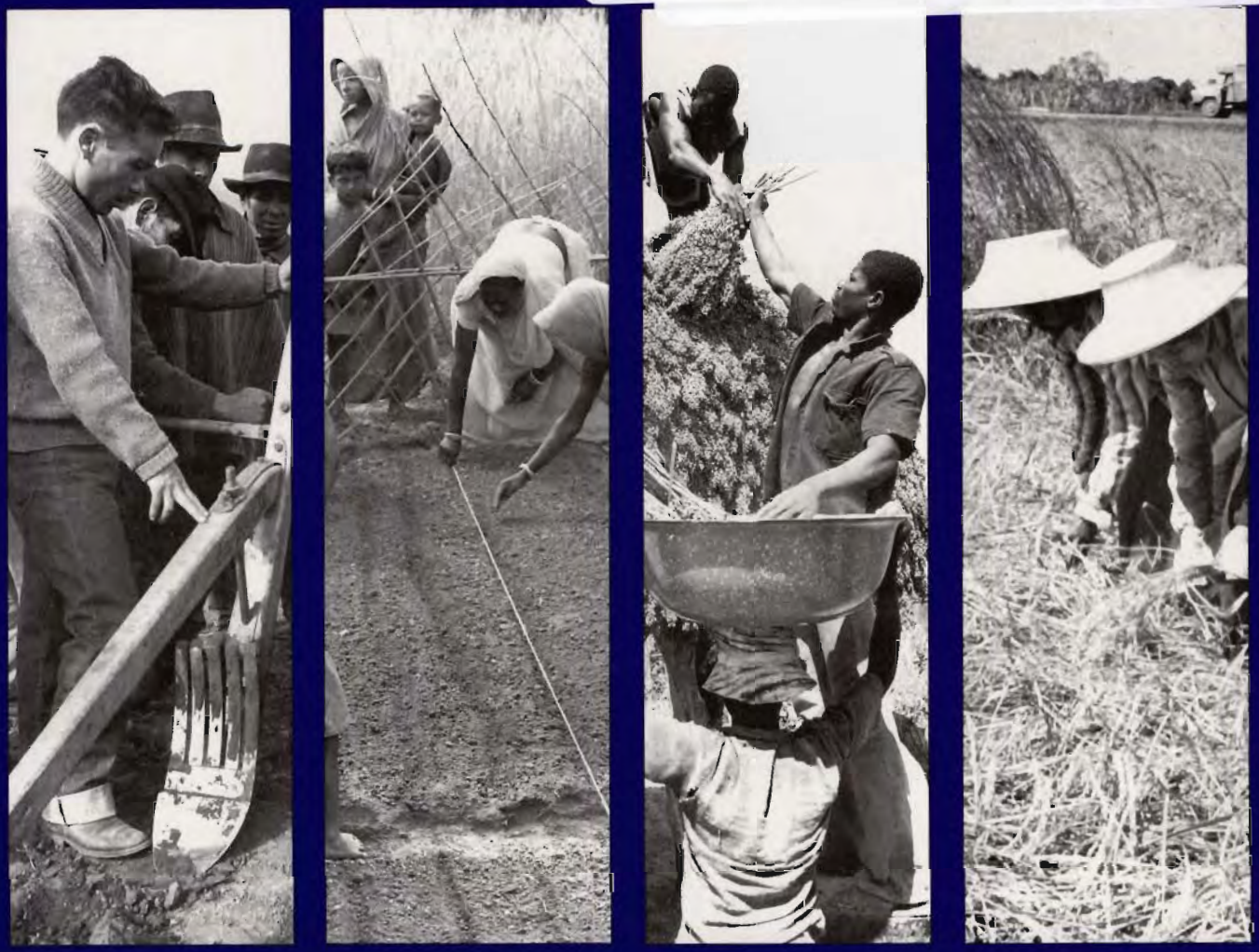

WOMEN: THE KEY TO FOOD SECURITY

AGNES R. QUISUMBING • LYNN R. BROWN • HILARY SIMS FELDSTEIN • LAWRENCE HADDAD • CHRISTINE PEÑA

FOOD POLICY REPORT
THE INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

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The International Food Policy Research Institute was established in 1975 to identify and analyze alternative national and international strategies and policies for meeting food needs of the developing world on a sustainable basis, with particular emphasis on low-income countries and on the poorer groups in those countries. While the research effort is geared to the precise objective of contributing to the reduction of hunger and malnutrition, the factors involved are many and wide-ranging, requiring analysis of underlying processes and extending beyond a narrowly defined food sector. The Institute's research program reflects worldwide collaboration with governments and private and public institutions interested in increasing food production and improving the equity of its distribution. Research results are disseminated to policymakers, opinion formers, administrators, policy analysts, researchers, and others concerned with national and international food and agricultural policy.

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PREFACE

Women's role in the economy has often been underestimated, and their work in agriculture has long been invisible. While policymakers have targeted population, health, and nutrition programs to women in their reproductive roles, they have neglected women as productive agents. This approach, however, is changing. In the decade since the 1985 World Conference on Women in Nairobi, Kenya, new research has highlighted the crucial role of women as farm managers and farm workers all over the world. Growing evidence shows that income in the hands of women contributes more to household food security and child nutrition than income controlled by men. Such knowledge about women's key role in food security is essential to the design and implementation of effective programs to enhance their potential. The Fourth World Conference on Women, in Beijing, China, in September 1995, provides a milepost for assessing women's progress in the last decade, taking stock of current knowledge, and building on this knowledge to guide future policies.

The International Food Policy Research Institute (IFPRI) places a high priority on research to improve the understanding of women's roles in agriculture and food security. IFPRI's work in this area started with a series of studies on the effects of agricultural commercialization on women's income, food consumption, and household and child nutrition. Now, through a multicountry research program called "Strengthening Food Policy through Intrahousehold Analysis," IFPRI researchers are examining the processes of family decisionmaking to learn how resources are allocated within the household. This research aims to inform the design and implementation of more effective food policy by taking into account how women's access to and control over productive resources, stakes in development and food security, and responses to development incentives differ from those of men.

