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Feminization of Agriculture in the Context of Rural Transformations:

What is the Evidence?

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Abstract

Male outmigration, the globalization of agri-food systems, conflict, and pandemic human disease have all been linked to changes in rural economies, changes in women's roles in the agricultural sector, and consequently to assertions that agriculture is "feminizing." This review assesses the global evidence surrounding the feminization of agriculture. First, it proposes a number of indicators to track the feminization of agriculture, noting that although limited data exist for some of the indicators, efforts should be expanded to collect data for all of them to provide better diagnostics of women's work in agriculture and their welfare. Next, it critically examines the factors that may lead to the feminization of agriculture and evaluates the empirical evidence on each factor worldwide. The review concludes by identifying policy imperatives based on the evidence on women's roles in agriculture in the context of rural transformation.

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Acronyms and Abbreviations

DHS	Demographic and Health Survey
FAO	Food and Agriculture Organization of the United Nations
ILO	International Labour Organization
ISA	Integrated Survey on Agriculture
LFS	Labor Force Survey
LSMS	Living Standards Measurement Survey
NENA	Near East and North Africa
PC	Population census

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Executive Summary

While substantial debate surrounds rural transformations and the changes in family farming, one important issue has escaped attention—the expanding role of women in agriculture in many countries around the world. In the process of rural development and transformation, employment in the agricultural sector is expected to shrink, as employment for both women and men expands in other sectors. Yet while men may move out of agriculture, in many developing countries women stay (or move out significantly more slowly), and their roles in agriculture may actually expand, leading policy makers and scholars to evaluate the implications of these changes.

The objective of the study was to find out the extent and driving forces of feminization of agriculture, to elucidate the consequence for the agricultural policy and program agenda as well as make recommendations to support a transformative change in addressing the opportunities and challenges women face as their labor force participation in agriculture increases. It reviews how women's roles in agriculture evolve in response to key global drivers such as migration, the growth of commercial farming, pandemic human disease, conflict, agro-technologies, and climate change, keeping in mind that these global factors are mediated by local institutions and cultures. The resulting impacts on rural women's employment vary across and within regions and across countries within the same region. The policy implications and recommendations of the review are as follows:

- **A conceptual framework of indicators is required to understand agricultural feminization.** Rural women's employment in the sector characterizes agricultural feminization; sector; it the types and quality of jobs and activities that women undertake are equally important. Four indicators are proposed to capture this shift: 1) whether more women work in agriculture over time and 2) relative to men, 3) whether they spend longer hours in agriculture, and 4) whether they are engaged in high-skilled work, either as managers of their own farms or in management positions in commercial farms. A lack of data restricts the use of some of the proposed indicators, but future efforts to collect high-quality, detailed, sex-disaggregated data would help to overcome this limitation.
- **The available evidence supports the “feminization of agriculture” hypothesis in a great number of developing countries.** Based on the available data and review of the literature, compelling evidence emerges that in several countries around the globe agriculture is feminizing, either because men move out of agriculture or because women engage in different types of agricultural employment. In most countries in sub-Saharan Africa, the share of women working in agriculture has not changed significantly in the last few decades, but the mere fact that it remains well above 50% and exceeds 60% in a number of countries of the agricultural workforce is an indicator of a feminized sector. However, changing roles of women within agriculture (from contributing family members on the farm to primary farmers) or changing activities (from subsistence to wage employment) are hard to detect at the national level with the data currently available.
- **Male outmigration and the growth of commercial farming are among the key factors driving women's growing role in agriculture, with other factors (disease outbreaks, agro-technologies, conflict, and climate change) playing a contributing**

role, both directly and as factors in migration and rural development. *Male outmigration* is a key factor that directly and rapidly alters women's roles in agriculture through the loss of male able-bodied labor. *Commercial agriculture* is opening new opportunities for women to undertake paid employment outside the family farm, particularly through participation in non-traditional export crop production (as contract farmers or direct wage employees). *Human diseases* such as HIV/AIDS change women's and men's roles in agriculture through the loss of income from the affected working-age member, the loss of able-bodied labor, the increase in medical costs, and higher demands for care from family members. *Technological innovations* play an important role in structural transformation and may change the traditional roles and responsibilities of men and women. For example, labor saving-technologies may free men's labor from family agriculture and allow men to diversify out of agriculture or at least out of the family farm. *Climate change* may exacerbate migration and lead to fragility, civil unrest, and conflict. *Civil unrest, conflict, and fragility* lead to large displacements of people and may leave a large share of widowed women as primary providers for all agriculture and household needs. Although the same factors may lead to feminization of agriculture in different regions, the local characteristics and impacts of agricultural feminization may differ because of the local social, political, and economic institutions.

- **Depending on the context, the feminization of agriculture can increase women's empowerment.** Successful migration and good remittances have the potential to boost agricultural production and women's empowerment, but not all male outmigration is successful. In many countries, the costs of migration are increasing relative to the benefits, and in many contexts the weight of the costs may fall disproportionately on women, who have to deal not only with the lost able-bodied labor but also with potential costs related to financing the attempted migration. When remittances are inadequate, women face higher workloads and financial difficulties, leading to women's disempowerment. In addition, wage employment on commercial farms may not empower women, because they are more likely to be concentrated in labor-intensive, low-skilled jobs, and the few managerial positions are more likely to be taken by men.
- **The collection of high-quality, time-series, sex-disaggregated data on labor and agricultural production is a key policy imperative.** For a better evaluation of women's work in agriculture, statistics must be disaggregated not only by sex but also by the type of agricultural work to yield a better account of women's multiple activities, whether the work is on the family farm or in wage employment, whether the wage employment is casual or permanent, returns from each activity, and time in the activity. Comparable cross-country statistics are needed to identify global trends, and regular, timely collection of the data is essential to better track changes in women's status in agriculture and in their welfare over time.
- **Policies must address women's constraints in agriculture.** Other policy imperatives that arise from this review are not new and not specific to the growing phenomenon of the feminization of agriculture. Rather they reflect rural women's longstanding disadvantages in terms of limited access to productive resources for own agricultural production, limited access to decent jobs, insecure property rights, and the effects of social norms.

1. Introduction

In the process of rural development and transformation, employment in the agricultural sector is expected to shrink, as employment for both women and men expands in other sectors. Yet while men may move out of agriculture, in many developing countries women stay (or move out significantly more slowly), and their roles in agriculture may actually expand, leading policy makers and scholar to evaluate the implications of these changes.

Informed by the literature on rural transformation,¹ and focusing strictly on women's roles in agriculture rather than in other sectors, this review examines the literature and global statistics for evidence regarding this hypothetical "feminization of agriculture." Because this term has no clear and agreed definition, a framework of indicators is proposed for evaluating whether the sector is feminized (or becoming feminized) and to assess the consequences for women's empowerment and welfare. The consequences of agricultural feminization have been described in conflicting ways. On the one hand, women's increased involvement in agricultural work, especially if it is remunerated, is seen as a positive development, since women's earnings may contribute to their empowerment in the household and the community. On the other hand, the expansion of women's roles in agriculture, while they still perform the bulk of unpaid household work and while men access more lucrative jobs, is seen as a worrisome development that may exacerbate gender gaps in wealth and work burden.

This review also seeks to delineate the pathways through which key global factors linked with rural transformation—male outmigration, commercial farming, human pandemic diseases, modern agricultural technologies, climate change, and conflict and fragility—are thought to drive women's changing roles and responsibilities in agriculture, and it reviews the empirical evidence to support these conceptual linkages. Mediated by local institutions and cultures, these global factors will contribute across and within regions to distinct rural transformations with distinct effects on women's roles in agriculture. Note that although government policies and interventions that foster direct change in institutions governing gender relations and norms are powerful instruments of change for rural women (if effectively implemented), they are also narrow instruments from the perspective of this review and do not enter into the discussion. This review maintains a focus on global factors related to rural transformation precisely to permit comparisons across and within regions.

With those purposes in mind, the discussion is organized as follows. Section 2 proposes a set of indicators to serve as a conceptual framework for tracking women's participation in agriculture across countries and over time. Using this conceptual framework, Section 3 reviews the global patterns in female participation in agriculture. Section 4 discusses factors that may lead to women's higher involvement in agriculture as workers and managers of their own farms or as wage laborers on others' farms; as noted, it draws on empirical studies to support the conceptual linkages between the different factors and women's involvement in agriculture. Section 5

¹ "Rural transformations" is defined as "a process of comprehensive societal change whereby rural societies diversify their economies and reduce their reliance on agriculture; become dependent on distant places to trade and to acquire goods, services, and ideas; move from dispersed villages to towns and small and medium cities; and become culturally more similar to large urban agglomerations" (Berdegué, Rosada, and Bebbington 2014). The purpose of this study is not to discuss rural transformations but to understand whether women's roles in agriculture have expanded in recent years and whether (and how) that expansion is related to the factors that characterize rural transformation.

concludes with recommendations for policy responses and actions for governments and other development actors.

2. Indicators for Tracking Women’s Roles in Agriculture

When increasing numbers of women take on agricultural employment, either over time or relative to men, this change often is seen as a sign that the sector is feminizing. The term “feminization of agriculture” is not ideal because it carries the negative connotation that working in agriculture is undesirable. In many developing countries, the agricultural sector may be underperforming and wages in the sector may be lower than wages in other sectors, yet not all agricultural employment has low returns. Jobs in agriculture, as in other sectors, vary in quality. For that reason, this review purposely avoids general references to the feminization of agriculture that do not take the quality of agricultural jobs and activities into account. The advantage of the term feminization, though, is that it suggests movement or change, which is at the heart of this inquiry into how women’s roles in agriculture change in response to various socioeconomic and political factors in the context of different traditional norms and gendered ideologies.

Four basic indicators would be useful for tracking changes in women’s roles in agriculture. The indicators capture different aspects of women’s engagement in agriculture, including trends in women’s employment in the sector (relative to men’s employment) and trends in the quality of work. The framework represents an ideal scenario in which high-quality, detailed, time-series data disaggregated by sex are available on women’s work in and outside of agriculture. Unfortunately, the current data surrounding women’s work and responsibilities in agriculture are limited. For the first two indicators, more data are available (in terms of time series and countries covered); limited or no statistics are available for the other two indicators, even though they are key for assessing the qualitative characteristics of women’s work in agriculture.

- **Indicator 1**—A relative increase in the incidence of women’s participation rates in the agricultural sector, either as self-employed or as agricultural wage workers (in other words, an increase in the percentage of women who are economically active in agriculture):

$$\Delta \left(\frac{\text{Women participating in the agricultural sector (self-employed + wage-employed)}}{\text{Total number of adult women}} \right) \cdot 100$$

- **Indicator 2**—An increase in the percentage of women in the agricultural labor force relative to men, either because more women are working and/or because fewer men are working in agriculture (Katz 2003; Deere 2005):

$$\Delta \left(\frac{\text{Women participating in the agricultural sector (self-employed + wage-employed)}}{\text{Total number of people employed in agriculture}} \right) \cdot 100$$

The advantage of Indicators 1 and 2 is that they are relatively straightforward to calculate at the national level. With certain caveats around capturing agricultural employment and particularly women’s agricultural employment, these statistics can be extracted from Labor Force Surveys

(LFSs),² Living Standards Measurement Surveys (LSMSs) or LSMS-type surveys, and even from the Demographic and Health Surveys (DHSs).³

Because they focus on agriculture while collecting information on a wide range of household characteristics (including labor, education, assets, and welfare), the LSMS-ISA (Integrated Surveys on Agriculture) are good potential sources of information about women's and men's work in agriculture, other off-farm employment, and the determinants of employment. These surveys have already been utilized to study women's labor contribution to crop production in six African countries (Palacios-Lopez, Christiaensen, and Kilic 2015). The LSMS-ISA labor module includes detailed questions about the time spent on each plot on each activity (land preparation, planting, harvesting) by each family member, so additional statistics about the types of activities done by women and men can be obtained. Citing other research, Palacios-Lopez, Christiaensen, and Kilic suggest that the reporting bias in LSMS-ISA surveys is greatly reduced because the labor module is long enough to capture women's contribution, as opposed to short labor modules that do not have additional probing questions about contributions of all household members.⁴

The literature review conducted for this study took particular care to scrutinize the data sources in the literature. Because knowledge about the data available was limited a priori, the review did not prioritize one source over another but attempted to obtain information from all sources available. As much as possible, the review included data at both the national level and subnational level, because even if national statistics show no trend toward the feminization of agriculture, some regions within a country may still be experiencing feminization. It is important to use all available information to compile a more complete picture of where and why feminization of agriculture is happening and what the consequence are for women's empowerment.

