**Appendix A. Supplementary Information**

This supplementary material to the 2020 article “Which farms feed the world and has farmland become more concentrated?” presents results and methods for the updating of data and production of some figures originally presented in Lowder et al. (2016). Those figures presented here (as opposed to in the 2020 article) include any for which the general results have changed little from the article by Lowder et al. (2016). Section 1 presents a description of the location of farms by regional and income group category. Farmland distribution by regional group is presented in Section 2. Section 3 estimates the share of land operated by family farms and Section 4 concludes with an examination of trends in average farm size over time.

# Location of farms by region and income group category

As shown in Figure 1, of the world’s 608 million farms about 43% are located in East Asia and the Pacific, including China, and 30% in South Asia, including India (Figure 1).[[1]](#endnote-1) China and India each represent a large share of the world’s 608 million farms (34 and 24%, respectively). Farms in sub-Saharan Africa represent 12% of farms worldwide, while those in Europe and Central Asia account for 6%, in Latin America and the Caribbean we find 4% of the world’s farms and finally 3% of the world’s farms are in the Middle East and North Africa.

The largest share of the world’s farms are located in lower- or upper-middle-income countries, representing, respectively, 39% and 46% of the 608 million figure. This is due in large part to India being classified in the former group and China in the latter (Figure 1). Farms in low-income countries represent 13% of the worlds farms while farms in high-income countries represent 2% of the world’s farms.

|  |  |
| --- | --- |
|  |  |

**Figure 1. Share of farms worldwide, by country group, most recent observation.**(Notes: number of countries included is shown in parentheses. Country income and regional groupings for this figure and throughout the article and Appendices are the same as those used for FY 2011 by the World Bank (see World Bank, 2020 for details). Seven countries are not classified by the World Bank income groupings. Sources: Various from the FAO World Programme for the Census of Agriculture (WCA). For Nigeria and Kenya, data are taken from the World Bank Living Standards Measurement Study (LSMS) surveys and a government administered household survey, respectively. For Burundi, Ghana and Zimbabwe estimates are made using data from Demographic and Health Surveys (DHS) surveys. For details see Table 1 in the web Appendix B.

# Farmland distribution by farm size and region

Figure 2 presents the number of farms and farmland distribution by farm size and region for all countries other than those classified as high income. This leaves 84 countries for which we perform regional analysis (Figure 2). The majority of farms in all regions, except Latin America and the Caribbean, are smaller than 2 hectares. The distribution of farms and farmland according to farm size is similar in East Asia and the Pacific, South Asia and sub-Saharan Africa. In those regions about 85 to 95% of farms are smaller than 2 hectares and operate 45% to 60% of the farmland; few farms reach a size larger than 50 hectares and, the few that do, comprise only a small share of total farmland. In Latin America and the Caribbean, we see a different distribution. Farms smaller than 2 hectares represent only about 35% of holdings and much of the land (about 90%) is operated by the 8% of farms that are larger than 50 hectares. In the Middle East and North Africa as well as in Europe and Central Asia, 60% to 70% of all farms are smaller than 2 hectares, but more than 50% of the land is farmed by holdings larger than 10 hectares in size. This suggests that farmland seems to be more unequally distributed in favour of the larger farms in regions of higher per capita income such as Latin America and the Caribbean, but also the Middle East and North Africa, compared with other regions of low- and middle-income countries.

|  |  |
| --- | --- |
|  |  |
|  |  |
|  |  |

**Figure 2. Average distribution of farms and farmland area by land size class and by region.** (Note: for details see Tables 2 and 3 in the web Appendix B. Number of countries in parentheses). Sources: Authors’ compilation using FAO (2001, 2013) and agricultural census reports from the 2010 census round (see "Sources: Agricultural census reports and information consulted" in the web Appendix B).

# Family farms and the share of land that they operate

To estimate the number of family farms we first consider whether the farm is owned or operated by a family. We have estimates for 49 countries;[[2]](#endnote-2) they show that between 90% and 100% of farms are held by an individual, a group of individuals or a household (Table 4 in the web Appendix B).

Next we consider whether the family supplies the majority of the labour used on the farm. Relevant data are on family and hired labor are limited in the censuses. Sixty countries[[3]](#endnote-3) report data on the number of permanent hired workers; in most instances there is less than one hired worker per farm (Table 6 in the web Appendix B). Forty five countries[[4]](#endnote-4) report data on both family labour and permanent hired labour; for those countries the median ratio of family members engaged in agriculture to permanent hired workers is ten to one. In many contexts, seasonal hired workers provide an important source of labour for farms, but such information is only available from a few agricultural censuses. Given the evidence, we conclude that most labour is provided by the family as opposed to hired workers in most countries.