This food policy report synthesizes current research about the roles that women play in ensuring food security in the developing world. It presents evidence on women as food producers, as providers of food to the household, and as contributors to household nutrition security. In so doing, it offers concrete proof that reducing gender disparities by increasing women's physical and human capital promotes agricultural growth, greater income for women, and better food and nutrition security for all.

THREE PILLARS OF FOOD SECURITY

Eight hundred million people in the developing world currently face food insecurity, and the challenge of meeting their food and nutritional needs is likely to become greater in the years ahead. Population growth, urbanization, and the limited potential for increasing production through the expansion of cultivated area imply that for food needs to be met in the future, yields will have to increase. While agricultural research continues to develop new varieties with higher yields and increased tolerance to unfavorable environmental conditions, an untapped source of agricultural growth could lie in reducing the bias against women in agriculture.

The three central ingredients, or pillars, of food security are food availability, or adequate food production; economic access to available food; and nutritional security, which often depends on the availability of nonfood resources such as child care, health care, clean water, and sanitation. Women play significant, if not dominant, roles in supplying all three ingredients necessary to achieve food security in developing countries. But women play these roles in the face of enormous social, cultural, and economic constraints.

This report brings together the latest evidence on the key roles that women play in maintaining the three pillars of food security and examines ways to strengthen the pillars through policies and programs that enhance women's abilities and resources to fulfill their roles. A more equal distribution of existing resources between women and men can improve food security, but even greater gains can be achieved by addressing the specific constraints women face. By alleviating these constraints and leveling the agricultural playing field, such policies and programs will substantially contribute to meeting world food needs and sharply reducing the numbers of malnourished and food insecure people in developing countries.

WOMEN AND AGRICULTURAL PRODUCTION

Sustainable production of food is the first pillar of food security. In every region of the developing world, but perhaps most in Africa, millions of women work as farmers, farm workers, and natural resource managers. In doing so they contribute to national agricultural output, maintenance of the environment, and family food security. They make these contributions despite unequal access to land, to inputs such as improved seeds and fertilizer, and to information. A growing body of evidence indicates that if male-female access to inputs were less unequal, substantial gains in agricultural output would occur, benefiting both women and men.

Women as Key Food and Cash-Crop Producers

In Sub-Saharan Africa, where women and men farm separate plots, women farmers have traditionally been responsible for food production. Estimates from the Food and Agriculture Organization of the United Nations (FAO) show that women account for more than half the labor required to produce the food consumed in the developing world, and perhaps three-fourths in Sub-Saharan Africa.[1] Aggregate data suggest that African women perform about 90 percent of the work of processing food crops and providing household water and fuelwood, 80 percent of

the work of food storage and transport from farm to village, 90 percent of the work of hoeing and weeding, and 60 percent of the work of harvesting and marketing.[2] Despite their traditional specialization in food production, women are becoming increasingly involved in cash-crop cultivation.[3]

In Asia and Latin America, men and women typically do not farm separate plots but work together on the family farm. While it is commonly believed that Asian agriculture relies almost entirely on male labor, women work as hired agricultural laborers or unpaid family workers and contribute between 10 and 50 percent of labor for various crops.[4] In Latin America, women play an important role in peasant agriculture. In Guatemala, for example, women contribute a quarter of family labor devoted to growing traditional and export vegetables, and in Peru women's share of labor across all crops is 25 percent. Women in Latin America also contribute significantly to harvesting, postharvest processing, and marketing.[5]

Constraints Faced by Women Farmers

Despite women's importance in agricultural production, they usually have lower levels of physical and human capital than men. These disparities persist because of legal, social, and institutional factors that create barriers for women.

Weak Land Rights

The laws governing women's rights to land differ widely in various parts of the world. Some religious laws forbid female landownership. Even when civil law gives women the right to inherit land, local custom may rule otherwise. In Sub-Saharan Africa, where women have prime responsibility for food production, they are generally limited to user (or usufruct) rights to land, and then only with the consent of a male relative. Some resettlement and irrigation projects have actually worsened women's rights to land by providing formal titles only to men.[6] This insecurity of tenure reduces the likelihood that women will invest much time and resources in usufruct land or adopt environmentally sustainable farming practices such as tree planting.

Such unequal land rights are reflected in the smaller farm sizes of women farmers. Women farmers in Sub-Saharan Africa, for example, often farm smaller plots of land both in absolute terms and in relation to household size (Table 1). Women also tend to be allocated poorer land, whose quality deteriorates even further as it is intensively cultivated.

Many programs with redistributive objec-

Table 1—Size of holdings by gender of farm manager or household head, selected countries

Country and Year	Area Cultivated		Household Size		Area per Person in Household	
	Male	Female	Male	Female	Male	Female
	(hectares)		(number of people)		(hectares)	
Kenya (1989)	2.6	1.7	8.6	8.0	0.30	0.21
Nigeria (1989)	2.6	0.8	7.6	4.9	0.34	0.16
Zambia (1986)	2.7	1.2	3.5	1.7	0.77	0.71
El Salvador (1988)	(*manzanas*[a])				(*manzanas*[a])	
Cooperative members	0.78	0.49	5.3	4.8	0.15	0.10
Tenant beneficiaries of land reform program	1.91	1.81	6.1	5.6	0.31	0.32

Sources: See page 20.

[a]A *manzana* is a measure of land area.

tives, such as land reform programs, often fail to recognize women as potential beneficiaries. A review of 13 land reform programs in Latin America found that the majority have not produced significant numbers of female beneficiaries or even given attention to gender as a beneficiary category.[7] Even when female heads of households are included as potential beneficiaries, they may have lower land allocations than male household heads. In El Salvador, for example, among cooperative members on former large estates, male household heads were allocated significantly larger areas than female heads.[8] Recent development projects have therefore attempted to give women access to land (Box 1).