Indicators 1 and 2 capture whether more women, compared to men or over time, work in agriculture. In some cases, however, the number of women in agriculture may not increase, but the hours they spend in agricultural work may increase (see Mu and van de Walle 2011). When men migrate to search for work, their wives may have limited access to hired labor, so they may

² The United Nations 1993 System of National Accounts greatly expanded the activities that count as work. The changes significantly affect people engaged in the household sector. In essence, the new guidelines stipulate that activities that involve the production of goods for household consumption are included as work. Activities that include the production of services for own-use are not counted as work. Therefore, while fetching water and collecting fuel are considered work, taking care of children and the elderly and cleaning the house are not considered work (Government of Nepal 2009).

³ Although DHSs are not designed to capture employment in general or issues specifically related to agriculture, they have some attractive features for the purpose discussed here. They are collected regularly and are therefore available for multiple years, at least for some of the many countries they cover, and they include questions related to women's empowerment, although not in agriculture (such as decisions about own health and the health of children, decisions about purchases, and visiting relatives). Information on wages is not collected, and neither is information on multiple activities. The DHS is also not representative for all women but for women of reproductive age (15–49 years).

⁴ Unfortunately, information on some of the factors that may explain feminization (such as migration and the spread of commercial farms in the community) may be harder to obtain from the LSMS-ISA surveys. Some LSMS-ISA surveys do ask questions about the current or past location of family members, and with some assumptions the information can be used to try to capture migration, but certainly there is a need for incorporating more questions around migration, including duration and remittances. Employment on commercial farms could be proxied by women's employment in off-farm wage jobs.

respond by increasing their time on the farm. Therefore, a third indicator that captures the intensity of agricultural work is proposed:

- **Indicator 3**—An increase in the percentage of women’s time in agricultural work relative to men’s time in agricultural work, either because women are working more hours and/or because men are working fewer hours in agriculture:

$$\Delta\left(\frac{\text{Number of women's hours in agriculture}}{\text{Total number of hours in agriculture for both men and women}}\right)$$

LSMS-ISA surveys could be used to derive information about women’s time in agricultural activities, both on and off of the farm (Palacios-Lopez, Christiaensen, and Kilic 2015). Time-use data on other activities, such as household maintenance and care work, are not available, which is an important limitation if women substitute leisure, including sleep, for work in agriculture or if they have to increase multitasking, resulting in a reduction in their own welfare. Women, who often carry the brunt of domestic work, may allocate more time to agriculture by making welfare-decreasing trade-offs (Gammage 2010). Unfortunately national-level time-use surveys, which would also help to understand shifts in women’s responsibilities in the home, are largely missing.

A fourth indicator is proposed to look at changes in women’s empowerment in agriculture. Labor market participation does not automatically increase women’s empowerment (Elson 1999), and the narrow focus on women’s employment in agriculture misses the important issue of the quality of new employment opportunities, including “downgrading of jobs, flexibilization, decrease of job benefits and job security, change of responsibilities and workloads” (Bieri 2014). On family farms, women may increase their labor contributions without increasing their participation in decisions related to agricultural production and control of the harvested produce. As wage workers, women may be concentrated in the lowest-skilled, lowest-paid jobs and have no access to higher-value managerial positions. The roles and qualitative characteristics of the jobs that women carry out will have important implications for women’s empowerment, their welfare, and the welfare of their dependents.

- **Indicator 4**—An increase in the share of female managers/decision-makers in agriculture out of both sexes:

$$\Delta\left(\frac{\text{Number of female managers in agriculture}}{\text{Total number of managers}}\right)$$

The fourth indicator requires more detailed data about the agricultural jobs that women and men perform. On family farms, managers could be proxied by the household members who make decisions about agricultural production (such as planting, inputs, and crop choice). Such data have been collected successfully in surveys under the LSMS-ISA project. In wage employment, women managers as a share of all managers may be estimated from the reported occupation, provided that the occupation classifications are detailed enough to capture differences in agricultural wage employment. It may be necessary to differentiate between the feminization of

agricultural labor and the feminization of agricultural management to develop a better understanding of women's positions and empowerment in agriculture.⁵

Note that Indicator 4 in its current formulation focuses only on women's agency and empowerment in relation to rather narrow aspects of agriculture. Ideally, a more comprehensive measure of women's empowerment should be used; such a measure would also pay attention to women's agency and empowerment outside agriculture—in the household and community. The data requirements for such measures are high, but without a harmonized approach to defining women's empowerment, it is hard to draw definitive conclusions about global patterns in women's empowerment and agency as women's roles in agriculture change.

Fortunately, tremendous efforts have been made to advance the construction of harmonized measures of women's empowerment, particularly in agriculture. The Women's Empowerment in Agriculture Index (WEAI) is constructed from high-quality, sex-disaggregated data on many dimensions of empowerment, including women's input in decisions about agricultural production, autonomy in production, access to and decision-making about resources (including ownership of assets, rights to assets, and access to and decisions about credit), control over use of income, leadership in the community (measured by group membership and speaking in public), and time use (including workload and leisure) (Alkire et al. 2013). National-level statistics on women's empowerment, focusing on all five dimensions used for the WEAI, are not expected to be available. These dimensions are highlighted here because they are useful for critically assessing the evidence available on women's empowerment with regard to the feminization of agriculture and for identifying which aspects of women's empowerment may be missing in the analyses.

Ideally, women's roles in agriculture should be evaluated using these four indicators. As noted, in practice data limitations may prevent some indicators from being used, particularly Indicator 3, which focuses on the actual hours in agricultural work, and Indicator 4, which highlights the differentiation between labor and management. Indicators 1 and 2 are straightforward to estimate from available survey data, but they are also not without limitations (discussed in Annex A1). Despite the data limitations, this review aims to demonstrate the types of analysis and diagnostics that could be carried out with better sex-disaggregated data.

3. Feminization of Agriculture: What Is the Evidence?

Table 1 provides statistics about the share of women in agricultural employment as a percentage of both sexes (Indicator 2) in selected countries where females predominate in agriculture. Multiple data points in time show how the distribution of female employment in agriculture has shifted over time, although the statistics should be interpreted with caution if they come from

⁵ Decision-making around planting and agricultural production is an important aspect of empowerment, but it is not the only one. Decisions about what to plant and which inputs to use may not always contribute to women's welfare and empowerment, and women may prefer not to take those decisions (especially if women also have to take responsibility for the failed crop season) (Fernandez, Della Giusta, and Kambhampati 2015).

Therefore, another aspect to consider is women's economic empowerment, measured by women's control over income or participation in decision-making about the earnings from agricultural or other livelihood activities.

different survey sources or if the employment questions are formulated differently in different years.⁶

In all countries listed in Table 1 and Table 2, agriculture is feminized or feminizing. Agriculture is feminized (or female-dominated) if women constitute the majority of those employed in the sector, and it is feminizing if the share of women in agriculture has increased significantly compared to past years, regardless of whether women form the majority of those employed in agriculture. In many countries in the Near East and North Africa (NENA), Central Asia, South Asia, and Latin America, agriculture is clearly feminizing.

The trends are especially pronounced in the NENA region. In North Africa the share of women in agriculture increased from about 30% in 1980 to 43% in 2010, and in the Near East the share increased from 35% to 48% in the same period (FAO 2011b), with even more striking changes for some countries in the region. For example, before the conflict in Syria, women's share in agricultural employment more than doubled, rising from about 30% in 1980 to more than 60% in 2010. A similar pattern is observed in Iraq and Morocco over the same period, where the share of women in agricultural employment increased from 30% to 50%. Table 1 shows that in less than 15 years (between 1999 and 2013) in Armenia, females' share in agricultural employment increased from 45% to 59%.⁷ In other countries such as Jordan, the occupied Palestinian Territory, and Syria, women's share of agricultural employment surpassed 60% in 2010 (Table 2). Across the region, women's increased role in agriculture is too striking to attribute simply to the higher visibility of women's work in statistics or to different methods of data collection, although some of the variation across years may be caused by the data sources.⁸ It is more likely that women's role in agriculture across NENA has increased through the effects of various drivers of structural and rural transformation, including the diversification out of family farming induced by demographic pressure and land fragmentation, the intensification of agriculture (which may increase the need for female labor and decrease the need for male labor), the parallel growth of non-agricultural jobs (which may or may not be perceived as women's jobs),⁹ and social and cultural norms that affect women's and men's mobility and livelihoods.

⁶ For example, in Nepal the share of women in agriculture in 2001 is estimated from the population census (PC) and the same shares in 1999 and in 2008 are from the national LFS. The PC and the LFS provide distinguishably different statistics; estimates from the LFS are significantly higher than estimates from the PC, perhaps because the PC does not probe respondents about all the employment activities. Even within the same source, the survey question itself or the types of activities considered to be work may change over time, and the statistics may capture those changes rather than true shifts in women's employment.

⁷ It is clear from the table that some of the increase is linked to different survey sources.

⁸ A number of studies illustrate how employment responses can be affected significantly by how a survey question is formulated and by who provides the answers (Bardasi et al. 2011; Doss 2014). Compared to surveys using a detailed employment module (such as the LFS and LSMS), surveys that adopt a short employment module (the Welfare Monitoring Survey is one) tend to underestimate women's employment rates, since they do not probe for all activities, especially activities that may be harder to perceive as work, such as non-market productive work, apprenticeship, and work paid in-kind (Bardasi et al. 2011). Surveys in which the household head provides answers for all household members lead to biased estimates, so the best practice (according to the Bardasi et al. study) is to use a detailed module and interview everyone in the household above a certain age, as done in the LFS.

⁹ In a comparative study of structural transformation and the feminization of the labor force in Egypt and Tunisia, Assaad (2004) suggest that Tunisia experienced a feminization of the labor force because of the growth in female-dominated sectors such as textiles, while Egypt experienced a de-feminization of the labor force because of the growth in sectors such as construction and transport, which are regarded as male-dominated. Assaad focuses on wage employment and provides no discussion of how structural transformation processes affected the agricultural sector.

The data also suggest that agriculture is feminizing in other Asian countries. In Nepal the share of women in agricultural employment increased from 35% in 1980 to about 50% in 2010. Some estimates from the 2008 LFS suggest that women's share is much higher, about 60%¹⁰ (see the case study for Nepal in Annex 2). Patterns of feminization in agriculture are also noticeable in Iran, where females' share in agricultural employment grew from 25% in 1980 to almost 50% in 2010, and in Pakistan, where it was a meagre 12% in 1980 but approached almost 30% by 2010. Women's employment in agriculture is also on the rise in a few countries in Central Asia. In Tajikistan, women constitute more than 55% of agricultural employment, as men have migrated in large numbers to neighboring Russia for work, largely motivated by poverty and the inadequate employment opportunities in Tajikistan (see the case study for Tajikistan in Annex 2).

In the majority of countries in sub-Saharan Africa, where women traditionally have engaged strongly in agriculture, the share of women in agriculture is already high: 56% in Burundi, 67% in Lesotho, 59% in Malawi, 57% in Rwanda and Chad, and 62% in Sierra Leone—so the absence of significant increases is not surprising. Even so, the share of women in agriculture is rising in some countries. In Chad, for example, the share of women active in agriculture increased from 28.9% to 56.9% in the span of 20 years. In Botswana, women accounted for about 47% of agricultural employment in 1980 and 57% in 2010¹¹ (Table 2). While these statistics show that women are economically active in agriculture, they say nothing about the types of jobs and activities that women do. In Malawi, there is evidence that more and more women are taking on casual labor as a secondary occupation in addition to working on their own farms (see the case study for Malawi in Annex 2). The implication is that while the share of women in agriculture has not changed much in the last two to three decades, the types of agricultural jobs for women have changed and have unfortunately become more precarious.

Lastly, increases in women's participation in agriculture are reported even in some Latin American countries, where agriculture has been and continues to be considered a male job. For example, in Chile women's share in agriculture increased from 9% to 14% even while the size of the agricultural sector was shrinking (Table 2). Similarly, Peruvian women increased their share in agriculture from 19% in 1980 to 31% in 2010, and Ecuadorian women increased their share from 14% to 25% in the same years (Table 2). In other regions, the feminization of agriculture is likely to be driven mainly by men's movement out of agriculture to take jobs in other sectors or distant locations, but in Latin America it is likely to be driven by female wage employment in agribusinesses concentrated on non-traditional agricultural exports. Many regard employment on commercial farms producing non-traditional agricultural exports as an opportunity for women to increase their economic empowerment, although policies must be in place to ensure that these jobs are "decent," as some researchers have identified abuses of women in the sector (see the next section for a more detailed discussion).

¹⁰ The statistics in Table 2 are from the *State of Food and Agriculture 2010–11* (FAO 2011b) and thus extracted from the FAOSTAT database of the Food and Agriculture Organization (FAO). The statistics in Table 1 are extracted from the website of the International Labour Organization (ILO). Given that both are based on the same source (the 2008 LFS), the differences are hard to reconcile but may be due to differences in definitions.

¹¹ For Botswana, Table 1 and Table 2 show that women's share in agriculture has increased significantly, but the levels are very different, depending on the source of the data.

