



**Food and Agriculture Organization
of the United Nations**

Sex-Disaggregated Data and Gender Indicators in Agriculture

A Review of Data Gaps and Good Practices

**Publication prepared in the framework of the
Global Strategy to improve Agricultural and Rural Statistics**

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Acronyms and Abbreviations

EDGE	Evidence and Data for Gender Equality
FAO	Food and Agriculture Organization of the United Nations
GAAP	Gender, Agriculture and Assets Project
GAGP	Gender Asset Gap Project
GLRD	Gender and Land Rights Database
GPI	Gender Parity Index
ICATUS	International Classification of Activities for Time-Use Statistics (UNSD)
IFAD	International Fund for Agricultural Development
IFPRI	International Food Policy Research Institute
ILO	International Labour Organization
ILRI	International Livestock Research Institute
LSMS-ISA	Living Standards Measurement Survey – Integrated Surveys on Agriculture
MEXA	Methodological Experiment on Measuring Asset Ownership from a Gender Perspective
MDG	Millennium Development Goal
SDG	Sustainable Development Goal
UNESCO	United Nations Educational, Scientific and Cultural organization
UNICEF	United Nations Children’s Fund
UNSD	United Nations Statistics Division
USAID	United States Agency for International Development
WCA	World Programme for the Census of Agriculture
WEAI	Women’s Empowerment in Agriculture Index

Acknowledgements

The lack of sex-disaggregated data is now a recognized constraint limiting the understanding of agricultural development in developing countries. Such data are required to support the monitoring of gender differences and their effects on agricultural production, and to promote gender equality.

FAO recognizes the value of sex-disaggregated data and gender indicators in agricultural statistics and supports the Global Strategy to Improve Agricultural and Rural Statistics by financing work to increase their availability.

This document reviews the literature on the collection of sex-disaggregated data in agricultural surveys and the agricultural modules of national household surveys in preparation for a guidance document for national statistical institutions. It: i) examines current practices and gaps in collecting sex-disaggregated data and gender indicators in agricultural surveys; ii) summarizes main methods used; and iii) reviews initiatives and proposals.

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Introduction

As part of the Global Strategy to Improve Agricultural and Rural Statistics – the Global Strategy – FAO recognizes that sex-disaggregated data and gender indicators in agriculture constitute an essential element of agricultural statistics.

Statistics on gender in agriculture are in short supply because most of the data are collected at the farm level, and the dynamics in individual farms or agricultural households are not measured. Given the importance of gender gaps with regard to decision-making and access to assets and inputs, the lack of sex-disaggregated data at the individual level is now recognized as a serious constraint affecting the understanding of agriculture in developing countries. Such data help with the monitoring of gender differences and the assessment of their effects on agricultural production, and inform practical recommendations promoting gender equality in agriculture.

For this reason the Global Strategy is preparing a document entitled *Guideline on Mainstreaming Sex-Disaggregated Data and Gender Indicators in Agriculture*. Its objective is to support national statistical institutions in collecting sex-disaggregated data through agricultural surveys and the agricultural modules of national household surveys. In particular, the guideline will:

- establish gender indicators for monitoring gender inequality in agriculture that are comparable among countries and over time; and
- identify the data required and specify the required questions and modules, make recommendations as to data-collection methods and provide computation formulas and tabulations.

The first of the two main arguments for promoting gender equality in agriculture is that gender equality matters in its own right. In 1979 the United Nations General Assembly adopted the Convention on the Elimination of All Forms of Discrimination against Women,¹ and the concept is reflected in international agreements such as the 1995 Beijing Platform of Action, the Millennium Development Goals (MDGs) and the Sustainable Development Goals (SDGs) (see in Box 1.1).

Box 1.1. Millennium Development Goals and Sustainable Development Goals

Target 3.A of MDG 3 – Eliminate gender disparity in primary and secondary education by 2005 and in all levels of education no later than 2015 – emphasises education, but the attached indicators also consider economic and political gender gaps: the second indicator refers to parity in wages in non-agricultural sectors and the third to the proportion of seats in national parliaments (United Nations, 2003). Progress has been made in achieving gender parity in education, but the 2015 MDG Report showed that women are still more vulnerable to poverty than men and they still face discrimination in domains such as public and private decision-making (MDG Report, 2015).

The post-2015 development agenda contains 17 SDGs and 169 targets (United Nations General Assembly Resolution 70/1).

SDG 1 – End poverty in all its forms everywhere – targets equal rights to economic resources and equal access to basic services, ownership and control over land, inheritance, natural resources, technology and financial services.

SDG 2 – End hunger, achieve food security and improved nutrition and promote sustainable agriculture – stresses the importance of gender equality in agriculture by demanding the doubling of “... agricultural productivity and incomes of small-scale food producers, in particular women, [...] including through secure and equal access to land, other productive resources and inputs, knowledge, financial services, markets and opportunities for value addition and non-farm employment.”

SDG 4 – Ensure inclusive and quality education for all and promote lifelong learning – promotes gender equality in education.

SDG 5 – Achieve gender equality and empower all women and girls – is devoted to gender parity and addresses topics such as the valuation of unpaid care and domestic work, equal access to economic resources and equal property rights.

¹ The convention defined gender discrimination as: “[...] any distinction, exclusion or restriction made on the basis of sex which has the effect or purpose of impairing or nullifying the recognition, enjoyment or exercise by women, irrespective of their marital status, on a basis of equality of men and women, of human rights and fundamental freedoms in the political, economic, social, cultural, civil or any other fields.” This definition can be reframed in terms of social justice and welfare theory. According to Sen (2000), what matters for evaluating well-being is the quality of life that individuals are able to achieve. In terms of Sen’s capability approach, gender inequality is a deprivation in capabilities in that women cannot choose between the same functioning combinations as men – for example unequal access to technology and financial services and lower educational attainment. Hence women lack support for the fundamental capabilities of a human being (Nussbaum, 2000 and 2003).

The second argument focuses on gender inequality as a constraint on economic growth and development. Studies such as Klasen (1999) have shown how gender inequality in education and employment directly or indirectly affects economic growth, and the significant role of gender equality in economic development was discussed in Duflo (2011) and King *et al.* (2008):

- Promoting women's education is found to improve children's health (Mason and King, 2000).
- Gender-based inequality in the labour market and in access to productive resources reduces efficiency and productivity; greater access to employment opportunities would enhance women's independence and empowerment and would make women's work more visible – and making women's work visible would in turn increase measured economic output, just as shifting women's labour from domestic work to productive sectors would increase economic output (Klasen and Lamanna, 2009).
- Gender equality tends to reduce fertility (Summers, 1994; Hill and King, 1995; Klasen, 1999 and 2002) and thus increases economic growth through the mechanisms of the demographic transition theory (Herzer *et al.*, 2012).
- Gender inequality affects bargaining in households and leads to inefficient allocation of resources in production (Udry, 1995) or consumption (Hoddinott and Haddad, 1995); Pitt and Khandker, 1998); promoting gender equality may lead to more efficient household decisions and hence foster economic growth and development.

The importance of gender equality in itself and as a vehicle to promote economic growth and development is internationally recognized, but gender equality in agriculture has only a subordinate place in many international agreements. The report of the Beijing Declaration and Platform for Action, for example, identifies gender equality in agriculture only in the context of other objectives such as macroeconomic policies addressing poverty; none of the reports of the four world conferences on women mentions gender equality in agriculture as an objective, and MDG 3 on gender equality does not mention agriculture at all. Article 14 of the *Convention on the Elimination of All Forms of Discrimination against Women*, however, is devoted to agriculture and calls for equal access to resources and technology in agriculture.

There are wide gender gaps in access to and use of resources in many developing countries: because agriculture is the basis of the livelihoods of most poor people, it is crucial to minimize these gender disparities and address the issue of gender equality. The FAO *State of Food and Agriculture 2010-11* stated: "... closing the gender gap in agriculture would produce significant gains for a society by increasing agricultural productivity, reducing poverty and hunger and promoting economic growth." The first Global Conference on Women in Agriculture in New Delhi in 2012 led to the creation of the Gender in Agriculture Partnership, whose members include the Global Forum on Agricultural Research, the Consortium of International Agricultural Research Centres, FAO, the International Fund for Agricultural Development (IFAD) and the World Food Programme. Also in 2012, UN Women, FAO, IFAD and the World Food Programme launched the joint programme "Accelerating Progress towards the Economic Empowerment of Rural Women" to increase the productivity and incomes of women farmers. The SDGs stress the importance of equal access to resources, services and land and call for a doubling of the productivity and incomes of women farmers by 2030. These examples show that awareness of gender inequality in agriculture is rising and increasingly addressed at the international level despite the subordinate role of agriculture in many international agreements.

In some domains, gender gaps are assumed to exist even without empirical evidence. In cases where data are consulted the evidence often rests on insecure foundations such as comparisons between households headed by women and men, and conclusions based on the sex of household heads are often negated by the heterogeneity of households, whether headed by women or men. It is therefore important to distinguish at least between households that are headed by women *de jure* – as a result of divorce, separation or widowhood – and those headed by women *de facto* – even in the presence of husbands. The former are different in terms of structure and socio-economic status from the latter, and indeed from households headed by men, and hence gender analysis based on the sex of the household head has limited validity. More important, comparing these two types of household does not take into account the inequalities between men and women in the household context. Household-level data are hence insufficient to provide information about gender gaps or to inform gender-sensitive policies. More sex-disaggregated data at the individual level are needed to monitor gender gaps in agriculture with a view to establishing policies for gender equity and facilitating economic growth.

The goal of this research in the context of the Global Strategy is to facilitate the mainstreaming of sex-disaggregated data collection in agricultural surveys with a view to developing a guideline document for national institutions collecting sex-disaggregated data in agricultural surveys and establishing comparable indicators for monitoring gender inequalities in agriculture.

Recent initiatives with regard to measuring gender gaps in agriculture include the Women's Empowerment in Agriculture Index (WEAI) and the Gender Asset Gap Project (GAGP). These helped to improve the measurement of the situation of agricultural women, but did not focus on mainstreaming the collection of sex-disaggregated data in large-scale agricultural surveys or national household surveys with an agricultural component: their focus was to provide measures for monitoring project outcomes related to women's empowerment. The present work thus has a specific area of action and does not overlap with other initiatives.

This literature review serves as a preparatory document for the proposed guideline. Chapter 2 summarizes the literature on gender gaps in agriculture and their consequences for development; Chapter 3 outlines the current situation with regard to the collection of sex-disaggregated data; Chapter 4 presents three frameworks for detailed discussion in Chapter 5, which discusses good practices; and Chapter 6 draws conclusions about gender in agricultural indicators and the collection of sex-disaggregated data with a view to informing the proposed guidelines.

The objectives of the guideline and of this literature review are shown in Table 1.1.

Table 1.1 – Objectives of the Guideline and the Literature Review

	Literature review	Guideline
General	Identification of data gaps and good practices.	Support national institutions in the collection and production of sex-disaggregated data through agricultural surveys and agricultural modules of household surveys.
Specific	<ul style="list-style-type: none"> • Identification of gender gaps relevant for the agricultural sector. • Description of current practices and data gaps in agricultural surveys and censuses. • Discussion of the main challenges with regard to the collection of sex-disaggregated data and gender indicators. • Description of good practices. 	<ul style="list-style-type: none"> • Establish gender indicators that: <ul style="list-style-type: none"> i) enable the monitoring of gender inequality in agriculture; ii) inform policy design; and iii) ensure comparability among counties and over time. • Identify the data required to compute the recommended indicators and suggest data-collection methods – in particular: <ul style="list-style-type: none"> - questions and modules; - the appropriate sections of surveys; - and computation formulas and tabulations.

Gender Differences in Agriculture

In spite of women's substantial involvement in agriculture, women farmers tend to be less productive and to earn less than men, largely because they have less access to inputs, seeds and technologies. Women's agricultural roles and status in developing countries differ by country, ethnicity, religion and class; they often face segregation and discrimination in agricultural activities, which may in turn affect perceptions of their contribution to household welfare. It is therefore important to take into account women's traditional roles and domestic responsibilities and the time that has to be allocated to them; social norms in some countries may even exclude women from certain types of activity. This section discusses women's roles in agriculture in developing countries in eight domains: i) human capital; ii) natural capital; iii) physical capital; iv) financial capital; v) social capital; vi) time allocations and work; vii) decision making; and viii) agricultural production.

The discussion is based on a review of methodological and empirical papers, statistical resources and academic articles.

2.1. Human Capital

We use the term "human capital" to indicate educational attainment and agriculture-specific training such as vocational education and extension services.

Education is a basic asset in terms of productive work: the number of years of education is correlated with agricultural productivity (Reimers and Klasen, 2013). Although primary education has expanded substantially in developing countries, large educational gender gaps persist: of the 35 countries in sub-Saharan Africa, for example, 33 experience gender disparity in education (United Nations Children's Fund [UNICEF], 2015). In South Asia and West Asia, 80 percent of out-of-school girls have virtually no possibility of starting school compared with 16 percent of out-of-school boys (UNICEF, 2015). The review by Lockheed et al. (1980) of the education of small farmers and productivity found that education usually had significant positive effects on

productivity. Knowles et al. (2002) used national data to estimate the long-term effect of women's and men's education on output per worker and reconciled evidence in Hill and King (1995), Barro and Lee (1993, 1994) and Klasen (1999, 2002), concluding that the education level of women had a statistically significant positive effect on labour productivity, while the education level of men was lower and its effects uncertain. Estimates in Quisumbing (1996) suggested that productivity would increase by 24 percent if all women farmers received at least one year of primary education.

Extension services influence the adoption of technologies and improve the management of inputs such as crop diversification, fertilizer use and the utilization of modern communication technologies. Studies based on visits by agricultural extension officers have found that women have less access to extension services than men: i) 10 percent of women compared with 27 percent of men in Ethiopia; ii) 19 percent of women compared with 81 percent in Malawi (Gilbert et al., 2002); iii) between 8 percent and 19 percent of households headed by women compared with 29 percent of households headed by men in Karnataka in India; iv) up to 2 percent of households headed by women compared with 12 percent of households headed by men in Ghana (Meinzen-Dick et al., 2011); and v) an average of 1.13 contacts with extension officers for women compared with an average of 2.03 contacts for men in Uganda (Katungi et al., 2008).

There are various reasons for this. Doss (2001) showed that extension services were less likely to reach the poorest farmers, who were in many cases women. In Ghana, extension agents tended to visit farmers with extensive land who had adopted improved technology rather than women farmers (Doss and Morris, 2001). Illiteracy often hampered women's access to productivity training in agriculture (Mehra and Hill-Rojas, 2008), household and care responsibilities limited women's time for training, and gender norms tended to constrain women's participation (Peterman et al., 2010; Waddington et al., 2014; Doss and Morris, 2001; Doss, 2001). And women had less access to information about extension services than men and were less likely to understand it because their educational attainment and literacy levels were lower (Doss, 2001).

Lessons Learned

Gender gaps in human capital are a significant barrier to improving women's agricultural productivity, as shown in numerous case studies.

Gender gaps in access to formal education are well understood and monitored, but attention has recently shifted from school enrolment and attendance to quality of education. Gender-disaggregated information about quality differences in education is limited in the agricultural and other sectors.

The evidence on gender disparities in extension services indicates two data and information gaps. First, the evidence on unequal access to extension services relies on comparisons based on the sex of the household head: because such comparisons are, as discussed, likely produce biased gender statistics, sex-disaggregated data collection is essential. Second, the question arises as to ways of ensuring that extension agents cater for the needs of women farmers, who frequently have fewer assets and inputs: more information about the targeting strategies of extension agents and the challenges experienced by women farmers is needed to ensure the roll-out of extension-service policies that favour women or at least do not discriminate against them.

2.2. Natural capital

Natural capital refers to assets such as land, water, and livestock that constitute primary production factors for agricultural activities. Unequal access to or control over natural resources limits women's productivity and reduces their income-generating potential and their bargaining power in the household, which has significant implications for individual, household and aggregate income. Security of land tenure can be crucial for the food security and even subsistence of women and their children in cases of divorce or the death of a spouse: in particular, land provides collateral for credit and protection during emergencies and can hence support financial security. It follows that women's limited land rights often imply reduced rights to productive means, reduced access to safety nets and reduced economic security (Assan, 2014).

Because land is a fundamental asset in agricultural production, unequal land rights are often regarded as the central gender gap. This was clearly reflected in Deere and León (2003), Allendorf (2007) and Doss *et al.* (2015). The evidence showed that women owned very little land worldwide (Allendorf, 2007): data

available in the FAO Gender and Land Rights Database (GLRD) show that women constitute only 26 percent of agricultural landowners.²

Fletschner (2000) emphasized that agrarian and civil codes in some countries restrict women's access to and control over property. In Brazil, Bolivia, Chile, the Dominican Republic and Peru, married women were until recently unable to sell, buy or rent land. Studies in Assan (2014) showed that women were restricted in terms of land ownership in southern Africa by legal barriers and customs: in rural Zimbabwe, for example, women did not receive a share of household land when they divorced, and customary laws prevented land from being inherited by widows (Horrell and Krishnan, 2007). Empirical evidence from Akwapim South District of the Eastern region of Ghana indicated that women left their land fallow for shorter periods than men because they were less confident of their tenure rights (Goldstein and Udry, 2008). Agrarian reforms often allocate land to "household heads", which in many cases are men.

Gender-based disparity in land ownership is severe. Sex-disaggregated data for land ownership is only available for a few countries in the FAO Gender and Land Rights Database³ or the DHS Beta STATcompiler;⁴ no other database compiles sex-disaggregated land ownership indicators. There is hence an urgent need to collect individual-level data to improve understanding of the gender gap in agricultural land ownership.

It is often difficult to assess the quality of the land available to men and women with the available data. A simple count of units of land by sex is informative, but every unit of land is treated equally irrespective of its size or value (Doss *et al.*, 2015). It is obvious that more crops can be grown on bigger fields and that the quality of crops grown on fertile land is better, and that both lead to higher incomes, so data on the quality and extent of land holdings would help researchers to understand gender gaps in agricultural productivity and hence the quality and extent of land that needs to be documented. Doss *et al.* (2015) emphasized the importance of standardizing methods and definitions related to land ownership to inform advocacy and policies (see Chapter 5).

² The figure refers to reported or documented ownership of any land owned individually or jointly; it is based on 11 African, Asian, and Latin American countries. See http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=1162

³ See: <http://www.fao.org/gender-landrights-database/data-map/statistics/en/>

⁴ See: <http://beta.statcompiler.com/> Data are drawn from demographic and health surveys and do not necessarily refer to agricultural land.

Livestock constitute an important asset for rural women, who can acquire livestock more easily than land or other assets (Herrero et al., 2013). Women farmers in Zimbabwe, for example, have stated that ownership of cattle is an advantage because the animals provide power for ploughing, land clearing and transport and are hence an entry point into agricultural production (Mupawaenda et al., 2009). Gender disparities are still evident, however. The Rural Income-Generating Activities (RIGA) database indicated that households headed by women have smaller livestock holdings on average than households headed by men (FAO, 2011): this was particularly evident in Bangladesh, Ghana and Nigeria, where households headed by men were three times more likely to have livestock than households headed by women. Social class, religious systems and paternalistic cultures often restrict women's ownership of large animals (Assan, 2014), and according to FAO (2009) women were more likely to own poultry and small animals than large ones. In Ghana, 6 percent of men owned large livestock, but only 1 percent of women; in Uganda, 11 percent of men owned a large animal, but only 8 percent of women did so (Doss et al., 2012). Findings in Botswana showed that men farmers owned three times more cattle and donkeys and five times more horses than women farmers (Oladele and Monkhei, 2008); in Kenya and Tanzania men owned 10 times more cattle and 18 times more horses than women (Njuki and Mburu, 2013).

Animals tended by women are frequently registered in husbands' names, which prevents women from using them as collateral (Chawatama et al., 2005). Men and women also own different breeds: men tended to own more improved animals than women in dairy production in Kenya, and in Rwanda 45 percent of men farmers owned exotic cattle compared with 32 percent of women farmers (Herrero et al., 2013).

Lessons Learned

Even though gender gaps in land and livestock are regarded as important, there is little information as to their extent and severity and it is often not spatially or temporally comparable. More detailed data on ownership and rights to agricultural land and on land quality and extent are required. Data on livestock ownership are also lacking: many databases and analyses rely at least partially on information about household heads and hence fail to provide an accurate account of livestock ownership (see Box 5.6). To compile meaningful gender statistics in relation to livestock, sex-disaggregated household-level data on

livestock ownership must be collected to show the differences between men and women.

2.3. Physical Capital

Physical capital refers to capital assets such as machinery and vehicles and equipment and inputs such as tools, seeds, irrigation and fertilizer, and information and communications technology (ICT). Women farmers often have less access to physical assets because savings or external funds are needed to buy them. But physical assets are essential for efficient agricultural production, and hence inequalities with regard to access or use affect agricultural output and individual incomes. According to Kilic et al. (2014), 80 percent of the gender gap in agricultural productivity in Malawi can be attributed to differences in agricultural inputs. Saito et al. (1994) used survey data to show that women farmers in Kenya owned 18 percent less in terms of tools and equipment than men farmers. Even when women live in households that own or have access to agricultural equipment, they may not have access to the assets and hence may be unable to use them for timely planting and harvesting (Peterman et al., 2010).

Vehicles and roads have great potential in terms of increasing women's productivity and hence allowing more time for agricultural work (World Bank, 1999). In some rural areas in Africa, for example, women were shown to devote three times as much time to transport than men: they spent 0.9 to 2.2 hours per day collecting water and firewood (Malmberg Calvo, 1994) and up to 23 percent of their working time on transport (Barwell, 1996). Vehicles and roads increase productivity by saving time, and also facilitate access to markets and participation in farmers' meetings. But in most developing countries women have limited access to transport options compared with men (Riverson et al., 2005): a case study in Uganda showed that only 7 percent of coffee transactions in a market involved households headed by women compared with 15 percent involving households headed by men, because men were more likely to own a bicycle and could hence reach the market more easily than the women (FAO, 2011).

As noted above, gender comparisons based on the sex of household heads provide only a partial view of the gender gaps, whereas individual-level data would enable accurate quantification of gender disparities in access to transport. Greater attention needs to be given to improving women's access to markets: a

positive example emerged from a project by the World Bank and the Inter-American Development Bank in Peru in which women and men were consulted about improving 3,000 km of tracks, which led to increased participation by women in markets and confirmation by 43 percent of the beneficiaries that the improved roads increased income-earning opportunities (World Bank, FAO and IFAD, 2009).

Technology helps to improve the quality and quantity of agricultural output and reduces harvest and post-harvest losses (Gender, Agriculture and Assets Project [GAAP], 2014). Seed variety, pesticide controls and fertilizer use are crucial for productive farming – but women tend to make less use of technology because they find it difficult to access, and women’s crops and livestock are low research priorities (Mehra and Hill-Rojas, 2008). In Malawi, northern Nigeria, Niger and Uganda, for example, women use less fertilizer than men and consequently produce less (O’Sullivan et al., 2014). Rural women often have difficulty in accessing irrigated land because they have little political or social power: in Kenya and Tanzania, for example, women farmers bought only 18 percent of irrigation pumps in 2005 and 6 percent in 2013 (Njuki et al., 2014). Women in many developing countries are perceived as unable to contribute to the maintenance of irrigation systems, which exacerbates their difficulties in obtaining water. The right to use water for irrigation is frequently considered to be limited to men (IFAD, 2001). Even when women obtain the use of irrigated land, they may end up losing it: in Kenya, for example, women usually had to pay men for access to irrigation water, and in Burkina Faso women could often only borrow irrigated land during dry seasons (IFAD, 2001).

Even if men and women had the same access to technology, the ways in which they used it would vary according to complementary assets such as education, credit or land. Evidence from Ghana showed that gender differences in access to complementary inputs led to gender differences in the adoption of modern maize varieties and chemical fertilizers (Doss and Morris, 2001). A study in Ethiopia and Tanzania showed that women farmers were more likely to use low-quality fertilizers, applying them at the wrong times or incorrectly. Women farmers in Nepal were more likely than men to use pesticides incorrectly because they did not know how to apply them correctly (Peterman et al., 2010).

Access through ICT to the information required for producing, buying and selling agricultural products and acquiring modern farming technologies is crucial, particularly for women farmers, in that it results in productivity gains (Peterman et al., 2010). But there is a gender gap favouring men farmers in access to ICT. Women in developing countries were 21 percent less likely to own a mobile phone than men (GSMA Development Fund, 2010): in Africa the figure was 23 percent, in the Middle East 24 percent and in South Asia 37 percent. There are also gaps with regard to other communication technologies: a survey in 17 African countries, for example, showed that men listened to the radio more regularly than women (Gillwald et al., 2010).

There are many reasons for women's unequal access to and use of ICT, often attributable to unequal access to factors enhancing ICT access and usage (Gillwald et al., 2010). Studies in developing countries have found that time constraints affecting women limit their use of telecommunication centres (Hafkin and Taggart, 2001). Social norms affecting women's use of technology and their presence in public facilities further restricted their access to ICT (Hafkin, 2002). Low educational levels and lack of income to purchase mechanical tools have also been highlighted as factors limiting women's use of ICT (Hafkin and Odame, 2002; Hafkin and Taggart, 2001). As technologies become more sophisticated and expensive, rural women need greater financial means to access them – but their incomes and savings have been shown to be often insufficient or controlled by men (Gillwald et al., 2010). Sulaiman et al. (2011) found that rural women in India were unable to make use of new information and knowledge, even when ICT was accessible to them, as a result of lack of personal networks and financial support.

Few comparable statistics are available on women and men farmers' access to or use of productivity-enhancing ICT. Information as to the use of some ICT systems is accessible, but it is limited and not specific to the agricultural context. There is no evidence as to the types of productivity-enhancing ICTs preferred by men and women farmers, and only limited evidence with regard to the effect of ICT on agricultural productivity. If detailed and accurate data were available, policy-makers would be able to improve women farmers' access to ICT and hence increase their productivity.

Lessons Learned

The gender gaps in access to physical capital must be understood in order to account for the differences in agricultural activities and proceeds. But most of the information on this issue derives from case studies from which

generalizations are not easily drawn, and large-scale national surveys do not regularly pick up the issue in a comparable manner.

The evidence presented here reflects the limited research into the technology and input needs of women farmers and distribution channels that would ensure that they used ICT correctly, even though there is a large body of literature dealing with productivity gains from technology and input adoption in agriculture.

2.4. Financial Capital

Financial capital in the agricultural context refers to financial services such as credit, savings and insurance. Credits enable productive investments when the upfront costs are high; insurance addresses the risk of income losses as a result of illness, extreme weather and natural disasters; and savings can provide the means for productive investments or a cushion for unexpected losses.

The evidence shows that take-up of financial services is not gender-neutral (Fletschner and Kenney, 2014; FAO, 2011). The Agricultural Credit institution in Jamaica, for example, granted only 5 percent of loans to women farmers (Antonopoulos, 2013); in Nigeria only 5 percent of women obtained formal credit, and in Kenya only 4 percent did so (Saito et al. (1994). In Madagascar the share of rural households headed by women using credit was 9 percentage points less than the share of households headed by men (FAO, 2011). Similar patterns have been observed in rural Paraguay, where 23 percent of women were credit-constrained compared with 17 percent of their husbands (Fletschner, 2008b). Even when women obtain loans, the amount received is often insubstantial and they rarely retain control over the use of the loan: 92 percent of women in Progreso,⁵ for example, received loans of less than US\$ 1,000 (Fletschner, 2000), and women in Bangladesh retained full or significant control of loans in only 37 percent of the cases observed (Goetz and Gupta, 1996).

Women often face credit constraints because they have less access to information than men and hence may be unaware of available funding. Studies in Fletschner and Kenney (2011) indicated that rural women in Paraguay were

⁵ A credit union created in 1969 in Ecuador; it is an open-bond cooperative with an urban clientele of 30,000.

15 percent to 21 percent less informed about financial institutions than men. In many societies discrimination by private and public lenders and legal barriers prevent women from using financial services. Frequently, women lacked the collateral to take out loans or depend on their spouse's support (Fletschner and Kenney, 2014; FAO, 2011). Other constraints limiting women's uptake of financial services include high travel costs, low literacy and lack of experience with financial institutions (Fletschner, 2008b).

There is evidence that women tend to take up financial services with characteristics different from those used by men. Women tend to prefer financial products that provide secure savings, loans that do not put assets at risk and insurance against risks, possibly because they are more vulnerable to shocks than men (Fletschner and Kenney, 2011) and because they tend to be more risk-averse than men (Charness and Gneezy, 2012).

Lessons Learned

Gender differences in access to credit are recognized as a major constraint to women's agricultural productivity. But there is little information about gender gaps in access to finance, and it relies largely on statistics based on household heads. Such data are not a valid base for comparing men and women farmers, so there is an urgent need for individual-level data. The available data rarely show whether financial capital is used for investments in agriculture, so it is important to acquire data on access by men and women farmers to agriculture-specific credit and their use of other types of credit for agricultural activities. There is also a need to understand how different types of credit affect agricultural productivity. Such improved data and statistics would enable identification of the financial needs of women farmers with a view to closing the gender gap.

2.5. Social Capital

Social capital in agriculture refers to institutions that promote productivity and sales. They include organizations where farmers can obtain agricultural services and knowledge about market rules and customs, which in turn enhances sales and earnings.

Agricultural organizations and farmers' associations have been important in the agricultural sector for decades, particularly for smallholders. In the 1960s and

1970s they were often state-run and membership was often mandatory, but independent farmers' groups now have a significant role in facilitating the creation of business networks and promoting productivity through the exchange of knowledge and the supply of credit and extension services.

Women's participation in these organizations is relatively low and varies by country and agricultural sector: dairy cooperatives, for example, are slightly more gender-inclusive than other farmers' organizations (Meinzen-Dick et al., 2011). A result of this under-representation is that most women cannot profit from the benefits of membership in these organizations such as credit, education, sales opportunities and innovations. The discussion of extension services in section 2.1 highlighted the link between gender gaps in access to knowledge and technology and in participation in farmers' groups.