Box 1
Strengthening Women's Land Rights

Some development projects have made innovative attempts to give women access to land. A World Bank sericulture project in India made it possible for women in Jammu and Kashmir to obtain joint titleship to mulberry gardens if they have a "no-objection letter" from the husband or landowner. In Andhra Pradesh, state land grant schemes promoted women's access to land. In Karnataka, project funds were used to lease land for women's groups. Similarly, obtaining land titles for female heads of households is a priority in a small farmer service project in Chile. Chile's experience that farmers with secure land tenure more readily accept new technology has led that country to target rural land titling efforts to the most difficult and neediest cases, with rural women explicitly recognized as beneficiaries.[1]

[1]A. R. Quisumbing, *Increasing Women's Agricultural Productivity as Farmers and Workers*, Education and Social Policy Discussion Paper No. 37 (Washington, D.C.: World Bank, 1994).

Limited Access to Common Property Resources

Especially in rural areas, the livelihood of families often depends on women's access to communal land, nearby forests, and waterways for supplies of food, fuelwood, water for domestic consumption and agricultural production, medicines, and materials for craft production and house building. As wives, females are almost always granted only limited rights to these resources, and their access is shrinking in the face of state takeovers and the shift from common property to private entitlement. Women's declining access and lack of rights to these resources may reduce their incentives to conserve forest resources (Box 2). Likewise, public irrigation systems are often considered an area of male control, and decisions about the use of irrigation water are made without reference to women's needs for their own production and domestic purposes.

Lack of Equipment and Appropriate Technology

Female farmers generally own fewer tools than men. Since farm capital contributes positively to yields, female farmers are likely to have lower yields than male farmers. Moreover, new technology has often been inappropriate to women's needs. Recently, however, international research efforts have developed a number of machines that reduce the drudgery of tasks largely performed by women and that fit women's ergonomic requirements. These new machines include micro rice mills, direct seeding equipment, transplanters, and threshing machines developed by the International Rice Research Institute (IRRI) and cassava-processing equipment developed by the International Institute for Tropical Agriculture (IITA).

The effect of the adoption of labor-saving equipment for agricultural production, however, depends on whether those affected are a

Box 2
Gender Bias and Property Rights

In Western Ghana and West Sumatra, property rights are evolving from communal to individual ownership and from matrilineal to mixed-patrilineal inheritance systems. The evolution of inheritance rules implies a shift from a system in which members of an extended family have partial rights to land to one in which individual land rights—passed on from fathers to sons and daughters—prevail. While daughters stand to inherit land, there is evidence that land inheritance is gradually favoring sons.[1]

If property rights to cultivable land are established only for men, women may not have strong incentives to adopt sustainable farming practices. This gender bias will be particularly important in cases where the appropriate practice of natural resource management is labor-intensive, such as tree planting. Indeed, a number of studies in Africa find that women farmers are less likely than men to plant tree crops such as coffee and cocoa.[2]

[1]K. Otsuka and A. R. Quisumbing, "Gender and Forest Resource Management: A Comparative Study of Selective Areas of Asia and Africa" (International Food Policy Research Institute, Washington, D.C., 1994, mimeo).

[2]A. R. Quisumbing, *Gender Differences in Agricultural Productivity: A Survey of Empirical Evidence*, Education and Social Policy Discussion Paper No. 36 (Washington, D.C.: World Bank, 1994).

mix of smallholders looking for labor-saving devices or hired laborers depending on employment from larger farm households. For women who farm their own plots, new agricultural technologies may reduce drudgery and increase productivity. But for female hired laborers, adoption of labor-saving devices may mean the loss of employment and income (Box 3). Also, where decisions about investment in equipment are made principally by husbands, investment in labor-saving technologies for women is frequently a low priority.

Limited Contact with Agricultural Extension

Despite women's prominent role in agriculture, they do not get an appropriate share of agricultural extension advice and other services (such as seeds, fertilizer, and credit delivered through the agricultural extension

Box 3
Do Agricultural Technologies Help or Hurt Rural Women?

The distribution of the costs and benefits of technology adoption depends on the specific cultural and social characteristics of a particular location. In one location in the Philippines, the introduction of a mechanical thresher relieved both men and women of threshing and substantially speeded the threshing process. As a result, rice farmers were able to grow a second crop of rice, which in turn led to increased employment for women in transplanting, weeding, and harvesting. The benefits substantially outweighed the small cost of reduced opportunities for manual labor in threshing. In Bangladesh, however, the substitution of a mechanical rice mill for a traditional threshing implement had a negative effect on poor and landless women who had previously earned income by providing hand-pounding services. The negative effect resulted from cultural restrictions on women's leaving their homestead for alternative employment.[1]

[1]T. R. Paris and P. Pingali, "Do Agricultural Technologies Help or Hurt Poor Farm Women?" paper presented at the International Workshop on Enhancing Incomes of Rural Women through Suitably Engineered Systems, May 10–13, 1994, International Rice Research Institute, Manila, Philippines.

system). In Africa, since women farm separate plots and since husbands do not necessarily share extension information with their wives, women's access to extension services is important. Evidence from a number of Sub-Saharan African countries, however, suggests that male farmers have greater contact with extension services than do female farmers (Table 2). A similar pattern is evident among land reform beneficiaries in El Salvador: male-headed households have significantly higher access to technical assistance than female-headed households.[9]

Four primary constraints limit women's access to extension services. First, in many places, cultural restrictions prevent male extension officers from meeting with women farmers. Second, domestic responsibilities sometimes limit women's mobility, making it harder for them to attend meetings and courses away from home. Third, women are less likely than men to speak the national language, and extension services are often not offered in the local language. Fourth, there are not enough female extension agents (Table 3).