Table 1: Share of women in agricultural employment (as a percentage of both sexes) by region and country, 1998–2014

Region and country	Source†	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Asia																		
Armenia‡	OE, HS					44.6	44.8	43.8	45.8	45.6	50.9	54.4	53.8	55.8	56.2	57.1	58.7	
Azerbaijan††	OE, LFS		53.7	53.6	51	46.8	46.5	45.8	45.2	45.4	48.5	51.6	56.1	56.5	56.3	56.5	56.7	56.2
Bangladesh	LFS			46.4			25.2		33.8					40.9				
Bhutan‡‡	LFS, PC								52.6				53	53.1	53.4	61.6	53.3	52.7
Cambodia	HIES													51.5				
Georgia	LFS	50.6	50.7	53.6	48.5	49.5	48.9	50.3	50	49.1	50.8							
Nepal†††	LFS, PC		55.9		48.1							60.6						
Tajikistan	LFS							55.8					55.9					
Viet Nam	LFS	51	50.5	50.5	50.1	50.2	50.8	50.6									50.7	50.6
Africa																		
Botswana‡‡‡	LFS, HS	27.6		38.2			28.6			38.8						37		
Gambia	LFS																54.3	
Guinea	OE												53.1	53.4	52.9	52.9		
Liberia	LFS													50.3				
Morocco	LFS	21.8	24	22.4	19.6	32.4	34.1	35.8	36.4	38.4	38.7	38.9			40.4	39.9		
Rwanda	PC					58.7										58.1		
Tanzania, United Republic of	LFS									53.3								
Uganda††††	LFS, HIES						55.2						54				54.4	
Zimbabwe	LFS														54.6			54

Source: ILOSTAT.

Note: Statistics and their source are indicated in the same color (the notes that follow detail the specific instances).

† HS—Household Survey; OE—official estimate; LFS—Labor Force Survey; PC—population census; HIES—Household Income and Expenditure Survey (national socio-economic survey).

‡ Armenia: Estimates for 2002–08 are OEs, while those for 2009–13 are from the Household Living Standards Survey.

†† Azerbaijan: Estimates for 1999–2008 are OEs and comes from the LFSs thereafter. There is a divergence between the OEs and LFSs for 2006 and 2007, but the divergence is very small for 2008. In 2008 the OE suggests that women form 45% of the agricultural labor force, while the LFS estimates place their share at 52%; in 2007 the OE suggests that women are 48.5% and the LFS suggests they are 54%; and in 2008 the OE puts women's share at 51.6%, while the LFS puts it at 50.9%.

‡‡ Bhutan: Estimates for 2005 are from the PC; the rest are from LFSs.

††† Nepal: Estimates for 2001 are from the PC; the rest are from LFSs.

‡‡‡ Botswana: Estimates for 2010 are from HS; the rest are from LFSs.

†††† Uganda: Estimates for 2009 and 2013 are from HIES for 2009 and 2013; estimates for 2003 are from LFS.

Table 2: Female share of the population that is economically active in agriculture, by region and country, 1980, 1995, and 2010

Country	1980	1995	2010
Africa			
Burundi	55.9	55.9	56
Comoros	50	50.3	52
Madagascar	54.7	53.9	53.5
Malawi	56.7	56.1	59.2
Mozambique	58.6	63.4	65.2
Rwanda	55.3	56.1	57
United Republic of Tanzania	53.7	54.1	55
Zimbabwe	54.3	55.3	53.3
Angola	52.4	52.6	55
Chad	28.9	50.8	56.9
Congo	56.6	60	56.5
Botswana	46.6	52.4	56.9
Lesotho	72	68.2	67.3
South Africa	37.1	31.1	29.6
Swaziland	58.5	60.7	54.3
Benin	34.5	41.1	39.6
Gambia	50.6	51.2	53.3
Mauritania	47.6	49.2	53.9
Senegal	44.9	45.5	47.4
Sierra Leone	59	58.5	61.7
Algeria	41.5	50.4	52.7
Libyan Arab Jamahiriya	37.2	50	69.9
Morocco	29	38.9	47.7
Sudan	32.5	32.9	39.5
Tunisia	27.1	34.4	32.8
Western Sahara	42.1	47.8	53.7
Asia			
Cambodia	57.3	54.9	51.2
Indonesia	33.7	39	39.3
Lao People's Democratic Republic	51.3	51.8	52.3
Viet Nam	50.7	51	49.1
Bangladesh	42.4	44.5	51
Bhutan	26.3	19.4	34.7
Iran (Islamic Republic of)	25.2	33.9	46.4
Nepal	35.4	42.2	48.1
Pakistan	12.2	18.4	29.6
Western Asia			
Azerbaijan		53.8	53.9
Iraq	29.7	38.2	50.3
Jordan	41.9	44.3	62.2
Occupied Palestinian Territory	64.8	64.1	72.5
Syrian Arab Republic	31.7	50.7	60.7
Turkey	40.4	48.2	52.3
Yemen	29.3	31.4	40.1
Latin America			
Chile	9.2	10.6	14.2
Colombia	19.5	19.9	24.8
Ecuador	14	17.6	24.8
Peru	19	27	31.3
Papua New Guinea	47.9	53.5	55.8

Source: FAO 2011b, Table A4.

The discussion so far has focused on women’s participation in agriculture, regardless of the actual number of hours they work. Surveys with detailed labor modules often collect information about employment hours to determine the distribution of full-time and part-time employment and hourly wages, but sex-disaggregated labor hours by sector (Indicator 3) are reported in only a few studies. In a very recent paper, Palacios-Lopez, Christiaensen, and Kilic (2015) examine women’s labor contribution in agriculture in six countries in sub-Saharan Africa, focusing on crop activities. Table 3 reports their estimates, along with estimates of the female share of agricultural employment (from LFSs—Indicator 2). Because the shares of labor hours are similar and not significantly higher than the shares of women in agriculture, there is no evidence that women spend disproportionately large number of hours in agriculture relative to men. In fact, in Niger and Ethiopia a large number of women seem to engage in agriculture but to provide significantly fewer hours of labor for cropping activities compared to men. Palacios-Lopez, Christiaensen, and Kilic (2015) do not take women’s labor related to livestock rearing into account, however. The neglect of livestock labor hours, the different data collection methods, and differences in definitions may partially explain the differences observed in the statistics in columns 2 and 3.

Table 3: Share of women’s labor hours in agriculture

Country	% female workers†	% labor hour contributions‡	Year/period
Uganda	54%	56%	Uganda National Panel Survey 2010/11
Malawi	54%	52%	Malawi Third Integrated Household Survey 2010/11,
Tanzania	53%	52%	Tanzania National Panel Survey 2010/11
Nigeria	36%	37%	Nigeria General Household Survey – Panel 2012/13
Northern Nigeria		32%	Nigeria General Household Survey – Panel 2012/13
Southern Nigeria		51%	Nigeria General Household Survey – Panel 2012/13
Ethiopia	46%††	29%	Ethiopia Socioeconomic Survey 2011/12
Niger	37%††	24%	Niger l'Enquête Nationale sur les Conditions de Vie des Ménages et l'Agriculture 2011

† Source is ILO database, based on all agricultural activities, cited in Palacios-Lopez, Christiaensen, and Kilic (2015).

‡ Source is Palacios-Lopez, Christiaensen, and Kilic (2015), based on crop activities.

†† Source is FAO (2011b).

Similar studies have not been carried out for countries in other regions, so it is not possible to draw conclusions about the trends in hours of work in agriculture provided by men and women globally. Nor are there any cross-country studies at the national level of the distribution of women among decision-makers and managers in agriculture (Indicator 4). The scarce reporting of sex-disaggregated statistics on types of jobs, activities, and decision-making in agriculture limits the understanding of how rural transformation impacts women’s and men’s roles and agency in the sector.

To sum up, national-level statistics support the hypothesis that in many countries women dominate the agricultural sector. Whether this development is positive depends on the characteristics of the jobs and activities performed by women and on whether they empower women or exacerbate existing gender inequalities. If incomes from agriculture continue to lag behind those in other sectors, and if women are more likely to perform low-skilled and less formal agricultural jobs, then women’s higher concentration in agriculture is a source of concern

for efforts to promote gender equality and alleviate poverty. If women's increased predominance in agriculture is a response to lucrative income-generating opportunities, such as participation in global agri-food systems through contract farming and other channels, that participation may confer significant gains in terms of rural poverty reduction and female empowerment.

The next section examines key factors that may be pulling or pushing women into agriculture. The aim is to gain a better understanding of the welfare of women in agriculture and the positive and negative developments surrounding the feminization of the sector in different countries.

4. Factors Leading to the Feminization of Agriculture

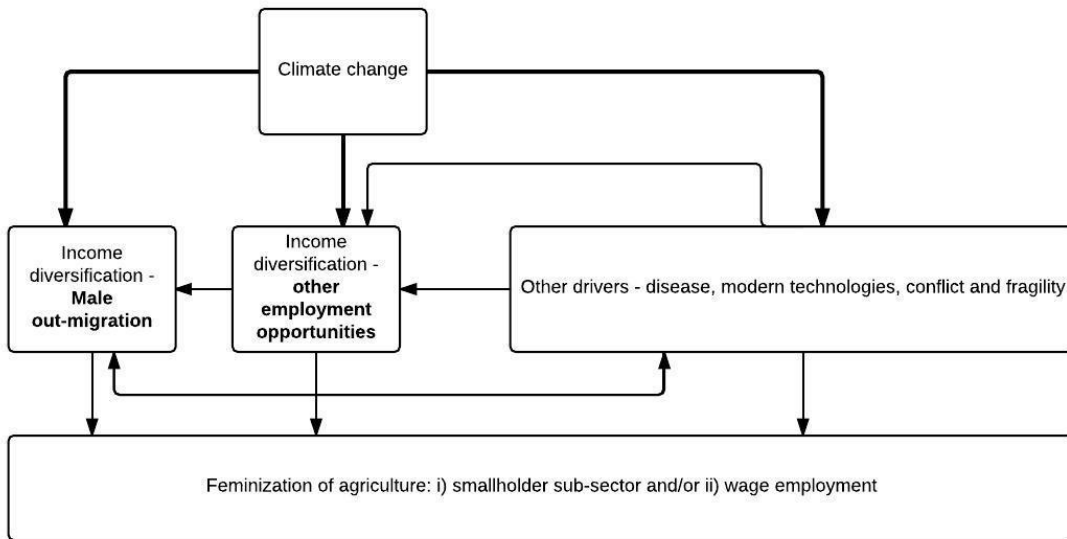
Building on the literature on the feminization of agriculture and rural transformation, this section examines how a number of global factors may contribute to the changing roles of women and men farmers in agriculture. Two main factors that can rapidly and significantly change women's agricultural work and responsibilities are male outmigration and the spread of commercial farming. Other factors linked to changes in women's work in agriculture include human pandemic diseases, modern agricultural technologies, conflict, and climate change.

All of these factors have a global reach, but the second set of factors can be more relevant in some regions than others. For example, the impact of the HIV/AIDS pandemic was heaviest in Southern Africa. The spread of the disease has abated since its peak in the 1990s and 2000s, but without question, the weight of the disease was borne largely by women, whether or not they contracted it (Parker, Jacobsen, and Komwa 2009). Understanding the consequences of that pandemic may inform responses to other outbreaks that could also disproportionately affect women, such as outbreaks of the Zika virus. From a gender perspective there are certain similarities between the two disease outbreaks. Zika, if unabated, will probably affect women's time in employment through the higher financial and care needs of disabled children. Women with disabled children are also more likely to be abandoned by male partners.¹²

Figure 1 provides a simple illustration of the factors that affect women's roles in agriculture. The factors are interlinked, and often multiple factors operate to bring about significant changes in women's and men's roles in agriculture. While climate change may have an independent effect on women by augmenting their household work and even affecting their preferences about which crops to grow on the farm, it also exerts an influence through its effects on other factors—for example, by increasing the urgency for smallholders to diversify out of traditional agriculture, increasing the incidences of diseases (such as mosquito-borne viruses), exacerbating fragility, and heightening the incidence of conflict. Except in extreme situations, however, climate change and environmental degradation are rarely the sole drivers of migration, displacement, or conflict, as their effects are largely mediated by local political, social, economic and cultural factors (Piguet 2010).

¹² See Frances Martel, "Doctors: Brazilian Men Abandoning Pregnant Women over Zika," *Breitbart*, February 8, 2016 (<http://www.breitbart.com/national-security/2016/02/08/brazilian-men-abandoning-pregnant-partners-over-zika/>).

