

NUTRITION-SENSITIVE AGRICULTURE FOR GENDER EQUALITY

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Globally, malnutrition¹ remains unacceptably high, and its burden falls disproportionately on women and girls. The 2018 Global Nutrition Report states that women experience a disproportionate burden of some forms of malnutrition: one in three women of reproductive age has anemia; women have a higher prevalence of obesity than men—yet millions of women are underweight (Development Initiatives 2018). Women and adolescent girls have greater nutritional needs. For example, young women’s iron requirements are higher at puberty, and caloric and micronutrient needs are higher during pregnancy and lactation. Poor nutritional status for women and girls also has direct intergenerational consequences via pregnancy and childbirth outcomes (Victora et al. 2008, Black et al. 2013a). The first 1,000 days (start of pregnancy until the child’s second birthday) represent a critical window during which poor nutrition leads to irreversible deficits in children’s development, the ability to learn, and productivity and health in adulthood (ibid.).

Many empirical studies and programmatic approaches have focused on the instrumental value of leveraging women’s empowerment for improved nutrition outcomes; nutrition-sensitive agriculture programs (NSAPs) have been one such area (Malapit 2019). (See recent systematic reviews on gender in NSAPs by Newton et al. 2018 and Ruel et al. 2018.) This chapter flips the framing of how women’s empowerment and gender equity can lead to improved nutrition outcomes in NSAPs by examining how investments in NSAPs contribute to women’s empowerment and gender equality. Empowerment is the process by which women acquire the ability to make strategic life choices in areas where they were previously denied that ability (Kabeer 1999).

1 Malnutrition refers to forms of undernutrition and overnutrition. Commonly assessed forms of undernutrition include stunting (low height for age), wasting (low weight for height), and anemia (low blood hemoglobin concentration). Overnutrition includes overweight and obesity.

In this chapter, we operationalize empowerment as the ability to make important decisions, especially regarding production, livelihoods, food provision, and other areas that are critical for the interventions implemented in NSAPs, as well as shifting gender attitudes and norms toward a more equitable division of labor and resources. We begin by describing the background on NSAPs in relation to gender equality and women's empowerment. The next section reviews four NSAPs to highlight what we can learn about the potential of using NSAPs to achieve women's empowerment and gender equality. We then discuss the four cases, drawing out lessons. In the final section, we outline a forward-looking research agenda for this theme.

Nutrition-sensitive agriculture programs vis-à-vis gender equality and women's empowerment

Despite increasing global commitments, it is clear that scaling up even the most effective nutrition-specific interventions and programs will not achieve global nutrition targets (Black et al. 2013b, Ruel and Alderman 2013). Doing so requires large-scale nutrition-sensitive programs in sectors that address the underlying determinants of nutrition, alongside nutrition-specific interventions (Ruel and Alderman 2013). Nutrition-sensitive interventions cannot simply address food security or income with the expectation that these will improve nutrition. Rather, nutrition-sensitive programs and interventions must include nutrition-specific goals and actions targeted to populations with nutritional deficits (see Box 5.1). Nutrition-specific goals and actions must address the immediate determinants of nutrition, such as diets and nutrient intakes, feeding and care practices, and infectious diseases. An agricultural program or intervention that promotes production of a nutritious food, without nutrition-specific goals and actions for increasing consumption, cannot be considered nutrition-sensitive.

Given agriculture's role in the production, availability, and consumption of food, and in providing livelihoods and incomes in rural areas, the need for investments in NSAPs is undeniable. To enhance nutrition outcomes, it is necessary to redirect agriculture from merely producing large quantities of food toward producing nutritious foods and ensuring they are available to, and consumed by, those who need the key nutrients (Willett et al. 2019).

NSAPs must also recognize that factors outside agriculture determine health and nutrition status, and that men and women face differential health needs and risks that vary across contexts and the lifecycle (A4NH 2016).

BOX 5.1 Definitions of nutrition-specific and nutrition-sensitive interventions or programs

Nutrition-specific interventions or programs are those that address the *immediate determinants* of fetal and child nutrition and development: adequate food and nutrient intake, feeding, caregiving and parenting practices, and low burden of infectious diseases.

Nutrition-sensitive interventions or programs are those that address the *underlying determinants* of fetal and child nutrition and development: food security; adequate caregiving resources at the maternal, household, and community levels; and access to health services and a safe and hygienic environment—and incorporate specific nutrition goals and actions.

Source: Ruel and Alderman (2013).

Poor households do not have the same access to the right kinds, qualities, and quantities of food, and the household dynamics that dictate the intra-household distribution of food may place some individuals in poor households at greater risk of poor diets and undernutrition. For example, recent country-specific studies including macro and micronutrient assessment found inequitable shares of food and nutrients among household members (Wibowo et al. 2015, Harris-Fry et al. 2018).

Agriculture can contribute to nutritional outcomes through six general pathways (Ruel and Alderman 2013) (see Box 5.2). NSAPs justifiably focus on women, given their prominent role in three of the six pathways (Pathways 4–6). However, gender matters for all the pathways, because gender differences in roles, preferences, and power mediate each step in the series of actions leading to nutrition and health outcomes. Different genders and social groups may also receive differential benefits and risks associated with these pathways owing to their specific health needs and sources of resilience that vary across contexts and the lifecycle (A4NH 2016, Harris and Nisbett 2018).

NSAPs could potentially improve women's empowerment and gender equality in two ways. First, if NSAPs succeed in improving the nutritional status of women and girls, the immediate consequences are improvements in well-being and the narrowing of existing gender gaps in nutritional status. If sustainable, these impacts lay the foundation for better health and nutrition

BOX 5.2 Agriculture–nutrition pathways

Pathway 1: Agriculture is a source of food, both for households directly engaged in **production** and for the food system as a whole.

Pathway 2: The sale of agricultural products is a source of **income**, which can be used to purchase nutritious food, and goods and services that support good health.

Pathway 3: Agricultural markets determine food **prices**, which influences the relative cost of buying and selling nutritious foods.

Pathway 4: Women's empowerment and social status influence how resources are allocated within the household.

Pathway 5: Women's participation in agriculture influences their **time use**, which can have positive or negative consequences for their ability to provide care for children.

Pathway 6: Women's participation in agriculture may also have positive or negative consequences for **women's own health and nutrition**, through exposure to health hazards related to agricultural activities, and the balance of energy expenditure and consumption.

