



Food and Agriculture Organization
of the United Nations

ISSN 2709-006X [Print]
ISSN 2709-0078 [Online]



FAOSTAT ANALYTICAL BRIEF 51

Agriculture and the food value chain 2005–2015

HIGHLIGHTS

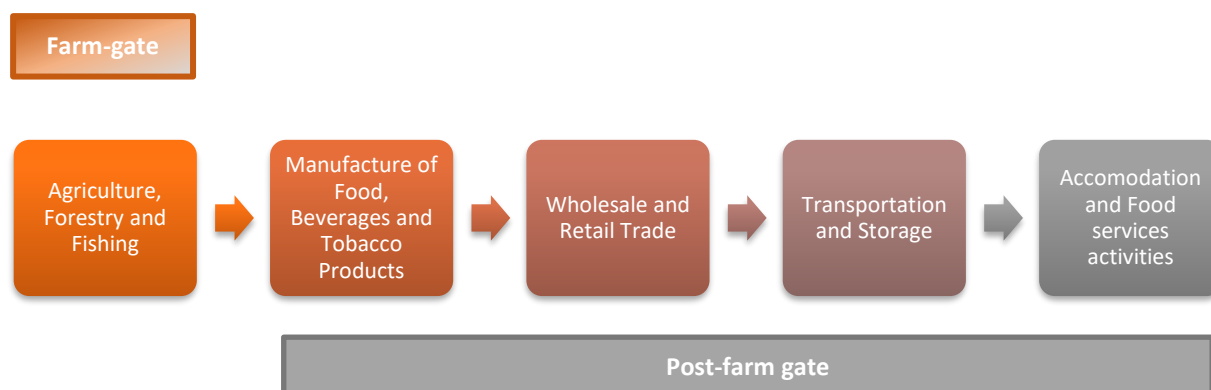
- FAOSTAT is launching the Food Value Chain (FVC) domain to inform users about the breakdown of consumers' expenditures among the different agrifood value chain industries and factors of production.
- The domain highlights three different food value chains, referring to the domestic final consumption expenditure on food at purchaser's prices: (i) *Food At Home*, (ii) *Food and Tobacco At Home*, and (iii) *Food and Accommodation Away from Home*.
- Data from 65 countries and territories for the period 2005–2015, representing over 90 percent of the global gross national income, show that only 6.7 percent of consumer expenditure on food consumed away from home accrues to the agricultural sector. This share has slightly decreased by around 1 percentage point over the period and is expected to further decrease over time.
- While the share of agriculture in the food value chain for food consumed away from home dropped slightly, the overall value of this food value chain increased by around 35 percent during the period, highlighting the need to pay attention to the post farm-gate dimension due to its increasing importance.
- The decomposition by primary factors shows that, on average, they follow the same order in the three food value chains although with variations in the values. The gross operating surplus was the larger factor, accounting for 36–42 percent, while labour accounted for 31–38 percent, imports for 16–30 percent, and taxes for the remaining 3–6 percent.

FOOD VALUE CHAIN

BACKGROUND

The **Food Value Chain** (FVC) domain informs on the distribution of national final consumption expenditures on food among the different food value chain industries (agriculture, processing, wholesale and retail distribution) and related primary factors. It measures the share of domestic consumer food purchases received by agriculture and the other industries along the food value chain, and their primary factors (labour, gross domestic surplus, imports) that contribute to the industry value added. Therefore, the FVC data highlight both the *farm* and the *post-farm gate* agrifood value chain dimensions (Figure 1).

Figure 1: Main farm and post-farm gate economic activities components



Source: Author's own elaboration.

The FVC data refer to three food value chains, which reflect consumption expenditures in three items: (i) Food At Home (FAH), (ii) Food and Tobacco At Home (FTAH), and (iii) Food and Accommodation Away From Home (FAAFH).

