Divide in the fields: A study of global agricultural land inequality[1]

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Abstract

Agricultural land inequality affects rural development and constrains economic growth and poverty reduction, yet comprehensive global datasets to monitor it have been lacking. This study introduces the Global database of land distribution and inequality (LINEQ), which integrates agricultural census, survey data, and earth observation-based proxies for land quality to provide a more nuanced and cross-country comparable measurement of land inequality. Expanding traditional indicators like the land operated Gini coefficient, we incorporate measures that account for tenure rights, potential productivity differences, and landless populations. Our findings reveal that global land inequality is higher than previously estimated, with Latin America and Oceania exhibiting the highest disparities, while Africa and Asia show lower levels. Over time, land inequality has declined in Africa but increased sharply in North America and Europe. The inclusion of tenure rights amplifies inequality estimates, whereas landless populations have a lesser impact.

Keywords: land inequality, rural poverty, land tenure, agricultural land

1 Introduction

Agricultural land inequality is a central concern for rural development and poverty reduction, as land remains the primary productive asset and source of livelihood for rural populations [1]. Access to land shapes not only agricultural production and income generation, but also access to credit, resources, and broader economic opportunities. A substantial body of literature links unequal land distribution to slower economic growth, persistent poverty, and constrained structural transformation, particularly in low-income contexts [2–5].

Despite its importance, globally comparable data on agricultural land inequality have long remained limited. Existing studies typically rely on the land Gini coefficient derived from agricultural census data, yet cross-country and intertemporal comparisons are hindered by inconsistent census coverage, methodological differences, and fragmented data sources [6,7]. In

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addition, conventional measures often exclude landless populations and overlook differences in land quality, potentially understating the extent of inequality [8,9].

Recent advances have sought to address these limitations by expanding the measurement space of land inequality beyond farm size alone, including consideration of land tenure and productivity differences derived from geospatial data. Building on these developments, this study introduces the Global Database of Land Distribution and Inequality (LINEQ), a harmonized dataset combining agricultural census tabulations and household survey data across multiple World Programme for the Census of Agriculture rounds. The dataset incorporates indicators capturing land operated, land rights, land quality, and the inclusion of landless populations.

Using these data, the paper examines three questions. First, what is the current level of agricultural land inequality globally and across regions? Second, how have patterns of land inequality evolved over recent decades? Third, how is land inequality associated with broader processes of structural transformation? Our results indicate that global land inequality is substantially higher than previously reported. Latin America and Oceania exhibit the highest levels of concentration, while Africa and Asia display comparatively lower inequality. Over time, inequality has declined modestly in Africa but increased in parts of Europe and North America. Accounting for tenure security and land productivity further amplifies observed disparities, whereas incorporating landless populations has a more limited effect on aggregate inequality measures.

2 Data and methods

2.1 Inequality indicators

We follow the measurement framework proposed by Cabrera-Cevallos *et al.* [7], which defines five complementary indicators of agricultural land inequality spanning land operated, land rights, land quality, and the inclusion of landless populations (Table 1). Indicators 1 and 2 measure inequality in land operated among agricultural holdings and among farm households, respectively. Indicator 3 measures inequality in access to land rights using two configurations: land operated with documented or alienable rights, and land operated excluding rented or sharecropped land. Indicator 4 adjusts land operated by potential land productivity, and Indicator 5 extends measurement to the relevant population by imputing zero land for “pure” landless households. We compute all indicators using the Gini index for comparability across dimensions and because it accommodates zero land values.

Table 1. Land inequality indicators

Rationale	Indicator number	Land description	Reference population	Description
Inequality in the distribution of agricultural land	1	Land area **operated**	**Agricultural holdings**	Inequality in agricultural land area operated by agricultural holdings

