INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE
IFPRI

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AGRIFOOD SYSTEM DIAGNOSTICS
COUNTRY SERIES

Madagascar's Agrifood System
Structure and Drivers of Transformation

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Four Parts to the Diagnostics

2019

- **Current structure**
  What does Madagascar's food system look like today?
- **Decomposing value chains**
  How are different products contributing to the broader agrifood system?

2009-2019

- **Growth and market structure**
  How is Madagascar's agrifood system growing and transforming?

2019+

- **Future drivers of inclusive agric. transformation**
  Which value chains could be most effective?

Summary

Madagascar's agrifood system (AFS) diagnostic results

Madagascar's AFS performed poorly during 2009–2019

- Growth of AgGDP+ and agriculture GDP has been stagnant (1.0% and 0.5% respectively)

The domestic-market-oriented value chains were the main cause for the poor performance of the AFS

- Rice is one of the largest value chains, but rice production fell in 2009–2019
- Less-traded value chains had a negative growth rate as a group

Madagascar faces serious food security challenges

- Many food crops and livestock have grown more slowly than population or have shrunk

Pulses, oilseeds, and fish value chains have performed better

- These value chains grew more rapidly than population growth (4–6% p.a.)
- Promotion of these fast-growth value chains needs to be combined with support to food crops and livestock for improving food security

Looking forward, the structure of AFS growth will be crucial in driving development outcomes…
(e.g., poverty, dietary improvement, employment creation, and growth)

…but no single value chain is the most effective at driving all these development outcomes

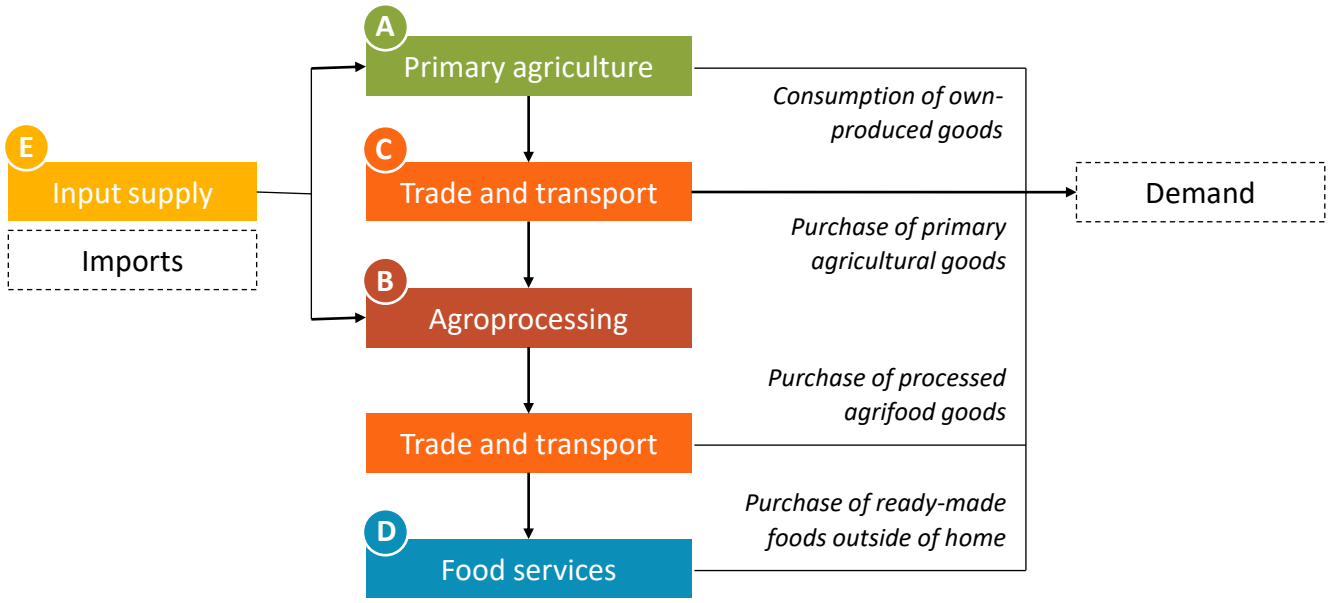
- Rice, horticulture, and the two livestock value chains rank highly in the combined development outcomes

