Two women harvest leafy vegetables in Bangladesh. Women's higher workloads in agriculture are more consistently associated with higher dietary diversity for mothers and children, but also imply worse child anthropometric outcomes. (IFPRI)

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Women in Agriculture and the Implications for Nutrition

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Key Role of Women in Agricultural Development, Nutrition and Health

There is now greater urgency to close gender gaps and empower women and girls in the most vulnerable settings. Gender equality is important not only because women have the same rights as men, but also because it sets off a virtuous cycle, paving the way for achieving other development goals, such as reducing poverty and hunger, and improving nutrition and health. Women are often the primary caregivers and food providers for their families. When women benefit, so can their children, their households, and their communities, and these benefits can be passed on to future generations.

But despite widespread acknowledgement of womens' crucial role in the economy, particularly in agriculture, women throughout the developing world continue to face pervasive disadvantages (FAO, 2011; O'Sullivan *et al.*, 2014; Quisumbing *et al.*, 2014b). New data confirm that women own significantly less land than men in Africa (Doss *et al.*, 2015) and Asia (Kieran *et al.*, 2015) and have less say over how household resources are used or allocated (Malapit *et al.*, 2014), yet provide 40% of the labor for crop agriculture in Africa (Palacios-Lopez *et al.*, 2017). This growing recognition of women's importance in agricultural development has now led to more serious efforts to ensure that agricultural development programs are socially inclusive and consider the gendered roles and responsibilities, resources, and constraints of both women and men.

This chapter discusses the role of women in agriculture, and the ways in which their status affects the health and nutrition of their households. It highlights recent literature on the impacts of gendered and nutrition-sensitive agricultural programs. It also goes beyond a singular focus on women to consider the role of gender dynamics in agriculture and nutrition, and why the relationships between men and women are just as important for nutrition. Finally, it considers the ways in which agricultural research and nutrition-sensitive agricultural interventions can be designed so as to achieve better outcomes within nutrition and gender, and how these outcomes can be more accurately measured.

A Theory of Change for Gender, Agriculture, and Nutrition

Gender – the socially determined relationship between women and men – influences agriculture and nutrition in different ways. To understand the role of gender in increasing the nutrition impact of agricultural development projects, one must begin with a credible hypothesis of how the series of positive changes are expected to occur. This theory of change helps bring to focus what the key assumptions are, and whether the expected impacts are achievable if, or when, conditions change. Understanding the pathways also helps identify key milestones that can be measured along the way to monitor whether changes are occurring in the right direction or not.

There is now a broad consensus on the multiple pathways by which agricultural interventions can impact nutrition (Ruel *et al.*, 2017). This framework spans three levels at which processes occur and can be measured: (i) the individual level; (ii) the household level; and (iii) the broader environment (Fig. 6.1). It shows how decisions around agricultural production and household consumption can ultimately influence the health and nutrition of the nutritionally vulnerable populations we care about, particularly women and children. The extent to which the health environment, food environment, and natural environment support behaviors towards better health and nutrition also contributes to the effectiveness of agricultural policies and interventions in improving health and nutrition.

Ruel and Alderman (2013) identified six main pathways through which agricultural interventions affect nutrition:

1. **food access** from own production;
2. **income** from the sale of commodities produced;
3. **food prices** from changes in supply and demand;
4. **women's social status and empowerment** through increased access to and control over resources;
5. **women's time** through participation in agriculture, which can have either positive or negative nutrition impacts for themselves or their children; and

