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Who are small-scale food producers in Italy? Comparisons among different approaches[1]

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Abstract. The question "What is a small-scale producer?" keeps receiving different answers depending on the context in which is posed. Alternative ways of defining smallholders reflect heterogeneous historical and institutional eco-systemic contexts and depend upon what is the role of small-scale agriculture in the rural economy. This has become a pressing issue given the need to monitor the Sustainable Development Goals (SDGs), which refers to "small" farmers. Two important related issues are: 1) the adoption of a specific and robust definition of small-scale food producer (SSFP) and 2) the empirical implementation of this definition to determine the SSFPs. The calculations require suitable databases with microdata at the level of individual farms. Based on the 2020 agricultural census results, we identified the small food producers in Italy. We also proposed and compared other approaches to identify SSFPs, that are simpler than that proposed by the FAO and could also be calculated for other census years. Since revenues are not available for every farm – even the census did not collect this information – the standard indicator of production was used instead of revenues to identify SSFPs.

Keywords: Agricultural holding, census of agriculture, poverty, revenues, standard output

1. Sustainable agriculture and the concept of small-scale food producer[2]

Sustainable agriculture is not a well-defined goal. Social, economic, and environmental sustainability are closely intertwined and necessary components for a truly sustainable agriculture.

Agricultural sustainability rests on the principle that we must meet the needs of the present without compromising the ability of future generations to meet their own needs. That is not an easy task for farmers. For example, farmers faced with poverty are often forced to mine natural resources like soil fertility to make ends meet, even though environmental degradation may hurt their livelihoods in the long run.

Several statistical indicators deal with sustainability: a key question is to assess how many of them can be regularly calculated by each country each year. For example, Gismondi [1] and Jouzi et al. [2] underlined that conversion to organic farming is one of the key indicators of sustainable agriculture, even if it is not the only one and it is not easy to ensure international comparability of organic farming figures.

In this framework, the need to focus on small-scale farming is due to many reasons. Small-scale farming systems are often more environmentally sustainable than large-scale. They are often more productive than other types of agricultural businesses, including industrial farms as well. Small-scale farms are especially critical for the food security and nutrition of vulnerable groups since these farms serve predominantly domestic and local markets. Small-scale farming also contributes to culture and community. Last but not least, increased revenues and profits among small-scale farmers and their businesses are often invested back into local economies, where they create jobs and equitable growth.

By the way, the Sustainable Development Goals (SDGs) were adopted by all United Nations Member States in 2015 as a call to action to end poverty, protect

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the planet, and ensure that all people enjoy peace and prosperity by 2030. The 2030 Agenda for Sustainable Development is organized into goals, targets, indicators, and sub-indicators. The 6 goals strictly concerned with the sustainable agriculture concept are 2. Zero Hunger, 5. Gender equality, 6. Clean water and sanitation, 12. Responsible consumption and production, 14. Life below water, 15. Life on land. There are 21 SDGs indicators for which FAO plays the role of custodian. FAO is a contributing agency for other 4 SDGs indicators as well. A highlight of the main indicators with the greatest gaps in country reporting is given by FAO [3].

In particular, goal 2 has these purposes: end hunger, achieve food security and improved nutrition, and promote sustainable agriculture. Indicator 2.3 has this purpose: by 2030, double the agricultural productivity and revenues of small-scale food producers, in particular women, indigenous peoples, family farmers, pastoralists, and fishers, 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. Finally, the sub-indicator 2.3.2 is defined as the average income of small-scale food producers (SSFPs), by sex and indigenous status.

A critical point is the definition of the term "small-scale food producer". The FAO has proposed the definition described in Section 2. Using the data sources described in Section 3, we analyze the main findings in Section 4. The FAO has proposed the SSFP definition described in Section 2 so that each country can apply the same criterion to identify SSFPs, using baseline data that should be available in each country, even in years when there is no census. However, in each country, the definition of "small", "medium" and "large" farms may depend on the level of agricultural development. Furthermore, other definitions of "small" farmers may result from the availability of additional indicators relating to the structural characteristics of farms and/or farm managers.