Figure 1: Factors that may lead to the feminization of agriculture



Source: Authors

Climate change also drives the development of technologies to adapt to a changing climate, and those technologies may affect women’s and men’s work in agriculture differently. If technologies make food crops (generally women’s domain) more resistant to weather fluctuations and more profitable, then men may find it more lucrative to diversify out of family agriculture into other sectors. Who diversifies out of traditional agriculture is mediated by human capital accumulation and the jobs available in other sectors. Some structural transformations are characterized by the development of industries that favor women’s employment (for example, the majority of employment in the textile industries of South Asia is female), while other structural transformations are characterized by the growth of sectors traditionally perceived as male (such as construction and transportation). Growth in commercial agriculture, depending on the commodity, may also pull more women than men into off-farm wage employment.

Figure 1 also highlights the fact that the feminization of agriculture concerns not only agricultural wage employment but the smallholder sector as well. The sections that follow provide a more detailed discussion of how each factor can lead to the feminization of agriculture and of whether the evidence supports the hypothetical linkages.

4.2 Male outmigration

What are the effects of male outmigration and the linkages with women’s labor supply, and to what extent are these linkages supported by empirical studies? Male outmigration¹³ affects

¹³ In many countries, female outmigration may be just as common as male outmigration, but that subject is beyond the focus of this review (unless female outmigration is for agricultural employment and therefore contributes to the feminization of agriculture). Lastarria-Cornhiel (2008) reports that, faced with emergencies, women may migrate for employment to agribusiness sites. The increased number of women in the migrant labor force is also noted in Deere (2005). See Lee (2010) for an account of Nicaraguan migrant women’s experience working in packing plants for export agriculture in Costa Rica.

women’s labor supply decisions in agriculture through two main channels—the loss of male family labor and the flow of remittances.¹⁴ Although this review does not focus on the allocation of women’s labor to sectors other than agriculture, the changes observed in the agricultural sector cannot be evaluated without properly understanding labor opportunities in other sectors. Table 4 summarizes the hypothetical effects of male outmigration on women’s labor allocation to agriculture and other sectors. The table has been adapted from Binzel and Assaad (2011) to include the hypothetical effects of increased decision-making.

Table 4: Expectations about the effects of male outmigration on women’s labor supply

	Migration	Remittance income	
	Replacement of the migrant’s labor	Reservation wage hypothesis	Investment hypothesis
1) Wage work	+/0/-	-/0	0/-
2) Subsistence work	0/+	0/-	+
Overall effect of 1 and 2	+	-	+
3) Decision-making (agriculture)	+/0	+/0/-	

Source: Adopted from Binzel and Assaad 2011.

An increase in the supply of female labor to the family farm may be driven by the need to compensate for male labor lost to migration, or it may be a response to the farm’s increased growth potential when remittances are sufficient and invested in the farm (investment hypothesis). By the same token, high remittances may discourage women from continuing to farm if the returns from farming are not high enough (the reservation wage hypothesis). A further consideration is that women may increase their decision-making related to agricultural production when their male partners are absent, but the effects of greater decision-making power will be mediated by the size and frequency of remittances and by who controls how they are used. High remittances and growth of the family farm may boost female decision-making, unless men, as the primary earners, take full control of how remittances are invested. Poor remittance flows may disempower women if they have to increase working time and deal with the financial difficulties resulting from the missing migrant labor.

The most immediate effect of male outmigration on farming households is the loss of male able-bodied labor, especially as it is younger men who are more likely to migrate (Mueller et al. 2015). In farming systems that rely extensively on family labor, the loss of male labor can cause a substantial shock to the farm. A substantial intra-household labor adjustment will be required for farming to continue. To maintain the same level of agricultural production, spouses who remain behind may have to increase their own labor contributions to compensate for the lost male labor, hire labor, or rely on the labor contributions of other family members. Women may decide to reduce agricultural production or move out of agriculture altogether. The adjustments that are made will depend on a number of factors, including the duration of migration, the remittance flows, labor market conditions at home, access to productive resources, the availability of other income-generating opportunities for women at home, and women’s own time constraints and preferences.

¹⁴ Many studies explore the relationship between male migration and women’s labor supply, without regard to sector or type of job, but they fall outside the specific concern here, which is to understand how male outmigration changes women’s roles in agriculture. In any event, as Table 4 shows, a narrow focus on wage employment that disregards subsistence production will underestimate women’s labor supply.

Male migration that is temporary and done in the off-peak agricultural season may not have a discernible effect on women's labor force participation or hours in agriculture. Such instances may be rare, because temporary income-generating opportunities that are easily accessible, preferably at lower costs, must exist. For example, in their study of the effects of migration on crop incomes in the Kyrgyz Republic, Atamanov and Van den Berg (2012) find that migration causes crop income to drop, but mostly for permanent migration, not for temporary migration. The few other empirical studies that examine the effect of migration on household production also point to negative (Rozelle, Taylor, and DeBrauw 1999) or no (Wang, Rada, Qin, & Pan, 2014) effects on household production, but they do not differentiate between temporary and permanent migration. Using data from Bangladesh, Mendola (2008) finds that international migration is linked to higher adoption of modern technologies on the farm which raise productivity, but households that cannot overcome the high cost of international migration and engage in domestic migration do not see productivity gains. Temporary migration may not have a negative effect on household production if temporary migrants return regularly and contribute to agricultural production, if temporary migrants did not engage in crop production before they migrated, or if the remaining family members compensated for the loss of labor by increasing their own labor, hiring labor, or through adopting labor-saving technologies. Unfortunately, most studies, including Atamanov and Van den Berg (2012), do not look at women's time in agriculture, which may be one mechanism through which crop output is maintained. In addition, when social norms and other factors, including low education and literacy and the lack of expertise in agriculture, obstruct women from carrying out farming activities in the absence of their migrant husbands, both farm productivity and women's welfare may diminish, as may be the case with permanent migration in the Kyrgyz Republic.

Especially if they have limited opportunities to hire labor, women may increase their time in farming to compensate for the missing male farm labor. Using data for 1997–2006 from the China Health and Nutrition Survey, Chang, Dong, and MacPhail (2011) find that internal migration of household members increases the burden of work for the children and elderly who are left behind, with the effect being higher for elderly women and girls than for elderly men and boys.

Expanding the analysis of patterns in the feminization of labor in rural China and focusing on the period from 1991 to 2006, Chang, MacPhail, and Dong (2011) examine the unpaid farm sector, paid off-farm sector, and unpaid domestic sector in terms of time rather than labor force participation. They find evidence of a feminizing labor force both on and off of the farm, with migration acting as a critical driver of these changes. The same study observes that agricultural development (defined as structural change and income growth) has led to an absolute increase in paid and unpaid labor for both men and women, but the gap in time use has not increased over the 15-year period.

On the other hand, De Brauw et al. (2008) find little evidence of the feminization of agricultural labor or managerial feminization of agriculture in China in the 1990s. The authors conclude that women's participation in the sector is high but find no systematic movement of women into agriculture, except perhaps among middle-aged women who appear to contribute to farming more than men of the same age. The study does, however, indicate a trend toward feminization of the livestock sector, with women contributing more and more labor but still having limited control of the marketing operations and therefore the proceeds, an issue that has remained largely unexplored. While there may be little evidence of the feminization of agriculture in China in the

1990s, Mu and de Walle (2011) find that by the mid-2000s male outmigration had increased both women's participation rates and time spent in agriculture, while reducing wage work and family work, though the effects are different for women of different ages.

Despite Chinese women's greater role in agriculture, their participation in decision making (managerial feminization) has not improved. De Brauw et al. (2013) confirm that agricultural labor in China has become feminized since the 1990s, both in terms of female participation in farming and the number of hours that women spend farming. While total hours in farming fell between 1997 and 2009 for all family members, total hours fell more slowly for women and led to the feminization of agricultural labor. The study also suggests that the feminization of agriculture was linked to greater specialization of employment—households that continued farming after the 1990s were more likely to have one family member specializing in farming, and most often that family member was female. By 2006–09, in almost 30% of households women performed *all farm work*, compared to around 13% in 1991 (De Brauw et al. 2013). The same study corroborates Mu and de Walle's (2011)¹⁵ findings of heterogeneous patterns in the feminization of agriculture by age group.

Studies from other countries also confirm that migration changes rural women's labor supply. Mendola and Carletto (2009) find that having a migrant abroad decreased the supply of female paid labor in Albania while increasing their supply of unpaid work. Binzel and Assaad (2011) show that following male migration, rural women in Egypt increase their share of labor in unpaid household work and subsistence agriculture to replace the migrant's labor and not in response to higher remittances that relax financial constraints on the family enterprises.

The effects of migration and remittances are also mediated by local labor market conditions and the substitutability of family labor with hired labor. At peak times in the cropping season it may be hard to hire labor to replace the missing (migrant) family member (Wodon and Beegle 2006). Aside from dealing with this problem by increasing family labor, farming households with migrant members may shift from producing labor-intensive crops to land-intensive crops (De Brauw 2010) that may mitigate the increased demands on women's time.

In analyzing the literature on changes in women's labor contribution in agriculture, a recurring challenge is to evaluate whether those changes are accompanied by changes in women's agency and role in decision-making. On the one hand, managing a farm remotely is difficult for migrants, and women's decision-making, at least jointly with their spouses or other family members, is expected to increase. On the other hand, migrants may cement their positions as decision makers in the household and perhaps even on the farm, since their contributions to the family's income will increase. Women's empowerment may even decrease if women withdraw from the wage labor market to work in subsistence agriculture. There is growing evidence that the spouses who stay behind assume responsibility for the household farm even where agriculture is traditionally a male occupation, as in Latin America (Deere 2005; Radel et al. 2012; World Bank 2015a). In both Guatemala and Mexico, strong norms dictate that women

¹⁵ Women of different ages may be joining agriculture at higher rates compared to men of the same age. Mu and de Walle (2011) find evidence that the feminization of agriculture in China is driven by younger women. The same study notes that before 2006 women under age 45 worked in agriculture at the same rates as men of the same age, but in 2006 a gap started to emerge, and women in their thirties were more likely to work in agriculture compared to men in their thirties. Women's participation in other sectors in China lags participation of men of all ages (Mu and de Walle 2011), suggesting significant gender inequalities in access to decent employment opportunities.

should not be farmers, and when women take on primary responsibility for the family farm, they face certain gender-specific difficulties, including difficulties hiring and supervising labor and acquiring technical knowledge about farming. In the absence of their male partners, Guatemalan women assume more responsibilities in farming, including managerial tasks (World Bank 2015a), suggesting that women are not only taking over agricultural labor but also increasing their role in decision-making, at least in relation to agricultural production.¹⁶

Data on decision-making are rarely available from large surveys, and this deficiency has hindered careful analysis of the effects of migration on the empowerment and agency of women left behind. In the absence of better data, De Brauw et al. (2013) use the increase in female-headed households to approximate the feminization of the farm management role in China. The study also explores the consequences of the feminization of farm management on agricultural productivity and finds that it does not negatively affect farm productivity if women managers have access to productive resources.

Using the gender of the household head as a proxy for the farm manager role is not ideal, however, because *de jure* female household heads may still take limited decisions on their own, especially if migrant men still influence how remittances are spent or if other family members become the primary farm decision-makers, as may be the case in many Central and South Asian countries. In those countries, multigenerational households are common, and in-laws have a strong decision-making role within the household (Reeves 2011; Shahriari et al. 2009). After reviewing studies on the issue, Yabiku, Agadjanian, and Sevoyan (2010) conclude that the influence of other family members on farm decision-making is not equivalent to the influence of the migrant husband, and wives generally experience an increase in their autonomy and decision-making when husbands migrate.

It is important to distinguish between autonomy and empowerment, however. Autonomy in decision-making is only one aspect of empowerment, as highlighted in the discussion of Indicator 4 in Section 2. In their study of migration and women's autonomy in Mozambique, based on data for 2000–06, Yabiku, Agadjanian, and Sevoyan (2010) find that both successful and unsuccessful cases of male outmigration are linked to significantly higher autonomy for wives who stay behind, and the gains in autonomy persist after husbands return. At the same time, although unsuccessful migration increases women's autonomy, it may have disempowering effects on women. Unsuccessful migration itself can be a strain on women's time, as they have to assume the work of their migrant husbands and also deal with financial difficulties that accompany unsuccessful migration experiences. Low social status and low economic independence have also been linked to women's disempowerment in other contexts, such as Mexico (Boehm 2008) and Morocco (Sadiqi and Ennaji 2004). Some studies highlight that women, in the absence of their migrant partners, do not necessarily enhance their welfare as a

¹⁶ This trend may not be universal, because the low productivity of subsistence agriculture and steady remittance flows may discourage women from farming. There is evidence that agriculture in some areas of Mexico is becoming less feminized (Marín and Baer 2009, cited in Radel et al. 2012). Women in southern Niger traditionally were very active in agriculture, but they were pushed out by land shortages; their exit was justified by the assertion that women should not work the fields (Doka and Monimart 2004). In response, the same study finds that women took on more off-farm income-generating activities. Instances of the defeminization of agriculture are few and not discussed in this review, although they are important in cases such as in Niger, because they highlight again how women's disadvantaged position in relation to men pushes women into more insecure, lower-quality activities to generate income.

result of greater decision-making and responsibilities (Sadiqi and Ennaji 2004; Yabiku et al. 2010), and that the nature of the tasks they undertake does not necessarily “challenge the deeply entrenched gender inequality” (Menjívar and Agadjanian 2007).