Source: Ruel and Alderman (2013).

outcomes not only for themselves but also for their future children. For women, improved nutritional status may unlock the empowerment process, whereby the benefits of improved health can enable them to take advantage of opportunities and exercise agency. Whether these changes result in long-term improvements in gender equality is still unknown. Longitudinal studies with sufficiently long follow-up periods have traced the benefit of good nutrition in early childhood over the life course, but these studies are few (for example Maluccio et al. 2009, Hoddinott et al. 2013). Additionally, nutrition impact studies typically measure nutritional status (for example height and weight) only for the target populations of interest (usually women and children within a specific age range), and rarely document how gender gaps in nutritional status have changed as a result of the intervention.

Second, many NSAPs recognize that gender dynamics and women's empowerment play an important role in achieving nutrition impacts. By targeting pregnant women and mothers of young children, these programs have capitalized on the instrumental role of women's empowerment and

leveraged it for enhancing nutrition and health outcomes. NSAPs may adopt specific strategies and actions that shift gender norms and promote women's empowerment as a pathway for achieving their nutrition goals. While initially motivated by instrumental objectives, in practice this presents an opportunity to directly empower women as part of the intervention. Such impacts are measured alongside other outcomes that the NSAPs are seeking to improve within the program's timeframe.

Evidence from selected case studies

This section presents evidence from four types of NSAPs that used different approaches in addressing gender dynamics in design and implementation. We purposely selected these cases from among technologies that CGIAR and other agricultural research centers have developed, as well as those implemented by partners and evaluated by a CGIAR research center. We selected only nutrition-sensitive programs—that is those that incorporate nutrition-specific goals and actions targeted at nutritionally vulnerable populations (see Box 5.1). We therefore excluded CGIAR programs that have nutrition objectives (for example reducing malnutrition, increasing dietary diversity) but that do not have nutrition-specific goals and actions (for example nutrition training), as they do not meet this definition of “nutrition-sensitive.” We also selected cases based on the strength of the evaluation design, including particularly those with peer-reviewed publications on their impacts and those that provided more systematic information and analyses on how the program had addressed gender dynamics. Finally, cases selected show a range of approaches to gender programming in a diverse set of interventions and contexts, to highlight what we can learn from different approaches to NSAPs.

The cases feature programs that introduced biofortified orange-fleshed sweet potato (OSP) in Uganda, improved vegetables and fish technologies in Bangladesh, a dairy value chain project in northern Senegal, and homestead food production (HFP) and home gardening in Bangladesh and Burkina Faso. All four cases address the production pathway (Pathway 1), two of the cases address the income pathway (Pathway 2), and three address the women's empowerment pathway (Pathway 4). The last case also reports findings on the program's negative influence on time use (Pathway 5). At the minimum, most NSAPs aim to both reach and benefit women, as reflected in the four cases featured; in three of the selected cases, the programs also included activities to empower women, whether implicitly or explicitly. In reviewing

the evidence, we acknowledge that not all of these NSAPs were designed to empower women or to achieve gender equality, and thus not all evaluations included indicators for these outcomes. Nevertheless, the evaluations as well as organizations' reflections on implementation can provide important lessons on how NSAPs can promote women's empowerment and gender equality. Table 5.1 presents a summary of the approaches used in the four cases.

Disseminating orange-fleshed sweet potato to women's farmer groups in Uganda²

Biofortification, the process of breeding staple crops rich in essential micronutrients, is a feasible and cost-effective means of delivering micronutrients to populations with limited access to diverse diets and other micronutrient interventions (Bouis et al. 2011, Bouis and Saltzman 2017). Biofortification has been shown to be effective for vitamin A-rich OSP in Mozambique and Uganda, where randomized controlled trials (RCTs) document impacts on vitamin A intake among mothers and young children in both countries and on child vitamin A status in Uganda (Hotz et al. 2012a, 2012b). Additional analyses also show large reductions in the prevalence and duration of diarrhea among young children (Jones and de Brauw 2015), supporting the well-known role of vitamin A in protecting immunity (Ruel et al. 2018).

In Uganda, the HarvestPlus Reaching End User (REU) project introduced OSP to approximately 10,000 farm households between 2007 and 2009, by providing free OSP planting material (vines) and complementary training. The intervention included a one-time distribution of OSP vines to project households, provision of extension services to men and women who were members of project farmer groups on OSP production and marketing, and provision of nutritional knowledge training on vitamin A deficiency to women in the same households (female farmer group member or female spouse of the male farmer group member). The impact evaluation sample included 84 farmer groups from 3 districts where white and yellow sweet potato were commonly grown and consumed.

The REU project was designed to increase production of OSP and increase vitamin A availability in the household (Pathway 1), by promoting its cultivation alongside complementary nutrition training intended to encourage the consumption of OSP by mothers and young children among beneficiary households. As typical in nutrition projects, this NSAP aimed to reach and benefit mothers with young children who resided in the project

2 This section draws heavily on Gilligan et al. (2020).

TABLE 5.1 Summary of case study approaches

	Case 1 Disseminating OSP to women's farmer groups in Uganda	Case 2 Improved vegetable and polyculture fish management technologies in Bangladesh	Case 3.3 Dairy value chain project in northern Senegal	Case 3.4 HFP programs and their evolution
Intervention	<ul style="list-style-type: none"> • Distribution of OSP vines, provision of extension services (primarily to men) • Nutritional knowledge training (primarily to women) 	<ul style="list-style-type: none"> • Training and credit for homestead production of vegetables (targeted to women group members) • Training to some group members and credit to all adopters of group-operated polyculture fishponds (targeted to women's groups) • Training to all and credit to poor adopters of individually operated polyculture fishponds (primarily to men) 	<ul style="list-style-type: none"> • Provision of micronutrient-fortified yogurt as incentive to milk producers who met supply quota (implicitly targeted to women) • BCC training provided to all households (primarily to women) 	<ul style="list-style-type: none"> • Provision of inputs and training for homestead production of nutrient-rich food (targeted to women) • BCC training (targeted to women)
Pathways influenced	Pathway 1 (production)	Pathway 1 (production) Pathway 2 (income) In the vegetables and group fishponds only: Pathway 4 (women's empowerment)	Pathway 1 (production) Pathway 4 (women's empowerment)	Pathway 1 (production) Pathway 2 (income) Pathway 4 (women's empowerment) Pathway 5 (time use)
Aim to Reach, Benefit, or Empower women?	Reach, Benefit	Reach, Benefit, Empower (vegetables and group-based fishponds only)	Reach, Benefit, Empower	Reach, Benefit, Empower
Institution originating technology	HarvestPlus	<ul style="list-style-type: none"> • World Vegetable Center • WorldFish 	n/a	<ul style="list-style-type: none"> • Helen Keller International
Implementation partners	<ul style="list-style-type: none"> • Volunteer Efforts for Development Concerns and Farming for Food • Development Program-Eastern Uganda 	<ul style="list-style-type: none"> • Vegetables: Gono Kallayan Trust • Group fishponds: Banchte Shekha • Individual fishponds: Mymensingh Aquaculture Extension Project and Department of Fisheries 	<ul style="list-style-type: none"> • La Laiterie du Berger • Cellule de Lutte Contre la Malnutrition 	<ul style="list-style-type: none"> • Helen Keller International • Local partner in Burkina Faso: Association d'Appui et de Promotion Rurale du Guimou
Evaluation partner	IFPRI	IFPRI	IFPRI	IFPRI
Key references	Hotz et al. (2012a), Gilligan et al. (forthcoming)	Kumar and Quisumbing (2011), Quisumbing and Kumar (2011)	Le Port et al. (2017), Bernard, et al. (2019)	Quisumbing et al. (2015), Olney et al. (2016)

