmill byproducts for fuel (in sawdust stoves or wood-shaving stoves).

Legal Rights

To ensure the right public perception of women's contribution to development, there is need for a proclamation of women's legal rights. This can be brought about through

- massive and extensive education on women's rights
- review of existing laws that are inadequate for the protection of women, e.g., marriage, inheritance, revenue, and residence laws

- re-orientating family and societal attitudes toward gender roles
- refuting the view that women's rights are privileges, so that they will not be subjected to political changes

Mobility and Time

Women farmers' propensity to mobility and leisure is very low. This is obvious in their roles, which combine domestic chores with production practices. Thus, innovative extension approaches to reach them should decentralize programs and break them into short modules. The establishment of programs that address women's needs will be an avenue to reach them. When enterprises of interest to women are established, their attention is also drawn, e.g., processing centers for crops in the area and daycare centers.

Policy and Research

Women's access to technology to improve national food security is a complex issue necessitating support from many quarters to be effective. An enabling environment will require policies as well as research for the advancement of knowledge on issues related to women. The following are useful:

- proper representation of women at decision-making levels
- changing society's view about women's roles
- favorable policy toward women's activities
- women's activities not being an appendage of a main development program
- funding of more research on women's activities
- transmitting research results through WIA programs

Use of Women's Groups

Working through women's groups to reach the African female farmer is among the earliest innovative approaches used by development and extension agencies. Three questions come to mind: What do groups have to offer to the African female farmer? Has the African female farmer not always worked in groups? And, if she has, what then is the innovation in this extension approach?

The answer to the first question is that groups, whether male, female, or mixed, facilitate adoption of new techniques, foster peer learning, allow members to pool resources for production, and allow reaching a large group of farmers using limited resources. For women, groups have special advantages. In cultures where husbands may be opposed to their wives working with male extension agents individually, they may be less likely to object if their wives as a group meet with agents. Furthermore, in women-only groups, women tend to be more outspoken than in mixed groups or when working individually with male agents (Saito and Weidemann 1990; Safilios-Rothschild 1986).

The answer to the second question is, yes, traditionally women have always worked in groups to improve their welfare and that of their families. These groups, sometimes based on age (Kafor groups in Gambia) or lineage, have always facilitated the mobilization of labor, savings and credit, provision of mutual aid, and cooperation for social and ceremonial purposes. The potentials of these groups for agricultural extension, however, have remained unrecognized and untapped until recently. This leads to the third question. The innovation in the use of these groups lies in

the ability of development and extension agencies to consciously harness and redirect the energies, resources, and skills of these groups for extension.

Reaching the African Farmer Through Her Own Kind—Female Extension Agents

A lot of technological innovation in agriculture has passed over the heads of African female farmers because in some cultures women are not allowed to interact directly with males who are not family members. Typically, information on innovations has been given to the heads of households, who generally are men. It is assumed that they will pass on the messages to their female household members. This has not happened, unfortunately, or where it has happened, information has been diluted, wrongly interpreted, or further sieved to that which is thought to be of interest to women.

To redress these tendencies, the new strategy is to reach the African female farmer though her own kind—female extension agents. This strategy is based on the concept of homophily developed by Rogers (1973). He postulated that the more alike two people are, the more likely they interact and empathize with each other and vice versa. It therefore stands to reason that, being the same sex, the African female farmers are more likely to understand female agents and communicate better and more freely than with the opposite sex (Saito and Weideman 1990; Endeley 1992). The increasing recruitment of female extension workers demonstrates national and international awareness about reaching the African female farmer.

To what extent have female extension agents influenced women farmers' access to extension services? Empirical research in this area is scarce. Moreover, results from these studies tend to be controversial. For example, an FAO study of women farmers' access to selected extension services in Kenya and Cameroon showed increased participation of these women with the presence of female agents on the extension staff.

However, a USAID study of 10 extension programs in Africa, found that having females on the extension staff made no difference to women's access to extension services. Rather the nature of the project activities, mobility of extension agents, and the type of crop promoted by the project were important determinants in reaching women farmers. Endeley's (1992) findings concurred with USAID for Cameroon's MIDENO Project. She reported that male agents were more effective in reaching women farmers than female agents, as observed by women's awareness of, and participation in, extension activities and general satisfaction with agents' services.

This notwithstanding, there is a high potential in the use of female agents to reach women farmers. However, female agents experience a broad range of problems that hamper their reaching women farmers, including limited access to institutional resources, such as mobility, housing, allowances, and promotion; negative attitudes of male colleagues; few female agents on the ground; lack of female agent role model to emulate; limited technologies for women farmers; women farmers' poor resources; and women's heavy workload.

Using Male Agents to Reach Women Farmers

Even if female agents (redeployed home economics agents and female agents directly recruited into extension) increase tenfold, their numbers will in no way be proportional to the ratio of women in the farming populations. Yet there exists a large cadre of male agents, with higher qualifications and more field experience than female agents, who could be used to reach women farmers, given the proper orientation. On this premise, Malawi and Cameroon started a new extension approach based on male agent-female farmer interaction. Spring (1985) reported that Malawi began with a study on the situation of women farmers, their roles in reproduction and production, their resource base, their constraints in access to resources, their situation regarding extension, need for extension, and appropriate extension methods to reach women, among other things. An intensive nationwide campaign was launched to legitimize interaction of male agents and women farmers. After a few years, a follow-up study was done to determine the impact of the training on female farmers' access to extension. It showed that male agents, if effectively trained and sensitized, backed by a realistic incentive system, can work effectively with female farmers. The number of females serving as contact farmers and the number of female farmers' group and cooperators were found to have greatly increased.

In Cameroon, gender targeting, as it was called, started by using the small number of female agents to serve women farmers (Walker 1990). These agents helped the groups to gain confidence in dealing with extension agents and establishing group dynamics. They also built agents' trust and credibility with these groups. With a supportive and highly motivated group, the female agents gradually introduced the group to the male agent responsible for that geographical area. The female agent then moved on to work with other women's groups.

Conclusion

None of these approaches is entirely new, but they are practiced with various intensities. It appears that the most effective approaches should focus on existing women's groups in villages, and where none exists formation of such groups will be important. Second, it is imperative to have women well represented among policy makers. At the same time, the views of village farm women should reach these women representatives among policy makers, giving a bottom-up approach.

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Agricultural Extension and Constraints to Women's Productivity

S. Korang-Amoakoh

The importance of female farmers and their role in the agricultural development of Ghana has been stated in diverse ways. For instance, the 1984 census indicates that in Ghana 48 percent of females and 52 percent of males are in agriculture (Ghana Statistical Service 1984). According to the World Bank (1992), women in Ghana constitute 47 percent of total labor force in agriculture, and they account for as much as 70 percent of the total food production. Women also dominate activities such as processing and marketing of grains and starchy staple foods. In certain agricultural production activities, however, such as land preparation men dominate (fig. 1).

Nonetheless, the overall contribution of the female farmer cannot be downplayed,

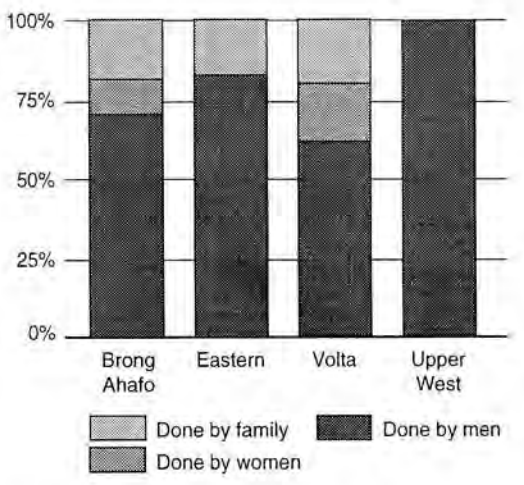

Fig. 1. Gender roles in land preparation by region, Ghana.

especially when one considers the numerous roles, duties, and activities that the female farmer will undertake in a "typical" day (fig. 2). Although the hypothetical typical day would have different characteristics in different regions and communities in Ghana, the overall pattern of time and labor commitments for men and women is consistent with survey findings here and in other sub-Saharan African countries. The important thing to note is that the relationship between males and females at the family farm level is not haphazard but rational.

Fig. 2. A typical day in a farming household in Ghana (developed by participants, Gender Training Workshop, Ghana Grains Development Project, Kumasi, 1991).

Time	Women	Men
4 am	wake up	sleep
5–6 am	sweep, clean house, fetch water, prepare food	wake up, set off for farm
7–10 am	set off for farm, farm operations, search for food, prepare food at farm	farm operations
10 am	breakfast/lunch	breakfast/lunch
11 am–4 pm	search for food, farm operations	farm operations
4 pm	return from farm/ search for wood	return from farm
5 pm	carry water, prepare meals	leisure
6 pm	dinner	dinner
7–8 pm	wash utensils, child care	leisure
9 pm–4 am	sleep	sleep

S. Korang-Amoakoh is director, Department of Agricultural Extension Services, Accra.

Generally, African female farmers can be categorized as:

- Those working with male spouses and children on the same farm business all the time; the wife may plant crops relevant to the immediate demands of the family on the same farm.
- Those working with male spouses and children on the same farm business part-time and working on their own farm with their children at different times.
- Those who work on their own farm business all the time.
- Those working on group farm business at some times and working on their own farms at other times.

Whatever the case, in the Ghanaian context, all females are at liberty to participate in, and own, crop and livestock farming enterprises and fishing businesses in one form or the other. Female farmers are generally known for the efficiency and dedication with which they conduct various farm and fisheries marketing activities. What perhaps may be debatable is their access to critical resources of land, credit, inputs, and marketing avenues. Female access to proceeds of the farm either in kind or cash has also been debated in several quarters. Surely the category to which a female farmer may belong in the farming businesses also has a bearing on her access to the proceeds from the farming business.

Perhaps the best approach to removing the barriers to females that have bearing on development, especially agricultural development, is a critical analysis of gender roles in agriculture and other household duties.

Constraints to Technological Innovations

Socio-Cultural Setting

Man-first. In Ghana, there is generally a man-first attitude. Consequently in the farm business setting, females, males, and children assume that men should always have priority in the provision of innovative extension. It appears to me that the female farmers do not see this as strange, but this attitude could impede their acquisition of knowledge for farming.

Marketing as a Preserve of Women. Generally in Ghana, processing and marketing of farm produce is the preserve of women. Female farmers often make long and tedious journeys to market with children on their backs and carrying heavy headloads of farm produce to sell.

Debt Burden. Society generally sees credit as debt, and females are not supposed to be indebted. Consequently women are reluctant to seek credit from lending institutions or individuals, and hence their inability to expand their businesses.

Education

According to the Ghana Living Standard Survey, 77 percent of females are illiterate. In rural areas, the general illiteracy is as high as 83 percent and obviously the greater portion of that would be female farmers. Contemporary farming must be developed and operated in a more scientific manner to be able to meet the challenges of growing populations. High illiteracy is obviously a handicap.

Technology Dissemination

Extension workers, researchers, and other program planners tend to assume that the technology, programs, and policies that are brought to farm families are usable by both

sexes. It is important to note that changes may have different impacts on the male and female farmers. Technology development therefore must take into consideration biased access to information that will affect farming practices and whether males and females have equal access to new technologies.

Extension Approaches

Various actions are being taken by governments to remove the socio-cultural constraints facing the African female farmer. At the agricultural production front, a series of interventions have been put in place to increase adoption of technologies by female farmers.

Government Initiatives

The first attempt at an extension delivery system aimed at giving female farmers access to technologies was the introduction of the home economics program into the agricultural production effort. This program was later expanded into the home extension program, which had the following program areas: home management, youth program, nutrition, and income-generation activities. In addition there were agricultural production components, which emphasized cultivating vegetables and legumes especially bambarra beans, *agushie*, and cowpea in backyard gardens to encourage consumption of nutritious crops. The production of staples such as maize, cassava, and yams were, however, backstopped through the national extension system.

The women farmers' extension program later took over the activities of the home extension program. This change stressed the important role of women in the agricultural production effort. However, the main activities remained virtually the same, with some expansion into the utilization and postharvest areas.

The Women in Agricultural Development unit (WIAD) was later created to increase participation of women in total agricultural production from production through processing, marketing, and utilization. The unit (which recently became a department) has been a subject-matter department like other technical departments within the Ministry of Food and Agriculture. The primary objective of WIAD is to source and develop technologies that would improve the efficiency of women-specific activities in agriculture. The department backstops the national extension delivery effort to reach female farmers and women in general with technologies for increased production. The subject-matter specialists of the department specifically:

- train front-line staff (extension workers) in women-specific activities
- make follow-up visits to operational areas to help front-line staff operate and also participate in the continuous diagnostic process initiated
- receive training to better carry out their responsibilities

NGO- and Donor-Supported Initiatives

In addition, various NGOs and donors have initiated programs intended to ensure adequate uptake of technologies by women farmers. The IFAD-sponsored Agricultural and Rural Development Project has a specific components to support women's participation. Examples are the Smallholder Credit, Input, and Marketing Project, operating in selected districts of the transitional zones of Ashanti, Brong-Ahafo, and Volta regions; the Smallholder Rehabilitation Project in selected districts of Northern Region, and the Land Conservation and Smallholder Rehabilitation Project in the Upper East Region.

A host of NGOs, including church organizations, have also initiated programs ensuring dissemination of technologies to female farmers. The SG 2000 agricultural program in Ghana is actively collaborating with governmental agencies in ensuring that technologies for production, storage, and utilization reach the female farmer.

The question now is whether we have, through these systems and initiatives, been able to adequately address the needs of women farmers. I dare say that despite these efforts, there is much to do to get technologies appropriate for use by female farmers.

The Way Ahead

The constraints enumerated earlier—man-first attitude, debt burden, and education of the women farmers—are socio-cultural issues. These barriers, I believe, can only be removed through the empowerment of women. Various attempts based strictly on transfer of technology may not be the ultimate solution. Male farmers need to appreciate the role of the women in the development of the family. The participation of female farmers in decision making and technology delivery is a critical input for the production process.

It is important to note that fear can be no recipe for ensuring women's participation. What is needed is the commitment from male front-line staff, NGOs, male farmers, etc., to acknowledge the importance of involving women in the technology delivery system. The commitment will then provide the necessary impetus. We need to give equal operational status and recognition to women to contribute to extension activities.

In Ghana in addition to the participatory approach being advocated, the following actions are recommended for effective delivery of women specific extension messages:

- improving the system of extension delivery to ensure that women-specific agricultural extension messages are considered and delivered in the implementation of the unified extension system
- strengthening the institutional capacity of WIAD to develop, coordinate, and monitor women-specific agricultural extension programs to meet the needs of women farmers

Conclusion

The constraints facing female farmers are not easily understood and where they are understood, people become apathetic and neglect them. It is however important to say that the success of women farmers is the success of the agricultural industry and the farm family. The time has come for social scientists to look into the whole matrix of female farmer production, house chores, and activities relative to the success or failure of the family unit. Agricultural extension must understand issues related to the female farmer as clearly as possible to remove constraints, increase women's productivity and production, and raise their incomes for the betterment of their lives, the lives of their families, and the society as a whole.

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Agricultural Intensification, Research, Women Farmers, and the Subsistence Imperative

Sue Ellen Johnson

The importance of women in African agriculture is well-recognized as is the need for agricultural intensification to increase food production and economic development. Accessible, equitable agricultural research initiatives and technology outcomes are essential for sustainable agricultural productivity. This paper discusses women farmers, subsistence systems, and research to support agricultural intensification in the context of West and Central Africa's fragile and degrading resource base.

Agricultural Intensification

Agricultural intensification involves the greater rate or quantity of resource use relative to another resource, generally land area, or to output, generally economic yield (National Research Council 1993). Agricultural resources encompass biophysical resources (such as inorganic nutrients), land area, chemical inputs or human labor, or knowledge or information. Intensification may involve more complete, synchronized, and efficient use of the available resource base, through the rapid use and cycling of internal resources, or the introduction of supplementary or alternative resources to an agricultural system.

At the farm level, the goal of intensification is higher productivity on a unit-resource (land or labor or inputs) basis. However, intensification does not always result in greater-than-historic production levels. On a degrading resource base, the immediate objective of intensified resource use may be to maintain an absolute yield level for subsistence. In such a situation, intensification (often of labor) is compensating for natural resource degradation, not augmenting or transforming production. This phenomenon is particularly relevant to farmers on marginal lands (often women) or farmers in highly dynamic, transitional systems.

Agricultural intensification is associated with increasing human populations and commercialization of the agricultural sector. Agricultural intensification has tended to subsidize overall economic development (Timmer 1992). Intensification of agricultural resource use is also associated with decreasing availability or quality of arable land, increasing markets (and prices) for agricultural products, general economic development, and changing availability of agricultural labor and wage rates. These conditions tend to prevail at the periphery of human population centers. Intensified use of land, labor, or other technological or biophysical inputs reflects relative resource availability and the knowledge base.

Farmers may reorient and reorganize agricultural systems in response to land

Sue Ellen Johnson is the agroecologist in the IITA, Humid Forest Program, Resource and Crop Management Division, Cameroon.

pressures, market or policy environments, and developing populations and resources. Such reorganization may or may not result in intensification. For scientists, a key challenge in developing technology is to anticipate and complement the trends and patterns of farmer-led intensification. These may be subtle or comprehensive transformations of the current agricultural systems, with simple or drastic consequences for the agricultural resource base, the welfare of the rural population, and agricultural productivity in the near and long term.

Agricultural intensification can also be the outcome of deliberate policy. Policies regarding land use, tenure, resource access, infrastructure development, labor markets, industry, and market regulation influence farm and regional intensification trends, directly and indirectly. Research informs policy decisions that shape intensification trajectories. And policy-led intensification encompasses public research policy.

Intensification can also be research- or technology-led as a consequence of research and technology innovations and introductions. Research policy influences which systems or criteria or practices are selected for intervention or monitoring. These decisions affect the development of physical input and information technology options that farmers can use to intensify resource use or increase resource-use efficiency and productivity. Research direction and topical decisions greatly determine farmers' participation in technology development.

Research interventions can lead to the reorganization of the agricultural system to utilize resources more fully or efficiently with new technologies, resulting in an alternative optimization of resource use. Natural resource status, on and off farm, is also influenced by intensification of resource use as well as influencing viable technology options. Research-led intensification is expected to benefit individuals, households, and the regional economy (IITA 1992, 1993) and to help maintain the ecoregional resource base through the development of comparative advantage. For example IITA research in West and Central Africa is focused on three contiguous agroecological regions that are defined by climate and agricultural potential: humid forest, moist savannah, and dry savannah.

The implicit objective of agricultural research and technology introduction is resource-use efficiency and higher productivity, frequently with a shorter term production goal and often for commercial markets rather than direct household consumption. Agricultural intensification and development may improve the traditional cropping systems or reorient the production system by introducing new crops or crop combinations. Specialization and diversification are processes that are commonly associated with the intensification or commercialization of farming systems. The occurrence of these phenomena is important at both the farm and regional scales, although the processes and outcomes differ with scale.

Specialization is a response to particular technology, information, or markets. Specialization implies a reduction in the diversity or number of production activities and a concentration of resources on a specific output.

Diversification may involve substitution of a crop component or inclusion of a new production (income) activity in an existing farming system. In women's traditional

cropping systems in West and Central Africa, this process would add activities in an already highly diversified system. Diversity provides ecological as well as economic stability to farming systems (National Research Council 1993). The scale of diversification is an important consideration. Regional or farming systems diversification can have differential impacts environmentally and economically.

Integration is the more complementary, complete, and efficient use of the farming system's resources. Agricultural resource management research is increasingly focused on the integration and optimization of biophysical resource use and flows. Integration improves resource-use efficiency and thus long-term productivity. Traditional cropping systems are often highly integrated, particularly in terms of labor and land use.

Enterprise (income) diversification or integration may not involve the same activities or objectives as agroecological system diversification or integration. Balancing the economic advantages of specialization or diversification with the necessity for integrated resource management is essential for development of sustainable intensified agricultural systems.

Women Farmers, Subsistence, and Intensification Process

Women in West and Central Africa are responsible for the food security and nutritional well-being of their families. Food security requires household activities for both caloric production (and processing) and gaining income to purchase food (Quisumbing et al. 1995). Women's subsistence imperative encompasses other family maintenance (or reproductive) tasks (fuelwood, water, sanitation, child care) as well as food production, processing, and preparation. Implicit in these activities is women's involvement in resource management, a responsibility the research community needs to appreciate more fully.

Managing this subsistence responsibility and the risks associated with intensification is the critical task for women farmers. Women must consider and adapt to new opportunities and constraints while ensuring their families' basic food supply (as well as cash income from surplus production). Subsistence tasks impose time and logistical constraints on women's participation in formalized agricultural research. In particular, they have little time to attend meetings and limited capacity to allocate resources for uncertain benefits (Agarwal 1985).

Women's subsistence systems are necessarily highly diversified and complex, and they accommodate household as well as farm-field management responsibilities. Women's field systems tend to be distinct from men's field systems. In southern Cameroon, men's field systems tend to be biologically simpler and more commercially oriented (Riviere 1996). Women's field systems are designed for a range of functions, some of which are becoming specialized and commercialized through the process of economic development, while still supporting basic subsistence needs. Specialization (dis-integration) options, regardless of whether they are a supplemental or substitute activity in the system, will be comparatively more difficult for women than men to implement. Market specialization can result in a loss of diversity in women's fields, and consequently in a loss in diversity of the subsistence bundle produced for the household. Therefore specialization can result in greater household involvement in the market economy (through

substitution) or it may marginalize women and children nutritionally while intensifying labor output (Whitehead 1985).