⇨ ***Jointly promoting rice, livestock, and horticulture would offer an effective way to achieve multiple development outcomes***

Framework | Agrifood Systems (AFS)

Includes agriculture, plus all upstream/downstream sectors

- Five major components (A to E)
- Same format as standard economywide datasets (e.g., national accounts)
- Allows us to measure AFS structure and performance using actual data



Agrifood System GDP (AgGDP+)
Total value added generated by all agricultural value chains (in constant dollars)

Agrifood System Employment (AgEMP+)
Total number of workers who are primarily employed in an agricultural value chain

Structure $_{2019}$ | Madagascar's Agrifood System Today

- **Part 1** focuses on the **current size and structure** of the national agrifood system
  - Latest AgGDP+ and AgEMP+ estimates
  - Decomposed into five AFS components
  - Situates AFS within the broader economy
- Uses **official data** sources
  - GDP from national accounts
  - Employment from various sources (i.e., population census, labor force surveys, ILO, etc.)
- **Madagascar estimates** indicate that
  - AFS makes up 44% of GDP ($6 billion AgGDP+) …
  - … and 74% of total employment (10 million AgEMP+)
  - Primary agriculture (A) is large, but off-farm components (B–E) are also important (40% of AgGDP+, 13% of AgEMP+)

GDP and employment in Madagascar's agrifood system (2019)

	GDP ($ billions)		Employment (millions of workers)	
Total economy	**13.6**	**100%**	**13.6**	**100%**
Agrifood system	**6.0**	**44.3%**	**10.1**	**74.0%**
Primary agric. (A)	3.6	26.7%	8.7	64.1%
Off-farm AFS	**2.4**	**17.6%**	**1.3**	**9.9%**
Processing (B)	0.9	6.9%	0.5	3.3%
Trade & transport (C)	1.0	7.0%	0.7	5.2%
Food services (D)	0.3	2.2%	0.1	0.8%
Input supply (E)	0.2	1.5%	0.1	0.5%
Rest of economy	**7.6**	**55.7%**	**3.5**	**36.0%**

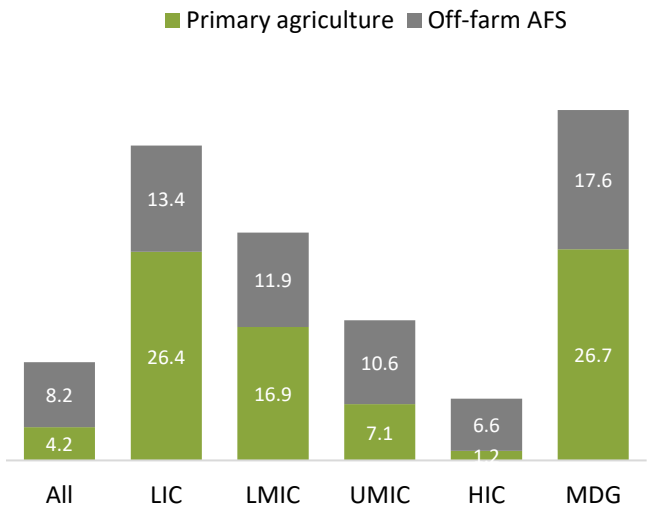
Structure $_{2019}$ | Comparing to Other Countries

- **Importance and structure of the AFS varies at different stages of development**

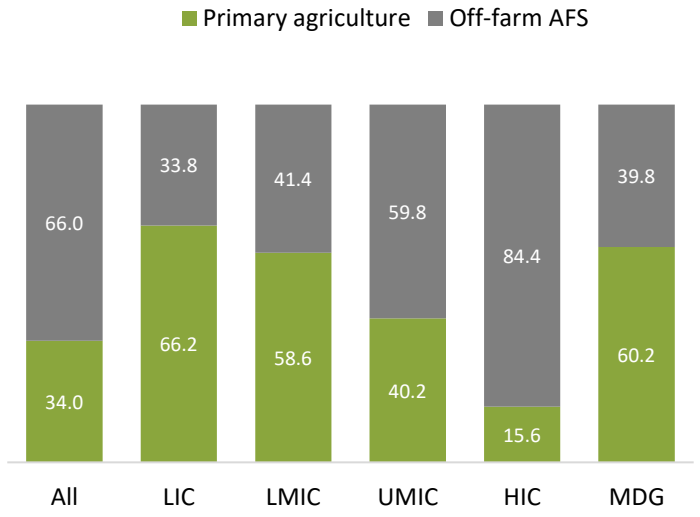
  Madagascar is a low-income country (LIC)