Note: BCC = behavior change communication, HFP = homestead food production, IFPRI = International Food Policy Research Institute, OSP = orange-fleshed sweet potato.

households. It targeted mothers as beneficiaries of the nutrition improvements, and they received training on the nutrition content of the biofortified crop, but there was no explicit strategy to involve men in the nutrition training. While men take a lead role in crop choice decisions in the Uganda project areas, women also play an active role in crop selection, particularly for food crops for household consumption, and they often supply labor on household farms.

Gilligan et al. (2020) find that the probability of adoption of OSP is highest on parcels where there is joint (rather than female-exclusive) control over productive decisions, and where women take the lead in deciding which crops are grown. On the other hand, the probability of adopting OSP is lowest on parcels exclusively controlled by men. These results suggest women play an important role in the decision to adopt OSP but that they often make this decision jointly with their husbands. Thus, the strategy of targeting only women with nutritional training may be missing an opportunity to create awareness of the benefits of OSP among men, and recognition that engaging with both men and women may be the best strategy for promoting adoption.

The REU project in Uganda is an example of a NSAP designed to influence OSP production and consumption, but it did not explicitly aim to shift gender norms or empower women in OSP crop choice or consumption. Rather, it viewed gender norms around crop choice and consumption decisions as given and was designed to accommodate these norms. Women were reached in the nutritional training but less so in the extension services on OSP. While the REU project achieved positive nutrition impacts, providing benefits to women through improved vitamin A intake, the impact evaluation was not designed to assess whether it had increased women's ability to exercise greater agency over OSP production and consumption decisions, or whether the changes in dietary intake of vitamin A had closed gender gaps in micronutrient deficiencies. Nutrition information was collected only from women and children, and even the impact results on children in Uganda are not reported separately for girls and boys (Hotz et al. 2012a).

Improved vegetable and polyculture fish management technologies in Bangladesh³

In Bangladesh, as in other countries in South Asia, a pro-male bias in food distribution within the household is closely linked to women's micronutrient deficiencies (Kumar and Quisumbing 2011). Boys in this region are also favored

3 This section draws heavily on Kumar and Quisumbing (2011) and Quisumbing and Kumar (2011).

in the distribution of non-food health inputs such as healthcare (Haddad et al. 1996). Thus, many of the food-based interventions that government and civil society organizations in Bangladesh have undertaken have targeted women. Examples include programs that promoted improved vegetable and polyculture fish production technologies that were evaluated for their long-term impacts on household and individual well-being using a quasi-experimental approach.

The agricultural technology interventions included a vegetable intervention targeted to women's group members who grew vegetables on small plots on or near the household compound, and a polyculture fish technology intervention implemented using two alternative dissemination strategies. In one site, the implementing non-governmental organization arranged long-term leases of small ponds managed by groups of 5–20 women who received credit and training in polyculture fish production methods. Some groups also took advantage of a food-for-work program to excavate ponds. In the other fishpond site, a government extension program required beneficiary households to already own or manage a pond or to share pond ownership with other households.

The group fishponds intervention provided training to some members of each adopter group and credit to all group members. The individual fishponds intervention provided training to all adopters but credit only to relatively poorer households. The individual fishponds training and credit was supposed to reach both men and women, but it reached more men than women, and the training tended to reinforce existing gender norms about women's tasks and mobility in public spaces.

All three intervention modalities aimed to increase household well-being, as measured by consumption expenditures, assets, income, and calorie availability; diet, as measured by intakes of calories, protein, iron, and vitamin A consumed by children and adults; and nutritional status, as measured by the concentration of blood hemoglobin and anthropometric measures (height and weight) converted into standardized height-for-age and weight-for-height indicators.

While all three intervention modalities aimed to work through the production and income pathways (Pathways 1 and 2, respectively) by providing training and credit so that beneficiaries could adopt the improved agricultural technologies, the vegetable and group fishponds interventions worked through women's groups and provided them with resources, such as credit and access to a fishpond site. These group-based interventions offered opportunities for the women beneficiaries to manage and make important decisions on different aspects of vegetable and fish production (Pathway 4).

Thus, while all three intervention modalities aimed to reach and benefit women, only the group-based interventions had the potential to contribute to women's empowerment.

The largest monetary returns to early adoption at the household level were in the individually operated fishponds sites, while early adopters of the vegetable technologies experienced insignificant impacts on household-level monetary returns, in large part because the diffusion of the vegetable technologies beyond the original treatment area may have eroded any short-term gains the early adopters enjoyed. Nevertheless, early adopters of improved vegetables achieved sustained improvements in nutritional status, especially for women and girls. The proportion of stunted girls decreased differentially by 28 percentage points while the proportion of thin boys decreased differentially by 43 percentage points. Women's body mass index (BMI) increased as desired, although men's BMI decreased—an unintended effect in this undernourished population. These findings suggest that working through women's groups and disseminating vitamin A- and iron-rich vegetables that are consumed by women had a positive net impact on the nutritional status of women and children, especially girls.