A major constraint to women's participation in such networks is the widespread perception of women as homemakers and mothers, as a result of which they are not seen as equal and active members of cooperatives dominated by men. Such gender stereotyping means that women's time tends to be spent on domestic responsibilities, often at the expense of participation in networking activities. This may result from cultural barriers preventing women from using public transport or travelling alone away from home, as discussed in section 2.3. Institutional regulations sometimes admit only one member of a household, usually the man, and it is often the case that the requirements for joining a cooperative or obtaining services involve land ownership and the means to invest in technological innovations. Because women are less likely to own land or other productive resources, they tend to be invisible to services provided by these organizations. Hence even if institutions do not discriminate directly against women, laws restricting the ownership of private property indirectly prevent their participation (Nippierd, 1999). The education gap between men and women is also important in this context: poorly educated women are likely to be at a disadvantage in obtaining services, as discussed above. These processes constitute a vicious cycle that exacerbates existing gender gaps.

The exclusion of women from business networks applies particularly to developing countries. In western Europe, for example, women are fully integrated into agricultural associations. A way to give women better access to agricultural organizations in developing countries is to establish women-only groups: a case study in China showed that women set up their own groups to exchange knowledge, obtain institutional support and even participate in organizations dominated by men (Song et al., 2009).

Access to markets is crucial in enabling farmers to sell their products and generate income. But women's access to markets is often limited, and their marketing and control of the proceeds is hence constrained: in southern Cameroon, for example, the cocoa sector is entirely controlled by men (Kumase et al., 2010). In northern Afghanistan men are usually in charge of selling produce in markets and women tend to work in isolation as a result, which prevents them from building their own market networks (Grace, 2004). In remote areas the availability of vehicles significantly affects accessibility and efficiency (Ajiboye, 1994), but because women farmers are disadvantaged in this respect (see section 2.3) their access to markets is constrained.

Household dynamics may limit women's opportunities to sell their produce at markets: a study in Tanzania by Barham and Chitemi (2008) showed that when women traded on their own in markets they were sometimes suspected of withholding money from their husbands. Women farmers in Cameroon tended to have less bargaining power than men and therefore received lower prices for their produce (Banerjee et al., 2014).

It is important for all farmers, and particularly women farmers, to organize themselves into producer organizations to remove these limitations and enable women to overcome high transaction costs, limited production, poor access to resources and a lack of individual bargaining power (World Bank, 2009). But women farmers' groups were less successful than men's groups in accessing new markets for their products (Quisumbing and Pandolfelli 2010), often because companies traditionally approach men.

Lessons Learned

Limited access to networks and producers' organizations appears to reduce the productivity of women farmers, but most information is based on specific case studies. It is therefore important to obtain from women farmers themselves the missing information as to the causes of their non-participation before implementing policies such as women-only groups.

Similarly, limited access to markets appears to constrain women's control over the proceeds of sales and limit their bargaining power, but there are significant knowledge gaps. Some studies suggest that women receive lower prices for their produce than men, but the extent of this phenomenon and its drivers are not clear. Too little is known about the factors and barriers affecting women's

participation in marketing. In some cases, women rely on men to market goods on their behalf, but the reasons for this are not clear. And women's access to input and labour markets has not been studied in sufficient detail: if women have less access to input or labour markets than men, their agricultural productivity may be seriously constrained.

2.6. Time use and work

Accounting for people's use of their time enables us to understand the differences between men and women with regard to time devoted to paid and unpaid activities, production of goods and services for own use, production of crops for marketing and on-farm and off-farm work.

Such studies show that women typically work more hours per day than men when unpaid domestic work is taken into account (Abdourahman, 2010). The difference in workload is considerably larger in rural areas and among poor households (Ilahi, 2000; Antonopoulos, 2008), and in some countries the inequality between sexes is particularly striking: data from Benin, for example, showed that women worked 40 percent more than men (Antonopoulos, 2008).

Women tend to be more time-constrained than men because they bear a double burden of income-generating activities and domestic work such as fetching water and firewood, preparing household meals and caring for children and the sick. Women's contribution to income-generating activities often takes the form of unpaid household work, whereas men are usually engaged in paid work (Bourmpoula, 2012). In 30 developing and developed countries the World Bank (2011) reported that women carried out between 59 percent and 86 percent of housework and between 10 percent and 42 percent of market-related activities.

This division of tasks tends to make women more vulnerable to poverty (Blackden and Wodon, 2006): unskilled women in South Africa, for example, had to work four hours longer than unskilled men to earn enough to stay above the poverty line (Antonopoulos, 2007). Time constraints also prevent girls from going to school when they have to care for siblings and help with household chores (Abdourahman, 2010): this affects girls from an early age and has the effect of passing on traditional gender roles to future generations.

But women's extensive workload tends to be underestimated because unpaid and domestic tasks are not recorded and are often not considered to be "work" at all (Abdourahman, 2010) – but when the time spent on all activities including

unpaid work, domestic work and subsistence farming activities is taken into account, women are more often time-poor than men.⁶

Women not only make up a smaller share of the labour force than men because they have to devote time to traditional domestic roles, they also have less time to spend on education or searching for work, which reduces the likelihood of employment (Floro and Komatsu, 2011). Women account on average for 43 percent of the agricultural labour force in developing countries, but the share varies considerably by country and region: in Latin America the share is less than 20 percent, but it is more than 50 percent in parts of Asia and Africa (FAO, 2014).

The division of labour between men and women also tends to be unequal: women are usually responsible for labour-intensive and unskilled work such as picking, processing, sorting or packing, whereas men carry out tasks that need strength or involve machinery (Lastarria-Cornhiel, 2008). Men also dominate scarce permanent jobs, whereas women are mostly employed on an informal or occasional basis; and permanent jobs often provide training, from which women are hence excluded (Lastarria-Cornhiel, 2008).

An example of sex-segregation in employment is contract farming in Africa, in which women tended to dominate crop production whereas men occupied the better-paid and less labour-intensive jobs (Bijman, 2008). Because contract farming makes traditional women's crops more lucrative, there is a danger of men taking over women's cropland or retaining the proceeds of crop sales (Dolan, 2001).

As a result of these inequalities and occupational segregation, women tend to earn lower wages than men and are more often paid at piecework rates (Kabeer, 2005). Evidence from Pakistan shows that poor women are more vulnerable to discrimination, which suggests that wage discrimination in developing countries is likely to be high (World Bank, 2011). Much of the segregation is attributable to women's domestic responsibilities, which makes them choose flexible or unskilled jobs that generally pay low wages (World Bank, 2011).

In many African and Latin American countries, paid work increased women's control over their income: in Ecuador, for example, 80 percent of the women

⁶ "Time poverty" means that individuals have little time to spend as they wish; this often applies to women.

working in flower production decided how to spend their wages (Dolan and Sorby, 2003). Rural women taking up paid non-agricultural work seem to be more empowered than those involved in paid agricultural work: this is because women often migrate to other places to take on non-agricultural jobs and are hence more likely to emancipate themselves from family and community pressures (Kabeer, 2005). Some studies challenge these findings, however, and emphasize that working conditions in such cases are usually poor and that many women work informally (Kabeer, 2005).

Because time poverty and income poverty often go hand in hand, women should be enabled to free themselves from the burden of domestic chores and devote more time to paid activities. One means of achieving this may be to expand the availability of care for elderly and sick family members, thereby freeing women's time for paid work (Ilahi, 2000). Other studies have shown that providing childcare, for example in pre-school facilities, increased women's participation in the workforce (Cassirer and Addati, 2007; Bourmpoula, 2012); and in India day-care for children aged between 3 and 6 is freely available in most villages, which enables women to earn incomes (Chudasama et al., 2015). In rural areas of developing countries, improvements to transport systems have been shown reduce the time spent collecting water and firewood (Blackden and Wodon, 2006; Ilahi, 2000); in South Africa, household electrification increased women's share in the labour force by 9 percent (Dinkelman, 2011). Ilahi (2000) stated that a change in social norms and women's preferences is required to enable women to redistribute their time.

Lessons Learned

This discussion has shown that many women in developing countries are subject to an extensive workload, much of which is neither recorded nor remunerated, and that the traditional allocation of household tasks limits women's employment opportunities and their ability to concentrate on agricultural work, and increases their vulnerability to poverty. There are, however, many data gaps and unresolved issues.

The first step in promoting gender equality in terms of workload and employment is to collect data on the working hours of men and women, including unpaid and domestic work, with a view to establishing sex-disaggregated statistics on total workload and its main components, in the light of which areas for policy interventions can be identified. This could involve impact evaluations examining the role of external caregiving, improved household and community infrastructures and redistributions of workloads

within households to increase the opportunities for women to engage in productive work and earn incomes. It will also be important to investigate the relationship between girls' time poverty, school enrolment and professional success later in life.

2.7. Decision-making

Decision-making in agriculture generally refers to decision-making power over: i) the use of productive resources and inputs; ii) the use of credit; iii) participation in agricultural associations; and iv) farming activities in general and the marketing of agricultural produce in particular. Decision-making is not limited to resources owned by individuals: it also refers to resources owned collectively.

For many women farmers, access to and use of resources does not guarantee control over resources, produce or incomes. Studies in Guatemala, for example, showed that even if women carried out nearly all the tasks involved in the production of cash crops, men made most of the decisions, marketed the produce and controlled the income (Lastarria-Cornhiel, 2008). In rural Colombia, men usually made decisions regarding the production and sale of agricultural products and the allocation of resources, whereas women typically made decisions regarding the raising of small animals, food preparation and household management (Fletschner, 2000). In Malawi, women tended to make half of the decisions about crops that did not need fertilizer but only 10 percent of the decisions about crops that needed fertilizer (World Bank and Government of Malawi, 2007). In Uganda in the late 1990s, men controlled 90 percent of the income from vanilla production (Lastarria-Cornhiel, 2008); and in Kenya men held 90 percent of the export contracts for French beans and received the related payments, even though most of the crop was cultivated on land farmed by women, who accounted for three quarters of the labour force but who received only 38 percent of the income generated (Lastarria-Cornhiel, 2008).

A number of studies have found that if a household is headed by a women, she has greater decision-making power and control (Horrell and Krishnan, 2007). In Zimbabwe, for example, 48 percent of sale decisions were made by wives in households headed by men but they kept the proceeds in only 78 percent of the cases, whereas women household heads exercised greater control and made 88 percent of sale decisions and kept 100 percent of the proceeds (Horrell and Krishnan, 2007). De Brauw (2015) took women's management of plots as a measure of their empowerment and found that women "controlled" 30 percent

of all plots in northern Mozambique, of which they “managed” about 70 percent, where “control” is defined as operational responsibilities such as the sale of crops, and “management” is defined as decision-making power as to what to grow on each plot. Peterman *et al.* (2010), however, suggest that the sex of the household head is not a sound indication of women’s decision-making: in rural Zimbabwe, for example, men are the agricultural decision-makers even in households headed by women; and data from rural Colombia showed that 19.1 percent of women made production decisions even though 18.1 percent of women were household heads (Fletschner, 2000).

Women’s lack of decision-making power is often related to other gender gaps: the exclusion of women farmers from decision-making is often as result of responsibility for domestic activities such as childcare and household work (Lastarria-Cornhiel, 2008), and of illiteracy, low levels of education and social norms regarding women’s behaviour and tasks.

Lessons Learned

Women’s limited decision-making power is documented in case studies, but its drivers are less clear and are likely to vary by context; nationally representative data are rarely available. The effect of women’s limited influence on agricultural output and productivity for different types of households remains unclear.

2.8. Productivity⁷

Understanding gender differences in agricultural productivity has been the focus of considerable research over the past two decades. Most studies focus on gender differences in crop production⁸ and largely neglect gender differences in productivity in the livestock and forestry sectors⁹. The focus on crop production is partly motivated by the available data and partly by the fact that in many developing countries the crop sector comprises the largest share of agriculture.

Most of the evidence about gender gaps in agricultural productivity comes from sub-Saharan Africa, where men and women in the same household often farm different plots. This enables researchers to check for gender gaps in productivity in and between households.

⁷ This section was written by Vanya Slavchevska, Economist, FAO.

⁸ Differences in agricultural productivity or, more correctly, differences in the productivity of crop plots, are generally measured at the plot level because decision-makers are also identified at the plot level.

⁹ Plots of permanent crops are often excluded from analyses of gender gaps in agriculture.

A widely cited study of the issue is Udry's 1996 exploration of gender differences in agricultural productivity in Burkina Faso. The author used extensive data on household agricultural activities, but the sample of 150 households in six villages in three provinces was small and geographically limited.¹⁰ The author concluded that even in the same households and for the same crops, plots managed by women yielded less than plots managed by men. He linked the difference to the lower allocation of labour and fertilizer to women's plots compared with men's plots, and concluded that households could improve agricultural output by relocating inputs from men's to women's plots or by relocating land from women to men.

A number of studies since then have investigated gender gaps in agricultural productivity in various countries. Some concluded that women farmers were as productive as men farmers when differences in access to productive resources and tenure security are taken into account (Akresh, 2005; Chavas et al., 2005; FAO, 2011; Githinji et al., 2011); Goldstein and Udry, 2008; Saito et al., 1994). Other studies show that even when controls for inputs were applied, a gender gap in agricultural productivity remained (Saito et al., 1994; Udry, 1996; Quisumbing et al., 2001; Peterman et al., 2011). These studies are not without limitations.

Until recently, plot-level studies have relied on small samples with limited geographic representation and nationally representative surveys did not often include a list of plots and did not account for all decision-makers in households. An exception was Akresh (2008), who attempted to replicate Udry's analysis using a nationally representative plot-level dataset for Burkina Faso and also found a significant gender gap in productivity, but only in the areas studied by Udry, and could not find evidence of a gender gap in households in the rest of the country. The two studies point to the need for nationally representative plot-level data to enable accurate accounts of gender differences in productivity in households and across regions in the same country.

The Living Standards Measurement Study–Integrated Surveys of Agriculture data led to several studies that revisited the issues around gender differences in agricultural productivity.¹¹ Using decomposition methods, which are popular in the labour literature, the studies set out to explain which part of the gender gap in productivity was a result of differences in production factors – land,

¹⁰ The households were visited several times over four years, giving 432 household-years of observation and usable information for 4,655 plots.

¹¹ Kilic *et al.* (2015), Malawi; Oseni *et al.* (2015), Nigeria; Ali *et al.* (2015), Uganda; Aguilar *et al.* (2015), Ethiopia; Slavchevska (2015), Tanzania; OSullivan *et al.* (2014).

labour, fertilizer and mechanization – and which was a result of differences in the returns from the factors of production:

- In Malawi, Kilic et al. (2015) found that plots managed by women were on average 25 percent less productive than those managed by men, and that 82 percent of the gap was a result of gender differences in the quantities of inputs – particularly family labour supplied by men, adoption of export crops and access to agricultural machinery and fertilizer; the remaining 18 percent of the gap was a result of differences in the returns from inputs such as men’s household labour, inorganic fertilizer and the child dependency ratio.
- In Nigeria, Oseni et al. (2013) found considerable heterogeneity in terms of factors explaining gender differences in productivity, even across regions. Women had less access to productive resources in northern and southern regions, but when controls for factors of production were applied the gender gap in the south disappeared: this suggested that if women and men had equal access to inputs they would be equally productive. This did not hold true in the north, however, where the analyses suggested that even if women and men had equal access to inputs there would still be a gender gap in productivity, partly because women did not get the same returns from the production factors as men. As the authors point out, this is not to say that women would not benefit from more equitable access to resources but that equalizing access to resources would not eliminate the gender gap in productivity.
- Aguilar et al. (2015) recorded a similar finding in Ethiopia, where unequal access to resources and differences in the characteristics of managers and plots explained less than half of the 23 percent gender gap in agricultural productivity. Different levels of returns from extension services, land certification and product differentiation are among the factors driving the unexplained component of the gap.
- As in northern Nigeria and Ethiopia, gender differences in agricultural productivity in Tanzania and Uganda persisted after controls for manager characteristics, plot characteristics, labour and non-labour inputs were applied: the unexplained differences were partly a result of gender differences in the returns from the factors of production (Ali et al., 2015; Slavchevska, 2015). Karamba and Winters (2015) studied the gender-differentiated effects of participation in the Farm Input Subsidy Programme in Malawi, noting that participation improved agricultural productivity for both sexes but did not eliminate the gender gaps in agricultural productivity because women farmers experience constraints

to productivity in addition to limited access to information, restricted access to extension services and communications technology and time constraints.

Lessons Learned

Despite the different approaches, some common points arise from the studies. Labour barriers, low levels of inputs and low returns from non-labour inputs such as fertilizer, improved seeds and agricultural machinery and low adoption of high-value cash crops hinder the productivity of women farmers (see O'Sullivan *et al.*, 2014). Recent studies show that in many contexts equalizing the levels of inputs would not necessarily close the productivity gender gap because women would be likely to obtain lower returns from the inputs. In sub-Saharan Africa the incidence and levels of non-labour inputs and mechanization are very low among all farmers. As access to these inputs expands, women farmers should not be left behind: if they were, the productivity gender gap would grow wider. Women have limited access to land for cultivation and they farm smaller plots than men, but in a context of limited access to non-labour inputs small plots are advantageous because they are farmed more intensely. Increasing women's access to land would widen the gender gap if the constraints they experience, especially in terms of childcare, are not addressed.

Sex-Disaggregated Data in Agricultural Surveys and Censuses and Use of Administrative Data

3.1. Sex-Disaggregated Data in Agricultural Surveys and Agricultural Censuses

“A census of agriculture is a statistical operation for collecting, processing and disseminating data on the structure of agriculture, covering the whole or a significant part of a country. Typical structural data collected in a census of agriculture are size of holding, land tenure, land use, crop area, irrigation, livestock numbers, labour and other agricultural inputs” (FAO, 2016, p. 3). Another important function is to create sampling frames for the census of supplementary modules or for national programmes of agricultural surveys. The unit of analysis in agricultural censuses is the holding,¹² though some information may be collected at the community level.

Agricultural surveys are related to agricultural censuses in that they involve the collection of data on agricultural production units. Countries with an established agricultural survey programme normally use agricultural surveys to collect non-structural items and to provide timely in-depth data on production and inputs.

¹² “An agricultural holding is an economic unit of agricultural production under single management comprising all livestock kept and all land used wholly or partly for agricultural production purposes, without regard to title, legal form or size. Single management may be exercised by an individual or household, jointly by two or more individuals or households, by a clan or tribe, or by a juridical person such as a corporation, cooperative or government agency. The holding’s land may consist of one or more parcels, located in one or more separate areas or in one or more territorial or administrative divisions, providing the parcels share the same production means, such as labour, farm buildings, machinery or draught animals” (FAO, 2016, p. 43).

Because agricultural censuses focus on structural data, analyses of gender-based differences are beyond their scope. Recent rounds of agricultural censuses, however, have shown signs of consideration of gender issues in that they have proposed the sex of the farmer as a core item, adopted the “sub-holder” concept and taken into account divisions of responsibilities and ownership in relation to the same holding (World Programme for the Census of Agriculture [WCA], 2010).

With the sex of the holder as a core item, it is not surprising that many countries collected the information and generated related statistics: 56 countries of the 122 countries that conducted an agricultural census during the WCA 2000 round reported the number and share of holdings managed by women (FAO, 2013) and in the WCA 2010 round a preliminary review of 76 countries showed that the sex of the holder was collected in 95 percent of questionnaires.

But information about sub-holders is rarely available because such data items were proposed as “supplementary” and because the WCA 2010 guidelines did not provide a standard definition for the concept. In the absence of guidance, countries used the concepts of “sub-holding” and “sub-holder”. In several agricultural censuses, mainly in Africa, “sub-holder” became the equivalent of “plot manager” or “responsible person” and the information was collected through plot modules.

This section provides an overview of the collection of sex-disaggregated data in agricultural surveys and censuses with a view to showing how frequently sex-disaggregated data is collected and identifying topics and regions for which sex-disaggregated data are rarely collected. The focus is on intra-holding data because the sex of the holder gives only a partial account of gender disparities. The overview is based on:

- a 2013 FAO review of 76 agricultural censuses, providing evidence of the availability of sex-disaggregated data on land ownership or management;
- a 2015 FAO review of 43 agricultural surveys and 28 agricultural censuses, providing evidence of the availability of sex disaggregated data on work; and
- 15 agricultural surveys and 9 agricultural censuses with a view to covering the domains not addressed in the reviews above and to give a

general picture of the availability of sex-disaggregated data in agricultural surveys.¹³

The findings are summarized below.

Human Capital

Most African and Asian agricultural censuses enquire about educational attainment, literacy and agricultural training, but no Latin American censuses do so. Sex-disaggregated census data on human capital is collected only in The Gambia, where information on educational levels is available for each household member; the census also asks about agricultural training and extension services.

All African agricultural surveys enquire about human capital. In Asia, only India and Armenia do so; and in Latin America only Columbia does so. Most surveys ask about educational attainment and agricultural training and extension and advisory services.

Sex-disaggregated data on educational attainment is collected in the surveys in Armenia, Ghana, India, Lesotho and Tunisia. None of the Latin American countries collected sex-disaggregated education data, which are largely acquired through various types of household roster. None of the surveys collects sex-disaggregated data on participation in agricultural training.

Natural Capital

Based on an FAO review conducted in 2013 on 76 agricultural censuses, almost all countries collect land tenure information at the holding level, but only one-third of the countries collect this information at the parcel or plot level, a practice applied mainly in Africa.

In 93 percent of the countries, census questionnaires make it possible to generate sex-disaggregated data on land tenure at the holding level; 7 percent of the countries, all in Africa, collect the information needed to generate sex-disaggregated data on land ownership and management.

¹³ Details are given in Annex I.

Table 3.1 – Availability of Sex-Disaggregated Data on Land Ownership* in WCA 2010

	Africa (11 countries)		Asia (11 countries)		Oceania (10 countries)		Europe (22 countries)		North and Central America (13 countries)		South America (8 countries)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Sex of the holder	10	91	12	100	8	80	22	100	12	92	8	100
Land tenure/ownership	11	100	11	92	10	100	22	100	13	100	8	100
Sex-disaggregated data on land	10	91	11	92	8	80	22	100	12	92	8	100
Parcel/plot level module included	8	73	5	42	5	50	0	0	4	31	4	50
Land tenure/ownership	8	73	5	42	5	50	0	0	4	31	3	38
Sex of the plot manager	6	75	0	0	0	0	0	0	0	0	0	0
Sex-disaggregated data on land ownership at plot/parcel level	6	75	0	0	0	0	0	0	0	0	0	0

* The term “ownership” encompasses ownership and management. Source: Brunelli and Neciu (2013).

The agricultural surveys reviewed asked about agricultural land and livestock.¹⁴ Those in the African countries also asked about fruit trees; the survey in Ghana included questions about aquaculture facilities such as ponds or lakes. Except Argentina, the Latin American countries included forestry.

Only the African surveys included sex-disaggregated data on natural capital, but there were few questions: the survey in Ghana, for example, asked which household members tended animals; Lesotho included the most extensive set of sex-disaggregated questions, enquiring about ownership, management and decision-making with regard to land, kitchen gardens and livestock.

Physical Capital

Most agricultural censuses enquired about some form of physical capital, usually machinery and fertilizer; none collected sex-disaggregated data on physical capital.

Most of the agricultural surveys asked about agricultural equipment such as machinery and tools, and most African surveys included vehicles as well. Most

¹⁴ Except for the Rwanda agricultural survey, which only enquired about agricultural land.

surveys covered fertilizers, pesticides, irrigation and seeds planted. The Latin American surveys covered fewer physical capital variables than the African and Asian surveys. None of the agricultural surveys reviewed collected sex-disaggregated data on physical capital.

Financial Capital

Most agricultural censuses enquired about credit or loans and in some cases about savings. Sex-disaggregated financial capital data was collected in the Democratic Republic of the Congo and The Gambia, but the approaches were different: the census in the Democratic Republic of the Congo collected the number of men and women with savings in a bank or microfinance institution; the census in The Gambia collected individual-level information about loans and credit.

Of the 15 agricultural surveys reviewed, 7 included questions about financial capital; only one of these was a Latin American survey. All financial capital questions covered access to or use of credit and loans.

None of the agricultural surveys collected sex-disaggregated data on financial capital.

Social Capital

Most agricultural censuses enquired about social capital, mostly with reference to membership of cooperatives or market access. Sex-disaggregated data on social capital was only collected in The Gambia through questions about membership of farmers' organizations.

All the African agricultural surveys enquired about social capital, but in different ways. Some asked about membership of associations, others about suppliers and buyers or services provided by cooperatives. None of the Asian surveys included questions about social capital; the surveys in Columbia and Ecuador collected information about market access.

None of the agricultural surveys collected sex-disaggregated data on social capital.

Time Allocation and Work

A 2015 FAO review of 43 agricultural surveys and 28 agricultural censuses showed that information about work was frequently collected: 80 percent of the surveys had at least one question on work on holdings carried out by household members and external workers. Information was usually collected at the holding level in the case of external workers, showing a balance between individual-level and holding-level data for household members. Agricultural censuses were more likely than agricultural surveys to collect data on on-farm labour, particularly with regard to external work.

Few questionnaires considered the time and payments involved in work on holdings by household members. With regard to external workers, the questionnaires frequently collected information on activity types and in a few cases on time devoted to work on holdings. Sex-disaggregated data on work provided by household members was available in 33 percent of the agricultural census questionnaires and 50 percent of the agricultural survey questionnaires.¹⁵

Sex-disaggregated data on external workers was available in most of the agricultural census questionnaires and agricultural survey questionnaires.

Decision-Making

None of the agricultural censuses or surveys enquired about decision-making except in Lesotho, where a question was asked as to which household member made decisions about land and livestock. These questions covered land and livestock rights but not decision-making (see Chapter 5).

In summary:

1. Most surveys collected data on natural capital, physical capital and labour inputs. Information about credit, human capital, social capital and productivity was frequently collected, whereas decision-making was hardly covered at all. The same pattern held for agricultural censuses.

¹⁵ The reference population is the number of reviewed questionnaires that collected information on household members' work on their holding.

2. There was little attention to sex-disaggregated data. In the agricultural surveys reviewed, there were few or no sex-disaggregated data for physical, financial or social capital, or decision-making and productivity. A few African censuses collected sex-disaggregated data on financial and social capital.
3. The extent and type of sex-disaggregated data on natural capital, human capital and labour inputs varied, leaving little scope for comparisons between countries. The domain in which sex-disaggregated data was collected most frequently was labour inputs at the holding level.
4. Africa had the most comprehensive agricultural surveys and censuses in terms of topics covered and the collection of sex-disaggregated data.
5. The review shows the urgent need to mainstream sex-disaggregated data collection in agricultural surveys.

3.2. Administrative Data for Sex-Disaggregated Statistics

Administrative data are “... produced from sources that are primarily established for government administrative or regulatory procedures” (African Development Bank [ADB], 2010, p. 49). Administrative data comprise official records relating to matters such as birth and death, immigration, enrolments, tax and police and court proceedings.

The relevance of administrative data for gender analysis is established, particularly for demographic, socio-economic, cultural and environmental information purposes (ADB, 2010; FAO and World Bank, 2014). The advantage of administrative data is that they are readily available and cost little to obtain (ADB, 2010). If they are regularly updated, they may be used to monitor changes over time (ADB, 2010).

The main limitation of administrative data is that definitions and methods used by administrative sources may be unsuitable for statistical analysis, and the data may have coverage bias in that they only include the population recorded in specific registers. And governments may not provide administrative data for statistical use.

In an ideal situation, different administrative records and registries from different domains may be linked with each other with personal identifiers to create a unified database. This enables the linking of data across records, and provides comprehensive information (ADB, 2010; FAO and World Bank, 2014): linking registered marital status with land-ownership information from

property registers leads to improved understanding of ownership and inheritance rights derived from marriage regulations.

3.3. Administrative data for sex-disaggregated data in agriculture

The most important requirement from a gender perspective is the possibility of disaggregating data by sex, as set out in the following paragraphs.

Property ownership by sex

Administrative data have sometimes been used to generate sex-disaggregated statistics for property: FAO and the World Bank (2014), for example, used property data from the administrative records of seven Balkan countries to calculate, by sex:¹⁶

- the distribution of property ownership;
- the distribution of portions of properties owned;
- the incidence of portions of properties owned;
- the distribution of property owners having mortgages in their own name; and
- the incidence of property owners having mortgages in their name.

Because land registers include information about types of property, analysis can be extended to consider agricultural land. The drawback of using administrative data from this type of record is that analysis is limited to registered properties, and in the case of the Balkans countries the lack of identification prevented the generation of individual level-statistics such as the percentage of men and women with properties.

For assets other than land, administrative data is unlikely to be useful because such assets are not registered.

Education

The MDGs comprise a variety of education indicators that are partly based on administrative data; some MDG indicators are constructed from administrative data and complemented with other sources. Examples include: i) the ratio of

¹⁶ Albania, Bosnia Herzegovina, Kosovo, Macedonia, Montenegro, Serbia and Republika Srpska.

girls to boys in primary, secondary and tertiary education; ii) child mortality rates and iii) infant mortality rates (ADB, 2010).

Administrative data often provide the numerator of the indicators; the denominator is based on censuses and surveys. In the MDG 2.1 indicator “net enrolment ratio in primary education”, for example, the number of children enrolled in primary school can be taken from school registers and enrolment data held by ministries, whereas the population of children of primary school age is estimated from population censuses and administrative statistics on births, deaths and migrations (ADB, 2010). Administrative data are also a major source of health information: to obtain incidence rates for malaria, for example, data on the incidence of malaria is usually collected through surveillance systems, and population data is based on projections from the census population (ADB, 2010).

A major challenge to global monitoring is the comparability of the concepts, definitions and methods used in administrative data in different countries. Official statistical systems need to adopt consistent definitions and methods for all data sources. With regard to gender in agriculture, it is important that these numbers can be disaggregated by sex and area of residence.

Labour

The International Labour Organization (ILO) utilizes administrative data from social security and insurance records, tax returns, collective agreements and administrative reports to generate its statistics on employment, wages, hours of work and related topics such as income from employment and vacancies.¹⁷

The ILO points out, however, that labour statistics from administrative data are not fully comparable between countries as a result of differences in sources and legislation.¹⁸ Pember (1989) noted that administrative data sources were often underutilized in developing countries for the compilation of labour statistics because there were not enough trained staff and software was outdated.

It is important that data on labour can be disaggregated by sex, area and sector. Many ILO indicators are disaggregated by sex, but very few are disaggregated by area and only some are available for the agricultural sector.

¹⁷ See <http://laborsta.ilo.org/applv8/data/SSM4B/E/INTRO.html>

¹⁸ See <http://laborsta.ilo.org/applv8/data/SSM4B/E/INTRO.html>

In theory, administrative data may be a useful source for statistics on gender in agriculture in terms of: i) ownership of agricultural land; ii) education; and iii) work in agriculture. In practice poor data coverage and lack of disaggregation, for example by sector, area of residence and type of land, seriously hamper their use. When comparing statistics based on administrative data, it is important that definitions, methods and legislations are aligned; this tends to be a greater challenge with regard to administrative data than, for example, survey data. And in some countries administrative data are wholly unreliable because records are not up to date and no adequate quality control procedures are in place.