			(Household and non-household agricultural sector)	
	2	Land area **operated**	**Households operating farms**	Inequality in agricultural land area operated by farming households
Inequality in the distribution of agricultural land rights	3	a. Land area operated with **documented ownership or alienation rights** b. Land area operated **excluding land rented or sharecropped**	Any	Inequality of agricultural land area with strong or weak land rights operated by farm holdings (or by farming households)
Inequality in the distribution of agricultural land quality	4	Land area standardized by **land quality features**	Any	Inequality of agricultural land area standardized by land quality features operated by farm holdings (or by farm households)
Inequality in distribution of agricultural land in the relevant population	5	Land area operated	Farm households **and "pure" landless households**	Inequality of agricultural land area operated by the relevant population (including farming and landless households)

Source: Authors' own elaboration based on Cabrera-Cevallos, C.E., Admasu, Y., de La O Campos, A.P., de Simone, L., Pierri, F.M., Moncada, L., 2025. *Measuring agricultural land inequality: Concepts and methodological issues*. FAO Agricultural Development Economics Working Paper 25-03. https://doi.org/10.4060/cd4728en

2.2 The Global Database of Land Distribution and Inequality

The analysis uses LINEQ, a harmonized database combining agricultural census tabulations and survey microdata to generate cross-country comparable measures of land distribution and inequality. LINEQ_Census draws on the World Programme for the Census of Agriculture (WCA) and related national statistical publications to recover distributions of holdings and land operated by farm-size class across multiple WCA rounds (1930–2020). LINEQ_Survey complements the census series for a smaller set of countries with publicly available household or agricultural survey microdata, enabling construction of indicators that require parcel- or household-level information, including land rights variables and productivity-adjusted measures.

2.3 Reconstruction of land distributions and productivity adjustment

Census tabulations were digitized and converted into continuous approximations of farm-size distributions using generalized Pareto interpolation [10] implemented using the gpinter R package. Where tabulations used non-standard thresholds, reconstructed distributions were re-binned into harmonized size classes prior to computing inequality and distributional statistics.

For survey-based productivity adjustment, georeferenced parcels were linked to the Crop Productivity Index (CropPI) to proxy land quality and compute quality-adjusted land measures. Full details on data compilation, consistency checks, harmonization decisions, and indicator computation are provided in the LINEQ technical brief [11].

2.4 Comparability and considerations

Cross-country and intertemporal comparability is affected by differences in census coverage, definitional differences, thresholds utilized, land-use concepts employed and reporting differences across farm-size classes [6,12]. LINEQ documents key metadata to support interpretation of results, but remaining differences should be considered when comparing levels and trends across countries.

3 Results

3.1 Global patterns of land inequality

Figure 1 presents global and regional estimates of agricultural land inequality using the LINEQ_Census database. Two measures are reported: an aggregate Gini computed from pooled land distributions, and the average of country-level Gini coefficients. Aggregate estimates are consistently higher, reflecting the influence of cross-country differences and the concentration of land in large agricultural systems.

Regional disparities are substantial. Europe and Oceania display the highest aggregate inequality, while the Americas exhibit the highest average country-level inequality. Asia shows comparatively consistent estimates across both measures, whereas Africa records lower overall levels of concentration. These results highlight pronounced heterogeneity in global land distribution and confirm that inequality assessments depend strongly on the level of aggregation considered.[2]

3.2 Land inequality and structural transformation

To situate land inequality within broader development dynamics, Figures 2 and 3 relate land inequality to structural transformation indicators: agricultural employment share and agricultural value added as a share of GDP. Countries with high agricultural employment generally exhibit lower inequality, consistent with smallholder-dominated systems in earlier stages of transformation. In contrast, more advanced economies display greater dispersion and higher inequality, reflecting consolidation into larger commercial farms.

A subset of countries combines high land inequality with high agricultural employment or value added, suggesting conditions in which a large share of livelihoods depends on agriculture despite

[2] Decomposition analysis using the Theil index indicates that global land inequality is driven primarily by within-region disparities rather than differences between regions (results available upon request).

concentrated land access. These cases may present heightened risks of rural exclusion and unequal transmission of agricultural growth benefits.