Women are also the primary producers (and market agents) of surplus staple food crops throughout West and Central Africa. Women's value-added crop processing activities are increasingly recognized as contributing to household food security. Urbanization has resulted in specialization and sole cropping for commercial objectives, yet a good deal of the food supply continues to be produced as surplus in small, mixed cropping systems by female farmers (Snyder 1994). Women constitute an increasing percentage of food producers, and agricultural resource managers (Quisumbing et al. 1995). This feminization of food production is a result of both male out-migration, cash crop development, and tradition.

Women's inclination and capacity to take risks with the subsistence food supply of the family needs to be investigated. Where resources are scarce, households may be more risk-averse with their subsistence-field systems than with market-oriented production systems. It is possible that women's subsistence systems are used to help manage the risk of men's research-innovative activities for commercialization. The timing of returns to innovation as well as the rate of returns, i.e., the opportunity cost, needs consideration. Increased labor or other investments for a deferred benefit probably is less feasible for women (Agarwal 1985). Intensification options must have direct, tangible, immediate benefits to cover the transaction costs of trial and adoption. Women's access and control of resources—land, credit, and their own time—are also fundamental constraints.

Subsistence Systems and Agricultural Research

Are subsistence systems logical and appropriate targets for research investment? A primary consideration for technology research and intervention is which systems to designate for development and intensification, as well as the nature of that development. Options for altering crop components or practices that are targeted for intensification need to be selected with regard to resource-use efficiency, productivity, and equity objectives. A broad objective of the international agricultural research centers such as IITA is to enhance regional productivity, while improving household welfare and food security. Yet supporting the enhancement of subsistence production systems, as opposed to encouraging the evolution or transformation toward higher productivity or commercialized, specialized production, remains a fundamental debate.

The number of households, the large area of often marginal lands involved in subsistence food production systems, and the significant percentage of calories produced by subsistence farms justify research for their development (Singh 1988). Complex subsistence systems also encompass important sources of indigenous knowledge, experience, and species for future multi-strata, multi-species systems. Such integrated systems will be necessary to optimize resource management and long-term productivity.

As resource managers, women are an important target group. Feldstein (1995) suggests that women utilize a poorer quality, less-resilient natural resource base. From the resource management perspective, women's

systems are critical because of their land and labor allocations. Increasingly, long-term productivity will depend on engaging women who are managing natural resources for food production. Current cropping strategies and land and labor intensification are resulting in loss and degradation of biophysical agricultural resources, as well as increasing cultivation of marginal and fragile lands. Declining fallows indicate increases in the rate (intensity) of land use and losses of inorganic nutrients. Also, with land degradation, labor required to manage weed populations rises (IITA 1995).

In south central Cameroon, gender roles in subsistence systems have changed. Women have gained greater responsibility and somewhat more influence on the subsistence system as overall commercialization has increased (Guyer 1984). Men's contributions to the household are primarily access to resources (land) and shelter. Other contributions, including cash, are voluntary. Guyer (1984) indicates that increased vertical integration of subsistence cropping systems in terms of women's labor and control has been coupled with disintegration of sequentially shared field tasks and family labor systems. This breakdown simultaneously increased women's workload and their autonomy in decision-making. How such a shift influences opportunities for research interventions deserves study. Researchers need to find ways to help subsistence systems managers, who are generally women, in their transition to intensified resource management and toward commercial development to meet regional caloric needs.[20] Enhancing the surplus production and the sustainability of subsistence production systems should be an intermediate goal for research and development.

Women Farmers and Participation in Agricultural Systems Research

Agricultural scientists need greater commitment to including women in the research process. They need efficient methods for soliciting and incorporating women's criteria and priorities to develop options that complement women's systems and resource access. Identifying intervention points in women's field systems is critical because of women's labor and time constraints (Snyder 1994). Targeting women's tasks, such as crop processing and weed control, or women's crops has been a good start (IITA 1992, 1993).

By offering multiple ("gender neutral") options, the research community can hope that some will fit women's priorities and resource base, though this is difficult because women's systems are so highly integrated and, in subsistence systems, priorities (concerns) shift with the season. Alternatively, technology can be deliberately targeted to women. Which systems or domains scientists choose to work on, which intervention points they target in these systems, and how they conduct and implement their research activities are important determinants of women's development and adoption of innovation.[21]

Scientists must continue to seek cost-effective techniques for involving women farmers in technology development and, consequently,

[20] However, there is a fundamental difference between regional and farm-level technological and economic strategies and their respective impacts on food security and resource management. This difference necessitates their linkage.

[21] Equally important, but not discussed here, are the mechanisms for technology dissemination including credit and extension services.

agricultural and economic development. Research cooperation with appropriate local institutions can help direct international and regional research and technology development to involve women and women's systems. National institutions collaborating with international agricultural research centers must actively direct research to their country-specific gender situations and dynamics.

Integrated systems and on-farm approaches stand a better chance of accommodating women's priorities because women tend to be systems managers (while specialized, commodity production tends to be dominated by men). A systems approach may be better suited for addressing women than a component or commodity approach because of the traditional division of responsibility for providing cash versus subsistence (that is productive, specialized activities versus diversified, maintenance activities) (Guyer 1984; Whitehead 1985). Potentially, women can take part in participatory approaches if they are appropriately scheduled and designed. Consequently such approaches can inform scientists of women's perspectives and priorities. Timely interdisciplinary research can alert scientists to gender dimensions of their particular activities.

The integration of women's production systems to meet multiple objectives may be highly efficient from a total resource perspective, but the systems' complexity makes modification difficult. Researchers must find ways to accommodate women's responsibility for managing multiple objectives as well as multiple resources, and they must recognize that women may be constrained by family or cultural factors, which are difficult for outsiders to address. Scientists should examine their research programs and the context of their assumptions underlying basic problem definition and research design.

Research Systems and Women Farmers

As scientists move toward on-farm research and the requisite participation for doing systems research, women's function in the agricultural system and transformation will become increasingly apparent. Technology alternatives may need to meet many more criteria than just market profitability. This perhaps explains the persistence of subsistence systems in much of West and Central Africa.

Although there is clearly support for gender analysis at the top levels within the international agricultural research center system, Feldstein (1995) indicated that many individual scientists still are unsure how gender should influence their particular research activities. Agricultural intensification, which tends to focus on productivity more than equity, does not automatically account for gender aspects. However, sustainability and intergenerational equity is increasingly important in technology development. Feldstein found that scientists need direct examples of gender relevance in their own work. IITA's scientists are expected to have an end-user perspective in all research. Although awareness of the general gender dimension in agricultural research reportedly exists, especially at the senior (and funding) levels, many scientists would also like it to be easier to define the gender perspective in a particular project and clearer how to respond to it.

The challenge is identifying and linking actual end-users and beneficiaries to tangible interventions within the limited resource control situations women face. Differential gender relations in African households have been increasingly recognized as competing for access to productive resources, including technology (Udry et al. 1995). Resource allocation and resource-use efficiency, overall productivity, and household welfare may not be maximized due to this competition. For example in Burkina Faso, overall production losses were estimated at 10 percent when women had to divide their labor between their subsistence, communal, and husband's fields (Udry et al. 1995). Efficiency arguments have been used both to target women and exclude them from the agricultural development process (Adesina 1995; Snyder 1994), although women's production efficiency is generally similar to men's on a unit-resource basis (Adesina 1995; Quisumbing et al. 1995; Udry et al. 1995). Interventions must be targeted at women as resource managers and not as labor resources.

In developing systems, scientists often consider available resources, but to adequately address women they also need to be cognizant of resource accessibility (Snyder 1994; Quisumbing et al. 1995). Resource access and control (including education, land, and labor) partially defines the parameters of women's research participation. Although women may not make allocation decisions, they are often responsible for implementing them. Individual scientists should solicit feedback from gender-sensitive actors at the national and community level, rather than relying solely on institutional gender-awareness programs. Scientists and development agents in national agricultural research systems are well qualified to comment on the gender aspects of international research in their own countries. New collaborative efforts, such as the ecoregional programs (IITA 1996), should provide increased opportunity for such interaction and input.

The pace and direction of technological and social change is determined by those cultures, many of which are very dynamic. Agarwal (1985), Guyer (1984), and other authors have addressed the cultural constraints of women's resource access and control and the co-optation of commercialized food crop technologies by men. Displacement of women in the process of intensification and commercialization of their traditional activities needs to be prevented. Displacement of women from traditional tasks can alleviate drudgery, but it also eliminates opportunities. Deliberate efforts are necessary to ensure that women both inform the technology generation process and benefit from it. Women producers need to be empowered through technological innovation, but that cannot be accomplished by research efforts alone. How scientists manage traditional intra-household inequities or other cultural constraints that limit women's participation or profit from research needs to be addressed in concert with other development agents, particularly national agricultural scientists. If women farmers are limited by nonagricultural circumstances (for example water hauling or basic education), collaboration with development agencies would allow research programs and interventions to be designed to accommodate community circumstances while scientists fulfill their primary research role. An ecoregional approach that seeks to involve all institutional actors in

strengthening the linkage between research and development in a given locality can generate awareness and responsiveness in the research system (IITA 1996).

The interplay between research and development (particularly participatory research) is a difficult milieu. Managing it should be easier with greater site-specific cooperation. Equitable technological change and economic transformation in West and Central Africa depend on a cultural shift in the role of women (Agarwal 1985). Through interaction with women farmers, researchers can appreciate the social context of technology and the possible distortion of the intended benefits. These unplanned impacts, which Whitehead (1985) asserts are typically the outcome of technologies introduced into traditional agrarian societies, often disadvantage women.

Quantifying women's constraints is less critical than identifying opportunities for women to satisfy their subsistence imperative, while improving their welfare (and income). But women farmers may be as concerned with constraints to their subsistence production as with commercializing their systems (Agarwal 1985). Developing cash-crop niches in subsistence fields that complement existing resource and labor use may diversify the already extraordinary portfolio of women farmers, yet allow them to increase their participation in the market. Because women tend to have limited access to capital (credit) and labor (time), substitute activities may be more feasible than supplemental activities in early technology shifts.

The nature of intensification and diversification of farming systems in the tropics will be related to these initial cultural and economic shifts, as well as the technological options available. Social systems may dominate economic and technological decisions, but should not limit the set of technical options. How does research reduce the burden and drudgery of women, while simultaneously providing them with a proportional share of opportunities and benefits of technological change and innovation? This challenge surrounds the process of technology generation for food security and sustainable resource management. In West and Central Africa, the development of intensification options needs to be guided by the resource managers' experience and priorities. The implications for agricultural productivity, agricultural and natural resource management, and food security are profound.

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Agriculture Research Issues as Related to Gender: Gender-Sensitive Technology Dissemination

Mary A. Mgonja, Catherine A. Kuwite, Liberata C. Mushi, Zubeda O. Mduruma, and Tuael E. Mmbaga

Agriculture remains the backbone of the economy in most African countries and is the key to both social and economic development. Nevertheless, despite investments made by governments and donor agencies in the agricultural sector, food security in Africa has steadily declined over the past 20 years.

The recent concerns over food crises in sub-Saharan countries has focused attention on African agriculture itself, economic changes, and the relegation of rural women to food production within an under-resourced subsistence sector (Whitehead 1990). Food security involves the whole cycle of agriculture from land preparation, planting, and weeding to processing, preparation, and serving of food. In most African countries, the success of new technologies does not depend on the high return and low cost of a technique but on simplicity and similarities to, or possibility of integration into, traditional practices (Kassimoto 1992). This clearly suggests the need for having a user focus.

Agricultural Research and Technology Development

Agricultural research attention is increasingly turning to the small-scale farmers whose landholdings have less productive potential in terms of inherent physical and climatic properties. The concern here is on the distinction between agricultural research and technology development. The latter has no function outside a definable market or market potential, and the process of meeting the needs of that market cannot be effective and profitable without the involvement of members of that market in the determination of research criteria, design, testing, and evaluation or without early consideration of promotion, sales, and servicing (Feldstein et al. 1989).

The fact that agricultural development, particularly that aimed at bettering the lives of the impoverished majority of individuals in developing countries, occurs in a social context requires looking at the social construction.

All aspects of agricultural research from problem identification to methodology and dissemination have social implications. The challenge for agricultural research—a challenge that gender analysis helps to meet—is to better direct research toward specific groups in order to increase both equity and efficiency. By specifying research by user group, we make explicit the biases inherent in technologies.

Mary A. Mgonja, Catherine A. Kuwite, Liberata C. Mushi, Zubeda O. Mduruma, and **Tuael E. Mmbaga** are on the staff of the Selian Agricultural Research Institute, Arusha, Tanzania.

According to Jiggins (1986), the international agricultural research centers have not avoided gender issues altogether in their socioeconomic studies of impacts nor in yield and constraints analysis, but there is much that is methodologically unsatisfactory about what has been measured, how it has been valued, and how data has been analyzed and presented.

Still under the role of agricultural research, there are five basic facts about gender and agriculture (Feldstein et al. 1989):

- Many households in developing countries have different income streams (his and hers) and different destinations for their income within the household.
- There are socially assigned differences in men's and women's roles and resources.
- Increasing household income does not benefit all members equally.
- In most parts of the world, technological innovation has tended to disadvantage women relative to men.
- Women farmers are as productive as male farmers when given access to similar resources.

The goal of agricultural research is the development of technologies that farmers will use to improve their welfare and that of their country. There are four parts to the goal, all of which have gender implications: the technologies must be developed (agricultural research is technology oriented), technologies must be used (otherwise they are ineffective), technologies should improve family welfare, and technologies should improve the welfare of the country (Feldstein et al. 1989).

In most sub-Saharan African countries, agricultural research has been under way since before independence several decades ago. This guarantees that technologies are available whether or not they were developed for specific groups of people. Many technologies have proved to be socio-culturally unacceptable, or they have not saved time or reduced energy needed as compared with existing technologies. Similarly some technologies have been beyond the financial capabilities or skills of women, who have less access to credit and training than men (Kassimoto 1992).

In discussing agricultural research issues, it is worthwhile to consider the patterns of gender responsibilities in agriculture (Cloud 1985):

- *Separate crops*. Men and women are responsible for production and disposal of different crops. Women are often responsible for small livestock, vegetables and tree crops near their dwellings, and food crops.
- *Separate fields*. Women and men produce the same crops, but in different fields. This pattern is common in West Africa, where private fields are part of a larger system in which both men and women also contribute their labor to communal fields. In such cases, there may be three interlocking systems: fields worked by each wife, fields worked by the husband, and fields worked by the extended family.
- *Separate tasks*. In this pattern, some or all of the tasks within a cropping cycle are assigned by gender. For example, rice transplanting is often carried out by women, plowing by men, and processing by women.
- *Shared tasks*. In this pattern, which overlaps other patterns, men and women undertake the same tasks on the same crops. In some systems most tasks are shared; in others only labor-intensive tasks such as weeding and harvesting are shared.

- *Women-managed farms.* There are two types of women-managed farms, *de facto* and *de jure*. In de facto systems, even though men legally own the land, they work away from the farm for days, months, or even years, leaving the women to manage the farm. De jure systems are ones in which women have legal ownership of the farm; these types of farms appear to be increasing worldwide. They tend to be among the poorest farming households, yet many people depend on them for survival.

Women and Appropriate Agricultural Technologies

In recent years "appropriate technology" has become a catchphrase in development literature. Technology is considered appropriate if it makes optimum use of the available skills and resources of any given economic environment (Mitchel 1980). Thus, appropriate technology is not a specific package of tools or techniques, but an approach that reflects a particular view of society or technology.

In some parts of the developing world, productivity in agriculture has been substantially increased by the attention given to the tools for different activities in the production cycle, e.g., domestic vegetable dehydrators, rice hullers, small presses for palm oil, improved crop varieties, introduced crops, and even new cookstoves. In other areas, such technologies have not reached the target group. One reason could be an inefficient extension system that does not focus the end user or target group. This calls for gender analysis in developing women-focused strategies in agricultural research as well as for other specialties that support improvement in agricultural production.

Agricultural Extension

Extension services are traditionally directed to men, even where women clearly perform much of the farm work and make many of the farming decisions. A few programs particularly in Africa are pioneering in providing extension to women as well as men, not through separate programs but by adjusting existing services. Promising strategies include (Herz 1987):

- Designing programs with an awareness of female farmers' issues (the crops or animals for which women are responsible and the tasks women perform).
- Recruiting and deploying more female extension agents.
- Working more with groups of, say, 15 to 20 farms. This may be particularly effective for women, who may be more accustomed to working together in such groups than are men.
- Encouraging women to comment on programs and giving them information.

User Need Approach in Tanzania

In Tanzania, as in some other African countries, those strategies have not always been considered. Research approaches that give due consideration to those strategies will most likely have positive effects on technology adoption. Integrating gender into agricultural research and development requires agricultural professionals to acquire a new set of conceptual and analytical perspectives and skills to deal explicitly, effectively, and efficiently with women-related issues.

With the understanding of the agriculture and environment systems in Tanzania, the role of women in ensuring food security, the problems associated with women's

accessibility to appropriate technologies, and the frequent threats of food insecurity, a group of professional women formed the Tanzania Association of Professional Women in Agriculture and Environment (TAPWAE). The group's challenge was, what can be done to uplift the lives of rural women?

Concerned about the current situation in agriculture and environmental degradation, heightened by frequent drought, TAPWAE started with a community-based food security project in 1994. The developmental objective of the project was to identify priority areas for enabling women to more effectively ensure community food security through increased access to improved food-cycle technologies.

The immediate objectives were to

- identify major causes of large food deficits and environmental degradation
- conduct community analysis through surveys to derive research questions from, or in collaboration with, the community
- identify major food components and the constraints to use of developed technologies
- identify possible points or areas of intervention
- develop a scientific response to basic food needs in selected agroecologies

Implementation of TAPWAE's Objectives

One of TAPWAE's immediate objectives was to develop a scientific response to basic food needs in selected agroecologies. As a startup point, the Same district, a drought-prone agroecology in northern Tanzania, was chosen. The district has frequent droughts, acute food shortages, and heavy environmental degradation (soil erosion and deforestation). Food insecurity in Same district was a major concern that required immediate attention. For many years, sorghum had been strongly recommended for the district as a drought-tolerant cereal, but farmers had been slow to adopt it. Realizing this problem, TAPWAE worked out a strategy help people learn to accept sorghum as food. The strategy is targeting the role of women in a particular stage of the food cycle to serve as an entry point to the project that is geared to improving food security.[22] TAPWAE considered the "user need" approach and responsibilities in the food cycle to introduce sorghum utilization before sorghum production technology. Because of this strategy's success, we now call it the Same model. The model is considered effective in introducing a new food crop in an area where it has not customarily been grown and eaten.

Future Activities

Under the community-based food security project, other smaller projects have been developed to address food security issues:

- sorghum processing and utilization
- sorghum variety evaluation
- development of a sustainable food basket for resource-poor communities of marginal areas of northern Tanzania
- community-based production of improved maize, sorghum, and bean seed
- re-introduction and production of neglected indigenous food crops and vegetables
- rehabilitation of night ponds to revive the traditional irrigation system

[22] The details are given in the following paper in this volume.

Conclusions

1. Women are critical to agricultural production and rural development, but their access to resources is often constrained by gender barriers or blindness.

2. The incorporation of gender issues and analysis grew out of discontent with the inequitable distribution from the results of technological change.

3. Integration of gender into agricultural research and development requires agricultural professionals to acquire a new set of conceptual and analytical perspectives and skills to deal effectively with women-related issues.

4. Judicious efforts made by professional women to work with rural women in short and long-term strategies to develop sustainable agriculture and improvement of the environment should be encouraged and supported.

5. To avoid misconceptions, gender-sensitizing training and programs should be emphasized for policy makers, researchers, and extension workers.

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Community-Based Food Security through Women in Drought-Prone Areas of Northern Tanzania: The Same Model

Catherine A. Kuwite, Mary A. Mgonja, Liberata C. Mushi,
Zubeda O. Mduruma, and Tuael E. Mmbaga

In Tanzania, as in many sub-Saharan African countries, women are the major actors in the food security cycle. But they rarely get improved agricultural technological packages mostly because men, being the heads of most households, have more direct contact with extension officers in agriculture and other disciplines. When communities are not addressed as a whole, there is very low adoption of improved ways of life, and this has slowed national development both socially and economically. Technologies that aim to improve the food security of rural households should therefore be introduced through appropriate target groups.

The Tanzania Association of Professional Women in Agriculture and Environment (TAPWAE) brings together professional women in the fields of agriculture and environmental sciences to develop short- and long-term strategies to improve women's efficiency in fulfilling their roles in community development especially food security (TAPWAE 1994).

Although TAPWAE is still in its formative phase, it has already begun to address the immediate concern of rural women subject to harsh arid environments. Same district in Kilimanjaro region was the startup point. TAPWAE developed a project proposal called, Community-based Food Security through Women in the Drought-Stricken Areas of Northern Tanzania. Certain districts were identified in the Northern Zone (Arusha and Kilimanjaro regions) as drought-prone. The Same district, a district often seriously hit by drought, was taken to be a model. To address community food security problems in Same District the project components are sorghum utilization demonstration, sorghum on-farm variety trial, and rehabilitation of natural water ponds.