FAH refers to the domestic consumption expenditures for food consumed at home. The FTAH measure is similar, but it includes tobacco together with food. This happens when countries do not separate these consumption categories in their original input-output data. FAAFH refers to domestic consumption expenditures for food consumed away from home (e.g. in restaurants, canteens and other collective consumption locations) and includes expenditures for accommodation in all the cases where the two types of expenditures were not separable in the original data. The Food at Home and the Food Away From Home measures are therefore complementary and mutually exclusive since they focus on different food systems.

In the methodology adopted to build the FVC dataset, the value added of the food value chain industries associated with the three food value expenditures described above is then decomposed by industry group and primary factor using a methodology based on Leontief's industry reduction method (Leontief, 1967).

The data in the FVC domain result from input-output modelling based on supply and use tables and official [System of National Accounts \(SNA\)](#) data and information. Hence, it complies with the main international statistical standards and classifications on economic statistics, such as the [International Standard Industrial Classification of All Economic Activities \(ISIC\)](#), the [System of Environmental-Economic Accounting \(SEEA\)](#) and the SNA itself, and can be scaled up at the global level when adequate information is made available.

In the FVC, five classes of agrifood industries (classified according to the ISIC in Table 1) are identified, as well as a set of primary factors linked to the food value production: (i) *operating surplus*; (ii) *labour*; (iii) *taxes*; and (iv) *import*, as determinants for the related industry value added.

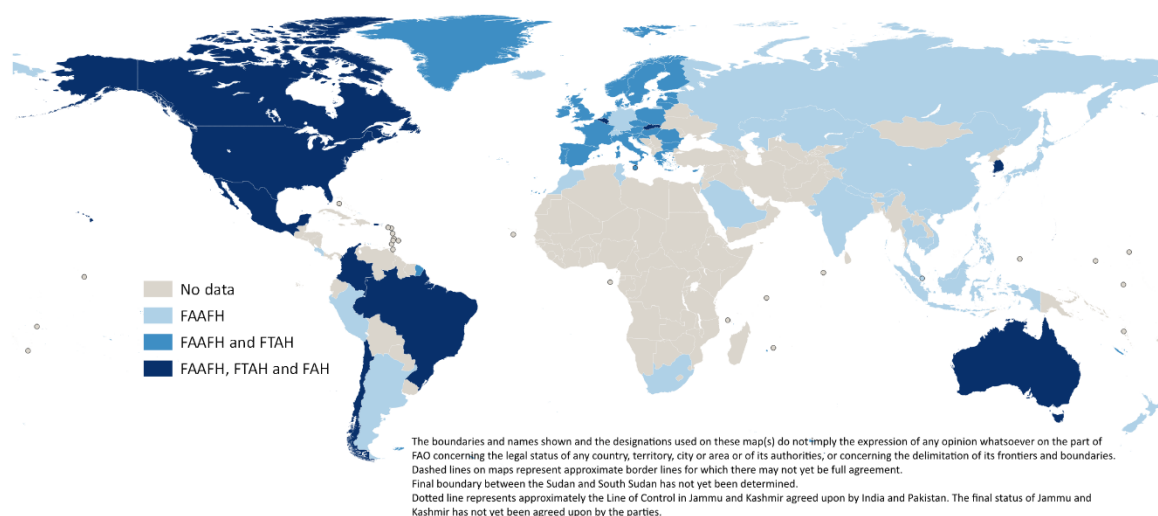
Table 1: Agrifood value chain industries classification according to the ISIC

Agrifood value chain industry	ISIC Section	ISIC Division
Accommodation and food service activities	I	55, 56
Agriculture, Forestry and Fishing	A	1-3
Manufacture of food, beverages and tobacco products	C	10, 11, 12
Transportation and storage	H	49, 50, 51, 51, 53
Wholesale and retail trade	G	46, 47

Source: Author's own elaboration.