Women’s empowerment and welfare are also determined by whether women have a say in how remittances are spent and by whether local institutions support women. In a comprehensive review of migration patterns and effects in Asia, Mueller et al. (2015) highlight that women and men may have different preferences for investing remittances; women favor expenditures on human capital (including children’s education), while men favor the acquisition of more land. Women resist investing in more land because they face gender-specific difficulties cultivating and managing additional land, including constraints in hiring and working with men when their partners are far away (Radel et al. 2012; World Bank 2015a). Because women face challenges in monitoring and supervising male labor, their returns from hired male labor are low (O’Sullivan et al. 2014). If women cannot successfully hire labor, more land will simply increase their workload and the workload and welfare of other household members, including children (Antman 2013).

When male migrants do not send substantial remittances, the resulting financial distress and severe work burdens can be disempowering for women. Using data from Nepal, Maharjan, Bauer, and Knerr 2012 show that higher remittances have the potential to reduce women’s work burden and improve their decision-making, while low or no remittances increase women’s workload (Annex 2). From a gender perspective, unsuccessful male migration is a particular concern. Poor rural income-generating opportunities for men and women lead to an increase in male outmigration and the greater concentration of women in agriculture. Male outmigration is largely a response to the lack of local opportunities, implying that women’s expanding role in agriculture is a mechanism to cope with poverty rather than a response to lucrative opportunities in agriculture.

4.3 Off-farm employment opportunities

Women’s role in the smallholder sector is mediated by the availability of off-farm and non-agricultural income-generating activities. When women have access to well-paying cash-generating activities outside family farming, they may reduce their participation in agriculture and may choose not to take over management of the farm in the case of male outmigration. Unfortunately, off-farm (especially non-agricultural) employment opportunities for women in rural areas are often scarce and characterized by low returns.¹⁷ Additional factors that may help to explain the increase in women’s roles in agriculture at times when men are able to diversify out of agriculture include mobility constraints related to social norms and women’s traditional responsibilities in the reproductive sector, as well as women’s lower levels of education (including literacy).

It is also important to note that women farmers have less access to agricultural inputs and other resources than men farmers, and that this disparity has been linked to significant gaps in men’s and women’s agricultural productivity across various countries (Udry 1996; Goldstein and Udry 2008; Peterman et al. 2010; FAO 2011b; Aguilar et al. 2015; Kilic, Palacios-Lopez, and

¹⁷ Useful references on gender discrimination in access to and returns from off-farm employment include (Hertz et al., 2009) and (FAO, 2011b)

Goldstein 2015; Oseni et al. 2015; Slavchevska, 2015). Low productivity on female-managed farms may reduce household food production and food security, and it may increase the pressure on women to supplement household income with off-farm income-generating activities.

Casual, temporary wage employment on larger farms may be one such opportunity, but in many developing countries, the spread of modern agribusinesses is expanding women's access to potentially better wage employment opportunities. Agricultural commercialization, an important feature of structural transformation, is rapidly changing rural landscapes in developing countries. Commercial agriculture is shifting from more traditional export crops such as cocoa, coffee, and sugar to non-traditional agricultural export crops that often are more labor-intensive to produce, such as fruits, vegetables, and flowers (Lastarria-Cornhiel 2008). In the past 20 years, horticultural exports from Latin America have more than tripled, and the same exports from Africa and Asia have more than quadrupled (Van den Broeck and Maertens 2016).

Commercial agriculture is also opening new paid employment opportunities for women outside their traditional roles (often as unpaid labor) on family farms. A large share of workers in non-traditional export sectors are women. Dolan and Sorby (2003) suggest that in Chile, Ecuador, Guatemala, Kenya, Mexico, South Africa, and Zimbabwe, women form at least 50% or more of the employment in the high-value agricultural industries. Women constitute 75% of the workforce in Kenya's flower industry and 65% of the workforce in Zambia's vegetable sector; in both countries, most of this employment is temporary or casual (Barrientos 2007). For some crops, such as green beans in Senegal and vegetables in Mexico, women's share of the labor in commercial farms can be as much as 90% (FAO 2011b).

Women and men can take two main paths toward participation in the production of non-traditional export crops: contract farming and direct wage employment. Because contract farming gives farmers access to productive inputs and new technologies (including improved seed, fertilizer, pesticide, and even technical knowledge supplied directly by contractors), contract farming has led to significant benefits in terms of higher agricultural productivity, reduced production risk, and higher incomes for farmers. At the same time, contract farming is often biased against smallholders (Reardon et al. 2009) and women farmers in particular, who are perceived to have less control over family labor, more limited access to resources, and more insecure land tenure (Maertens and Swinnen 2012; Van den Broeck and Maertens 2016).¹⁸

A major issue for assessing linkages between contract farming and women's changing roles in agriculture is raised in Oya's (2012) review of the literature on contract farming. Oya warns that most evidence on contract farming comes from case studies and that no clear information appears to exist on the incidence and outcomes from contract farming over time or across countries. The lack of systematic national-level data on the spread of contract farming makes it hard to assess the importance of contract farming globally or even for selected countries, and it creates opportunities for "over-generalizations and ideologically-driven recommendations" (Oya 2012). Despite the lack of aggregate indicators to quantify the importance of contract farming in sub-Saharan Africa, Oya finds that the literature does not support the conclusion that a major share of agricultural production or even export production is provided through contract farming, which suggests that contract farming may not be a significant driver of changes in women's role

¹⁸ Discussions of the direct linkages between global value chains and gender should not overlook the indirect linkages, such as gender-differentiated investments on the farms (Maertens 2009) and technology spillovers (Minten, Randrianarison, and Swinnen 2009).

in agriculture. Yet contract farming may be more important in some countries than in others. In countries where opportunities for contract farming exist, women may face higher demand for their labor because of contracts held by male family members. Women may even lose the control of their plots if their husbands need additional land for expanding their contract farming activities.

Tightening quality standards in the European Union, the main market for most non-traditional export crops, have led to a shift away from contract farming and toward greater integration and consolidation of all crop production and agro-processing activities on one large commercial farm. The rise of large commercial farms around non-traditional agricultural exports has generated new employment opportunities for women and men, with the effect and consequences purportedly higher for female employment (Deere 2005). As mentioned, the available statistics clearly suggest that females largely predominate in wage employment in agribusinesses focusing on non-traditional exports, and some evidence indicates that men predominate in the few managerial positions available (Dolan and Sorby 2003), suggesting that while agricultural wage labor is feminizing, women are excluded from the higher-value positions.

Studies have reached mixed conclusions on the benefits and drawbacks of these agribusinesses (and by implication the consequences for the women who constitute a larger share of their employees). Some studies underline the positive effects of rising horticultural exports for rural households, including increased rural incomes and food security, lower rural poverty rates, and higher bargaining power (Maertens & Swinnen, 2012, 2009b; Maertens & Verhofstadt, 2013; Minten, Randrianarison, & Swinnen, 2009; Van den Broeck & Maertens, 2016). Wages and working conditions in the sector may also be better than they are in other jobs available to women (Deere 2005). Other studies question specific issues, including the instability of employment (short contracts), the repetitive nature of the tasks and the low skill level required, low wages, and the exploitation of workers in horticultural export industries (Dolan and Sorby 2003; Barrientos, Dolan, and Tallontire 2005; de Schutter 2013; Schuster and Maertens 2016) as well as land grabs for large-scale production that dispossess small-scale producers (Deininger and Byerlee 2012).

The majority of wage work in these agribusinesses is short term and does not provide sufficient security for employees; see Lastarria-Cornhiel (2008) for earlier studies. Exceptions exist, such as the flower industries in Colombia, Kenya, Uganda, and Zimbabwe, where a great number of workers are permanent because operations continue year-round (Lastarria-Cornhiel 2008). An important concern with short-term employment opportunities is whether they are available during or outside the main agricultural season. If labor demands in the agro-industries do not overlap with the main agricultural season, then women and men may supplement their incomes from small-scale farming with wage employment in the agro-industries. If demand for labor in the agro-industries overlaps with the main agricultural season, then short-term off-farm employment may not lead to higher household incomes and may even negatively affect own farm production.

Employment opportunities in large-scale commercial farming should be evaluated against the other opportunities for employment off of the family farms in rural areas. In many developing countries, rapid population growth in areas where farms are already very small is placing additional pressure on agriculture, and populations are chronically food insecure. Headey and Jayne (2014) suggest that one mechanism for adapting to falling land-labor ratios is to intensify agricultural production, which many farmers, especially women, may lack resources to pursue.

Another mechanism is to diversify out of agriculture by pursuing temporary migration or off-farm employment. Often the off-farm employment opportunities are very meager; as noted, the majority of wage employment opportunities available for women are part-time, seasonal, and pay little (FAO 2011b). For example, 90% of women and 66% of men in Malawi work part time, and a similar pattern arises in Nepal, where 70% of women and 45% of men work part time (FAO 2011b). A study of women and agriculture in Andhra Pradesh shows that women are heavily involved in agricultural wage labor, largely because more lucrative employment opportunities such as self-employment and seasonal migration are not available to most women (Garikipati 2008). In Andhra Pradesh, agricultural wage labor offers the only opportunity for women to gain some financial independence, but their incomes from agriculture lag behind those of men, whose income from seasonal migration widens the gender gap in wealth (Garikipati 2008). Wage work on large commercial farms may be the only opportunity available, especially for women, who often have limited education and skills and whose mobility is restricted by social norms. Maertens and Swinnen (2009) consider women's disproportionate presence in the sector as a positive development, especially given the paucity of other off-farm employment opportunities for women (see Razavi et al. 2012). Yet these studies highlight that governments should do more to address women's opportunities for better-paying jobs on and off the farm, as well to improve their educational opportunities and enable them to obtain more skilled jobs.

Off-farm wage employment affects women's empowerment through two main channels—earned income and work burden. Women's earned income increases their contribution to household income and therefore their bargaining power within the household (Anderson and Eswaran 2009). Maertens and Verhofstadt (2013) find that women employed in the horticulture industry report gaining increased decision-making power in the household. Women's employment in the sector and the resulting higher bargaining power within the household have led to increased primary school enrollment for both girls and boys, although it is the effect of girls' enrollment that is attributed to women's increased bargaining power, rather than a pure income effect (Maertens and Verhofstadt 2013). Employment in Senegal's horticultural export sector is also linked to lower fertility rates, especially among the most illiterate women, which suggests that the effect on fertility comes mostly through empowerment rather than education (Van den Broeck and Maertens 2014).

If women's wage employment is more likely to consist of casual and temporary work, or if women are exposed to unhealthy work conditions and excluded from social protection, then women's paid employment may lead to limited welfare and empowerment gains (Barrientos 2007). In a study of Ethiopia's cut flower industry, where most workers are female but male employment is also significant, Mano et al. (2011) point out that the industry created jobs for less-educated people who may be more susceptible to poverty. The study goes on to explore wage differentials in the sector and finds significant male-female wage gaps only among workers who were paid daily or weekly, but the gender gap in earnings does not carry over to employees under monthly payment schemes. Men who are paid monthly, rather than weekly or daily, may have higher starting wages than women who are paid monthly, but over time the gap closes. Nor is there a gender gap in payment among permanent workers and workers with formal contracts (Mano et al. 2011), suggesting that gender inequalities in the sector are mitigated among more permanently employed workers.

While wages have positive effects on women's welfare and empowerment, their time in wage employment may have the opposite effect. Off-farm employment may actually reduce women's

welfare if their workload at home and on the farm is not reduced. In the presence of missing or incomplete markets, there may be few market substitutes for women's household production. Women may still continue to grow food and continue to carry out the majority of reproductive work, including caring for children, cleaning, cooking, and collecting water and fuel, and wage employment may simply increase women's work burden and time poverty. Women's participation in agriculture may have increased, but often that increase is not accompanied by a decrease in women's reproductive and domestic work (Lastarria-Cornhiel 2008). Data from both low-income and upper-income settings indicate that as the gap between the time women and men spend on paid work has diminished, the gap between the time women and men spend on unpaid care work has not diminished nearly as much (in some places hardly at all) (World Bank 2012). Reports suggest that in many countries women provide 85–90% of the time spent on household food processing and preparation (FAO 2011b). Women also provide the bulk of care work for children and the elderly. Although these norms may be shifting over time, it is important to see whether they are shifting as women take on other responsibilities in paid employment, whether as wage workers or as managers and workers on the family farm.