Definitions of "small-scale food producers" that are found in the scientific literature and policy documents are mostly based on four criteria: size of operated land, amount of labor input employed for agricultural production (especially of family members), market orientation, and economic size of the holding. Examples of alternative classification criteria for agricultural holdings are given in Sotte [4], Arzeni and Sotte [5], Italian Ministry of Agriculture [6], Davis et al. [7]. For this reason, in Section 5 we propose other methods to identify SSFPs and compare the results with those in Section 4. Section 6 contains some perspective conclusions.

2. The FAO definition of SSFP

The reference population includes *food producers*. They are farmers, herders, foresters, fishermen and aquaculture holders engaged in the production of food products. According to FAO [8,9], small-scale food producers are producers who meet the following criteria.

2.1. Physical size

- operate an amount of land falling in the first two quintiles (the bottom 40 percent) of the cumulative distribution of land size at the national level (measured in hectares); and:
- operate a number of livestock falling in the first two quintiles (the bottom 40 percent) of the cumulative distribution of the number of livestock per production unit at the national level (measured in Tropical Livestock Units – TLUs); and:

2.2. Economic size

- obtain an annual economic revenue from agricultural activities falling in the first two quintiles (the bottom 40 percent) of the cumulative distribution of economic revenues from agricultural activities per production unit at the national level (measured in Purchasing Power Parity Dollars).

Within the resulting set of producers identified by these criteria, producers earning a revenue higher than 34,387 Purchasing Power Parity (PPP) Dollars per year will be excluded.

According to [8], it is important to highlight that the definition of SSFP described here is only meant to serve the purpose of computing and monitoring the FAO indicators concerned, and it is not intended to replace country-specific definitions. National definitions reflect national policy priorities, while the proposed international definition ensures global reporting of the SDGs, as well as comparability among countries.

The choice of relying on land size and the size of herds reflects the aim of capturing structural constraints in production. However, the physical size fails to consider the quality of the land and the livestock, the type of crops grown, the farming systems, and the many and wide disparities that exist across countries and regions in terms of socio-economic and agroecological characteristics and distribution of resources. To overcome these limitations, the definition combines the physical size of the food producer with its economic size, expressed by the revenues from farming activities (rev-

enues from other types of activities, instead, are not considered). This additional criterion provides a more accurate view and a more precise identification of SSFPs compared to land and herds' size only. Information on land size, the number of livestock heads and revenues is available in most countries.

Thresholds can be "absolute" or "relative". An absolute definition assigns, for each criterion variable, the same threshold in all countries – say, for instance, 5 hectares, 5 livestock heads, and $1000 of revenue – regardless of agroecological and socio-economic conditions. A relative definition, instead, assigns for each criterion variable a threshold at the same relative level in each country; that is, thresholds are set with a homogeneous criterion but within a reference system defined at the national level. A relative threshold can be set at the same point of the cumulative distribution of the three variables; examples are any percentile of the distribution of land, herds, and revenues in each country. With the relative approach, thresholds are still established with a unique criterion, whose application yields different thresholds in each country, depending on the shape of the distribution of the criterion variables. Depending on the distribution of land, livestock heads, and revenues in a given country, therefore, thresholds that identify small-scale food producers can be, for example, 5 hectares in one country and 10 hectares in another.

Within the framework of SDGs 2.3.1 and 2.3.2, for which FAO plays the role of custodian, it is requested to make calculations for SSFPs, not SSFPs and the total, with breakdown by gender, rural/urban location of food producers, indigenous people, kind of main activity (farmers, fishermen, and aquaculture, foresters, herders). Calculations are not simple and request the availability of basic data on agricultural land, livestock, and revenues at the single unit level for all farmers in a country. Normally these data are available through the farm register and/or the agriculture census, even though even these sources often do not include revenues.

3. Data sources for identifying SSFP

In Italy, the most updated identification of SSFPs is based on data from the last census of agriculture and the yearly survey on the economic results of agricultural holdings (FADN). Some details are described as follows.