With this level of disaggregation, the Food Value Chain domain provides estimates of national food expenditures across the whole agrifood value chain for 65 economies from 2005 to 2015: 65 countries for Food and Accommodation Away From Home, 37 for Food and Tobacco At Home, and 10 for Food At Home. As a result, 28 countries are covered only by FAAFH, another 27 countries are covered by both FAAFH and FTAH and the remaining 10 countries are covered by all three measures, as shown in Figure 2.

Figure 2: Data coverage of the Food Value Chain domain by measure



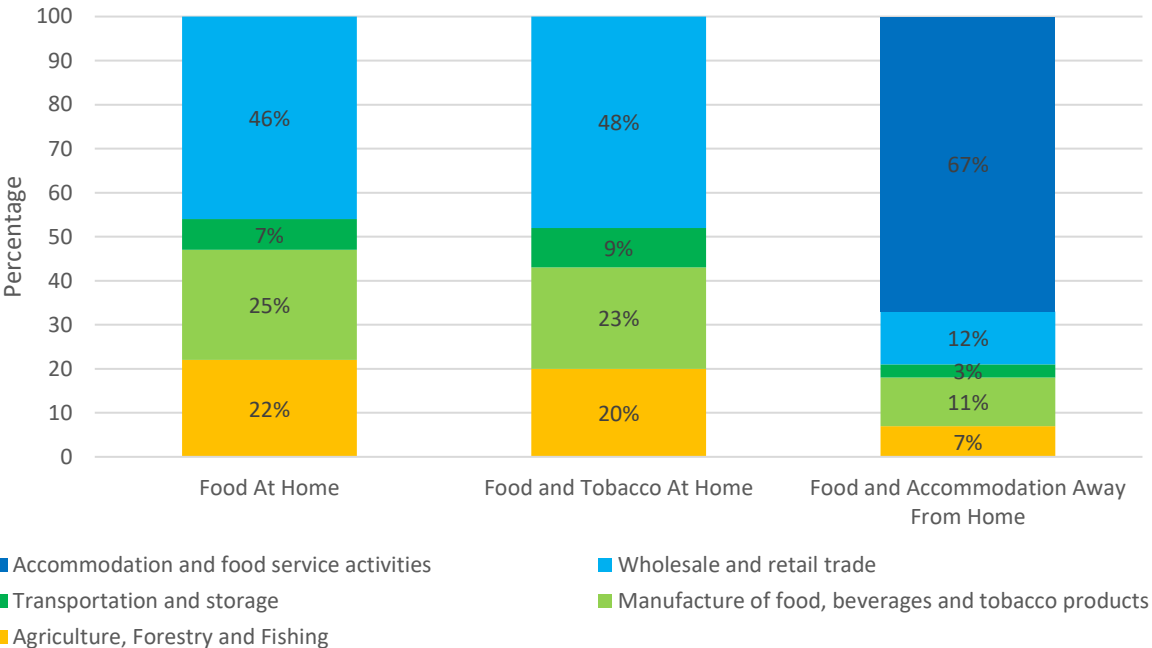
Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: FAO. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI> based on UN Geospatial. 2020. Map geodata [shapefiles]. New York, USA, UN.

The food value chain data may inform national, regional and global food policy, including additional measures in the World Food Summit framework. In addition, the disseminated data are relevant for assessing sustainable consumption and production patterns under Sustainable Development Goal (SDG) 12 (responsible consumption and production) and may help measuring indicators for SDG 2 (zero hunger) and SDG 1 (no poverty).

RESULTS BY MEASURE

Over the 2005–2015 period, wholesale and retail trade accounted on average for all countries for roughly half of the total food industries for the Food At Home and Food and Tobacco At Home measures (46 percent and 48 percent, respectively), as shown in Figure 3, with manufacturing of food representing around one-quarter and agriculture around one-fifth. This changes drastically for the Food and Accommodation Away From Home measure, as accommodation and food service activities represented two-thirds of the total industries, which significantly reduces the share of the other sectors, with agriculture accounting for only 7 percent.