All of this shows that it is challenging to use administrative from developing countries on a routine basis for gender analysis in agriculture.

Statistical Frameworks on Women in Agriculture

As discussed in chapter 2, the measurement of gender inequality in agriculture requires consideration of many dimensions. This section introduces three statistical frameworks that address these dimensions and propose core indicators.

The first is the Agri-Gender Statistics Toolkit developed by FAO to support the production and use of sex-disaggregated agricultural data; it suggests 39 indicators in nine domains. The second proposal, by Tayyib *et al.* (2013), comprises 18 sex-disaggregated indicators on the socio-economic status of the agricultural and rural population. The third is the framework that underlies the WEAI.

These frameworks are the foundation of the review of best practices (see Chapter 5) and will be a useful resource for the guidelines document itself.

4.1. The FAO Agri-Gender Statistics Toolkit¹⁹

The Agri-Gender Statistics Toolkit was developed by FAO to enhance the production and use of sex-disaggregated agricultural data. It suggests 39 indicators in nine domains and provides examples of gender-relevant questions and tables developed by national and FAO statisticians for use in agricultural censuses in Africa between 1993 and 2006.

The domains and indicators are set out below. Most of the recommended indicators are disaggregated by sex of the holder or household head because the aim was to enhance the production of sex-disaggregated data through agricultural censuses and guide the re-tabulation of already collected data.

¹⁹ See: <http://www.fao.org/gender/agrigender/agri-gender-toolkit/en/>

1. Agricultural population and households

- 1.1 Characteristics of the agricultural population by sex and by sex of the head of household
- 1.2 Dependency ratio of the household by sex of the head of household
- 1.3 Distribution of agricultural holdings or sub-holdings by sex of the holder or sub-holder
- 1.4 Distribution of holdings or sub-holdings by type of holding and by sex of the holder or sub-holder
- 1.5 Migration of household members by sex and age, and by sex of the head of household

2. Access to productive resources

2.1. Access to land and water

1. Access to land by sex of holder or sub-holder
2. Area cultivated by sex of holder or sub-holder
3. Tenure status of land used by sex of holder or sub-holder
4. Distance from the fields to the homestead by sex of holder or sub-holder
5. Access to irrigation, erosion control and water harvesting structures by sex of holder or sub-holder

2.2. Access to agricultural inputs

1. Access to selected agricultural inputs by sex of holder or sub-holder
2. Source of agricultural inputs by sex of holder or sub-holder
3. Reasons for not using agricultural inputs by sex of holder or sub-Holder

2.3. Access to agricultural implements, assets and technologies

1. Access to selected tools, equipment and machinery by sex of holder or sub-holder
2. Access to draught animals by sex of holder or sub-holder
3. Reasons for not using agricultural implements or assets by sex of holder or sub-holder
4. Access to selected agricultural technologies by sex of holder or sub-holder

2.4. Access to credit

1. Access to credit by sex of borrower and position in the household
2. Purpose of credit by sex of borrower and position in the household
3. Source of credit received by sex of borrower and position in the household
4. Type and amount of credit received by sex of borrower and position in the household
5. Type of collateral provided for credit by sex of borrower and position in the household
6. Repayment period of loan by sex of borrower and position in the household
7. Reasons for not receiving a loan or credit by sex of the head of household

2.5. Access to extension services and training programmes

1. Access to agricultural training and extension programme(s) by sex of holder or sub-holder
2. Adoption of extension messages by sex of holder or sub-holder

3. Production and productivity

- 3.1 Food and cash crop production and productivity by sex of holder or sub-holder
- 3.2 Horticultural production and productivity by sex of the head of household/holder or sub-holder
- 3.3 Animal production and productivity by sex of the household member or head of household
- 3.4 Aquaculture production and productivity by sex of holder or sub-holder
- 3.5 Agro-forestry activities by sex of holder or sub-holder
- 3.6 Hunting and gathering activities by sex of holder or sub-holder
- 3.7 Production constraints faced by agricultural producers by sex of holder or sub-holder

4. Destination of agricultural produce

- 4.1 Destination of agricultural production by sex of holder or sub-holder
- 4.2 Storage practices of agricultural households by product and sex of holder
- 4.3 Agro-processing practices by product and sex of holder
- 4.4. Marketing:
 - 1. Marketing practices by product and sex of holder or sub-holder
 - 2. Means of transport used for marketing purposes by sex of holder or sub-holder
 - 3. Marketing constraints faced by product and sex of holder

5. Labour and time-use

5.1. Farm labour used on own holding

- 1. Family labour used on own holding by sex of holder or sub-holder
- 2. Temporary and permanent hired labour used on own holding by sex of holder or sub-holder
- 3. Mutual support groups used on own holding by sex of holder or sub-holder
- 4. Involvement of husbands/wives in agricultural activities on plot(s) managed by their spouses by sex and activity

5.2 Farm labour provided on other holdings

Number of household members working on other holdings by sex, age and duration

5.3 Farm labour remuneration

- 1. Kind of remuneration received by sex, labour status and activity and sex of holder or sub-holder
- 2. Level of remuneration paid by sex of holder

5.4 Division of labour

Division of labour and responsibilities by sex and by sex of holder

5.5 Time use

Amount of time devoted to domestic and socio-economic activities by sex of holding member and sex of holder

6. Income and expenditure

6.1 Household income

1. Main sources of income by sex of the head of household
2. Income obtained from agricultural activities by sex of the head of household

6.2 Agricultural expenditure

1. Agricultural expenses by activity and sex of the head of household
2. Farm labour expenses by sex of the manager or owner of the holding

6.3 Decision-making

Decision-making related to the use of household income obtained from agricultural activities by sex and by sex of the head of household

7. Membership of agricultural/farmers' organizations

- 7.1 Membership of agricultural/farmers' organizations by sex, age, position in the household, type of organization, level of involvement and services provided

8. Food security

8.1 Food sources

Main sources of food by sex of the head of household

8.2 Food consumption

1. Number of meals normally taken by the household by sex of the head of household
2. Number of days on which the household consumed meat during the past week by sex of the head of household
3. Frequency with which the household could not meet its food needs over the past 12 months by sex of the head of household
4. Changes in food consumption patterns observed over the past 12 months by sex of the head of household
5. Main reasons for food shortages by sex of the head of household

9. Poverty

- 9.1 Housing conditions by sex of the head of household
- 9.2 Water sources used by sex of the head of household
- 9.3 Energy sources used by sex of the head of household
- 9.4 Toilet facilities used by sex of the head of household
- 9.5 Ownership of household assets by sex of the head of household
- 9.6 Livelihood constraints by sex of the head of household
- 9.7 Financial constraints for agricultural activities by sex of the head of household

4.2. Core Gender Indicators for Assessing the Socio-Economic Status of the Agricultural and Rural Population

The 18 core gender indicators proposed by Tayyib *et al.* (2013) were intended to provide “... guidance and support for integrating a more comprehensive gender perspective ...” (p. 1) into the core set of data items of the Global Strategy.²⁰

The framework of indicators they proposed was based on the “livelihood assets” and “livelihood strategies” components of the Department for

²⁰ The Global Strategy – an initiative of FAO, the World Bank and the United Nations – aims to improve the quality of agricultural statistics to create core data items for international comparison and the monitoring of agricultural development. Data items are classified as social, economic and environmental.

International Development *Sustainable Livelihoods Framework*,²¹ because: i) “assets” are the core of each livelihood analysis in that they are the starting point from which households can choose their “strategies”; ii) in the authors’ view, “assets” and “strategies” constitute the most measurable, people-focused and people-dependent components of the framework; and iii) “assets” and “strategies” are components in which gender disparities are evident at the household level. The “livelihood assets” component of the *Sustainable Livelihoods Framework* comprises natural, financial, physical, human and social capital.

As in the Agri-Gender Statistical Toolkit, most of the indicators were disaggregated by the sex of the household head or holder, and there was no explicit request for intra-household or intra-holding data. The authors acknowledged the limitations of conducting gender analysis based on holding-level and household-level data,²² but the priority of the framework was to provide immediate guidance for analysing existing and available data.

The core gender indicators were proposed at the holding or household level, but the issues they address are relevant and the framework provides guidance as to the aspects considered important with regard to women in agriculture.

²¹ Livelihood strategies are defined by the authors as the range of activities and choices that people make to achieve their livelihood goals.

²² See section 3.2.

Table 4.1 – Core Gender Indicators for Assessing the Socio-Economic Status of the Agricultural and Rural Population; (Tayyib *et al.*, 2013)

Livelihood Framework, Elements			Global Strategy, Key variables	Gender indicator		SEAGA*					
				Holding/Household	Sub-holding	1	2	3	4	5	6
Livelihood assets	Human	Household/holding composition	Sex	Percentage of holdings/households by sex of the holder/household head	available	X	X				X
		Household/holding composition	Household composition	Average holding/household size by sex of holder/household head		X	X				X
		Household/holding composition	Age in completed years	Average age of the holder/household head and household members by sex of holder/household head	applicable	X					X
		Employment	Number of family/hired workers	Percentage of holdings/households with hired labour by sex of holder/household head	applicable	X					X
		Food security status	Household consumption	Percentage of holdings/households by sex of holder/household head with the risk of food shortage (past)				X			X
		Education	Highest level of education	Percentage of holdings/households with holder/household head with education level over a CERTAIN level by sex				X	X		X
		Knowledge	N/A	Percentage of holdings/households receiving agricultural extension services by sources of agricultural extension services and sex of holder/household head				X	X	X	X
	Social	Networks and organizations	N/A	Percentage of holdings/households participating in "agricultural" collective actions by sex of holder/household head			X	X		X	
	Natural	Land	Land cover and use	Average area of holding by land use type and sex of the holder/household head	applicable	X	X			X	
		Livestock	Livestock	Average number of livestock by species and sex of holder/household head	applicable	X	X			X	
		Forestry	N/A	Average area of forest and other wooded land as primary land use by sex of holder/household head	applicable	X	X			X	
		Aquaculture	N/A	Average area of aquaculture by sex of holder/household head	applicable	X	X			X	
	Physical	Irrigation	Irrigation	Percentage of holdings/households with irrigated land by land use type and sex of holder/household head	applicable		X			X	
		Pesticides/Fertilizers	Pesticides / Fertilizers	Percentage of holdings/households using chemicals by type of chemicals and sex of holder/household head	applicable		X			X	
		Agricultural machinery	Machinery	Percentage of holdings/households with selected machinery and equipment by sex of holder/household head	applicable	X	X			X	
	Financial	Credit and loans	N/A	Percentage of holdings/households receiving credit for agricultural purposes by sex of holder/household head			X		X	X	
	Livelihood strategies	Livelihood strategies	Area harvested and planted	Percentage of holdings/households by type of farming (crop (temporary, permanent), livestock, aquaculture and forestry) and sex of the holder/household head	applicable	X	X			X	
Other income sources		Total income of the household	Percentage of holdings/households with other gainful activity in the household by type of activity and sex of holder/household head		X	X			X		

4.3. The Women's Empowerment in Agriculture Index

The WEAI was proposed by the International Food Policy Research Institute (IFPRI), Oxford Poverty and Human Development Initiative and the Feed the Future initiative of the United States Agency for International Development (USAID). It is a survey-based tool that measures the empowerment and inclusion of women in agriculture, but unlike the previous frameworks it subsumes the proposed indicators into a single multi-dimensional index. The WEAI is composed of two sub-indices: the first, called the 5DE sub-index, measures five domains of empowerment and has a weight of 90 percent in the total index; the second, called the gender parity index (GPI) has a weight of 10 percent (Alkire *et al.*, 2013).

The WEAI is based on five domains: production, resources, income, leadership and time; the indicators associated with each are described below (Alkire *et al.*, 2013). The individual is the unit of analysis in all cases.²³

1. Production

- Input into productive decision-making
- Autonomy in agricultural production

2. Resources

- Ownership of land and assets measured through self-reporting
- Ownership of land and assets measured through a bundle-of-rights approach – decisions regarding the purchase, sale or transfer of land and assets
- Access to and decisions about credit

3. Income

- Sole or joint control over the use of income and expenditures

4. Leadership in the community

- Membership of economic or social groups
- Comfort in speaking in public

²³ The list of indicators reflects the initial version of the WEAI: some were modified after the pilot studies; detailed discussion of the five domains is given in sections 5.2–5.6.

5. Time

- Productive and domestic workloads
- Satisfaction with time available for leisure activities.

For each indicator an individual receives a binary score that reflects adequate or inadequate achievement in that indicator, from which a weighted empowerment score between 0 percent and 100 percent is generated (Alkire *et al.*, 2013).²⁴ An individual is considered empowered if adequate achievement is shown in four of the five domains or if the weighted empowerment score is 80 percent or more.

The achievement indicators and empowerment scores are used to construct the GPI, which measures the inequality between the primary man and woman in each household in the five dimensions of empowerment: this shows the percentage of women who are as empowered as their men counterparts, and hence reflects the empowerment gap. As mentioned above, the 5DE and GPI are combined in the WEAI.

A single composite measure of empowerment is not particularly relevant for the purposes of this paper, but the domains and indicators in the index provide valuable information (see Section 4.4).

4.4. Conclusions

The FAO Agri-Gender Statistics Toolkit, the core gender indicators framework and the WEAI are different but complementary. This section considers some of the differences and similarities on the “domain” side.

- Of the 18 core gender indicators, 16 focus on livelihood assets; most of them deal with human, natural, physical, social and financial capital.
- The same types of capital are considered by the Agri-Gender Statistics Toolkit in the “access to productive resources” and “membership of agricultural/farmers’ organizations” domains.

²⁴ The weights are chosen such that each indicator adds the same weight to its domain and each domain adds the same weight to the index. As a result, the income indicator has the largest weight and the resource indicators the lowest weight.

- The WEAI considers much the same types of capital but with a smaller number of indicators, and it ignores issues such as use of irrigation and fertilizers or receipt of extension services.²⁵
- The WEAI refers specifically to input regarding productive decisions and control over income, which are ignored by the other two frameworks.
- The Agri-Gender Statistics Toolkit and WEAI acknowledge the importance of time-use and labour.
- The three frameworks recognize the value of production, productivity and the destination of agricultural produce; these topics are specifically addressed by the Agri-Gender Statistical Toolkit.

Recognizing the complementarity of these frameworks, Chapter 5 reviews best practices. It covers indicators of human, natural, physical, financial and social capital:²⁶ financial assets are different from natural and physical assets, but some data-collection approaches are similar. Natural capital may be held for financial security reasons, particularly in developing countries, so the separation between financial capital and natural and physical capital is vague. Human and social capital are closely related, but they are discussed separately because the data-collection considerations are different.

The analysis of best practices is organized as follows:

1. Human capital.
2. Natural, physical and financial assets.
3. Social capital.
4. Time-use and labour.
5. Decision-making.
6. Production and productivity.

²⁵ Terminology is different: the WEAI “resources” domain corresponds to the core gender indicators’ natural, physical and financial capital; the WEAI “leadership” domain corresponds to the core gender indicators’ social capital.

²⁶ The relevance of these domains for gender in agriculture is discussed in Chapter 2.

Measuring Gender Gaps: Good Practices

This chapter introduces theoretical considerations and practical applications of gender indicators for the agricultural sector, and reviews best practices for the collection of sex-disaggregated data and gender indicators.

The best practices presented here are based on: the Evidence and Data for Gender Equality initiative (EDGE), the GAGP, the Living Standards Measurement Studies – Integrated Surveys on Agriculture (LSMS-ISA), the World Programme for the Census of Agriculture 2010 and 2020 (WCA 2010; WCA 2020), and the WEAI (see Boxes 5.1 – 5.5).

Discussion of methods of collecting sex-disaggregated data and gender indicators such as the choice of unit of observation and respondent selection is followed by discussion of gender indicators and best practices with respect to human capital, natural, physical and financial assets, social capital, time use and labour, and decision-making.

Box 5.1: Evidence and Data for Gender Equality

The EDGE project, which will run from 2013 to 2017, was designed to improve evidence-based policymaking by including gender issues in national statistics. Its conclusions will be submitted to the United Nations Statistical Commission.

EDGE is an initiative of the United Nations Statistics Division (UNSD) and UN Women. Other partners are the African Development Bank, the Asian Development Bank, FAO, the Organization for Economic Co-operation and Development, the World Bank and national statistical offices in selected countries.

EDGE complements the Inter-Agency and Expert Group on Gender Statistics in establishing a minimum set of gender indicators. It aims to: i) compile country-level gender indicators on education, health and employment in a single platform (see <http://genderstats.org/EDGE>); and ii) develop standards and guidelines for measuring entrepreneurship and asset-ownership indicators. The list of assets considered by EDGE include agricultural land, livestock and agricultural equipment.

Data-collection protocols are being piloted in Fiji, Georgia, Ghana, the Maldives, Mexico, Mongolia, the Philippines, South Africa, Swaziland and Uganda.

Box 5.2: The Gender Asset Gap Project

The GAGP, which was established in 2009, focuses on identifying sex-disaggregated patterns of asset access and ownership. It is implemented in collaboration with the Indian Institute of Management in Bangalore, Yale University, the University of Florida, the American University, the *Facultad Latinoamericana de Ciencias Sociales Sede Ecuador* (Flasco) and the University of Ghana.

The project involves country surveys, development of gender-asset indicators, workshops and training materials. GAGP collaborates with various organizations to improve data collection on asset ownership and to advance gender-related property rights. Pilot studies in Ecuador, Ghana and India address the main research questions:

- What are the patterns of asset ownership and control when disaggregated by sex?
- How are assets acquired and disposed of? Does this vary along the lines of gender?
- Is there an association between women's decision-making power and asset ownership?

Data collection focused on gathering an inventory of household physical and financial assets and investigating the ownership distribution in households; housing, consumer durables, financial assets and agricultural assets are included. Questions range from quantity, quality and utilization of agricultural land to ownership of livestock and agricultural equipment. Other household indicators for livelihoods and decision-making are included. On the basis of asset distribution, GAGP considered two major issues: i) the gender asset gap; and ii) the gender wealth gap.

Box 5.3 - Living Standards Measurement Study – Integrated Surveys on Agriculture

The World Bank LSMS-ISA is a household-level survey project that includes detailed agriculture modules. It differs from other data-collection initiatives in this document because it does not focus on gender. It does, however, collect detailed agricultural data at the individual level that enable gender analyses in the context of agriculture.

A major goal is to encourage innovation and effectiveness in statistical research, focusing on the linkages between agriculture and poverty. LSMS-ISA aims to develop analytical tools for the analysis and use of data such as guidelines on questionnaire design, sample questionnaires and manuals for planning and implementing surveys.

LSMS-ISA provides a platform for field validation of measurement issues relating to agricultural data such as: i) area measurement with global positioning systems; ii) measurement of soil type and quality; iii) valuation of own production and agricultural income; iv) methods for estimating crop production; v) evaluation of livestock by-products; and vi) accounting in fisheries and aquaculture.

LSMS-ISA applies a multi-dimensional approach integrating household, agriculture and community questionnaires in every survey to collect detailed information about socio-economic indicators such as agricultural production, non-farm income-generating activities and consumption expenditure.

The LSMS-ISA project is implemented in collaboration with national statistical offices in Burkina Faso, Ethiopia, Malawi, Mali, Niger, Nigeria, Tanzania and Uganda.

Box 5.4 – World Programme for the Census of Agriculture

The WCA was launched in 1930 with a view to increasing the availability of structural data in the agriculture sector. It is organized in “rounds”, each lasting 10 years. At the beginning of each round, FAO provides guidelines for national institutions on the design and implementation of a census of agriculture.

The objectives of these censuses have been extended over time: the WCA 2010 round therefore introduced “modularization” in agricultural censuses and proposed a distinction between a minimum set of core data and supplementary data. WCA 2020, which starts in 2016 and ends in 2025, supports these elements.

Because the WCA focuses on structural data for agriculture, exploring gender-based differences is beyond its scope. The recent rounds of agricultural censuses, however, considered gender issues by proposing the sex of the farm holder as a core item, encouraging the adoption of the “sub-holder” concept and launching the “intra-holding division of responsibilities and ownership” as a stand-alone theme. This theme supersedes the “sub-holder” concept proposed in WCA 2010 and provides a more practical approach to investigating women’s decision-making and ownership on holdings.

Box 5.5 – Women’s Empowerment in Agriculture Index

The WEAI is a comprehensive composite index that captures women’s empowerment and inclusion in the agricultural sector. It can be used to analyse linkages between women’s empowerment, food security and agricultural growth.

Introduced in February 2012, the index was developed by IFPRI, the Oxford Poverty and Human Development Initiative, and the USAID Feed the Future programme. It is a composite measure based on individual-level data on men and women in households. Its two sub-indexes are: i) the 5DE, which measures women’s empowerment in agricultural production, resources, income, leadership and time; and ii) the GPI, which is the ratio of empowerment of women to men as measured with 5DE. By combining them the WEAI measures the degree of women’s empowerment and gender inequality in a household with respect to agriculture.

Since 2011, surveys have been conducted in Bangladesh, Cambodia, Ethiopia, Ghana, Guatemala, Haiti, Honduras, Kenya, Liberia, Malawi, Mali, Mozambique, Nepal, Rwanda, Senegal, Tajikistan, Tanzania, Uganda and Zambia, with further data collection every two to three years. Data from the first round of data collection is available for Bangladesh, Guatemala and Uganda; information on the WEAI index and its sub-indexes is available for all the surveyed countries.

5.1. General Survey Methods

This section discusses the choice of the unit of observation and the choice of survey respondent(s).

5.1.1. Unit of observation and the unit of analysis

Choosing the unit of observation is crucial because it partly determines the unit of analysis and hence lays the foundation for the construction of gender indicators.

The unit of analysis depends ultimately on the research question, and hence may be the agricultural input or activity, the individual, the household, the community or organizations such as farmer's cooperatives and financial service providers (Doss and Kieran, 2014). Gender analysis has often used the household or holding as the unit of analysis and has typically focused on differences between households headed by men and those headed by women. Chant (1997, 2004 and 2008), Buvinić and Gupta (1997), Drèze and Srinivasan (1997); Quisumbing et al. (2001) and Klasen et al. (2015) have discussed the poverty status of households headed by women compared with those headed by men, often with ambiguous results. As discussed in Chapter 3, simple comparison of households headed by men and women is problematic and does not provide any comparison of the status of men and women in households. On the basis of individual asset-ownership data, for example, Deere et al. (2012) found in some Latin American countries that the distribution of asset ownership in the household among women and men was more equitable than analysis based on the sex of the head would indicate.²⁷ Box 5.6 discusses the disadvantages of using the household as a unit of observation and gender comparisons based on household headship.

²⁷ On the basis of individual asset data, Deere *et al.* (2012) estimated that 36 percent to 41 percent of household wealth in Nicaragua was owned by women, although households headed by women owned only 20 percent to 23 percent.

Box 5.6 - Drawbacks of gender analysis based on the sex of the household head

Investigating gender equality in agriculture based on the sex of the household head has two major drawbacks: i) households headed by women are not a homogeneous group, so a simple comparison of households headed by men and women is not appropriate; and ii) the definition of headship leads to restrictive assumptions and differs in many agricultural surveys to the extent that comparisons between countries become challenging.

Heterogeneity among households headed by women

A woman may be the head of a household for a variety of reasons. She may, for example, be unmarried, separated, divorced or widowed, in which case the term *de jure* is used to denote that she is the household's legal and customary head. If a woman describes herself as a household head, or as happens more frequently the husband is absent for long time (Moghadam, 2005), the term *de facto* is applied (Quisumbing *et al.*, 2001; Klasen *et al.*, 2015). Households headed by women *de jure* and *de facto* experience different socio-economic situations and they differ substantially from each other and from households headed by men.

Households headed *de jure* by women tend to have fewer income earners, whereas *de facto* headship may be associated with high levels of remittances (Horrell and Krishman, 2007), and households headed *de jure* by women tend to be disadvantaged in access to inputs and income-generating opportunities compared with households headed by men, whereas households headed *de facto* by women tend to have incomes similar to those in households headed by men (Horrell and Krishman, 2007).

If the data make it possible, analysis based on household headship should split households headed *de jure* and *de facto* by women into more specific categories, for example identifying those designated *de jure* on the basis of the marital status of the household head, and separating households headed *de facto* by women according to the presence or absence of the husband and receipt of remittances. Klasen *et al.* (2015) and Horrell and Krishman (2007) analysed gender analysis subgroups of headship.

The point here is not that households headed by men are homogeneous – on the contrary, there may be households headed by men who are single, monogamous or polygamous, or households headed by men consisting of an extended family or several families, or households headed by men of more than one generation (FAO, 2015). When comparing an average of households headed by women with an average of households headed by men, the analyst may fail to observe the heterogeneity these groups, and such comparisons may hide more than they reveal.

Definition of headship

The household head may be defined as the authority representing the interests of all household members (Becker, 1974), but in practice such narrow definitions are inadequate (FAO, 2015): in many households, especially multi-family households, there is unlikely to be a single “authority” who knows and controls all the members. And surveys use different definitions of household heads, which makes the data non-comparable (FAO, 2015): in some the head is self-reported, but in others may be identified on the basis of precise attributes such as being the oldest male member or the most knowledgeable member (FAO, 2015).

Such differences among households headed by women and by men and the various definitions of headship in different surveys confound gender comparisons based on the sex of the head, and as a result the literature no longer makes comparisons between households headed by men and those headed by women.

Various survey practices²⁸ and papers (Doss, 2013; Brunelli and Neciu, 2013) identify two units of observation that are suitable for mainstreaming the collection of sex-disaggregated data in agriculture: i) the agricultural item – that is, the productive asset or the agricultural activity; and ii) the individual. This distinction applies to physical assets and to any other item such as natural, human and social capital, and decision-making.

If the item is the unit of observation, all owners of each item should be listed. If the individual is the unit of observation, each individual should be asked whether s/he owns the item of interest or which household member owns the item of interest. The essential difference is that if the individual is the unit of observation, information about each individual must be collected, whereas if the item is the unit of observation, questions about each item must be asked. It should be noted that:

- The approach based on the individual and that based on the item provide different indicators, unless additional information is collected.
- If the item-based approach is complemented by a list of women and men in the household,²⁹ it is possible to calculate the proportion of items owned by women, because the reference population is the item, and the proportion of women and men owning the item, because the reference population is the individual.
- The individual-based approach provides the same indicators as the item-based approach if it records the ownership of all of the item. If the record shows only whether or not an individual owns at least one piece of the item of interest, for example at least one plough, the individual-based approach cannot be used to generate asset-based proportions.
- All individuals associated with the item of interest should be listed, not just the primary owner. This is particularly important from the gender perspective because women frequently co-own assets with their spouses.
- The preferred unit of observation is always context-specific in that it depends on the type of data-collection tool and the purpose and design of the survey. But because the number and sex of household members are frequently collected in household surveys, the item-based approach is likely to be more useful because it can be used to generate item-based and individual-based indicators.

²⁸ The data-collection initiatives are discussed later in this section.

²⁹ Alternatively, the total number of women and men in the household.

The Gender Asset Gap Project

The GAGP used a two-stage questionnaire with the item as the unit of observation: i) an inventory of all assets owned by the household and all the owners of each asset was compiled through a household questionnaire; and ii) an individual questionnaire asked two household members whether they owned one of the assets listed in the inventory (Doss *et al.*, 2011 and 2012). The intention was to match the information in the inventory with the information from the individual questionnaire with a view to revealing different perceptions in the household as to ownership and control and as to hidden assets. The individual questionnaire asked for individual information on issues such as rights, decision-making power or legal knowledge, which might not have been appropriate for a proxy respondent. This two-stage procedure is also applicable to other assets such as decision-making about expenditures.³⁰

The Evidence and Data for Gender Equality Project

In the EDGE project, Doss (2013) proposed a household inventory of all assets owned by anyone in the household, followed by an individual questionnaire asking who owned each asset. In the first pilot study in Uganda in 2014,³¹ a two-part questionnaire was used that did not include a household asset inventory (UNSD, 2014): the first part consisted of a household roster including demographic and economic information for all members, and the second was an individual questionnaire about asset ownership. The household roster naturally used the individual as the unit of observation, and the individual questionnaire on asset ownership used the item as the unit of observation.

³⁰ In this case all types of expenditures are listed first, and the primary respondent is asked in a household questionnaire: “Who makes decisions about the listed expenditure item?”. An individual questionnaire is then used to ask: “Did you make decisions about this expenditure item?”. Similarly, the “expenditure inventory” can be matched to the individual questionnaires and is likely to reveal different perceptions about decision-making power over certain expenditures.

³¹ This was part of MEXA (see below). EDGE pilots in Fiji, Georgia, Ghana, the Maldives, Mexico, Mongolia, the Philippines, Swaziland and South Africa were conducted in 2015; the results are expected in 2016.

The Living Standards Measurement Survey – Integrated Surveys on Agriculture

None of the LSMS-ISA uses a two-stage procedure. The agricultural questionnaire is administered to all households practising agriculture, and most data is collected through a household-level questionnaire. Some questions, however, ask about ownership in the household and are usually put in the form: “Who in the household...?”; a number of household members may be listed. Hence sex-disaggregated data collection is embedded in the agricultural questionnaire, and no separate individual questionnaire is submitted.³²

The LSMS-ISA questionnaires typically include rosters of plots, parcels and crops, and in that sense the structure of the questionnaire is similar to that of the household inventory; the unit of observation is almost always the item.

In some of the LSMS-ISA, data on livestock is collected in a different way: because households may own numerous livestock there is no exact list of all animals, and questions of the “how many” type are asked with the household as the unit of observation.

The World Programme for the Census of Agriculture

Recognizing that the idea of the holder as sole decision-maker of a holding may not reflect the complex decision-making dynamics in holdings, WCA 2020 proposes the collection of supplementary data items that enquire about: i) the distribution of managerial decisions in the holding; ii) management of livestock and crops; and iii) ownership of land. The WCA 2020 Guidelines do not provide clear recommendations as to data-collection methods, but new operational guidelines are in preparation.