The Same District

Tanzania has 20 regions, grouped into seven agroecological zones. The Same district is in Kilimanjaro region in northeastern Tanzania. This region is the smallest and most densely populated, however some districts are highly developed both socially and economically. The Same district is one of least developed districts in the region. It is often hit by drought and crop failures. The Wapare, a Bantu-speaking group, are the main inhabitants of this area. They combine agricultural production with livestock-keeping for their livelihoods. The majority live in the highlands where the topography

Catherine A. Kuwite, Mary A. Mgonja, Liberata C. Mushi, Zubeda O. Mduruma, and **Tuael E. Mmbaga** are on the staff of the Selian Agricultural Research Institute, Arusha, Tanzania.

is undulating with rolling steep hills. Such a topography makes the land susceptible to erosion. The rainfall is erratic and amounts to 300 to 500 millimeters in the lower Pare to more than 500 millimeters on the hilltops. Drought, especially in the lower Pare, is a common phenomenon.

For over 10 years, drought has depressed production of maize and beans. These staple crops are used to prepare *makande*, a mixture of dehusked maize and beans sometimes consumed with vegetables and sour milk. On the hilltops, the main cash crop is coffee. Excluding remittances, approximately 80 percent of total household income is spent on food purchases. During the last 8 years as a result of drought, food had to be purchased from markets that require trips of 5 to 10 hours.

The Wapare have a long tradition and expertise on gravitational irrigation. This knowledge still exists though the system has fallen in disuse as river flows have shrunk and have become more seasonal due to deforestation from increases in cultivated land area, cutting of fuelwood, and the tendency of farmers to cultivate crops near water sources.

Sorghum and lablab beans (*Dolichos lablab*) have been recognized as crop plants that can tolerate drought conditions. Sorghum yields fairly well with 300 to 500 millimeters of rain during the cropping season as compared with a seasonal requirement of 550 to 700 millimeters for maize.

Despite official recommendations to grow sorghum in Same district, especially lower Same, the idea was not well received by farmers (Oniang'o 1994a, 1994b), mainly due to their preference for maize and lack of familiarity with ways for processing and using sorghum. The poor palatability and unpopular grain color of sorghum varieties also contributed to farmers' reluctance to grow sorghum.

Farmers in Same district have persistently planted maize despite yearly crop failures. As a result, the district usually has huge food deficits. Food aid from both local and international sources has become an almost permanent feature. Against this backdrop, TAPWAE did an analysis of the situation in Same district in order to help alleviate the problems. TAPWAE took an entirely different approach to the problem by starting with sorghum utilization followed by on-farm trials and long-term water rehabilitation.

Sorghum Utilization Demonstration

As part of a community-based food security project, a sorghum utilization demonstration was held in Same district in August 1994 (Kuwite and Mushi 1994). This was a reverse way of trying to make sorghum accepted as a crop.

A preliminary visit was made by a few members of TAPWAE. Meetings were arranged with regional agricultural and livestock development officer, district commissioner, and district agricultural and livestock development officer for Same, Kilimanjaro region nutritionists, the SG 2000 representative, and leaders of two villages in Same district. All these people agreed that the demonstration might motivate people to grow sorghum.

The extension officers helped identify a village in which to carry out the demonstration. Although we would approach the Bangalala village community

as a whole, the main target group for the technology dissemination was women. As a consequence, it was agreed that 20 influential women would be nominated to participate in preparing sorghum dishes. Of the 20 women, 15 would come from Bangalala where the demonstration was to take place and 5 from Mwembe a village 15 kilometers away. The leaders and people we met were given specific roles so that everyone would be active participants.

Bangalala Primary School was chosen for the demonstration. The teachers and pupils were to participate in preparing songs, poems, and dances emphasizing sorghum cultivation and utilization.

TAPWAE provided resource persons, who came from Mtwara, Dodoma, Arusha, and Kilimanjaro regions, and a coordinator for the demonstration. These were mainly nutritionists who were conversant with preparation of sorghum dishes. The village leaders arranged all the protocols.

Taste Panel

Because it was important to proceed to Same with a convincing message for the villagers, a taste panel was arranged at Selian Agricultural Research Institute. The following dishes were prepared: *ugali*, pops, *pilau, makande, wali wa mtama*, bread, and *maandazi*.[23] The panelists, who included scientists at Selian were members of TAPWAE who had not tasted sorghum dishes before. The taste panel was given questionnaires to rate dishes. All the dishes were rated good to very good, but the completed questionnaires revealed some aspects that needed modification.

Demonstration

On the day of the demonstration, we had the district commissioner as a guest of honor. Other visitors included the SG 2000 representative, regional agricultural and livestock development officer, district agricultural and livestock development officer, other district, division, and village leaders, and the villagers who were our target group. Food preparation started at 6 A.M.

We had discovered that maize mills could also process sorghum, doing away with laborious sorghum dehulling. The 20 women farmers participated fully in the preparation of ugali, wali, pilau, maandazi, bread, sorghum pops, and *uji*.[24] These were made of either sorghum alone or sorghum blended with wheat flour. All the men, women, and children of Bangalala village were invited to taste the dishes. A few representatives from Mwembe village and from each of the neighboring villages were also invited.

After songs, poems, and dances by the primary school pupils, the district commissioner gave a speech emphasizing sorghum production. The DC then opened the show and everyone had a chance to taste the dishes. The foods were well received. The DC closed the demonstration by saying that

[23] Ugali: stiff porridge with sorghum flour substituted for maize flour. Pops: popped sorghum grain. Pilau: pilaf with dehusked sorghum substituted for rice. Makande: a mixture of dehusked maize with beans sometimes taken with vegetables and sour milk. In this case, dehusked sorghum was substituted for maize. Wali: boiled rice with dehusked sorghum substituted for rice. Bread: bread from sorghum flour blended with wheat flour. Maandazi: donuts made of sorghum flour blended with wheat flour.

[24] Porridge made of sorghum flour.

the dishes tasted very good and asked for similar demonstrations in many villages or at key places to involve several neighboring villages.

The 20 women farmers who participated were given 1 kilogram of Tegemeo sorghum for planting, a manual on sorghum production, a brochure on preparation of sorghum dishes, and a questionnaire for rating the dishes.

Assessment

Although all the guests and visitors were impressed by the prepared sorghum dishes, TAPWAE also assessed the acceptability of the dishes. The response was very good.

The demonstration was successful because a team approach involving TAPWAE, SG 2000, regional district leaders, primary school teachers and pupils, village leaders, and villagers (men and women) was adopted.

Monitoring

We had a chance to follow up on the 20 women involved in sorghum-dishes preparation. They planted the sorghum seed left with them and asked for more. Their men were delighted with the new dishes prepared by the women at home. However, due to bird problems, sorghum will be grown during the short rains season, when bird damage is expected to be minimal.

Because of the success of the program, TAPWAE has been asked to carry the demonstration extensively in Same district and other districts. However, this will only be possible with more funds. Until now SG 2000 has been our only source of funds.

Nobel Peace Prize laureate Norman Borlaug visited Bangalala in June 1995 together with the minister of agricultural and livestock development, Frederick Sumaye (who is now prime minister), SG 2000 officials, and a filming crew. A mini sorghum dish preparation was held. Dr. Borlaug gave TAPWAE an award worth US$5000. This has been a motivation to TAPWAE.

Sorghum Variety Trial

After the successful sorghum utilization demonstration, it was essential to be able to provide farmers with varieties that have the best attributes including high yields, disease resistance, wide adaptability, acceptable grain color, and bird resistance (Mgonja et al. 1995a).

In three villages in Same district, one sorghum variety and three lines were tested in 1995 long-rain season: Tegemeo, SDS 2293-6, SV1, and 85-1L-208. Tegemeo is a released cultivar whereas the other three entries are advanced (elite) lines. The experiment was laid out in a randomized complete block design with three replications. Two farmers in each village provided land. Trials were planted under the direction of the researcher, but in collaboration with the farmers as well as the village extension officer. The seedlings were thinned and topdressed with 50 kg N/ha. Plots were hand weeded, and birds were scared off after 50 percent heading occurred. In 1996, the trial was repeated using SV1, Tegemeo, Marcia, and Pato.

In 1995, the three elite lines tested had higher mean grain yields than Tegemeo, however the differences were not statistically different (Mgonja et al. 1995b). All four entries were white seeded, and they yielded more than what farmers usually

obtain (about 0.5 t/ha). Farmers prefer white-seeded sorghum as it does not contrast much from the maize.

The 1996 trial has already headed and Pato appears to be earlier than the other lines. We intend to hold a field day before harvest to have farmers participate in identifying a suitable variety for the area.

As these trials are about to be concluded, we have developed a project proposal, Community-Based Sorghum Seed Production, to ensure availability of improved seed at the village level.

Pond Rehabilitation

Interviews with the women farmers revealed that water availability was a critical problem. We intend to help rehabilitate natural ponds so that water will be available for vegetable gardening and, in severe droughts, for irrigating sorghum.

A visit to natural ponds and areas where ponds could be built was made by TAPWAE members, staff of the Christian Council of Tanzania, Traditional Irrigation Project (TIP) personnel, and agricultural extension staff in Same. After the visit, we asked TIP staff to prepare an estimate of the cost for building or rehabilitating individual ponds. The estimates have been made and funds will be solicited. We plan to involve other parties, such as government, nongovernmental organizations, and the villagers themselves, to improve the situation.

Conclusion

The Same model is to us an example to follow. However, because each area has unique characteristics, the model has to be refined and modified. There is still much to do in Same to develop a sustainable agricultural system including:

- water rehabilitation
- introduction of tree planting
- introduction of perennial cash crops
- terracing
- economic activities, e.g., milling machines
- marketing for sorghum
- rural road networking
- social center

What we have accomplished is only the beginning.

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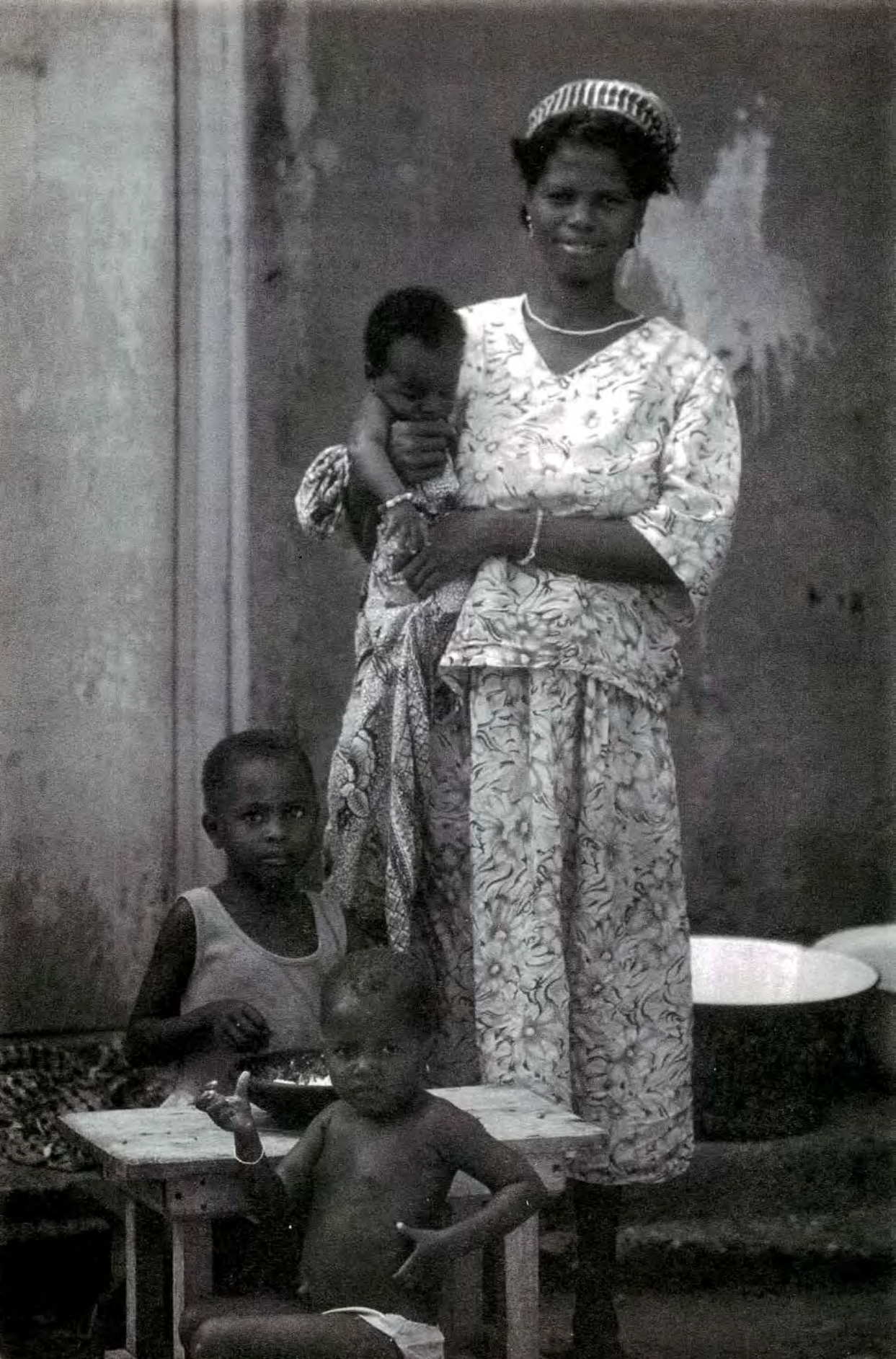

Access of Rural Women to Formal Credit Institutions

Ramatu Al-Hassan

Access of rural women to formal institutional credit is a critical issue for rural women because of their productive and reproductive roles and their increasing participation in community development programs. There is evidence that the yields on farms owned by women are generally lower than those owned by men. The lower yields have been ascribed to the less adequate access to essential inputs that women have relative to men (Alderman et al. 1995). Bonitatibus and Cook (1996) cite a FAO study of Kenya, Malawi, Sierra Leone, Zambia, and Zimbabwe that found that rural populations generally have less access to formal credit institutions than do urban residents. Furthermore, women received less than 10 percent of credit directed to smallholders and just 1 percent of the total credit directed to agriculture.

The Need for Credit

One of the important support services for increased agricultural production is credit. Credit enables producers to procure inputs such as agro-chemicals, equipment, services, and hired labor. Credit is essential because equity capital is seldom sufficient to meet the expenditure requirements for higher productivity and expanded production. In rural areas, the need for external financing is even more important because access to local financial resources is restricted by the low productivity and widespread poverty of rural people (Sadeque 1986). On the other hand, it is also believed that the relative poverty of rural peoples has led to the dualistic structure of developing countries—a large traditional agricultural sector with low productivity and a small modern sector of industrial and other highly productive export-related activities. Because rural peoples are thought to be too poor to save or receive credit, efforts to mobilize domestic savings and provision of credit have, for far too long, been concentrated in the modern sector (located in urban areas) (United Nations 1981, 12).

Despite its inadequacy, equity capital continues to be the main source of funds for agricultural production. The available sources of external funds for agriculture in Africa are commercial banks, specialized national credit, and development institutions, cooperatives, and the informal sector. The dualistic concept of developing economies has relegated the financing of the traditional agricultural sector to the informal sector.

Lending in the Informal Sector

The informal financial market is made up of individual money lenders, single collector savings (*susu*) operators, and thrift associations or clubs for savings and credit. Other sources are friends and relatives, traders, and input suppliers such as contractors for export or industrial crops

Ramatu Al-Hassan is in the Department of Agricultural Economics, University of Ghana, Legon.

(cotton, tobacco, cocoa). This market is older than the formal financial market and is more accessible because of flexibility in meeting the savings and credit needs of most people. Aryeetey and Gockel (1991) provide a detailed description of the sector in Ghana.

However, informal sector loans are usually short-term, and, because the scale of operation of the average individual lender tends to be small, there is a limited supply of credit compared with demand (Adera 1987; Sadeque 1986). Also loans tend to be granted on a personal basis, and in some cases, repayment in the form of produce or service discourages monetization of savings. Terms of informal sector loans also tend to create a dependency of the borrower on the lender. These factors limit the ability of the informal sector to improve productivity and harness capital accumulation, especially in rural areas.

Although efforts have been made to improving rural financial services and to facilitate savings mobilization through specialized banks, such as the agricultural development banks or rural banks in Ghana located within rural communities, formal financial institutions are still out of the reach of the majority of rural people, particularly women. For example under the group lending scheme of Ghana's Agricultural Development Bank, about 16 percent of the small-scale farming population was reached (Aggrey-Mensah 1980).

Factors Limiting Women's Access to Credit

Women's inadequate access to formal institutional credit is due to their peculiar circumstances as well as the failure of institutions to adapt to the needs of women. The factors most frequently cited in the literature as limiting women's access to formal institutional credit are as follows:

- High rates of female illiteracy especially in rural areas, coupled with complex procedures for securing loans (e.g., completing loan application forms or business plans).
- Fear of indebtedness, which is a result of poverty and risk aversion.
- Low savings capacity.
- Lack of collateral.
- Women may have no capacity to establish a reputation for credit-worthiness as independent agents (e.g., the requirement of the consent of a male relation).
- Banks' requirement for a savings account to qualify for a loan.
- Formal credit programs are usually directed to household heads, but most women live in male-headed households.

Thus women are not necessarily discriminated against by financial institutions in assessment of loan applications. Rather, because the institutions are profit seeking, their objectives, rules, and regulations do not lend themselves to meeting the credit needs of rural women.

The current pressure for macroeconomic reforms in Africa also influences the willingness of financial institutions to extend credit to difficult areas or target populations such as rural women. The financial sector adjustments under structural adjustment aim to improve efficiency and viability through competitiveness of institutions. These goals are clearly at variance with the goal of equity, which the promotion of credit for rural women seeks to address. Reforms also sidestep the need to strengthen small producers (i.e., raising their capacity to generate and use funds, thereby raising their productivity). In spite of the desirability of

reforms, it also important to seek additional or alternative systems to meet the otherwise unmet needs (FAO 1986).

Supplying Credit Needs

There is little documentation on how rural women meet their credit needs, however it is generally accepted that women participate more in the savings and credit associations of the informal sector. For example, Collier (1988, 6) writes, ". . . women predominate in the informal savings market (both as savers and even as lenders in many cases). A particularly interesting manifestation of this is the savings club." Savings clubs or thrift and credit societies are social groups that meet at regular intervals, bring agreed savings to each meeting, and allocate them to an individual. The thrift societies are common to both men's and women's groups in many parts of Africa (Miracle, Miracle, and Cohen 1980).

Savings and credit institutions (formal and informal) are insufficient for the large numbers of families currently needing credit for family survival. Thus donor interest in supplementing credit sources, especially for women, who are responsible for many family expenditures, has increased (Due et al. 1990).

Several programs have been initiated by governments, donors, and nongovernmental organizations to provide support to women in their productive activities. Although few of these programs may be described as women-only programs, the majority have special provisions to target women. In Ghana, examples are ENOWID,[25] various agricultural development projects supported by the International Fund for Agricultural Development, and a number of NGO-supported credit schemes including the Credit with Education Scheme of the Freedom from Hunger Project.

The programs have had varying outcomes but the more successful ones, as elsewhere in Africa, have been those that have been modeled after the operations of the savings and credit societies. According to Bonitatibus and Cook (1996), the factors influence success of programs are

- low transactions costs
- availability of deposit facilities
- development of income-generating skills
- reliance on groups for credit and related activities
- linking of repayment to future lending

One necessary condition for the success of credit programs, not listed above, is the availability of a market for the products of beneficiaries.

Low transactions costs are essential for the sustainability of any credit program and this is achieved in group credit schemes through a reliance on groups to manage themselves. Group lending, though not necessarily for group production, facilitates easy repayments through peer pressure on individual members not to default. The provision of deposit facilities inculcates the savings habit among individuals and the desire to save is further enhanced by linking an individual's credit limit to the level of their savings.

Credit is not an end in itself but a means for increasing productivity or expanding production or even increasing consumption. There must be viable income-generating

[25] Enhancing Opportunities for Women in Development Project, under the Programme of Action to Mitigate the Social Cost of Adjustment (PAMSCAD).

activities to invest in. Borrowing for production makes sense only if the returns from production can pay for the cost of capital borrowed, and this must apply to poor rural women as well. Access to markets as well as an orientation to produce marketable products are therefore essential for profitable utilization of credit.

Issues and Recommendations

Group credit schemes with conditions as listed above are dotted all over Africa. What is needed is a cross-fertilization of ideas and experiences for refinements and further adaptations to local conditions. However three issues remain to be addressed: What should be the role of government? What is the most appropriate institutional framework for administering these programs? Is use of credit profitable under the present high interest rates.

Role of Government

Many rural credit programs have been sponsored by donors through governments and NGOs. Although this donor support is welcome, African governments need to play a leading role. Donor-supported programs usually run for a specified period after which the problems that these programs are meant to address are no longer supposed to exist. The problems of improving credit supply to the rural sector and to rural women in particular cannot be carved into some short time-frame. The size and diversity of the rural sector requires a credit support program that is entrenched in the overall development strategy of the country.

The role of government in the supply of credit to the rural sector in general, and to rural women in particular, must be assessed within the context of the outcomes of structural adjustment. As noted earlier, restructuring the financial sector for higher efficiency further limits the expansion of financial services to rural areas because of the relatively high costs and risk of lending to these areas. Government should therefore ensure equity by redistributing the benefits of financial restructuring to the losers. Formal financial institutions should be encouraged to expand to rural areas and support the new frameworks for credit delivery. As an incentive, tax rebates could be specifically targeted to the provision of credit and other financial services to rural areas. Although these programs need not target only women, they must have women's components with specific measures for reaching women.

Institutional Framework

A review of diverse credit activities in several countries by the U.S. Agency for International Development in the 1970s (Bathrick 1981, 20) concluded that "the institutional form of the credit organization, i.e., commercial or agricultural bank or cooperative, seems not to matter so much as the economic opportunities associated with the use of credit" and that more efficiency is obtained by "using those institutions that already possess a system of outreach to rural areas."