3.1. The census of agriculture

The seventh general agricultural census has its legal basis at European level in Regulation (EU) 2018/1091 of the European Parliament and of the Council of July 18, 2018, concerning integrated statistics on agricultural holdings (Commission of the European Union [10]). The 2020 census was therefore mandatory in every country in the European Union. The main purpose of the census was to update the now outdated structural data collected with the 2010 census and to expand the available information resources. The most important feature was the current state of agricultural activity in a historical context characterized by the progressive concentration of agricultural holdings and the resulting reduction in the number of very small agricultural self-sufficiency units. The census referred to 1 October 2020 and included questions on the degree of modernization and integration of farms into the market. These include generational turnover (see e.g. Proctor and Lucchesi [11]), the level of education of the farm manager, the importance of non-EU labor, innovations, and digitalization introduced on the farm, irrigation equipment, breakdown of farm income and other gainful employment in agriculture.

The data collection took place between January and July 2021. ISTAT is currently finalizing the data dissemination process (some results and analyses are available in Henke and Sardone [12] and ISTAT [13]). The available data include agricultural land and livestock, but not revenues. However, based on the census data, ISTAT has calculated the standard output (SO) for each active farm. The SO plays an important role in identifying small food producers. Its definition is explained in section 4 and further details can be found in CREA [14].

3.2. The FADN survey

The Farm Accountancy Data Network (FADN) – better known in Italy as RICA – is an annual sample survey set up by the European Economic Commission in 1965. The FADN survey does not represent all the farms operating in a given area, but only those that are professional and market-oriented. The FADN observation area is therefore a subset of the area surveyed by ISTAT as part of the population census. The economic size limits of the EU observation areas vary from Member State to Member State and are defined by specific regulations. In Italy, the minimum threshold for inclusion in the FADN observation field as of 2014 is an annual standard production value of 8,000 euros. The farms covered by the FADN represent almost 5 million EU farms, 90% of the agricultural area, and 90% of standard production. In Italy, the survey is managed by CREA, a research organization that is part of the national statistical sys-

Table 1
Number of farms in the bottom 40% of the cumulative distribution of utilized agricultural area, livestock units and standard output. Cross analysis, year 2020

Criterion	Utilized agricultural area (UAA)	Livestock units (LU)	Standard output (SO)	UAA+LU+SO	Not falling in the bottom 40%	Total
Number of farms						
Utilized agricultural area	1,013,836	990,722	992,626	987,553	115,176	1,102,729
Livestock units	990,722	1,095,871	1,055,241	987,553	115,176	1,102,729
Standard output	992,626	1.055.241	1,065,860	987,553	115,176	1,102,729
% of farms on total						
Utilized agricultural area	91.9	89.8	90.0	89.6	10.4	100.0
Livestock units	89.8	99.4	95.7	89.6	10.4	100.0
Standard output	90.0	95.7	96.7	89.6	10.4	100.0

*Total does not include farms: 1) with less than 0.2 hectares and less than 0.2 livestock units; 2) with standard output = 0.

tem. At present, the Italian FADN sample is based on a random selection of about 11,000 agricultural holdings, structured to represent the different types and sizes of production on the national territory. The variables collected concern physical and structural data, economic data, and financial data. The survey is highly informative and can provide useful structural and productivity indicators on an annual basis. In particular, the survey can provide data on both revenue and standard output for each unit in the sample. Both indicators are used in Section 4.

4. Identification of SSFPs

Based on the census data, the utilized agricultural area (UAA), and the number of animals by species are available for each farm. The available data on livestock was used to calculate the number of adult livestock units (LU), which are representative of the livestock units reported by the FAO. The census did not collect data on farm revenues, but it allowed the SO to be calculated. For this reason, the method used in Italy is not exactly the same as that used by the FAO, as the economic size was estimated using SO instead of revenues. To ensure the robustness of the results, the following farms were not taken into account in the calculations: 1) with less than 0.2 hectares and less than 0.2 livestock units and/or 2) with a standard output = 0. Starting from the original figure of 1,133,023 active farms counted in the census, 1,102,729 farms were taken into account in the following elaborations, which represent the reference population.

Table 1 shows some preliminary results depending on the physical size of the farms. In the table, the virtual SSFPs amount is given when we consider the criteria based on UAA, LU and SO separately (numbers on the diagonal) or coupled (numbers not on the diagonal).