Figure 1. Gini coefficients of agricultural land, globally and by region

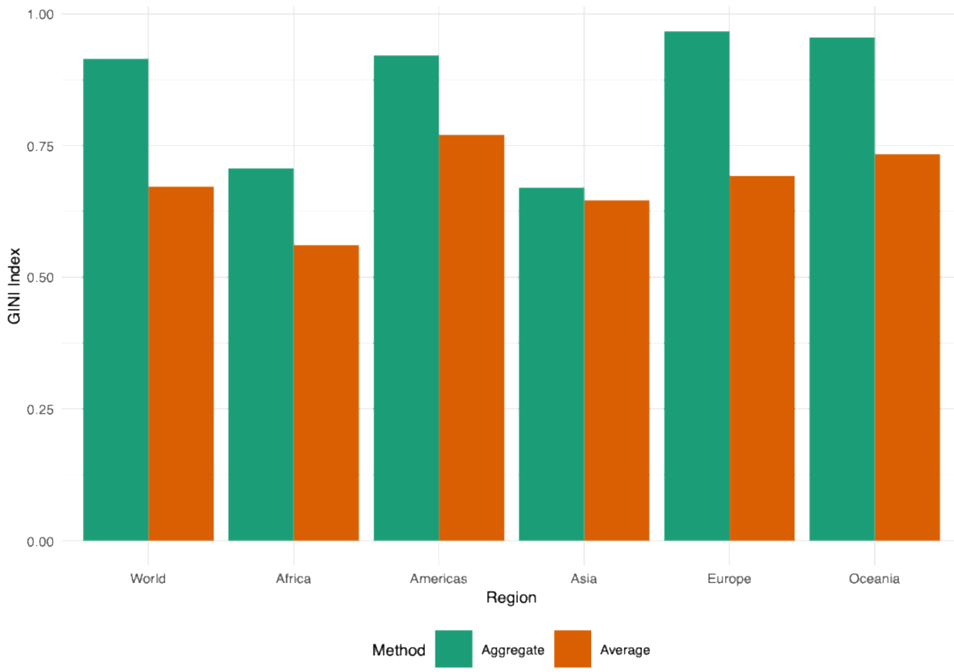


Figure 2. **Agricultural land distribution and agricultural employment**

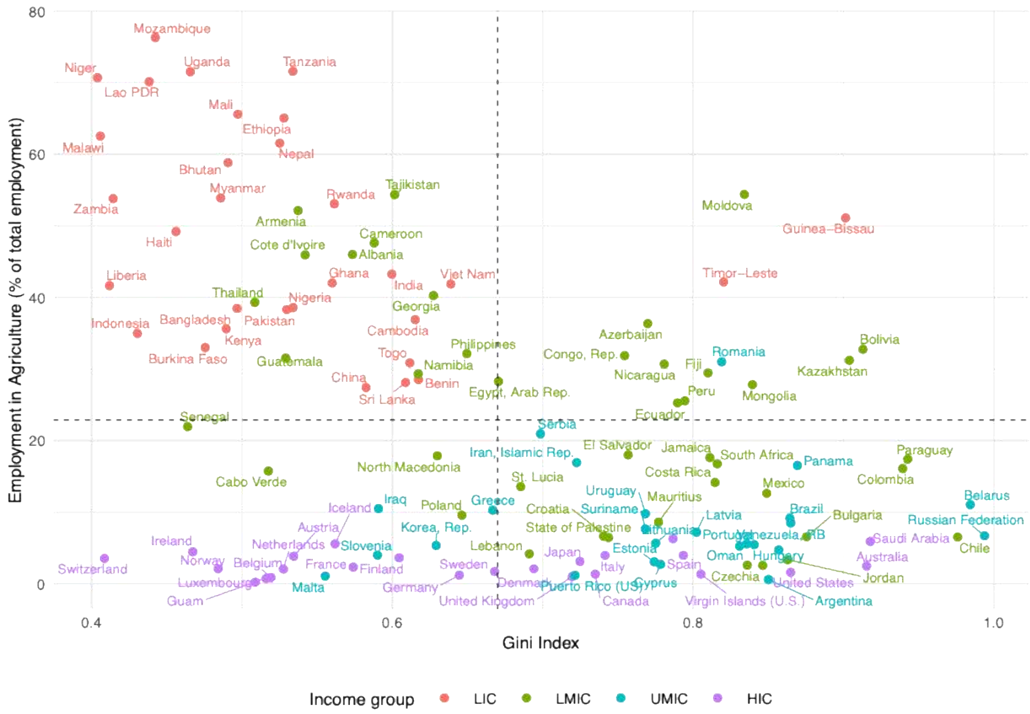
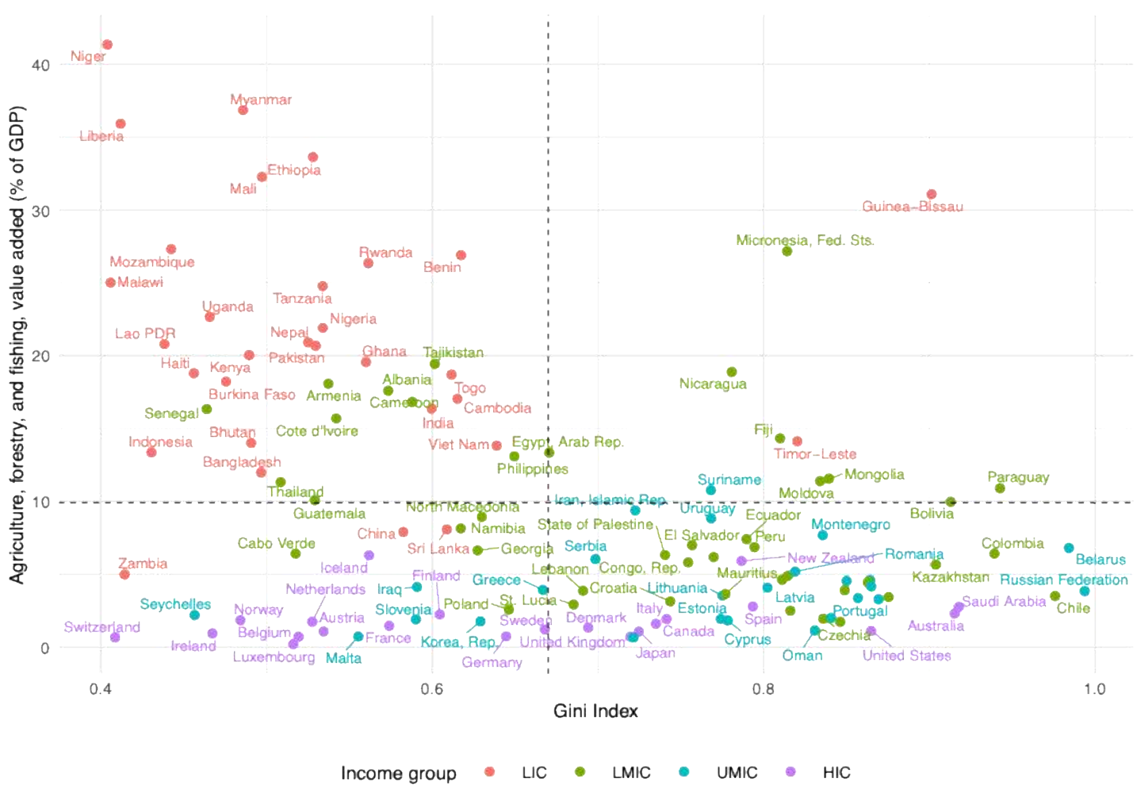


Figure 3. **Agricultural land distribution and agricultural value added**



Notes: LIC = low-income countries; LMIC = lower-middle-income countries; UMIC = upper-middle-income countries; HIC = high-income countries. The sample covers 131 countries with farm size distribution data from 2006 onward: 28 from Africa, 27 from the Americas, 31 from Asia, 37 from Europe, and 8 from Oceania. The data come primarily from national agricultural census reports compiled through the World Programme for the Census of Agriculture (WCA). For countries that did not conduct an agricultural census after 2006, the sample was complemented with nationally representative survey data on farm size distribution.

Source: Authors' own elaboration.

3.3 Recent trends in agricultural land inequality

Figure 3 and Table 2 summarize changes in agricultural land inequality between the 2000 and 2020 rounds of the World Programme for the Census of Agriculture.