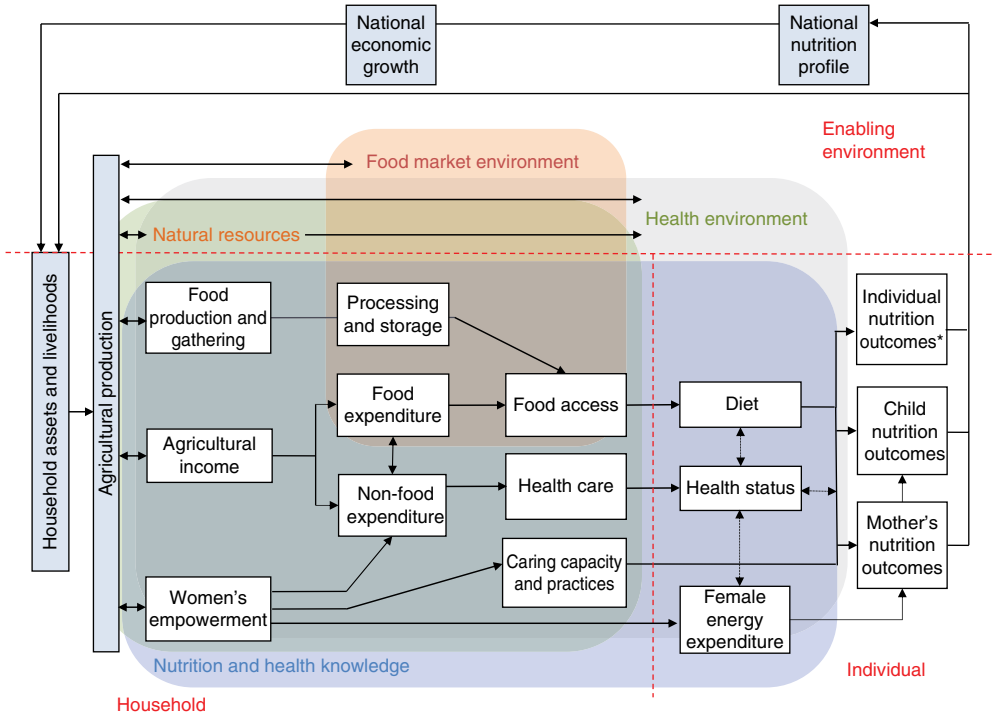

Fig. 6.1. Conceptual pathways between agriculture, nutrition and health (adapted from: Headey *et al*., 2011; Gillespie *et al*., 2012; Herforth and Harris, 2014; and Kadiyala *et al*., 2014).* Individual nutrition outcomes refer to the general population, including women, men, and adolescents (not just mothers and children).

6. women's health and nutrition through engagement in agriculture, which can also have either positive or negative nutrition impacts depending on exposure to occupational health hazards and the balance between energy intake and expenditure (Ruel and Alderman, 2013; Ruel *et al*., 2017).

Pathways 4, 5 and 6 highlight the special role that women have in safeguarding the health and nutrition of children, which helps explain the specific focus that many nutrition programs have had on women and their explicit inattention to men. Throughout much of the world, women are more likely to be caregivers and food providers within their families, so targeting nutrition interventions to women and mothers makes sense. The pathways framework shows that increasing women's social status and control over resources might help direct household spending towards nutritious food and health care, consistent with the positive associations that researchers have found between women's social status and control over resources and child outcomes (Hallman, 2000; Smith *et al*., 2003; Quisumbing, 2003; Yoong *et al*., 2012). Mothers are often targeted for behavior change communication (BCC) interventions that promote optimal infant and young child feeding (IYCF) practices, often with the implicit assumption that they will continue to provide the same level of care regardless of the time intensity of the practices and often without regard for any trade-offs that might arise from competing demands for their time such as other production or livelihood activities and domestic tasks. Women of child-bearing age are also targeted as beneficiaries of nutrition interventions because of their reproductive role: healthy women are more likely to have healthy babies. An improvement in women's health and nutrition is an investment in the health of the next generation.

While these are all valid reasons for targeting women in nutrition-sensitive agricultural programs, this only paints a partial view of the gender equation. Both men and women have

important roles in achieving good health and nutrition for themselves and their households, which encompass all six pathways. Gender determines the distribution of all the resources used in agriculture and the distribution of gains from increased agricultural productivity (Doss, 2017): who raises which crops and which animals; how labor and other agricultural inputs are allocated among farm activities; how and by whom agricultural output is distributed and processed along the value chain; who is exposed to which occupational hazards; how food and income are distributed within the household; and which child gets more (or less) access to food and health care (Malapit and Quisumbing, 2016; Quisumbing *et al.*, 2017). Focusing on women without paying attention to men and the gender dynamics between them misses important mechanisms that can make or break efforts to leverage agriculture to improve nutrition.

Nutrition Impacts of Gender- and Nutrition-sensitive Agricultural Programs

Nutrition-sensitive agricultural programs, which explicitly aim to improve nutrition through specific nutrition interventions, are often designed in line with women's roles as both agricultural producers and gatekeepers of food and nutrition security for their households (Ruel and Alderman, 2013; van den Bold *et al.* 2013; Ruel *et al.* 2017). These programs can be classified into three modalities: (i) targeting nutrition education to women through BCC; (ii) targeting resources to women, such as assets, inputs, credit, and extension messages; and (iii) organizing women into groups, which serve both as a delivery platform and a way to increase social capital (Quisumbing *et al.*, 2017). This section highlights key gender findings from the most recent impact evaluations reviewed by Ruel *et al.* (2017) (see also Chapter 9), organized by the type of activities used by different programs to address gender issues.