One potential remedy is to increase the number of women receiving appropriate training to be agricultural extension agents. A second is to give agricultural training to women trained as community development or home economics officers so that they can work directly with women farmers. In Guatemala, home economics officers were trained in agriculture and farming systems research. They are now cultivating demonstration plots with women farmers, and in some places they have helped expand the use of improved varieties among women farmers by encouraging women to form groups to produce seeds of maize, beans, and tomatoes for themselves and for sale.

A third strategy is for extension agents, whether men or women, to meet with farmers in groups. This practice would reduce or remove the cultural constraints against interaction between individual male extension agents and female farmers and would have the added benefit of enabling the sharing of information by the women in the groups. The group approach has been used successfully in Botswana, Kenya, and Nigeria. In Zambia, farmers' field days at which farmers look at experimental materials are held separately for men and women.

In the Philippines, agricultural extension services have successfully used radio to transmit information. Radio was used, for example, for a course on integrated pest management (IPM), with farmers periodically sending in homework and tests for evaluation.[10] The use of radio was less successful

Table 2—Technical assistance received, by gender of household head

Indicator of Technical Assistance	Male-headed Household	Female-headed Household
Percent of families ever visited by extension worker		
Kenya (1989)	12	9
Nigeria (1989)	37	22
Tanzania (1984)	40	28
Zambia (1986)	60	19
Technical assistance score[a]		
El Salvador (1988)		
Cooperative members	0.74	0.59
Tenant beneficiaries of land reform program	0.96	0.74

Sources: See page 21.

[a]Based on a score of 0 for no technical assistance, 1 for access to technical information (from mass media, for example), and 2 for visits from agricultural extension agents.

Table 3—Number of farmers per extension agent and share of female extension agents

Region	Farmers per Agent	Women as Percentage of	
		All Extension Staff	Field Extension Staff
Africa	1,809	11.1	7.0
Asia and Pacific	2,661	14.8	14.1
Near East	2,499	19.5	9.5
Latin America	2,940	14.5	13.9
Europe	431	15.7	6.6
North America	325	39.2	15.0

Source: K. Saito and D. Spurling, *Developing Agricultural Extension for Women Farmers,* Discussion Paper No. 156 (Washington, D.C.: World Bank, 1992).

in Mali, however, in large part because the language on the radio was different from that spoken locally.

Lack of Access to Credit

Women face a number of barriers to obtaining credit. Property that is acceptable as collateral, especially land, is usually held by men, and formal financial institutions often deem the types of valuables held by women (such as jewelry) unacceptable. The transaction costs involved in obtaining credit—transportation costs, paperwork, time spent waiting—may be higher for women than for men owing to higher opportunity costs from forgone activities. Indeed, in rural Kenya, distance to a bank is a significant determinant of the probability of obtaining credit for women but not for men.[11]

Social and cultural barriers, women's lower educational levels relative to men, and their lack of familiarity with loan procedures may also limit their mobility and interaction with predominantly male credit officers or moneylenders. Exclusion from local groups, such as farmers' groups, may prevent women from receiving not only extension advice but also credit, particularly if the extension worker plays an important role in credit delivery. Women also tend to be involved in the production of relatively low-return crops that are not included in formal sector lending programs.

Since the early 1980s, a number of alternatives to the formal sector have given women access to credit and financial services.[12] Most programs do not heavily subsidize interest rates, and they link repayment to future lending. Successful programs typically reduce transaction costs, charge commercial interest rates, establish deposit facilities, target poor clients, develop income-generating skills, strengthen existing local institutions like farmers groups, and emphasize the provision of financial services rather than business training.

Lower Levels of Education

In the early 1980s, average literacy rates for men in developing countries were over 50 percent, while over two-thirds of women were still illiterate.[13] This disparity continues to be larger in rural areas, where educational attainment is lower, and persists despite high private rates of return to women's schooling[14] and high social returns to women's education.[15] This gap has serious implications for agricultural productivity and incomes. Better-educated farmers are more likely to adopt new technologies and to have access to extension services. For example, a study of coffee, a high-value crop, in Kenya found that increasing the primary education of women farmers not only causes them to plant coffee trees more readily, but also increases the adoption of coffee by other

women farmers, who are more likely to copy women than men farmers.[16] Underinvestment in women's education thus has high opportunity costs.

Gains from Removing Constraints on Women Farmers

Barriers to women's increased productivity and the use of their experience and knowledge may impose a large opportunity cost to society in terms of forgone output and incomes, the magnitude of which is only now being realized. For example, many studies show that plots of land controlled by women have lower yields than those controlled by men. These lower yields are usually the result of lower use of labor and fertilizer per acre rather than managerial and technical inefficiency (Box 4).[17] Unequal rights and obligations within the household, as well as women's limited time and financial resources, prevent women from applying the optimal levels of inputs.

Given equal access to resources and human capital, women farmers can achieve yields equal to those of men or even, as some studies show, significantly higher.[18] One study estimates that yields among Kenyan women farmers could increase by 7 percent if they were given the same average levels of age (or experience), education, and inputs as those possessed by the entire sample of male and female farmers.[19] Yields could increase by as much as 24 percent if all women farmers had primary schooling.[20] If women had the same experience, education, and inputs as men, yields could increase by 9 to 24 percent. These results, however, need to be taken with caution since the simulations do not address how input levels can actually be increased.[21] To the extent that better-educated farmers are more likely to use modern inputs, the key to increasing agricultural productivity may lie in educating women in rural areas and increasing their human and physical capital.