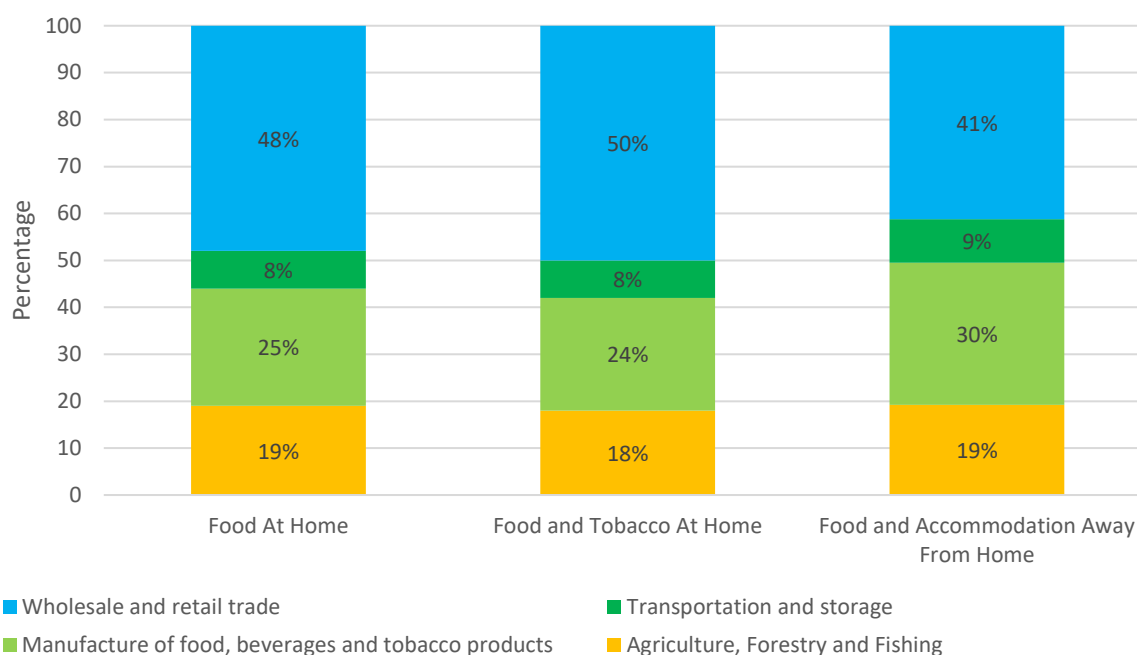
Figure 3: Food value measures by industry (2005–2015 average)



Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: FAO. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI>

As prices paid by final consumers for food consumed away from home are generally higher than those that are paid for food consumed at home, a meaningful comparison between the at-home and away-from-home measures needs to deduct the accommodation and food service activities from the food value chain, as shown in Figure 4. After the adjustment, the average contributions of each industry to value addition are comparable in scale; for FAAFH, the share of manufacture is higher, and that of wholesale and retail trade lower than for the at-home measures. This opens interesting perspectives for the analysis of the economic features of dietary habits when eating at home or away from home, and for comparisons over time and across regions and countries.