Nutrition BCC targeted to women

Nutrition BCC comprises a range of interpersonal, group and mass-media channels and methods that provide program participants with relevant information to encourage and support the adoption of optimal nutrition and child feeding practices and behaviors (McNulty, 2013). Targeting nutrition BCC to women and mothers is perhaps the most common approach used in nutrition-sensitive agricultural development programs. This is consistent with findings by Ruel *et al.* (2017) that inclusion of a strong BCC component to promote optimal diets and child feeding practices is a primary driver for enhanced impacts of agriculture on diets and other nutrition outcomes.

For example, a project promoting biofortified vitamin A-rich orange sweet potato (OSP) has been shown to be effective in Mozambique and Uganda. Project activities were targeted along traditional gender lines: vine distribution combined with agricultural extension services were targeted to men; and BCC and mass media nutrition messages were targeted to women. Hotz *et al.* (2012a, b) documented high rates of farmer adoption and impacts on vitamin A intakes among mothers and young children in both countries, and on child vitamin A status in Uganda (Hotz *et al.*, 2012a, b). However, further analysis of the Uganda data (Gilligan *et al.*, 2014) found that although women often played a leading role in the decision to adopt OSP, this decision was often jointly made with their husbands. Because of the jointness of these decisions, the current strategy of targeting only women with nutritional training may be missing an opportunity to create an awareness of the benefits of OSP among men (Quisumbing *et al.*, 2017).

Resource transfers + nutrition BCC targeted to women

Programs on homestead food production typically combine support for agricultural production with nutrition BCC. The enhanced-homestead food production (EHFP) program in Burkina Faso, implemented by Helen Keller International (HKI), provided inputs and training to women beneficiaries of the program and negotiated with the community for land on which women could establish a village model farm (van den Bold *et al.*, 2015). The program had an explicit goal of improving children's nutrition outcomes, targeted to households with women and children

in the first 1000 days, and integrated agriculture production activities with a strong nutrition and health BCC strategy (Olney *et al.*, 2015). Beneficiary women received inputs and training for establishing homestead gardens and small livestock rearing. They also received bi-weekly home visits from an older female leader or a health committee member, who trained them on essential nutrition actions, optimal IYCF practices, and provided advice related to adoption of these practices.

Olney *et al.* (2016) found significant improvements in several child outcomes (hemoglobin and anemia, diarrhea, wasting), positive impacts on maternal outcomes (intake of nutritious foods, dietary diversity, underweight), and improvements in several dimensions of women's empowerment, such as meeting with women, purchasing decisions, and health care decisions. The evaluation also documented improvements along the impact pathway, including increases in agricultural production, and household access to, and consumption of, nutrient-rich foods and dietary diversity. In Nepal, where HKI implemented the same EHFP model with a poultry component, Osei *et al.* (2017) found that the program significantly improved household food security and production of eggs and vegetables; several maternal breastfeeding, complementary feeding and hygiene practices; and the use of preventive health services during pregnancy and the first few years of the child's life. Similar positive impacts of EHFP on child anemia were found in the second phase of the Burkina Faso study carried out between 2012 and 2014 (Olney *et al.*, 2017).

A nutrition-sensitive dairy value chain project in northern Senegal, where the population suffers from severe anemia, targeted resources and BCC to women dairy farmers using a different approach. The project distributed a micronutrient-fortified yoghurt (MNFY) as an incentive for increasing milk supply from dairy farmers, coupled with a BCC strategy focused on promoting optimal IYCF practices (Le Port *et al.*, 2017). The MNFY was produced by a local dairy firm that established a contractual arrangement with dairy farmers. Farmers who met the production target were eligible to receive the MNFY, and were instructed to give it to their children aged 24–59 months. The project also included a BCC strategy focused on the promotion of optimal IYCF practices, including use of micronutrient-fortified foods or products for young children. Le Port *et al.* (2017) found that, compared with a control group that received only BCC, children exposed to the BCC + MNFY intervention had greater increases in hemoglobin over the 1-year study period, with larger impacts in boys than girls.

Targeting resource transfers through women's groups

In some cases, targeted resource transfers to women were combined with group-based approaches. Livestock-oriented programs typically fall under this category, and have not traditionally included nutrition interventions (such as BCC) even though they may have nutrition goals such as increasing consumption of animal-source foods, improving household dietary diversity and, in some cases, child nutritional status (Ruel *et al.*, 2017).