Early adoption of group fishponds had mixed impacts on children's long-term nutritional status, and did not significantly affect men's or women's nutritional status. Among early adopters of the individual fishponds, consumption expenditures and calorie availability at the household level improved and the proportion of women with low hemoglobin levels decreased. However, impacts on long-term indicators of nutritional status for girls were not sustained. Unlike at the vegetables site, BMIs of women in the individual fishponds site did not improve, perhaps because the increase in nutrient intake did not compensate for women's increased work effort. Because the individual fishponds approach did not effectively target women for disseminating technology or nutrition knowledge, the intervention did not enable women to invest the family's resources toward their own nutrition or girls' nutritional status in the long run.

These NSAPs promoting improved vegetable and fish technologies show that group-based dissemination strategies targeted to women are an effective strategy to reach women and can benefit them by improving the nutritional status of women and girls. The group-based approach may also help women build social capital and accumulate other physical assets. Social and physical assets are important resources that support the empowerment process, alongside agency and achievements, which in this case are improvements in nutritional status (Kabeer 1999). A mixed-methods study by Hallman et

al. (2007) and qualitative work by Naved (2000) have explored the role of group-based approaches in building social capital and enhancing women's decision-making.

In addition, although the evaluation was not designed to assess empowerment impacts (for example using decision-making indicators), a related paper assesses the impact of these new technologies on men's and women's asset accumulation (Quisumbing and Kumar 2011). The paper finds that women's assets increase more, relative to men's, when technologies are disseminated through women's groups, suggesting that implementation modalities are important in determining the gendered impact of new technologies. Social capital, as embodied through women's groups, not only serves as a substitute for physical assets in the short run but also helps build up women's asset portfolios in the long run. However, even if women's assets increased more than men's in the group vegetable site, men's asset stocks were still much greater than women's. This finding suggests that closing the gender asset gap may require more concerted and deliberate programming to increase women's control of assets and reduce gender asset inequality. This intervention did not include any programming to increase men's involvement in health and nutrition, so it is difficult to compare the results with the counterfactual approach involving men. This continues to be a gap in the design and implementation of NSAPs.

Dairy value chain project in northern Senegal⁴

A nutrition-sensitive value chain integrates nutrition objectives and nutrition-specific interventions along the supply chain while maintaining the product's economic value and taking into account the nutritional needs of multiple actors, including consumers (Le Port et al. 2017). Nutrition-sensitive value chain approaches have the potential to deliver nutrition-specific interventions, such as micronutrient supplements or micronutrient-fortified food products, at scale cost-effectively. Can such approaches also promote women's empowerment and gender equality?

A pilot study in a remote area in northern Senegal tested whether it was possible to use a dairy value chain to distribute a micronutrient-fortified yogurt (MNFY) to improve hemoglobin and reduce anemia among women and children in semi-nomadic milk supplier households (Le Port et al. 2017, Bernard et al. 2019). A local dairy factory (La Laiterie du Berger) produced the MNFY using milk collected from its suppliers. The intervention used

4 This section draws heavily on Le Port et al. (2017) and Bernard et al. (2019).

a novel nutrition-sensitive contract design, whereby milk producers who supplied a minimum amount of cow milk delivered five days a week received daily MNFY the following week and were instructed to give it to their children aged 24–59 months (Le Port et al. 2017). The MNFY was delivered to milk collection points mainly accessed by women. Thus, the scheme implicitly targeted women as the main recipients of the incentive, whereas men are typically the main recipients of cash payments (Bernard et al. 2019).

Additionally, the study conducted a behavior change communication (BCC) strategy with all target households. This strategy focused on optimal infant and young child nutrition, the importance of micronutrients, and the role that diverse diet and fortified food can play in delivering them. Although the BCC training was open to all, it was mostly women who attended the sessions.

The intervention was designed to influence the dairy production and women's empowerment pathways (Pathways 1 and 4, respectively), recognizing that, among the semi-nomadic pastoralists (the Pulaar or Fulani) who dominate milk production in this region, gender norms around milk production are clearly established at a young age, with women in charge of milk production and men in charge of herd management. The MNFY incentive was also viewed as valuable to women, given their role as primary caregivers. It therefore functioned as a valued resource transferred to women dairy farmers directly, benefiting them by increasing the returns to their individual efforts in dairy production. The intervention was also designed around the milk production domain, which women already controlled (men were in charge of contracts and traveling to the central processing plant to receive payment). Because women provided the labor in household dairy production, they could adjust production to fulfill the contract and receive the incentive at milk collection points, which were in areas they could access easily.

Evaluation of the impact of the nutrition-based incentive on children's nutritional status and milk production using a cluster RCT shows that the dairy value chain intervention was effective, increasing the regularity of milk deliveries, although these impacts were limited to the dry season and to those contracts headed by a woman (Bernard et al. 2019). It also improved hemoglobin in children 24–59 months of age at baseline, after one year of intervention, with a statistically significant impact on boys but not girls.

The incentive also increased women's decision-making: the overall female decision-making index increased by 0.53 points, from an average of 4.48 in the control group. It led to significant increases in women being the main decision-makers with respect to veterinary, vaccination, and insemination

services, and cow migration decisions.⁵ For female-controlled contracts, the incentive also led to women being significantly more likely to be the main decision-maker on domains of selling milk and cow migration.

Overall, the intervention successfully reached, benefited, and empowered women. It effectively reached women by selecting milk collection points that women accessed and by focusing on aspects of milk production that women already controlled. Women benefited through increased returns on their labor, provided in the form of an in-kind transfer that they valued (MNFY). Women were also empowered, as improvements around their ability to make decisions regarding milk production show. These results highlight the potential of using nutrition-sensitive value chain interventions to empower women.

It is also notable that men had a limited response to the incentive. The intervention implicitly targeted women but there was no explicit strategy to exclude men. It is possible that, because the MNFY was distributed at collection points where women more often went, men were less likely to directly receive the incentive. Men may have been less aware of the nutritional benefits of the MNFY than the BCC, which reached more women than men, reinforced. As in the OSP case, this supports the recommendation to include men in BCC strategies to emphasize the shared responsibility of both men and women in enhancing the nutritional status of all household members.