That said, data on women's work in the household, including care work, are very scarce. Clearly there is a need for better integration of time-use data in household and agricultural surveys, as there are no studies exploring how employment in the new non-traditional export crop industries impacts women's household reproductive work. For example, Maertens and Swinnen (2012) provide a good review of the linkages between gender and modern supply chains, but there is a gap in the evidence about their effects on the intra-household division of labor and resources. Maertens and Swinnen conclude that “although modern supply chains are gendered, their growth is associated with reduced gender inequalities in rural areas,” but likely not in terms of care work and household maintenance work.

4.4 Other drivers

Besides male outmigration and the globalization of agri-food systems, a number of other drivers transform rural areas as well as women's roles in agriculture. The list presented here may not be exhaustive, but it is based on the available, even if scarce, evidence in the literature. Some of the factors affect women's roles in agriculture just as male outmigration does—through the loss of able-bodied labor. Diseases that disproportionately afflict men (HIV/AIDS in the past) or lead to women's abandonment because of stigma and high financial and care requirements (HIV/AIDS, or Zika virus leading to child disabilities) leave family members to cope with the loss of the male member. War and conflict also change women's roles through the loss of able-bodied male labor. Disease, war, and conflict may be seen as negative household shocks, and while these factors have some similarities with male outmigration or may in fact influence male outmigration, they differ in that they are linked to no expectations of remittances and incur significant financial costs for women and other family members. Unlike migration, however, disease, war, and conflict offer no remittances to cushion the effects of the lost labor. Prolonged disease may incur significant monetary costs and additional costs in terms of lost labor productivity from other family members who help to care for the sick individual, since most support for ill household members is provided in the household, not in care centers, and it is often women who provide the care (Kipp et al. 2007).

The effects of climate change on women's changing roles in agriculture can also be analyzed in a similar household shock framework. Weather-related disasters or unpredictable weather patterns leading to losses of all or part of the harvest undermine farm households' livelihoods and may

force some members to diversify out of farming, including through migration. Climate change does not affect women's agricultural work only through the male outmigration effect but directly exacerbates women's workloads and time poverty.

Finally, technological innovations and other changes in farming systems may decrease demand for men's labor, leading men to diversify out of agriculture. Labor-saving technologies that can be accessed by poor farmers can free labor for more productive uses and diversification of livelihoods. However, labor-saving technologies that are adopted by large farmers and are not accessible to smaller farmers may displace male labor, leading to a loss in male farming wages that forces men to look for alternative employment, including through migration.¹⁹

The sections that follow provide more details and evidence from the literature on how each of these factors (disease, conflict, climate change, and technologies) change women's roles in agriculture.

4.4.1 Disease

Disease affects households through the loss of income from the affected working-age member, the loss of able-bodied labor, increased medical costs, and higher demand for care from family members. For example, the HIV/AIDS pandemic has had significant negative effects on farm households in many southern African countries, where it has largely affected working-age males and has led to an increased number of female-headed households with high child dependency ratios (Kanyamurwa and Ampek 2007). Poor young and old women in rural communities in southern Africa carry the burden of the disease because of the loss of income from the able-bodied husband or son and the additional care they have to provide to them.²⁰ The effects of disease go beyond the infected individuals and change the lives and livelihoods of family members and whole communities.

Often households affected by HIV/AIDS depend heavily on agriculture (Parker, Jacobsen, and Komwa 2009). When able-bodied family members are infected, women farmers face conflicting demands for their time—they must provide care for the sick and also take care of the farm activities. (Beegle, 2005) finds no evidence of a change in the hours spent in agriculture following the death of a family member, but Onyango et al. (cited in Parker, Jacobsen, and Komwa 2009) find evidence of a 52–65% reduction in labor productivity in households affected by illness or death, even though total labor hours do not change. Total household labor hours may not decrease, however, if the remaining family members, including women, compensate for the lost labor by increasing their hours in agriculture.

The effect of disease on women's role in agriculture is also unique from that of migration because, following the death of the husband, women may need to take over all decisions related to the farm, which may therefore increase the incidence of farm managers among women. Without adequate access to resources, inputs, and technical knowledge, the new women managers may not be able to exercise their decision-making power fully. The significant productivity losses following the death or illness of a family member cited earlier suggest that even though women may take over farming without decreasing total labor hours on the farm,

¹⁹ Technologies can displace women's labor, as examples from South Asia indicate. The effects are particularly severe for poor landless women, whose only source of income is their labor.

²⁰ See (Parker, Jacobsen, & Komwa, 2009)) for a discussion of issues surrounding HIV/AIDS in rural Ugandan communities.

they face significant additional constraints in maintaining the same level of productivity. In addition to having lower access to inputs and resources, families affected by HIV/AIDS face specific social costs, including stigma, which may prevent them from accessing agricultural clubs for technical knowledge (Parker, Jacobsen, and Komwa 2009).

4.4.2 Civil unrest, conflict, and fragility

Large and active conflicts displace large numbers of people, with diverse consequences for women and men. Conflict and war may leave a large share of widows who must provide for household needs. There is limited evidence about the effects of conflict on the feminization of agriculture. For example, Shahriari et al. (2009) argue that the 1992–97 civil war, massive male outmigration, and higher longevity of women in Tajikistan have resulted in an increased number of female-headed households, with the majority of women engaged in agriculture. They do not clearly disentangle the effect of conflict from that of other factors, however, such as male outmigration and even the shorter expected lifespan of men relative to women. In general, it is difficult to disentangle the effects of conflict and fragility from other factors, including failing institutions. Understanding how conflict may affect women and men differently and how it may change their roles is of great importance in many contexts at present. Armed conflicts have led to significant population displacement with potentially significant impacts on traditional norms and institutions. From a gender perspective, women's traditional roles and responsibilities are inadvertently affected by the refugee experience. In refugee camps, rural women are exposed to different people and customs, including urban ways of life, since camps often may be located near urban centers. Some camps provide skills training to women, but regardless of whether they do so, the refugee experience is likely to change women's skills, preferences, and perceptions.²¹ Upon their return to rural areas, women are likely to derive some empowerment from those experiences, but gender-sensitive analyses of such linkages between conflict and agriculture are largely missing.

4.4.3 Climate change

Livelihoods in many developing countries are heavily dependent on rainfed agriculture, which means that climate change will continue to have significant impacts on household food security. Arslan, Belotti, and Lipper (2016) find that highly variable rainfall in the cropping season can reduce maize yields by 15%, and higher temperatures are linked to a yield reduction of approximately 25%. Through its effect on rural livelihoods and poverty, climate change may exacerbate migration and lead to fragility, civil unrest, and conflict. The most recent evidence of this relationship comes from Syria, where an unprecedented drought between 2007 and 2010 provoked massive migration to already crowded Syrian cities, which in turn worsened governance issues and precipitated civil unrest and the devastating civil war (Kelley et al. 2015). Environmental degradation does not lead to war in the absence of other social, political, and cultural factors. Environmental degradation does affect poverty and inequality, however, and in the absence of good governance and good institutions it may exacerbate instability and lead to conflict, particularly in contexts where poverty is high (Raleigh and Urdal 2007). In the wake of the Darfur conflict, climate change emerged as a probable cause of the conflict, but later its role was debunked (Alix-Garcia, Bartlett, and Saah 2013).

²¹ Some studies show an increase in different farming activities, such as dairy and poultry farming, around displacements camps; see Buchanan-Smith and McElhinney (2011), cited in Alix-Garcia, Bartlett, and Saah (2013).

Erratic rainfall patterns and higher temperatures associated with climate change are expected to impact traditional farming practices and ultimately affect women's and men's roles in agriculture. Women and men farmers have different assets to help them respond to climate change. In this sense, women farmers are especially vulnerable to climate change because they tend to have less education, more limited access to extension services, more insecure land rights (Doss et al. 2015; Kieran et al. 2015) that prevent them from investing in their farms, as well as time constraints from bearing the brunt of household reproductive work. Secure rights over land (a key asset) is a central issue. Women's insecure land rights mean that while men may transfer their land through sales or rent it out to pursue other employment opportunities, women may not be able to do the same. Weak land rights also mean that women lack incentives or cannot obtain credit to invest in their land (for instance, by adopting climate-smart technologies). The adoption of soil and water conservation measures often is linked to greater tenure security, placing women at a clear disadvantage.

At the same time, women's responsibility for growing food for household consumption may prevent them from mitigating the risks of climate change by adopting more diversified cropping and labor strategies (including engaging in off-farm employment) (Asfaw, Palma, and Lipper 2016). While men diversify their activities, traditional norms and women's responsibilities in the reproductive sector may constrain women to remain in the subsistence sector, increasing their vulnerability to poverty and dependence on men. Romero González, Belemvire, and Saulière (2011) list climate change as a factor pushing men to look for alternative income-generating activities through migration, leaving women behind to take care of the households and dependent on men's remittances.

Females face the negative consequences of climate change not only on the farm but in the household itself. In many developing and rural areas, women and girls perform most domestic tasks, including collecting water and firewood. In severe droughts, they may have to walk further to find water, suggesting that climate change will affect not only their crop output but their time in agricultural employment, in addition to their leisure time. Poor infrastructure, including poor access to fuel and water for household needs, is not supportive of working women, their economic independence, and their ability to mitigate risks and respond to better income-generating opportunities.

4.4.4 Technological innovations

Technological innovations play an important role in structural transformation, and as new technologies spread, they may change the roles and responsibilities of men and women. Technological innovation will have different effects depending on the farming system. For example, in farming systems where men and women work the same plots but perform different tasks, labor-saving technologies may free men's labor from family agriculture and allow men to diversify out of agriculture, or at least out of the family farms (Abdelali-Martini and Dey de Pryck 2015).²² If such technologies are more likely to be adopted on larger farms than

²² More than one factor is often at play to influence changes in women's and men's role in agriculture. For example, Abdelali-Martini and Dey de Pryck (2015) discuss how productivity-enhancing changes in the organization of farming, technologies that saved on male labor, and new, more labor-intensive crops led to shifts in demand for male and female labor. At the same time, developments in other sectors, including construction and transport in urban areas, increased male outmigration. The authors mention that long-term impoverishment (rather than short-term shocks) led to a significant reduction in the stigmatization of women's off-farm employment, enabling women to

smallholder farms, the demand for male labor may decrease, which would result in feminization of agricultural labor as men are pushed out of agriculture. Mechanization, like the spread of commercial farming, may change women's and men's roles in agriculture by changing the demand for women's or men's labor. Labor-saving technologies will have differentiated impacts on women and men as long as tasks in agriculture are gendered, with some tasks viewed as women's responsibility and others as men's responsibility.

Because technological innovations may displace women's or men's labor, in some instances these innovations may be resisted even if they have the potential to improve productivity. Abdelali-Martini and Dey de Pryck (2015) suggest that women were concerned that they could lose their jobs if technologies to facilitate women's work were introduced. Even among women, the effects of female labor-saving technologies will be mixed and will depend largely on women's type of work in agriculture, socio-economic status, and access to resources. Poor, landless women whose only source of income comes from labor-intensive work on others' farms are likely to be most negatively affected by technologies that decrease demand for their labor. Better-off women who cultivate their own land may experience net benefits from the introduction of female labor-saving technologies if the benefits from adopting the technology outweigh the costs in terms of forgone wages (if they supplement their farm income with wage employment on others' farms) and if the reduction in women's labor contribution to the family farm does not reduce their control of household income. The effects of technologies will also be mitigated by the availability of alternative opportunities for employment in rural areas. In a study in southern Vietnam, Paris and Chi (2005) find that the introduction of a technology that reduces time for tasks generally performed by women had a differential impact on poor landless women and better-off women. The technology increased the better-off women's leisure time and allowed them to take on additional lucrative income-generating activities, while it reduced landless women's incomes and forced them to look for wage employment in neighboring communities. In the absence of alternative job opportunities for women, technologies may exacerbate income inequalities. This point highlights the importance of policies that expand the income-generating activities available for women and men in rural areas.

5. Conclusions and Policy Implications

Considerable discussion surrounds rural transformation and the impacts on family farms, yet an important topic that has received much less attention is the linkages between rural transformation and the increasing roles of women in agriculture in many developing countries across the globe. This review tries to fill that gap by critically assessing the evidence related to women's expanding roles in agriculture, the drivers of that change, and the consequences for women's empowerment.

A review of the available data and literature finds compelling evidence that in various countries around the globe agriculture is feminizing, either because men move out of agriculture or because women engage in different types of agricultural employment. Various factors may promote these changes in women's roles and work in agriculture. Guided by the literature on structural transformation and feminization of agriculture, this review focuses on two main factors—the diversification out of subsistence farming through male outmigration and the

take on wage employment outside the family. These two main development led to the feminization of agriculture—as women stayed to work as unpaid-family labor on the family farms or to engage in agricultural wage employment.

globalization of agri-food systems. The effects of several other factors—pandemic disease, agrotechnologies, conflict, and climate change—on women’s roles in agriculture are discussed as well, but the extent to which they affect women’s agricultural work, either directly or as factors contributing to migration and the need to diversify out of subsistence farming, remains limited, even in geographic terms.