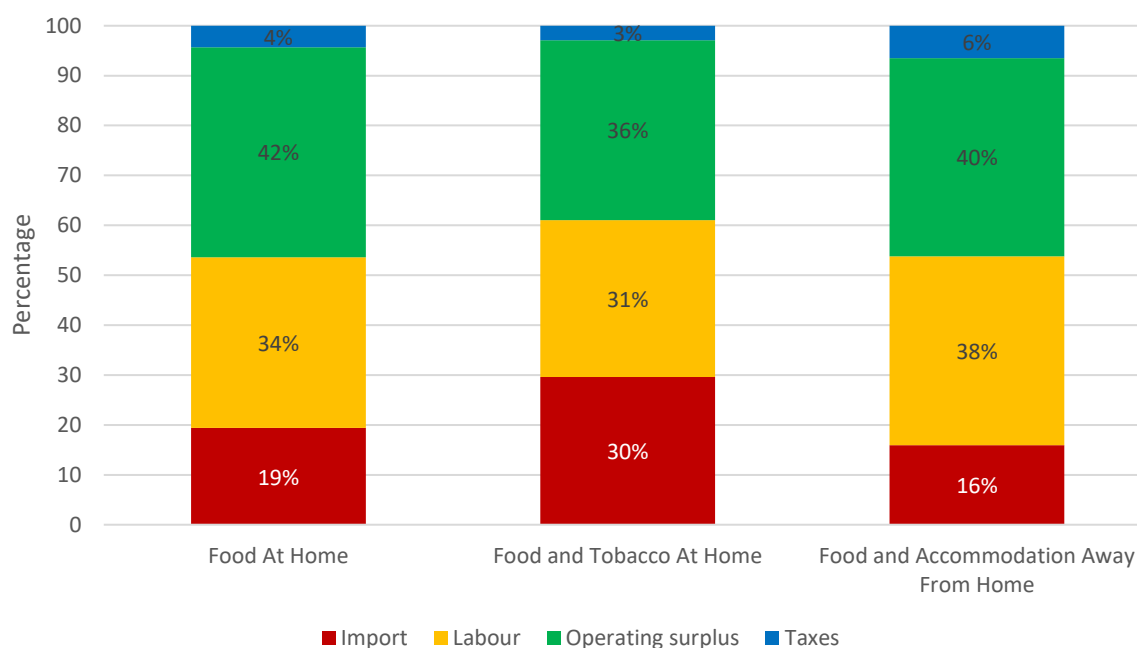
Figure 4: Food value measure by industry excluding accommodation and food service activities (2005–2015 average)



Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: *FAO*. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI>

Over the 2005–2015 period, the decomposition by primary factors shows that, on average, the primary factors follow the same order in the three food value measures, although with variations, as shown in Figure 5. The gross operating surplus was the larger factor, accounting for 36–42 percent (42 percent for FAH; 36 percent for FTAH and 40 percent for FAAFH). Labour was the second factor, reaching 34 percent for FAH, 31 percent for FTAH and 38 percent for FAAFH. Import came third, with similar shares for FAH and FAAFH (16 and 19 percent, respectively) and a much higher share (30 percent) for FTAH. Taxes accounted for the remaining 3–6 percent.

Figure 5: Food value measure by primary factors excluding accommodation and food service activities



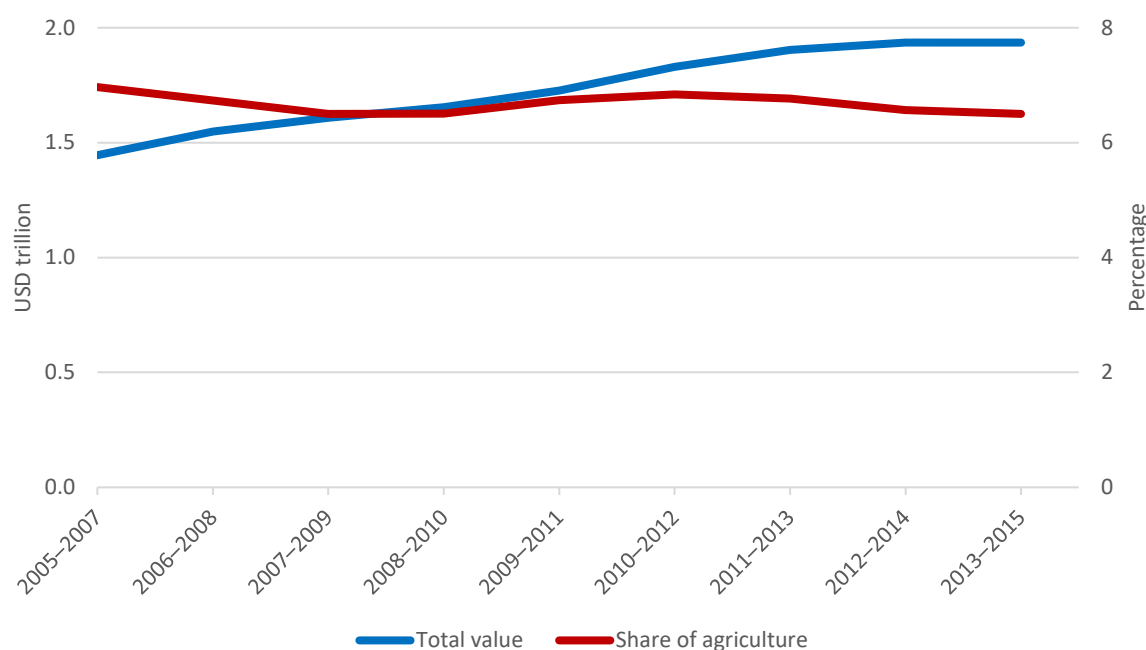
Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: FAO. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI>