Box 4
Agricultural Inputs and Female-controlled Farm Plots

Detailed data from Burkina Faso show that resources are allocated inefficiently across plots controlled by different members of the household. Plots controlled by women are farmed less intensively than similar plots controlled by men in the same household and simultaneously planted with the same crop. Much less male labor per hectare is devoted to plots controlled by women than to similar plots controlled by men. Child labor and unpaid exchange labor are also applied more intensively to plots controlled by men. Lastly, virtually all fertilizer is concentrated in plots controlled by men, even though each additional unit of fertilizer applied to a plot results in progressively smaller increases in output. The less intensive application of resources on women's plots results in lower yields. One study estimates that the value of household output could be increased by 10–20 percent by reallocating currently used inputs across plots.[1]

[1]H. Alderman, J. Hoddinott, L. Haddad, and C. Udry, *Gender Differentials in Farm Productivity: Implications for Household Efficiency and Agricultural Policy,* Food and Consumption Division Discussion Paper 7 (Washington, D.C.: International Food Policy Research Institute, 1995).

Women's Untapped Potential for Contributing to Agricultural Research

Unrecognized Expertise

Women suffer not only from lower levels of education and lack of access to information, but also from a lack of recognition of the expertise they have acquired. Women have detailed, complex knowledge of seeds and the growing systems of which they are in charge. In Zambia's intricate *chitimene* system, for example, in which forest and fallow

areas are brought into crop production with the felling, harvesting, and burning of woody vegetation, both men and women have detailed knowledge of local woodland and fallow land species, their growing patterns, their agronomic attributes, and their uses. Each sex, however, specializes in knowledge of certain species.[22] Recent research is demonstrating the value of women's indigenous knowledge base as a source of productivity growth (Box 5).

Box 5
Using Women's Indigenous Knowledge Base

Scientists at the Institut des Sciences Agronomiques du Rwanda (ISAR) and the Centro Internacional de Agricultura Tropical (CIAT) in Colombia collaborated with local women farmers to breed improved bean varieties. Previously, the breeders' predictions of the 2 or 3 bean varieties that displayed most potential under actual growing conditions had resulted in mildly successful increases in bean productivity. In this collaboration, the women farmers were invited to examine more than 20 bean varieties at the research station and take home and grow the 2 or 3 they thought most promising. The women planted these varieties using their own methods for experimenting with new varieties. Although the women's criteria for selection were not confined to yield, which had been the breeders' primary measure for ranking, the selections of the women farmers outperformed the selections of the bean breeders in terms of yield by 60–90 percent. Farmers were still growing their own choices six seasons later.[1]

[1]L. Sperling and B. Ntabomvura, "Integrating Farmer Experts into On-Station Research," in *Tools for the Field: Methodologies Handbook for Gender Analysis in Agriculture,* ed. H. S. Feldstein and J. Jiggins (West Hartford, Conn., U.S.A.: Kumarian Press, 1994).

Few Women Agricultural Scientists

The number of women who work as agricultural research scientists or extension agents has been, until recently, minuscule. All continents are now experiencing a rising enrollment of women in agricultural science, but the numbers are still low. Once trained as scientists, they are often given responsibility for anything to do with women, whether it is within their discipline or not. Their skills are underused, and they face workplace difficulties related to their minority status.

One innovative program, the Winrock International program for African Women Leaders in Agriculture and the Environment, focuses on increasing the number of African women scientists through access to education and African-based research opportunities for M.S. and Ph.D. students. The program recognizes that scholarships and degrees are not always enough for women scientists to be effective and to attain higher positions. The program therefore includes managerial training for women, with specific preparation for being a minority in a male-dominated workplace. The program also trains both male and female scientists in gender analysis, to improve their diagnostic skills about desirable new technologies and to help them to understand women farmers and their specific needs.

Women's Absence in Agricultural and Environmental Decisionmaking Bodies

Women are overlooked as decisionmakers both at the farm level and at the policy level. For too long, much agricultural research has ignored the on-the-ground reality of farming systems and farmer preferences, resulting in lost opportunities and miscalculated priorities. Several international agricultural research centers have demonstrated that incorporating the views of farmers early in the research process results in more productive research, and these centers have helped

many national systems do the same. These centers, however, have focused on male farmers; the explicit inclusion of women's knowledge and perspectives in this process has been much slower, and this delay remains an obstacle to meeting the needs of women producers.

The process of listening to—and learning from—female farmers can be facilitated by increasing the representation of women in agricultural policymaking bodies. Relatively few women have yet reached senior management positions in public and independent research and training institutions, ministries with responsibilities for agriculture and the environment, and environmental nongovernmental organizations.

One interesting attempt to ensure that women's views are incorporated into local decisions is taking place in Burkina Faso, where the World Bank has undertaken a project on community decisionmaking about community land management. The implementation manual has specific instructions on how to ensure the participation of women, including the stipulation that in voting on community land management plans, 30 percent of those voting in favor must be women for a plan to pass.[23]

WOMEN AND ECONOMIC ACCESS TO FOOD

The second pillar of food security is economic access to available food. A household's access to food depends greatly on its real income. In recent years, a growing number of studies have shown that improvements in household welfare depend not only on the level of household income, but also on who earns that income. These studies find that women, relative to men, tend to spend their income disproportionately on food for the family. Moreover, women's incomes are more strongly associated with improvements in children's health and nutritional status than are men's incomes.

Women's Incomes and Household Food Security and Nutrition

Women's decisions to engage in income-earning activities involve complex trade-offs, and the ultimate effects of women's employment on household nutrition security depend on the specific setting. Sufficient evidence supports the argument that women's employment, especially for low-income households, may be good not only for women's own welfare, but also for the rest of the household members.[24] Most of this evidence pertains to the positive effects that women's incomes have on household food security and nutrition.

A number of studies conducted during the 1980s suggest that men and women spend income under their control in systematically different ways.[25] Women typically spend a high proportion of their income on food and health care for children, as well as other goods for general household consumption. In contrast, men retain discretionary control over a higher proportion of their own incomes for personal expenditures. The findings of these studies were subsequently confirmed by more recent studies that provide quantitative measures of the different effects of men's and women's income (Box 6).