With regard to units of observation, the FAO technical report “Improving the Collection and Analysis of Sex Disaggregated Data on Land Ownership in Agricultural Censuses and Household Surveys” (Brunelli and Neciu, 2013) recommends the collection of asset-based information. In particular, it suggests inserting questions on land ownership/management into the parcel/plot modules of the questionnaires: this is because parcel/plot modules were included in sample enumeration in a third of the agricultural censuses in the 2010 round, and the identification of owners/managers and their sex through the parcel/plot

³² See section 5.2.2.

modules appeared to be a feasible strategy (Brunelli and Neciu, 2013). According to the authors, this approach should be preferred because: i) it can enrich the study with other characteristics of the plots; and ii) it generates individual and plot-level measures, thereby increasing the flexibility of the analysis.³³

As an alternative to the parcel/plot-level approach, Brunelli and Neciu (2013) suggest inserting questions on land ownership/management into the roster of household members, which normally contains questions on the demographic and social characteristics of the individuals. In this case the unit of observation shifts to the individual. Because rosters of household members are common in household census questionnaires, the approach is a highly practicable strategy and should be considered if the plot/parcel module is not used.

No documents generated in the context of the WCA mention the possibility of adopting a two-stage approach like the one in the GAGP project, which clearly goes beyond the scope of a census.

These reviews suggest that it is more productive to use the item rather than the individual as the unit of observation, especially if the survey includes a household member roster, because item-based data collection allows for more flexibility at the analysis stage in that the item and the individual can be units of analysis. It is hence important to frame questionnaires so that the item is the unit of observation for critical items such as land or other assets when mainstreaming sex-disaggregated data collection into agricultural surveys.

The approach whereby an asset inventory is established first and followed by individual questionnaires appears to be promising because it is likely to reveal discrepancies among household members. Administering individual-level questionnaires in addition to household questionnaires, however, is likely to go beyond the scope of many agricultural surveys, and particularly agricultural censuses.

³³ Individual-based indicators can be derived only if a roster of household member is available; this information is frequently collected in agricultural censuses.

5.1.2. Respondent selection – Who to interview?

To generate data suitable for gender-sensitive analysis, interviewing only the household head or one person in the household may not yield the required information. The person being interviewed may not be the most knowledgeable household member, or might not be able to provide accurate information about ownership with regard to household members of the opposite sex. Different household members may have different knowledge or perceptions, so it may be worth interviewing more than one person. There is evidence that in some contexts household members will hide information on wealth from each other, so it may be important to interview several members and to do so in private (Baland *et al.*, 2011; Boltz *et al.*, 2015).

How many people should be interviewed? Clearly, the largest amount of information will be obtained by interviewing everyone in the household, but the information will be difficult to reconcile and may not yield the most accurate or useful data. In any case, it is not always feasible to administer a questionnaire to every household member.

For gender analysis, it would make sense to interview at least the most knowledgeable man and woman in each household. In view of their different roles, men and women have different understanding and experience of household economics, markets and income-generating activities, and they may not know enough about the activities of the other person or other household members. The answers of the principal man and woman in the household may therefore be different but complementary.

When interviewing several household members, there is a question as to whether to interview them separately or jointly. On the one hand, interviewing household members together can lead to discussion before consensus is reached; on the other, separate interviews allow individuals to reveal their perceptions because peer pressure and other influences are minimized; this would make it possible, for example, to detect assets that are hidden from other household members.

Given the importance of hidden assets, separate interviews are likely to be preferable, particularly in settings where social norms prevent women from

speaking freely in public, asset ownership is general, agricultural activities are separate and households are large. In settings where women can speak comfortably public, the agricultural household is the family and production is a joint venture, collective interviews might produce more accurate information.

The review of current sex-disaggregated data collection projects suggests that consensus is yet to be established. The only agreements are that researchers should abandon the notion of “household head” when collecting data, and that interviews with a single respondent who happens to be present when the interviewer calls are likely to provide misleading data.

In the GAGP the interview structure varied from country to country. Studies were designed to interview the principal man and women in a household:³⁴ in Ecuador, for example, they were interviewed together for the asset inventory, and the individual questionnaire asking whether they owned each asset in the inventory, and if they owned additional assets, was administered separately (Doss *et al.*, 2011; Deere and Diaz, 2011; University of Florida and Flasco, 2010). The GAGP was not designed to test respondent selection, but it provided some insights related to the issue.

It was observed, for example, that the second respondent added few major assets to the inventory – less than 1.5 percent of assets were added in the three countries, with the exception of other real estate (Doss *et al.*, 2011, 2013). This suggests either that the primary respondent had good knowledge of household assets or that the second respondent was reluctant to reveal hidden assets.

Some inconsistency between the two respondents was also observed (Doss *et al.*, 2013),³⁵ which might have been the result of: i) different wording in the household inventory and individual questionnaire;³⁶ and ii) the fact that other household members attended the household inventory, while the individual

³⁴ The primary respondent was identified as the adult who maintained the home and had the best knowledge about the household assets owned by its members. If the primary respondent was married, the spouse was identified as the secondary respondent. If the primary respondent was not married, another adult of the opposite sex was identified as secondary respondent.

³⁵ In Ecuador, for example, 31 percent of answers on ownership of agricultural parcels and 28 percent of answers on ownership of dwelling did not match. In Ghana, only 8 percent of answers on ownership of dwellings and other real estate were inconsistent. The greatest level of inconsistency was observed in Karnataka, in India, with 90 percent of secondary respondents listing themselves as owners when the primary respondent had not listed them as an owner in the asset inventory.

³⁶ The inventory asked: “To whom does this asset belong?”; the individual questionnaire asked: “Do you consider yourself the owner or one of the owners of this asset?”. The former is likely to elicit more detached answers, whereas the later may elicit a more inclusive response (Doss *et al.*, 2013).

questionnaire was conducted in confidence and hence incentivized respondents to reveal the truth about what they owned.³⁷ Marital custom might also have influenced the perception of ownership: in contexts where items are owned individually after marriage, for example, asset ownership is generally clearer to both respondents.³⁸ And cultural norms might have led to inconsistencies: in a patriarchal society, for example, men are likely to report individual ownership of an asset that is legally owned by husband and wife, so if one respondent bases a reply on marital custom and the other on cultural norms the outcome may be different (Doss *et al.*, 2013).

The issue of respondent selection is one of the research questions of the EDGE project,³⁹ which in 2013 hosted a meeting of representatives of UNSD, UN-Women, LSMS, World Bank Africa Region Gender Practice, USAID and Yale University with a view to agreement on the design and implementation of an experiment to test respondent selection protocols.

The Methodological Experiment on Measuring Asset Ownership from a Gender Perspective (MEXA) was conducted in Uganda in 2014, in collaboration with the World Bank LSMS programme and the Uganda Bureau of Statistics. Designed as a randomized household survey experiment, MEXA assessed the relative effects of five approaches to survey-respondent selection on the individual-level measurement of asset ownership and control. The five approaches or “treatment arms” were as follows:

- (1) The self-identified “most knowledgeable” household member was interviewed alone about the assets owned, exclusively or jointly, by any household member. This is a standard practice, and so the results were analysed using treatment arm 1 as the reference category.
- (2) A member of the principal couple was randomly selected and interviewed alone about assets owned, exclusively or jointly, by any household member.

³⁷ In Karnataka only those secondary respondents were interviewed individually who were not listed in the inventory as an owner of the asset. Therefore the framing and confidentiality arguments are likely to explain the large inconsistency.

³⁸ Marital customs are discussed below.

³⁹ In 2013 the EDGE initiative convened a meeting of national statistics offices, regional partners and donor agencies to discuss a draft report on measuring individual-level asset ownership and control through official statistics. A major recommendation was that EDGE should develop guidelines on which household member should be interviewed to obtain individual-level data on the ownership and control of assets because no prior studies had addressed respondent-selection protocols. Most household surveys implemented by national statistics offices interviewed the head of household or the person most knowledgeable about the survey topic, but participants at the Bangkok meeting questioned whether this approach was appropriate for measuring asset ownership from a gender perspective.

- (3) The principal couple was interviewed about assets owned, exclusively or jointly, by any household member.
- (4) Up to four household members aged 18 or more were interviewed alone and simultaneously about assets owned, exclusively or jointly, by any household member.
- (5) Up to four household members aged 18 or more were interviewed alone and simultaneously about assets owned, exclusively or jointly, by the individual respondent.

Respondents were asked to list all the assets owned by members of the household and indicate: i) reported ownership; ii) documented ownership; iii) economic ownership; and iv) for each asset the right to sell, rent, bequeath, use as collateral and make improvements or investments.⁴⁰ Individual and joint ownership were documented.⁴¹ On the basis of the GAGP experiences⁴² each respondent answered an identical individual-level questionnaire so that inconsistencies between the answers of respondents in the same household could be identified. In treatment arm 5, in which respondents were asked only about the assets they owned, the phrasing of the questions was different, and the interviewer reported whether the respondent was alone when answering the questions, and if not, information on the witness was documented. This made it possible to control for the influence resulting from the attendance of others.

Analysis of the MEXA data focused on: i) variations in the estimates of asset ownership in the five respondent-selection approaches described above; ii) the extent to which respondents agreed or disagreed about who owned and controlled assets in households where several members were interviewed; and iii) the extent to which assets could be matched in the inventories of assets created by individual respondents in households where several members were interviewed.

The MEXA analysis found no statistically significant differences in the estimates of women's and men's asset ownership when a randomly selected member of the principal couple was interviewed or the self-identified most-knowledgeable household member was interviewed. When the principal couple

⁴⁰ Information on reported ownership was collected by asking respondents to identify who owned an asset, either exclusively or jointly. Documented ownership was measured by asking first whether an ownership document existed for a given asset and second whose names were listed as owners on the document. Economic ownership was measured by asking who would decide how the money would be used if a given asset were to be sold or rented. For definitions of ownership, see section 5.2.2.

⁴¹ The questionnaire included questions on whether consent from another person were needed to exercise the right, and identified the person from whom consent would be needed.

⁴³ Conclusions are based on our reviews of Ethiopia (2013/14), Malawi (2013), Niger (2011/12), Nigeria (2012/13), Tanzania (2012/13) and Uganda (2011/12). The latest stage of the Burkina Faso and Mali LSMS-ISA had not been published at the time of drafting.

was interviewed, there were no statistically significant differences in the estimates of men's and women's asset ownership in comparison with cases where the self-identified most-knowledgeable household member was interviewed, except for reported exclusive or joint ownership of dwellings and reported joint ownership of dwellings and livestock. Estimates of women's and to a lesser degree men's asset ownership were statistically significantly higher for all assets when several household members were interviewed compared with cases where the self-identified most-knowledgeable household member was interviewed.

In households where several members reported what everyone in the household owned, discrepancies were high and had to be reconciled to establish the incidence of asset ownership. The approach adopted by the GAGP was eventually applied, in which a household member was "tagged" as an owner provided at least one respondent identified that member as an owner. This was the most inclusive approach to reconciling discrepancies among household members, and it explains the higher estimates of women's and men's asset ownership in comparison with those derived from interviews with the self-identified most-knowledgeable household member. In many instances, irrespective of sex, respondents were identified as owners by other respondents even when they did not consider themselves to be owners. From a policy perspective, this discounting of people's self-perceptions of ownership is problematic because people's behaviour is influenced by their perceptions of what they own.

In households where several members reported only what they themselves owned there were no discrepancies to reconcile for the compilation of estimates of women's and men's exclusive ownership of assets, because respondents did not serve as proxies for others. Nonetheless, women's reported exclusive ownership of principal dwellings and agricultural land was statistically significantly higher compared with interviewing the self-identified most-knowledgeable household member. This result does not hold for men's reported exclusive ownership of dwellings and agricultural land, but it provided further evidence that proxy reporting and self-reporting yielded different information as to which household members – in this case women – owned the assets.

Matching assets in the different asset inventories created at the individual level proved challenging, despite the use of various auxiliary variables such as soil quality and the size of agricultural parcels to match the assets listed by different individuals. Hence if an inventory of household assets is required it should be

created at the household level, keeping in mind that the approach may not yield a complete inventory of assets belonging to individual household members.

Similar analyses will be conducted in Georgia, Mongolia and the Philippines before conclusions can be drawn, but the results from MEXA suggest that interviewing the self-identified most-knowledgeable household member about individual-level asset ownership will yield different estimates of the incidence of asset ownership for women and men, probably because there information sharing among household members is incomplete. In view of the challenges associated with proxy reporting discussed above, the remaining EDGE pilots in the Maldives and South Africa will collect self-reported data only. Given the operational challenges in the EDGE pilots of interviewing up to four household members separately and simultaneously, one adult will be randomly selected for interview in the Maldives with a view to obtaining nationally representative estimates of asset ownership and control disaggregated by sex. In South Africa one randomly selected adult and spouse will be interviewed with a view to compiling nationally representative estimates and analysing household asset gaps between spouses.

In the LSMS-ISA, respondent selection in the agricultural module differs by country and questionnaire topic.⁴³ Unlike the GAGP and MEXA studies, no separate household or individual questionnaires are administered: only one questionnaire is administered, which is answered individually by the household head or the most knowledgeable household member or jointly by several respondents.

In Niger, the person responding to the agricultural module was always the household head; in Ethiopia, Nigeria and Tanzania the questionnaire was administered to the most knowledgeable respondent, who differed by module topic and so single respondents were interviewed for each topic. In Ethiopia, general household information was sought from the household head; the field manager was asked about crop planting and management, seeds, fertilizer use, access and use of credit and extension services, and field staff were asked about crop cutting. In Malawi, the respondent was usually the most knowledgeable person with regard to the module topic, assisted by other knowledgeable people; hence several respondents answered parts of the questionnaire together.

⁴³ Conclusions are based on our reviews of Ethiopia (2013/14), Malawi (2013), Niger (2011/12), Nigeria (2012/13), Tanzania (2012/13) and Uganda (2011/12). The latest stage of the Burkina Faso and Mali LSMS-ISA had not been published at the time of drafting.

The LSMS-ISAs are recurrent large-scale nationally representative surveys, comparable with the surveys targeted by our guideline on sex-disaggregated data and gender indicators in agriculture. The LSMS-ISA does not use the GAGP/MEXA two-stage procedure and so does not identify hidden assets or inconsistencies among respondents. The magnitude of the surveys and their different focus has probably deterred the LSMS-ISA from investigation of specific details of gender and asset ownership.

Using several respondents to elicit information on ownership or decision-making with regard to a holding is beyond the scope of agricultural censuses. Like most large-scale surveys, agricultural censuses rely on a single respondent for interview, though they admit the possibility of selecting different respondents for different modules. In this way agricultural censuses are similar to the LSMS-ISA in terms of choice of respondent.

The FAO report *Improving the Collection and Analysis of Sex Disaggregated Data on Land Ownership in Agricultural Censuses and Household Surveys* acknowledges the importance of triangulating information and reconciling inconsistencies, but there appears to be little scope for interviews with more than one person.

5.1.3. Lessons Learned

There is consensus that the unit of observation and the number and characteristics of respondents are important for measuring gender gaps in agriculture.

With regard to the unit of analysis, there are sound arguments for favouring the asset as the unit of observation in that the approach can provide individual-level estimates only if a list of women and men household members is available.

Regarding the number and identity of respondents, empirical evidence shows that collecting information about the asset ownership of all household members from a single respondent is subject to bias and is hence an unsuitable approach. It is important to recognize that the suitability of alternative approaches will depend on the objective of the research.

Evidence from the EDGE project suggests that interviewing a single randomly selected person about their assets is a suitable approach for compiling

nationally representative indicators of gender asset gaps in terms of the percentages of women and men who own land. But interviewing the principal couple separately as to what they each own will result in biased estimates, because they are likely to own more assets than others in the household; this is not an issue if they are proxy reporting, however. Selecting one adult household member at random does not enable intra-household analysis of gender asset gaps; if this is the priority, more than one household member should be interviewed.

5.2. Human Capital: Existing Indicators and Methodological Aspects of Data Collection

5.2.1. Human Capital Indicators

This section presents five of the many human capital indicators proposed in different contexts that we consider relevant for analysing gender disparities in agriculture. The focus is on education and extension services.

There is a variety of indicators measuring gender inequality in education at the national level, but none of them addresses the economic aspect. It is hence necessary to increase the availability of educational indicators relevant to agriculture, for example by disaggregating individual or household involvement in agricultural activities.⁴⁴ Very few databases distinguish individuals living in agricultural households from those in non-agricultural households. Education data are not usually disaggregated by sex or residence in urban or rural areas, a distinction that can be used as a proxy to disaggregate agricultural and non-agricultural households in that most people active in agriculture live in rural areas. National household surveys and agricultural surveys are appropriate tools for generating education indicators relevant to agriculture provided that they collect information as to sex, area of residence and individual or household involvement in agricultural activities.

The four education indicators presented here, which have been proposed in contexts such as the MDGs, are included in the *Minimum Set of Gender Indicators*.⁴⁵

⁴⁴ There is no official definition of “agricultural household/population”, but the concept lies outside the scope of this document.

⁴⁵ This comprises 52 quantitative and 11 qualitative gender indicators, of which 18 are education-specific, to inform the gender policy concerns in the Beijing Platform for Action and subsequent international commitments. It was compiled by the Inter-agency and Expert Group on Gender Statistics through its

They are:

1. *Ratio of girls to boys in primary, secondary and tertiary education.* This measures the educational gap between girls and boys. Given that a common measure of children's educational attainment is enrolment, the ratio of enrolment by sex has been used to monitor MDG 3.⁴⁶
2. *Ratio of literate women to men in the 15–24 age range.* This is particularly relevant for the population working in agriculture because literacy is a significant input into agricultural work, especially market-oriented activities, in that it enables people to deal with information relevant to the business aspects of agriculture. This measure has also been used for monitoring progress in MDG 3.
3. *Ratio of girls to boys in the transition from primary to secondary education.* This is valuable in that many children in rural areas of developing countries do not proceed to secondary school; in general, boys are more likely to proceed to secondary school than girls.
4. *Ratio of women to men who complete primary, secondary and tertiary education.* This indicator should be preferred to “years of schooling” because it captures gender disparities in levels of completed education. Tayyib *et al.* (2013) suggested using “percentage of holdings/households with holder/household head with education level over a certain level, by sex” to assess the socio-economic status of the agricultural and rural population. The *Minimum Set of Gender Indicators* includes completion or graduation rates, but does not include years of schooling.

These indicators are universal in the sense that they do not focus on particular population groups. In the context of mainstreaming gender in agricultural statistics, these indicators must be generated for individuals living in agricultural households, or at least disaggregated by rural or urban area of residence.

The MDG indicators website at <http://mdgs.un.org/unsd/mdg/Data.aspx> disseminates indicators (1) and (2) at the national level only. The data, which are provided by the United Nations Educational, Scientific and Cultural

advisory group on gender statistics and indicators and approved by the United Nations Statistical Commission.

⁴⁶ See: <http://mdgs.un.org/unsd/mdg/Search.aspx?q=primary> for the MDG 3.1 indicator for monitoring progress, and <http://genderstats.un.org/> for the *Minimum Set of Gender Indicators*.

Organizations (UNESCO) Institute for Statistics, are derived from school registers or school surveys and censuses; they are not available for the rural population. Attendance rates by sex in primary and lower secondary schools in rural areas, based on household survey data, is available at the UNESCO Institute for Statistics.⁴⁷ UNICEF definitions of enrolment and attendance suggest that these measures are similar, even though they are based on different sources.⁴⁸ Hence a proxy of indicator (1) is available for rural areas, at least for some countries, but there is no major database that provides indicators (2), (3) and (4) by sex for rural areas or for the agricultural population.

For all four indicators, disaggregation by area of residence can be obtained from household surveys. Disaggregation into agricultural and non-agricultural households is less likely because such information is not always collected. On the other hand, agricultural surveys sample farm households but may not collect information on the education of all household members.

To generate such indicators, large-scale household surveys need to collect evidence on household or individual involvement in agricultural activities, and agricultural surveys should expand their scope to collect education data on household members.

Although educational indicators are generally available, indicators for extension services in agriculture are rare. The FAO AgriGender Toolkit and Tayyib *et al.* (2013)⁴⁹ support:

5. *The ratio of men and women farmers who receive extension services for agriculture.* Unlike the education indicators, this indicator is agriculture-specific. Data on access to extension services is frequently collected in agricultural surveys and agricultural modules of household surveys, but rarely at the individual level, so there is no large database containing sex-disaggregated data on extension services. It is possible to fall back on surveys only in a few countries (see Chapter 3).

⁴⁷ See <http://data.uis.unesco.org/index.aspx?queryid=142&lang=en>

⁴⁸ See http://www.unicef.org/infobycountry/stats_popup5.html or <http://data.unicef.org/education/overview.html>

⁴⁹ Tayyib *et al.* (2013) proposed the percentage of holdings/households receiving agricultural extension services by sources of agricultural extension services and sex of holder/household head.

Extension service programmes are frequently provided by governments, farmers' associations or NGOs, so data must be available for use in gender analysis. Such data may, however, be outdated, incomplete or not disaggregated by sex.

Applications⁵⁰

Figures 5.1 – 5.3 present modified versions of indicators (1), (2) and (3).⁵¹ Figure 5.1 shows the net attendance rate for boys and girls at primary schools in rural areas and the GPI.⁵² The data were obtained from the UNESCO Institute for Statistics and from household surveys.

Substantial gender parity – GPI between 98 and 102 – is evident in 15 of the 27 countries, inequality in favour of girls in four countries and inequality in favour of boys in eight countries.

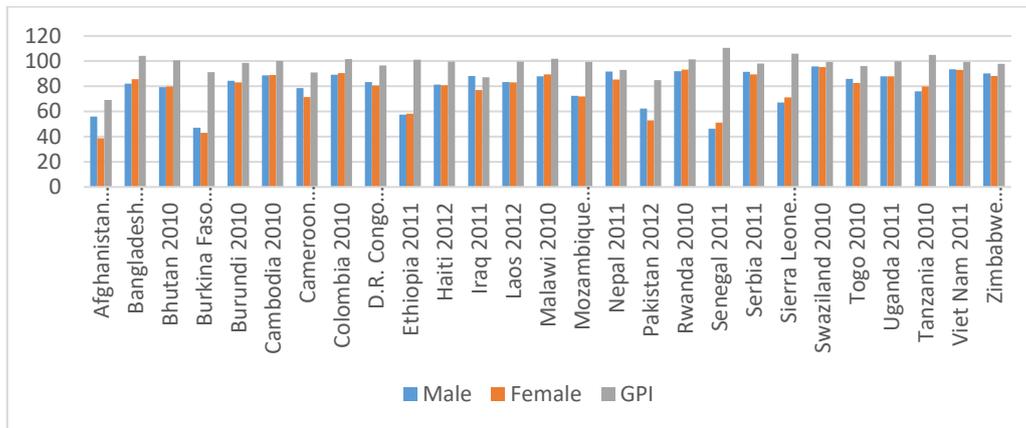
The numbers show no large gender gaps in the primary net attendance rate, but the GPI is 69 in Afghanistan and 85 in Pakistan. Figure 5.1 also shows that net attendance at primary schools in rural areas is very low in some countries: in Burkina Faso in 2010, for example, net attendance was 47 percent for boys and 43 percent for girls; in Senegal it was 51 percent for girls and 46 percent for boys. The figures also indicate the presence of many over-age children in primary schools; this is not reflected in the net attendance measure.

Figure 5.1 – Net attendance in primary school in rural areas 2010-2015.

⁵⁰ We found no comprehensive data on the receipt of extension services by sex, so the indicator applications only cover gender-education indicators.

⁵¹ For the sake of brevity we only present statistics on these three indicators. School completion rates are available at <http://data.uis.unesco.org/>

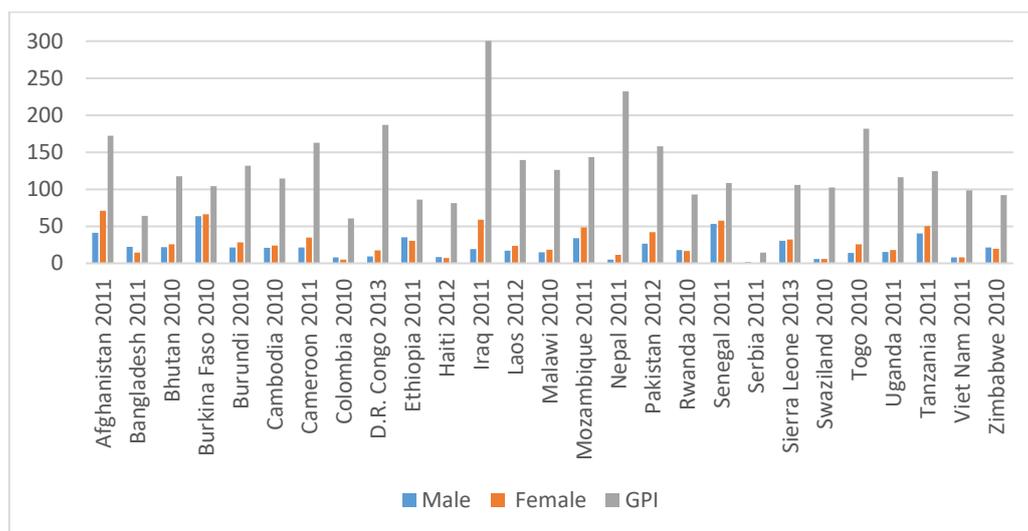
⁵² Net attendance was chosen instead of enrolment because the data were disaggregated by area of residence. The GPI is the ratio of girls to boys in net attendance at primary schools in rural areas x 100. A GPI of 100 indicates gender parity, less than 100 indicates disparity in favour of boys, and over 100 indicates disparity in favour of girls.



Source: UNESCO Institute for Statistics

Figure 5.2 shows the rate of out-of-school adolescents of lower secondary school age and GPI in rural areas; the data were obtained from the UNESCO Institute for Statistics, which constructs this indicator from school registers, school surveys or census for enrolment. The figure also shows large gender disparities in the out-of-school rates for secondary schools: gender parity is achieved only in two countries, inequality in favour of boys exists in 18 countries and inequality in favour of girls in seven countries. The degree of gender disparity is considerable in some countries; in Iraq, for example, GPI was 3.03 and in Nepal it was 2.32, suggesting that girls are a large majority of out-of-school young people. The rate of out-of-school children in rural secondary schools was over 50 percent in Burkina Faso and Senegal.

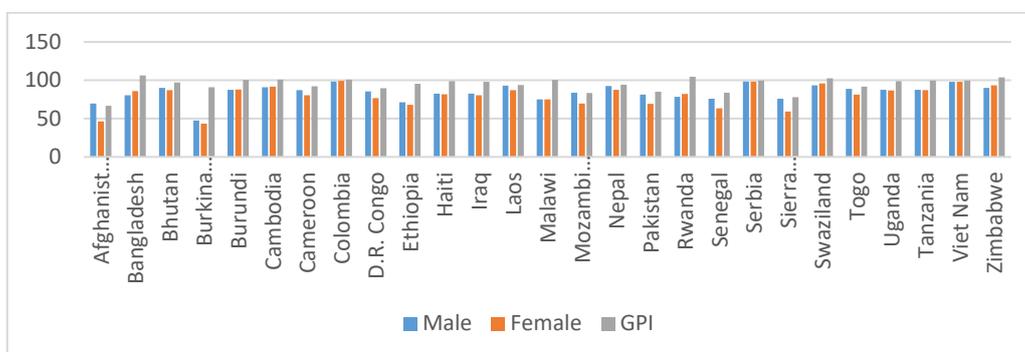
Figure 5.2 – Rate of out-of-school rural adolescents of lower secondary school age, 2010-2015



Source: UNESCO Institute for Statistics

Figure 5.3 presents literacy rates in 2015 for people aged 15–24, taken from the UNESCO Institute for Statistics, which compiles this indicator from national population censuses and household and labour force surveys. The indicator is not disaggregated by region. The figure shows that gender parity exists in ten countries, inequality in favour of boys in 13 countries and inequality in favour of girls in four countries; it also shows that the literacy rate is extremely low in some countries: in Burkina Faso and Afghanistan, for example, literacy among women is less than 50 percent.

Figure 5.3 – Literacy rates among people aged 15-24 in 2015



Source: UNESCO Institute for Statistics

This section has shown how sex-disaggregated statistics on education can be used and interpreted. It is evident that the statistics are particularly useful for monitoring time trends and for comparing countries, but education data disaggregated by sex and region are rarely available and there are no education data disaggregated by sex and by farm/non-farm households. There is hence an urgent need to collect sex-disaggregated data in agricultural surveys with a view to understanding education gender gaps in agriculture.

5.2.2. Data Collection

This section discusses good practices in the collection of sex-disaggregated data on education and extension services. The collection of individual-level education data is a standard practice in household surveys and many agricultural surveys: we therefore focus on collecting data on extension services.

Education data, which are usually collected at the individual level in the education modules of household surveys, normally include detailed questions on literacy, completed years of schooling or highest level of education. They are usually put to each household member over the age of 5; for children, current attendance and reason for drop out are recorded where applicable.

As stated in Chapter 3, agricultural surveys sometimes collect information about human capital. It is relatively easy to include questions on the highest level of completed education, current schooling and literacy in agricultural

surveys with a roster of household members. For agricultural surveys without a roster, the best course is to add one if educational data for each household member are to be reported. Such data are useful only if collected at the individual level.

Data on extension services are increasingly being collected, but they usually refer to the household or holding and are rarely collected at the individual level. The formula for such questions is: “Has the household or any member of it received any advice on [specify] extension services?” This may be supplemented with questions about service providers and the frequency, cost and usefulness of the services. Detailed questions about country-specific extension service programmes may also be asked.

The LSMS-ISA in Malawi in 2013, Nigeria and Tanzania in 2012/13 and Uganda in 2011/12 improved the collection of individual-level data by asking: “Which household members received advice from [specify source such as government or NGO extension service, farmers’ association]?”. Such data enable the allow calculation of the gender extension service indicator introduced above. No surveys or studies collect individual data on the frequency of extension services.

5.2.3. Lessons Learned

There is extensive data on educational attainment disaggregated by sex, but they are not usually broken down into agricultural and non-agricultural households and hence may not be suitable for identifying gender gaps in agriculture. Where possible, education indicators based on involvement in agricultural activities should be disaggregated by sex.

Most data on education focuses on school enrolment, to some extent on attainment and rarely or not at all on educational quality. The fact that educational quality lags behind improvements in enrolment is reflected in the shift in priorities from the MDGs to the SDGs, and should be reflected in future data collection.

The collection of individual-level education data is standard practice in household surveys, and could easily be introduced into agricultural surveys by means of a roster of household members.

Individual level data on extension services may be collected by asking which household member has received extension services and how often. Such questions could also be included in household rosters or individual questionnaires: eliciting each respondent's use of extension services is likely to yield more accurate information, particularly in terms of frequency.