For example, looking only at the UAA criterion, the number of farms that fall into the bottom 40% of the cumulative distribution is 1,013,836, i.e. 91.9% of the total. In addition, the number of farms falling in the bottom 40% of the cumulative distribution of LU is 1,095,871 (99.4%) and the number of units falling in the bottom 40% of the cumulative distribution of SO is 1,065,860 (96.7%). These results confirm the high degree of concentration of land, livestock, and standard output in the left tail of the frequency distribution.

If we consider as "potential" SSFPs those farms that fall in the bottom 40% of the cumulative distribution for all three criteria, the number of units is slightly lower: 987,553 (89.6% of the total). Excluding the FAO's other economic criterion, almost nine out of ten farms in Italy would be small holdings.

According to the FAO, producers with revenues of more than 34,387 purchasing power parity dollars per year should be excluded from the subgroup of small farmers. To take this restriction into account, we had to estimate the revenues. The basic idea is to estimate revenues based on standard production. For this purpose, we used the 2020 FADN data at the unit level.

The FADN data available until 2020 concern 10,764 agricultural holdings for which both standard output (independent x-variable) and revenues (dependent y-variable) are available. The basic idea is to obtain estimates of revenues through the linear model $y = \alpha + \beta x + \varepsilon$. The main limitation of this approach is that the FADN survey does not include very small farms, e.g. those with a SO $<$ 8,000 euros. To obtain reliable estimates, 19% of units were excluded as they are outliers; the final database used for the calculation therefore included 8,731 farms. The farms were broken down by their main agronomic orientation (AO), which indicates the main type of farming practiced by each farm. There are 8 AOs: 1) Arable farming; 2) Horticulture; 3) Permanent crops; 4) Grazing livestock; 5) Grain eaters;

Table 2
Linear regression models used to estimate revenue from standard output. Year 2020

AO	Number of units	R^2 correct	Fisher's F		Intercept term		Regression coefficient	
			Estimate	Significance	Estimate	Significance	Estimate	Significance
1	2,407	0.681	5,144.1	0.0000	5,704	0.0001	0.486	0.0000
2	324	0.574	436.8	0.0000	18,463	0.0002	0.380	0.0000
3	2,721	0.499	2,707.1	0.0000	5,513	0.0019	0.648	0.0000
4	2,034	0.748	6,038.4	0.0000	8,589	0.0002	0.484	0.0000
5	121	0.863	754.9	0.0000	36,052	0.0110	0.272	0.0000
6	635	0.543	754.8	0.0000	5,078	0.0817	0.510	0.0000
7	58	0.823	265.8	0.0000	24,856	0.0319	0.277	0.0000
8	431	0.729	1,157.5	0.0000	7,220	0.0121	0.458	0.0000

AO: Agronomic orientation. *Legenda*: 1) Field crops; 2) Horticulture; 3) Permanent crops; 4) Grazing livestock; 5) Granivores; 6) Mixed cropping; 7) Mixed livestock holdings; 8) Mixed crops-livestock.

Table 3
Number of small-scale food producers and revenues in Italy according to the FAO methodology. Year 2020 (values in euros)

Kind of farmer	Breakdown	Number	Estimated revenues	Average estimated revenues	Percent on total	
					Number	Revenues
Small scale	Total	753,884	7,567,465,363	10,038	68.4	23.9
	Male	489,208	4,918,819,268	10,055	64.8	19.9
	Female	264,676	2,648,646,095	10,007	76.2	38.1
	Indigenous people	751,922	7,546,144,989	10,036	68.4	23.9
	Farmers	685,733	6,931,632,417	10,108	72.3	32.9
	Herders	43,474	411,681,489	9,470	38.0	4.3
	Farmers and herders	24,677	224,151,456	9,083	62.8	22.4
Medium-Large	Total	348,845	24,110,435,710	69,115	31.6	76.1
	Male	265,973	19,803,397,411	74,456	35.2	80.1
	Female	82,872	4,307,038,299	51,972	23.8	61.9
	Indigenous people	347,317	23,996,608,525	69,091	31.6	76.1
	Farmers	263,306	14,140,003,843	53,702	27.7	67.1
	Herders	70,895	9,192,680,929	129,666	62.0	95.7
	Farmers and herders	14,644	777,750,938	53,111	37.2	77.6
Total farmers*	Total	1,102,729	31,677,901,073	28,727	100.0	100.0
	Male	755,181	24,722,216,679	32,737	100.0	100.0
	Female	347,548	6,955,684,394	20,014	100.0	100.0
	Indigenous people	1,099,239	31,542,753,514	28,695	100.0	100.0
	Farmers	949,039	21,071,636,261	22,203	100.0	100.0
	Herders	114,369	9,604,362,418	83,977	100.0	100.0
	Farmers and herders	39,321	1,001,902,394	25,480	100.0	100.0