The importance of the availability of viable economic activities to the effective utilization of credit has already been underscored. However, the institutional form of the credit organization deserves more consideration than the above finding seems to suggest.

In Ghana, the programs operated by government with donor support have been administered either solely by the program coordinating unit or in collaboration with a formal financial institution (e.g., the Agricultural Development Bank) that has the

machinery and experience in the business of managing loans even if not under their terms. Other programs, however, such as ENOWID and those run by NGOs, have been managed without collaboration with banks.

The provision of financial services should be carried out only by those with the training experience and machinery to deliver them. In line with the recommendation to encourage the formal sector to extend services to rural areas, these institutions should develop the machinery to reach rural areas themselves. For those that have rural branches or branches in the districts, this will not be too difficult. Others with weak rural links should aim to support NGOs with well-established systems of outreach to rural areas.

High Interest Rates and the Profitability of Credit

Although the level of interest rates charged is not one of the factors influencing the success of credit schemes, the interest rates of about 46 percent that prevail in Ghana are high enough to keep away potential borrowers. The role of government is also essential here to reduce cost of reforms to the poorer members of society. A subsidized credit program, administered through formal financial institutions is one of the ways to mitigate the social cost of adjustment.

Conclusions

Much of rural Africa depends on the informal sector for credit. The high cost of financial transactions and risk have limited the availability of financial services to rural people. Although both men and women are affected by the low density of formal financial institutions, the burden falls more on rural women because of their lower economic and social standing as well as cultural norms that further inhibit their ability to establish creditworthiness as independent agents. Formal financial institutions have failed to modify their modes of operations to meet the needs of women.

The response to women's credit needs has come through donors and NGOs. Various group-lending schemes, often incorporating savings mobilization and some form of education, have been modeled and tried with varying degrees of success. These group schemes hold promise, and more should be done to fine-tune them to fit local conditions.

African governments should take a leading role in providing credit to rural areas through incentives and with specific measures to reach women. Although efficiency in operations will be achieved by the financial institutions delivering these services to the rural areas, the institutions can also provide the support and guidance to well-established NGOs to perform the outreach activities.

The rural sector in most of Africa is large and diverse. The vicious circle of low productivity, low incomes, and poverty can be broken only through a concerted effort by governments and donors, with governments playing the leading role. The provision of credit must be part of a long-term development strategy to harness rural resources for development.

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Off-Farm Income-Generating Opportunities for Women: Women as Food Processors and Traders

Ester Ocloo

African women have won an enviable reputation for their economic contribution through food production, processing, and trading. In Ghana, most of these women, who have little or no education, use indigenous methods to process all that small farmers grow. In addition they control the retailing and distribution of agricultural and marine produce. Thus women have already demonstrated their capability for off-farm income-generating activities.

It is said that in the developing countries, there are more self-employed women than men. I feel that this is because the women, being custodians of family life, are more sensitive to the sufferings of human beings and as such they easily identify areas that cater for their needs. As a result, you will find many women in the food and clothing income-generating activities or industries in developing countries.

The food processing and trading sectors provide many opportunities for women because they do not require a lot of capital to set up business, and they are profitable and yield good returns. Some 10 years ago, I did some work for the Equity Policy Center, Washington, D.C. I had to find out whether the street food businesses were profitable to those who were engaged in them. This work was carried out in Madina near Accra and involved two groups of five women engaged in cooking and selling *kenkey* and *abolo*.

In the first week of the exercise, I helped the women to record all their expenses and work out the profit margin on what they produced. We allowed only ¢2,000/day as labor cost and nothing was allowed by way of indirect cost. The inputs were bought on credit and the average credit facility available to them was ¢10,000 each. At the end of the first week, after accounting for all inputs, we realized a profit of ¢7,000/day for the abolo production group and ¢4,800/day for the kenkey production group.

In a meeting with the women, we discussed what we had done and the profit levels. I told them it was not enough and that they could improve upon it. They all appreciated the points I made, yet they laughed and said, "Madam, do not worry, we are happy because our families had some kenkey and abolo to eat." It is obvious that these women were not so much looking for profit, but they were concerned about the well-being of their families.

In the second week of the exercise, instead of acquiring their inputs on credit, they paid cash for them and after expenses were accounted for, they realized their profit margin had gone up 40 percent.

Ester Ocloo is the founder of Sustainable End of Hunger Foundation, Accra, Ghana.

A few weeks ago, I went through a similar exercise with a group of young women attending a course in food processing, preservation, and home management at the African Women Entrepreneurial Centre in the Volta Region of Ghana. In this exercise, I demonstrated to them that they could easily learn to cook our Ghanaian dishes and engage in them as income-generating ventures.

I give these examples to stress that the opportunities for food processing and trading as income-generating activities are many, and we need to appreciate and adopt them as viable and alternative employment opportunities for our womenfolk.

The activities of women who pursue serious income-generating activities in the agricultural sector can be divided into two categories: trading and food processing. Those in trading can be further divided into those in the distributive trade and those in retailing. Some of the women in the distributive trade are so rich that they are able to pre-finance the farmers or contract them to grow solely for them. Those in processing deal with either ready-to-eat foods, such as those sold by the street, or preserved foods, such as dehydrated cassava chips, pepper, or okra.

These activities engage about 30 percent of our women who are basically illiterate and who are seen as without any other choice but to engage in them. These activities are usually carried out single-handedly by the women on a small scale as a domestic activity and often to supplement family income and support. In some cases, a few women team up to operate small chopbars or to trade.

Just as in agricultural production, the food processing and trading sector is characterized by small enterprises, the lack of institutional support, the lack of appropriate and adaptable technologies useful to the small operator, the illiteracy of the majority of the women, lack of access to credit, and dependency on how good the crop season is.

There is also one major sad phenomena associated with this sector. This is the attitude of our educated young girls and women who see food processing as an activity of the illiterate and therefore below them. It may be true that our illiterate grandparents and parents have engaged in them over the years, but they have also proved the viability of these activities as income-earning ventures or businesses in a very considerable way. In this era, when we are faced with finding alternative employment and income sources, it is important that we begin to cultivate a positive attitude toward the food processors and traders and to develop forward-looking strategies to improve their viability and to expand the sector as well as empower our young women to take up these activities on a large-scale basis. This will not only create jobs, it will also contribute immensely toward the attainment of national food security.

But how can we improve the situation to enable women take greater advantage of the many opportunities the sector provides? The Sustainable End of Hunger Foundation (SEHUF) believes that one of the ways of addressing the issue is through training. An appropriate package of training can help young women to appreciate dignity in labor and open their minds to the realities of life as well as expose them to business ideas.

To be able to pursue this as an effective program, SEHUF has set up the African

Women Entrepreneurial Training Centre at Peki Blengo in the Volta Region to help address the issue. Among the courses offered is a 6-week intensive training package in food processing and preservation, home management, and business skills. The training takes the young women through different methods of cooking as well as lessons in preparing dishes like soups, gravies, and stews. It also demonstrates the essence of nutrition. They are taken through the practice of cooking some Ghanaian dishes both at household and large-scale levels. They are taught to cost and price their dishes and work out profit margins, and they are surprised at the amount being made by the street food sellers, chop bars, etc. Such practical demonstrations enable the women to appreciate the options available in food processing and helps them form a more positive attitude and take steps toward starting their own businesses in the sector. Further, women can be trained in improved methods of food preservation, which will help increase the economic availability of food throughout the year. We find in our markets forms of dried cereals, cassava flour, smoked fish, and vegetables like peppers.

If off-farm food processing enterprises by the women is to make an impact, there is need to upgrade their skills and introduce them to scientific methods and new technologies appropriate to the small-scale operations they are engaged in. The technologies introduced must be less expensive and less tedious to operate and should help to improve the time use and management of their activities. This I believe will enable the women expand their enterprises and, given the proper training and packaging materials or inputs, they can help reduce the large postharvest losses common in Africa. In fact, some of it is being done already during the glut seasons.

Their efforts are however, being limited largely by the lack of access to credit on terms that will empower them to do more in the sector. Lacking collateral, poor women in developing countries find it almost impossible to obtain the credit for augmenting productivity or starting new income-generating activities.

It is however heart-warming to note that in the past few years there has been a considerable innovation in developing different kinds of institutional structures, credit delivery, and financial support systems for small entrepreneurs. The role of women as economic actors and change agents finally has attracted attention from development planners, government officials, financial institutions, and the donor community.

To help build a sound and responsive financial service in Ghana, women engaged in income-generating activities should get rapid and convenient access to small short-term loans devoid of cumbersome paperwork and other bureaucratic hurdles. Poor rural women should have financial services at hand where they can offer nontraditional collateral and have ready access to repeated loans. The confidence of these women as borrowers and business owners should be built through simple and convenient credit-related training, such as orientation on the use and repayment of loans through small savings accounts.

To ensure against defaults, loans should be advanced to women who have joined into small work groups or cooperatives that will guarantee each loan and put pressure on members to repay on time. Also small

lenders should take pains to know the borrower, treat her with respect, and build a relationship of mutual accountability. The focus here should be to improve the women's quality of life, not necessarily linked to credit and indebtedness.

Special linkages should be developed between the rural banks and these women. The banks should recruit local credit officers from the community, selecting individuals who have the same social background as the borrowers and who basically speak the same language and provide them with simple credit-related training to build the bank-client relationship.

Various support systems should be created to sustain the development of the sector. There are several NGOs, government organizations, international development agencies engaged in micro-enterprise programs. Careful analysis needs to be carried out to establish special working and support relationships between them and the women in the sector.

Communication and exchange of ideas should be encouraged between the women and development agencies. I will propose a forum in which women and NGOs, government officials, technology experts, financial institutions, and researchers can share ideas on how to improve the sector to increase the opportunities for income generation.

To have greater impact, there is a need for the coordination of existing programs and policies directed at these women. Such programs, policies, and strategies must be flexible, adaptable, and user-friendly. They should be able to empower women to achieve more and not make them dependent, so that when the programs end the women will be self-sufficient and can go on their own.

It is also important that the programs and policies be reviewed as often as practicable within the framework of changing technology and the business environment. This will ensure that they are responsive to the essential needs of the women.

Over the last few years, international development agencies, the government, and NGOs have placed more emphasis on promoting cooperative groups, technical assistance, and credit to speed up micro-enterprise development in the country. Therefore, it is only by focusing on profitability, by creating development linkages and appropriate credit conditions, and by redirecting support to women in food processing and trading that we can confidently expand the opportunities for income generation and achieve positive growth and long-term sustainable development.

Improving Postharvest Technology Development in Africa

Y. W. Jeon and L. Halos-Kim

Despite technological interventions in sub-Saharan Africa during the last two decades, subsistence agricultural production generally prevails, and agricultural processing mostly takes place at the family level. One reason is that African agriculture has unique characteristics that make technologies already proven to work in other places difficult to adopt in Africa.

The limited success of agricultural research in raising production in sub-Saharan Africa is usually attributed to harsh climate and poor soils, to its short research history, or to poor management of research efforts (Binswanger 1986). The approach researchers use, however, can significantly affect research impact. Too many research programs in developing countries are limited to agronomic issues and fail to include socio-cultural and economic dimensions.

In recent years, improved farming techniques have raised agricultural production markedly. This change has, however, underscored the inadequacy of post-production practices[1] and infrastructure. Production increases have had little impact on the rural farm economy because of the inability of the agricultural development system to support post-production operations.

Despite some technological advances, agro-processing[2] remains a subsistence industry with few incentives for expansion. The lack of appropriate and low-cost equipment is one of the problems encountered by small-scale processors.

Processing is a traditional responsibility of women. But they often are not in a position to make decisions about investing in improved technologies. Their inability to acquire new equipment, and the distance to processing centers, which are usually located in urban areas, limits the volume of processed food they can produce, so they forgo an opportunity to earn more income.

To increase agricultural production in Africa, it is imperative that the needs of women farmers and women agro-processors be given serious attention. Recently, development institutions such as IITA have started to add gender-related issues to their agendas to improve the delivery and utilization of research results.

[1] Operations occurring from the time the crop is mature enough for harvest and processing until the time of consumption.

[2] Off-farm postharvest activities done to transform agricultural crops into convenient forms for sale or for consumption, consisting of various unit operations unique for any desired product. Examples of general operations are peeling, washing, tuber cutting, soaking, defibering, drying, grinding, threshing, and cleaning.

Y. W. Jeon is postharvest technologist and **L. Halos-Kim** is research specialist, Postharvest Engineering Unit, Resource and Crop Management Division, IITA, Ibadan, Nigeria.

At IITA a holistic approach to technology development has led to the proper targeting of the technology user. A participatory development strategy has also contributed to fully understanding constraints and opportunities for improving the system. In technology design, incorporating a gender perspective in addition to technical and socio-economic factors has proven effective in defining the target clients for the development of appropriate technologies.

IITA addresses constraints in postharvest systems by developing simple, low-cost, labor-saving devices and equipment that can be fabricated from locally available materials. These innovations are intended to minimize losses, increase labor productivity, improve product quality, and reduce drudgery, especially for women processors. They are now being offered as alternatives for improved postharvest handling of the major food crops in Africa.

Characteristics of the Postharvest System

The postharvest system can be divided into two stages: crop processing and food processing. Crop processing involves harvesting and all other activities done until the crop is brought home to store or to process further. Food processing starts when the crops are withdrawn from storage and lasts until they are processed into the desired form for sale or consumption.

Crop and Food Processing Patterns

Agriculture in sub-Saharan Africa is characterized by small, fragmented, resource-poor farms that cultivate multiple food crops. Cassava is a major food in the diets and livelihoods of many smallholders. About 80 percent of the cassava is consumed by the producing household. Harvesting for consumption is usually done weekly, and processing is done throughout the year by women and children using traditional methods, which are slow and unhygenic.

Cereals and grain legumes are also grown extensively. Seventy-five percent is consumed by the producing household. Maize is mainly grown as a cash crop, while sorghum, millet, and cowpea are grown for family consumption. Each crop has a brief harvest period, but the harvested crop is processed into food products in small quantities throughout the year. The average farm family's production of cereals and grain legumes is sufficient to feed the household for not more than 3 months.

The crops are processed into indigenous forms (foods) requiring special preparations unique for any given region.

Labor Requirement

Most postharvest operations with traditional methods are time-consuming. In Nigeria, it takes 663 laborer-hours to harvest and process a 1-hectare field yielding 10 tonnes of cassava roots (Jeon and Halos-Kim. 1994). Harvesting and processing require the most labor. Women contribute 87 percent of the time required to process food for family consumption, and they are also involved in harvesting and handling (Jeon and Halos 1991).

Labor input for harvesting, handling, drying, and processing cereals and grain legumes (217 laborer-hours/t) is provided mainly by the family members—20 percent is contributed by the husband, 62 percent by the wife, and about 15 percent by adult sons or daughters (Jeon and Halos-Kim 1994).

Timing of harvesting and subsequent operations for cereals and grain legumes is critical because, for safe processing and

storage, the crop has to be gathered quickly before severe deterioration and pest damage occur. This urgency places a heavy load on women and children who normally do most of the job.

Handling Efficiency

Production increases resulting from improved growing practices are diminished by improper handling of the crops after harvest. In cassava, post-production losses may be as high as 45 percent, with about 14 percent during harvesting and 22 percent during processing. Qualitative and quantitative post-production losses in cereals and grain legumes have been estimated at 30 to 50 percent. These losses result from field and environmental conditions, varietal characteristics, untimely harvesting, improper drying, insect damage, consumption by livestock, operators' attitude, and lack of processing tools and equipment.

Gender Roles in Crop and Food Production

Men and women perform distinct roles in crop and food production. The division of labor is based more on the physical difficulty of the task than the magnitude (the series or number of activities involved). Men are generally involved in production activities, while post-production activities, in addition to household chores, are reserved for women. The woman's role in processing is dictated by social and cultural norms.

Division of land resources among adult family members is common in Africa. Land allocation distinguishes each family member's role and status in crop and food production. In a study in three major cassava-producing states of Nigeria, gender role and status were defined by land ownership, as well as the production objectives (table 1). Husband and wife have absolute control of their own farms. However, the wife is obliged to work in the husband's farm harvesting, handling, and

Table 1. Gender roles[a] and status as shown by decision making and participation in cassava farming for family consumption and sale in Oyo, Rivers, and Delta states, Nigeria.

	Cassava intended for consumption		Cassava intended for sale	
Activity	Decision making[b]	Participation[c]	Decision making	Participation
		Husband's farm		
Land preparation	1.1	1.2	1.1	1.1
Production	1.2	2.5	1.2	1.3
Harvesting	4.1	4.3	1.3	2.0
Handling	4.2	4.5	1.7	3.1
Processing	4.5	4.7	1.5	3.3
Marketing	–	–	1.2	2.8
		Wife's farm		
Land preparation	3.4	3.6	3.3	3.9
Production	4.0	4.1	4.0	4.4
Harvesting	4.4	4.6	4.4	4.5
Handling	4.3	4.6	4.7	4.6
Processing	4.8	4.8	4.8	4.8
Marketing	–	–	4.6	4.9

Source: Y. W. Jeon, unpublished survey results, 1990–92.

a/ Scoring: 1 = Always husband. 2 = Shared but mostly husband. 3 = Equally shared. 4 = Shared but mostly wife. 5 = Always wife.

b/ Decision role on how, when, and what to do.

c/ Level of participation in the activity once the decision is made.

processing the portion of the crop meant for family consumption and, in addition, helping to handle and process the portion of husband's produce that is intended for sale.

The wife plays a strong decision role in her own farm. In some cases she consults her husband on land preparation and other production activities. The husband, on the other hand, relies on his wife's decision on harvesting, handling, and processing.

Farmers tend to differentiate tasks by the type of crops grown. Maize is considered a cash crop and is controlled mostly by men from production to marketing. Sorghum, millet, and cowpea are crops grown by women for family consumption. In many cases, women and children provide the labor required from crop care and management to processing.

Experiences in Postharvest Technology Development

In the past, few attempts to address the constraints in the postharvest system were developed fully enough to achieve adoption of new technologies. The application potential of new technology has often been limited because developers have followed the classical approach based on designers' assumptions. In general, the characteristics of this approach are:

- *Piecemeal technology development.* The interrelationship of operations and processes in the system is not established before development begins. Therefore, some operations are highly mechanized while others are not. The result is poor system performance owing to the unbalanced technology.
- *Design to satisfy the whims of the designer.* Machine-centered designers tend to overlook the end-users' needs and technical capability. Most technologies have been designed based on theories and systems used in developed countries. The resulting technologies satisfy the designer, but not the end-user.
- *Use of imported technologies.* Technologies from developed nations are introduced to developing countries through aid, grants, or loans. Failure to consider the technical requirements for operating these imported technologies is one of the reasons why they are underutilized or nonoperational.

Implications for Technology Development

The problems associated with postharvest operations can be overcome by introducing appropriate tools and equipment, system arrangement,[26] and investments in training of farmers and agro-processors.

Analysis of the postharvest system (Jeon and Halos 1991; Jeon and Halos-Kim 1994) has indicated that losses and labor inefficiencies are mainly due to lack of appropriate tools and equipment for processing. Processing food is a job reserved for women who use traditional methods and have limited access to production and investment opportunities.

Maintaining a separate farm, in addition to performing household chores and providing post-production labor in the husband's farm, puts a heavy load on the wife, who also has to manage her meager resources. Increasing production will demand more and more of the women's time both for on-farm and off-

[26] Arrangement of component operations so that process and material flow are most efficiently handled with the least movement, therefore avoiding losses (due to spillage, etc.) and unnecessary delay.

farm activities. Providing incentives and appropriate facilities for women while at the same time providing improved production technologies for men, as has been the object of many development projects, should balance the situation.

Because the bulk of the post-production activities are performed by women, small-scale crop and food processing technologies are vitally needed to help women at least cope with family food-processing requirements. However, the development of technologies should focus on food products that are sufficiently available and for which competitive markets exist so that families can satisfy their own needs and increase their incomes, as well. To accomplish this, the development approach needs to incorporate the mechanization aspect of the operation. This, however, is a shortsighted strategy if it neglects the other factors in the system such as the economic capability of farmers and agro-processors and the nature of the farming system.

Observations on the successes and failures of technology introduction in developing countries in the last decade suggest that design approaches should be re-oriented to fully integrate the social, economic, and technical aspects into the technology. Technology development efforts therefore need careful planning and a strategic approach. A designer should always know the clientele and be familiar with existing technologies upon which any development should be based.

Strategies for Technology Development

Strategies for technology development are varied. At IITA, technology development does not end in the workshop, rather it is passed on to the user then back to the designer, and so on, until the desired result is attained (fig. 1). The technology designer and user should work together until a satisfactory solution to a defined problem is found.

Experiences in generating and introducing postharvest technologies, provide a basis for suggesting guidelines for developing technologies that will suit users' requirements.

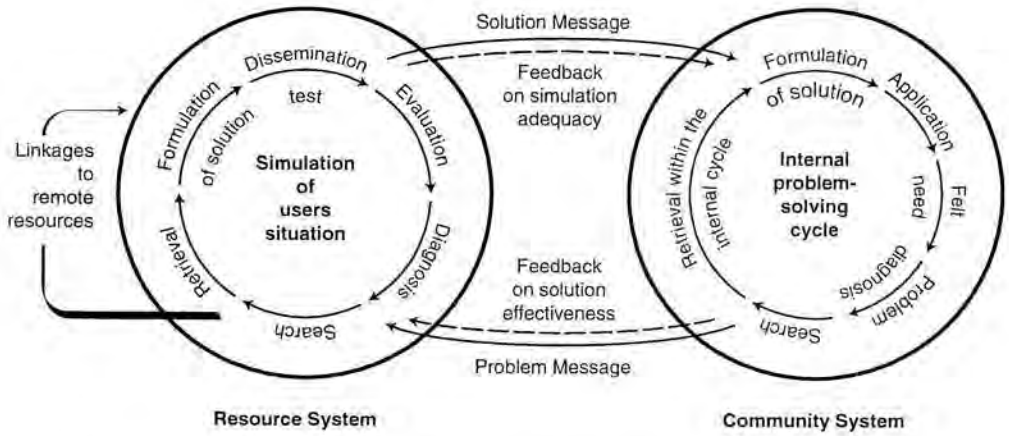

Fig. 1. Model for postharvest technology development and introduction.