No uniform global trend emerges. Across the sample, similar numbers of countries experienced increases and decreases in land inequality over the past two decades. Regional patterns differ modestly, with rising inequality somewhat more common in Asia and Oceania, while declines appear more frequently in Europe. Africa and the Americas display mixed trajectories.

Complementary evidence from the mean–median gap suggests increasing distributional skewness in a majority of countries, indicating growing concentration in the tails of farm-size distributions even where overall Gini indices remain stable. These results point to heterogeneous national dynamics rather than a generalized global trend toward either increasing or decreasing land concentration.

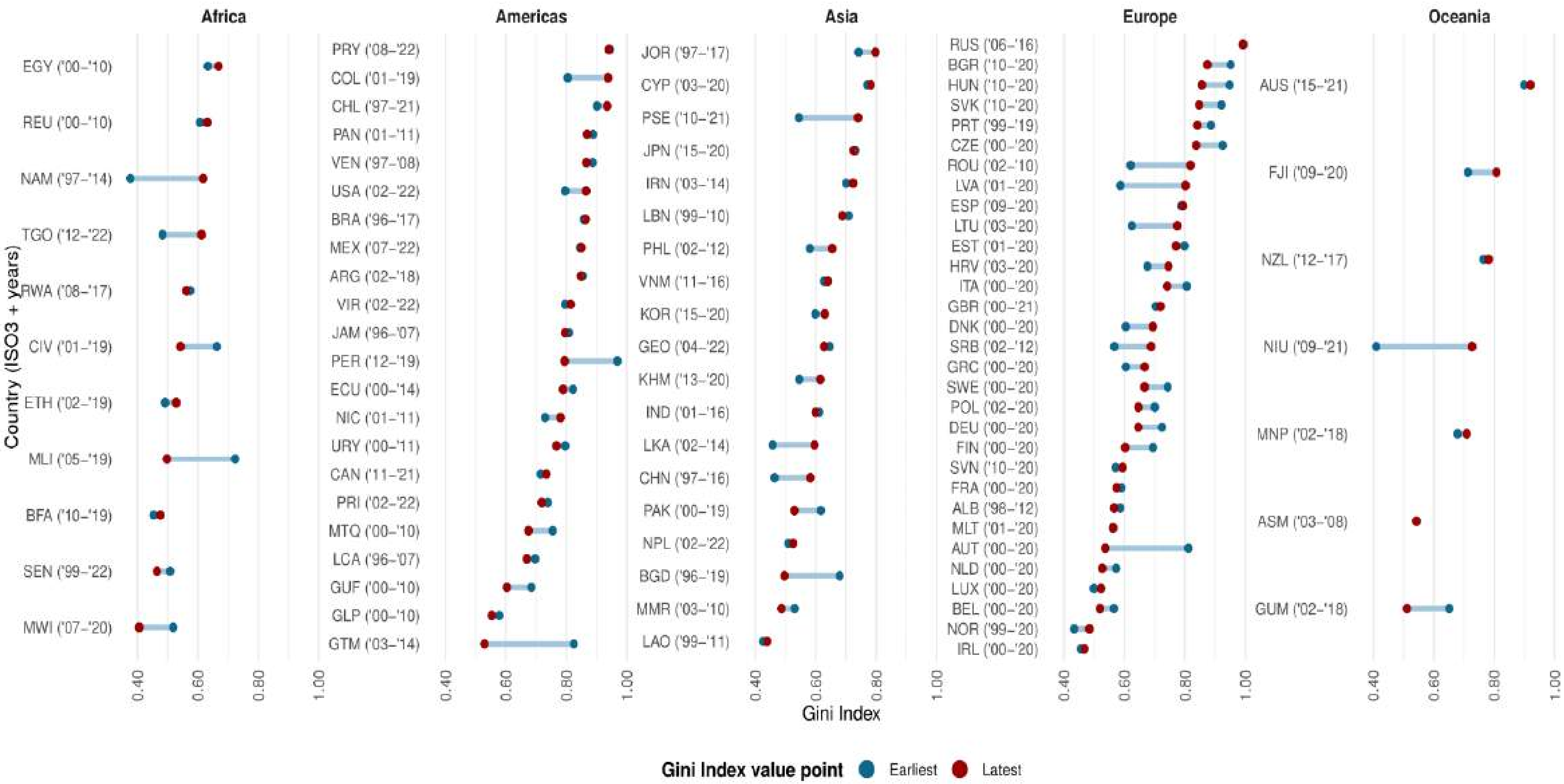
Table 2. Number of countries with changes in Gini index by region, 2000s–2020s