*Total does not include farms: 1) with less than 0.2 hectares and less than 0.2 livestock units; 2) with standard output = 0. Farmers have Agronomic Orientation 1, 2, 3, 6; herders 4, 5, 7; farmers and herders 8.

6) Mixed crops; 7) Mixed livestock farms; 8) Mixed crops with livestock. For each AO, we used a specific regression model, as shown in Table 2. Even though the model performs better for some AOs (1, 5, 7, 8), the results are always satisfactory as all models are statistically significant.

Using the estimated α and β coefficients, it was possible to estimate the revenue for all census farms. Therefore, following FAO recommendations, within the resulting group of producers identified using the physical and economic criteria, producers with revenues greater than 23,883 euros were excluded from the smallholder subgroup (23,883 = 34,387 × 0.68, where 0.68 is the purchasing power parity coefficient in dollars applied to revenues expressed in euros).

The final results can be found in Table 3. In 2020, the number of small farmers amounted to 753,884, or 68.4% of the total. Results are available for specific profiles.

- Gender of the farm manager: women are more likely to be SSFPs than men (76.2% compared to 64.8%).
- Nationality of the farm manager: native (Italian) SSFPs are exactly on average (68.4% of Italian farm managers are SSFPs; this is because there were only a few non-Italian farm managers in 2020).
- Main agronomic orientation: "farmers" (see footnote under Table 3 for definition) are SSFPs more frequently than average (72.3% of cases), while

Table 4
Number of small-scale food producers and revenues in Italy according to the alternative methodology 2. Year 2020 (values in euros)

Kind of farmer	Breakdown	Number	Estimated revenues	Average estimated revenues	Percent on total	
					Number	Revenues
Small scale	Total	776,297	8,263,068,457	10,644	70.4	26.1
	Male	501,630	5,362,233,248	10,690	66.4	21.7
	Female	274,667	2,900,835,209	10,561	79.0	41.7
	Indigenous people	774,585	8,284,868,614	10,696	70.5	26.3
	Farmers	708,171	7,574,074,145	10,695	74.6	35.9
	Herders	44,427	459,807,872	10,350	38.8	4.8
	Farmers and herders	23,699	229,186,440	9,671	60.3	22.9
Medium-Large	Total	326,432	23,414,832,616	71,730	29.6	73.9
	Male	253,551	19,359,983,431	76,355	33.6	78.3
	Female	72,881	4,054,849,185	55,637	21.0	58.3
	Indigenous people	324,654	23,257,884,900	71,639	29.5	73.7
	Farmers	240,868	13,497,562,116	56,037	25.4	64.1
	Herders	69,942	9,144,554,546	130,745	61.2	95.2
	Farmers and herders	15,622	772,715,954	49,463	39.7	77.1
Total farmers*	Total	1,102,729	31,677,901,073	28,727	100.0	100.0
	Male	755,181	24,722,216,679	32,737	100.0	100.0
	Female	347,548	6,955,684,394	20,014	100.0	100.0
	Indigenous people	1,099,239	31,542,753,514	28,695	100.0	100.0
	Farmers	949,039	21,071,636,261	22,203	100.0	100.0
	Herders	114,369	9,604,362,418	83,977	100.0	100.0
	Farmers and herders	39,321	1,001,902,394	25,480	100.0	100.0

*Total does not include farms: 1) with less than 0.2 hectares and less than 0.2 livestock units; 2) with standard output = 0. Farmers have Agronomic Orientation 1, 2, 3, 6; herders 4, 5, 7; farmers and herders 8.

"livestock breeders" are significantly less frequent (only 38.0%) and "farmers and livestock breeders" are less frequent than average (62.8%).