1. *Apply a participatory development process.*
The need for farmer-tested technologies is crucial in the African environment. The participatory approach will improve the understanding of constraints, opportunities, and criteria to ensure a greater adoption of technology by target users. This approach requires the involvement of the target users in the planning and development stages. It encourages the users to give full support in the information-seeking process so that designers can fully understand users' needs and limitations. This method has been widely recommended, but fully integrated and truly interdisciplinary teams involving both technical and social scientist have rarely been constituted.

2. *Define a holistic view of the problem.*
Because technology is introduced within a social system, the different subsystems that will affect and will be affected by the technology must be considered. The technology should be suited to these environments. The strategy for technology development should then involve examining the postharvest system as a whole rather than focusing on specific commodities, techniques, processes, or technologies. The approach also overcomes gender-bias and provides more sustainable options—the designer who has a holistic view understands the gender division of jobs and is able to design technology to fit them.

3. *Consider existing technologies.*
Existing technologies, although mostly traditional, are potential materials for development. Because people are used to them, modifications and improvement can be appreciated more readily. Once people have experience with the development process, they become eager for better technology and are more willing to try out new ideas.

4. *Appropriate is affordable.*
Some technically efficient machines may be impractical for a specific environment. The applicability of the technology will depend on whether it can be locally manufactured using locally available materials. To reduce operational costs, it should be simple to operate and maintain. Costs considerations are important to investors and even more so to farmers and processors who barely have enough cash for their daily needs.

Technology development should properly focus its objectives. Analysis of the farming system and processing operations should be done conscientiously, taking into consideration constraints and their causes, as well as the doers of the job, among other production and post-production factors.

A full farming systems approach should be considered with the groups chosen for emphasis. Research, development, and funding institutions should also realize that investments in yield-increasing innovations can be useless if post-production constraints are ignored. For women farmers, bottlenecks in processing are major constraints to higher productivity.

Any technological innovation should be enhanced with the farmers' traditional knowledge to ensure effective technology transfer. Farmers are likely to innovate if given the proper incentives.

Technologies for Agro-Processors

To enhance productivity, the development objective is to provide appropriate tools and equipment that overcome excessive losses, high labor input, and poor product quality, which can result from inability to process crops immediately after harvest. Consequently, technology development

should create opportunities to increase the income and save the time of processors, which can then be devoted to other productive activities.

The pattern of crop production, the type and nature of food processing and consumption, available resources, the technical and economic capability of the farmers, and marketing opportunities are among important criteria considered in developing postharvest technologies. The special requirements for specific food preparations, as well as the discriminating taste of the consumers, must also be taken into account.

The need to consider gender roles in crop and food production, in addition to the technical requirements of different operations, implies a more discerning approach. This leads to the development of packages of technologies for different levels of operations—from family-based to fully commercial—by adapting existing technologies and by developing new designs. Table 2 shows features of technologies developed at IITA for different levels of operations and targeted toward specific user groups and their operational objectives.

The family-based processing package consists of manually operated equipment designed for women and children responsible for family food preparations. It is recommended for a hamlet-based operation that three to five family units can use in turns.

The technology package for women's group processing is designed to reduce the drudgery of individual processing and to encourage women to invest collectively. It is partly mechanized to process family food and at the same time to provide opportunity for women to generate income. It is intended to be operated for food exchange, contract processing, and product marketing. The food-exchange scheme offered by the center relieves the women of individual household processing—the women can come to the processing center to exchange raw materials for processed products and work to earn income.

The technologies for small- and medium-scale enterprises are more mechanized and

Table 2. Features of post-production technology packages developed for different levels of operation.

Features	Family-based processing	Women's group operation	Small-scale enterprise	Medium-scale enterprise
Target user	Family units: wives and children	Women's groups (up to 30 members) Cooperatives	Women's groups and family units Private entrepreneurs	Private entrepreneurs Community associations
Design capacity (raw material input)				
Cassava	50 kg/day	1 t/day	3 t/day	5 t/day
Cereals and grain legumes	10 kg/day	200 kg/day	0.5 t/day	5 t/day
Degree of mechanization	Manually operated	30% mechanized	50% mechanized	80% mechanized
Component equipment				
Cassava package	Peeling bay, peeler, fermentation rack, grater, bagging stand, dewatering device, sifters, chippers, grinders, transport facility, stove, dryer			
Cereals and grain legumes	Harvesters, threshers, bagging stand, winnowers, sorters, grinders, polishers, dryer, storage cribs			
Recommended operational scheme	Family food processing or hamlet-based	Food exchange, contract processing, or trading	Contract processing or trading	Trading and custom hiring

designed for enterprising men's and women's groups, community associations, or private individuals, primarily to generate income.

Impact of Improved Postharvest Technologies

The packages of technologies developed by IITA are being tested and introduced in villages of Nigeria, Benin, and Ghana. Some of the technologies (such as a manually operated cereal grinder, a field cart, a gari[27] processing package, and a multi-crop thresher) are now being utilized by the target user groups. Among the features of the equipment that lead to ready adoption are adaptability to various crops, a range of capacities, ease of operation and maintenance, and use of locally available materials.

In village operations, these technologies reduced handling and processing losses by 50 percent and increased labor efficiency by 75 percent in the first 6 months of utilization (Jeon and Halos-Kim 1994). Technologies for maize processing reduced labor input by 23 percent in harvesting, 70 percent in handling, and 65 percent in processing. Women's handling and processing burden was significantly reduced. Time savings resulted in more intensive production and postharvest activities during the succeeding cropping season.

Impacts were also notable among women's groups using the cassava-processing package and among women and children using the family-based processing package for cereals and grain legumes.

In the cassava-processing technology package, although part of the operations is mechanized, the control of the enterprise remains in the hands of the women. Women hire male operators for grating and dewatering (pressing). In the classic approach of piecemeal technology development, men usually take over the control of the enterprise as the operations become more and more mechanized because the type of technology is difficult for women to operate.

Analysis of the cassava-processing package used by the women's group in Dogbo village, Benin, indicated that even at 30 percent utilization capacity, the gari-processing enterprise alone is capable of generating profits, with a benefit-cost ratio of 1.43 (Akalumhe 1996).

In northern Nigeria where technologies for hamlet-based food processing were introduced, even modest innovations such as apron-type and knapsack-type harvesters for cowpea and maize have been quickly adopted by women farmers. Men farmers' interest in mechanized processing is explained by their need to process their produce for marketing and the opportunity to use the equipment for custom hiring.

The Task Ahead

The postharvest technologies IITA has developed, tested, and introduced in pilot sites have generated interest among the crop growers and processors. Although feedback from users is satisfactory, diffusion of the technology is still slow. Several issues of design, social science, utilization science, and technology transfer require increased attention for research and development.

Technology Design. The diverse nature of African farming systems should be considered, in addition to the taste and food

[27] A grated, fermented, and roasted cassava product.

preferences of the consumers. Various types of technology packages or package components should be available that can be applied under various situations. One particularly desirable design feature is ability to handle different crops.

Technology, Economics, and Social Science. The ultimate goal of technology introduced in any development project should be a favorable impact on the social well-being of the target users. Impact should be measured according to set objectives and priorities. While many technologies have been developed to reduce postharvest losses, the losses even after farmers adopt the technologies are still appreciable. Often farmers do not fully adopt new technologies because of socio-economic factors such as the nature of ownership and lack of price incentives for better quality products. Target user's attitudes and economic status are also factors to address when introducing new technology. Issues relating to improvement of their economic well-being including benefit distribution, gender and power, and product diversification should be considered.

Technology and Utilization Science. New products developed to expand the market potential of a crop may be hindered by consumer preference for traditional processes and products. New high quality products should be similar to existing preferences to ensure a high level of acceptability. Also improvements in the nutritional attributes of the crops must be considered along with providing expanded utilization alternatives for added value products.

Technology Transfer. An appropriate technology transfer mechanism should be put in place to ensure that the technologies are delivered and fully utilized by the target beneficiaries. Fitting the technology into the farming system is as crucial as the development process. Technology transfer can be likened to a transplanting process. Providing training to users on technology management will equip them with the understanding and skill to sustain the technology.

Developing technologies for African condition is complex. This process entails a careful analysis of the socio-cultural and economic characteristics of the rural farm families including attitudes and preferences, more than the technical criteria. Any strategy adopted should consider system development in terms of modifying existing production and post-production patterns to include possibilities of making a commodity price competitive in the market while providing enough food for the family.

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Developing Agricultural Enterprises for Rural African Women: A Case Study from Ghana

Margaret Bowman-Hicks

TechnoServe's goal is to increase the productivity, income, jobs, and food security of rural poor clients by supporting small-scale businesses in the agricultural sector. We help women and men to own and run their own agricultural processing and marketing businesses. In doing so, we aim to develop and leave behind profitable businesses that serve as engines of rural growth within those communities. We work alongside the business owners, developing their capacity to run their businesses and linking them with other support services. In essence, we are a subsidized consulting and training service for the poor who want to make money in agricultural business.

In 1971, TechnoServe's first worldwide program was initiated in Ghana. Today, we operate in 7 of the Ghana's 10 regions, helping 72 community-based enterprises that generate more than 1 billion (almost US$700,000) in rural revenues per year, directly benefiting 60,000 Ghanaians and indirectly another 400,000. We currently focus on three main agricultural sub-sectors: edible oils, grains, and nontraditional exports (such as cashew, kola nut, shea nut, and pineapple).

Since its inception, TechnoServe has focused on community-based enterprise development. Over the years, we have refined our methodology for approaching communities and developing successful businesses. In an economy where few people make a good living from agriculture, we have significantly improved the lives of many Ghanaian farmers and food processors. Many started from the bottom with very little and now own and run profitable community-based processing and marketing enterprises.

TechnoServe's 10-Step Methodology

TechnoServe's approach can be summed up in a 10-step methodology:

1. Choose an appropriate agricultural subsector.
2. Analyze the sector.
3. Select appropriate points of intervention.
4. Design a viable enterprise.
5. Select committed communities.
6. Provide integrated technical assistance.
7. Monitor performance.
8. Evaluate performance.
9. Replicate successful business concepts.
10. Wholesale the methodology to others.

Choose an Appropriate Agricultural Subsector

We evaluate a subsector based on the profitability of the sector, the role of small-scale farmers in that sector, the importance of the subsector to the overall economy (contribution to GNP, food security); the

Margaret Bowman-Hicks is country director of TechnoServe, Accra, Ghana.

potential for increasing jobs, productivity, and income; the role of women; the environmental impact of assistance; and the fit of staff skills with the needs of the sector.

Analyze the Sector

We next do a sector study to broaden our understanding of the industry, identifying the key players and studying various products, financing, marketing channels, policy support, and constraints. Through such studies, we identify key constraints to profitability of businesses within the subsector and potential points at which to intervene.

Select Appropriate Points of Intervention

Our primary point of intervention is the community-based enterprise that aims to help small-scale farmers capture more value-added for their hard-won production. For example, in the oil palm subsector, we work primarily in processing and local marketing, but in the cashew subsector we work in production and financing as well.

We recognize that no business exists in a vacuum, so, beyond assisting the businesses, we also work with local banks, technology centers, extension services, market "queens," and suppliers of seed to create stronger linkages within a sector so that the enterprises will truly succeed.

Design a Viable Enterprise

Having decided where it makes sense to intervene within the flow of a product from farm to consumer, we next evaluate (with the group) whether good ideas on paper will translate into commercially and technically viable ones. For start-up businesses, we conduct both commercial and technical feasibility analyses to ensure that the products the business proposes to sell are satisfying market needs. We also get a sense of how much the market is willing to pay for the product. We then determine whether it is technically feasible to produce that product at a cost that will allow the business owners to make a profit by selling it. These answers provide the parameters of what will be viable. If the business idea is not viable at the scale that the group can support, we discourage the group from pursuing that idea.

With existing businesses that wish to revitalize their production and sales, we conduct participatory studies to diagnose the business's strengths and weaknesses and to recommend ways to ensure its long-term profitability and sustainability.

Select Committed Communities

Once we identify winning business concepts, we need to identify the right clients and the right communities. Choosing the right community entails assessing the enterprise owner's commitment to the process of establishing a profitable business. We do this by monitoring attendance at meetings, development of by-laws, formal registration, share capital contributed, and willingness to enter into a formal agreement with us. Our goal in this step is to ensure that our partners understand the extent and the limits of our assistance. They must assume full "ownership" of the business and should have their own contributions (in cash or in kind) invested in the business before we start. If a community is not fully committed, we run the risk of wasting far more time and resources than we invest in this selection process.

Provide Integrated Technical Assistance

TechnoServe provides both direct and indirect services to the businesses we assist. We provide a variety of direct services,

depending upon the business needs of the group including developing production and operational plans, identifying sources of equipment, linking businesses with financing, designing plant layouts, recruiting and training staff, setting up books, designing business plans, training management and owners, developing marketing channels, locating storage facilities, and helping to secure transport. We provide these services on the job at the place of business with the ultimate goal of enabling the business owners to be able to accomplish these tasks on their own once we withdraw assistance.

TechnoServe also assists many businesses indirectly by helping to improve the support services available to them, including government extension services, other NGOs, technology centers, and banks. By strengthening the support network around businesses in a sector, we ensure greater enterprise sustainability. TechnoServe does this by working with these other players in the sector, training them in the process to appreciate a business approach to agricultural development.

Monitor Performance

Our project advisors regularly monitor and report on each enterprise's progress. We compile key indicators in a computerized system and produce reports that we share with other offices and our donors. This information allows us to compile management reports, ensures the quality of services delivered, and tracks actual progress against our plan.

We monitor and evaluate our project advisors on how well the businesses they assist are doing. They set personal targets and write regular reports that analyze any problems they are having in the field.

Evaluate Performance

We carry out baseline evaluations, impact evaluations, and cost-effectiveness evaluations. Depending on the goals of each intervention, we evaluate the effect our assistance has had on communities we assist. Have we raised standards of living? Increased productivity? Created jobs? Brought women into the mainstream of economic development? Improved food security? Linked the community with outside services? Had a positive overall impact on the environment? Strengthened the institutions? We ask these questions not just to report progress to donors, but to continually improve the services we are providing and to learn more as an organization.

One important area in which TechnoServe has invested much time is developing a methodology for measuring the cost effectiveness of our services. This is a method of comparing our overall costs of providing services with the quantifiable and nonquantifiable benefits that a community receives from our assistance. This tool helps us to determine whether the benefits we generate in a community exceed the costs of generating them; the answer in all cases should be, yes, or serious modifications to our approach are warranted.

Replicate Successful Business Concepts

Having successfully established or revitalized a venture, we next aim to replicate our success. With each new business in the same sector, the process becomes easier and cheaper as we build upon greater knowledge and understanding of the sector. Our goal is to establish a critical mass of community-based enterprises that can serve

as models for the industry, provide visible "beacons of success," and eventually have an impact on the entire subsector.

Wholesale the Methodology to Others

Our organizational aim is to eradicate rural poverty in the areas where we work and to make small agricultural business profitable for women and the poor. We cannot achieve these goals working by ourselves, so a key component of our methodology is to share our approaches with other organizations, government departments, and donors. Through this indirect assistance, we can help many more clients than we could directly.

Our institution-building assistance includes short-term advice and long-term collaborative relationships that we develop with local partner NGOs who share our mission. This institutional assistance includes developing trade associations of palm oil processors and maize growers, assisting other organizations who share our basic mission through capacity building, training rural banks to implement innovative financing schemes for agriculture, and sharing development strategies with other organizations through workshops.

We hope that by creating viable models of development, government and other NGOs can take up and expand the concepts throughout the country or to other countries.

An example of a TechnoServe-backed enterprise in Ghana is the Assin Dosii Cooperative Society.

Case Study: Assin Dosii Cooperative Society

The Assin Dosii Cooperative Society, formed in 1992, is a cooperative enterprise comprising 77 farmers and processors, 33 of whom are women. The cooperative was formed under the leadership of Agnes Munko with the objective of improving the lives of both its members and the community at large by enhancing their productivity and earnings. To this end, they operate a community-based fee-for-service palm oil processing mill capable of turning highly perishable low-value palm fruits into storable, high-value palm oil.

Members were previously processing their palm fruits using arduous traditional methods. Because they could not keep up with the harvest, they lost a considerable amount of fruit and money. Many of the fruits were simply left to rot on the trees.

TechnoServe helped the group to locate a source of a mechanized mill costing approximately US$4,000, which was financed by a loan from the Agricultural Development Bank. It has been in operation since 1994. In 1995, processors earned, on average, US$211 each from palm oil processing alone. This level of income was unprecedented in history of the community. The tonnage of fruit processed in the community has doubled and oil yield on that tonnage has increased by 38 percent. This mill, like others, has its problems, but small-scale processors and farmers are making good money running an agricultural business. The gains they make are theirs to keep and can continue long into the future.

TechnoServe followed the 10-step methodology and invested in feasibility studies of the palm oil sector; determined that money could be made for the target clients in both processing and marketing; and designed a simplified business concept (that relied more on private-sector market incentives than on local management skills).

In order to show their commitment, each palm oil group made significant contributions in cash and in kind to their enterprise before TechnoServe began to work with them. TechnoServe provided training and technical assistance to them at their business site to teach them to run their mill. We provide ongoing advice to make sure they stay on track and can meet new challenges. We did not provide any direct financing, only loan guarantees and help in linking them with sources of credit.

After gaining in-depth experience with a couple of mills, we embarked on a larger project with the government to replicate the concept in 60 communities, one of which was Dosii. Having addressed the major processing constraints, we now are working on marketing and implementing an inventory credit program to allow the women to store their processed oil until the lean season when prices rise considerably. We have involved the Agricultural Development Bank again, in providing credit against oil that is stored in various sites as collateral. Because we have maintained a focus in this sector, we have developed highly skilled staff who have a lot to offer their clients. Even as a small NGO, TechnoServe is recognized as a leader in the palm oil sector.

Adapting our Work to Meet Women's Needs

Women's needs for enterprise assistance are similar to that of men—they need credit and technical and managerial assistance to help them earn more money. Often we use the same approaches for women and men and find this effective. There are also times when, due to cultural norms, women are at a disadvantage in business. We have made attempts to meet these specific needs in the following ways:

- We develop workshops on gender and technology to get women used to dealing directly with machines. These workshops are held not only for our processor clients, but also involve government extension staff as well. We have found these sessions empowering. Especially for our palm oil processing groups, women have become much more active participants in their communities after the training.
- We conduct participatory research on technology choices, involving female clients. In this way, the research parameters directly respond to women's concerns with, and questions about, technologies.
- We adapt technologies to meet women's needs. For example, the oil processing mills are designed at a height and weight appropriate for handling by women to reduce their burden.
- We consciously target and research sectors that show particular promise for women, such as oil palm, shea nut, and most food processing.
- We recommend a mix of mechanization and manual labor that retains work for some manual laborers. For example, the palm oil mills maintain jobs for older women sorting fibers from palm kernels and chopping the fruits from their bunches, processes that could have been mechanized.
- We disaggregate our monitoring and evaluation data by gender to ensure we are not leaving the women behind.

- We try to hire female technical advisors. We know that female advisors can communicate easily with female clients. This, however, is not always easy as our work is field-based and requires a very heavy travel schedule.

Conclusion

I would like to underscore three things that have been critical to our success:

1. Viewing agriculture as a business—if a sector is not viable, do not pursue it.

2. Focusing on a couple of sectors or services and doing those as best you can.

3. Insisting that clients make up-front contributions to enterprises to determine their real commitment to a venture. This way, one can ensure active participation and a sense of ownership.

Extension Training to Empower Women through Greater Access to Income-Earning Options

Edward Ntifo-Siaw, Moses M. Zinnah, and J. A. Kwarteng

Introduction: Bridging the Training Need Gap

The preparation of agricultural extension staff in Ghana and many African countries is often criticized for producing theoretical specialists with few practical skills. Programs offered by many African agricultural colleges and universities are not relevant to the skills that graduates' prospective working environments and situations demand (FAO 1992, 1993; Ntifo-Siaw and Agunga 1994). Because qualified extension staff are needed for revitalizing agriculture in Africa, it is urgent to improve the quality and relevance of agricultural extension education.

To meet this demand, the Sasakawa Africa Association established a new educational initiative, the Sasakawa Africa Fund for Extension Education (SAFE), in 1991. The SAFE program, which is being implemented in collaboration with Winrock International, helps selected agricultural institutions in Africa develop responsive degree-training programs in agricultural extension for the professional development of mid-career staff. As described by Zinnah et al. (1996) the focus of the SAFE program is to

- facilitate the development and implementation of a responsive and relevant agricultural extension curriculum
- develop organizational learning capabilities
- promote institutional linkages
- help acquire instructional materials

Under the SAFE program, the University of Cape Coast in collaboration with the Ministry of Food and Agriculture (MOFA) and Winrock International launched a new B.Sc. degree program in 1993 to improve the quality of university training in agricultural extension. The main goal is to produce graduates with the requisite human relations, methodological, and technical skills to solve farmer problems.