Region	Number of countries	Indicator	Increase	Decrease	No significant change
Africa	11	Gini	6	5	
		Mean-Median	4	6	1
Americas	22	Gini	6	12	4
		Mean-Median	8	8	6
Asia	19	Gini	11	5	3
		Mean-Median	10	8	1
Europe	31	Gini	12	17	2
		Mean-Median	25	5	1
Oceania	7	Gini	3	1	3
		Mean-Median	1		6
Global	90	Gini	38	40	12
		Mean-Median	48	27	15

Notes: The table presents differences in Gini indices, and gap between mean and median aggregated by region, using data from 90 countries drawn from agricultural censuses and nationally representative survey sources. Changes in Gini indices are classified as increases, decreases, or no significant change based on bootstrapped confidence intervals.

Source: Authors' own elaboration.

Figure 4. Trends in land inequality for selected countries and territories, 2000s–2020s



Notes: The figure presents differences in Gini indices, using data from 90 countries drawn from agricultural censuses and nationally representative survey sources. The time window spans from 1996 (WCA 2000) to the current WCA 2020 round. Comparisons are made between the earliest and latest available year for each country with at least two data points. Regional groupings follow the United Nations Standard Country or Area Codes for Statistical Use (M49).

Source: Authors' own elaboration

3.4 Multidimensional agricultural land inequality: evidence from surveys

Survey-based indicators allow examination of dimensions of land inequality not observable in census tabulations, including land rights, productivity potential, and landlessness. Figures 5–8 summarize how inequality estimates change when these dimensions are incorporated using the LINEQ_Survey database.

Land rights

Accounting for documented or alienable land rights systematically increases measured inequality across all countries (Figure 5), indicating that secure tenure is more unevenly distributed than operated land itself. The effect is particularly pronounced in several African countries, suggesting unequal access to formal land rights among smaller producers.

Rental and sharecropped land

Excluding rented or sharecropped land produces more moderate changes in inequality estimates (Figure 6). This finding suggests that temporary access arrangements partially mitigate ownership concentration in some contexts while reinforcing disparities in others, depending on the institutional role of land rental markets.