Evidence from Africa, Asia, and Latin America shows that women's income has a greater effect on household food security and preschooler nutrition than men's income (Table 4). In southwestern Kenya, for a given household income level, female-controlled income share had a positive and significant

Box 6
Women's Income and Household Food Security

Evidence to support the greater impact of women's income on household food security is increasing. In Rwanda, cash income earned by women is positively and significantly associated with household calorie consumption.[1] Although female incomes were lower than total male incomes and men had more than 10 times as much off-farm earnings as women, there were no female-headed households with severely malnourished children and a less than proportional number were found to be calorie-deficient.[2] In Côte d'Ivoire, the share of household cash income earned by women in the household has a positive and significant effect on the budget share for food.[3] Lastly, in the Philippines, after controlling for overall household total expenditures, female income share has been shown to have a positive and significant association with household calorie availability, household budget shares of medical care and child's schooling (important nonfood inputs into nutrition), and preschooler weight for age. The probability of preschooler fever and diarrhea is also lower in families where women earn higher incomes.[4]

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[1]J. von Braun, H. de Haen, and J. Blanken, *Commercialization of Agriculture under Population Pressure: Effects on Production, Consumption, and Nutrition in Rwanda*, Research Report 85 (Washington, D.C.: International Food Policy Research Institute, 1991).

[2]J. von Braun and G. Wiegand-Jahn, "Income Sources and Income Uses of the Malnourished Poor in Northwest Rwanda," in *Income Sources of Malnourished People in Rural Areas: Microlevel Information and Policy Implications*, ed. J. von Braun and R. Pandya-Lorch, Working Paper on Commercialization of Agriculture and Nutrition No. 5 (Washington, D.C.: International Food Policy Research Institute, 1991).

[3]L. Haddad and J. Hoddinott, "Household Resource Allocation in the Côte d'Ivoire: Inferences from Expenditure Data," in *Poverty and Rural Development*, ed. T. A. Lloyd and W. O. Morrissey (London: Macmillan, forthcoming).

[4]M. Garcia, "Impact of Female Sources of Income on Food Demand among Rural Households in the Philippines," *Quarterly Journal of International Agriculture* 30, no. 2 (1991): 109–124.

effect on household calorie consumption, while men's income had a negative effect.[26] A study using Taiwanese data finds that, after holding per capita household income constant, women's income share has a significant and positive effect on household budget shares of staples and education and a negative effect on budget shares allocated to alcohol and cigarettes.[27] In Guatemala, the average yearly profits from nontraditional agricultural export crops would increase household food expenditures by twice as much if they were controlled by women rather than their husbands.[28] Finally, one of the most careful studies ever conducted on the welfare effects of male and female incomes shows that the positive effect on the probability that a child will survive in urban Brazil is almost 20 times greater when certain income sources accrue to women rather than men.[29]

Why do men and women tend to spend income differently? Societal and cultural norms may assign women the role of "gatekeepers," in which they ensure that household members, especially children, receive an adequate share of available food. Alternatively, women may prefer to spend more on children's daily needs because they spend more time with them. Women may also face different constraints than do men. To minimize the competing demands on their time, for example, women may spend more on food because they purchase more expensive calories that take less time to prepare. Finally, women and men may have different income flows and thus different transaction costs. In other words, since women's income tends to come more frequently and in smaller amounts, it may be more readily spent on household daily subsistence needs than lumpier seasonal income, which tends to

Table 4—Effects of income earned by men and women on household welfare

Country	Effect on	Effect of Women's Income	Effect of Men's Income	Ratio of Effect of Women's Income to That of Men's Income
Kenya	Household calorie level	Positive	Negative	...
Taiwan	Household budget share of alcohol	Negative	Negative	1.3
Guatemala	Food expenditures	Positive	Positive	2
Brazil	Child weight for height	Positive	Positive	4.2
Brazil	Child survival	Positive	Positive	18.2

Source: See page 21.

come to men and is likely to be spent on more expensive items.[30] A recent study tested this hypothesis by controlling for the flows of incomes earned by men and women in Niger.[31] The findings indicate that the timing of female income flows has a significant effect on both total household expenditures and food expenditures in a given season, while the timing of male income flows has no effect. This suggests that women have less access than men do to resources that tend to even out consumption, such as credit and savings. Thus, both the timing of overall household income and the flow of income by gender influence seasonal food expenditures.

Women and Poverty

Since income is a critical determinant of a household's ability to obtain food, poverty is a major threat to household food security. The combination of poverty and gender inequality poses an even greater threat because of the positive nutritional outcomes associated with increasing women's incomes and the empirical finding that inequality within households tends to decline as households become better off.

A careful review of past studies finds that women are slightly overrepresented in poor households. New evidence from 11 data sets in 10 countries shows that there are more women than men as a proportion of adults in the lowest income group, but this is significantly different from the highest income group only in countries with extreme gender biases.[32]

Given the positive nutritional outcomes associated with increasing women's incomes, the growing percentage of female-headed households around the world is a cause for concern, for past studies suggest an association between female headship and poverty.[33] Closer analysis of poverty measures of individuals in male-headed and female-headed households in rural Ghana and Bangladesh shows that there are significantly more persons in female-headed households below the poverty line.[34] Poor access to education and other resources that tend to raise income levels thus has serious implications for the growing number of women who are the sole income-earners for their families.

One key dimension of poverty that analyses using total expenditures or income often fail to adequately take into account is time.

When time spent on home production (such as child care and fetching wood and water) is included in the computation of full household income, women contribute between 40 and 60 percent of household income.[35] Any efforts to increase women's cash income must take into account the conflicting demands from domestic responsibilities and the need for women to maintain their own nutritional status.