For example, Heifer International's community development program in Nepal provided livestock and training to rural women's self-help groups, intended to promote income generation by building women's social capital (Miller *et al.*, 2014; Darrouzet-Nardi *et al.*, 2016). Miller *et al.* (2014) found that, in the Terai areas where program implementation was stronger, the intervention group had significantly increased income per household member (+6,712 vs +2,589 NPR (Nepalese rupees)), improved sanitation practices, better child weight-for-age (WAZ) and height-for-age z-scores (HAZ), and reduced reported sick days compared with control. Household health practices improved in the intervention group from baseline, with more households reporting a water tap in the compound (12% to 28%) and a toilet in their home (40% to 70%), and were more likely to treat drinking water (12% vs 5%) and use soap for hand washing. In all districts, longer participation in the program led to greater improvements in HAZ. A follow-up analysis of child dietary diversity using data from the same study showed that the benefits associated with the program differed depending on agroecological region and season (Darrouzet-Nardi *et al.*, 2016). These studies suggest that the positive impacts on nutrition and diets are mediated through women's empowerment by

developing and facilitating women's self-help groups (Darrouzet-Nardi *et al.*, 2016). However, program impacts on women's empowerment were not analyzed.

Women's groups were also used as a delivery platform for a solar-powered drip irrigation intervention in Benin. The intervention aimed to increase crop diversity and dietary diversity security by installing solar market gardens (SMGs) in two villages, working in conjunction with women's agricultural groups that grew vegetables in hand-watered plots prior to the intervention (Alaofè *et al.*, 2016). The evaluation found that the proportion of SMG women's group households engaged in vegetable and fruit production significantly increased by 26% and 55%, respectively, and that SMG women's groups were three times more likely to increase their fruit and vegetable consumption compared with non-women's groups. The study also found that the majority of SMG women's group households used the additional income from the sale of produce to purchase food items that improved the diversity of family diets, including beans, fish and cooking oil.

Discussion

Interventions that paid attention to women's roles in household food and nutrition security tended to focus on women exclusively, resulting in limited attention being paid to men's roles as well as to intra-household dynamics. The lack of attention paid to men's roles in nutrition outcomes may be a missed opportunity, as illustrated by the Uganda OSP evaluation, which has shown that intra-household gender dynamics played an important role in crop choice, child feeding practices, and technology diffusion through information networks in this intervention. A study by Quisumbing *et al.* (2017) found that, where significant, greater equality within households was almost always associated with positive nutritional outcomes. This suggests that nutritional programs that also aim to improve intra-household inequality could have greater impacts than those that do not, highlighting the importance of a household working together towards better nutrition for the family. Targeting women without understanding the broader dynamics of the household and community is likely to miss out on key constraints, opportunities, and impacts (Doss, 2017).

Impact evaluations also rarely address trade-offs between agricultural and nutritional objectives, such as the potential impact on workload from participation in agricultural interventions, or trade-offs between different outcomes. For example, higher incomes could be detrimental to diets if they substitute processed, sugary foods for nutritious ones, as illustrated by some cash and food transfer programs (Quisumbing *et al.*, 2017). Trade-offs could also exist between outcomes for mothers and children. For example, in Nepal and Ghana, studies have found that domains of women's empowerment that were significantly associated with women's diets and nutrition outcomes were different from those associated with children's diets and nutrition outcomes (Malapit and Quisumbing, 2015; Malapit *et al.*, 2015). Similarly, new evidence on associations between dimensions of empowerment and food security and nutrition outcomes in Bangladesh, Cambodia, Ghana, Mozambique, Nepal, and Tanzania found that, indeed, improved nutrition was not necessarily correlated with being empowered across all domains and that different domains had different impacts on nutrition (Quisumbing *et al.*, 2017). This lends support to the hypothesis that increased workloads associated with intensifying agricultural participation may lead to both positive and negative nutrition outcomes. Quisumbing *et al.* (2017) reported that, across the six countries, higher workloads were more consistently associated with higher dietary diversity for mothers and children, but also implied lower women's BMI and worse child anthropometric outcomes. While these observational studies do not allow the same level of causal inference as do well designed and well implemented experimental trials, they have been useful in confirming associations between hypothesized drivers of outcomes, and in generating new hypotheses about potential impact pathways (Ruel *et al.*, 2017). The lack of attention to these potentially harmful unintended consequences remains an important gap in the literature.