Entrants into the B.Sc. agricultural extension program must be experienced extension staff who have either a diploma or certificate[28] in agriculture and who are on paid study leave from their employer. Students must (1) have a minimum of 3 years field experience in the extension service subsequent to finishing the previous academic program, (2) be at least 30 years of age, and (3) pass five "O"-level courses including mathematics and English. Students are selected from all 10 regions of Ghana. To ensure diversity in the training

[28] The program is 2 years for candidates who posses a diploma in agriculture or related fields and 4 years for those with a certificate.

Edward Ntifo-Siaw is lecturer and **J. A. Kwarteng** is senior lecturer, Department of Agricultural Economics and Extension, University of Cape Coast, Ghana. **Moses M. Zinnah** is agricultural extension specialist and team leader, Winrock International Institute for Agricultural Development, based at the University of Cape Coast.

program, at least 25 percent of each incoming class is reserved for qualified female candidates.

Supervised Enterprise/ Experience Projects

Supervised Enterprise/Experience Projects (SEPs) constitute the core of the innovative B.Sc. agricultural extension degree program. SEPs serve as a means of matching theory with off-campus, real-life experiences and situations. Students' field experiences are accorded a weight as due recognition. After a period of in-residence instruction, students return to their place of employment to undertake a 9-month action-oriented research and extension project, the SEP. SEPs immerse students in farmer-focused and experience-based activities relevant to local client needs across the country. SEPs help reduce the gap between classroom learning and the actual tasks that students will carry out in the field after training. Development of critical thinking skills and lifelong learning attitudes are also emphasized in conceptualizing the SEPs. Thus SEPs are designed to facilitate experiential learning (Kolb 1984).

Courses in human relations and technical skills are geared toward informing, strengthening, and implementing the quality of the SEPs. Unlike traditional degree programs where practicals and experiments help to explain concepts and ideas from theory courses, the SEPs are rather enriched with information from theory.

After the 9 months of field work, each student writes and presents the SEP report, the equivalent of a B.Sc. dissertation. The report serves as a partial fulfillment of the requirements for the B.Sc. degree in agricultural extension.

Women-Focused SEPs

A unique characteristic of the B.Sc. agricultural extension program is the allocation deliberately given to female extension staff admission, which in 1994 and 1995 constituted about 30 percent of each class. This procedure is in response to the low proportion of women extension staff in Ghana, despite the fact the nearly 70 percent of the active agricultural population is made up of women (Tetebo 1994).

Of the first batch of 24 students, who are graduating in 1996, 5 are females. In their SEPs, the females students opted to work on activities that would empower women farmers through increased income-generating opportunities—introduction of improved meat-smoking technology to pig farmers, testing decision-making tools with women farmers on maize storage options, training rural women in processing soybean into spices, integrating bee-keeping into plantation crops, and introducing woodlots as fuelwood sources for cottage industries.

Three of the SEPs are summarized below.

Meat-Smoking Technology

A SEP on the introduction of improved meat-smoking technology to pig farmers was conducted by Nyuieme Adiepena, production officer with the Women in Agricultural Development Division of MOFA. Simple meat-smoking technologies developed by the Food Research Institute in Ghana could be used by pig farmers to process pork that will satisfy wider market preferences, Yet, pig farmers have not made use of these technologies. Given the scarcity of protein in the Ghanaian diet, there is a need to encourage the use of appropriate smoking technologies to increase the acceptability of pork especially in a large urban markets such as Accra.

Specific objectives of the project were to

- introduce low-cost, fuel-efficient, and time-saving meat-smoking technologies to pig farmers at Korle-Lagon, Accra
- guide farmers in constructing their own improved local meat smokers
- improve marketing of pork to consumers through better packaging of choice cuts, curing, and smoking
- increase pork sales and incomes of pig farmers

By the end of the SEP, nearly 20 farm families had constructed low-cost smokers. Instead of selling live animals, they are producing high quality, high value meat, which they are supplying to leading supermarkets in Accra. The farmers, who were barely breaking even prior to the SEP, are now making profits, with some margins exceeding 70 percent. There is also evidence of an interesting division of labor on the farms, where the men do the husbandry, and the women do the processing.

Maize Storage Options

In her SEP, Rose Feakpi, an agricultural extension staff of the Agricultural Extension Service Department, Volta Region, focused on developing decision tools that farmers could use to select maize storage options most appropriate to their needs. Decisions about the marketing or storage of maize are significant for women farmers in many regions of Ghana. They must decide whether to sell immediately after harvesting or to sell later. If a farmer decides to store, then the problems of pest infestation and crop losses become critical. The recent invasion of the Volta region by the larger grain borer, a destructive pest of stored maize, has worsened postharvest losses and complicated the range of options available to farmers.

Specifically, the project aimed to

- explore the value of presenting a range of options to farmers instead of one recommendation
- test decision trees as tools to be used by agricultural extension staff for advising farmers on a range of maize storage options

Using a participatory approach, Mrs. Feakpi developed and tested the decision tools with extension staff, women farmers, traders, and chemical sellers. The decision trees helped farmers to carry out an in-depth cost-benefit analysis. Nearly 100 farmers were also introduced to the decision-tree options in controlling larger grain borer and their cost-benefit analyses.

Processing Soybeans

The third SEP was aimed at empowering women farmers at Ejura in the Ashanti Region by introducing the processing of soybean into *dawadawa*, a local spice commonly used in various sauces. The project was conducted by Dorothy Effah, an agricultural extension staff of the Department of Agricultural Extension Services in the Ashanti Region. The objectives were to train rural women in Ejura to process soybean into dawadawa as an income-generating activity, to facilitate group formation, and to help group members to acquire the requisite entrepreneurial skills to manage their business.

In addition to processing of soybean into dawadawa, the women learned basic record-keeping and how to access credit from the bank. The participatory approach used has instilled confidence in these rural women,

and they are now effectively managing their group income-generating activities. The groups have already received a working loan of over 5 million (about US$3,000) from the Agricultural Development Bank to expand their business. This is a significant milestone given the fact that women farmers do not usually have access to formal lending institutions. The group members have also started growing their own soybeans to ensure supply of their main input for processing.

Mrs. Effah's SEP has added value to soybean and provided additional income to the female farmers. Most important, it has increased the women's confidence in themselves, and in what they are capable of doing.

What these three projects have in common is the empowerment of women farmers by facilitating their access to income-generating opportunities. The students and the women farmers have learned to believe in themselves.

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Women, Household Food Security, and Nutrition

Rosalind W. Mutua

Kenya has four major cash crops—coffee, tea, sugar, and pyrethrum—which are grown in different ecological zones. Coffee and tea are grown in prime agricultural areas that also have high population density. Studies indicate that, in some areas ,growing cash crops exclusively seems to lead to inadequate food security and poor nutrition. In the rice irrigation schemes of Mwea and Kano, a positive correlation has been found between cash-crop growing and poor health caused by poor nutrition.

In contrast, in the rich central areas of the country where tea, coffee, and pyrethrum are grown, there is a mixture of large farms and smallholdings of 0.5 to 2 hectares. Smallholders carry on subsistence crop farming. They grow vegetables and other food crops as well as keeping livestock. People in these communities therefore are able to supplement their diets. It is the purely cash-crop areas that are affected by nutrition-related problems.

The Role of Women in Household Food Security

Historical Background

African society has undergone dramatic changes in the recent past. The introduction of the cash economy, Western education, and other social changes have occurred, and the woman has basically been transformed into a squatter or tenant farmer on her male relatives' land.

Traditionally the clans owned the land. Each woman who married into the clan had a right to her own piece of land, which she worked to support her "house," i.e., her children. She relinquished this right on her death, although she could bequeath it to her male children. She was able to exchange her produce with others in the marketplace and retain enough in her granary to last until the next season. Therefore, baring adverse weather, the woman was sure of food security for her household. The first important change came during the 1950s. Land was consolidated and taken from the control of the clans and put in the hands of individuals.

The Land Tenure System and Household Food Security

Generally, Kenyan society is patrilineal. Consequently capital, land, or any factor of production is also based on the male line. The man is the bread earner, and therefore he needs to own and control the factors of production. The system of land tenure, is based on male ownership; the woman is viewed as merely the producer on land owned by her husband, father, brothers, or other male relatives. This is particularly clear in the cash-crop areas where ownership and control of land goes with reaping all the benefits in terms of cash.

Although the woman, the producer, is the person whose traditional role it is to feed the

Rosalind W. Mutua is deputy vice chancellor, Jomo Kenyatta University of Agriculture and Technology, Nairobi.

family and ensure food sufficiency, she does not have the economic (monetary) empowerment to perform that role.

In Kenya two debates are going on that are likely to have a positive impact on both the nutrition and family food security. First there is a debate on land ownership and inheritance. The crux of the debate is that women should own land, and it should be possible for them to inherit land from a male relative such as a father or husband. In some communities, only a few years ago, the wife herself was inherited together with her late husband's land and other chattels. Today this practice is being looked at in a different light, and it is likely to die in the near future. In addition, an increasing number of women are now able to buy land in their own right. The women still take their role as the family's breadwinner seriously, and their ability to own land is likely to impact positively on both nutrition and household food security.

The second debate is on women's empowerment. The focus on this issue in the last decade has improved the general economic status of women in Kenya. This not to say that the Kenyan woman is in control of her economic affairs, but there are signs that it is no longer an issue worthy of note for a woman to hold high office in either the public or private sector. But although this is true in paid employment in urban areas, the situation in rural areas, where the main economic activity is agriculture, remains basically the same as it was a decade ago.

Women and Family Nutrition

The Woman: The Major Player in Family Nutrition

Areas that grow only cash crops are disadvantaged, especially if government policy prohibits the growing of subsistence crops and vegetables. Fortunately the government in Kenya has relaxed such laws, and although subsistence crops cannot be grown among the cash crops, people in such areas can grow subsistence crops in other fields.

The Mwea Irrigation Scheme is such an area. It was established by the British colonial government at the end of the Mau Mau hostilities, partially to settle displaced and dispossessed persons. Probably as a continuation of the punitive measures, but mainly to establish a cash-crop economy in the African reserves, the paddy holders were prohibited from growing other crops and from owning land elsewhere.

A survey in the area showed that children are suffering from kwashiorkor and stunted growth. The problem is seen to lie in the ownership and control of land by the segment of the society that is not concerned with family nutrition and who spend the greater proportion of their income on nonnutritional expenses.

The purely cash-crop areas have other problems. Because they are areas newly settled specifically for cash-crop farming, traditional health and nutritional infrastructure is lacking. Modern infrastructure is at times in conflict with the traditional practices of the less-sophisticated settlers. For example, the traditional vegetables and other foodstuffs that have been in existence and have been nurtured for generations in the older lands could be absent in the newly settled land, and the acceptance of new or exotic foodstuffs takes time. During the transition period, children suffer from diseases related to poor nutrition.

The problem of food security and nutrition in urban areas in Kenya has received less attention and been given less prominence than in rural areas where the purchasing power of a household is the determining factor in both security and nutrition.

Economic activities in the poor peri-urban and slum areas have survival as their prime objective. Provision of food for tomorrow or the nutritional value of the food takes a very low priority indeed. It is worthy of note that these activities are carried out mainly by women and children. This emphasizes the continued role of women as providers of food for their households. There is a dire need for studies on the role of the poor urban woman in nutrition and household food security.

The Mumias Project

The Mumias Project involves a study of health and nutrition in a cash-crop area. It is an intervention project whose objective was not just to study the status of health and nutrition but also to take action.

The project is based in one of the most densely populated areas of Kenya with high agricultural potential. The introduction of sugarcane as a cash crop, and the creation of what has come to be known as the sugar belt has had both positive and negative effects. The area has been industrialized quickly, and modern infrastructure facilities have emerged. As a consequence of the rapid modernization, food production patterns have changed tremendously with the unfortunate consequences of severe malnutrition in young children and a food security problem.

One of the objectives of the Mumias Project was enhancement of the awareness of the problems of food security and nutrition that have come as a result of cash-crop farming. Prior to the establishment of the Mumias Sugar Scheme, the local community grew traditional crops (maize, millet, beans, sorghum, simsim, and groundnuts) and kept cattle for milk and meat. This ensured food security throughout the year. With the creation of the sugar belt, where the project is located, the whole configuration of the population settlement patterns, eating habits, and food security changed. Families or parts thereof moved from their traditional lands, supplies of traditional foods diminished, and availability of traditional foods fluctuated as more and more land fell under sugarcane production. This has adversely affected not only food security, but the nutrition and health of the families, as well. Such foods as sorghum, bananas, and nuts were abandoned in favor of sugarcane. Nevertheless, a 1987 survey showed that sugarcane occupied only 35 percent of the average outgrower's[29] total landholding, leaving 65 percent for the homestead and other food crops (Oniang'o, Odada, and Matete 1987). The survey notes, however, that there were still food shortages, and the land area devoted to food crops was insignificant. There therefore was not competition for land between sugarcane and food production.

The survey found that lack of labor was an important factor militating against production of food crops. The researchers noted that most of the labor was devoted to sugarcane production and little was left for food production. The question of labor in cash-crop areas is an important one for policy makers.

[29] Farmers who contract with a commercial plantation to supplement the plantation's production.

The second factor is the overpopularization of cash crops at the expense of food crops. The government emphasizes cash crops. It is also important to note that in purely cash-crop areas, women are not in control of the food situation because it is purchased with cash from the cash crop. In many cases, and until the woman has grasped modern feeding patterns or instituted an integrated cash crop/subsistence farming by establishing small food and vegetable plots within or outside the sugarcane farms, household food security and nutrition remain precarious.

Although, traditionally, responsibility for basic food security was shared between the man and the woman of the family, with the woman ensuring constant storage and supply while the man came in during times of famine, the introduction of cash cropping has changed this equation drastically. The total responsibility for food security and nutrition on a day-to-day basis rests on the woman not only because this is not men's traditional role, but also because men's priorities are removed from family feeding systems.

Finally, in Mumias, as in all cash-crop areas in Kenya, a system of loans has been established to fund sugarcane farming. No such system exists for food production. This has a double effect. It makes cash-crop farming preferred over food crop farming. It also creates indebtedness on the part of the cash-crop farmer so that there is almost always little money left for food after the creditors are repaid. This coupled with the fact that the financial control is not in the hands of the family breadwinner leads to poor nutrition and household food insecurity because much of the income from the sugarcane goes to loan repayment.

The Mumias Project has used the following intervention strategies:

- Extension services have been established to reach each household in the project location to engage in a dialogue with the members of the household on matters of health, nutrition, and food security.
- Sensitization seminars and workshops have been held in the project area.
- In Kenya there exist various groups, both men and women under the Ministry of Culture and Social Services. The project engages them in various activities related to health, nutrition, and food security such as constructing latrines and cattle dips, protecting water catchments, constructing food stores, and diversifying food production.
- Assistance in starting nursery and pre-school units, which, it is hoped, will include school feeding.

Conclusion

The project began in 1992. By 1994 some progress had already been made. The most outstanding accomplishment has been sensitization and mobilization of the community. Nutrition and food security are the result of human action and activities. Often a whole community can spend valuable time looking for solutions without knowing where to look; others will know neither where to look nor what to look for.

Food security and nutrition start with the construction of a cattle dip, and women have been sensitized to the importance of diversifying food production, while the men

have been sensitized on the construction of appropriate food stores.

The project ends in 1996, and there is no doubt the intervention has had a great impact on the local community, which can now build on the foundation that has been laid.

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Women, Agriculture, and Nutrition: Implications for Design of Research Intervention Programs

Bede N. Okigbo

The relationship between agriculture and nutrition lies in the fact that a productive, efficient, and sustainable agricultural system goes a long way to ensure food security at household, community, national, and regional levels. Agricultural production is a key factor in ensuring that enough food is available, but access to the food is determined by many other factors that eventually determine nutritional status. Various agricultural production systems start with decision-making processes in the use and management of physico-chemical factors (soils, water, radiation) and biological factors, especially plants, which effectively utilize energy from sunlight, water, and small amounts of minerals to produce biomass of diverse chemical composition in different ecological zones to feed man and animals. Various agricultural production systems are able to produce the full range of foods and nutrients required by man. Consequently agricultural production is a major determinant of food security and nutritional security.

The importance of women in agricultural production and nutrition lies in their involvement in activities that, at each stage of the food chain, contribute to determining the quantity and quality of food available, losses, and nutritional values of the products, which at the end determine what gets to the table and the nutritional status and well-being of those who consume the food directly or buy it from producers.

The prevailing farming or production systems determine the diversity of commodities produced, which complement each other in the diet; the levels of productivity attained; and availability of food year round from stored surpluses or sequential production continuously throughout the year. Therefore, there are linkages between agriculture and nutrition in relation to the contributions of production to nutritional status through all stages of the food chain.

Kennedy and Bouis (1993) have noted the broad linkages between agriculture, health, and nutritional status of individuals in addition to the policy implications and programs that determine nutritional status. Agricultural research has its most direct impact on nutritional status through its effect on food prices and wages. But agricultural policies and programs influence the nutritional status of individuals though (1) effects on incomes and food prices, which affect food consumption, (2) effects on health and sanitation, at the household and community level, thereby increasing or decreasing morbidity, and (3) effects on time allocation patterns especially of mothers, that determine the time spent in nurturing activities that in turn are related to women's

Bede N. Okigbo is director, Institute for Natural Resources in Africa, United Nations University, Accra.

control over household income—a key determinant of women's nutritional status. In the design of research interventions, due consideration should be given to these linkages.

Implications of Women's Roles on Health and Nutrition

The multiple roles of women in agriculture and all stages of the food chain including food preparation and cooking, industry, entrepreneurial or business activities, professional jobs, childbearing, care of children, housekeeping chores, fuelwood gathering, and water collection have nutritional implications. Furthermore, in all those activities, women interact with environmental components, which have impacts of varying degrees on women. Women are often engaged in agricultural work that is seasonal, with labor peaks occurring at planting, weeding, and harvesting. Each of these activities compete for the time needed for other tasks.

In rural communities, fuelwood is used for cooking, water heating, preserving food, lighting and heating, drying produce, and social and ritual purposes (Clarke 1987; Okigbo 1991). According to Cecelski (1987), when women face fuelwood scarcity, there is more cooking with smoky fuels, less space heating for keeping warm, and less washing with hot water. Fuelwood shortage also results in less-thorough cooking of meats, which may contain eggs or reproductive forms of intestinal parasites or pathogens. These nutritional effects not only affect women but also other members of the household and may be transferred to the unborn of pregnant women.

The longer women and children spend collecting fuelwood, the more they are pressed for time required to accomplish other tasks. In addition to the energy loss and drudgery faced by women in such situations, they suffer stresses that are not easily quantifiable.

It is not only fuelwood scarcity that women face. Water scarcity causes them to walk long distances and spend more time fetching water, which may neither be good for drinking nor sufficient for drinking, washing, sanitation, and other household needs.

Sims (1994) has observed that in water used in rural areas, time and distance outweigh safety measures; women fetch and use unsafe water after the day's field work due to their lack of time and energy to pump water or to obtain the large amounts of water needed for large families. There are also problems of water-borne diseases and diseases related to patterns of water use, such as trachoma, schistosomiasis, guinea worm, and non-B (ENAMB) hepatitis.

Sims (1994) also reported key women's issues with health and environmental implications related to nutrition and agriculture, housing and shelter, indoor pollution, and occupational hazards. In nutrition and agriculture, differences were identified in men's and women's life-styles that place women at greater risk than men; in health consequences of poor nutrition resulting in PEM of two-thirds of WHO requirements; in access to food, with women's access being less than that of men, resulting in deterioration in health and nutritional status; in cash crops, food crops, and work, with women not earning returns commensurate with their inputs and the bulk of their work regarded as invisible; and in seasonal energy stress in marginally nourished women.

In housing and shelter, Sims (1994) observed problems associated with women's roles including higher share of household expenditure contributed by women; housing location and design affecting women's earning potential, and widowhood practices with adverse effects on women, including deprivation of husbands' property.

As regards domestic fuel shortage and air pollution, Sims (1994) found that energy shortage imposes life-style changes, as already noted above; indoor pollution affects women who cook in huts; and carbon monoxide exposure from cooking fuels and chronic respiratory disorders in women due to kitchen smoke.

In occupational hazards, Sims (1994) listed health problems of women in job ghettos and the fish-processing industry; parental exposure to solvents and lead causing spontaneous abortion; pesticide exposure with adverse effects on pregnancy outcomes; and cassava processing into gari in Nigeria causing exposure to cyanide.

Chatterjee (1989) concluded that (1) the major challenge facing third-world women is how to overcome the resource constraints that consign them to low levels of productivity and well-being, with malnutrition often adversely affecting women's participation in economic activities, (2) nutrition stress in women is the outcome of low dietary intake because of economic and social backwardness and the high energy output for work and childbearing, and (3) while nutritional problems have received attention in relation to pregnancy and lactation, and while the consequences of inadequate body reserves, deficient dietary intakes, and resultant low pregnancy weight gains for birth outcomes and birth weights are well-known problems of material depletion, nutritional problems in the context of women's general well-being and participation in economic and social development are still of major concern.