Depending on its drivers and characteristics, agricultural feminization may indeed empower women. There is evidence that male outmigration is linked to higher female autonomy in decision-making, but if migration is unsuccessful and remittances inadequate, women face greater workloads and financial difficulties, leading to women’s disempowerment. Women’s employment in commercial farming can also be a source of empowerment, especially through higher earnings, but if additional employment outside the household is met with little or no reduction in women’s unpaid work in the household, then it can be a source of disempowerment by exacerbating their workload. Unfortunately, studies on how women’s wage employment on commercial farms affects their time in unpaid work and on the family farm are hindered by the lack of quality sex-disaggregated data.

For a better and more accurate evaluation of women’s work in agriculture, better statistics disaggregated by sex and also by the type of agricultural work are needed. Employment data need to account for women’s multiple activities, whether the work is on the family farm or in wage employment, and whether the wage employment is casual or permanent. The data must also include returns from each activity and time spent in the activity. Cross-country comparable statistics are needed to draw more definitive conclusions about women’s status in agriculture. The review recommends that governments strengthen their efforts to collect high-quality, sex-disaggregated data, particularly related to women’s work.

Collect high-quality and timely sex-disaggregated data to monitor women’s and men’s roles and activities in agriculture and welfare

Government should increase their investment in the collection of high-quality, sex-disaggregated statistics to evaluate and monitor trends in women’s and men’s work in agriculture and other sectors, time in unpaid household activities, and welfare. The LSMS-ISA project presents good examples of collecting relevant sex-disaggregated data. These efforts could be improved by including time-use data, and they must be more widespread (including more countries over more years).

Despite their limitations, the statistics and studies that are available provide substantial evidence that in a significant number of countries, women’s roles in agriculture have expanded in recent decades, leading to the feminization of the sector. For that reason, policies must also support women in agriculture by addressing the constraints women face.

Perhaps the greatest contribution of this review is to show the types of important analyses that could be carried out and the valuable insights that could be gleaned with rich, high-quality, sex-disaggregated data on women’s employment and decision-making in agriculture and other activities. For these reasons, the foremost recommendation of this review is for governments to strengthen efforts to collect high-quality, sex-disaggregated data, particularly related to women’s work. Details on that recommendation and additional specific recommendations for policy makers and other development partners follow.

Agricultural policies must focus on improving women's access to physical and financial resources, to rural advisory services, and to improved agricultural technologies that increase farm productivity

In general, women have less access to productive resources and technical knowledge, leading to a significant gender gap in agricultural productivity (Udry 1996; Goldstein and Udry 2008; Peterman et al. 2010; Aguilar et al. 2015; Kilic et al. 2015; Oseni et al. 2015; Slavchevska 2015). As more women take over agricultural production and become the primary supporters of the household, these constraints will have strong implications for household food security and wellbeing. Policies must ensure that women have access to agricultural extension services, physical inputs, and agro-technologies.

Policies must address women's labor constraints

The immediate effect of male outmigration is the loss of able-bodied labor on the farm, leading to a reduction in productivity, a shift to less labor-intensive, less profitable crops, or a reduction in planted area. In theory women can replace the migrant's labor with hired labor, yet in practice women in most developing countries face constraints in hiring and managing male labor. In response, policies need to focus on promoting labor-saving technologies and infrastructure to free women's time for more productive activities.

Policies need to ensure that jobs on commercial farms are decent

Women employed on commercial farms may endure poor working conditions, abuse, exposure to health risks, and low wages. Poor (landless) women with limited alternative sources of income may be particularly vulnerable to exploitation. Governments must protect workers' rights and ensure that all commercial farms offer decent jobs that do not discriminate against women.

Create better rural earning opportunities

Remittances alone cannot transform agricultural production if market formation is inadequate and the condition of the local economy is poor (Wouterse 2010). There is strong evidence that growth of the agricultural sector has the highest potential for alleviating poverty because of the sheer number of poor people engaged in the sector and the strong linkages between the agricultural sector and other sectors in most developing countries. For that reason, policies must focus on expanding investments in rural areas for the development of adequate infrastructure and services, and on enabling smallholder agricultural producers to connect to urban and global markets.

Develop gender-sensitive safety nets

It is important that social safety nets protect women against the depletion of productive assets (such as land and livestock) and against having to engage in casual low-paid work just to sustain the family. A growing body of research assesses the potential of cash transfers to increase smallholders' productivity by reducing their vulnerability to poverty. Among smallholders, households headed by single females are especially vulnerable to poverty and potentially the most likely to benefit from such safety nets.

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Annex A.1: Potential Issues Related to the Proposed Indicators

Indicator 1 and Indicator 2 rely on estimating women's participation in agriculture over time. A few issues deserve attention: the increased visibility of women's work in statistics, the time span necessary to notice significant changes in women's participation in agriculture, subnational or agriculture sub-sector feminization of the labor force, and the potential heterogeneity by age of the feminization of the agricultural labor force.

A1.1: Statistical feminization or the increased visibility of women's work in statistics

An increase in women's participation in agriculture may simply reflect the higher visibility of women's labor owing to better awareness of the role of women and better sex-disaggregated data.²³ For example, in many parts of the world women historically have contributed to family farming, mostly by providing unpaid family labor. More recently, feminist efforts have made huge strides in promoting greater recognition and visibility of the labor provided by women.

Patterns showing the feminization of agriculture may also be attributed to changes in how women's labor force participation (on and off the farm) is measured. Changes in statistical approaches and definitions of agricultural wage employment may provide differing accounts about women's role in agriculture (Deere 2005; Doss 2014; Abdelali-Martini and Dey de Pryck 2015). For example, women's casual and seasonal agricultural labor often is not captured by surveys that ask only for the primary occupation; see Bouzidi, El Nour, and Moumen (2011), cited in Abdelali-Martini and Dey de Pryck (2015). Oya (2013) provides an eye-opening account of how and why agricultural wage employment in sub-Saharan Africa frequently is misunderstood and underestimated.

A1.2: Time span required to track changes in women's participation in agriculture

The other problem that is especially pertinent to Indicator 1 is the relevant time span. National panel data are not widespread, and most of the evidence would need to come from repeated cross-sections. Most recently, efforts to collect panel data for a number of countries in sub-Saharan Africa, including Uganda, Malawi, Tanzania, and Ethiopia, were undertaken by the World Bank's LSMS-ISA project. The LSMS-ISA panel data could be used to analyze how women's participation in agriculture has changed in the last few years, but that time horizon may be too short to detect significant changes. For example, Mu and van de Walle (2011) find evidence of the feminization of agriculture in China only in the late 2000s. Studies using earlier data waves found no such evidence, and Mu and van de Walle (2011) confirm that it was not until 2006 that the gender gap in employment in agriculture started emerging. In the absence of abrupt socioeconomic and structural changes (such as economic crises or conflicts), it may be difficult to observe significant changes in the role of women in agriculture over a short period of time. For meaningful comparisons, it may be necessary to look at data covering a wider time span. The exact timeframe required to talk about a trend is hard to identify a priori, and it is necessary to look at the literature and available data for guidance.

A1.3: Feminization of the agriculture sub-sectors

²³ For a review of statistical methods for measuring women's employment in rural areas and the data issues, see Sender, Oya, and Cramer (2006).

Another issue is that agriculture encompasses a number of subsectors (crop farming, livestock, fishery and aquaculture, and forestry) and while any single agriculture sub-sector may be feminized, agriculture as a whole does not have to be. For example, De Brauw et al (2008) does not find evidence that agriculture in China is feminizing but does note a trend towards the feminization of the livestock sub-sector.

Moreover, agribusinesses in value chains for non-traditional agricultural exports may rely largely on female labor, but females may not dominate the labor force for agriculture as a whole. For example, between 61% and 78% of the labor in Ethiopia's cut flower industry is female (Nigatu 2010), but Palacios-Lopez, Christiaensen, and Kilic (2015) calculate that women provide only about one-third of the labor for crop production in the country. For better understanding of whether and how women's roles in agriculture change, the proposed indicators should be further disaggregated by sector. Unfortunately, data availability may limit the detailed analysis of the feminization of the labor at the agricultural sub-sector level.

A1.4: Differentiating change by age group

Furthermore, it is important to pay attention to whether changes in women's roles in agriculture differ by age group. A common assertion is that interest in agriculture is declining among young people in Africa (Bezu and Holden 2014; Maiga, Christiaensen, and Palacios-Lopez 2015). Palacios-Lopez, Christiaensen, and Kilic (2015) find no evidence of statistically significant gender differences in labor contribution by age group, suggesting that the gender gap in agricultural labor contribution is not larger among younger or older cohorts in a number of countries in Sub-Saharan Africa. In China, however, the feminization of agriculture is driven by younger women (Mu and de Walle, 2011 and De Brauw et al., 2013).

Annex A.2: Country Case Studies

Results of three country case studies (Tajikistan, Nepal, and Malawi) from three regions help to illustrate how factors related to rural transformation can affect women's roles in agriculture. The countries chosen for the case studies are known to have a high concentration of women in agriculture, but little knowledge is available a priori on any changes that may have taken place in women's roles. Nepal has sufficient national data to show that women's share of agricultural labor has increased in recent years, but Tajikistan has only two somewhat recent (2004 and 2008) surveys, which do not offer the longer time series required to confirm a significant increase in the share of female agricultural labor. On the other hand, although women traditionally have played an important role in agriculture in Malawi, women's share in the sector has increased only slightly over the last 20 years, amid concerns that the types of agricultural employment that are expanding will do little to improve women's empowerment and the food security of their households.

Whether feminization of agriculture is a recent trend or has been emerging over the last several decades is of little importance if women's labor continues to be concentrated in the kinds of agricultural work that are poorly remunerated and not conducive to their empowerment. One characteristic of development is a shift from agriculture to industries and services, but in many developing countries women appear less likely than men to gain employment outside agriculture. This disparity indicates the need for specific policies to help achieve greater gender equality and empower women.

A2.1: Tajikistan

Tajikistan is one of the poorest countries outside of sub-Saharan Africa. It gained independence after the collapse of the Soviet Union, but the transition was characterized by a severe economic crisis and a brutal civil war, which displaced a large number of people and claimed the deaths of at least 60,000 men (Shahriari et al. 2009). Following the end of the war in 1997, the economy started recovering, but its economic performance remained far below pre-independence levels. In 2013–14 GDP was approaching its 1989 level, while GDP per capita still lagged significantly at only 68% of GDP per capita in 1989 (World Bank 2015b).

Structural changes in the transitional period and the lack of adequate income-generating opportunities at home are the factors driving massive male outmigration, particularly from rural areas. About 10% of the population is engaged in international migration (Olimova 2010), making remittances an important source of income. Globally, Tajikistan has the highest share of remittances in GDP (43%), followed by Kyrgyz Republic (30.3%) and Nepal (29.2%) (World Bank 2015b).

The massive male outmigration, civil war, and lower male life expectancy increased the number of female-headed households, which constitute almost one-fifth of all households (Shahriari et al. 2009). With other choices and employment opportunities being limited, women came to dominate agriculture. In 2004 and in 2009, women's share in agricultural employment was about 56%. No earlier labor force surveys are available to assess how women's rate of participation in agriculture changed after the collapse of the Soviet Union or the end of the civil war, but the pronounced role of women in agriculture in recent years deserves attention.

Despite women's growing concentration in agriculture, they continue to face significant constraints. Tajikistan has an adequate legal framework for gender equality, yet in practice

traditional sociocultural norms limit women's rights (Brustinow 2014). Women are less knowledgeable about their rights to land and face higher financial and time barriers to get land certificates (Brustinow 2014). Only 4.3% of women, compared to 28.6% of men, have land-use certificates, and as a result women constitute only 17% of landowners (Kieran et al. 2015). Because agriculture offers employment for the majority of economically active women, strengthening women's rights to land is seen as an opportunity to empower women, improve food security, and reduce poverty. But the land reforms may not be sufficient to improve household and women's economic welfare. Women farmers' technical skills, access to finance, and access to input and output markets should also be strengthened (Brustinow 2014). Women's limited autonomy in deciding what to grow on their plots is a key contributor to their lower empowerment relative to men (Brustinow 2014; Malapit et al. 2014).

Aside from being concentrated in the subsistence sector, women have come to dominate the labor force on *dekhan*²⁴ farms (Tandon 2011). The growing concentration of women on *dekhan* farms (in fact, the number of *dekhan* farms run by relatively older women is rising) may strengthen rural women's economic independence but not their empowerment in other spheres, including political and social spheres (Tandon 2011).

Rural Tajik women face significant time burdens that will only be exacerbated by the projected changes in climate. In addition to working for wages on *dekhan* farms and growing food for consumption, women must provide care for the elderly and children and perform competing household chores, including the collection of water and fuel (Tandon 2011; Meurs and Slavchevska 2014). Less than one-third of the population has access to piped water (Barbone, Reva, & Zaidi, 2010; Tandon, 2011), and access to electricity has deteriorated for most of the rural population (Robić et al. 2010).