Homestead food production programs and their evolution⁶

HFP programs, which focus on the production of nutrient-rich foods on homestead plots, represent a notable type of NSAP. Helen Keller International (HKI) originally piloted the HFP model in Bangladesh in the 1980s; it expanded and adapted the program for Cambodia, Nepal, and the Philippines in the late 1990s and recently adapted it for West Africa. These programs typically target women in smallholder agricultural households and train them to cultivate kitchen gardens and often to raise poultry or fish. Training is conducted on Village Model Farms (VMFs) and field staff train women to cultivate on their own homesteads. Production of both crops and animal source foods is intended to benefit households via home consumption (Pathway 1) and through the sale of surplus produce for increased incomes

⁵ Decision-making was assessed over cattle purchases and sales, inputs provided to cows, milk sales and use of money from cows, home consumption of milk, and timing of seasonal migration; responses were also aggregated into an index (Bernard et al. 2019).

⁶ This section draws heavily on Quisumbing et al. (2015), Olney et al. (2016), and personal correspondence with Stella Nordhagen of Helen Keller International (April 10, 2018).

(Pathway 2). HFP programs are nutrition-sensitive; in addition to cultivating nutrient-rich foods, they include a BCC strategy that teaches beneficiaries optimal nutrition, health, and hygiene practices and provides them with skills to negotiate in favor of these behaviors in their household.

Evaluations of these programs have consistently found positive impacts on the diets of women and households (Girard et al. 2012), and on the nutritional status of children and women in Burkina Faso and Cambodia, among others (Olney et al. 2009, 2016).

Early HKI programming did not deliberately aim to empower women. The original Bangladesh model did not initially challenge gender norms or patriarchal power structures (Hillenbrand 2010). All-male field staff conducted agricultural training while all-female staff delivered nutrition education. The main selection criteria for the VMF owners were possession of a suitable and sizeable land plot and prior experience in farming, which favored men. Inadvertently or deliberately, men were not held responsible for the nutritional side of food production, reinforcing existing gender norms. Agricultural technology transfer in this model reinforced the stereotypes that men are capable of “farming” whereas women are suited for “gardening” and food preparation.

HKI’s programs have since evolved to increase attention to empowering women and transforming gender dynamics. Feedback from field managers and beneficiaries indicated positive changes in women’s lives related to program participation (Hillenbrand 2010). Earlier evaluations, although not always optimally designed, also found evidence of increased influence on household decisions (Bushamuka et al. 2005, Iannotti et al. 2009). Subsequently, programming in Bangladesh was modified to address gender concerns more directly, by eliminating land size as a criterion for choosing VMF owners, having women’s groups themselves choose the Village Farmer Leader (VFL), using group-based marketing, employing new tools to describe and build women’s own capacities and needs, and creating opportunities at all levels for staff training and reflection on gender concerns. Many of these changes have been included in the design of HKI’s current HFP programs, including the Enhanced Homestead Food Production Program (E-HFP) in Burkina Faso.

However, women taking on the role of VFL faced heavier workloads (Pathway 5), because, despite their added responsibilities in farming, attending meetings, and other program-related activities, their household workloads did not diminish (Hillenbrand 2010). Beneficiaries often cited workloads and time as constraints, which may have not only limited uptake

but also discouraged women from growing labor-intensive crops and selling products in the market (Kjeldsberg et al. 2018).

Specific adaptations made for Burkina Faso included training women as VFLs, cultivating model farms on land designated by the village for that purpose, and providing drip irrigation on the VMF. As is the case in much of West Africa, the Burkina Faso site faces more severe water constraints than do HKI's Asian sites, and the process evaluation identified potential program adaptations related to irrigation. Even if both men and women benefit from adaptations addressing water scarcity, women may gain greater benefits, because they are typically responsible for water collection. In addition, increasing space available at VMFs tends to benefit women more, as they typically do not have land of their own that has a reliable water supply (Olney et al. 2013).

The E-HFP program in Burkina Faso reduced wasting and diarrhea and increased hemoglobin among children aged 3–12 months old at the start of the 2-year program, although no significant impacts were found on stunting or underweight prevalence (Olney et al. 2015). The program also reduced underweight among mothers and increased their say in decision-making, notably in areas relating to purchasing decisions and healthcare decisions, as well as overall empowerment (Olney et al. 2016). These improvements in women's say in the domains of spousal communication and decisions on purchasing, healthcare, and family planning contributed to the program's impact on reducing wasting, with the largest share attributable to spousal communication, although improvements in these same domains of women's empowerment did not contribute to the increase in hemoglobin (Heckert et al. 2019).

There were also positive impacts on women's ownership and control of assets, as well as an increased perception among community members of women's ability to manage agricultural land (van den Bold et al. 2015). The change in gender norms on women's landownership is notable, given that the program did not distribute land to women but taught them how to manage their home gardens.

Increased evidence of program impacts on women's decision-making, as well as other aspects of women's empowerment, has led to greater integration of empowerment objectives in HKI's programming over time (Haselow et al. 2016). The current phase of the E-HFP program serves as a platform for *Nurturing Connections*®, a gender-transformative curriculum that aims to change gender norms, attitudes, behaviors, and institutions that underlie or reinforce gendered inequalities, through dialogues with husbands,

community leaders, and community members in general (Nordhagen et al. 2017). This approach focuses on enhancing women's self-esteem and self-efficacy and also aims to mitigate the excessive demands that such programs place on women's time.

The *Nurturing Connections*© curriculum has been applied in a number of projects in the CGIAR. For example, WorldFish in collaboration with the Cereal Systems Initiative for South Asia-Bangladesh (CSISA-BD) applied *Nurturing Connections*© activities focused on the intrahousehold distribution of food with the nutrition-sensitive small-scale aquaculture program (Farnworth et al. 2015). Through practical family activities focused on distributing food within the household, women reported a change in husbands' attitudes toward women's practice of eating last and leaving a small amount of food on their plates. Until this exercise, men had not noticed this practice. The men acknowledged that women worked hard all day and should eat equally, and committed to paying more attention to what their wives were eating in the future. *Nurturing Connections*© was also the basis for the gender-sensitization curriculum in the Agriculture, Nutrition, and Gender Linkages (ANGeL) project in Bangladesh (Ahmed et al. 2018), a cluster RCT whose treatment arms included agricultural training, nutrition BCC, and gender-sensitization trainings to husbands and wives together.

HKI continues to use the *Nurturing Connections*© curriculum in new projects. An RCT in Cambodia has three arms: a treatment arm with a gender-transformative HFP model using the *Nurturing Connections*© curriculum, gender messaging within technical trainings, and women elected as homestead producers; a second arm in which households decide who will be the main producer and participant in trainings that are gender-blind; and a control arm (A4NH 2019). HKI's willingness to learn from implementation and to design and test modifications to improve its programming to enhance empowerment impacts illustrates how programming can be more intentional in tracking progress on gender outcomes. Such gender-intentional, well-evaluated NSAPs help build the evidence base to show how these types of programs can empower women and transform gender dynamics.