  - **A**: Madagascar's share of AgGDP+ in total GDP is similar to the LIC average
  - **B**: Madagascar's primary agriculture component is also similar to the LIC average
  - **C**: Madagascar's off-farm structure of AFS is also close to the LIC average

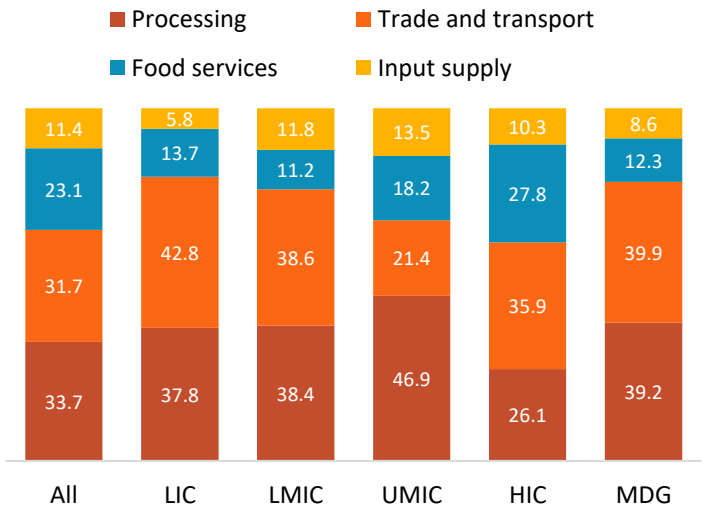
A **Share of total GDP (%)**



B **Share of AFS GDP (%)**



C **Share of off-farm AFS GDP (%)**



LIC = low-income countries | LMIC = lower-middle income | UMIC = upper-middle-income | HIC = high-income

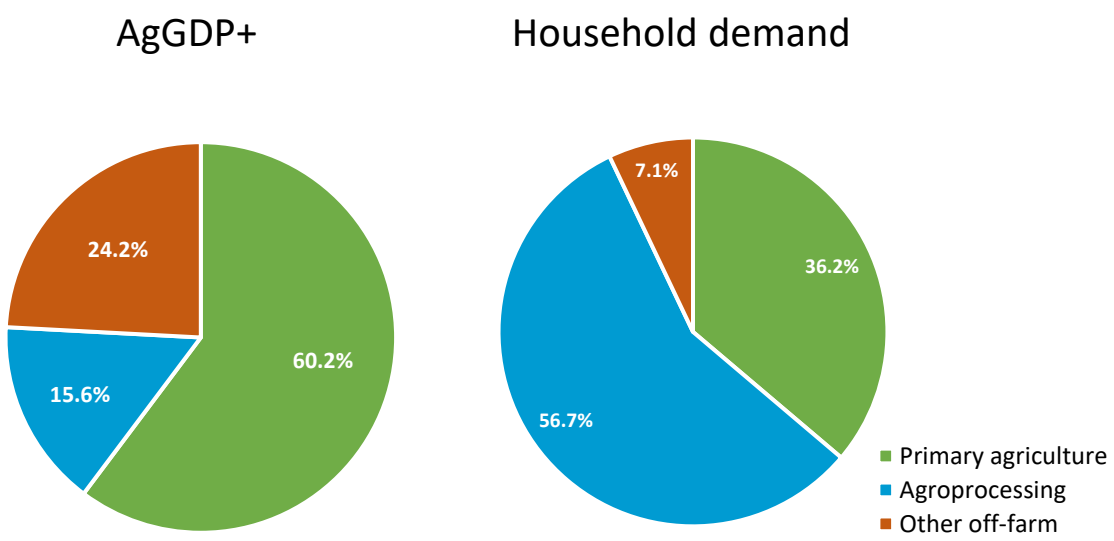
Source: IFPRI Agri-Food System Database

Structure $_{2019}$ | Supply vs. Demand Sides of the Agrifood System

- AgGDP+ defines the AFS on the **supply side**
- Household demand and trade (imports) capture AFS structure on the **demand side**
- Agrifood processing is more important on the demand side than the supply side in the AFS