While Food At Home is a measure of particular interest, as it shows more directly the share of national food expenditures that accrues to the agricultural sector, without considering tobacco (as in FTAH) or food accommodation and services away from home (as in FAAFH), the discussion of trends over time is more robust for Food and Accommodation Away From Home due to a larger and more consistent over time coverage.

RESULTS FOR FOOD AND ACCOMMODATION AWAY FROM HOME

Over the 2005–2015 period, the average share of agriculture (which also includes forestry and fishing) in food expenditures using the Food and Accommodation Away From Home measure, based on the 65 countries and territories shown in Figure 2, was 6.7 percent. The minimum was 0.46 percent in Singapore in 2012, corresponding to USD 19 million for agriculture over a total food value of USD 4.1 billion, and the maximum was 25 percent in India in 2015 (USD 6.1 billion over a total of USD 24.3 billion). In monetary terms, the value of the whole food value chain (from agriculture to retail trade) increased by around 35 percent from 2005–2007 to 2013–2015, from USD 1.4 trillion to USD 1.9 trillion. In contrast, the average share of agriculture decreased slightly during the same period, from 7 percent in 2005–2007 to 6.5 percent in 2013–2015, as shown in Figure 6. During the food price crisis period (2008–2010), farm shares dropped slightly, to rebound in 2009–2011 and 2010–2012. The high food prices observed in 2007–2009 have been considered as an incentive for small producers in low-income countries to increase agricultural production (FAO, 2009).

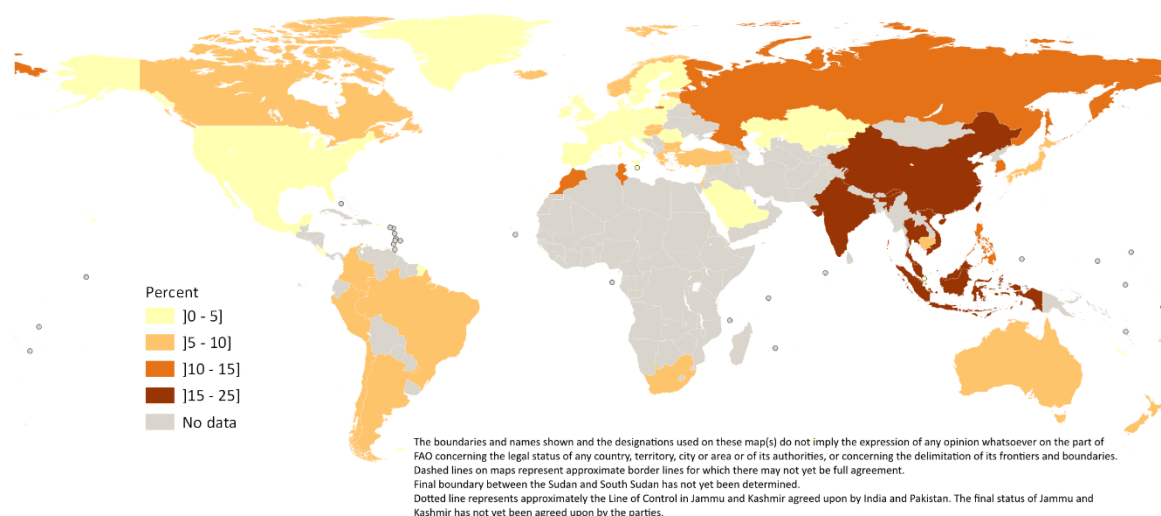
Figure 6: Value of the food value chain value and average share of agriculture using the Food and Accommodation Away From Home measure



Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: FAO. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI>

In 2015, the share of agriculture in food expenditures – referred to Food and Accommodation Away From Home – varied significantly between countries, from 0.8 percent in Singapore to 24.8 percent in India, as shown on Figure 7. The share seems to be negatively correlated to the income level of the countries, as high-income economies in Europe, Northern America and Western Asia have shares below 5 percent, while the higher shares are observed in lower-middle-income economies, especially in Southern and South-eastern Asia.

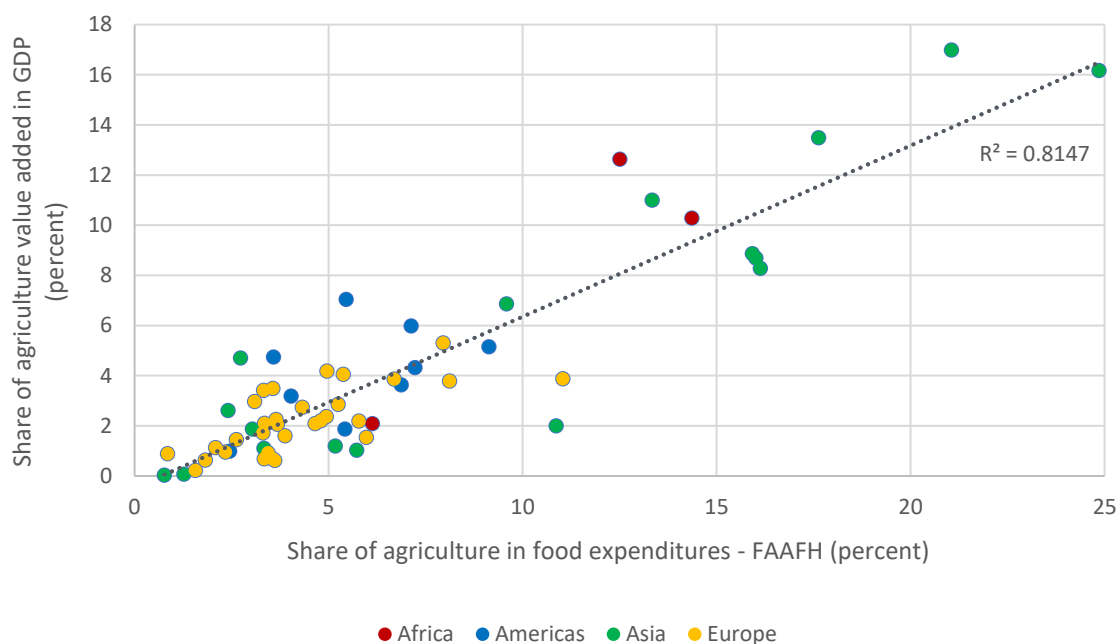
Figure 7: Share of agriculture in food expenditures using the Food and Accommodation Away From Home measure, 2015



Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: *FAO*. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI> based on UN Geospatial. 2020. Map geodata [shapefiles]. New York, USA, UN.