What have we learned?

Our review of selected NSAPs indicates that, while such programs can contribute to women's empowerment and gender equality, this does not happen automatically. First, there are multiple pathways linking agriculture and nutrition, and, although gender dynamics influence all of these pathways,

the design and implementation of NSAPs do not always consider the role of gender dynamics. They are more likely to pay attention to women but not always in relation to men and other influential persons within their households and communities. When NSAPs do pay attention to gender relations, they may design programs to accommodate existing gender norms rather than to transform them. That is to say, most often these programs are gender accommodative (that is, they operate within existing gender norms and dynamics but do not attempt to change them) rather than gender transformative (that is, they aim to address gender inequalities by addressing harmful norms and dynamics).

For example, although both the HarvestPlus REU project that disseminated OSP and the Senegal dairy value chain intervention recognized women's productive roles as farmers growing OSP and as dairy producers in the fortified yogurt intervention, respectively, these NSAPs targeted nutrition trainings to women and not men, reinforcing existing gender stereotypes. The fact that OSP adoption was highest in plots that were jointly owned (but where women had a greater role in deciding what to grow) signals a missed opportunity to educate men on the benefits of growing OSP for their families. In Senegal, the limited impact of the incentive on men may have been an unintended consequence of targeting women, even if men were not intentionally excluded. While there is evidence of gender-accommodative approaches increasing women's empowerment, gender-transformative approaches may lead to larger and sustained increases in women's empowerment (see also Chapter 10, this volume).

Second, even when the design of NSAPs considers gender relations, they may seek only to "reach" (for example including them in nutrition education activities) or "benefit" women (for example leading to improved diets), not to "empower" them. This falls short of providing women opportunities to empower themselves and make strategic life decisions (Johnson et al. 2018). Without explicit empowerment objectives, they may not have specific strategies or actions that can empower women. This is well illustrated in the case of the agricultural technologies in Bangladesh: the group-based strategies had more sustained long-term impacts in reducing the gender asset gap (even if the gap was not completely closed) and in improving the nutritional status of women and girls compared with the program that targeted the household as a whole (but ended up reaching men by default). Qualitative work undertaken in conjunction with the agricultural technology study attested to the increased decision-making power of women who were involved in group-based programs (Naved 2000, Hallman et al. 2007). NSAPs that were more

intentional in addressing gender barriers had more transformative impacts, such as the E-HFP program in Burkina Faso, which reduced the gender asset gap, empowered women, and changed local norms around women's land ownership.

Third, even if NSAPs have empowerment objectives, they may fail to attain them because of lack of intentionality and limited consideration of the range of domains that could be affected. NSAPs may be more likely to attempt to increase women's ability to make decisions in domains related to health and nutrition (OSP; HKI Burkina) or in productive domains where women traditionally make decisions (milk production in Senegal; vegetables in home gardens) but have only recently begun addressing nutrition messages to men or improving spousal communication. NSAPs, particularly those dealing with agricultural production, may increase women's control of assets, and perceptions that women are able to manage land (HKI Burkina), yet none of the NSAPs reviewed had attempted to address labor burdens or workloads. Engaging men in recognizing women's roles in agricultural production may help improve decision-making around those domains but involving men in sharing in domestic work and childrearing is a relatively unexplored area that may both shift gender norms around caregiving and reduce women's workload.

Finally, even if NSAPs aim to empower women, their monitoring, evaluation, and learning (MEL) frameworks may not include measurable indicators of empowerment, and thus will not be able to ascertain whether they have empowered women (Santoso et al. 2019). We are unable to ascertain the empowerment impacts of the agricultural technology interventions in Bangladesh or of disseminating OSP through farmer groups in the REU project because these interventions did not have empowerment as a stated objective, and thus no efforts were made to monitor progress toward it.

Moreover, when the earlier NSAPs were implemented, no internationally validated measure of women's empowerment existed to monitor empowerment impacts; as such, projects that assessed such impacts did so with an ad hoc set of indicators, making comparisons difficult. Later projects, more aware of the importance of empowering women, deliberately collected empowerment indicators so as to assess whether they had empowered women, and used internationally validated indicators. Nevertheless, across NSAPs, there is often no uniformity in the empowerment indicators collected, suggesting that future research that articulates what empowerment survey

modules could or should look like would be valuable to guide understandings of the complexities of capturing gender equality and empowerment.⁷

In sum, based on the case studies presented here, NSAPs that have the most potential to empower women and to shift underlying barriers that perpetuate gender inequalities are those that share the following features. First, they are intentional about their objective to empower women and to transform gender relations. Second, they recognize potential tradeoffs between women's different roles and the unintended consequences of participation in NSAPs, such as increased work burden. Third, they employ evidence-based strategies that work to empower women, and continue to learn from their experience and adapt, as illustrated by the experience of HKI. These strategies include women's group-based programming, gender-sensitization activities that reach men and communities, building women's technical capacity, and addressing exclusionary gender norms. Fourth, they make deliberate efforts to monitor progress toward women's empowerment and gender equality by using the appropriate indicators and methodologies.

Building a research agenda that supports the next generation of gender-transformative NSAPs

Nutrition-sensitive agriculture holds promise as a vehicle to achieve women's empowerment and gender equality. However, it is vital to address programming and evidence gaps if we are to transform the harmful norms and dynamics that perpetuate gender inequalities. Addressing these gaps begins with recognizing both the comprehensiveness and the blind spots of measures in the area of nutrition and NSAPs, and designing research to close these gaps.

First, for research to shape the next generation of gender-transformative NSAPs, project designers and researchers should work together to ensure that strategies aim to empower women and **assess impacts on women's empowerment as an outcome in its own right, not merely as an instrument for achieving nutrition outcomes**. Significant work is now being conducted under the Gender Assets and Agriculture Project Phase 2 (GAAP2), working with a portfolio of nutrition- and gender-sensitive agricultural development projects, to fulfill the need for improved women's empowerment measures.⁸

⁷ See also Chapter 9, this volume.

⁸ Descriptions of the projects in the GAAP2 portfolio are available at <http://gaap.ifpri.info/portfolio/>.