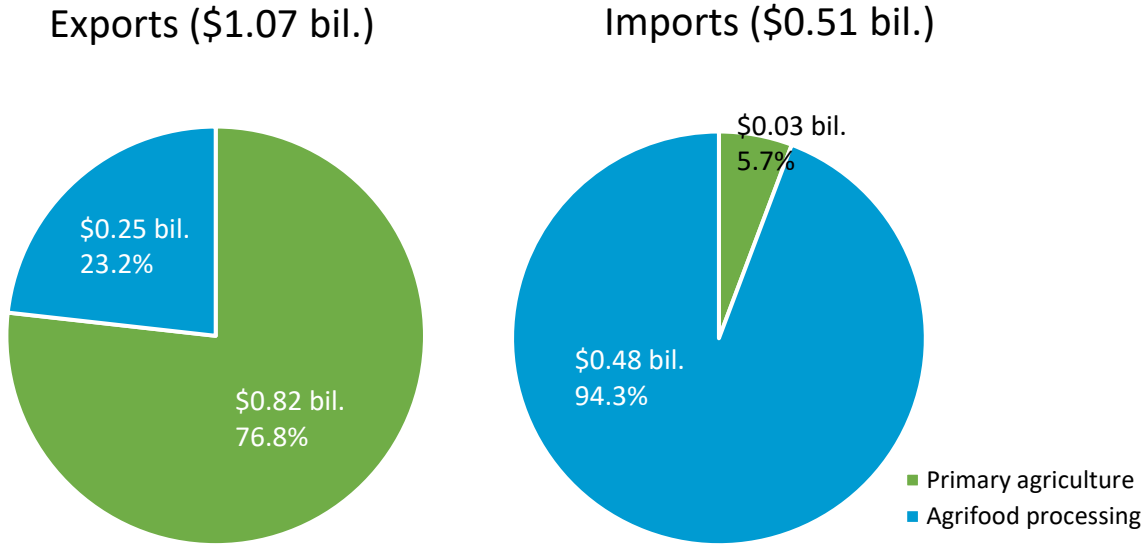
Agrifood GDP vs. consumption

Primary, processed, and other product shares (%)



Agrifood exports vs. imports

Primary and processed product shares (%)



Value Chains $_{2019}$ | Contributions & Trade Orientation

- **Part 2** decomposes the AFS across **broad value chain groupings**

- Classify value chains based on trade orientation
  - **Exportable** value chains have above-average export-output ratios (> 10.3%)
  - **Importable** value chains have above-average import-demand ratios (> 5.4%)
  - **Less-traded** value chains make up the rest

- Five exportable value chain groups account for a larger share of primary agriculture GDP (41.3%) and a smaller share of off-farm AFS GDP (32%) – exports dominated by primary agricultural products

- Three importable value chain groups account for a disproportionate share of off-farm AFS (29.4%) – these value chains compete with processed agrifood imports

- Four less-traded value chain groups include the country's largest value chain – rice (26% of AgGDP+); less-traded value chains have small off-farm components