5.3. Natural, Physical and Financial Assets: Indicators and Methods of Data Collection

This section considers indicators of ownership of and access to natural, physical and financial assets with a view to identifying best practices in collection methods and the use of gender indicators for all three types of capital.

5.3.1. Asset Ownership and Control Over Assets Indicators

The GAGP and WEAI propose a set of indicators that measure asset ownership and control over assets in agriculture. Because ownership is a multi-dimensional concept, to be discussed later, the first set of indicators regards asset ownership in terms of reported and documented ownership, whereas the second set regards control over assets in terms of "alienation rights".

Asset Ownership Indicators

The GAGP proposed two sets of measures applicable to natural, physical and financial assets – the gender asset gap and the gender wealth gap (Swaminathan *et al.*, 2011; Doss *et al.*, 2012).

The gender asset gap measures the incidence of asset ownership and the distribution of asset owners, by sex, on the basis of the count of women and men owning a specific asset; ownership can occur individually or jointly and between household and non-household members.

- Incidence of asset ownership:

$$\frac{\text{Men asset owners}}{\text{Total number of men}} ; \frac{\text{Women asset owners}}{\text{Total number of women}}$$

The incidence of asset ownership measures the percentage of adult women or men who are asset owners irrespective of the form of ownership or number of assets owned. In this case, gender parity is achieved when the incidence of asset ownership is equal for men and women.

- Distribution of asset owners by sex:

$$\frac{\text{Men asset owners}}{\text{Total asset owners}} ; \frac{\text{Women asset owners}}{\text{Total asset owners}}$$

This measure indicates the percentage of women or men asset owners among all asset owners by considering the distribution of asset owners, by sex, irrespective of the form of ownership or the number of assets owned.

These measures use the individual – the population of men and women or owners – as the unit of analysis and are complementary: the first measures how many men and women own the asset of interest, and the second focuses on the sex of the individuals who own the asset.

The gender wealth gap also shows the share of wealth owned by men and women as indicated by asset ownership. The corresponding indicators are:

- Share of total value of assets by sex:

$$\frac{\text{Total value of assets accruing to men owners}}{\text{Total value of assets}} ; \frac{\text{Total value of assets accruing to women owners}}{\text{Total value of assets}}$$

The total value of assets is calculated aggregating the market prices of all assets owned by individuals. Depending on whether debt is subtracted off, the indicator may be a gross or net measure. While the calculation of net measures requires greater effort, it has the advantage of integrating financial debt into the indicator. In case of joint ownership, the asset's value is split equally to calculate this indicator.

- Average value of assets by sex of owner:

$$\frac{\text{Total value of assets accruing to men owners}}{\text{Total number of assets accruing to men owners}} ; \frac{\text{Total value of assets accruing to women owners}}{\text{Total number of assets accruing to women owners}}$$

This measure captures the average value of assets owned by men and women, and thus reflects the average quality or importance of such assets. Doss et al. (2015) point out that land size can be a useful approximation for the value of land if market values are not available, but they recommend that the indicator

“mean size of women’s (men’s) plots” is not used in isolation because it ignores the fact that fewer women or men may own land. The quantity and quality of assets can only be compared by combining this indicator with the distribution of owners by sex.

The gender wealth gap indicators use the asset as the unit of analysis. They can be calculated only if the asset is the unit of observation. Accurate valuation of assets is difficult in the gender wealth gap indicators, and will be discussed later.

Control Over Asset Indicators

Control over assets is often measured in terms of “alienation” rights so it is not surprising that the GAGP and WEAI propose indicators of purchase, sale and transfer of assets.

Two items of the WEAI “resources” domain apply to control over assets:⁵³

- Decisions regarding the purchase, sale or transfer of land and assets: the corresponding question is: “Who is the person who can decide individually or jointly regarding the purchase, sale or transfer of [specify item]?”
- Access to and decisions about credit: the corresponding questions are: “Who made the decision to borrow from [specify source]?” and: “Who made the decision about what to do with the money/item borrowed from [specify source]?”

The GAGP also focuses on the right to alienate, which includes the right to make decisions over the sale, bequest or collateralization of assets. The GAGP decomposes alienation rights into “independent” and “consultative” rights. The proposed items are: i) the right to alienate independently, by sex; and ii) the right to alienate in consultation with others, by sex.

The questions eliciting indicators for control over assets use the asset as the unit of observation: statistics can hence be calculated for the population of individuals and the population of assets provided that additional information on the number of women and men in the household is collected.

⁵³ <https://www.ifpri.org/publication/women%E2%80%99s-empowerment-agriculture-index>

Applications of Asset Ownership and Control Over Asset Indicators

This section shows results obtained using some of the indicators discussed above, and hence the types of conclusions that can be drawn. Data have been extracted from the GLRD,⁵⁴ Doss *et al.* (2015), Alkire *et al.* (2013)⁵⁵ and Oduro *et al.* (2011).

Tables 5.1 and 5.2 show the gender asset gap method applied to agricultural land. Table 5.1 shows the incidence of agricultural landownership by sex, and Table 5.2 reports the distribution of agricultural landowners by sex.

Tables 5.3 and 5.4 show the gender wealth gap method applied to agricultural land. Table 5.3 shows average land area and the share of total land area, by sex of owner, and Table 5.4 reports the average land value and the share of total land value, by sex of owner. As mentioned above, “area of land” may be an approximation for the value of land, and hence Tables 5.3 and 5.4 have similar implications.

As expected, women appear to be disadvantaged on average in terms of land ownership and the area or value of land owned. The incidence of ownership is lower for women in all countries except Lesotho and Zimbabwe, with an unweighted average gap of 10 percentage points for sole and joint ownership and 17 percentage points for sole ownership (see Table 5.1). The distribution of landowners suggests that women landowners outnumber men only in Ecuador, but the difference is negligible and the average gender gap in the distribution of landowners is 45 percentage points (see Table 5.2).

With regard to the gender wealth gap, the share of land value held by women (see Table 5.4) is lower in all countries except for reported ownership in Malawi and “management or control of output” in Uganda. In terms of the share of land area held, Uganda is the only country where men are disadvantaged with respect to management or control of output (see Table 5.3). “Average land size by sex” shows that women tend to own smaller land parcels (see Table 5.3); “average land value” shows that women are disadvantaged in all countries except for the “right to sell/use as collateral” in Nigeria. The

⁵⁴ See: <http://www.fao.org/gender-landrights-database/en/>

⁵⁵ The most recent version of the WEAI indicators shown in Table 5.5 is based on pilots unconnected with these changes; no data based on the updated WEAI are publicly available. This does not affect the implications drawn from the data.

highest inequality in average land value is evident in Niger, where men's parcels are about twice as valuable as women's (see Table 5.4).

Tables 5.1 to 5.4 are based on non-standard definitions and measures of land ownership. Depending on data availability, the numbers may refer to documented ownership, reported ownership, certified land use rights or the right to sell/use as collateral.⁵⁶ Although the GLRD explicitly states that the data rely on different types of ownership, the lack of standardization complicates comparisons among countries and the statistics for single countries. The definition of ownership will be discussed later, but it is evident that some standardization is needed to compile meaningful statistics (see also Doss *et al.*, 2015).

The non-comparability of ownership statistics among countries reflects the variety and heterogeneity of the data sources. The GLRD constructs its indicators from various sources: for the incidence of agricultural landowners by sex, for example, the two essential data sources are demographic and health surveys (DHS) and the LSMS or LSMS-ISA, where the data displayed are not taken from the surveys but from academic papers analysing them.⁵⁷ The DHS record reported ownership, but the LSMS records documented ownership or certified land use rights; the DHS includes land used for purposes other than agriculture, whereas the LSMS refers to agricultural land only. Such discrepancies explain the non-comparability among countries and show the need for standardization.

⁵⁶ See: http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=1162 for a description of each ownership type.

⁵⁷ See http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=1164 for a list of sources.

Table 5.1 - Incidence of Agricultural Landownership, by Sex

Country (year)	Women (%)		Men (%)	
	Own any land (sole or joint)	Own land solely	Own any land (sole or joint)	Own land solely
Bangladesh (2011-2012)	8.5	N/A	52.2	N/A
Burkina Faso (2010)	32.0	12.0	54.0	43.0
Burundi (2010)	54.0	11.0	64.0	50.0
Cambodia (2010)	51.0	15.0	54.0	12.0
Ecuador (2010)	7.0	N/A	7.0	N/A
Ethiopia (2011)	50.0	12.0	54.0	28.0
Ghana (2010)	8.0	N/A	15.0	N/A
Lesotho (2009)	38.0	7.0	34.0	9.0
Malawi (2010)	48.0	23.0	N/A	N/A
Nepal (2011)	10.0	10.0	27.0	25.0
Rwanda (2010)	54.0	13.0	55.0	25.0
Senegal (2010–2011)	11.0	5.0	28.0	22.0
Tajikistan (2007)	N/A	4.3	N/A	28.6
Tanzania (2010)	30.0	8.0	N/A	N/A
Uganda (2011)	39.0	14.0	60.0	46.0
Vietnam (2004)	16.4	N/A	37.7	N/A
Zimbabwe (2010–2011)	36.0	11.0	36.0	22.0

Source: http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=1165

Table 5.2 – Distribution of Agricultural Landowners, by Sex

Country (year)	Women (% own any land)	Men (% own any land)
Bangladesh (2011-2012)	22.6	77.4
Ecuador (2010)	51.0	49.0
Ghana (2010)	38.0	62.0
Haiti (2001)	23.5	76.5
Honduras (2004)	14.4	85.6
Mexico (2002)	32.2	67.8
Nicaragua (2005)	19.9	80.1
Paraguay (2001-2002)*	27.0	69.9
Peru (2000)*	12.7	74.4
Tajikistan (2007)	17.1	82.9
Vietnam (2004)	37.3	62.7

* We are not aware of the reason for the shares of landownership not adding to 100%.

Source: http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=1162

Table 5.3 - Area of land owned or accessed, by sex

Country and ownership type	Total number of parcels			Total value in local currency	Average acreage			Share of total acreage		
	Women	Men	Joint		Women	Men	Joint	Women	Men	Joint
Bangladesh (2011-2012)										
Documented ownership	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.10	0.87	0.02
Ethiopia (2011-2012)										
Documented ownership	582	1 571	1 290	3 462	0.91	1.01	1.11	0.15	0.45	0.39
Malawi (2010-2011)										
Reported ownership	6 646	6 052	2 895	14 009	0.83	0.98	0.91	0.40	0.42	0.18
Documented ownership	43	72	93	213	0.9	1.09	1.11	0.17	0.35	0.47
Managed (owned and accessed)	5 194	14 783	N/A	17 990	0.84	0.93	N/A	0.24	0.76	N/A
Management (owned)	4 123	11 463	N/A	14 003	0.84	0.93	N/A	0.25	0.75	N/A
Management (accessed)	1 071	3 320	N/A	3 987	0.85	0.93	N/A	0.23	0.77	N/A
Niger (2011)										
Reported ownership	685	3 012	1,605	18 974	2.29	3.84	3.52	0.09	0.62	0.29
Documented Ownership	29	298	122	1 860	3.14	4.12	5.41	0.05	0.6	0.34
Nigeria (2010)										
Ownership (purchased land)	24	301	N/A	752	0.59	2.52	N/A	0.01	0.99	N/A
Right to sell/use as collateral (purchased + distributed by clan or family)	324	2 866	348	6 399	0.76	1.78	2.55	0.04	0.87	0.09
Management (purchased + accessed + distributed by clan or family)	1,052	4 731	N/A	9 791	1	1.78	N/A	0.13	0.87	N/A
Management (purchased + distributed by clan or family)	805	3 845	N/A	7 999	1.12	1.76	N/A	0.14	0.86	N/A
Management (accessed)	247	886	N/A	1 791	0.63	1.87	N/A	0.1	0.9	N/A
Tajikistan (2007)										
Documented ownership	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.14	0.86	N/A
Tanzania (2010-2011)										
Reported ownership	1,110	2 146	1,847	12 864	1.83	2.67	2.57	0.16	0.44	0.39
Documented ownership	108	250	195	1 502	1.47	2.49	3.17	0.11	0.45	0.44
Right to sell/used as collateral (owned land)	875	1 785	1,694	11 310	1.81	2.75	2.63	0.15	0.44	0.41
Uganda (2009-2010)										
Reported ownership	856	1 297	1,974	8 898	1.71	2.27	1.99	0.18	0.34	0.48
Documented ownership	157	229	446	1 995	1.94	3.37	2.11	0.16	0.32	0.52
Use rights (accessed)	457	361	639	1 147	0.6	0.91	0.7	0.25	0.3	0.45
Management or control of output (owned)	1,189	722	2,154	8 120	1.61	2.58	2.02	0.24	0.21	0.55
Management or control of output (accessed)	562	248	644	1 148	0.63	0.84	0.75	0.32	0.21	0.47
Vietnam (2004)										
Certified land use rights	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.15	0.72	0.13

Sources: Doss *et al.* (2015) and http://www.fao.org/gender-landrights-database/data-map/statistics/en/?sta_id=1169

Table 5.4 – Value of Land Owned and Accessed, by Sex of Owner or Manager

Country and ownership type	Total number of parcels			Total value	Average value in local currency			Share of total value		
	Women	Men	Joint		Women	Men	Joint	Women	Men	Joint
Malawi (2010-2011)										
Reported ownership	6 683	6,062	2,905	662 973	39	44	53	0.39	0.39	0.23
Documented ownership	40	80	92	11 732	49	61	56	0.17	0.40	0.43
Managed (owned and accessed)	4 770	13,217	N/A	758 311	37	45	N/A	0.23	0.77	N/A
Management (owned)	4 152	11,491	N/A	662 620	38	45	N/A	0.23	0.77	N/A
Management (accessed)	618	1,726	N/A	95 691	32	40	N/A	0.23	0.77	N/A
Niger (2011)										
Reported ownership	506	2 162	1,148	1 368 347	132	300	392	0.05	0.59	0.36
Documented Ownership	24	230	49	127 490	153	290	262	0.03	0.75	0.21
Nigeria (2010)										
Ownership (purchased land)	25	303	N/A	103 641	296	319	N/A	0.09	0.91	N/A
Right to sell/use as collateral (purchased + distributed by clan or family)	326	2 799	325	1 172 665	354	333	400	0.10	0.78	0.11
Management (purchased + accessed + distributed by clan or family)	1,039	4 605	N/A	1 729 151	278	317	N/A	0.17	0.83	N/A
Management (purchased + distributed by clan or family)	787	3 737	N/A	1 473 369	307	332	N/A	0.17	0.83	N/A
Management (accessed)	252	868	N/A	255 782	191	250	N/A	0.20	0.80	N/A
Tanzania (2010-2011)										
Reported ownership	1 101	2 149	1 832	6 377 203	1,013	1,327	1,267	0.18	0.45	0.37
Right to sell/used as collateral (owned land)	869	1 793	1 679	5 252 311	958	1,204	1,262	0.16	0.43	0.41
Documented ownership	104	250	189	1 266 465	2,018	2,288	1,752	0.19	0.50	0.31

Country and ownership type	Women	Men	Joint	Total value	Women	Men	Joint	Women	Men	Joint
Uganda (2009-2010)										
Reported ownership	776	1 272	1,854	17 700 000	3,038	4,467	4,563	0.15	0.34	0.51
Documented ownership	147	223	429	5 197 525	4,537	7,123	5,440	0.17	0.34	0.49
Management or control of output (owned)	1,088	710	2,044	17 400 000	2,896	4,916	4,680	0.21	0.21	0.58
Use rights (accessed)	118	189	305	738 243	1,118	1,064	1,297	0.17	0.29	0.54
Management or control of output (accessed)	172	131	309	741 443	1,135	1,171	1,227	0.24	0.22	0.54

Source: Doss *et al.* (2015).

Table 5.5 shows the headcount of individuals with inadequate decision-making power over the purchase, sale or transfer of land and assets and inadequate access to and decisions about credit as proposed by the WEAI “Resources” domain. Women have less power over “purchase, sale, or transfer of assets” in Bangladesh, Guatemala and Uganda, but in Uganda the figure is relatively low with men experiencing almost none. With regard to decisions on credit, women have more power than men in Guatemala and Uganda. The data show that women are disadvantaged compared with men in the rights indicators, but that large numbers of men fall into the “high inadequacy” headcount.

Table 5.5 – WEAI Resources Indicators: Inadequacy Headcount in “Purchase, sale, or transfer of assets” and “Access to decisions on credit”

Census headcount	Bangladesh		Guatemala		Uganda	
	Purchase, sale, or transfer of assets	Decisions on credit	Purchase, sale, or transfer of assets	Decisions on credit	Purchase, sale, or transfer of assets	Decisions on credit
Women	0.280	0.450	0.274	0.612	0.140	0.487
Men	0.201	0.456	0.142	0.350	0.053	0.309

Source: Alkire *et al.* (2013).

The indicators take the value 1 if the individual experiences inadequacy in that indicator, and 0 otherwise.

Table 5.6 shows the right to alienate assets independently and in consultation with others, by sex, and form of ownership in Ghana as proposed by the GAGP “rights over assets” indicators. These data refer to individuals who were reported owners, so they do not indicate the rights over assets of non-reported

owners in the household, as suggested by WEAI. With regard to individual ownership, fewer women than men have the right to sell independently or in consultation except for the right to sell agricultural land independently and other real estate in consultation. With regard to joint ownership, rights to sell independently are lower for dwellings, agricultural land and businesses, and higher for other real estate; rights to sell in consultation are lower for dwellings and other real estate, and higher for agricultural land – almost double – and other real estate. These results do not exhibit a clear pattern of gender gaps in rights to alienate in Ghana, but indicate that it depends on the type of asset, type of ownership and degree of decision-making autonomy.

Table 5.6 – Ghana: Men and Women Owners’ Rights to Sell Independently and in Consultation, by Form of Ownership.

Asset	Sex	Type of ownership	Independently (%)	Consultation (%)	Someone else has the right (%)
Dwelling	Man	Individual	60	22	0.5
		Joint	5	55	4
	Woman	Individual	56	14	2
		Joint	3	44	13
Agricultural land	Man	Individual	47	16	1
		Joint	5	26	0
	Woman	Individual	61	11	0.5
		Joint	2	51	3
Other real estate	Man	Individual	61	27	1
		Joint	12	57	0
	Woman	Individual	46	27	2
		Joint	15	52	4
Business	Man	Individual	74	19	0
		Joint	20	60	0
	Woman	Individual	67	18	0.1
		Joint	21	64	3

Source: Oduro *et al.* (2011).

The application of the proposed asset/gender indicators illustrates the statistics that can be constructed on the basis of sex-disaggregated asset data. Large gender asset gaps and gender wealth gaps for agricultural land in favour of men, differences in gender gaps among countries and complex results regarding rights over assets are evident. These statistics are particularly useful for monitoring time trends among countries, but comparability requires standardization of operational definitions.

As pointed out earlier, sex-disaggregated data on asset ownership are not always available. Apart from the data collected for EDGE, GAGP, LSMS-ISA, WCA and WEAI, statistics are only available from GLRD and DHS Beta STAT compiler for some countries.

As discussed in chapter 3, national land registries may be used to compile sex-disaggregated land-ownership data if modern IT systems are in place. Sex-disaggregated data on assets other than land are difficult to obtain from national records where registration is incomplete.

5.3.2. Data Collection

Choice of sex-disaggregated assets

The assets to be disaggregated by sex depend on the scope of the study and the country context. Assets of significant monetary value are included in most projects relevant to gender in agriculture: they include dwelling, agricultural land, other real estate, assets that are part of a household's farm or non-farm business, consumer durables and valuables, and financial assets.

GAGP recommends a minimum set of questions on assets for all general household surveys and a minimum set of questions to calculate the gender asset gap and gender wealth gap (Doss *et al.*, 2011). The assets cover the categories listed in table 5.7, which also lists the agricultural equipment and vehicle categories actually collected in GAGP surveys in Ecuador, Ghana and India and the recommended minimum set of questions (see Annex 1).

The project recommends that all surveys enquire at least into the ownership of residence and land, which enables respondents to list multiple owners. These

were chosen because they are normally the most valuable household assets: “dwelling” is the most valuable in urban areas and agricultural land is the most valuable in rural areas (Doss *et al.*, 2011).

Individuals in poor households are likely to hold much of their wealth in the form of consumer durables rather than assets such as land, whereas wealthy people tend to invest in real estate: GAGP therefore recommends the inclusion of questions on consumer durables to capture wealth and asset differences at the lowest level of wealth distribution, and suggest the inclusion of financial assets because they account for an increasing share of wealth in middle-income and high-income-countries. Technological assets such cellphones may be interesting because there are significant gender gaps in access to technology (Doss *et al.*, 2011).

In the context of the EDGE project, Doss (2013) suggested the inclusion of assets of significant monetary value as well as productive assets, recognizing that financial assets are increasingly important in growing economies and that urbanization increases the importance of housing, consumer durables and valuables. The EDGE project gives more emphasis than GAGP to agricultural inputs, and hence recognizes the importance of monitoring women’s ownership, control and access with regard to agricultural inputs. The EDGE pilots in 2014 and 2015 included the asset categories as suggested by Doss (2013) (see Table 5.7).

The LSMS-ISA countries – Ethiopia (2013/14), Malawi (2013), Niger (2011/12), Nigeria (2012/13), Tanzania (2012/13) and Uganda (2011/12) – all collected sex-disaggregated data on agricultural land, and frequently sex-disaggregated data on livestock, non-farm businesses and liabilities. Only Ghana sought sex-disaggregated data on dwellings. This is surprising, because even though the survey had an agricultural element it was primarily a household survey collecting detailed sex-disaggregated information about household assets yet did not ask about housing.

The WEAI method proposes enquiring after the same sex-disaggregated data as GAGP plus credit, fishponds and fishing equipment, but not financial assets. The choice of asset categories is context-specific.

WCA 2020 encourages countries to collect intra-holding data on the distribution of ownership and/or management of land and livestock under theme 10 – Intra-household distribution of managerial decisions and ownership on the holding. This theme, which replaces the “sub-holding” and “sub-holder” concepts in WCA 2010, proposes the indicators: i) the number and type of livestock, by sex of the manager;⁵⁸ ii) the number and type of livestock, by sex of the owner; and iii) the area of land owned, by sex of the owner.

Table 5.7 – Asset Categories Considered by Gender Focused Programmes

Asset	Recommendations		Asset categories included in recently conducted surveys/pilots.			
	GAGP minimum questions	WCA	GAGP	EDGE	LSMS-ISA	WEAI
Dwelling	X		X	X	U	X
Agricultural land	X	X	X	X	E, M, NA, NR, T, U	X
Other real estate	X		X	X		X
Livestock	X	X	X	X	M, NA, NR, U	X
Agricultural equipment			X	X	E, NA	X
Fishpond or fishing equipment						X
Business/non-farm enterprises	X		X	X	E, M, NR, T, U	X
Consumer durables and valuables; jewellery	X		X	X	E, M (durables, not jewellery), NA	X
Financial assets	X		X	X	NR, NA T (balance in savings group)	
Liabilities: loans and other dues	X		X	X	E (loans), M, NA T (loans)	X
Transport: bicycle, motorcycle, car			X		E, M, NR	X

E=Ethiopia, M=Malawi, NA=Nigeria, NR=Niger, T=Tanzania, U=Uganda. NR: person who has benefited from financial income.

⁵⁸ It recommends that livestock be grouped in categories, taking into account country specifics, to enable analysis by gender.

The review of data-collection practices in Chapter 2 and our summary of gaps show that:

1. Agricultural land is the asset for which sex-disaggregated data must be collected. Doss *et al.* (2011) note that agricultural land is usually the most valuable asset in rural areas. It is a primary production factor in agriculture and it provides financial security when used as collateral, protection against shocks and in cases of death of or divorce from a spouse. Land ownership is sometimes a requirement for access to services such as extension services and membership of farmers' associations.
2. Livestock is a major asset, particularly for women in developing countries, because women tend to acquire livestock more easily than land or other physical or financial assets. Livestock is hence an entry point in agricultural production, as reflected in the data-collection approaches strategies; only Ethiopia and Tanzania did not collect sex-disaggregated data for livestock (see Table 5.7).
3. Dwellings, real estate, non-farm businesses and consumer durables constitute major shares of household wealth (Deere and Diaz, 2011; Oduro *et al.*, 2011; Swaminathan *et al.*, 2011). These asset categories should therefore be included when there is interest in the wealth gap provided they are covered by the terms of the survey.
4. Agricultural equipment often constitutes a small share of household wealth, but unequal access to or ownership of such inputs may explain gender differences in productivity (see section 2.8). This is also the case for technical assets such as fertilizer, irrigation and communications technology. Such items should be disaggregated by sex if this is allowed by the survey.
5. Financial assets and liabilities may not constitute a large share of agricultural wealth in low-income countries (Deere and Diaz, 2011; Oduro *et al.*, 2011; Swaminathan *et al.*, 2011), but they are increasingly relevant in middle-income and high-income countries (Doss, 2013). Financial assets and credit enable investment in agricultural projects, so unequal access to financial assets and credit are likely to explain gender differences in agricultural productivity to some extent (see Chapter 2).

These asset categories must be defined in detail and adapted to the country context.

Defining Ownership

Ownership is a complex concept, so measurement poses conceptual and practical challenges. For some large assets such as land, a dwelling or other real estate, legal documentation of ownership may exist. But this is frequently not the case, especially in developing countries, and for most other assets there is no registration of ownership.

The most common form of question about ownership in survey questionnaires is “reported ownership”, where respondents are asked to identify the owner of an asset on the basis of their own perceptions or knowledge (Doss, 2013).

Data on assets such as land, dwellings or real estate are often sought by asking for the identity of “documented owners” according to titles, deeds, wills or other legal documentation. But limiting the questions to documented ownership poses challenges:

- Some women may be perceived as owners and reported as such, but their names may not appear on official documents. This substantially affects women’s security of tenure, especially in cases of divorce or death of the spouse (Doss *et al.*, 2015).
- In some countries a substantial share of land is communal, and individual households have use rights only. Hence ownership cannot, strictly speaking, be attributed to individual men or women.
- *De jure* ownership does not imply *de facto* ownership. What matters is the right to use and control an asset, including the right to manage or alienate it and to make decisions as to any proceeds generated through productive assets. If, for example, a woman is registered as the owner of a parcel of land cultivated by other household members under her husband’s management – who makes the decisions about any proceeds? In such a case, simple documented ownership would underestimate gender discrepancies in land ownership. On the other hand, women may have rights to use and control assets that they do not formally own: lack of knowledge about these rights would overestimate gender inequality.

With regard to the last point, information about formal ownership and rights over assets together determine the accuracy of measurements of gender equality in asset ownership in agriculture. Doss *et al.* (2015) explain that ownership implies holding all rights, including the rights to rent, sell or bequeath the asset, and to make decisions as to its use or improvements to it. The same authors

suggest that the right to alienate or transfer an asset to others ultimately determines ownership.

Johnson and Quisumbing (2009) note that *A Toolkit on Collecting Gender and Asset Data in Qualitative and Quantitative Programme Evaluations* (IFPRI and International Livestock Research Institute [ILRI], 2012) sets out five types of right over an asset that collectively define ownership:

- i. access: the right to use the asset; a farm worker, for example, has access to land for harvest;
- ii. withdrawal: the right to claim output and/or proceeds generated with the asset;
- iii. management: the right to make decisions about use of the asset;
- iv. exclusion: the right to exclude others from using the asset; and
- v. alienation: the right to sell or transfer the asset to others.

According to the “bundle of rights” approach of Doss *et al.* (2015) and the categorization of rights by IFPRI and ILRI (2011), it is useful to identify universal definitions of ownership rights that enable the creation of comparable spatial and temporal gender statistics (Doss, 2013; Doss *et al.*, 2015).

The interpretation of ownership data, however, depends on matters such as national gender norms, marital and inheritance regimes and laws defining women’s rights, which vary by country. Marital regimes, for example, determine whether assets acquired before or during marriage are common or separate property. Deere *et al.* (2013) show that in Ghana, India and Uganda assets obtained before and during marriage are considered to be separate property, whereas in Ecuador all assets obtained before marriage remain separate property, and assets obtained during marriage are common property;⁵⁹ they conclude that the separation regimes in Ghana, India and Uganda result in fewer documented women asset owners than in Ecuador.⁶⁰ This does not reflect the actual use and control of assets in these countries, however: it highlights the caution with which data on documented ownership must be interpreted and the importance of standardizing questions about alienation rights in surveys.

In the GAGP countries – Ecuador, Ghana and India – respondents were asked with regard to each asset who the owner was; this provided “reported

⁵⁹ See section 5.2.

⁶⁰ This also concerns joint and individual ownership of assets, discussed below.

ownership”. For real-estate assets, they were also asked about legal documentation of ownership and the names on the documents; this provided “documented ownership” (Doss *et al.*, 2011). In Ghana and India, the questionnaires for individuals included questions about the rights to sell, bequeath, collateralize or rent assets for which they had documented ownership, and whether they had to consult others or ask for permission to do so (Doss *et al.*, 2012).

The EDGE pilot in Uganda in 2014 collected data on the following bundle of ownership rights (UNSD, 2014):

- i. reported ownership;
- ii. documented ownership;
- iii. economic ownership – control of proceeds from sales of assets; and
- iv. the rights to sell, bequeath, rent and improve assets and to use them as collateral.

The experiences in Uganda showed high correlation among all asset rights, with the rights to sell or bequeath being the most robust (UNSD, 2014): EDGE therefore recommended the collection of information only with regard to the rights to sell and bequeath in the 2015 pilots.⁶¹

LSMS-ISAs in Ethiopia in 2013/14, Malawi in 2013, Niger in 2011/12, Nigeria in 2012/13, Tanzania in 2012/13 and Uganda in 2011/12) considered different rights over assets. With regard to agricultural land, for example, most of the questionnaires asked for reported ownership and documented ownership but did not ask about names on documents because it was known that women’s names could not be used. Questions about the rights to sell, collateralize, use and decide on the proceeds of plots were frequently included. With regard to agricultural land in Malawi and Uganda, there was a question as to the legal right to claim the asset if a challenge were to be taken in court.

For assets other than land, reported ownership was the most common question topic. With regard to livestock, most LSMS-ISAs asked who cared for assets in terms of time spent; a similar question was sometimes applied to businesses.

⁶¹ There is no information as to which rights over asset questions were included in other EDGE pilots in 2015.