Even in 2020, there is a dramatic gap between the estimated average revenue of non-SSFPs and SSFPs: 69,115 euros against 10,038, the ratio between them is 6.9.

5. Alternative criteria for identifying SSFPs

According to the FAO methodology, SSFP is determined by the cumulative distribution of three indicators: 1) agricultural area; 2) livestock; 3) revenues (estimated by standard output), plus the fourth criterion given by the threshold applied to revenues. Is it possible to obtain similar results using alternative (and perhaps simpler) methods? Possible answers are suggested in the next subsections. The basic idea is to examine the possibility of determining the SSFP more simply, possibly using an annually repeatable methodology (see also Gismondi [15]).

5.1. Methodology 2: Standard output distribution

In this alternative methodology, the cumulative distribution of quantitative indicators about farm size is maintained, but the analysis is limited to a single indicator (instead of three): standard output. The basic idea is that the SO itself is a synthesis of data on land and livestock and that it is possible to identify as potential SSFPs those farms whose SO is below the third quartile of the cumulative distribution of the SO.

A potential limitation of this approach – which is also a potential limitation of the FAO method – is that it does not take into account any particular characteristics of the holding beyond its economic size. For example, corporations cannot be considered SSFPs regardless of whether they are before or after the third quartile of the SO distribution. In addition, farms that engage in other gainful activities besides agricultural production and farms that have made investments in product or process innovation in recent years are most likely not SSFPs. On the other hand, the use of these additional selection criteria seems to contradict the need for a simpler approach to identifying SSFPs. In addition, the inclusion of non-agricultural activities would make the results less comparable between countries and more dependent on specific circumstances. Finally, details on other gainful activities and innovations are almost always only available when a census is conducted. Table 4 shows the most important results.

The number of SSFPs is slightly higher than that calculated using the FAO method (776,297); the estimated average revenues is slightly higher (10,644 euros compared to 10,038); the ratio between the average rev-

Table 5
Number of small-scale food producers and revenues in Italy according to the alternative methodology 3. Year 2020 (values in euros)

Kind of farmer	Breakdown	Number	Estimated revenues	Average estimated revenues	Percent on total	
					Number	Revenues
Small scale	Total	736,007	7,564,031,410	10,277	66.7	23.9
	Male	476,061	4,910,405,968	10,315	63.0	19.9
	Female	259,946	2,653,625,442	10,208	74.8	38.2
	Indigenous people	734,145	7,580,680,472	10,326	66.8	24.0
	Farmers	679,073	7,037,957,302	10,364	71.6	33.4
	Herders	35,614	340,978,850	9,574	31.1	3.6
	Farmers and herders	21,320	185,095,258	8,682	54.2	18.5
Medium-Large	Total	366,722	24,113,869,663	65,755	33.3	76.1
	Male	279,120	19,811,810,711	70,980	37.0	80.1
	Female	87,602	4,302,058,952	49,109	25.2	61.8
	Indigenous people	365,094	23,962,073,042	65,633	33.2	76.0
	Farmers	269,966	14,033,678,959	51,983	28.4	66.6
	Herders	78,755	9,263,383,568	117,623	68.9	96.4
	Farmers and herders	18,001	816,807,136	45,376	45.8	81.5
Total farmers*	Total	1,102,729	31,677,901,073	28,727	100.0	100.0
	Male	755,181	24,722,216,679	32,737	100.0	100.0
	Female	347,548	6,955,684,394	20,014	100.0	100.0
	Indigenous people	1,099,239	31,542,753,514	28,695	100.0	100.0
	Farmers	949,039	21,071,636,261	22,203	100.0	100.0
	Herders	114,369	9,604,362,418	83,977	100.0	100.0
	Farmers and herders	39,321	1,001,902,394	25,480	100.0	100.0

*Total does not include farms: 1) with less than 0.2 hectares and less than 0.2 livestock units; 2) with standard output = 0. Farmers have Agronomic Orientation 1, 2, 3, 6; herders 4, 5, 7; farmers and herders 8.

enues of medium-sized large farmers and small farmers is 71,730/10,644 = 6.7, which is slightly lower than the FAO ratio.