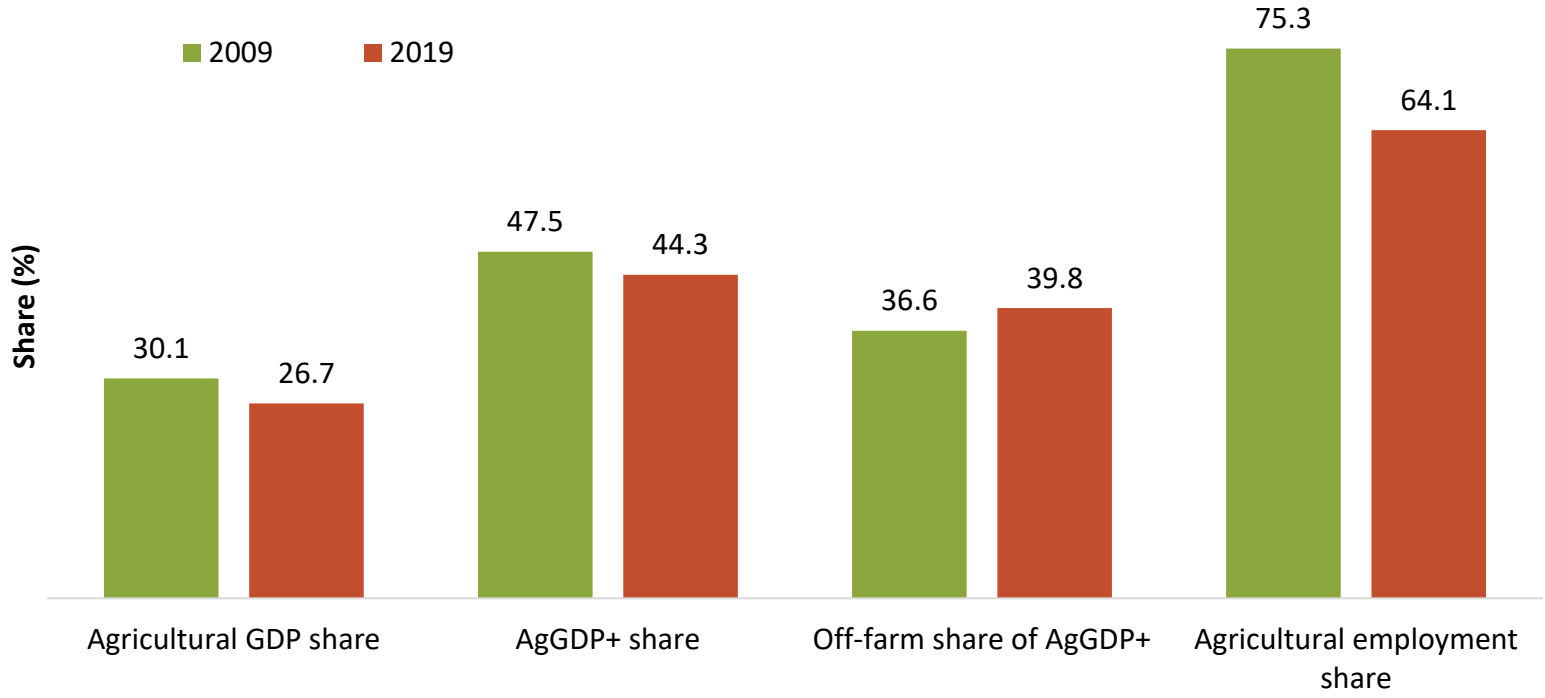
Breakdown of Madagascar's agrifood system (2019)

	Share of GDP (%)			Exports / output (%)	Imports / demand (%)
	Total AFS	Primary agric.	Off-farm AFS		
Total	**100**	**100**	**100**	**10.3**	**5.4**
Exportable	**37.6**	**41.3**	**32.0**	**37.5**	**2.3**
Pulses	1.2	1.6	0.5	46.2	2.5
Horticulture	12.4	16.1	6.9	21.8	0.9
Export crops	5.0	5.7	4.0	34.5	2.0
Fish	11.5	12.2	10.5	40.1	3.7
Forestry	7.5	5.8	10.1	27.8	2.8
Importable	**19.8**	**13.4**	**29.4**	**3.4**	**15.5**
Maize & other cereals	1.0	0.9	1.1	1.7	34.5
Oilseeds	4.1	1.7	7.7	13.7	22.2
Cattle & dairy	14.7	10.7	20.6	0.2	10.3
Less traded	**41.9**	**45.3**	**36.7**	**1.0**	**3.4**
Rice	25.7	26.0	25.3	0.2	3.9
Root crops	5.1	6.9	2.3	1.2	2.5
Other crops	4.5	3.3	6.4	5.9	
Other livestock	6.6	9.2	2.7	1.0	0.7