These questions showed who used the asset most, and hence distinguished rights from assets. As discussed above, access is an important issue but it does not ultimately determine ownership in the way that alienation rights can (Doss *et al.*, 2015).

Table 5.8 summarises the questions used in the data-collection initiatives discussed here.

Question	Details	GAGP	EDGE	LSMS-ISA
Reported ownership		x	x	E, M, NA, NR, T, U
Documented ownership (mostly real estate)		x	x	E, N, M, T, U
Legal right to claim asset if taken in court (applies to assets more generally)				M, U
Rights to...	... sell	x	x	E, NA, M, T
	... bequeath	x	x	
	... collateralize	x		E, NA, M, T
	... rent	x	x	
	... use			M, U, T
	... improve		x	
Decision making about...	... how it is used		x	E, NA, NR, U, T
	... who uses it and who does not			
	... spending the income generated			E, NA, M, U
Consultation/permission required?		x	x	E
Who actually uses the asset?				E, NA, M, T
Who cares for the asset in terms of time spent, repairs and maintenance?				E, NA, NR, M, U
Who collects income generated from the asset?				NR

E=Ethiopia, M=Malawi, NA=Nigeria, NR= Niger, T=Tanzania, U=Uganda. The exact questions of ownership rights vary by asset. The GAAP Toolkit questions were not all implemented or tested. The EDGE questions constitute recommendations for the pilot.

The discussion of defining asset ownership reflects the need to go beyond the concepts of “reported” and “documented” ownership to capture an accurate picture of access to and control over assets. Alienation rights in particular appear to be essential. The EDGE experience in Uganda showed strong correlation among rights, and the preliminary suggestion was accordingly to enquire only about the rights to sell and bequeath.

For the purpose of mainstreaming the collection of sex-disaggregated data in agricultural surveys, we recommend investigation of least reported ownership

and the rights to sell and bequeath. With regard to agricultural land and real estate, documented ownership and the names on the documents should be elicited to provide information about security of tenure. It would also be useful to determine whether an individual requires permission from or consultation with other household members when exercising the right to an asset. As shown in Table 5.6, the implications for gender equality are likely to differ according to whether consultation is required or not: if permission or consultation were required, it would be interesting to learn about the sex of the household members to be consulted.

Individual and Joint Ownership

The assets owned in a household cannot always be assigned to a particular member: some may be owned in general, some by a few household members, some by household and non-household members, and some solely by individual household members.

Differentiating between individual and joint ownership is essential for accurate gender analysis because women own assets jointly with other individuals more frequently than men. It is therefore insufficient to observe that a certain percentage of asset owners are women when in fact most of them are joint owners and most men are sole owners (Doss *et al.*, 2015). The two ownership types are likely to be associated with different benefits and responsibilities (Doss and Deere, 2008; Deere and Doss, 2006), and so all owners of an asset must be recorded to give a realistic picture of ownership by men and women.

LSMS-ISA, EDGE and GAGP all distinguish between individual and joint ownership. About the only difference between the programmes is the number of owners who can be identified as owning the different types of asset.

If agricultural surveys are to give an accurate gender-disaggregated picture of the incidence and distribution of individual and joint ownership, it is important that questionnaire make provision for recording all the owners of an asset.

Modes of Acquisition

Assets can be acquired by purchase, inheritance and marriage, and as gifts, transfers and government transfers (Doss *et al.*, 2011; Oduro *et al.*, 2011). The mode of acquisition may depend financial means and on social and legal norms such as inheritance and marital regimes. It is important to explore the channels of asset acquisition to understand gender-related inequalities in ownership and

to inform policies that promote gender equality. In many places where legal norms favour inheritance by men rather than women (Doss *et al.*, 2012), policy and legislative interventions could resolve the inequality.

Marital regimes are likely to determine asset acquisition, for example in cases where an individual acquires an asset because it was purchased by the spouse. Three types of marital regime can be identified: i) separation of property: all types of assets acquired before or during marriage remain separate property; ii) partial community of property: assets acquired during marriage become common property but assets acquired before marriage and through inheritance remain separate property; and iii) absolute community of property: all assets acquired before or during marriage become common property (Deere and Diaz, 2011; Doss and Deere, 2008; Deere and Doss, 2006).

Most countries have a default marriage regime in place, but a couple may decide to divide assets differently, they may marry under customary law or religious law instead of civil law and there may be different regional laws governing property arrangements (Doss *et al.*, 2011; Doss, 2013). Marital regimes are context specific, but they shape our knowledge of legal asset ownership by couples (Doss, 2013).

Social norms also influence modes of asset acquisition. Women tend to be gainfully employed less often than men, for example, and so have less money to purchase assets (Doss *et al.*, 2012) and they may have less access to markets.

Information as to the mode of acquisition for an asset clarifies the reasons for gender discrepancies in rights to assets and the nature of the rights enjoyed. Wife and husband may legally own an asset, for example, but the husband alone may hold the alienation rights: this may be because the husband brought the asset to the marriage. The wife may hold alienation rights over other assets that she brought into marriage.

GAGP includes the following modes of asset acquisition: inheritance, purchase, gift or transfer and government or other programme (Doss *et al.*, 2011). In cases where an asset was obtained by inheritance, as a gift or by transfer, the questionnaires asked from whom it had been received; in cases of purchase, they asked how the purchase was financed and whose earnings or savings were used (Doss *et al.*, 2011). Most questions about modes of acquisition were

placed in individual questionnaires, but in some countries and for some assets they were shifted to household questionnaires (Doss *et al.*, 2011).

GAGP underlines the importance of country-specific or even region-specific research on inheritance and marital regimes and customary, civil or religious forms of marriage. The questionnaires therefore include a module on marital and inheritance regimes to clarify patterns of asset ownership and provide information about respondents' knowledge of property rights.

In preparation for the EDGE project, Doss (2013) emphasized the importance of asking individuals how they came to acquire assets instead of the household head, because modes of acquisition for the same asset may differ among household members. When a wife inherits an asset, for example, her spouse may acquire it through marriage: interviewees should therefore indicate the assets they own individually. With regard to dwellings, he suggested asking about purchase, inheritance and buildings; for other real estate and agricultural land he suggested questions about purchase and inheritance as modes of acquisition. For livestock, questions should focus at least on acquisition by purchase, gift, inheritance or birth to an owned animal.

The LSMS-ISAs in Ethiopia in 2013/14, Malawi in 2013, Niger in 2011/12, Nigeria in 2012/13, Tanzania in 2012/13 and Uganda in (2011/12) enquired about mode of acquisition at least for the most valuable assets such as land and dwellings. For the latter the most common answers were purchase, by renting for cash or in-kind and used free of charge. For agricultural land the most common answers were purchase, rented, used free of charge, distributed by community or family, inherited and gift or transfer. The acquisition questions were not always asked with regard to smaller assets, and the answer options depended on the country being surveyed.

The acquisition questions were in a household questionnaire, so respondents were proxies for modes of acquisition of assets not owned by them. Doss (2013) pointed out, however, the importance of asking individuals how they acquired assets, not how the household acquired them: this provided information as to who brought assets into households or marriages.

The discussion above shows the benefits of enquiring about asset acquisition when legal ownership, rights and security of tenure are matters of interest. With regard to mainstreaming the collection of sex-disaggregated data in agricultural surveys, modes of acquisition that reflect legal and social norms such as inheritance, marriage, gift or transfer and purchase should therefore be included.

The GAGP approach of including a whole module on marital and inheritance regimes is beyond the scope of agricultural surveys, so analysis of country-specific legal frameworks and social norms should precede them.

It is desirable to obtain modes of acquisition that are comparable among countries and time to facilitate data analysis, even though they are context-specific.

Valuation of Assets

The value of an asset can be considered to be an imperfect proxy measure of its quality. The valuation of assets is important for calculating gender wealth gaps, so looking simply at ownership may fail to reveal inequalities in terms of number of assets owned and their quality.

The valuation of assets is affected by measurement errors in that respondents report an estimate of current value, knowledge of which often depends on whether the respondent has reference points such as acquisitions or sales of the asset type; if there is no market for an asset, there can be no such reference points (Deere and Diaz, 2011; Doss *et al.*, 2011 and 2013; Doss, 2013). In remote areas of Ecuador, for example, there was often no housing market, and consumer durables were used until the owners died (Deere and Diaz, 2011); assets of high liquidity such as livestock were therefore likely to be more accurately valued. For assets with low transaction values such as dwellings, Doss (2013) suggested asking questions about the characteristics of the dwelling to help to verify the value. Land values are particularly difficult to elicit accurately, particularly in the absence of a land market as in most low-income and many middle-income countries.

It is difficult to identify the best method for asking valuation questions because there is no “true” value of an asset (Doss *et al.*, 2013). Among the possible ways of eliciting asset values, Doss (2013) listed: i) the amount that would be received if the asset were sold immediately; ii) the amount the respondent would require to be willing to sell; and iii) the current purchase price of the

asset or the price paid for the asset and the date of purchase. A common way to enquire about asset values is to ask the market price, as in the GAGP, EDGE and LSMS-ISA discussed below.

The GAGP sought information on asset values in terms of: i) the price that would be received if the asset were sold at the time of the interview – the potential market price;⁶² ii) the replacement or construction cost;⁶³ and iii) the rental rate.⁶⁴ The potential market price was sought for all assets, whereas the other two valuation questions depended on the assets concerned: in Ghana and India only the construction cost of replacing dwellings was sought and in Ecuador the information was sought with regard to the value of the lot (Doss *et al.*, 2011 and 2013).

The three surveys differed in the placement of valuation questions and selection of respondents. In India they were in the individual questionnaires, in Ghana they were in the household inventory questionnaires and only answered by the primary respondent, and in Ecuador they were in the household inventory questionnaires and answered by the primary couple together. The best responses⁶⁵ were obtained when respondents were interviewed together in the household inventory: this was because the primary man and women respondent tended to have access to different information and so complemented each other with regard to acquiring or selling assets as they discussed the value of an asset (Doss *et al.*, 2011 and 2013).

Because of the “missing market” issue pointed out above, respondents were given the choice between reporting “There is no market” or “I don’t know” or “I refuse to divulge the value” (Doss *et al.*, 2013). This helped to indicate the reasons for not reporting a value, but the observation was a missing value nonetheless and hence problematic for calculating the wealth gap. Doss *et al.* (2013) also found that the potential market value was the most robust valuation

⁶² For a dwelling: “If you were to sell the dwelling today, how much would you receive?” For other assets: “For how much do you think you could sell this asset today in its current condition?” (Deere and Diaz, 2011).

⁶³ “How much would it cost to construct a dwelling like this today?”

⁶⁴ “For how much could a dwelling like this, in this neighbourhood, be rented per month?”

⁶⁵ Difficult to define, because the true value is unknown. Doss *et al.* (2013) proposed two ways of identifying the most reliable measure: i) assessing the incidence of missing values; and ii) examining certain statistical properties of the values obtained.

question measured in most non-missing values and certain statistical properties,⁶⁶ but they acknowledged that more research was necessary.

EDGE enquired about asset valuation in the individual questionnaires – the value of dwellings, land parcels, large agricultural equipment, enterprise assets, real estate and financial assets – for which respondents were asked to estimate in local currency how much could be received for the asset if it were to be sold immediately. Answer options included an indication of the value, inability to make an estimate or refusal to respond.

For dwellings, land, agricultural equipment and real estate the EDGE pilots also asked about the existence of markets for assets and knowledge of market transactions, usually by asking whether local asset owners sold or rented assets and whether the respondent knew the value of recent transactions. These questions addressed the missing market problem and helped to show whether respondent were able to provide accurate estimates.

The LSMS-ISAs in Ethiopia in 2013/14, Malawi in (2013, Niger in 2011/12, Nigeria in 2012/13, Tanzania in 2012/13 and Uganda in 2011/12 differed in their approach to enquiring about asset values. For agricultural land, most questionnaires asked for the potential market price; for dwellings the most common valuation question related to the potential annual rental rate for dwellings. For commonly traded assets such as agricultural equipment and livestock, the market value was normally acquired by asking for purchase and sale values. For agricultural land, dwellings and livestock questions about their characteristics were often included to proxy for values or respondents' ability to make valuations.

WCA 2020 does not propose to enquire about the value of land and livestock because the information is beyond the scope of an agricultural census.

⁶⁶ These properties include the extent of scatter as indicated by the coefficient of variation, skewness and kurtosis (Doss *et al.*, 2013).

This review shows the importance of including asset valuation questions when the gender wealth gap is the topic of interest, and that the framing and placement of questions and respondent selection can affect the results.

For the purpose of mainstreaming the collection of sex-disaggregated in agricultural surveys, asset valuation questions should be included if there is interest in measuring the gender wealth gap, and if so the asset valuation question should be preceded by a question about the markets and transactions with regard to the asset of interest, as in the EDGE project, with a view to assessing the accuracy of the response. Evidence from Ecuador suggest that there are benefits in interviewing couples together so that they complement each other's knowledge.⁶⁷

In view of the length of questionnaires, it may be sufficient to enquire only about potential prices if assets were sold immediately, which was the most robust valuation measure based on the GAGP surveys.

5.3.3. Lessons Learned

This review has focused on the choice of assets to be disaggregated by sex, the definition of ownership, individual and joint ownership, modes of acquisition and valuation of assets; the first and second are probably the most challenging.

On the basis of the literature and current practices, agricultural land emerges as the essential asset for which sex-disaggregated data should be collected: it has considerable value, it is a primary production factor for agriculture and it is a guarantee of financial security. Livestock and agricultural equipment should also be considered because the first is a significant asset for rural women and the second may explain gender differences in agricultural productivity. Dwellings, real estate, non-farm businesses and consumer durables should be included when the wealth gap is the subject of interest.

Ownership is a complex concept whose measurement poses conceptual and practical challenges. The discussion points out the necessity of going beyond the concepts of reported and documented ownership to capture an accurate picture of access to and control over assets. Alienation rights appear to be essential, though the EDGE experience in Uganda revealed a high correlation

⁶⁷ Validation of this conclusion in a different context is needed.

among rights and their preliminary suggestion was to enquire only about the rights to sell and bequeath.

For the purpose of mainstreaming sex-disaggregated data collection in agricultural surveys, reported ownership and the rights to sell and bequeath should be investigated as a minimum. For agricultural land and real estate, documented ownership and the names on the documents should be elicited to provide information about security of tenure, and it is worthwhile to ask whether individuals require permission from or consultation with other household members when exercising rights to assets.

Utilization and interpretation of ownership data depends largely on the country context because tenure systems, gender norms, marital and inheritance regimes and laws governing women's rights vary by country.

5.4. Social Capital: Indicators and Methodological Aspects of Data Collection

5.4.1. Social Capital Indicators

As discussed in Chapter 2 and Chapter 4, social capital is important for agricultural production. The Agri-Gender Statistical Toolkit recommended collecting data on participation in farmer's organizations. Tayyib *et al.* (2013) and WEAI suggested disaggregating participation by group type: the former focused on seeking "agricultural" information but the latter did not restrict participation to agricultural or economic groups because different groups provide opportunities for networking and improving social capital (Alkire *et al.*, 2013). The indicators proposed by the three frameworks are slightly different, but there is evident consensus with regard to measuring the following:

i. Membership of groups or organizations, by type.

As suggested by WEAI, the groups should represent: i) agricultural production and marketing; ii) water users; iii) forest users; iv) credit or microfinance; v) mutual help or insurance, including burial societies; vi) trade and business; vii) civil society or charities; viii) local government; ix) religious organizations; and x) women's groups.

ii. Comfort with speaking in public.

As suggested by WEAI, this indicator consists of responses to questions about the ease with which individuals can contribute publicly to decisions on infrastructure to be built, to ensure that wages are paid in full in public

works programmes and to protest about malpractice by authorities;⁶⁸ the indicator is not agriculture-specific, but it reflects the ability of individuals to influence matters affecting agricultural production (Alkire *et al.*, 2013).

Sex-disaggregated data on social capital must be derived from surveys, or from the membership registers of groups such as farmers' organizations. The quantity and quality of data derived from the latter are likely to be different in different regions, however, so it is questionable whether such data can be used for national and international comparisons.

There is a general lack of sex-disaggregated data on participation in the various types of organization, so it is essential that such data be collected in agricultural surveys. The inclusion of questions that enable the construction of the relevant indicators is not difficult in terms of the number of questions or conceptualization, as discussed below.

Applications

This section presents social capital indicators based on data collected in the WEAI surveys and as published in Alkire *et al.* (2013) and the statistics that may be derived from sex-disaggregated data on social capital.

Table 5.9 presents evidence from the application of the WEAI social capital index in Bangladesh, Guatemala and Uganda. In Bangladesh, inadequacy in "group membership" is balanced, but in Guatemala and Uganda the level of women's inadequacy is higher than that of men. In Guatemala and Uganda women are more disadvantaged with regard to speaking in public, but the opposite is true in Bangladesh. It is interesting to note that although women in Bangladesh are generally less empowered than men when evaluating all dimensions of the WEAI, they are actually better off in terms of social capital.

⁶⁸ In the WEAI approach an individual has "adequacy of speaking in public" if s/he is comfortable speaking in public on at least one of the named issues.

Table 5.9 – WEAI Leadership Indicators: Disempowerment in “Group Membership” and “Speaking in public”

Census headcount	Bangladesh		Guatemala		Uganda	
	Group member	Speaking in public	Group member	Speaking in public	Group member	Speaking in public
Women	0.491	0.284	0.451	0.283	0.319	0.146
Men	0.494	0.399	0.239	0.071	0.218	0.038

Source: Alkire *et al.* (2013).

Note: At the individual level the indicators take the value 1 if the individual experiences inadequacy in that indicator, and 0 otherwise.

5.4.2. Data Collection

Group membership questions may be incorporated in the household or individual questionnaire. The Uganda LSMS-ISA agriculture questionnaire in 2011/12, for example, asked whether anyone in the household was a member of a farmers’ group but did not disaggregate this information at the individual level. In this case a complementary question should have been added to discover which household members were members of farmers’ groups and to give respondents the chance to list several household members.

The question could be extended to include more groups, as in the WEAI group membership index. In this case the question should be: “Who in the household is a member of [list of groups]?”.

Social capital data can also be collected in individual questionnaires, as in the WEAI pilot studies where the question was: “Are you a member of [list of groups]?”.⁶⁹

The WEAI questions about speaking in public were also placed in an individual questionnaire:

- Do you feel comfortable speaking in public about anything that is important to you, your family, or your community? Answer options: No, not at all comfortable; Yes, I speak up with some difficulty; Yes, comfortable.

⁶⁹ See <http://www.ifpri.org/publication/womens-empowerment-agriculture-index?page=1> for questionnaires and manuals for pilot studies in Bangladesh, Guatemala and Uganda.

- In the last three months, have you spoken up in public about anything that is important to you, your family, or your community? Answer options: Yes; No.

5.4.3. Lessons Learned

In terms of mainstreaming sex-disaggregated data collection in agricultural surveys, an individual questionnaire about matters such as speaking in public is likely to be beyond their scope in many countries. But individual-level information about group membership can be easily integrated into household questionnaires, as shown above; information about membership of farmers' groups and microcredit associations is particularly useful. Because the roles of such groups are different in different countries, it is important to include groups that are relevant in various contexts and those that are context-specific.

If the questions are part of individual questionnaires, the reasons for non-participation in organizations can be elicited. This would be important if cultural or domestic norms impeded women's participation, in which case advocacy to amend national policies should be implemented.

5.5. Time-Use and Work: Indicators and Data-Collection Issues

5.5.1. Time-Use and Work Indicators

Traditional gender roles affect the division of labour in households and the ways in which women use their time. Women often have the double burden of fulfilling domestic obligations and contributing to household livelihood.

Our interest is in measuring women's contribution to agricultural production, particularly in the smallholder context where a large part of production results from unpaid work and is consumed in the household: this makes it difficult to quantify the contributions of women and men and to estimate their monetary value in the household. Time-use indicators help to reveal the invisible contribution of women and measure their time poverty relative to men. Some indicators that capture women's work burden relative to men in farm households are shown below.

Ferrant (2014)⁷⁰ proposes two time-use indicators to reveal discrepancies in paid and unpaid work⁷¹ between men and women and capture gender roles in terms of the division of labour division in the post-2015 agenda:

- (1)
$$\frac{\text{Average time devoted to household activities by women}}{\text{Average time devoted to household activities by men}}$$
- (2)
$$\frac{\text{Total workload of paid and unpaid work of women}}{\text{Total workload of paid and unpaid work of men}}$$

The first indicator measures the gender gap in domestic work. It shows how much more women contribute to household work than men, and hence their time-poverty with regard to engaging in paid work, education, training and social networks (Ferrant, 2014). The country context is significant in determining the time spent on household activities: in settings where most young children go to pre-school, for example, women spend less time on household activities, and in areas with piped water women save the time spent in collecting water.

The second indicator measures the gender gap in discretionary time, defined as the 24 hours available in a day minus the hours of paid and unpaid work (Ferrant, 2014). During this time, individuals are free to decide on their personal activities; if discretionary time is insufficient, time poverty becomes an issue.

Because they are expressed as ratios, the indicators focus on the gap between men and women but do not reveal time poverty for either sex. For this reason it would be better to decompose the ratios, presenting the numerators and denominators separately and disaggregating by sex.

The WEAI also proposes two indicators to capture the fifth dimension of the index – time (Alkire *et al.*, 2013).

⁷⁰ Target 5.4 of SDG 5 is: “Recognize and value unpaid care and domestic work through the provision of public services, infrastructure and social protection policies and the promotion of shared responsibility within the household and the family as nationally appropriate.” See: <https://sustainabledevelopment.un.org/?menu=1300>

⁷¹ Ferrant (2014) does not define paid and unpaid work. Paid work usually refers to time given to remunerated activity; unpaid work refers to unremunerated activity whether contracted, as in an internship, or non-contracted, as in domestic work or study (Antonopoulos, 2009; Veerle, 2011).

The first – productive and domestic workload – is similar to Ferrant’s second indicator. More specifically, in the underlying WEAI data individuals are expected to indicate the primary and secondary activities carried out in the preceding 24 hours;⁷² hours worked are then defined as the hours spent on work-related primary activities plus 50 percent of the hours spent on work-related secondary activities (Alkire *et al.*, 2013). The “double counting” of simultaneous activities reflects the fact that women’s care-giving responsibilities frequently coincide with other activities. An individual is considered to have inadequate time – excessive workload – if s/he has worked more than 10.5 hours in the preceding 24 hours. The 10.5 hours cut-off is an arbitrary choice.

The second – satisfaction with the time available for leisure – is a yes/no variable indicating whether an individual is subjectively satisfied with the time available for activities such as sport or watching TV (Alkire *et al.*, 2013). The WEAI considers an individual’s time to be adequate if s/he is satisfied with the leisure time available.

The indicators presented above are adequate for measuring women’s work burden, but none of them refers to women’s invisible contribution to agricultural production, a major topic in this research. Raney *et al.* (2011) use time-use surveys to estimate the time women spend on agricultural activities and make comparisons between countries. Their indicators are “proportion of labour in all agricultural activities that is supplied by women” and “proportion of labour for selected crops that is supplied by women”. Palacios-Lopez *et al.* (2015) examine women’s contribution to household agricultural labour by using labour-input data at the plot level disaggregated by sex to calculate the “average female labour share in crop production”.⁷³

⁷² In the case of a woman looking after her children while preparing food, food preparation is the primary activity and childcare is the secondary activity.

⁷³ Labour is defined as the number of weeks, days or hours of work provided by each household member on each plot, differentiated by activity. It does not appear to differentiate between paid and unpaid labour.

To estimate women's contribution to agriculture, it is essential to specify their labour input for all agricultural activities, by type of crop and by activity. The hours worked by men and by women are likely to be different, so a simple count of men and women engaged in agricultural labour would provide misleading statistics (Doss, 2014). With this in mind, the following indicators emerge:

- i. average labour share in agriculture by sex – measured hours worked;
- ii. average labour share by sex and by crop⁷⁴ – measured hours worked; and
- iii. average labour share by sex and by agricultural activity⁷⁵ – measured hours worked.

These indicators include paid and unpaid work because much agricultural labour is unpaid family work and we are interested in the overall contribution of women to agricultural output.

Traditional gender roles mean that women engage more frequently in domestic or unpaid work than men, which results in higher economic dependence and vulnerability to poverty. To quantify the extent to which women are involved in paid work and how much they earn, the following indicators are proposed:

- i. Average labour share in paid agricultural work by sex and by activity – measured hours worked;
- ii. The incidence of paid agricultural work by sex and by activity – measured hours worked;
- iii. Gender gap in agricultural wages by activity – measured hours worked.

Indicator (iv) gives the proportion women among paid agricultural workers, and (v) gives the proportion of women in farm households who are paid agricultural workers. They may be disaggregated further into occupation or agricultural activity to show which paid agricultural activities are done by women. Indicator (vi) measures gender discrimination in remuneration, and has been proposed as part of the Minimum Set of Gender Indicators and the ILO Decent Work

⁷⁴ The crops to disaggregate by are region-specific. An obvious distinction applicable to all regions is between cash and subsistence crops.

⁷⁵ The activity depends on context and season; it may include work such as land preparation, planting, weeding, harvesting, tending livestock and fishing.

Agenda.^{76,77} The wage gap may be disaggregated by agricultural activity and crop to compare remuneration by sex.

In summary, the proposed time-use and labour indicators show the role of women in agriculture by measuring:

- the work burden in farm households, by sex;
- overall contributions and remuneration in agriculture, by sex; and
- involvement in particular agricultural activities, by sex.

The data needed to construct these indicators are usually gathered from official labour statistics⁷⁸ or time-use surveys. The former, however: i) tend to underestimate women's employment in labour markets because they disregard unpaid work in households and undervalue unpaid work in household agriculture, subsistence and production (Raney *et al.*, 2011); and ii) do not enable disaggregation into types of crops or agricultural activity, or measurements of work in small units such as hours worked.

Time-use surveys may collect information on all types of work, crops and agricultural activities, and measure the exact time spent, but they are often based on small samples that are not nationally representative and they tend to use activity categories that are not standard in all countries. Hence they may not deliver national statistics and cannot be compared across regions (Raney *et al.*, 2011).

Applications

This section presents evidence from time-use and labour indicators to demonstrate the benefits of collecting such data.

Table 5.10 shows the WEAI time-use indicators “productive and domestic workload” – referred to as workload – and “satisfaction with time available for leisure” – referred to as leisure time – for women and men in Bangladesh,

⁷⁶ The Decent Work Agenda of the International Labour Organization promotes inclusive employment and decent work for all through four strategic objectives, with gender equality as a cross-cutting objective: i) promoting jobs; ii) guaranteeing rights at work; iii) extending social protection; and iv) promoting social dialogue. See: <http://www.ilo.org/global/about-the-ilo/decent-work-agenda/lang--en/index.htm>

⁷⁷ See: <http://genderstats.org/> for the MSGI and http://www.ilo.org/wcmsp5/groups/public/---dgreports/---integration/documents/publication/wcms_229374.pdf for Decent Work Indicators.

⁷⁸ Official labour statistics may come from sources such as labour force censuses and surveys or tax registers.

Guatemala and Uganda. The headcount for excessive workload is five times as large for women than men in Guatemala and twice as large in Uganda, but it is lower in Bangladesh. The figures for inadequate leisure time show similar patterns in Bangladesh and Guatemala, whereas in Uganda inadequate leisure time is much higher among women.

Table 5.10 – WEAI Time-Use Indicators: Inadequacy Headcount in “Productive and Domestic Work Load” and “Satisfaction with Discretionary Time”

Census headcount	Bangladesh		Guatemala		Uganda	
	Excessive workload	Inadequate leisure time	Excessive workload	Inadequate leisure time	Excessive workload	Inadequate leisure time
Women	0.147	0.259	0.257	0.097	0.307	0.248
Men	0.225	0.263	0.051	0.091	0.126	0.149

Source: Alkire *et al.* (2013).

Note: The indicators take the value 1 if the individual experiences inadequacy in that indicator, and 0 otherwise.

The workloads and leisure time of rural women and men in Benin, based on Brunnich *et al.* (2005), are shown in table 5.11. They emphasize that rural women spend less than half the time on leisure and education than men, and spend about a third more of their daily time on work than men. Overall, the findings show that rural women suffer much more than rural men from time poverty.

Table 5.11 – Percentage of Time and Hours Spent on Leisure, Education and Work, by sex, in rural Benin in 1998

	Rural women	Rural men
Leisure	2.3%	5.2%
Education	2.2%	4.9%
Total time spent working – market, non-market and domestic activities	34.7%	24.2%
Work – market, non-market and domestic activities	11 hours	8 hours 35 minutes
Domestic activities alone	3 hours 15 minutes	0 hours 50 minutes
Social and leisure activities	1 hour	2 hours 35 minutes

Source: Brunnich *et al.* (2005).

Data availability with regard to women’s labour contribution to agriculture is low. ILO provides only women’s share of employment⁷⁹ in agriculture on the basis of national labour-force surveys (see Figure A2.1), but the statistics are problematic in that they include only paid work and self-employment, and hence often under-report the amount of unpaid and family work in agriculture. The ILO database does not provide data on the shares of agricultural labour carried out by women and men disaggregated by crop or activity, and statistics on paid employment by sex are only available for non-agricultural employment.

More agriculture-specific data can be obtained directly from time-use surveys or modules in agricultural surveys. Palacios-Lopez *et al.* (2015), for example, used labour-input data from LSMS-ISA countries to calculate the average labour share by crop and by sex.⁸⁰ Table 5.12 shows that women’s share of labour in agriculture varies considerably by country and by crop: in Niger, for example, women provide only 5 percent of labour in root and tuber cropping, but 32 percent of labour in fruit, vegetable and permanent cropping.

Table 5.12 – Women’s Share of Agricultural Labour by Crop and Country (%)

Crop type	Tanzania	Malawi	Niger	Uganda	Northern Nigeria	Southern Nigeria	Total
Cereals	52	54	21	55	28	43	37
Legumes	54	53	29	59	28	51	38
Roots and tubers	52	50	5	60	50	54	51
Fruit, vegetables and permanent crops	45	49	32	53	36	39	41
Non-edible crops	54	47	9	50	31	61	40
Total	52	52	24	56	32	52	42

Source: Palacios-Lopez *et al.* (2015).