Food Security in Sub-Saharan Africa

In 1990–92, the index of per capita agricultural production in Africa (1979–81 = 100) had fallen to 93 and the index of food production to 94 (World Resources Institute 1994). Annual population growth rate in Africa during 1990–95 was 2.9 percent, and in 30 of 47 African countries the population doubling time was less than 25 years. With per capita food production declining 1 percent a year, it is not surprising that many African countries are increasingly relying on imports and food aid to meet demand. Furthermore, according to FAO (1992), 33 percent of the African population is suffering from dietary energy deficiency. Estimates of malnutrition in 1990 in children in intertropical Africa amounted to 7 percent wasted, 38 percent stunted, and 33 percent underweight (FAO 1996). Vitamin A deficiency and xerophthalmia, iron deficiency, and iodine deficiency are still serious nutritional problems in many parts of Africa. Thus, in the agricultural research agenda for sub-Saharan Africa, increased agricultural production to ensure food security, greater yield increases, and better nutritional status at the household, community, national, and regional levels should get the highest priority.

All available data indicate that sub-Saharan Africa continues to rely mainly on expansion of area under cultivation for increasing food production. Yields of all major staples are lowest in Africa among the world's major regions. According to Pinstrup-Andersen

(1994), in the 1980s increased production of cereal in Africa resulted from a 28 percent increase in area under cultivation and only a 12 percent increase in yields. It is estimated that 22 percent of Africa's vegetated area suffers from human-induced soil degradation, and over 150 million hectares suffer from physical constraints. This calls for research and development activities that give priority to increased agricultural productivity as part of sustainable agricultural systems with emphasis on development of land-saving agricultural technologies through increasing yields and higher cropping intensities. High priority should also be given to rehabilitating the large areas that have been degraded.

Design of Research Programs

Any research and development agenda to address the nutritional and health problems associated with the multiple roles of women should be multisectoral, multidisciplinary, and participatory. The following sections consider, first, intervention points that have been used in the past in nutrition, agriculture, health, and rural development programs and the experience gained; second, a research agenda on sustainable agriculture as a major intervention program; and, finally, recommendations on a research agenda for the development of sustainable agriculture that addresses women's problems especially if it involves on-farm participatory approaches.

Intervention Points for Research Programs

Chatterjee and Lambert (1989) on the basis of a review of several papers produced a matrix of sectoral interventions for policy planning that indicated that sectoral intervention points include primary health care, agricultural and rural development, labor, social welfare legal system, education, social communication, and housing and urban development. They also identified the causes of malnutrition that are encountered as social mores: girls not welcome at birth, women giving birth to girls not cared for adequately, low involvement of girls in schools, female illiteracy, low levels of skills, inadequate food in adolescence, early marriage, teenage pregnancy, frequent pregnancies, large families, unhygienic birth practices, lack of adequate child care services, low value-added jobs in the organized sector, low wages, irregular employment, low knowledge due to being in unorganized sector, crowded and unhygienic living conditions in urban areas, and inadequate fuel, fodder, and water facilities. For each of these causes possible sectoral policy intervention measures are given.

Rasmussen and Habicht (1989) identified points of intervention between food that is available in the community and the nutritional status of the individual (fig. 1). It is obvious from this that major challenges in interventions, policy formulation, planning, and program development are to determine the levels and causes of malnutrition in communities for both men and women; the level of food supplies that are produced or imported and the access to food of various elements in the population in the country or area of concern; the amounts of food produced in relation to food imported; income levels in the population in relation to food access for women and, in fact, all members of the households; the constraints to increased food production if the level of food production is low; and why food does not get to the malnourished in relation to policies, infrastructure for distribution, and

available resources including income needed to ensure access to food.

Kennedy (1991) reported the results of a survey of nutritional programs in Africa and identified the following ingredients for success:

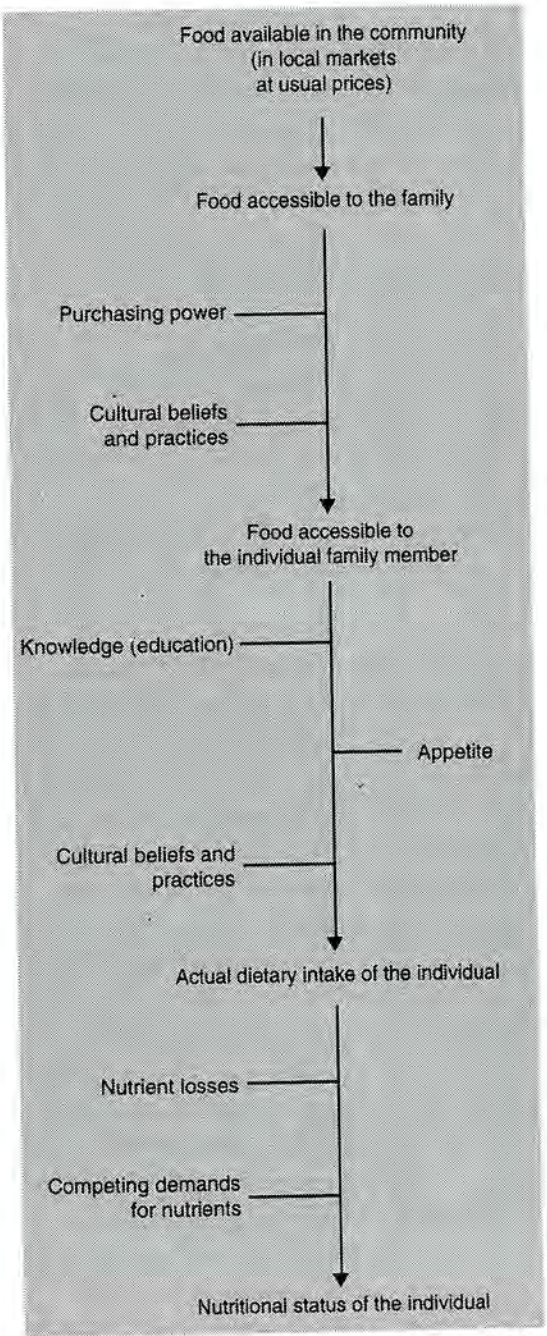

Fig. 1. Points of intervention between food available in the community and nutritional status of the individual (Source: Rasmussen and Habicht 1989).

- *Community participation (multi-level),* which is most convenient when one works through the existing structure; when NGOs, rather than governments, are used to mobilize the community; when ways have been developed for uncovering and responding to felt needs of intended recipients; when there is pooling of public, private, and foreign aid resources for the project; and when communities assume responsibility for it.
- *Program flexibility,* which is possible when there is ability and provision to change over time in response to changing community needs or community feedback.
- *Institutional structure,* which appears to be most successful when NGOs are linked with governments in a way that strengthens the capacity of national institutions. Complex nutritional structure involving various factors that interact to determine nutritional status generally and for women in particular requires a multidisciplinary approach that addresses food production, health, sanitation, and socio-economic factors affecting nutrition status in a holistic and integrated manner.
- *Recurrent cost recovery,* which ensures continuity.
- *Training and staff qualifications,* which are important not only for project execution and public awareness creation but also for monitoring and evaluating project progress as well as the training required for success of the program.
- *Infrastructure,* which is a necessary short-term and long-term element because adequate transportation and communication linkages are indispensable elements.

Assessing Status and Capability

To guide policy and programs in women, nutrition, and development, a preliminary research agenda would involve:

1. Rapid assessment of the human resources and institutional capacity for planning, executing, monitoring, and evaluating nutrition programs in the area of concern (country, subregion, or region).

2. Review of the available nutritional surveys and reports in the areas of concern; disaggregating the data along gender lines; and collection, analysis, and interpretation to determine what is known about nutritional status of the female component of the population at various ages in comparison with males, the nature and levels of malnutrition, and the underlying causes. Use must be made of various indicators of nutritional status. If data is not available a rapid appraisal may be necessary.

3. Review of the agricultural production situation in the country, per capita food production and availability for different food groups, and extent of food security, in addition to determining the extent of women's access to food in households as far as data is available. With this, plans for future research to fill gaps and update data can be prepared.

4. Review of activities of women in their various roles in agriculture, nonagricultural sectors, childbearing and caring, and household and nutrition management in relation to food intake, impacts of various activities on nutritional status, health, and general well-being of women and children.

5. Evaluation of the data on population, infant mortality, and life expectancy in urban and rural areas, including family size, family planning data, and development indicators while identifying deficiencies in available data for women that are necessary for planning, policy formulation, and program development.

6. Review of available data on the occupational problems faced by women and men in various sectors in relation to their health and nutritional well-being in addition to identifying environmental hazards due to the impacts of production and service activities in different sectors and available health and sanitation services in line with existing policies as a basis for planning an integrated nutritional intervention program.

7. Determination of the access of women to resources in different sectors ranging from agriculture to professional and crafts industries in addition to other self-employment jobs and assessing how it affect incomes and ability to purchase food.

8. Review of available educational statistics and related data on women collected in the above exercise to determine the level of literacy and education in various parts of the country for different sectors of the economy and the deficiencies in nutrition, health, sanitation, and environment contents of the curriculum.

9. Assessment of the scope and reliability of statistics being collected by the central statistics department and in different ministries, institutes, and universities to uncover deficiencies and determine measures needed to provide statistical back-up to the envisaged intervention program.

10. Review of previous nutritional intervention programs in the country and adjacent countries to determine their performance successes and failures as background for planning the nutritional intervention program.

11. Review of existing government policies on health, nutrition, and environment to determine how fully they reflect WHO and FAO conference declarations concerning nutrition, in addition to the Platform for Action and the Beijing Declaration on Women and Rio Agenda 21, as guidelines for formulating policies and programs.

12. Review of the communication and information services in the country to determine how the nutrition information is communicated to the public and how they can serve in the intervention program.

It may also be necessary to review information from international agricultural research centers on the development of new production systems and technologies in addition to studies and recommendations on policies and methodological issues from such institutions as the World Bank, International Food Policy Research Institute, World Resources Institute, United Nations Environment Programme, and FAO, and determine the extent that they may help overcome some deficiencies in data collected and in assessing existing government policy measures.

Research Objectives for Development of Sustainable Agricultural Systems

A sustainable agriculture is one in which the farmer relies largely on internal inputs, natural physico-chemical and biological processes, such as nitrogen fixation, mycorrhizal phosphate nutrition, nutrient cycling, and the interactions among organisms and their environment, to minimize the use of chemicals and pesticides in order to perpetually achieve optimal productivity and a positive trend in production, thereby satisfying increasing needs without adverse environmental impacts and, where possible, enhancing the resource base and environmental quality.

Agricultural systems are location specific. To remain sustainable in a given location, an agricultural production system requires continuous research and related activities to increase understanding of (1) the physico-chemical factors, such as soils, climate, moisture, radiation, and day length, and the way they change and interact so that they can be manipulated or given due consideration in efforts aimed at creating favorable conditions for (2) the biological elements of the production system in terms of crops or animals in relation to their interaction in the agro-ecosystem with weeds, pathogens, pests, and even beneficial organisms that shape their environment on the basis of changing and (3) appropriate technologies at the disposal of the farmer that are acceptable and relevant to his or her circumstances on the basis of prevailing (4) socio-cultural background, in relation to education, experience, community organization, social relations, and institutions and legal systems, all of which interact compatibly to determine (5) the economic viability, ecological soundness, and cultural acceptability of the system based on the farmer's managerial ability and operational cost-effectiveness, market and pricing structure, and trade-offs with respect to maintenance of environmental quality, prevailing infrastructure, and policy environment (Okigbo 1991). Sustainable agricultural systems reduce women's problems in access to resources because they minimize the use of costly external inputs, which women cannot afford.

Sustainable agricultural systems require a holistic approach in research, participatory on-farm approaches in technology generation

and evaluation of adoption, better understanding of environmental variables, and integration of traditional knowledge and technologies with modern technologies to ensure that the farming systems that are developed continuously meet agricultural and environmental requirements. The relevance of a participatory approach is that women in each community are involved at all stages of technology design, testing, adoption, and evaluation of impact.

Research to develop sustainable agricultural systems that address the constraints of increased food production and women's problems should be aimed at achieving the following objectives:

1. Reduced use of costly inputs such as fertilizers and herbicides, which low-resource farmers can ill-afford, by replacing them with internal inputs or what the farmer can raise such as nitrogen-fixing plants.

2. Increased reliance on biological processes such as biological nitrogen fixation, nutrient cycling mechanisms, and mycorrhizal phosphate nutrition for minimizing the amount and cost of fertilizer use.

3. Increased efficiency of fertilizer (organic and synthetic) but avoiding excess fertilizer use, which may cause pollution.

4. Breeding of crop plants with high yield and high nutrient density adapted to environmental stresses, such as high soil acidity and drought, and with resistance to insect, diseases, and weeds.

5. Development of agroecosystems that mimic natural ecosystems and maintain nutrient accumulation through continuous vegetative cover, maintain a litter layer over soil surface, foster synchronized plant and microbial activities, retain large portions of ecosystem nutrients in living tissues especially in wetlands, and create broad heterogeneity of root systems (Reijntjes, Haverkort, and Waters-Bayer 1993).

6. Diversification of production by growing plants in diverse arrangements in time and space that nutritionally complement each other, make better use of resources, and spread production of different species throughout the year.

7. Reduced burning of vegetation and use of controlled burning when farming is intensified, because intense burning leads to losses of organic matter.

8. Reduced volatilization of nitrogen by denitrification under wet soil conditions.

9. Avoidance of leaching by using organic and artificial fertilizers that release nutrients slowly (in synchrony with crop needs), maintaining a high humus content in the soil, and intercropping plant species with different rooting depths.

10. Maximum use of organic wastes and residues such as household, city, and market refuse.

11. Limiting nutrient export in products by producing crops with high economic value relative to nutrient content, e.g., fruits, nuts, herbs, milk.

12. Producing for self-sufficiency, so that as few products as possible need to be exported to the market.

— Efficient management of water by such techniques as water harvesting and improved soil structure to enhance water infiltration.
— Study and evaluation of indigenous knowledge and technology systems for use of sustainable elements in integration with modern (conventional) and emerging

technologies if proved sustainable and acceptable through participatory on-farm technology development and evaluation.

— Employment of integrated approaches to the development of more sustainable systems including integrated watershed development; IPM (integrated pest, disease, and weed management); agroforestry (integrated field crop and shrub or tree production systems); agrosilvopasture (integrated crop, tree, pasture, and animal systems); integrated aquaculture systems; mixed cropping systems and rotational sequences rather than monoculture; integrated land use planning; integration of traditional, modern, and emerging technologies (table 1); minimum and strategic use of pesticides and chemicals associated with a spectrum of compatible physical, cultural, and biological methods; and combining manual and appropriate mechanization systems.
— Intensification of production to increase cropping density through the use of appropriate technologies to address the increasing population pressures on the land.
— Use of more sustainable input mixes to reduce adverse environmental impacts.
— Elimination of gender bias in technology design and development that encourages men to perform certain operations that are usually left to women.
— Evaluation of technologies on the basis of their being women-friendly or gender-neutral.
— Development of a range of pre-harvest and postharvest technologies for all stages of the food system from primary processing to food preparation that are environmentally friendly, reduce losses in quality and quantity, and minimize occupational hazards to both men and women while enhancing value added.
— Giving high priority to crop diversification through the domestication and genetic improvement of underutilized indigenous crops and useful plants with emphasis on species of high nutritive value or specific nutrient density.
— Development of agribusiness systems for input delivery, storage, processing, packaging, and distribution to create employment opportunities in agriculture and reduce the drudgery and hazards faced by women in postharvest food handling.
— Development of home gardens for urban and peri-urban areas that utilize residues and waste, thereby reducing urban pollution while ensuring availability of food throughout the year.

There is also need for research of sufficient scope that enhances the realization of existing potentials of the following options for increasing food production and attaining food security: limiting expansion of area under cultivation to hydromorphic and valley-bottom soils of high inherent fertility, especially in areas where parasitic diseases such as guinea worm have been eradicated; increasing the quality and quantity of production per unit area and input through genetic improvement, use of resistant crop varieties, and better management of crops and soils; giving high priority, in mechanization and appropriate technologies, to gender requirements for reducing drudgery and ergonomic problems, thereby minimizing occupational hazards; improving postharvest handling, transportation, storage, and processing; diversifying production by making maximum use of indigenous African food crops, including exchange of information and genetic

materials among African countries, some of which are centers of diversity where the species are underutilized.

The United Nations University Institute for Natural Resources in Africa is currently giving high priority to study of biodiversity, genetic improvement, and enhanced utilization of indigenous African food crops, and soil and water management.

Although the above priorities are fairly comprehensive, they are by no means exhaustive. High priority should also be given to the following, which will accelerate the envisaged interventions:

1. Education and training at various levels and incorporation of nutrition, health, and environmental management into the curriculum at all levels with emphasis on measures to ensure equity of opportunities for men and women and making up for existing deficiencies in human resources development for women.

2. Public awareness about family planning, availability of family planning services, and nutrition.

Table 1. Inputs or technologies used in traditional, "modern" conventional, and sustainable farming system.

	Traditional agriculture	Modern agriculture	Sustainable agriculture
Land	Small (<1–5 ha).	Large (10–100 ha or more).	Small to medium (<1–100 ha or more).
Tools	Simple: fire, ax, hoe, digging sticks, machete.	Complex, tractors and implements, threshers, combine harvesters, etc. Few species (1-3).	Combination of appropriate animal, mechanical, or alternative natural processes.
Crops	Many species (5–80). Landraces, no genetic improvement, wide genetic base.	Improved narrow genetic base.	Diversity of species in sequence or spatial arrangement in appropriate systems of wider genetic base. May be associated with animals including fish.
Animal	Several species (2–5).	Usually one or two species.	One or more, but raised in such a way as to minimize adverse impacts on the environment; may be associated with crops.
Labor	Manual, human energy, or animal power.	Mechanical, petroleum fuels, electrical energy.	Wide spectrum of alternative energy sources with emphasis on solar and other renewable, efficient, and clean sources.
Soil fertility maintenance	Fallow, ash, organic manures.	Inorganic fertilizers, sometimes manures, soil amendments, e.g., lime and gypsum.	More use of biological processes (nitrogen-fixation, mycorrhizal phosphate nutrition); increased fertilizer-use efficiency, fallows, mulch, etc.
Weed control	Manual, cultural.	Mechanical, chemicals (herbicides and petroleum-based products).	IPM (compatible physical/mechanical, strategic chemical use, cultural, biological, etc.).
Pest and disease management	Physical, cultural.	Mainly mechanical/ chemicals, insecticides, fungicides, bactericides, nematocides, rodenticides.	IPM (compatible, manual, physical, cultural, strategic chemical use, biological).
Crop management	Manual.	Growth regulators for defoliation, control of flowering, fruit drop, etc.	Wide spectrum of techniques including use of genetically engineered species, physiological and other technologies.
Harvesting	Manual or simple tools.	Tractors plus implements; pickers, balers, threshers, combine harvesters.	Wide range of methods including those facilitated by genetic engineering.
Postharvest handling and drying	Simple sun-drying and drying over fires.	Mechanical forced-air drying using petroleum fuels; sometimes refrigeration.	Minimized energy uses, increased energy efficiency, reduced use of petroleum fuels.

Source: Okigbo 1991.

3. Human resources development and institutional capacity building.

4. Developing information and communication services to enhance dissemination of information on nutrition, health, and environment in a holistic manner that links all relevant institutions.

5. Research in agriculture, nutrition, health and environment as the basis for decision making and getting governments committed to improve the nutritional status of women and other household members.

Furthermore, governments should allocate adequate resources to research for generating technologies for all phases of the food chain, formulate appropriate policies that provide incentives to farmers to produce more food, develop adequate infrastructure including transportation and communication, promote effective marketing systems and ensure reasonable prices of equipment and farm inputs, and set up farmers organizations and commit continuous support to them.

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Feeding Trials with Quality Protein Maize in Ghana

Abenaa Akuamoa-Boateng

In Ghana, as in most sub-Saharan African countries, millions of people depend on maize. For many it is the main source of dietary protein. Poverty makes animal protein such as meat, eggs, or milk almost unafforable except on a special occasions. Most Ghanaian families, especially the larger rural population, cannot even afford beans and other protein-rich plant foods. These families are hardly able to meet the daily minimum amounts of protein, calories, and other micronutrients required for proper growth and development.

Growth Failure

Malnutrition is more common and more obvious in children than adults because they require "extra" food for growth. Children have little control over food supplies offered to them. Moreover, the traditional systems of household food distribution dictate that the children are served last, with the youngest child receiving the least in terms of quantity and quality. Thus the children have far smaller reserves for coping with the setbacks of food shortage or infection.

Growth failure means sub-optimal rates of gain in skeletal and soft tissues. It is estimated as a slowing of linear growth or stunting. The determinants of growth in height are uncertain. Golden (1985) suggests that "protein rather than energy intake is particularly important." In studies conducted in Papua-New Guinea, Malcolm (1970) found that protein-containing foods are useful in rapid growth of children. Millard and Rivers (1989) proposed that "the 'anabolic' drive depends on sufficient protein to stimulate the complex interactions of growth hormone insulin and other growth factors to allow a spurt in the growth of long bones."

A failure to grow in height is a disadvantage. There is increasing evidence that stunting induced by environmental factors is linked to increased risks of infection, illness, and even death (Waterlow, Ashworth, and Griffiths 1980). Stunted children also have slower mental growth (Grantham-McGregor et al. 1991).

The Ghanaian Situation

Growth failure in weanling children is a major cause of child morbidity and mortality in Ghana. According to the Ghana Demographic and Health Survey of 1992, 26 percent of children younger than 2 years old were stunted. Williams (1935) first introduced the Ghanaian term kwashiorkor to describe the fatal syndrome characterized by initial growth failure and irritability, skin lesions, edema, and fatty liver. She relates this growth failure to the thin gruel (*choke*) made from maize, which forms the first major supplementary food fed to weanlings, usually from an age of 2 to 3 months until the child is completely weaned between 15 and 24 months. Until the age of 1 year, *koko* (fermented maize dough) remains the only

Abenaa Akuamoa-Boateng is regional nutrition officer, Ministry of Health, Kumasi, Ghana.

supplementary food for over 60 percent of Ghanaian children.