Growth $_{2009\text{-}2019}$ | Agrifood System Performance

- **Part 3** analyzes structural change in the AFS and the contribution of different value chains to AFS growth
  - Madagascar's AFS showed little growth and transformation during 2009–2019
    - Share agriculture GDP in total GDP fell modestly (30.1% to 26.7%)
    - Share of off-farm components in AgGDP+ increased slightly (from 36.6% to 39.8%)
  - Share of agricultural employment also fell (75.3% to 64.1%)
    - Agriculture is still the largest sector for employment with lowest labor productivity

Agricultural GDP, agrifood system GDP, and employment shares (2009–2019)



Growth $_{2009\text{-}2019}$ | Value Chain Performance

- Growth was stagnant both in AgGDP+ (1.0% p.a.) and primary agriculture (0.5%) during 2009–2019
- Less-traded value chains grew negatively in total, a main cause of the poor performance of the AFS
- Only four value chains have growth rates above population growth (> 2.7% p.a.)
  - Three exportable value chains – pulses, fish, and export crops including cotton, nuts, cocoa and coffee
  - One importable value chain – oilseeds
- **Madagascar faces a serious food security challenge**
  - Most **food crops** and **livestock** could not match the growth in population
  - Rice, maize, and other cereals had negative growth in both AgGDP+ and primary agriculture GDP

Value chain growth in Madagascar (2009-2019)

	Average annual GDP growth rate (%)			
	Total AFS	Primary agric.	Off-farm AFS	Process-ing
Total AFS	**1.0**	**0.5**	**1.8**	**2.1**
Exportable	**2.6**	**2.3**	**3.2**	**3.7**
Pulses*	**4.0**	**3.9**	**4.9**	
Horticulture	2.1	2.4	1.3	5.6
Export crops*	**2.8**	**2.7**	**3.1**	**5.3**
Fish*	**3.9**	**3.0**	**5.8**	**5.0**
Forestry	1.0	-0.1	2.2	2.8
Importable	**1.2**	**-1.6**	**3.7**	**5.3**
Maize & other cereals	-1.4	-3.6	2.6	4.7
Oilseeds*	**6.7**	**10.1**	**5.8**	**5.7**
Cattle & dairy	0.2	-2.4	3.1	5.1
Less traded	**-0.3**	**-0.3**	**-0.2**	**-1.3**
Rice	-0.4	-0.7	0.1	-0.7
Root crops	1.1	1.2	0.7	5.5
Other crops	-1.5	-0.4	-2.3	-3.8
Other livestock	0.3	0.0	2.3	5.8

Future Drivers $_{2019+}$ | Modeling Faster Growth

- IFPRI's **RIAPA model** is used to analyze different sources of agricultural growth

- **Expand production** in different value chains
  - Increase on-farm productivity growth rates in targeted value chains
  - Achieve same overall growth in agriculture GDP (e.g., 1.0%)
  - Track linkage effects within value chains and spillover effects to other value chains