Finally, very few experimental studies examine impacts on women's empowerment, even when projects are intentionally designed to

influence women's empowerment as a mechanism for improving nutrition outcomes. This is partly due to the relatively recent development of metrics for measuring women's empowerment in the context of agricultural interventions, such as the Women's Empowerment in Agriculture Index (WEAI) (Alkire *et al.*, 2013), although new experimental and quasi-experimental impact assessments that use these metrics are now underway.

Designing and Measuring for Success

Recently, there has been encouraging progress in documenting agriculture, gender, and nutrition linkages, both in terms of well designed impact evaluations, as well as rigorous analyses of existing data (Ruel *et al.*, 2017). However, there remain important knowledge gaps particularly around how gender issues can be addressed in a way that enhances potential impacts of agriculture on diets and other nutrition outcomes.

An important limitation of nutrition-sensitive agricultural development programs, and the impact evaluations associated with them, is that they tended to target women rather than explicitly addressing gender, and rarely documented impacts on women's empowerment outcomes (Quisumbing *et al.*, 2017). Gender- and nutrition-sensitive agricultural programs converge around strategies that attempt to increase women's access to resources and information by targeting women or women's groups, but it is not clear whether any gender impacts are achieved and to what extent these gendered mechanisms contribute to the observed changes in nutrition outcomes.

Even when programs have explicit gender-related goals and strategies, these are rarely accompanied by the collection of appropriate indicators that would document impact on the gender-related goals. In Ruel *et al.* (2017), only two out of the 45 studies reviewed on nutrition-sensitive agriculture specifically documented impacts on women's empowerment outcomes. Programs undertaken by governments and civil society to address gender disparities are rarely rigorously evaluated for their gender impacts (Quisumbing *et al.*, 2014a).

Clarity in setting up the goal of the project is the first step: specifically, does the project aim to reach, benefit, or empower women? Simply including women in a program does not necessarily benefit them, and even when women benefit they are not necessarily empowered (Johnson *et al.*, 2017). Each of these goals requires different strategies and tactics, and therefore different indicators for monitoring progress. A project that claims to empower women but is only including women as beneficiaries cannot expect to have an impact on empowerment if its activities are insufficient to help beneficiaries make strategic life choices. A project that aims to benefit women must be able to assess how much of the benefits accrue to women compared with men. Similarly, a project that aims to empower women and implements strategies to shift gender norms cannot tell whether its strategies succeeded if it does not collect information on decision making around different aspects of empowerment. This is not to say that all nutrition-sensitive agricultural programs should aspire to empower women. On the contrary, reaching or benefiting women may be perfectly reasonable as an immediate objective in some contexts. But for these programs to succeed, they must be very clear about the program's goals, design a package of activities and interventions that make sense, and then measure the right things to assess impact. There is no rigorous way to tell whether a program is truly effective unless its goals, strategies, tactics and indicators are aligned.

Clarifying whether a program intends to reach, benefit, or empower women is one way to identify which impact pathways are important, and consequently what indicators and metrics should be used to assess gender and nutrition impacts. Although there is currently a lack of consensus on what types of indicators to use for measuring women's empowerment, ongoing research is underway to develop a project-level WEAI as part of the IFPRI-led Gender, Agriculture and Assets Project Phase 2 (GAAP2). GAAP2 is working with a portfolio of 13 nutrition-sensitive agricultural development projects implemented in nine countries to generate rigorous evidence on what dimensions of women's empowerment need to be strengthened to improve maternal and child nutrition.

Conclusion

There is now greater understanding that the global goals for nutrition cannot be achieved without paying attention to women and the role that gender dynamics plays in agriculture. A gender-blind approach is costly, not only because it tends to miss out on important constraints, opportunities, and impacts (Doss, 2017), but also because of the risk of unintended negative impacts of agriculture on nutrition. These can include impacts on women's time for child feeding and care, and the health and nutrition risks associated with exposure to livestock and chicken feces, especially for young children (Ruel *et al.*, 2017). Although more research is needed to understand these risks and how they might be prevented, the division of labor in the household and women's time allocation is central to this question.

Gender roles and norms vary across cultures and contexts, so it is difficult to generalize what types of impacts one could expect for gender- and nutrition-sensitive agricultural interventions.

Addressing such a complex issue requires rigor in the way programs must be designed, implemented, and evaluated. But above all, policy and programmatic efforts to support nutrition-sensitive agriculture need to be grounded in evidence on what works.

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