Traditional maize varieties are poor in protein quality. Koko prepared from these varieties is deficient in both protein and calories. This preparation cannot sustain acceptable growth and adequate health, especially in the weanling child, pregnant and lactating women, and the sick.

Over the years, attempts have been made to overcome protein and calorie shortage through the provision of nutritious weaning diets. Dried skim milk and wheat-soy blends have been donated by relief agencies. This method is only a stopgap for severely malnourished children and does not meet the needs of the large number of moderately malnourished children and borderline cases.

Another approach was the formulation of a nutritious weaning product, Weanimix, from locally available cereals and legumes by a collaborative group of scientists from the Ghana government and UN agencies in response to the poor economic status of the average Ghanaian who cannot afford to add eggs, milk, or fish to the koko.

Countrywide, 110 local Weanimix projects were established, but in 1990 an evaluation of the projects revealed that less than 5 percent of the target group were preparing and feeding Weanimix to weanlings. The reasons:

- The Weanimix preparation procedure is cumbersome and time consuming for the average woman, who is already overburdened with household chores.
- The unit cost of Weanimix was prohibitive for most families, compared with the cost of maize dough, which it was intended to replace.
- The limited education of the majority of mothers made it difficult for them to appreciate and use the correct proportions of the various ingredients despite training given by nutritionists and other extension staff.
- The keeping qualities of the flour was not as good as that of the traditional maize dough. Work done at Noguchi Memorial Research Institute also showed that fermented maize dough, koko, has a lower population of diarrhea-causing organisms at any time than composite flours such as Weanimix.

This project suggested that the improvement of the maize grain itself would be cheaper and better. To help rectify the problem, Ghana's Crops Research Institute developed an improved maize variety, Obatanpa.

Obatanpa—Quality Protein Maize

Obatanpa (literally, "good nursing mother") was developed from quality protein maize materials obtained from CIMMYT.[30] Though Obatanpa has about 10 percent protein, like other maize varieties, its protein has higher levels of tryptophan and lysine. The nutritive quality of its protein is twice that of Okomasa, a normal maize variety.

Because monogastric animals, such as humans, pigs, and poultry, are unable to synthesize their own lysine and tryptophan, they stand to benefit nutritionally from Obatanpa. Its protein has a nutritive value about 90 percent that of the protein in skim milk.

Feeding trials from poultry and pig experiments supported the nutritional

[30] International Maize and Wheat Improvement Center.

superiority of Obatanpa over normal maize. They proved that when Obatanpa is used in feed, the pig or poultry grower can reduce the amounts of high protein ingredients such as fish meal, maintain the same feed quality, reduce production costs, and increase profit margins (Okai and Dzah 1995). With these encouraging results from animal experiments, two feeding trials were conducted with children.

Feeding Trials with Weanling Children

The first trial with weanling children was conducted in nine farming communities in Ejura-Sekyeredumase, the major maize-growing district of Ghana. Obatanpa was first introduced into these communities as part of trial in 1993 during the major farming season. Target families were made up of maize-growing households that had children 23-months old or younger.

Sasakawa-Global 2000 gave these households credit in the form of seed and fertilizer. The Ministry of Agriculture extension staff gave technical advice to the selected households and taught farmers how to build improved cribs to reduce postharvest losses.

The households were randomly assigned to grow either Obatanpa or normal maize. The 140 children who formed the sample for the feeding trial were equally distributed between the two groups. Only the SG 2000 director and field coordinator knew what type of maize each household had been assigned.

The heights and weights of the children were measured on quarterly basis. The heights were measured using Shorr's infantometer, and weights were measured using a Salter hanging scale. At 6-month intervals, a 3-day dietary assessment was conducted on 50 children equally distributed within the two groups.

Anthropometric data for 52 subjects were incomplete because the subjects moved away from their communities before the end of the study period. Five deaths were recorded in the normal maize group. Three subjects died from diarrhea and vomiting, one from frank Kwashiorkor, and one from measles.

Due to the small number of subjects, they were not subdivided into smaller age groups but treated as an entity. The difference between the mean weight gained by the children fed on the two varieties of maize is not statistically significant, nor was the difference between the mean height gains.

Table 1. Weight and height changes in weanling children fed Obatanpa (QPM) or normal maize over a 1-year period.

Variety	Subjects (no.)	Weight[a] (kg)			Height[a] (cm)		
		Initial	Final	Gain	Initial	Final	Gain
				First trial [b]			
Obatanpa	43	7.71 ± 0.30	9.98 ± 0.26	2.27 ± 0.19	68.65 ± 1.34	79.25 ± 0.89	10.60 ± 0.65
normal	40	7.64 ± 0.32	10.00 ± 0.27	2.36 ± 0.19	68.05 ± 1.39	77.95 ± 0.95	9.91 ± 0.67
				Second trial [c]			
Obatanpa	39	7.13 ± 0.20	10.05 ± 0.21	2.92 ± 0.18	64.01 ± 1.08	78.77 ± 0.69	14.76 ± 0.68
normal	39	6.87 ± 0.20	9.81 ± 0.21	2.93 ± 0.18	64.66 ± 1.18	77.03 ± 0.69	12.37 ± 0.68

a/ Least square means + standard error.
b/ Initial age of subjects was 23 months or less.
c/ Initial age of subjects was 15 months or less.

Three factors may have unduly affected the growth potential of the QPM subjects:

- There was no strict control over exchange of maize between households. This was very frequent during the lean season (January-July 1994).
- Seventy-five percent of households had lived from assigned maize cultivated in March 1994 and were buying small quantities from the open market.
- Before the study, the only maize available on the market in Ejura and in the households was normal maize. The first harvest of Obatanpa was in late July 1994. This could have been a disadvantage to the QPM subjects as it means they ate QPM for only 6 months of the 12-month study period.

In the second feeding trial, tighter controls were employed. The study was conducted in Sekodumase, and 129 subjects aged 0 to 15 months were randomly assigned to either QPM or the normal-maize group. Each subject was provided with a ration of maize dough (koko) on weekly basis. The ration was 100 grams of koko per kilogram of body weight per day. Maize and funds for processing were provided by SG 2000. Nutritionists from Ministry of Health undertook anthropometric measurements of the subjects on a quarterly basis. All subjects were immunized against the six childhood killer diseases.

Data for 42 subjects were incomplete due to movement from community. Three deaths were recorded and they were all the normal maize group.

In the second trial, the QPM subjects gained 2.39 centimeters more than the normal-maize subjects (table 1), a statistically significant difference. In both trials, anthropometric results on height measures showed that the QPM subjects gained more in linear growth than the normal-maize subjects.

Overall the results agree with Golden (1985) and Millard and Rivers (1989) that a spurt in the growth of the long bones depends on the availability of sufficient protein to stimulate the complex interactions of growth hormones and other related hormones. The mortality pattern is also in consonance with the findings of Waterlow, Ashworth, and Griffiths (1980) that stunted growth induced by environmental factors is linked to increased risks of infection illness and even death. There is a need for further studies involving large enough samples to allow analysis of smaller age groupings.

Conclusion

The following can be said about Obatanpa quality protein maize:

- QPM has better growth-enabling capabilities than normal maize when fed to weanling children.
- Children fed on QPM have better chances of escaping death due to diarrhea and other infections than children fed on normal maize.
- QPM holds the promise of improving the nutritional status of all vulnerable groups whose staple food is maize and who cannot afford protein-rich food to supplement the staple.
- Though QPM cannot be said to be the magic bullet to solve the malnutrition problem, it can be used as one of the simplest, cheapest, and most practical ways to improve child nutrition.

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Afterword
Why Does Gender Matter?

G. Edward Schuh

My aim here is to identify several issues I feel deserve more attention and to suggest different ways of addressing some the issues posed at this conference.

1. *The lack of data and knowledge of underlying relations.* We heard many comments on the lack of data on gender issues and on the lack of knowledge of the underlying gender relationships. I want to emphasize the importance of that basic point. We cannot extend knowledge to women on the intensification of agricultural production in a vacuum of data and knowledge, nor can we design more effective policies to ensure that women are treated equitably in the distribution of public assets or that they contribute efficiently to the production process.

As a parallel point, and one that broadens the perspective for the collection of data and the analysis of the underlying relationships, it is important to start with the building block of the household as the basic conceptual unit for collecting the data and analyzing it. If we just collect data on women and what they do, we will miss a large number of gender issues, while at the same time not having an analytical framework for understanding the issues of concern.

As a third point, I was concerned that I heard a lot of urban bias in the comments and analyses that were presented. Society is organized differently in rural areas than in urban areas, and women play different roles in the two sectors. Reasoning from what one observes in urban areas and from the urban experience can be very misleading in addressing rural gender issues and in particular the contribution women can make in intensifying agricultural production.

2. *Food security is primarily an income issue; it is not in general a production issue.* Much of what we heard focused on the alleviation of the constraints to increasing food production—giving special attention to the constraints on women. Important as that is as a general proposition, and as the ultimate key to addressing food security, the direct connection between intensifying food production and increasing food security is at best rather tenuous.

Food security is primarily an issue of poverty. Some years ago Amayarta Sen of Harvard University studied seven major famines in China and India. He found little relationship between agricultural and food production and famine. Instead, he found the problem to be one of poverty. In each case the economy collapsed for one reason or another, and income-generating capacity collapsed along with it. The problem was not primarily one of scarcity as indicated by the fact that the price of food in some cases actually declined.

G. Edward Schuh is dean and professor, Humphrey Institute of Public Affairs, University of Minnesota, Minneapolis.

Another more contemporary example is provided by India, which has been striving for food self-sufficiency for a long time, with production-enhancing programs the main policy vehicle. The result is that India is now technically self-sufficient, but hundreds of millions of people are still malnourished. They do not have the income or means to acquire the food that is now in more abundant supply.

Intensifying agricultural production *is* a means of alleviating poverty, and thus ultimately of addressing the food security issue. However, that occurs only as the supply of output increases generally and the price of food declines. In that sense, society as a whole benefits, but more because the modernization of agriculture can be an engine of economic growth and development than because an increase in supply ensures a more food-secure situation.

3. *In addressing the broader issue of women and poverty alleviation, attention needs to focus on the multiple ways that women deliver their labor services and produce income.* Women in the agricultural sector in general have three options for the use of their time: working on the farm unit, working in the household, which is the preferred way to think about household duties, and working in the off-farm labor market for wages (which in some cases may involve working on other farms). To understand these alternative uses of the time of the woman in the household, we have to start with the household as the fundamental social unit. Within the household there are all kinds of interaction among the spouses, and between them and the children, and among all of them and other adults who may be present.

It is on the household that I believe we should put the emphasis. There is a rich analytical framework for understanding these issues in the new household economics. I was concerned that we heard little detail on how women participate in the off-farm labor market, for example, or on the interrelations among the various members of the household. Even with the rather narrow focus on how women participate in the farm production process, our understanding will be limited if we focus on the role of women alone, without taking account of the multiple options they have before them and the other members of the household.

Although it is somewhat of a side issue, I believe it is also an imperative that social programs designed to alleviate poverty should focus on the household and not on the private farms or private firms more generally, as they usually do.

4. *Investing in human capital is the key to alleviating poverty.* Human capital is the critical source of increases in per capita income. Moreover, the social rate of return to such investments is demonstrably high. Thus, such investments are efficient sources of economic growth and development. Moreover, raising the level of investments in such human capital to the levels obtained by men will be an important means of obtaining a more equitable distribution of income.

Human capital takes a number of different forms. It includes investment in new knowledge through investments in science, the development of new production technology through the use of that knowledge, investment in education, investment in health and nutrition, investment in vocational skills, and investment in the institutional arrangements that govern the relations among members of society.

The important point from the perspective of this conference is that many, if not most, of these investments take place in the household. Moreover, women play an important role in producing this human capital. Understanding these roles is a critical part to understanding the role of women in alleviating poverty at the level of the family and ultimately addressing the problem of food security.

5. *Two forms of human capital play an important role in augmenting the role of women in alleviating poverty at the household level.* The first of these is the technology used in the household. This is in contrast to the technology used in the farm production unit, such as modern inputs, and includes ovens and other modern cooking and heating equipment, water piped to the household, new equipment that helps grind grain and process other food materials, and so on. The demands on the time of the woman in the household are enormous. Investments that raise the productivity of the woman in the household and economize on her time release some of the woman's time for work on the farm, for investing in human capital such as education, health, and nutrition, for participating in the off-farm labor market to earn additional income, and for leisure and self-development.

The second form of human capital pertinent to the alleviation of poverty and to easing the constraints on intensification of agriculture is the education of women. This is a critical form of human capital for the household. It raises the productivity of the woman, opens opportunity for employment in the off-farm labor market, and enables her to decode new production technology for both the farm production unit and the household. The importance of educating women has been grossly underemphasized in the design of development strategies and programs for both the agricultural and nonfarm sectors.

Concluding comments. Rural Africa is undergoing enormous change, driven in part by a burgeoning (albeit slowing) growth in its population. If it should be able to launch a green revolution, which is what is behind the activities of the Sasakawa Africa Association, the changes could be even more rapid. If we are to anticipate and adjust to these changes and their ultimate consequences, we will need to *understand* what is taking place in the agricultural and the rural sectors. The value of woman's time in the household will undoubtedly increase in the future. That means that the productivity of women will need to increase accordingly. Investing in household technology, and in the education of women, will be critical to the modernization of agriculture and to adjusting to changing economic conditions. Understanding the complex roles women play in the household and in the production unit will be critical. Moreover, the need to bring about changes in how policy makers, political leaders, and others think about the role of women will be increasingly important.

Workshop Participants

Ernestine Akosua Addy
Senior Lecturer
School of Medical Sciences
University of Science and Technology
Kumasi, Ghana

Victoria Addy
Vice President
International Federation of Women Lawyers
Accra, Ghana

Abenaa Akuamoa-Boateng
Regional Nutrition Officer
Ministry of Health
Kumasi, Ghana

Ramatu Al-Hassan
Department of Agricultural Economics
University of Ghana
Legon, Ghana

Walter S. Alhassan
Director-General
CSIR
Accra, Ghana

Florence Ansere-Bioh
Rural Sociologist
Crops Research Institute
Kumasi, Ghana

Benedicta Gyamfua Appiah-Asante
Department of Agricultural Extension Services
Ministry of Agriculture
Kumasi, Ghana

Elizabeth Ardayfio-Schandorf
National Project Coordinator
Family and Development Programme
University of Ghana
Accra, Ghana

Achamyelesh Ademe Ashenafi
Post-Harvest Technician
SG 2000
Addis Ababa, Ethiopia

Tareke Berhe
Senior Agronomist
SG 2000
Accra, Ghana

Reine Boni
Regional Representative
Winrock International
Abidjan, Côte d'Ivoire

Meg Bowman-Hicks
Country Director
TechnoServe
Accra, Ghana

Steven Breth
Consulting Editor
Arlington, Virginia, USA

Alex G. Carson
Dean
School of Agriculture
University of Cape Coast
Cape Coast, Ghana

Alidou-Deen Aichatou Deen
Coordinatrice CFDAR/DAPS
Ministere du Developpement Rural
Cotonou, Benin

Bomoh Catherine Djedji
Program Administrative
Winrock International
Abidjan, Côte d'Ivoire

Samuel Kwasi Djepong
Vice Chancellor
University of Cape Coast
Cape Coast, Ghana

Florence A. Dolphyne
Pro-Vice-Chancellor
University of Ghana
Accra, Ghana

Franklin Donkoh
Deputy Director
Department of Agricultural Extension Services
Accra, Ghana

Christopher Dowswell
Director for Program Coordination
Sasakawa Africa Association
Mexico City, Mexico

Ivy Drafor
Lecturer
School of Agriculture
University of Cape Coast
Cape Coast, Ghana

Gloria Duah
Managing Director
Cristly Farms Ltd.
VE-Golokwati, Ghana

Joyce B. Endeley
Lecturer
University of Buea
Buea, Cameroon

Docea Gyanewa Fianu
Head of Department
Home Science Department
University of Ghana, Legon
Accra, Ghana

Djossou Monique Francine
SG 2000
Cotonou, Benin

Jonas Frempong
Accountant
Sasakawa Africa Association
Accra, Ghana

Esther Walabai Gadzama
Agriculture/WIA Specialist
World Bank
Abuja, Nigeria

Almaz Kinfe Gebremicael
Ministry of Agriculture
Asmara, Eritrea

Genet Zergaw
Home Economics
Ministry of Agriculture
Addis Ababa, Ethiopia

Christina H. Gladwin
University of Florida
Gainesville, Florida, USA

Margaret Grieco
Centre for Study of African Economics
Institute of Economics
University of Oxford
Oxford, U.K.

Leonides Halos-Kim
Research Specialist
International Institute of Tropical Agriculture
Ibadan, Nigeria

Sue Ellen Johnson
Agroecologist
Humid Forest Program
International Institute of Tropical Agriculture
Yaounde, Cameroon

Amanda King
Graduate Student
Brown University
Providence, Rhode Island, USA

Timothy Kipo
Savanna Agricultural Research Institute
Tamale, Ghana

Ewoe Sika Koffigo-Butu
Assistante a la legislation cooperative
a la Direction de la coopération
Mutualité et du Credit, DCMC.
Lome, Togo

Catherine Albert Kuwite
Principal Agricultural Research Officer
Ministry of Agriculture
Selian Agricultural Research Institute
Arusha, Tanzania

Joseph Adjei Kwarteng
Senior Lecturer
Department of Agriculture Economics & Extension
School of Agriculture
University of Cape Coast
Cape Coast, Ghana

Toshiro MADO
Program Officer
Sasakawa Africa Association
Accra, Ghana

Patience MENSAH
Project Officer
World Bank
Accra, Ghana

Mary Andrew MGONJA
Senior Agricultural Research Officer
Ministry of Agriculture
Selian Agricultural Research Institute
Arusha, Tanzania

Masataka MINAGAWA
General Manager
Sasakawa Africa Association
Tokyo, Japan

Custodio MUCAVELE
Head
Department of Extension
Ministry of Agriculture
Maputo, Mozambique

Inusa Danjuma MUSA
Deputy Director
Ministry of Agriculture & Natural Resources
Kano, Nigeria

Rosalind MUTUA
Deputy Vice Chancellor
Jomo Kenyatta University
Nairobi, Kenya

Ulla NAESBY
Junior Program Officer
International Food Policy Research Institute
Accra, Ghana

Deola NAIBAKELAO
Resident Representative
Sasakawa Africa Association
Accra, Ghana

Fidele NDAYISENGA
Research Fellow
Humphrey Institute
University of Minnesota
Minneapolis, Minnesota, USA

Edward NTIFO-SIAW
LECTURER
School of Agriculture
University of Cape Coast
Cape Coast, Ghana

Christine OBENG-BOAMPONG
Director
PPMED
Ministry of Food and Agriculture
Accra, Ghana

Esther Afua OCLOO
Founder
Sustainable End of Hunger Foundation
Accra, Ghana

Fiona Comfort ODARTEY
Regional Director
National Council on Women and Development
Cape Coast, Ghana

Victoria ODOI
Staff Writer
Daily Graphic
Accra, Ghana

Bede OKIGBO
Director
United Nations University
Accra, Ghana

Kwabena OKYERE
Deputy Minister
Ministry of Food and Agriculture
Central Region
Cape Coast, Ghana

Janice Olawoye
Senior Lecturer
Department of Agriculture Extension
University of Ibadan
Ibadan, Nigeria

Sam Stephen OPOKU
Regional Agriculture Director
Ministry of Food and Agriculture
Cape Coast, Ghana

Christine OPPONG
Accra, Ghana

Yaa Pokua OPPONG
Post-Graduate Student
University of Ghana
Accra, Ghana

Korka Diallo OUSMANE
Coordinator of Gender Issues
SNPRV/Guinea
Conakry, Guinea

Ekua PRAH
Consultant
TechnoServe
Accra, Ghana

Mansah PRAH
Lecturer
Department of Sociology
University of Cape Coast
Cape Coast, Ghana

Frederica Oyoo QUARTEY
Administrative Officer
Sasakawa Africa Association
Accra, Ghana

Victoria QUINN
Consultant
Accra, Ghana

Elizabeth SAGOE
Agricultural Economist
Ministry of Food and Agriculture
Cape Coast, Ghana

Ohenese Asau SAKYI
Programme Officer
SG 2000
Accra, Ghana

Juichi SATO
Programme Officer
Japan International Coop Agency
Accra, Ghana

Mirjam SCHAAP
Associate Professional Officer
FAO
Accra, Ghana

G. Edward SCHUH
Dean
Humphrey Institute of Public Affairs
University of Minnesota
Minneapolis, Minnesota, USA

Fatta Mafo SOKONA
PNVA
Bamako, Mali

Lilian SSERVWO
Animal Traction Specialist/Extensionist
Ministry of Agriculture
Entebbe, Uganda

Ana Hannatu TAUNA
Director General
Ministry of Agriculture and Natural Resources
Kaduna State, Nigeria

Rosetta TETEBO
Acting Director
Women in Agricultural Development
Ministry of Food and Agriculture
Accra, Ghana

Barbara WALKER
Doctoral Candidate
Department of Geography
University of California
Berkeley, California, USA

Carol Ebun WILLIAMS
Head
Agricultural Extension Services
University of Ibadan
Ibadan, Nigeria

Saugina Xavieir XAVIEIR
Tecnico de Extensao
Ministerio de Agricultura
Rural, Mozambique

Moses M. ZINNAH
Team Leader
Winrock International
Cape Coast, Ghana

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