GAAP2 has developed the project-level Women's Empowerment in Agriculture Index (WEAI) (pro-WEAI) (Malapit et al. 2019), adapted from the WEAI, a survey-based tool that measures inclusion and empowerment in the agriculture sector (Alkire et al. 2013). Pro-WEAI has been designed to diagnose disempowerment and assess empowerment impacts in mixed-methods impact assessments of agricultural development projects (Malapit et al. 2019). To complement pro-WEAI's significant focus on agricultural production, GAAP2 is also developing an optional add-on pro-WEAI health and nutrition module for nutrition-sensitive agriculture projects, which measures women's ability to make decisions in the area of health and nutrition (Heckert et al. 2020).

An ongoing project under the Innovative Methods and Metrics for Agriculture and Nutrition Actions (IMMANA) portfolio is developing the Women's Empowerment in Nutrition Index (WENI), designed to measure women's nutritional empowerment in relation to their own nutrition (Narayanan et al. 2019). Its development is based on qualitative and quantitative work in two sites in India. The instrument focuses on measuring knowledge, resources, and agency in the areas of food, health, and fertility. The WENI has expanded the health and nutrition relevant domains in which empowerment is being measured.

Second, research can contribute to understanding how NSAPs can **bring men on board in efforts to transform gender norms**. The majority of nutrition-related interventions and research focused on women's empowerment and gender equality has targeted women as potential agents, and been oriented toward improving the well-being of women and children. Men, the other half of the gender equation, have been understudied in nutrition research, especially the roles they can play in improving nutritional outcomes for women and children and in gender-transformative change. Engaging men may help improve the gender-equitable allocation of food produced or ensure women have a say in controlling the income from it. The shift in the allocation of food and all types of resources may occur through increased communication and more equitable negotiation about the use of these resources.

Engaging men may also help relieve women's time burdens, which are often high as a result of productive and domestic labor requirements. Many nutrition interventions involve trainings that increase women's time commitments, and, for those with young children, potentially increase women's labor in fulfilling the caregiving tasks that these programs encourage (Johnston et al. 2018). Evaluations of such approaches should continue measuring workloads via time use measures. Moreover, mothers and fathers,

through their respective social roles, may offer different benefits to their children. Given the potential for male involvement to affect these pathways, understanding how male involvement in nutrition-focused interventions can be channeled toward increasing gender equality and the empowerment of women is an important area for future research.

Third, research on NSAPs should pay attention to the **unintended consequences of women's involvement**, including increased work burdens and the possibility of backlash from men. The gendered division of labor is deeply rooted in beliefs that women are primarily responsible for managing the household and caring for children; women's work burdens at home tended to remain constant despite the additional time required for farming or livelihood activities. Challenging these norms by not performing assigned tasks may result in intimate partner violence (IPV): women and men smallholder pastoralists in Tanzania reported that "physical punishment awaited the wife in case of problems" related to tasks assigned by men (Galiè et al. 2019, 130). Thus, women felt they had limited capacity to gain more control over their own time and inadequate time to engage in revenue-generating activities of their choice (ibid.).

Gender-sensitization trainings are well suited to addressing the household division of labor and resources and shifting the distribution to promote joint household goals on income and nutrition. Because individuals often make tradeoffs in allocating their time, it will be important to measure not only time use but also time-use agency, or the ability to decide how women allocate their time. Complementing agricultural interventions with gender sensitization is a promising approach for transforming entrenched beliefs and reducing adverse outcomes. The *Nurturing Connections*© curriculum, for example, includes messages that encourage men to share domestic responsibilities with women. Moreover, BCC may have beneficial consequences for reducing IPV. A recent study shows that intensive nutrition BCC was critical for sustained reductions in IPV, where women who received both transfers and BCC experienced 26 percent less physical violence post-program compared with women who only received transfers or who were in the control group (Roy et al. 2018).

Intensifying women's engagement in agriculture may also require greater work effort. Women's increased energy expenditures, if uncompensated by adequate food intake, could negatively affect their own health and nutrition. For example, a recent study finds that time spent in agricultural cropping work is negatively associated with BMI for non-overweight individuals, suggesting that gains in nutritional status from increased income and food

availability could be offset by an increase in work effort associated with agricultural work (Komatsu et al. 2019). However, impact evaluations tend to focus on the gains in consumption following interventions, and rarely look at impacts on energy expenditures, which are more difficult to measure. Recent advances in wearable devices such as accelerometers are now expanding the ways that NSAPs can analyze other potential impacts. For example, researchers at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), in collaboration with the University of Reading, the University of East Anglia, and the National Institute of Rural Development and Panchayati Raj (NIRDPR), are developing methodologies for using these sensor-based technologies to create reliable energy expenditure profiles associated with agricultural and livelihood activities in rural agricultural settings in developing countries.