Despite the increasing demands that household maintenance puts on women's time, a report on women's empowerment in agriculture (based on the WEAI) in Tajikistan finds that workload is a much less significant factor for women's disempowerment in agriculture compared to other factors, including decision-making and autonomy over production decisions, as well as decision-making about access to and use of credit and group membership (Malapit et al. 2014). The findings suggest that even though women are disproportionately represented among agricultural workers, they lack decision-making power and often are relegated to the low-skilled and low-productivity agricultural activities. As in many other developing countries, in Tajikistan the concentration of women in agriculture is a coping strategy rather than an empowering process. Women are pushed into agriculture by increased food insecurity, the limited alternative income-generating opportunities, and the labor shortages generated by male outmigration, the economic crisis, and political instability.

A2.2: Nepal

Agriculture is the main sector of employment for Nepali men and women, but it is more important for women. Agricultural work is the primary activity for almost 66% of working-age women (over 15 years) compared to 53% of working-age men (Indicator 1). Figure A2.1 shows that between 1991 and 2001, the incidence of agricultural employment among both men and

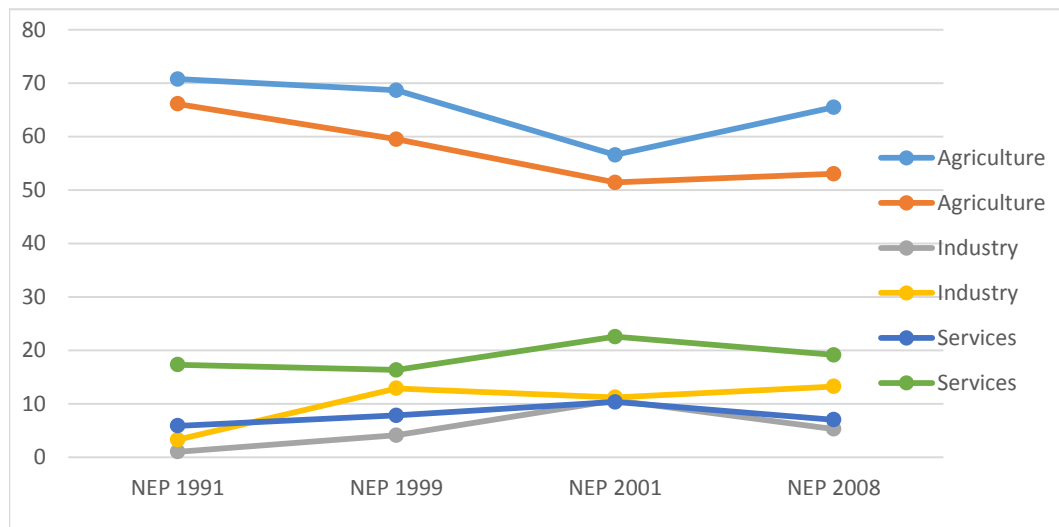
²⁴ "Tajik land reform laws provide for the restructuring of farmland holdings into four different enterprise forms: (1) production cooperatives; (2) joint stock companies (JSC's); (3) lease share enterprises (LSE's); and (4) *dekhan* farms. *Dekhan* farms are the enterprise form most closely resembling private family farms" (Tandon 2011).

women exhibited a downward trend but remained high. The trend reversed direction after 2001 for both men and women, but the increase among women is markedly sharper, implying a feminization of agriculture according to Indicator 1. In the same year, the share of women in agriculture (out of both sexes) was 60.6% (Indicator 2). The national-level data paint an unequivocal picture of an agricultural sector that is increasingly dominated by women.

The key driver behind women's increasing role in agriculture is the inability of subsistence agriculture to provide for basic household needs (Maharjan, Bauer, and Knerr 2012), which pushes households to seek alternative income-generating activities off the farm. In the absence of decent non-farm employment opportunities in rural communities, massive migration of working-age adults has been taking place. Lokshin, Bontch-Osmolovski, and Glinskaya (2010) estimate that one-fifth of the country's poverty reduction in the decade between 1995 and 2004 was linked to migrant remittances. The share of remittances in GDP is 29.2%, one of the highest in the world (World Bank 2015b). Ninety-seven percent of Nepali migrants are men age 15–44 (Lokshin & Glinskaya, 2009a), who leave women behind to take care of the household (Gartaula, Niehof, and Visser 2010). Therefore male outmigration—compounded by discriminatory government policies inhibiting women's migration and gendered ideologies (social norms discouraging women from working away from home, especially in the absence of their husbands)²⁵—is an important driver of the feminization of agriculture in Nepal (Allendorf 2007; Gartaula, Niehof, and Visser 2010; Lokshin and Glinskaya 2009; Maharjan, Bauer, and Knerr 2012; Tamang, Paudel, and Shrestha 2014).

²⁵ See Lokshin and Glinskaya (2009). The Nepal Foreign Employment Act (1985) places some restrictions on women's migration for foreign work. For example, it limits overseas travel by single women and women under age 35. It also prohibits the employment of women in foreign countries unless the women have permission from the Nepali government (Sanghera and Kapur 2000).

Figure A.2.1: Female and male employment in agriculture, industry, and services, Nepal, 1999–2008



Source: World Bank 2015b.

Because men and women perform different tasks on the farm in Nepal, the loss of male labor means that women have to take on tasks that are traditionally men’s, such as plowing, which is taboo in some parts of Nepal (see Nandini 1999, cited in Lokshin and Glinskaya 2009), managing irrigation and other technology, and marketing (Sugden 2014). On the one hand, these new roles have the potential to positively affect women’s agency and empowerment, but on the other, the empowerment effects are determined by the strength of women’s constraints related to ownership rights and access to resources.

In some instances, male outmigration has been linked to changes in farming practices, as increasing numbers of women, left behind to manage the farm, choose to adopt less labor-intensive crops, shorten cropping cycles, reduce the diversity of crops they grow, and even abandon agricultural land (Paudel, Tamang, and Shrestha 2014; Tamang, Paudel, and Shrestha 2014). The evidence for these developments comes from small case studies but deserves attention, as these practices have led to reductions in food production and food security.

Remittances mitigate the effects of the loss of able-bodied labor. In a study of the feminization of agriculture in the hills of Nepal, Maharjan, Bauer, and Knerr (2012) find that when remittances are large they reduce women’s workload and increase their decision-making in the household, whereas low remittances increase women’s workload. While male outmigration has increased women’s autonomy and decision-making about farming, the benefits are higher for better-off women (Maharjan, Bauer, and Knerr 2012), perhaps because poor access to resources does not constrain their decision-making. At the same time, women’s greater decision-making around agriculture does not carry over to non-farm investments, a finding that also emerged in earlier literature covering other regions in Nepal (see Kaspar 2005, cited in Maharjan, Bauer, and Knerr 2012).

As noted, most case studies examining the feminization of Nepali agriculture are based on small samples with limited geographic coverage, so it is difficult to draw conclusions generalizable across the country. Yet taken together, the studies provide strong evidence that women continue

to be active in agriculture following their husbands' migration, but women's work and roles on the farm change significantly.

A2.3: Malawi

As in other sub-Saharan countries, in Malawi women have high levels of labor force participation, with most engaging in some agricultural work, either on their own farms or as wage laborers on other farms and plantations. Data from the 2013 LFS for Malawi show that agriculture is the primary activity for about 54% of all working-age women, compared to about 45% of working-age men (World Bank 2015b). In the last few decades, women's share of agricultural employment has increased only slightly, rising from 56% in the 1980s to 59% in 2010 (FAO 2011b). Women also provide the majority of labor (Indicator 3) in crop production—about 52% of labor hours in all cropping activities (Palacios-Lopez, Christiaensen, and Kilic 2015).

Although women's share of agricultural labor has grown only slightly in the last decades, evidence indicates that their roles in the sector have changed in important ways in response to a number of factors, especially male migration, HIV/AIDS, and poverty resulting from the underperformance of small-scale agriculture. Climate change will not only exacerbate the effects of these factors but may have a unique effect of its own, especially on poor rural women.

Women's dominant role in family farming traces to the beginning of the 20th century, when the colonial economy approved male outmigration to mineral-rich neighboring countries while spouses stayed behind and continued carrying out subsistence agriculture (Bryceson 2006). With independence, women gained opportunities to sell the produce from their agricultural activities and independently control the income, which strengthened their control of the output from their work (Bryceson 2006). In the 1990s, when socioeconomic and political factors at home and abroad halted male outmigration (Bryceson 2006) and curbed remittances, rural poverty grew.

Male outmigration was linked to another factor that precipitated an economic shock in a large number of rural households: HIV/AIDS. The spread of HIV/AIDS along with male migration has played an important role in explaining women's crucial role in agriculture. In 2000 the prevalence of HIV was 16.6% among the working-age population (15–49 years), and although it had dropped to 10% by 2014, Malawi still ranked 9th in the world in terms of high prevalence (World Bank 2015b). The pandemic took a toll on agriculture, both by affecting the labor supply from sick individuals and by diverting the time of some family members from agriculture to care for the sick (Bryceson 2006). To cope with the labor shortage, some households reduced planted area and shifted from labor-intensive crops such as maize to less labor-intensive crops like cassava (Shah et al. 2002, cited in Bryceson 2006). Other households, especially those affected at the peak of the main cropping activities, often had to cope by depleting assets or engaging in *ganyu* (casual) labor (Bryceson 2006). Using a rather unique dataset that contains information on the HIV status of respondents as well as the time use of family members, which was collected when HIV was the leading cause of death among working-age Malawians, Bignami-Van Assche et al. (2011) show that the death of a working-age adult increases the surviving women's time in off-farm wage work by about 2.5 hours. The authors also suggest that *ganyu* often is the only opportunity for households to cope with the income lost and expenses incurred with the death of a prime age family member.

Ganyu labor has become an important source of supplementary income for many smallholder producers in rural Malawi, including women (Bignami-Van Assche et al. 2011). While the majority of working-age women in rural areas continue to engage in subsistence agriculture as a primary activity, a large share also engages in ganyu labor as a secondary activity. Estimates based on data from the 2008 Malawi Welfare Monitoring Survey indicate that about 88% of women compared to 65% of men also engage in ganyu work as a second activity (FAO 2011a). That finding reinforces a conclusion of this review, which is that surveys focusing on the primary activity alone would have missed the range of income-diversifying strategies pursued by women and men in rural areas.

The evidence suggests that ganyu labor, like subsistence agriculture, is dominated by females. Certain factors such as the death of a family member and crop failures may push women into ganyu labor, where they have low bargaining power and high risks of (sexual) exploitation (Bryceson 2006). Ganyu contracts may deepen poverty by reducing the time women spend on their own agricultural production, reducing their accumulation of assets, and increasing their exposure to HIV/AIDS²⁶ (Bryceson 2006).

Another factor expected to exert an increasingly strong effect on rural areas, especially on women in rural areas, is climate change. Malawi has experienced a number of climate-related disasters in recent years, including the 1991/92 drought that affected 6.1 million people across southern Africa and the 2001/02 famine, which was preceded by erratic rains and floods, followed by drought (ActionAid 2006; Potts 2006). Through its effect on smallholder agriculture, climate change is likely to widen the gap between wealthy and poor farmers, pushing the latter into more casual forms of labor. Historical evidence from experience with the 2001/02 famine shows that in response to extreme need, women increased their time in casual wage employment.

At the same time, climate change may affect women's work burden in the reproductive sector and in turn their time in productive work. Using the 2004 Second Integrated Household Survey, which collected time-use information from all family members (over age 4) and is nationally representative, Wodon and Beegle (2006) find that women provide about 10 more hours of labor per week than men (taking into account domestic work and fetching water and fuel). Frequent flooding has been linked to the spread of malaria and cholera, which has caused women to spend more time caring for the sick and less time working their fields (ActionAid 2006).

While the overwhelming majority of studies show that women continue to carry out subsistence farming and to combine subsistence farming with ganyu labor on other farms, the studies involve little discussion about women's empowerment and decision-making. Using data from Malawi's 2013 Integrated Panel Household Survey, which collected sex-disaggregated information on decision-making for each plot on the family farm, this case study develops estimates on women's decision-making in agriculture. The estimates suggest that 21% of all plots surveyed are managed solely by a woman, and 54% are managed jointly by a woman and a male family member, suggesting that women not only supply the labor in agriculture but participate in the management of household plots. Some of women's progress in decision-making may have been gained over a long period of continued involvement in subsistence farming during men's

²⁶ National statistics show that women comprise 60% of people living with HIV in Malawi, and HIV prevalence is higher among women age 15–24 than among males in the same age group (World Bank 2015b).

migration periods. Some progress may also be linked to the fact that a male adult is missing from the household, due to death or migration.