5.2. Methodology 3: Poverty threshold

This methodology is similar to methodology 2, the main difference being that methodology 3 does not take cumulative distributions into account, but is based on the concept of the "poverty threshold". Each year, ISTAT calculates poverty thresholds below which households are "poor". This concept applies to households, but could also be applied to farms, as more than 90% of farms in Italy are sole proprietorships. We assumed that households engaged in agriculture include on average 2 adults under 60, 1 adult over 60, and a child between 4 and 10 years old. In 2020, the poverty threshold for this type of household was 17,961 euros. According to methodology 3, SSFPs are those whose (estimated) annual revenues are below 17,961 euros. The main advantage of this methodology is that it uses absolute thresholds without the need to calculate a cumulative distribution. The main limitation is that it does not take into account other dimensional characteristics of the farm. Moreover, the FAO definition of small-scale producer is not necessarily geared towards identifying poor farmers. Poverty lines normally apply to household incomes from all sources (not only from agriculture) and small-scale food producers may perform multiple economic activities. Table 5 shows the main results.

The number of SSFPs is significantly lower than the number calculated according to the FAO method (736,007); the average revenues are not so different (10,277 euros compared to 10,038); the ratio between the average revenues of medium-sized farmers and small farmers is 65,755/10,277 = 6.4 and thus lower than the FAO ratio.

5.3. Methodology 4: Poverty threshold and standard output

This methodology is similar to methodology 3, the only difference resulting from this consideration. The annual revenues of a farm often includes public subsidies from the Italian government or the European Union. This was particularly evident in 2020 due to the Covid-19 pandemic. The intrinsic value of agricultural production is better synthesized by the standard output. The following restriction was therefore added to the criteria of methodology 3 in methodology 4: even if the farm's revenues are above the poverty threshold, the farm is still an SSFP if its SO is below 8,000 euros. The threshold of 8,000 euros is the same as that used in the FADN survey (Section 3.2). Of course, other, higher SO thresholds can also be chosen to check the variability of the results.

Table 6
Number of small-scale food producers and revenues in Italy according to the alternative methodology 4. Year 2020 (values in euros)

Kind of farmer	Breakdown	Number	Estimated revenues	Average estimated revenues	Percent on total	
					Number	Revenues
Small scale	Total	759,420	7,971,285,376	10,497	68.9	25.2
	Male	492,154	5,191,982,976	10,550	65.2	21.0
	Female	267,266	2,779,302,400	10,399	76.9	40.0
	Indigenous people	757,469	7,988,322,576	10,546	68.9	25.3
	Farmers	698,863	7,389,705,996	10,574	73.6	35.1
	Herders	38,087	379,345,085	9,960	33.3	3.9
	Farmers and herders	22,470	202,234,295	9,000	57.1	20.2
Medium-Large	Total	343,309	23,706,615,697	69,053	31.1	74.8
	Male	263,027	19,530,233,703	74,252	34.8	79.0
	Female	80,282	4,176,381,994	52,021	23.1	60.0
	Indigenous people	341,770	23,554,430,938	68,919	31.1	74.7
	Farmers	250,176	13,681,930,265	54,689	26.4	64.9
	Herders	76,282	9,225,017,333	120,933	66.7	96.1
	Farmers and herders	16,851	799,668,099	47,455	42.9	79.8
Total farmers*	Total	1,102,729	31,677,901,073	28,727	100.0	100.0
	Male	755,181	24,722,216,679	32,737	100.0	100.0
	Female	347,548	6,955,684,394	20,014	100.0	100.0
	Indigenous people	1,099,239	31,542,753,514	28,695	100.0	100.0
	Farmers	949,039	21,071,636,261	22,203	100.0	100.0
	Herders	114,369	9,604,362,418	83,977	100.0	100.0
	Farmers and herders	39,321	1,001,902,394	25,480	100.0	100.0

*Total does not include farms: 1) with less than 0.2 hectares and less than 0.2 livestock units; 2) with standard output = 0. Farmers have Agronomic Orientation 1, 2, 3, 6; herders 4, 5, 7; farmers and herders 8.