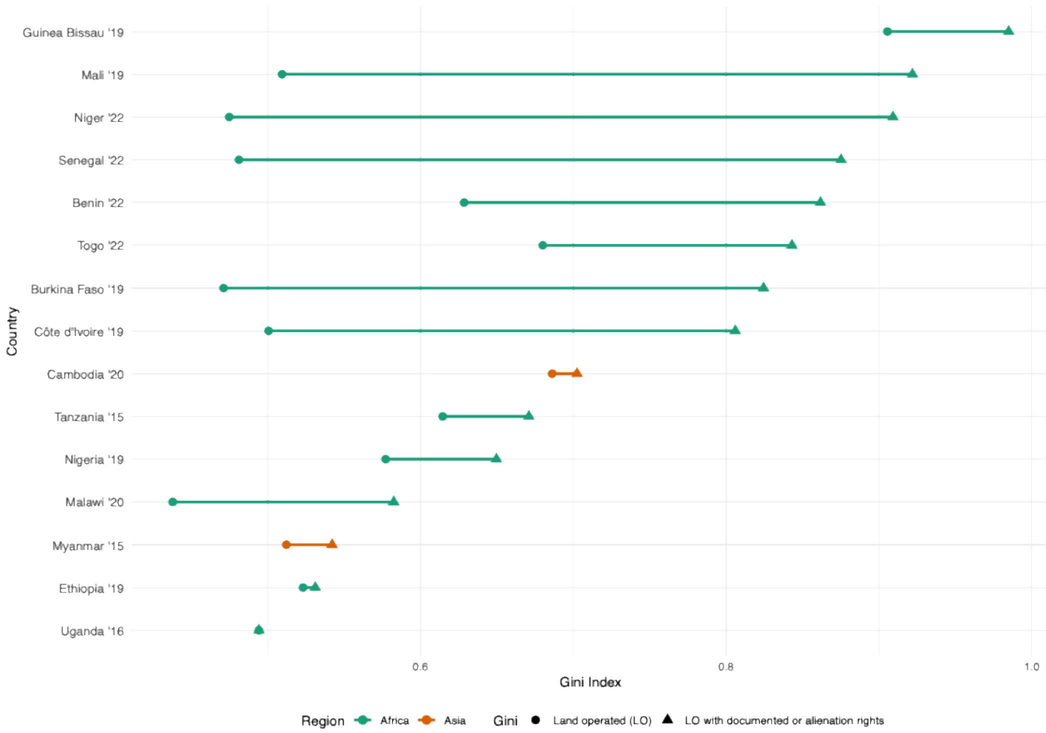
Land productivity potential

Adjusting land operated by agricultural productivity potential substantially amplifies inequality estimates across all countries (Figure 7). The results indicate that higher-quality land is disproportionately concentrated among larger holdings, implying that inequality in productive capacity exceeds inequality measured by land area alone.

Inclusion of landless households

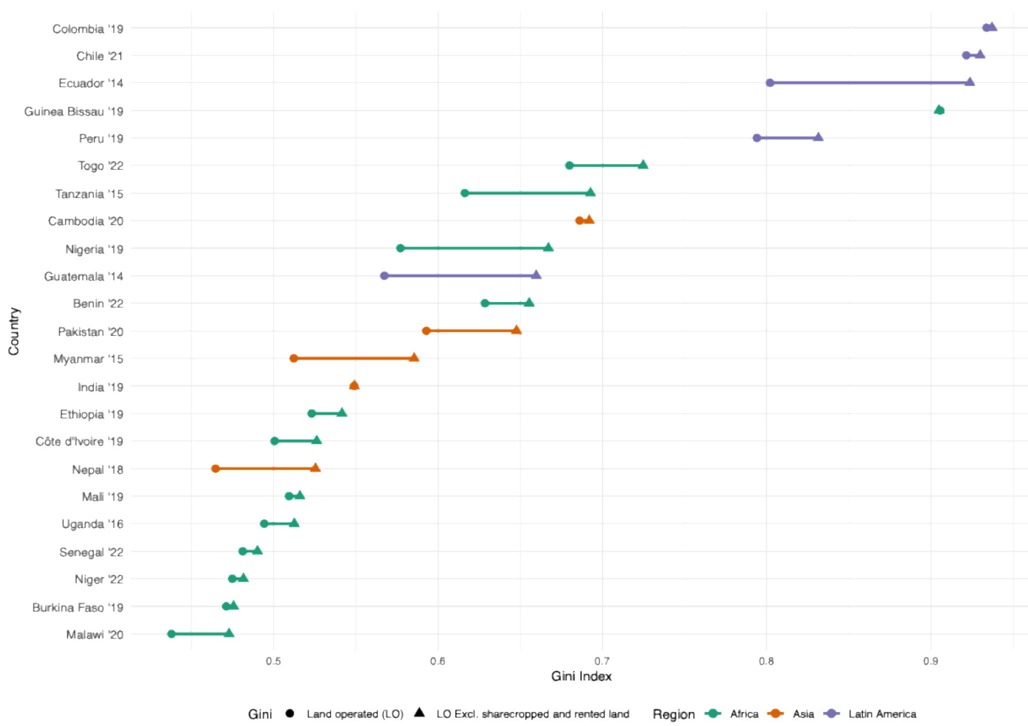
Incorporating landless households increases inequality modestly in most African countries but more strongly in parts of Asia and Latin America (Figure 8). These differences highlight regional variation in the role of landlessness in shaping agrarian inequality and reflect differing stages of structural transformation.