WOMEN AND NUTRITION SECURITY

The third pillar of food security is the achievement of nutrition security—that is, adequate nutritional status in terms of protein, energy, micronutrients, and minerals for all household members. Adequate availability of food at the household level is necessary to achieve nutrition security, but it is not sufficient. Other key contributors to good nutrition are adequate health and child care and access to clean water and good sanitation. Ensuring the nutrition security of the household, through the combination of both food and other resources, is almost the exclusive domain of women. Women's ability to manage these resources is especially important for the more vulnerable members of the household, such as children.

Women's Time Allocation

A critical underpinning to both the availability and use of these complementary inputs is time. Almost without exception, nonfood contributors to nutrition require complementary time investments, and in general this investment is made by women.

Agricultural and Domestic Production

Given women's roles in agricultural production, domestic production, and reproduction, women in developing countries are relatively short of time compared with men. Given that domestic production and reproduction are almost entirely within the female domain, one might expect that their time in agricultural production would be lower than men's. However, data from Botswana, Burkina Faso, Kenya, Nigeria, and Zambia show that this is not the case (Box 7).[36]

Added to the burden of agricultural production is the role of domestic production, including food preparation and the collection of fuelwood and water. In many regions of the world, women spend up to five hours per day collecting fuelwood and water and up to four hours per day preparing food.[37]

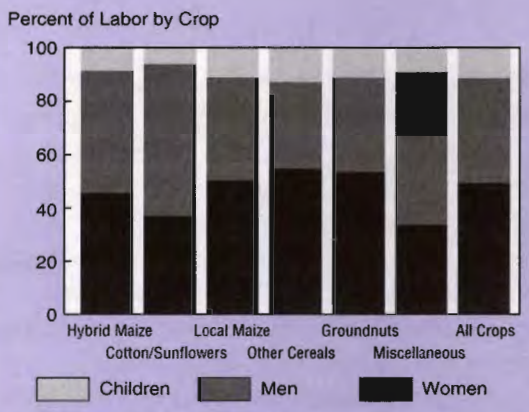
Care of Household Members

The provision of "care," namely, paying adequate time and attention to meeting the physical, mental, and social needs of growing children and other household members, is a crucial input into good nutrition. Care affects nutrition security in two broad ways: first, through feeding practices such as breast-feeding and the preparation of nutritious foods for weaned infants and others in the household, and second, through health and hygiene practices such as the bathing of children and the washing of hands before food preparation. These caring behaviors, particularly in relation to children, are time-intensive, yet time allocation studies consistently show relatively low periods of time being spent in direct child care. In a study of Bangladesh, Botswana, Ghana, Kenya, and the Philippines, time recorded in direct child care was generally less than one hour, except in Botswana and the Philippines. By design, all households in the Philippine sample had at least one preschool child, and yet even there time in

Box 7
Women's Agricultural Production in Zambia

In Zambia, women are responsible for 49 percent of family labor allocated to crop production, while men supply 39 percent and children supply 12 percent. Moreover, the traditional view that women specialize in food crop production and men in cash-crop production in Sub-Saharan Africa is not necessarily true. In Zambia, women's commitment of labor to cash crops—hybrid maize, sunflowers, and cotton—is not insignificant. Women contribute 44 percent of total family labor to hybrid maize and 38 percent to cotton and sunflowers.

Labor Share of Household Members in Cultivating Selected Crops in Zambia



Source: S. Kumar, *Adoption of Hybrid Maize in Zambia: Effects on Gender Roles, Food Consumption, and Nutrition*, Research Report 100 (Washington, D.C.: International Food Policy Research Institute, 1994), Table 18.

child care was generally only around two hours per day.[38]

Women constantly face difficult choices in their time allocation decisions. During times of economic hardship, women often assume the burden of adjustment. They absorb shocks to household welfare by expanding their already tightly stretched working day, often to the detriment of their own health and nutrition. The rapid pace of urbanization in many countries and increased female labor force participation imply even greater demands on women's time. Women turn to processed foods and "street foods" to save time and try to find substitutes for child care so they can participate in the labor market. Increased time spent in income-generation activities (translated into higher food expenditures) and in using health and education facilities can improve child nutrition, but the loss of direct time spent in child care may offset this. Devoting more time to generating income may also worsen women's own nutrition.[39] However, increasing female employment outside the home may increase women's bargaining power within the household. Development of technology that relieves women's time burdens in agricultural production and household maintenance without sacrificing their ability to earn independent incomes is therefore critical.

Women's Nutritional Status as an Input to Child Nutrition and Health

Protecting female nutritional status is important in providing a head start for children's nutritional status. Through prepregnancy nutritional status, weight gain during pregnancy, diet during lactation, and breastmilk production, better-nourished mothers lead to higher-birth-weight infants and better-nourished children. Birth weight is the single biggest determinant of neonatal and infant mortality and of child growth up to the age of seven.

A number of maternal factors have been shown to be significant determinants of birth weight; most important are the mother's prepregnancy weight and weight gain during pregnancy. Women entering pregnancy with a low weight are several times more likely to produce a low-birth-weight baby (that is, an infant weighing less than 2.5 kilograms). As the prepregnancy weight of the mother increases, mean birth weight increases and the incidence of low birth weight decreases.[40]

Infant birth weight and maternal weight

gain during pregnancy are highly correlated. In addition, this prenatal weight gain is associated with a decrease in the incidence of premature birth (gestational age of less than 37 weeks). Moreover, if nutritional status before pregnancy, as measured by low prepregnancy weight, is inadequate, weight gain during pregnancy becomes even more important in influencing neonatal outcomes.