Table 7
Number of small-scale food producers identified by each methodology (numbers in bold on the diagonal) and number of farms identified as SSFPs by the other methodologies (common units). Absolute values and percentages, year 2020

	FAO	Methodology 2	Methodology 3	Methodology 4	Average of not diagonal data
Number of common SSFP					
FAO	753,884	700,602	683,052	697,065	693,573
Methodology 2	700,602	776,297	687,886	704,562	697,683
Methodology 3	683,052	687,886	736,007	736,008	702,315
Methodology 4	697,065	704,562	736,008	759,420	712,545
% of common SSFP					
FAO	100.0	92.9	90.6	92.5	92.0
Methodology 2	90.2	100.0	88.6	90.8	89.9
Methodology 3	92.8	93.5	100.0	100.0	95.4
Methodology 4	91.8	92.8	96.9	100.0	93.8

Table 6 shows the main results. The number of SSFPs is only slightly higher than the number calculated using the FAO method (759,420), as are the average revenues (10,497 euros compared to 10,038); the ratio between the average revenues of medium-sized large farmers and small farmers is 69,053/10,497 = 6.6, which is lower than the FAO ratio.

By and large, all four methods lead to almost similar results if we look at the difference between SSFPs and non-SSFPs in terms of average estimated revenues. There are some differences in the number of SSFPs. However, there are a large number of farms that are identified as SSFPs by each of the compared methods (Table 7). For example, of the 753,884 farms classified as SSFPs by the FAO method, 700,602 (i.e. 92.9%) are also classified as SSFPs by Method 2. In total, 693,573 farms classified as SSFPs according to the FAO method are also classified as SSFPs according to all other methods (92.0%). The proportion of SSFPs that overlap with the other methods ranges from 89.9% for method 2 to 95.4% for method 3. 647,586 farms are classified as SSFPs by all methods: this is 85.9% of the number of SSFPs identified by the FAO.

The FAO methodology was applied to the census 2010 and the FADN survey 2010 data as well, using the PPP Dollars coefficient referred to 2010. In 2010, the percentage of SSFPs was larger than in 2020 (72.7% against 68.4%).

6. Perspective conclusions

Why are SSFPs important? Though their larger, industrial counterparts may dwarf the land they work and the total quantity they produce, their impact on the world is anything but minimal: According to [16], farms smaller than 5 acres produce roughly 35% of the world's food, and SSFP provide up to 80% of the food supply in Asia and sub-Saharan Africa. When smallholder farmers produce a higher quality and quantity of food, they can earn more revenues, better feed their families, and provide more food for the local marketplace, reducing prices and improving diets.

Of course, the importance of SSFPs may differ from country to country, and SSFPs tends to reduce especially in Italy, as the last 2020 agriculture census confirmed. Nevertheless, worldwide it is important to monitor how many there are and which are their main features.

In this paper, we have presented the main results obtained for Italy by using the main concepts and definitions recommended by the FAO for the determination of SSFPs. In addition, we have proposed three other calculation methods that represent an alternative to the FAO method. They could be equally simpler and could be applied in years other than the survey years. Further work is needed to better identify SSFPs and to assess whether it is possible to derive information on farmers' revenues without using estimates based on standard output.

Agricultural censuses represent useful benchmarks to update the list of SSFPs in a country. However, the great challenge for next future consists in the strategy to be used by national statistical institutes for obtaining reliable data on land, livestock, and revenues of farms without carrying out traditional censuses anymore. Censuses are very costly and time expensive, while administrative sources may often supply the backbone of a permanent statistical system on agriculture including all basic statistical data at the single farm level. In this way, the Farm Register may include additional indicators (such as those related to revenues) and may be updated every year instead of with a ten-year time lag (the number of years between two traditional censuses).

The paper showed that the FAO methodology aimed at identifying SSFPs may be substituted by alternative and maybe simpler methodologies. Of course, these results are valid in the Italian context, and reasonable concerns are raised about the validity of this exercise beyond the Italian context. However, we must consider that nowadays yearly data on surfaces, livestock and SO are available in many countries. Even the concept of the poverty threshold (used for methodologies 3 and 4) is quite used in many countries, not only in Europe.

The paper is intended as a starting research point, from which other applications may try to check the validity of some conclusions for other countries as well. To replicate calculations for other countries, access to microdata is a mandatory key issue

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