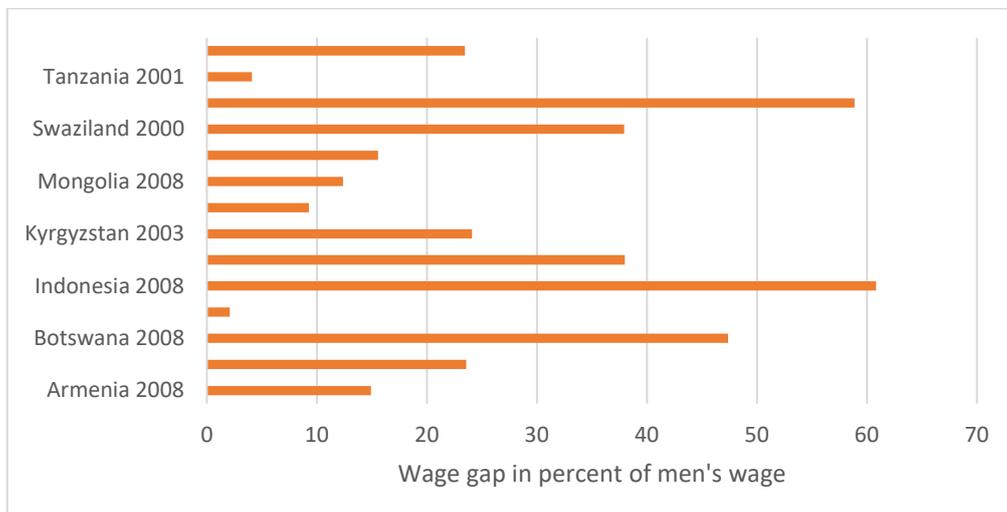
⁷⁹ According to ILO definitions, the employed comprise all persons of working age who during a specified brief period were in the following categories: i) paid employment, whether at work or with a job but not at work; and ii) self-employed, whether at work or with an enterprise and not at work.

⁸⁰ Palacios-Lopez *et al.* (2015) do not indicate what the time measure is, but most LSMS-ISA surveys record the hours spent working in agriculture.

There is no comprehensive database of sex-disaggregated data on paid and unpaid agricultural work. ILOSTAT compiles data on the share of paid employment only for non-agricultural activities, and statistics on the number of own-account and contributing family workers in agriculture by sex are available only for Malawi.⁸¹ Time-use surveys or integrated agricultural surveys should to be consulted directly to calculate the distribution and incidence of paid agricultural work by women and by men.

Table 5.14 presents the gender wage gap⁸² in agriculture for certain countries. The gap was calculated on the basis of data on monthly earnings in agriculture provided by the LABORSTA database. The original data were compiled by LABORSTA from labour force surveys, labour-related establishment surveys and censuses, household surveys, tax and insurance records, and administrative reports.⁸³ Table 5.14 shows large wage gaps in agriculture, with half of the countries presented having a wage gap larger than 20 percent.

Table 5.14 – Gender Wage Gaps in Agriculture



Source: Author's calculations based on monthly wages from LABORSTA (see: <http://laborsta.ilo.org/>)

⁸¹ ILOSTAT provides statistics on the share of informal employment by sex in agriculture. Informal employment comprises own-account workers and family workers, and employers and members of producers' cooperatives working in their own informal-sector enterprises – which does not necessarily mean that they are unpaid.

⁸² The wage gap is calculated as the difference between monthly wages received by men and by women divided by the monthly wage received by men.

⁸³ Another data source for earnings in agriculture is: <http://www.fao.org/economic/riga/rural-income-generating-activities/en/>

Application of the proposed gender indicators shows the statistics that can be constructed on the basis of sex-disaggregated time-use and labour data in agriculture. The indicators enable the calculation of women's work burden relative to men, women's contribution to agriculture by crop and activity, their participation in paid work, and gender discrimination in wages. Few data are available, however, on agriculture and sex-specific time use and employment, so analysis of gender in agriculture has to rely on non-standard and nationally non-representative time-use surveys.

5.5.2. Data Collection

Time-use questionnaires are a powerful tool for analysing gender differences in unpaid domestic work for producing goods and household-specific services, paid work in the formal and informal sectors and the overall work burden in economic and non-economic activities (Antonopoulos, 2009). This chapter discusses issues that are relevant for gender in agriculture.

General aspects of collecting time-use data in agriculture

Two methods for collecting time-use data are self-reported time diaries and standard questions covering a comprehensive activity list (UNSD, 2005).

In the case of time diaries, respondents are expected to report all activities undertaken in a certain period in a personal diary. The activities are not limited to a list, and so the diaries deliver accurate time-use information. Completing the diaries takes a good deal of respondents' time, however, and researchers have to devote time to cleaning and analysing the data (UNSD, 2005; Ferrant, 2014). The method is very informative for individual research questions, but because it seems to be difficult to scale up it is not considered to be promising for mainstreaming sex-disaggregated time-use and labour data in agricultural surveys.

The second approach asks respondents to estimate the total time spent on various activities, answering a question such as: "Yesterday, how many hours did you spent on activity xxx?" (UNSD, 2015). Variables such as activity frequency and context may be collected, for example how frequently an activity is carried out, where, with whom, for whom, with what purpose and whether remunerated or not (UNSD, 2005). This standard-questions method does not capture all activities because it enquires about particular activity categories. Detailed categories such as domestic and leisure activities are more than sufficient for constructing the indicators introduced in section 5.5.1.

The following section focuses on time-use questionnaires with stylized questions, the usual approach in integrated time-use modules of agricultural and household surveys and in collecting data on gender in agriculture.

Activity Classification

To analyse women’s contribution to agriculture, it is essential to specify the activities to be included in questionnaires. There is to the best of our knowledge no proposal for a comprehensive list of essential minimum activities for time-use surveys in the context of women in agriculture, so this section focuses on best practices in agricultural surveys and the UNSD International Classification of Activities for Time-Use Statistics (ICATUS), which enables international comparison of national time-use statistics (UNSD, 2005; Grum, 2014).

First, we consider the comprehensive LSMS-ISA questionnaires for activities related to:

- paid agricultural labour;
- paid non-agricultural labour;
- unpaid labour in agriculture; and
- domestic work.⁸⁴

Second, we compare the LSMS-ISA activity categories with those of ICATUS and conclude with activity recommendations for gender in agriculture.

The LSMS-ISA is an example of an agriculture-specific “standard question time-use survey” that targets particular activities (UNSD, 2005): it collects agricultural labour input data at the plot level in the agricultural questionnaire and non-agriculture specific time-use information in the household questionnaire.

Agricultural labour input

Table 5.13 shows the agricultural labour input data collected in recent LSMS-ISA agricultural questionnaires in Ethiopia, Malawi, Niger, Nigeria, Tanzania and Uganda. In particular:

- all surveys collected labour input of individuals at the plot level, and all except Uganda disaggregated this information by activity type;

⁸⁴ Domestic work is a sub-category of unpaid work, but in view of the importance of domestic work for women it is considered a separate activity category.

- all five questionnaires distinguished between land preparation and harvesting, or disaggregated in more detail; and
- the time unit reported was different in different countries.

On the basis of these data, the average labour share in agriculture by sex, crop and activity can be calculated even for units such as hours or days. Such an indicator would, however, only include labour input at the household plot level and would disregard agricultural labour outside the household. To prevent this, information about labour inputs inside and outside the household at the activity-level could be elicited, as in the 2001 Argentina National Agricultural Survey,⁸⁵ or at the individual level, as in the 2007/08 Armenia Farming Practices Survey and the 2014/15 Lesotho Agricultural Production Survey.⁸⁶ This has the disadvantage of being less flexible, however, in covering the different types of cropping that individuals may be involved in, whereas as the plot-level method makes it possible to link unique plot identification codes with crop information. Being able to link plots and crops makes it easier to include productivity information for the groups working at each plot when crop quantities and prices are collected.

⁸⁵ The activities for which family and non-family labour input data were collected were: manager/professional, technical production/operators of machinery, equipment and facilities, and other agricultural occupation.

⁸⁶ These did not enquire as to the exact time spent on agricultural labour.

Table 5.13 - LSMS-ISA Activity Categories for Agricultural Labour Input

Survey	Sample size	Activities	Unit reported	How the data were sought
Ethiopia Rural Socio-Economic Survey 2013/14	4 000 households	<ul style="list-style-type: none"> Land preparation, planting, ridging, weeding, and fertilizing Harvesting and threshing 	Weeks/household member, days/week, hours/day on each plot	Please list for me the household members that worked for the [activity] of [crop] from this [field].
Malawi Integrated Household Survey 2013	12 271 households	<ul style="list-style-type: none"> Land preparation, planting Weeding, fertilizing, non-harvest activity Harvesting 	Weeks/household member, days/week, hours/day on each plot	Number of weeks, average number of days per week, average number of hours per day
Niger National Survey on Household Living Conditions and Agriculture 2010/11	4 000 households	<ul style="list-style-type: none"> Preparation of soil Out-of-season agriculture Planting and maintenance Harvest 	Days per household member working on each plot/worked in out-of-season agriculture	Write the ID number of each household member who worked on the parcel and the total number of days worked during the period of the [activity] Write the ID number of each household member who worked on the parcel and the total number of days worked
Nigeria General Household Survey – Panel Component 2012/13	5 000 households	<ul style="list-style-type: none"> Land preparation, planting, ridging, weeding and fertilizing Harvesting 	Weeks/household member, days/week, hours/day on each plot	Please list for me the household members who worked during the last planting season on this [plot] on activities such as [activity]
Tanzania National Panel Survey 2012/13	3 924 households	<ul style="list-style-type: none"> Land preparation, planting Weeding Ridging Fertilizing Other non-harvest activities Harvesting 	Hours per day per household member on this plot	During the long rainy season/last completed short rainy season, how many days did [name] spend on the following activities on this plot?
Uganda National Panel Survey 2011/12	3,200 households	Total labour – all activities	Person days per plot; up to three household members	Family labour for all tasks during the first season such as land preparation and sowing, input application, weeding, pruning and harvesting

Source: Living Standard Measurement Study – Integrated Surveys on Agriculture. See:

<http://econ.worldbank.org/WBSITE/EXTERNAL/EXTDEC/EXTRESEARCH/EXTLSMS/0,,contentMDK:23512006~pagePK:64168445~piPK:64168309~theSitePK:3358997,00.html>

Paid Labour

All the LSMS-ISA household questionnaires sought information about primary and secondary jobs such as type of work and employer, time spent working and cash or in-kind wages. The time units referred to were usually the number of months worked in any year, weeks worked in any month and hours per week or day. The detail in which the surveys enquired about casual and temporary work was not standard for all countries.⁸⁷

Unpaid labour

There was no systematic way of enquiring about unpaid labour in the LSMS-ISA countries. Some surveys only asked whether the individual worked in unpaid labour, but not about the time spent. The Ethiopia, Malawi and Tanzania surveys enquired about the time spent working in unpaid apprenticeships,⁸⁸ the survey in Malawi also asked for the number of households and days worked in them unpaid, and the Ethiopia survey for the number of households for which unpaid work had been done. The Uganda and Tanzania surveys enquired about the time spent helping unpaid in any kind of business run by the household.

Domestic work

All the LSMS-ISA questionnaires collected data on the time spent fetching water and fuel in terms of the hours spent the previous day or in the preceding seven days. The Niger and Uganda surveys identified the largest number of domestic activities, and Uganda was the only country to enquire how much time individuals spent on domestic chores.

Detailed information about paid employment in agriculture can be obtained the LSMS-ISA questionnaires in terms of hours or days, assuming that no work other than the primary and secondary job is done.⁸⁹ This makes it possible to calculate the distribution and incidence of the hours worked in paid agricultural

⁸⁷ In Ethiopia and Malawi the surveys asked about time spent working in temporary and casual jobs and the wage earned in cash or kind; in Niger the question was whether individuals worked in casual, part-time or temporary labour. The other surveys did not ask for details of casual and temporary jobs.

⁸⁸ The Malawi and Tanzania surveys asked for the number of months, weeks per month, hours per week and hours in the previous seven days; in Ethiopia the question referred to the hours worked in the previous seven days.

⁸⁹ In Nigeria and Uganda the LSMS-ISA questionnaire also enquired about jobs other than the primary or secondary job.

labour by sex and by activity, and the gender gap in agricultural wages by activity.

The time-use information on unpaid and domestic work, however, does not appear to be sufficient to calculate an individual's overall work burden. Except in Uganda, the surveys only asked about particular domestic tasks but not about a list of specified activities or the time spent on domestic work overall. This is a problem when the workload of women has to be measured, as discussed above. The LSMS-ISA questionnaires hence fail to reveal women's invisible work burden, though this is not what it set out to do. Nonetheless, the domestic activities that were included provide interesting insights as to the time taken up by tasks such as collecting water and firewood.

The surveys were all different in terms of categorization of activities and reported time units, so comparisons among the countries on the basis of LSMS-ISA data may not be reliable.

The LSMS-ISA and International Classification of Activities for Time-Use Statistics

ICATUS is a hierarchical classification of all activities to which people may devote time in any 24 hour period. It is intended to be applicable to developing and developed countries, and is targeted to capture all forms of paid and unpaid work (UNSD, 2005; Grum, 2014). This provides for accurate monitoring of the status of women in informal employment, unpaid work and agricultural work (Grum 2014). The classification distinguishes between the production of goods for income or own use and the production of services, thereby providing a clear delineation of activities in developing countries (UNSD, 2005).

The categories of ICATUS and the categories covered in the LSMS-ISA are listed in Table 5.14. A detailed listing of ICATUS categories is given in Table A2.1 in Annex 2.⁹⁰ The ICATUS categories are not agriculture-specific, but they do include activities usually carried out in farm households.

⁹⁰ See <http://unstats.un.org/UNSD/cr/registry/regcst.asp?Cl=231&Lg=1>

Table 5.14 – International Classification of Activities for Time-Use Statistics

ICATUS divisions		Included in LSMS-ISA household or agriculture questionnaire
01	Corporations, quasi-corporations, government, non-profit institutions	✓ Details about the employer for primary and secondary jobs in the household questionnaire
02	Primary production activities	✓ Time spent working on household agriculture activities in the agriculture and household questionnaire
03	Non-primary production activities	(✓) In some questionnaires to a limited extent
04	Construction activities	(✓) Only in the Uganda household questionnaire
05	Providing services for income	✓ Time spent working in any kind of job in household questionnaire
09	Learning	(✓) Only in the Niger household questionnaire
06	Providing unpaid domestic services for own household use	(✓) Partial activity list
07	Providing unpaid care for household members	X
08	Providing community services and helping other households	X
09	Learning	(✓) Only in the Niger household questionnaire
10	Socializing and community participation	X
11	Attending or visiting cultural, entertainment and sports events and venues	X
12	Engaging in hobbies, games and other pastimes	X
13	Indoor and outdoor sports	X
14	Use of mass media	X
15	Personal care	X

Source: <http://unstats.un.org/UNSD/cr/registry/regcst.asp?Cl=231&Lg=1&Top=1>

Table 5.14 shows that the LSMS-ISA covered most major work-related activities,⁹¹ but that it lacked detailed information about domestic work and leisure activities. The data hence fails to provide the information needed to quantify unpaid work and domestic work.

On the basis of the review of LSMS-ISA questionnaires, the ICATUS activity classification proposal and the indicators introduced in chapter 5.5.1, we recommend that the following activity categories be included when women's time use and labour in the agricultural context are to be measured:

⁹¹ A category is considered "covered" if the main category is covered. The LSMS-ISA did not cover all sub-categories.

(1) Agricultural labour

- i. On household plots and outside the household.
- ii. Crops: If data are not collected at the plot level, information on cropping must be acquired.
- iii. Agricultural activity: depends on season and region; may include land preparation, planting, ridging, weeding, fertilizing, harvesting and threshing. Disaggregation by activity type is relevant from the gender perspective, especially if activities are linked with different wages or associated with specific hazards.
- iv. Paid or unpaid: enquire about compensation status and remuneration in cash and in kind.
- v. Time units: months in previous 12 months, weeks per month, hours per week.

(2) Non-agricultural labour

- i. Inside and outside the household.
- ii. Type of work and information about employer, if applicable.
- iii. Paid or unpaid: enquire about compensation status and remuneration in cash and in kind.
- iv. Time units: months in previous 12 months, weeks per month, hours per week.

(3) Domestic work

- i. Overall time spent on domestic chores; must be sufficient to calculate workloads.
- ii. Information about collecting water and firewood, cooking and cleaning, and caring for children, the elderly and the sick in the household.
- iii. Time units: days in the last seven days, hours per day.

(4) Leisure

- i. Overall time spent on leisure.
- ii. Time units: hours per day.

These categories provide details of paid and unpaid agricultural labour disaggregated by crop and agricultural activity, paid and unpaid non-agricultural work including type of work and information about employers, domestic work and leisure time. The data can be used to calculate the indicators established in section 5.5.1.

5.5.3. Lessons Learned

Time-use indicators enable assessment of the contributions of men and women to agricultural production, and they reveal women's double burden of income-generating activities and domestic work. They make it possible to identify crops usually produced by women, and can be the basis for sex-disaggregated comparison of the economic returns of certain activities.

The data requirements for time-use analysis are considerable. Time-use diaries would be the most accurate assessment method, but in view of resource and time constraints it does not seem feasible to make them a standard part of agricultural surveys. Standard questions covering all activities might be a good alternative for collecting sufficient data to calculate standard time-use indicators by sex.

It is important to be clear as to the purpose of generating time-use indicators by gender. If it is to document labour inputs by sex in agricultural activities, relatively simple crop-specific or plot-specific questions may suffice. If the subject of interest is the different time burdens of women and men, it is important to establish full on-farm and off-farm labour burdens including unpaid domestic work and time spent fetching water and firewood, because these affect time inputs in productive activities. Simultaneous activities can create biases, but in the cases just described they may not be relevant and some of the complex issues affecting the capture of secondary activities can be avoided.

The recent changes to the definitions of work and employment introduced by the 19th International Conference of Labour Statisticians complicate matters (ILO, 2013). The new standards consider "work for own consumption" as a form of work outside the employment category, and surveys are required to determine whether unpaid agricultural activity is "intended" for the market, in which case it counts as employment, or not, in which case it is not considered to be employment. ILO and FAO are seeking to identify an adequate operational definition for own-use or own-consumption work in which women are disproportionately represented.

5.6. Productivity: How do we model gender differences in agricultural productivity?⁹²

Assessing differences between women and men in agricultural productivity is challenging because the demand for sex-disaggregated data is considerable. Quisumbing (1996) argued that the gender gap in agricultural productivity should be assessed in terms of differences in total factor productivity where an index of outputs is divided by an index of inputs; this approach is difficult to implement because of the lack of sex-disaggregated data for all inputs and outputs.

In the absence of sex-disaggregated data for all inputs and outputs, studies often focus on partial measures of agricultural productivity such as yields, or productivity of single factors such as labour (Quisumbing 1996, Carletto *et al.*, 2015).⁹³ Even estimating these partial measures is not straightforward in all contexts and farming systems. Assessing gender differences on the basis of yields is feasible in contexts where men and women usually farm separate plots, as in many parts of sub-Saharan Africa,⁹⁴ but it is more difficult in contexts where plots are cultivated jointly by men and women, as in most of Latin America and Asia (Quisumbing 1996).⁹⁵

Production functions model expected output from given inputs and technology (Battese, 1992; cited in Peterman, 2010). An implicit production function used to model gender differences in agricultural productivity is:

$$Y_{it} = f(I_{it}, X_{it}, V_{it})$$

where Y_{it} is the quantity of crop produced by farmer i at time t , I_{it} is the vector of inputs – land, labour and capital – X_{it} captures farmers' characteristics and

⁹² This section was written by Vanya Slavchevska, Economist.

⁹³ Some studies measure differences in agricultural productivity in terms of earnings or technological adoption (Quisumbing 1996, Fisher and Kandiwa, 2014). Fisher and Kandiwa (2014) evaluated how Malawi's Farm Input Subsidy Programme (FISP) affected the gender gap in adoption of modern maize and concluded that the receipt of subsidy for seed and fertilizer increased the probability of adopting improved maize seeds by 222 percent among women household heads, thereby potentially narrowing the gap in the adoption of improved seeds. Larson *et al.* (2014)

⁹⁴ The most recent surveys in Africa such as LSMS-ISA recognize that more than one person may own or manage a plot, so they collect information on all owners and decision-makers on every plot. It becomes clear that the incidences of joint ownership and joint management are significant in many countries in Africa. Half of cultivated plots in Tanzania, for example, are managed by more than one family member, and of these almost all are managed jointly by men and women (Slavchevska, 2015). The land share under joint ownership as a proportion of all owned or accessed agricultural land is high in many countries - 14 percent in Malawi, 23 percent in Niger, 7 percent in Nigeria, 36 percent in Tanzania and 42 percent in Uganda (see Doss *et al.* (2015).

⁹⁵ Managerial efficiency may be more accurately estimated at the farm-level or household-level, but plot-level analyses are often used to take advantage of more degrees of freedom.

gender, and V_{it} captures the characteristics of the community (Peterman *et al.*, 2011).

The most commonly used measure of agricultural productivity is land productivity or crop yield, which is the quantity of crop harvested per unit of cultivated land. Estimating crop yields is complicated by the presence of intercropping, so some studies restrict analysis to monocrop plots or adjust the crop yields to take into account the share of land dedicated to the crop of interest.⁹⁶

An alternative and perhaps better approach is to use the gross value of output in local currency per hectare or profits per hectare, both of which take into account all crops on a plot.⁹⁷ In this case the difference in average gross values of output per hectare obtained by men and women managers constitutes the unconditional gross gender gap in productivity.

Box 5.6.1 – Estimating agricultural production: the main sources of error, and potential gender differences

The “crop yield” and the “profits per hectare” concepts are subject to various measurement errors.

Some surveys ask farmers to value the harvested quantity of each crop on each plot. But farmers’ valuations of harvested quantities are problematic because women often have less access to markets than men and may not be able to value their harvests accurately. In such cases, potential gender differences in harvest value per hectare may be nullified by gender differences in prices obtained or market access.

Measuring quantities of crop harvested is also challenging. Carletto *et al.* (2015) reported that it is relatively easy for farmers to recall quantities or even revenues from high-value crops, but it is difficult to collect harvest data for extended-harvest crops such as cassava or bananas because of the length of the harvest period, (which may last for months, and whether the crop is for sale or household consumption).

Women are often responsible for cultivating food crops, so if food crops are hard to quantify the productivity of women’s plots may be systematically underestimated, leading to biased estimates of the gender gap.

⁹⁶ A problem with adjusting the estimates arises when the portion of land planted with a particular crop is estimated by the farmer, rather than measured by GPS, particularly when these estimates are too general – for example less than a quarter, a quarter, half or more than half as in many LSMS-type surveys.

⁹⁷ To get the gross value of output per hectare, the total quantity produced in kg of each crop on each plot is obtained and multiplied by the median crop sale value per kg-equivalent measure in the village or area. The values of output of the crops grown on the plot are then summed, and the aggregate value of output on the plot is divided by the plot size in ha, ideally measured by GPS, to obtain the gross value of output/ha.

Gender differences in productivity can also be measured in terms of profit. Quisumbing (1996) argued that the appeal of profit functions is that they eliminate the problem of endogenous regressors because profits are a function of input and output prices. An added advantage is that profit measures can easily take intercropping into account: in their study of gender difference in agricultural productivity in Ghana, Goldstein and Udry (2008) used profit-per-hectare in maize/cassava farming systems as the dependent variable of interest.

Land productivity, however, gives an incomplete account of the disadvantages faced by women farmers in agricultural production. Palacios-Lopez and Lopez (2015) called attention to gender differences in agricultural labour productivity – the gross value of output per hour of managerial labour. They derived a measure of labour productivity for each plot by subtracting labour per hectare (L/ha) from land productivity (Y/ha):

$$\ln\left(\frac{Y}{L}\right) = \ln\left(\frac{Y}{ha}\right) - \ln\left(\frac{L}{ha}\right)$$

and showed that the gender gap in labour productivity can be higher than the gender gap in land productivity as a result of labour market imperfections that induce women farmers to allocate more labour to farming, which reduces labour productivity but increases land productivity.

An important area that has not been adequately investigated is differences between men and women in post-planting or post-harvesting crop losses, which are not always accounted for in productivity studies. If women are more likely than men to experience crop losses, an estimate of the gender gap that ignores the information would inevitably underestimate the true disadvantages faced by women in agriculture. Peterman *et al.* (2011) is one of the few studies that raises the issue of gender differences in crop losses.

Determinants of gender-based productivity gaps

Regardless of the productivity measure by which gender differences in agricultural productivity are assessed, most studies use similar controls to capture the characteristics of managers, households and communities, plots and crop choice, the presence of intercropping and labour and non-labour inputs.

When panel data are available, studies also include household-year fixed effects. An overview of variables commonly used in productivity analyses is given below; those used less frequently are marked with an asterisk.

Characteristics of managers and households

1. Manager's age, or the age of the oldest manager where there are several.
2. Manager's education level or years of schooling, or the highest level of education of any of several managers.
3. Household size – used as a proxy for available household labour.
4. Household composition.*
5. Dependency ratio – as a proxy for managers' unpaid home maintenance and care responsibilities.
6. Wealth – most studies are unable to control for individual wealth because asset information is often only available at the household level.
7. Social transfers.*
8. Access to extension services – most surveys collect this information at the household level.
9. An indicator for off-farm employment access – whether the household head works off-farm, whether the manager works off-farm, and whether other adults work off-farm. Kilic *et al.* (2015) differentiate between access to non-farm labour income and access to non-farm non-labour income; other studies control for whether the manager has off-farm employment (Oseni *et al.*, 2015).
10. Characteristics of the parents of the manager* – few studies include such controls, probably for reasons of data availability.
11. Orphan status of the plot manager* – only used in Goldstein and Udry (2008).
12. Managers' social and political capital* – how long the manager or his/her family have lived in the village, whether the manager is a member of a non-agricultural⁹⁸ organization, whether the manager is a member of an agricultural organization, and whether the manager holds a position of some authority in the village or village council.

Plot and farm characteristics

1. Plot area.
2. Irrigation of the plot – women tend to have less access to irrigated plots than men.
3. Elevation of the plot in metres.
4. Toposequence or plot slope – this is often a categorical variable with categories controlling for whether the plots is top, mid-slope, bottom-slope or steep.

⁹⁸ Non-agricultural organizations include credit and savings organizations.

5. Soil type – a categorical variable with some category type such as sand, loam or clay.
6. Soil quality* – few studies have measures for the quality of soil in a plot: in addition to soil type and toposequence, Goldstein and Udry (2008) also control for pH and organic matter; in some specifications, Peterman *et al.* (2011) also controlled for macronutrients in the soil.
7. Fallow duration*
8. Distance between plot and dwelling.
9. Intercropping – whether the plot is intercropped, or the number of crops on the plot.
10. Plot fragmentation* – not a commonly used control, but Larson *et al.* (2014) included it in their study of gender differences in maize yields between farms headed by men and by women which defined plot fragmentation as the area under cultivation divided by the number of plots managed.
11. Weather effects – included when available to determine whether such shocks affect men and women farmers differently; Larson *et al.* (2014) controlled for the difference from average rainfall and the start of the rains in agricultural seasons.
12. Plot ownership – an indicator for whether a plot is owned by a manager, and a set of variables that show whether the plot was inherited, purchased, given by local leaders, used free of charge or rented; Goldstein and Udry (2008) links gender differences in security of tenure with gender differences in agricultural productivity.

Inputs⁹⁹

1. Use of pesticides and herbicides – expressed as quantity of product applied per hectare. Because the use of such inputs is low in most developing countries, the quantity used will be zero for most farmers; for this reason some studies only control for the incidence of pesticides and herbicides, or include a control for incidence and the quantity used.
2. Organic fertilizer use – see (1).
3. Inorganic fertilizer – see (1).
4. Hired labour – hours/ha or days/ha; may be disaggregated by sex.
5. Exchange labour – hours/ha or days/ha; may be disaggregated by sex.

⁹⁹ Some studies argue that inputs are purchased and applied at the beginning of a season and are therefore determined with respect to harvest (Griliches, 1963; Dinar *et al.*, 2007 cited in Palacios-Lopez and Lopez, 2014). Others try to control for inputs such as inorganic fertilizer, which is a driving factor for higher yields (Larson *et al.*, 2014).

6. Men's family labour¹⁰⁰ – hours/ha or days/ha; may include managerial labour.
7. Women's family labour – hours/ha or days/ha; may include managerial labour.
8. Managerial labour – if separated from other family labour, hours/ha or days/ha.
9. Adoption of improved seeds – area of plot sown with improved seeds.
10. High-value crops – area of plot area sown with cash crops or export crops, or at least an indicator for whether the primary crop on the plot is a cash or export crop.
11. Agricultural implements index – can be constructed like the wealth index but for agriculture-related machinery and equipment; rarely available at the individual level.
12. Livestock – in parts of Africa ox power is important in agricultural production. Aguilar *et al.* (2015) included a control for the number of oxen per hectare and showed that it was not necessarily access to oxen that was important, but that women did not obtain the same return from access to oxen as men and that there was hence a large gender gap in productivity.
13. Access to credit* – related to input use, often cited as constraining women's production possibilities. Few studies control for access to credit, but the study of gender difference in agricultural productivity in Ethiopia in Aguilar *et al.* (2015) did not find access to credit to be a significant factor contributing to the gender gap.
14. Access to markets for the sale of outputs – a better distinction might be whether a household is market-oriented or subsistence-oriented or a combination of the two. Aguilar *et al.* (2015) included a control for whether more than half of production was sold.
15. Community characteristics – often include community fixed effects or at least a control for the distance to the nearest road, town or market; additional community variables are community wages (Peterman *et al.*, 2010), though the authors did not differentiate between men's and women's wages. Wages could be broken down by gender and farm and non-farm.

¹⁰⁰ The literature provides evidence against aggregating men's and women's labour; Quisumbing (1996) reviews earlier studies that tested the separability assumption. For confirmation of the differential effects of men's and women's labour on productivity, see Kilic *et al.* (2015), Slavchevska (2015) and Aguilar *et al.* (2013).

5.6.1. Lessons Learned

Yields from women's plots are consistently reported to be lower than yields from men's plots: the estimated gap varies from 4 percent to 40 percent, but in most developing countries it is between 20 percent and 30 percent (FAO, 2011).¹⁰¹ Gender gaps in agricultural output and productivity are substantial, and are influenced by gender gaps in access to physical, human, natural and social capital, by time use constraints and by gender inequality in access to markets for inputs, outputs and labour.