Evidence also suggests that fetal and early childhood malnutrition can lead to other serious disease, such as non-insulin-dependent diabetes, coronary heart disease, hypertension, and strokes, occurring in mid-adulthood onward.[41] Additionally, the micronutrient status of HIV-infected pregnant women, who compose up to 30 percent of pregnant women in some of the worst-affected countries, has been shown to influence whether an infant is born HIV infected. A study in Malawi indicated that as the vitamin A status of the pregnant woman worsened the likelihood of the infant's being born HIV positive increased.[42]

A less well documented observation is that women may act as shock absorbers through the liquidation of their own nutritional status. Studies of the seasonality of maternal and preschooler nutrition status have observed that in times of food surplus women's nutritional status returns to normal more quickly than that of preschoolers, but in the lean season female nutritional status is depleted more rapidly than that of preschoolers.[43] The physical labor performed by Ghanaian women, for example, particularly in agriculture, appears to have a negative effect on their own nutritional status.[44] In Ghana women participating in a credit program designed to intensify the cultivation of rice and vegetables had a lower nutritional status than women participating in a credit program targeted to food processing that reduced the energy required to do the task.[45]

Food Distribution within Households

Most of the evidence on biases in the allocation of food within households emanates from South Asia, strongly suggesting that a strong pro-male and pro-adult bias in terms of the quantity of food intake exists in that region.[46] Some of this bias can be explained by the specialization of adult males in energy-intensive tasks.[47] However, boys are also favored in food distribution, especially during the lean season.[48] There is less evidence for a pro-male bias from Latin America and Sub-Saharan Africa.

Distribution of Other Resources within Households

While the discrimination within households in terms of food distribution in South Asia may be one factor explaining higher female mortality rates among infants and children, it is probably better explained by inequities in other inputs into child survival. The unequal distribution of resources other than food, such as health care and mother's caregiving time, within the household may be detrimental to the health and nutrition of women and girls. Evidence of boy-girl discrimination in the allocation of such resources also comes mostly from South Asia.[49] Quantity and quality of health care and survival probabilities after diarrhea episodes are all reported to favor boys. In Pakistan, lower-income households seek care more often for boys than for girls and are likely to use higher-quality providers for boys.[50] Indeed, in India, breastfeeding duration is longer for boys, partly because there is less urgency to have another child after a boy.[51] In rural Bangladesh the risk of dying from severe malnutrition is more than twice as high for girls as for boys.[52]

CONCLUSIONS AND RECOMMENDATIONS

Women in developing countries currently play a crucial role in meeting the food and nutrition needs of their families through all three pillars of food security—food production, economic access to food, and nutrition security—but they do so with inadequate resources. If the constraints confronting women farmers were removed and women were granted access to the resources available to male farmers, they could make significant contributions to eradicating the food insecurity faced by millions of people. To allow women to fulfill their potential in generating food security, national governments and international organizations must take policy steps in three broad areas.

Increase Women's Physical and Human Capital

Women's ability to fulfill their roles as food producers can be enhanced by improving women's access to resources, technology, and information. Efforts must be made to safeguard women's traditional rights to land through nondiscriminatory registration and titling and the explicit inclusion of women as sole or joint beneficiaries in land reform programs. Guaranteeing the sustainable use of the natural resource base will also enable women to have continuing access to the forest products needed for their livelihoods. Innovative credit programs using nontraditional forms of collateral and local institutions (like women's groups) can ensure that women are able to obtain access to credit. Programs can support the development of farm technology that takes into account women's needs and their knowledge of indigenous farming systems.

Providing effective agricultural extension services to women as farm managers is essential to increasing the adoption of new technologies and realizing productivity gains in agriculture. Extension messages can be made more appropriate to female farmers and delivered cost-effectively using local institutions. More female extension agents can be recruited, particularly in rural areas, and additional training can be provided to female local experts to enable them to be extension providers. Male extension agents can be trained to work more closely with women in settings that are culturally acceptable, such as women's groups. Such groups can also improve access to infrastructure by serving as marketing cooperatives and communal irrigation associations. A revised incentive system can be used to encourage all extension officers to work with women farmers.

Increasing education for girls, particularly in rural areas, is one way to ensure the next generation's stock of human capital. Where there are cultural barriers, governments and communities can find appropriate mechanisms to increase girls' enrollment, such as hiring more female teachers, building separate schools for girls, and providing scholarships, books, and uniforms to girls. Increasing the number of female high school graduates will also, over time, provide a pool of potential agricultural extension officers.

Governments and donors can support the training of more women in the agricultural and related sciences. With increased support from governments and donors, such highly trained women can be included in decision-making positions in all agricultural and environmental departments of government, bilateral, and multilateral agencies. Finally, governments should ensure that the workplace, in agriculture as elsewhere, offers equal opportunity to women in terms of both hiring and the training and work opportunities that contribute to advancement.

Increase Women's Ability to Generate Income

To maximize the positive effect that women's incomes have on household food security and nutrition, efforts must be made to increase women's ability to generate and control income. Women are often prevented from participating in more remunerative employment opportunities because of the constraints of home production. Strategies should be geared toward increasing women's productivity both in paid work (whether in agriculture or other sectors) and in domestic production, so women can increase their incomes without sacrificing additional time, their children's welfare, or their own health and nutritional status. Such strategies can include the development of technologies to reduce time spent in traditional home production activities such as milling and fetching water and the provision of community child-care facilities. More important, education and training may be the most crucial investments to be made in women who do not have physical assets such as land. General education and skills training may also help many women gain employment outside agriculture.

Protect Women's Health and Nutritional Status

Good health and adequate nutrition are important to women at all stages of their lives. Women need to protect their own health and nutritional status to be able to fulfill their productive and reproductive roles.[53] In targeting appropriate development or safety net programs toward women, the focus should be on those that increase women's income-earning potential while reducing the energy or time intensity of their activities. Such efforts should also be supported by programs addressing girls' and women's specific health needs—especially in relation to puberty, pregnancy, and lactation. These include programs to relieve iron deficiency anemia, vitamin A and iodine deficiencies, general reproductive health care, and pre- and postnatal care. Lastly, women need to be empowered to seek health care for themselves and for those who depend on them for food and nutrition security.

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