The share of agriculture in food expenditures shows weak correlation with the share of labour in the food value chain ($R^2 < 0.2$). A stronger correlation is evident, for all countries and regions, between the FAAFH share of agriculture in food expenditures and the share of agriculture, forestry and fishing value added in gross domestic product (GDP), as shown in Figure 10 for the year 2015 ($R^2 = 0.81$).

Figure 8: Share of agriculture in food expenditures compared to the share of agriculture value added in GDP, 2015



Note: Cambodia (x = 7.8; y = 26.6) is omitted from the chart as an outlier.

Source: FAO. 2022. FAOSTAT: Industry and primary factors decomposition. In: FAO. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/GFDI> and FAO. 2022. FAOSTAT: Macro Indicators. In: FAO. Rome. Cited November 2022. <https://www.fao.org/faostat/en/#data/MK>

EXPLANATORY NOTES

The Food Value Chain domain is the result of a joint Food and Agriculture Organization of the United Nations (FAO)–Cornell University collaboration, aiming at applying the Global Food Dollar (GFD) approach at the global level.

The GFD adapts and scales up the *Food Dollar* series published by the Economic Research Service (ERS) of the United States of America Department of Agriculture (USDA)¹ since 1947, to understand, among other aspects, the magnitude of the role played by post-harvest food value chain intermediation, namely the various processing, storage, transport and wholesaling activities. Both the Food Dollar and the Global Food Dollar apply the System of National Accounts international standard and can therefore be scaled up when appropriate data are made available. This has been the goal of the joint FAO–Cornell exercise, which further improves the GFD methodology through the industry and primary factor decomposition components, the results of which are shown in the FAOSTAT Food Value Chain domain. This analysis component is based on the Leontief decomposition methodology (Leontief, 1967) and attempts to measure how selected food industries (accommodation and food service activities; agriculture, forestry and fishing; manufacture of food, beverages and tobacco products; transportation and storage; wholesale and retail trade) and related primary factors (gross operating surplus; labour; taxes; import) contribute to each of the three food expenditure measures.

The applied methodology aims to measure the share of domestic expenditures on food accruing to farmers through the following set of expenditure measures: Food and Accommodation Away From Home (FAAFH), Food At Home (FAH) and Food and Tobacco at Home (FTAH). These three food expenditures measures are derived through an input-output modelling, which mathematically connects total output supply and use in an economy (Walras's law²) with the final consumption expenditure through the Leontief matrix, as per equation (1) below:

(1)

$$x = L * f$$

Where

x = Output

L = total requirement (Leontief) matrix

f = final demand

¹ The Food Dollar Series measures annual expenditures by US consumers on domestically produced food. This data series is composed of three primary series – the marketing bill series, the industry group series, and the primary factor series – that describe different aspects of the food-supply chain. The three series show three different ways to split up the same food dollar. For more information about the Food Dollar Series, see Canning (2011).

² Walras's law is a principle in the general equilibrium theory asserting that budget constraints imply that the values of excess demand (or, conversely, excess market supplies) must add up to zero regardless of whether the prices are general equilibrium prices.

By introducing a subset of the final demand for food baskets, for example for the FAH, based on assumptions described above, we can easily derive equation (2) as the final consumption value of the Food At Home basket (the equations for the other two measures are similar):

(2)

$$x_{FAH} = L * f_{FAH}$$

This methodological framework allows to shed light on the breakdown of the national final food expenditures through the value added of the different food value chain industries. The three measures provide insights on the farm and post-farm agrifood system food value chain.



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This analytical brief was prepared by Silvia Cerilli and Michele Vollaro under the supervision of Veronica Boero, team leader of the Social and Economic Statistics Team, FAO Statistics Division.

Required citation: FAO. 2022. *Agriculture and the food value chain 2005–2015*. FAOSTAT Analytical Brief No. 51. Rome.

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CONTACTS

Statistics – Economic and Social Development

statistics@fao.org

www.fao.org/food-agriculture-statistics/en/

Food and Agriculture Organization of the United Nations

Rome, Italy

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