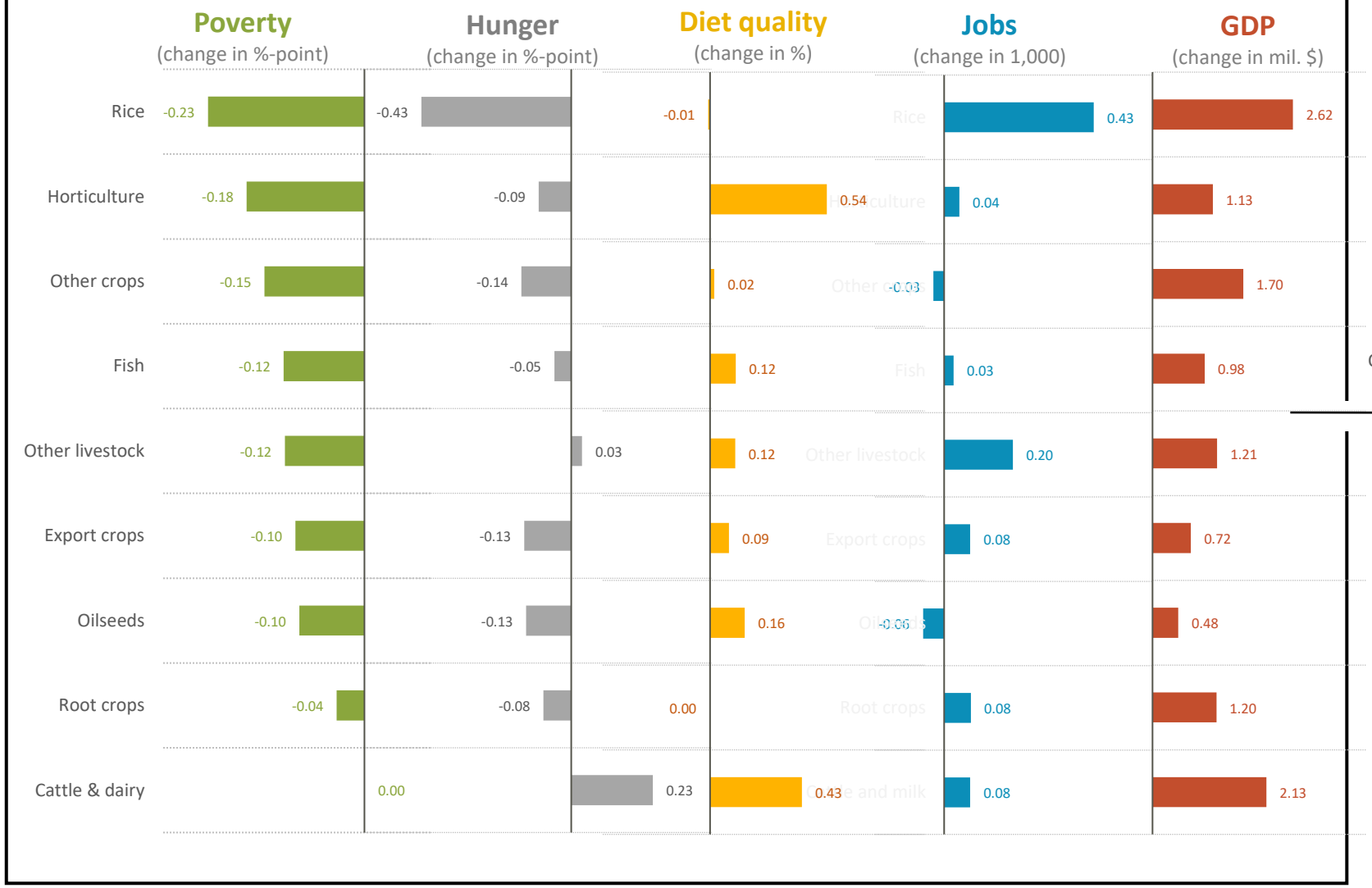
- **Assess outcomes**
  - **Poverty** – Poverty-growth elasticity in percentage points based on $2.15-a-day
  - **Hunger** – Hunger-growth elasticity in percentage points based on prevalence of undernourishment
  - **Diet** – Diet quality to growth elasticity in % derived from Reference Diet Deprivation index (REDD)
  - **Jobs** – Employment multiplier in thousand employed persons associated with US$1 million growth in targeted value chain
  - **GDP** – GDP growth multiplier in US$ millions associated with US$1 million growth in targeted value chain

- **Average across outcomes**
  - The value of outcome indicators (elasticity or multiplier) is expected to differ across value chain growth; not all value chains are equally effective at achieving all outcomes
  - Normalizing the individual outcome scores
    - The values of each outcome indicator are scaled so that the most effective value chain is given a score of one and the least effective is given a score of zero. A value chain with adverse impact is also given a score of zero.
  - An average score with equal weights is used to measure the total impacts across all value chains