Figure 5. Gini index: land operated vs land operated with documented or alienation rights



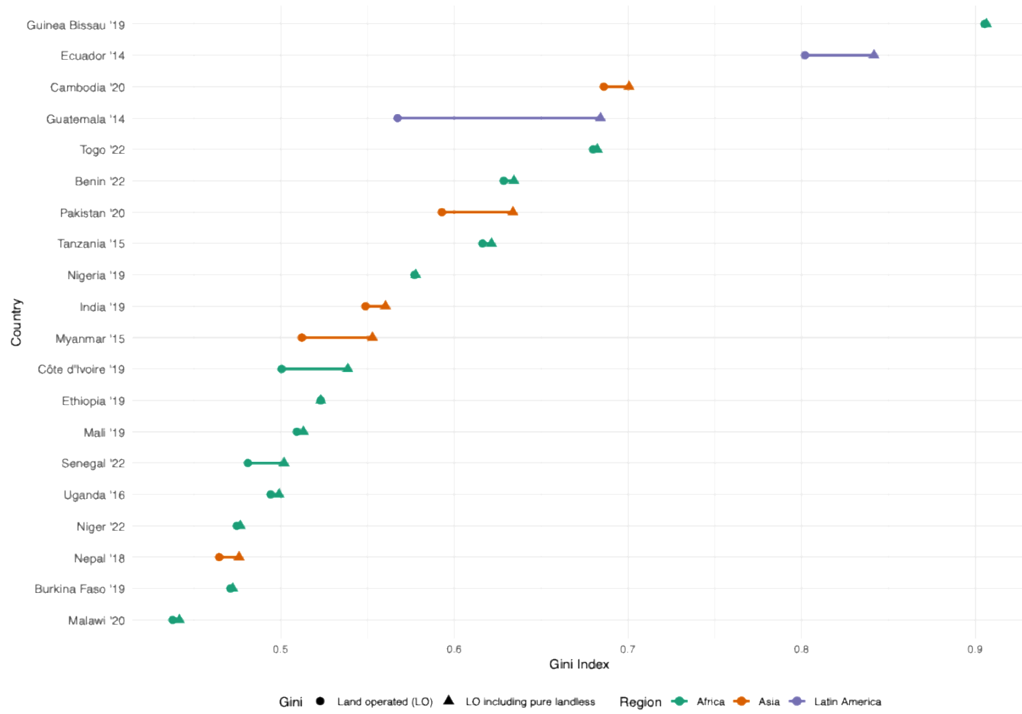
Note: The indicators shown are Indicators 2 and 3a as per Table 1.

Figure 6. Gini index: land operated vs land operated excluding rented and sharecropped land



Note: The indicators shown are Indicators 2 and 3b as per Table 1.

Figure 8. Gini index: land operated distribution vs land operated including pure landless



Note: The indicators shown are Indicators 2 and 5 as per Table 1.

4 Conclusion

Using the LINEQ database, this paper provides new evidence on the level and drivers of agricultural land inequality worldwide. Compared with earlier estimates, global land inequality appears substantially higher, reflecting improved coverage and harmonized reconstruction of land distributions across countries. The results further indicate that global inequality is shaped primarily by disparities within countries rather than differences between regions.

Marked regional heterogeneity persists. Latin America and Oceania exhibit the highest levels of land concentration, while Africa and Asia display comparatively lower inequality. Trend analysis reveals no uniform global trajectory, with countries experiencing both increases and declines in inequality over recent decades, underscoring the importance of national structural and institutional dynamics.

Survey-based evidence highlights that inequality deepens when additional dimensions of land access are considered. Inequality is consistently higher when measured using documented or alienable land rights, indicating unequal access to tenure security. Adjusting land by productivity potential further amplifies disparities, suggesting that productive land is disproportionately concentrated among larger holdings. Incorporating landless households provides a more complete representation of agrarian inequality, particularly in contexts undergoing structural transformation.

Overall, the findings demonstrate that agricultural land inequality extends beyond differences in operated area alone and is closely linked to tenure arrangements, land quality, and access to land itself. These results underline the importance of multidimensional approaches to land policy and rural development aimed at promoting equitable and inclusive agrarian transformation.

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