To estimate the number of family farms, we assume that, at least 90% of the world’s more than 608 million farms are held by an individual, small group of individuals, or a household as was the case for our 49 country sample. The result is that there are more than 550 million family farms worldwide. Due to data limitations, the estimate of more than 550 million family farms worldwide should be considered a rough approximation; it can be considered an update of the estimate of 500 million family farms presented in FAO (2014) and Lowder et al. (2016).

Agricultural censuses for 53 countries report information on how farmland is distributed among family and non-family farms. The unweighted average share of total agricultural land operated by those family farms is 73%. Using the amount of agricultural land in each of the 53 countries as a weight, we find that 78% of the land is actually operated by family farms.

# Trends in average farm size over time

We examine trends in average farm size from 1970 to 2010 using data for a sample of 129 countries. For those countries we have estimates of average farm size for at least two of the census periods from 1960 to 2010 and we perform linear interpolation and extrapolation to estimate farm size as needed for any countries and years.[[5]](#endnote-5)

The analysis is similar to that presented in Lowder et al. (2016), however, country coverage has been expanded from 111 to 129 countries. We see clear patterns according to income group (Table 1). In most low- and lower-middle-income countries, farm sizes have decreased. Increases in average farm size have been seen for nearly one-third of the upper-middle-income countries. And, in three out of four high-income countries, average farm sizes have increased. Patterns according to regional groupings of low- and middle-income countries show that farm sizes have decreased in most countries of every region, except Europe and Central Asia. These trends are, of course, merely indicative of broad trends and we must take them with caution as many of the data points (about 40%) were interpolated. Furthermore, agricultural census data have their own set of limitations (see Lowder et al. (2016) for a detailed discussion) and some of the variation over time may be attributed to a change in methodology or sample, rather than actual changes in farmland distribution.

**Table 1. Number of countries showing a decrease, increase or neither in average farm size by income and regional group, 1960–2010**

|  |  |  |  |
| --- | --- | --- | --- |
|  | Decrease | Increase | Neither clear increase nor decrease |
| Low and middle-income countries, by region | 62 | 20 | 4 |
| East Asia and the Pacific, excluding China | 8 | 3 | 0 |
| Europe and Central Asia | 1 | 4 | 0 |
| Latin America and the Caribbean | 21 | 6 | 1 |
| Middle East and North Africa | 9 | 1 | 1 |
| South Asia | 4 | 1 | 0 |
| Sub-Saharan Africa | 19 | 6 | 2 |
| Low and middle-income countries, by income group | 59 | 17 | 4 |
| Low-income countries | 15 | 3 | 1 |
| Lower-middle-income countries | 21 | 2 | 2 |
| Upper-middle-income countries | 23 | 12 | 1 |
| High-income countries, by region | 10 | 31 | 2 |
| Europe | 5 | 23 | 0 |
| Other | 5 | 8 | 2 |

Source: FAO (2013) and numerous agricultural census reports from the 2010 census round (see "Sources: Agricultural census reports and information consulted" in the web Appendix B).

# References

FAO. (2001). *Supplement to the Report on the 1990 World Census of Agriculture. International comparison and primary results by country (1986-1995)* (FAO Statistical Development Series 9a).

FAO. (2013). *2000 World Census of agriculture: Analysis and international Comparison of the results (1996-2005)* (FAO Statistical Development Series 13).

FAO. (2014). *The State of Food and Agriculture 2014. Innovation in family farming*.

Lowder, S. K., Skoet, J., & Raney, T. (2016). The Number, Size, and Distribution of Farms, Smallholder Farms, and Family Farms Worldwide. *World Development*, *87*, 16–29. https://doi.org/10.1016/j.worlddev.2015.10.041

World Bank. (2020). Data – World Bank Country and Lending Groups. Retrieved from https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups. Accessed August 7, 2020.

1. For comparative purposes with the estimate in FAO (2014) and Lowder et al. (2016), we used the World Bank 2011 classification of countries by region (World Bank, 2020). [↑](#endnote-ref-1)
2. These countries represent all regions as well as high-income countries; India is included, but China is not and countries in sub-Saharan Africa are under-represented. Details can be found in Table 4 in the web Appendix B. [↑](#endnote-ref-2)
3. These countries include many high-income countries as well as most of East Asia; they are under-representative of South Asia and sub-Saharan Africa. Details can be found in Table 6 in the web Appendix B. [↑](#endnote-ref-3)
4. Countries from all regions are represented, with the exception of South Asia. Only two countries in   
   sub-Saharan Africa are represented. See Table 6 in the web Appendix B for details. [↑](#endnote-ref-4)
5. Following the approach used by Lowder et al. (2016) we do a linear interpolation and extrapolation to estimate average farm size for all countries and periods for which that information is missing. We then note whether the slope of the best-fit line indicates that average farm size has increased (slope equals or exceeds .005), decreased (slope equals or is smaller than -.005) or neither (slope is between -.005 and .005). [↑](#endnote-ref-5)