Equalizing access to inputs may not be enough, however: gender differences in returns from inputs are the main drivers of the gender gap in some contexts, so removing the gaps would foster gender equality, improve women's welfare, increase agricultural productivity and national incomes, improve food security and reduce poverty (World Bank, 2015).

5.7. Decision Making: Indicators and Methodological Aspects of Data Collection

5.7.1. Decision Making Indicators

In discussions of women's decision-making in the agricultural context, the focus is on agricultural production and hence the extent to which women participate in making decisions about agricultural activities or the earnings generated. The sections below summarize the proposals of WEAI and GAGP on decision-making with regard to agricultural production and income use.

¹⁰¹ The estimates reported in FAO (2011) are from plot-level and farm-level studies. Plot-level studies identify the decision-maker for each plot but often use geographically small samples; Akresh (2005) was an exception in that the study used national plot-level data. Farm-level studies may use national data, but the decision-maker is at the farm level and is often equated with the household head.

Agricultural Production

The WEAI proposes two indicators of decision-making in agricultural production as part of their “production” domain (Alkire *et al.*, 2013):

(1) Input in productive decisions

This indicator has two components:

- i. Whether individual has sole or joint input into decision-making with regard to food-crop farming, cash-crop farming, livestock raising or fish culture; and
- ii. the extent to which the individual feels s/he can make personal decisions about: i) which inputs to buy; ii) which types of crops to grow; iii) when crops should be taken to market and who will take them; and iv) whether to engage in livestock raising.

An individual is said to have adequate input in productive decision-making if s/he participates¹⁰² and has at least some input in decisions, or if someone else makes the decisions but the individual feels s/he could participate (Alkire *et al.*, 2013).¹⁰³ The indicator hence captures decision-making that actually takes place and decision-making power that is not exercised.

(2) Autonomy in production

This indicator is measured by an index resulting from a weighted sum of answers to the following statement: “My actions in [area of decision making] are partly ...”: i) because I will get into trouble with someone if I act differently – weight = -2; ii) so that others will not think poorly of me – weight = -1; and iii) because I personally think it is the right thing to do – weight = +3.

The areas of decision-making are: i) agricultural production; ii) which inputs to buy; iii) which crops to grow; iv) when to take crops to the market, or who will take them; and v) livestock production. Responses can be: 1) always true; 2) sometimes true; 3) not often true; and 4) never true.

An individual is said to have adequate autonomy in production if her/his actions are motivated by her/his own values more than by coercion or fear of other

¹⁰² There is no judgement as to whether sole or joint decision-making better reflects greater empowerment (Alkire *et al.* 2013).

¹⁰³ Alkire *et al.* (2013) do not specify how many dimensions of input into decisions and perception of decision-making power are needed for an individual to have adequate input in decision-making.

people's disapproval (Alkire *et al.*, 2013). The autonomy indicator accounts for the motives of individual action: these can be external – coerced or based on reward or threat by others, introjected – the individual may want to please other people, or autonomous – motivated by personal values. This indicator hence captures women's decision-making when influenced by men and the motives for decision-making in women-only households that may be influenced by social norms.¹⁰⁴

Income

With regard to income, the WEAI proposes the indicator:

(1) Decision-making with regard to income generated from agricultural activities

It is based on two components:

- i. degree of input into decisions about the use of income generated from food-crop farming, cash-crop farming, livestock raising or fish culture; and
- ii. extent to which the individual feels she/he can make decisions regarding paid employment.

An individual is said to have adequate decision-making in the income domain if s/he has input into the use of income generated conditional on participation in the activity.

The GAGP also investigated decision-making with regard to spending personal income, but unlike the WEAI income indicators there was no focus on income generated from agricultural activities (Doss *et al.*, 2011). In the present context, decision-making power with regard to income and expenditure is interesting but less relevant than decisions about the use of income generated from agricultural activities.

Applications

The following paragraphs present applications of the agriculture-specific decision-making indicators of the WEAI production and income domain.

¹⁰⁴ See: <https://www.ifpri.org/publication/women%E2%80%99s-empowerment-agriculture-index>

Table 5.15 shows the headcounts of individuals in Bangladesh, Guatemala and Uganda with inadequate “input in productive decisions” and “autonomy in production”. Women had a much higher headcount than men for inadequate input in productive decisions in Bangladesh and Guatemala, where men’s inadequacy was very low. In Uganda, men and women experienced low inadequacy in input in productive decisions.

With regard to autonomy in production, women were worse off than men in Bangladesh and Guatemala, but better off in Uganda. In Bangladesh, few women or men experienced inadequate autonomy in production, indicating that most decisions were motivated by personal considerations and not by social norms or external pressure.

Table 5.15 – WEAI Production Indicators: Inadequacy Headcount in “Input in productive decisions” and “Autonomy in production”

	Bangladesh		Guatemala		Uganda	
	Decision input	Autonomy	Decision input	Autonomy	Decision input	Autonomy
Women	0.259	0.053	0.283	0.321	0.060	0.131
Men	0.083	0.024	0.046	0.203	0.042	0.225

Source: Alkire *et al.* (2013).

Notes: The indicators take the value 1 if the individual experiences inadequacy in that indicator, and 0 otherwise.

Table 5.16 shows the headcount of men and women in Bangladesh, Guatemala and Uganda with inadequate “control over income”. It shows that women were worse off than men in all three countries.

Table 5.16 – WEAI Income Indicator: Inadequacy Headcount in “Control over use of income”

	Bangladesh	Guatemala	Uganda
	Control over use of income	Control over use of income	Control over use of income
Women	0.248	0.367	0.206
Men	0.027	0.117	0.084

Source: Alkire *et al.* (2013).

Notes: The indicators take the value 1 if the individual experiences inadequacy in that indicator, and 0 otherwise.

Application of the proposed gender indicators shows the statistics that can be constructed on the basis of sex-disaggregated decision-making data in agriculture and enables conclusions to be drawn about gender inequality in productive agricultural decision-making, autonomy in production and control over income generated from agricultural activities.

Few data on decision-making are available: no large database compiles decision-making indicators for men and women in developing countries, and so the data have to be gathered from small-scale studies, articles and reports. Chapter 5.6.2 reviews best practices in collecting data on decision-making in agriculture with a view to integrating them into national agricultural surveys.

5.7.2. Data Collection

Decision-making data can be integrated into a household questionnaire where the proxy respondent indicates who in the household makes decisions on the topic in question. Alternatively, decision-making information can be collected in an individual questionnaire: this is likely to yield more accurate data if the respondent has the best knowledge about his or her ability to make decisions compared with other household members.

The decision-making module of the GAGP individual questionnaires was unique in asking respondents about their perception of their own decision-making and that of their spouses, which enabled investigation of the degree of agreement in decisions *made by couples and provided insights into each individual's influence*. But there were problems with the framing of certain questions. Some questionnaires asked, for example: “Who was involved in the decision whether [person] will work?”, which frequently resulted in missing answers in cases when the person concerned did not work. There was evidently a need to frame the question in a positive and negative way: “Who was involved in the decision as to whether or not [person] should work?” (Doss *et al.*, 2011).

The GAGP also concluded that questions about decisions over expenditure should have been framed differently (Doss *et al.*, 2011).¹⁰⁵ The reference was

¹⁰⁵ As in the Karnataka survey; the other GAGP surveys did not ask detailed questions about decision-making.

the person who had made the decision on the most recent occasion, but it would have been better to ask who normally made such decisions to elicit a generally applicable answer. Respondents were asked whether they decided alone or in consultation with others, whether they had to seek permission or whether someone else made the decision. If the decision could be made individually, the person who had to be consulted or give permission was required, which enabled measurement of inputs into decisions as in the WEAI “Production” domain. And some decision-making questions, for example about mobility and health services, were asked only of women.

The WEAI decision-making questions were placed in individual questionnaires.

The pilot surveys in Bangladesh, Guatemala and Uganda showed that questions as to the “autonomy in production” indicator described above were not easy to understand, so “vignettes” were used to clarify questions on: i) types of crops to grow for food and for sale; ii) taking crops to market; and iii) raising livestock. But these did not perform well in the pilot tests and were very time consuming.

As a result of its experience with questions on decision-making with regard to assets, the WEAI suggested that hypothetical questions such as “Who would you say can decide [...]?” should be avoided because they could be confusing, particularly in translation. More direct questions were suggested such as “In the past who has made the decision [...]?” to prompt recall of the most recent decisions.

The LSMS-ISAs exemplify the collection of information on agriculture-related decision-making in household questionnaires where a single respondent answered the questions for the whole household. In all countries, the questions followed the pattern “Who in the household decides on/makes decisions concerning [...]?”, and most offered the option to list up to two household members. These questions were specific rather than hypothetical in referring to particular fields and crops cultivated by the households or to the revenue obtained from certain sales.

Except in Niger, the surveys in the LSMS-ISA countries enquired about decisions concerning: i) cropping, for example crops to be planted, input use

and timing; ii) the use of crop output; and iii) the use of earnings from agricultural activities.

5.7.3. Lessons Learned

The above review leads to the following conclusions:

- Data on gender differences in decision-making in agriculture are scarce, and there is a need to improve the collection of such data in nationally representative surveys.
- Decision-making questions in household questionnaires are likely to be more accurately answered by individual respondents rather than by representative respondents, but the evidence is not conclusive.
- The survey environment – for example whether people are interviewed alone or in the presence of other family members – is likely to affect answers, but there is little evidence to this effect.
- Responses on decision-making are particularly sensitive to the phrasing of questions. Reference to specific agricultural tasks or items helps to link questions with actual events and is hence likely to generate accurate answers.
- The review does not show how outcomes differ when decision-making questions are put in household or individual questionnaires. Most agricultural surveys use household questionnaires only, which can lead to biased answers to decision-making questions. If plot-related modules are used, decisions about certain plots or the income earned can be identified. Nevertheless, it is likely that each individual knows best about his or her own decision-making power and so answers are likely to be accurate. Individual questionnaires make it possible to ask about respondents' perceptions of the decision-making power of other household members.
- The review suggests enquiring about inputs into decisions by asking whether decisions can be made individually, in consultation with others or with permission, or by another person. With regard to gender analysis, the person whose consultation or permission is needed should be recorded so that dependencies between the sexes can be investigated.

Conclusions

Gender gaps in agriculture are often substantial and have a significant effect on gender equity and development outcomes.

Chapter 2 reviewed the prevailing patterns of women's involvement in agriculture, bearing in mind country contexts, and discussed some of the consequences in terms of human capital, natural capital, physical capital, financial capital, social capital, time-use and work, decision making and productivity.

In spite of recent attempts to increase the availability of sex-disaggregated data on agriculture, especially in reliable, comparable and representative formats, such information is scarce and frequently based on small-scale surveys; it rarely focuses on gaps in households and is normally based on non-comparable methods. As a result it is difficult to assess with confidence the nature of gender gaps in agriculture in developing countries. With regard to data gaps, the overview in Chapter 3 of the frequency with which agricultural censuses and surveys collect sex-disaggregated data showed that little attention is paid to this element in any of the domains, and that there is a need to collect such information more effectively.

Chapter 4 discussed three proposed frameworks of indicators for analysing gender gaps in the agricultural sector, emphasizing their complementarity: the *FAO Agri-Gender Statistics Toolkit*, the Core Gender Indicators for Assessing the Socio-Economics Status of the Agricultural and Rural Population (Tayyib *et al.*, 2013) and the Women Empowerment in Agriculture Index. These frameworks were the point of reference for the rest of the review in Chapter 5, in which indicators and data-collection methods were discussed for each of the eight domains mentioned above; the chapter also summarized the main messages of the review, which will be developed in the forthcoming Guidelines.

General Survey Methods

Choosing the unit of observation and identifying the appropriate respondent(s) are crucial steps in any gender-sensitive analysis.

Unit of observation

Simple comparisons between households headed by women and those headed by men are problematic. In view of the heterogeneity of households headed by women, such comparisons hide more than they reveal and do not provide any insights into disparities between men and women in households. There is therefore consensus as to the need to move away from comparisons based on the sex of household heads. There are sound practical arguments for favouring the asset as the unit of observation, in that the asset-based approach can provide individual-level estimates provided the identities of all the men and women in a household are known.

Respondents: how many and who

The empirical evidence shows that collecting information about all household members from a single respondent is subject to bias, and is hence an unsuitable approach. It is important to recognize, however, that different approaches may be suitable depending on the research objective. In general, interviewing more than one household member generates practical problems such as the need to reconcile inconsistent answers.

Evidence from the EDGE initiative suggests that interviewing randomly selected individuals about the assets they own or about which they make decisions is a suitable approach for compiling nationally representative indicators of gender-based asset gaps. The approach does not enable analysis within the household, however.

Human Capital

Individual-level data on extension services are rarely available, but there is extensive information about gender disparities in educational attainment. The data are not usually broken down into agricultural and non-agricultural households, and are hence unsuitable for identifying gender gaps in agriculture. The collection of individual-level data on education is standard practice in household surveys, and could easily be introduced into agricultural surveys by means of a roster of household members. The collection of individual-level data on extension services could also be expanded without incurring large costs because the data-collection tools already cater for it; it is important because the issue is central to agricultural surveys.

Natural, Physical and Financial Capital

The review of best practices focused on the choice of assets to be disaggregated by sex, the definition of ownership, individual and joint ownership, modes of acquisition and valuation of assets. The choice of assets for which sex-disaggregated data should be collected and the definition of ownership are probably the most challenging issues.

Agricultural land appears to be the essential asset for which sex-disaggregated data should be collected: it has considerable value, it is a primary production factor for agricultural activities and a guarantee of financial security. Livestock and agricultural equipment should also be considered: the former is a major asset for rural women, and the latter can explain gender differences in agricultural productivity. Dwellings, real estate, non-farm businesses and consumer durables should be included when the wealth gap is the point of interest.

Ownership is a complex concept whose measurement poses various challenges. The discussion showed the need to go beyond the concepts of reported and documented ownership to capture an accurate picture of access to and control over assets; alienation rights appear to be essential. The EDGE experience in Uganda suggested high correlation among rights, and the preliminary suggestion was to enquire only about the rights to sell and bequeath.

To mainstream the collection of sex-disaggregated data in agricultural surveys, at least reported ownership and the rights to sell and bequeath must be investigated. For agricultural land and real estate, documented ownership and the names on the documents should be established to provide information on tenure security. Investigation as to whether individuals require permission from or consultation with other household members when exercising rights to an asset should also be investigated. It has to be borne in mind that ownership and the interpretation of ownership data depend on systems of land tenure, gender norms, marriage, inheritance and legal frameworks for women's rights, which vary from country to country.

Social Capital

Gender gaps in social capital can be a determinant of gender gaps in output and welfare. They are hard to capture in comparable ways, however, because types of social capital are different in different contexts. The three frameworks discussed in Chapter 4 and the review of data-collection practices indicate the

advisability of gathering data on individuals' membership of groups and associations; because the roles of such groups vary substantially among countries, establishing comparability and relevance at the country level will be challenging.

Time-Use and Labour

Time-use indicators enable identification of: i) the contributions of men and women to agricultural production; ii) women's double burden of income-generation and domestic work; and iii) crops that are usually produced by women and that can form the basis for comparing economic returns obtained by men and women.

The data requirements for analysis of time-use are considerable. Time-use diaries are the most accurate assessment, but time and resource constraints are likely to prevent their use in a standard format in agricultural surveys. Standard questions covering a comprehensive activity list might be an effective alternative for collecting sufficient data to calculate standard time-use indicators by sex.

It is important to establish the precise purpose of generating time-use indicators by gender. If it is to document existing labour inputs by sex for agricultural activities, simple and possibly crop-specific or plot-specific questions on labour inputs by sex may suffice. If the interest is the time burden of each sex and the effects on inputs to productive activities, it is important to obtain a sense of the on-farm and off-farm labour burden including unpaid housework and time spent fetching water and firewood. Simultaneous activities can create bias, but for the two purposes just mentioned they may be less relevant and the difficulties of capturing secondary activities can hence be avoided.

Decision-Making

The decision-making indicators proposed in the literature focus on women's participation in decisions on agricultural activities or the earnings generated. Decision-making questions are likely to be more accurately answered by the individuals concerned than by a knowledgeable member of the household. Responses on decision-making are sensitive to the phrasing of the questions and the setting in which they are posed. In view of the complex decision-making dynamics in agricultural households, it is important to establish whether decisions are made individually or in consultation with others.

Productivity

Assessing the differences between men and women in terms of agricultural productivity is challenging because of the high demand for sex-disaggregated data. Regardless of the productivity measures used to assess gender differences in agricultural productivity, most studies use similar control variables. This review presents a list of variables used in productivity analyses and distinguishes between those commonly used and those used infrequently. Control variables capture manager and household characteristics, plot characteristics such as crop choice and intercropping, labour and non-labour inputs and community characteristics. When panel data are available, studies include household-year fixed effects.

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<http://documents.worldbank.org/curated/en/2015/10/25155021/cost-gender-gap-agricultural-productivity-malawi-tanzania-uganda>

Annex 1

Table 1 – Agricultural Surveys Selected for Review of Sex-Disaggregated Data Collection

Region	Country/year	Survey	Agency	Sample
Africa	Ethiopia 2011/12	National Integrated Household Survey Agricultural Sample Survey, 2011/12 (2004 E.C.)	Not available	Not available
	Ghana 2013	Ghana Agriculture Production Survey (minor season)	Ministry of Food and Agriculture/ Statistics Research Information Directorate, Government Of Ghana	4 000 agricultural holders
	Lesotho 2014/15	Agricultural Production Survey 2014/2015	Ministry of Development Planning/ Agriculture and Food Security Statistics Division	Not available
	Rwanda 2012/13	2012/13 National Agriculture Survey	The National Institute of Statistics of Rwanda/Ministry of Agriculture	Not available
	Tunisia 2004/05	<i>Enquête sur Les Structures des Exploitations Agricoles</i>	<i>Ministère de l'Agriculture, des ressources hydrauliques et de la pêche/ Direction Générale des Etudes et du Développement Agricole</i>	47 700 agricultural holdings
Asia	Armenia 2008	Agriculture Sample Survey	National Statistical Service of the Republic of Armenia and Statistics Central Bureau of Sweden	2 500 farms
	Bangladesh 2005	Agriculture Sample Survey 2005	Bangladesh Bureau of Statistics	24 562 900
	Georgia 2014	Sample survey of Agricultural Holdings	National Statistics Office of Georgia	5 000 agricultural holdings
	India 2013	Land and Livestock Holdings Survey Visit 1, January–July 2013. NSS 70th Round	National Sample Survey Office	35 604 households
	Palestine 2010/11	Agriculture Statistics Survey, 2010/11	Palestinian Central Bureau of Statistics; Ministry of Agriculture	105 238 agricultural holdings

Region	Country/year	Survey	Agency	Sample
Latin America	Argentina 2011	National Agricultural Survey	Argentina National Statistics Office	6 000 producers in five regions
	Bolivia 2008	National Agricultural Survey	Bolivia National Statistics Office	8 022 producers in 9 districts
	Colombia 2010	National Agricultural Survey	Colombia Direction of Methodologies and Statistical Production	6 044 producers in 22 districts
	Ecuador 2012	National Producer Survey	Ecuador National Statistics Office	6 000 producers in 24 provinces
	Mexico 2012	National Agricultural Survey	Mexico National Statistics Office	75 148 producers

Table 2 – Agricultural Censuses Selected for Review of Sex-Disaggregated Data Collection

Region	Country/year	Census	Agency	Sample
Africa	Democratic Republic of the Congo 2014	<i>Recensement Générale de L'Agriculture/ General Census of Agriculture</i>	<i>Bureau Centrale du Recensement Générale de L'Agriculture/ General Census of Agriculture Central Office</i>	Not available
	Gambia 2011	Agricultural Census 2011	Agricultural Statistics and Resources Economics Unit, Planning Services Unit, Ministry of Agriculture	Not available
	Mauritius 2014	2014 Census of Agriculture	Ministry of Finance and Economic Development	Not clear. Total holdings in Mauritius: 23 456
Asia	India 2011	Agriculture Census 2010/11	Agriculture Census Division, Department of Agriculture and Cooperation, Ministry of Agriculture	Not clear. Total holdings in India: 137 757 000
	Iran 2014	National Census of Agriculture, 2014	Statistical Centre of Iran	4 032 467 agricultural holdings
	Thailand 2013	Agricultural Census of Thailand, 2013	National Statistical Office	5 900 000 agricultural holdings
Latin America	Colombia 2014	Agricultural Census	Colombia National Statistics Office	2 700 000 agricultural producers
	Costa Rica 2014	Agricultural Census	Costa Rica National Statistics Office	93 017 agricultural producers
	Peru 2012	Agricultural Census	Peru National Statistics Office	2 297 721 agricultural producers

Annex 2

The GAGP minimum questions for calculating gender, asset and wealth gaps, as proposed in Doss *et al.* (2011), pp. 24–25.

The gender asset and gross wealth gaps related to dwellings, agricultural land and real estate can be estimated by including in household surveys a minimum of five questions on each dwelling, plot and piece of real estate. Of these five questions, three are frequently asked in household surveys; the other two identify the owners.

Dwelling

- What is the present ownership status of this dwelling? (owned, rented....)
- Who are the owners of this dwelling? (with space for multiple owners to be listed)
- Is there an ownership document? (list types of documents)
- If yes, whose names are listed as owners on the document? (with space for multiple names to be listed.)
- If you were to sell the dwelling today, how much would you receive?

Agricultural Land

- Does any member of the household own any agricultural land?

For each plot of land:

- Who owns the plot? (with space for multiple owners to be listed)
- Is there an ownership document for the plot? (list types of documents)
- If yes, whose names are listed as owners on the document? (with space for multiple owners to be listed.)
- If the land was sold today, how much would you receive?

Other Real Estate

- Does any member of the household currently own any other building, dwelling, or plot of land of non-agricultural land?

For each building, dwelling, or plot of land of non-agricultural land owned:

- To whom does this real estate belong? (with space for multiple owners to be listed)
- Is there an ownership document for this piece of real estate? (list types of documents)
- If yes, whose names are listed as owners on the document? (with space for multiple owners to be listed.)
- If you were to sell the real estate today, how much would you receive?

The gender, asset and wealth gaps related to large agricultural equipment such as tractors, and consumer durables such as vehicles and cellphones can be estimated using similar questions. In some contexts it may be useful to gather additional information about the ownership of the asset: in Ghana, for example, asking about the tenure of the enabled more accurate estimates of the value of agricultural land.

Estimating the gender, asset and wealth gaps of non-agricultural businesses and large livestock is more complex. The In Her Name survey modules collected detailed information on each type of animal owned: the questions asked how many animals of each type were owned by each household member, how many were owned jointly or individually and by whom, and the market value of the animals.

A simpler approach that would still elicit this information would be to ask the primary respondent first to list the number of animals that each individual in the household owns individually and that each owns jointly. An approximate valuation measure could be constructed by asking for the value of all of the animals of a particular type and then apportioning it among the various owners.

Livestock

- Does [household member] own any [type of livestock]?

If [household member] owns [type of livestock]:

- How many [type of livestock] does [household member] own individually?
- How many [type of livestock] does [household member] own jointly?
- If all of the [type of livestock] were sold today, how much would you receive?

To calculate the incidence gaps – the proportion of women who own animals and the proportion of men who own animals, but not the gender wealth gaps:

- How many [type of animals] are owned by anyone in the household?
- List everyone in the household who is an owner of [type of animal].

Businesses

For non-agricultural businesses, additional questions are needed to calculate the gender wealth gap and avoid double counting of assets used in a business but reported in another module.

- Does any member of the household currently own or operate any businesses including self-employment activities?

For each business:

- Who owns this business? (Allow space for multiple owners to be listed)
- Is this business a sole proprietorship, partnership, limited liability company, or other?
- What is the value of this business if it were to be sold today?
- If the business were to be sold today, how much would each of the owners listed above receive?
- Does this business own any land?
- Was this land reported earlier?
- If the business owns land that has not been reported, what is the value of the land if it were to be sold today?
- Does this business own any buildings and other non-agricultural land?
- If the business owns any buildings and other non-agricultural land, what is the value of the building and other non-agricultural land if it were to be sold today?
- Was this building or non-agricultural land reported earlier?

Financial Assets

The above questions can all be asked in the inventory. Questions about financial assets and sensitive physical assets such as jewellery could also be asked in the inventory. Asking individual members about their asset ownership, however, is likely to provide more accurate estimates of gender-asset and gross-wealth measures than would inventory questions; this will depend on the context.

The gender-asset and gross-wealth gaps of financial assets – formal and informal savings, stocks, bonds, certificates of deposit, insurance policies and loans to third parties – can be estimated by including a minimum of two questions for each financial asset:

- Do you have a [type of financial account]?
- How much money do you keep in the account in a usual month as savings?

Jewellery

The gender asset and gross wealth gaps of jewellery can be estimated by including a minimum of two questions for jewellery:

- Do you own any jewellery?
- If you were to sell all of your jewellery today, how much would you receive?

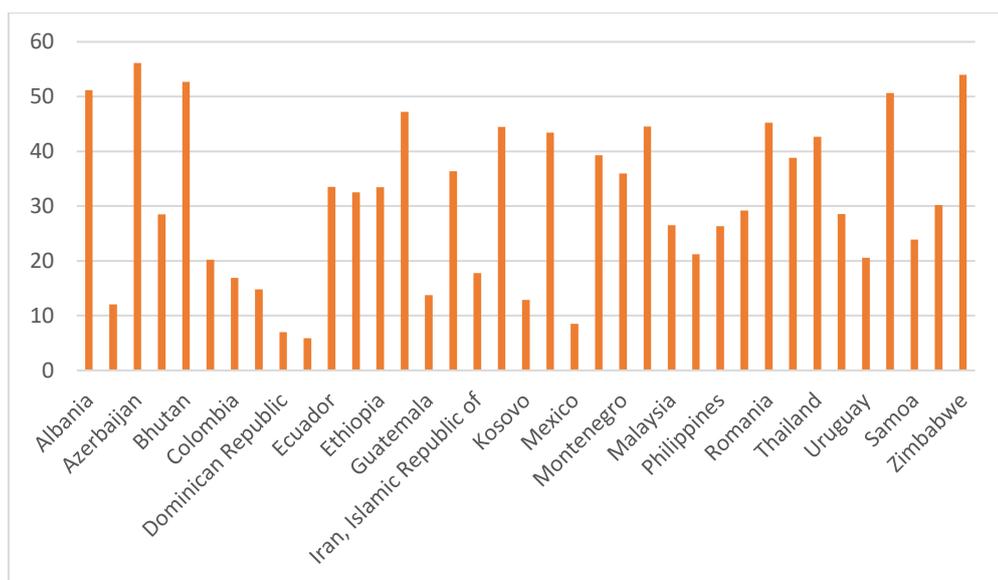
Net Wealth Gaps

For each type of asset two additional questions can be asked to be able to estimate the net worth of the asset:

- Is there an outstanding loan on the [asset]?
- If yes, how much is the loan?

Annex 3

Figure A2.1 – Women’s Share of Employment in Agriculture



Source: ILOSTAT database:

http://www.ilo.org/ilostat/faces/home/statisticaldata/bulk-download?_afzLoop=636943015673521#%40%3F_afzLoop%3D636943015673521%26_adf.ctrl-state%3Dokbd6s0td_985

Table A2.1 – Detailed Listing of ICATUS Activity Categories

01 - Work for corporations/quasi-corporations, non-profit institutions and government (formal sector work)
011 - Core activities: working in "formal sector" employment
012 - Related activities: looking for work/setting up business in the "formal sector"
013 - Travel related to work in the "formal sector"
019 - Work in the "formal sector" not elsewhere classified (n.e.c.)
02 - Work for household in primary production activities
021 - Core activities: working time in primary production activities
022 - Related activities: looking for work/setting up business in households primary production activities
023 - Travel related to primary production activities of households
029 - Work for households in primary production activities n.e.c.

03 - Work for household in non-primary production activities
031 - Core activities: working time in non-primary production activities
032 - Related activities: looking for work/setting up business in non-primary production activities in household enterprise
033 - Travel related to non-primary production of household
039 - Work for household in non-primary production activities n.e.c.
04 - Work for household in construction activities
041 - Core activities: working time in construction activities
042 - Related activities: looking for work/setting up business in construction activities in household enterprise
043 - Travel related to construction activities of households
049 - Work for household in construction activities n.e.c.
05 - Work for household providing services for income
051 - Core activities: working time in providing services for income
052 - Related activities: looking for work/setting up business in service activities in household enterprise
053 - Travel related to providing services for income
059 - Work for household providing services for income n.e.c.
06 - Providing unpaid domestic services for own final use within household
061 - Core activities: working time in providing unpaid domestic services for own final use
062 - Travel related to provision of unpaid domestic services
069 - Unpaid domestic services n.e.c.
07 - Providing unpaid caregiving services to household members
071 - Core activities: working time providing unpaid caregiving services to household members
072 - Travel related to unpaid caregiving services to household members
079 - Providing unpaid caregiving services to household members n.e.c.
08 - Providing community services and help to other households
081 - Core activities: working time providing community services and help to other households
082 - Related activities: attendance in meetings
083 - Related activities: other community services
084 - Travel related to community services and help to other households
089 - Community services and help to other households n.e.c.

09 – Learning
091 - Core activities: time spent in learning activities
092 - Related activities: other activities carried out in relation to learning activities
093 - Travel related to learning
099 - Learning activities n.e.c.
10 - Socializing and community participation
101 - Core activities: time spent in socializing and community participation
102 - Travel related to socializing and community participation
109 - Socializing and community participation n.e.c.
11 - Attending/visiting cultural, entertainment and sports events/venues
111 - Core activities: time spent attending cultural, entertainment and sports events
112 - Travel related to attending/visiting cultural, entertainment and sports events/venues
119 - Attending/visiting sports, entertainment and cultural events/venues n.e.c.
12 - Hobbies, games and other pastime activities
121 - Core activities: hobbies, games and other pastime activities
122 - Travel related to hobbies, games and other pastimes
129 - Hobbies, games and other pastimes n.e.c.
13 - Indoor and outdoor sports participation and related courses
131 - Core activities: time spent participating in sports and outdoor activities
132 - Travel related to indoor and outdoor sports participation and related courses
139 - Indoor and outdoor sports participation and related courses n.e.c.
14 - Mass media
141 - Core activities: time spent using mass media
142 - Related activities: visiting library
143 - Travel related to mass media
149 - Mass media n.e.c.
15 - Personal care and maintenance
151 - Core activities: time spent in personal care and maintenance
152 - Travel related to personal care and maintenance activities
159 - Personal care and maintenance activities n.e.c.