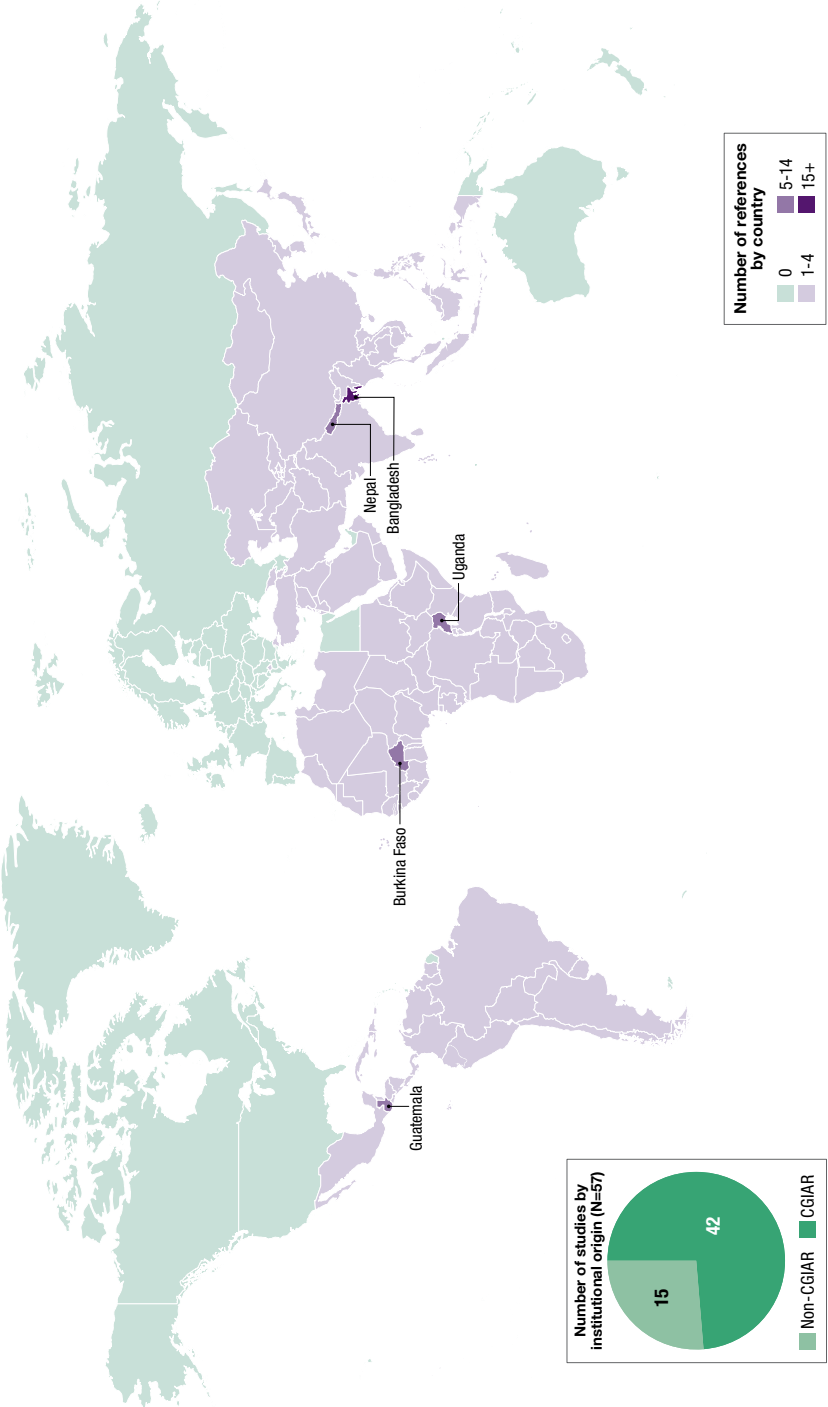
Fourth, there is a need to collect **data on nutrition and health outcomes from all household members**, not just the target group of the intervention. Many NSAPs focus on maternal and child nutrition but do not necessarily examine the diets and nutrition and health status of other household members, making it impossible to assess whether the intrahousehold distribution of food has shifted. To assess whether the NSAP is contributing to gender equality, we need to collect data on the diets and nutritional status of other household members, including adolescent girls and boys. The 2020 Global Nutrition Report (Development Initiatives 2020) also calls for these data, to investigate and address drivers of nutrition inequalities.

To be effective, NSAPs must recognize that gender relations and intra-household dynamics can either impede or facilitate the achievement of their nutrition goals in complex ways. Some NSAPs limit their programs to reaching or benefiting women while accommodating rather than transforming existing gender relations and structures. These restrictive gender relations and structures are not confined to the household. To make the next generation of NSAPs gender transformative will require a different approach to NSAP programming that takes into account the multi-level nature of structures that need to be transformed: from intrahousehold relations between individual men and women to structures that limit women's rights within the community and beyond. It will also require a different approach to MEL that goes beyond the individual and household, and may point to a research agenda that examines how individuals and households are embedded within their communities and societies.

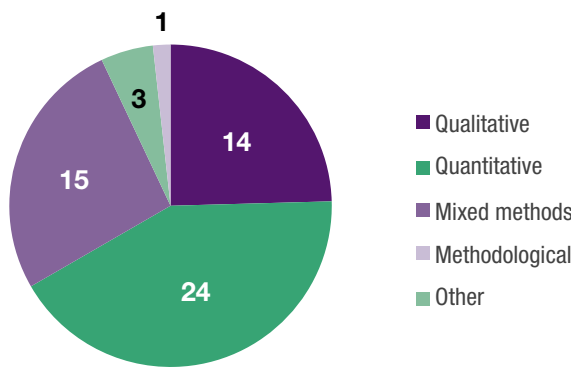
Finally, the lessons from the review of case studies are not specific to NSAPs: lessons learned from evaluations of other agricultural development

projects also point toward the importance of gender-transformative approaches that explicitly aim to “empower” women. We expect that impact evaluations of ongoing NSAPs will generate more evidence on how they can not only meet their nutrition objectives but also empower women and promote gender equality. The next generation of research that emerges from these impact evaluations will help sharpen our focus on how NSAPs can be a pathway toward women’s empowerment and gender equality.

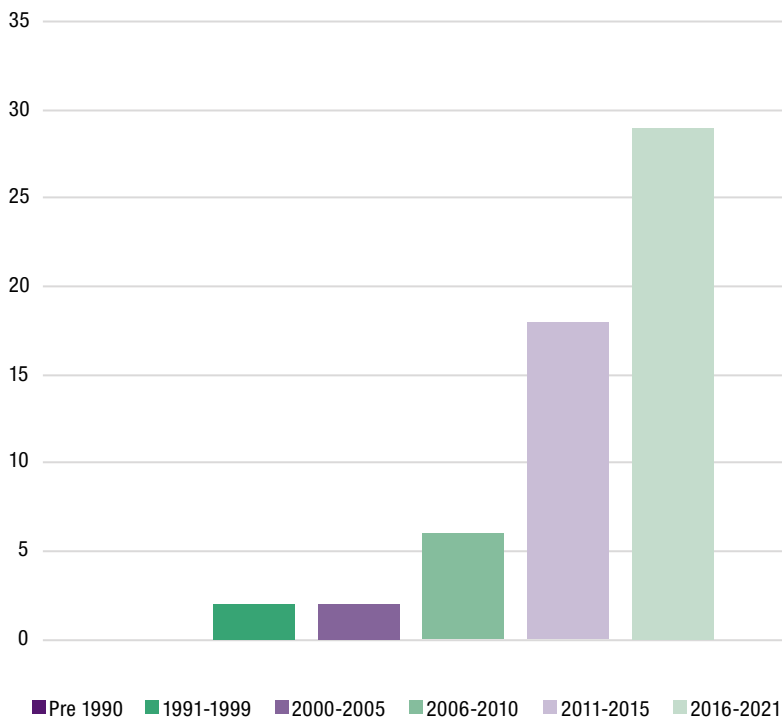
Geography of study sites for publications cited in Chapter 5



Number of cited studies by research methodology (N=57)



Timeline for references cited



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