Future Drivers $_{2019+}$ | Prioritizing Agricultural Growth

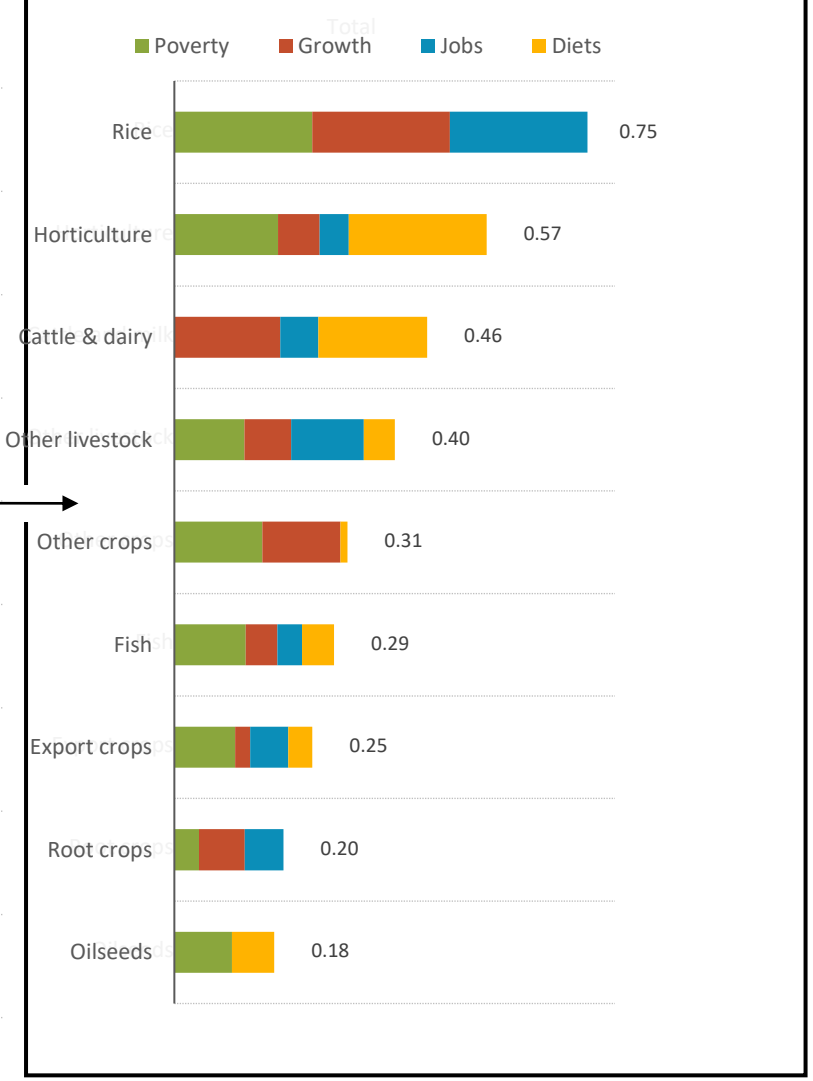
Individual outcomes

(per unit change in agriculture GDP, ordered by poverty outcome)



Average across outcomes

(average from the normalized scores, reordered)



Future Drivers $_{2019+}$ | Key Messages

AFS growth is **pro-poor**

- Growth led by most value chains reduces poverty, but rice and horticulture are most effective

AFS growth is effective in improving **food security (hunger)** and **diet quality**

- Most value chains reduce hunger; rice is most effective
- Most value chains improve diet quality; horticulture and cattle & dairy are most effective

Agricultural growth creates **jobs**, but not necessarily on-farm

- All value chains are associated with an increase in total employment, but most AFS jobs are created off-farm
- Rice is the most effective value chain in creating jobs in the overall economy, while the export-crop value chain is more effective for job creation within the AFS

Agricultural growth has strong **growth** multiplier effects that generate income beyond agriculture

- Rice and cattle & dairy value chains have stronger multiplier effects for both AFS income and total GDP growth

In conclusion, **promoting multiple value chains can achieve broad-based impact**

- No single value chain group is the most effective in achieving all five of the outcomes we consider
- Rice, horticulture, and the two livestock value chains rank highly in the combined poverty, diet, job, and growth scores
- Promoting these value chains together would offer an effective way to achieve broad-based outcomes, but the lack of growth in these value chains in the past indicates the serious challenges for achieving their growth

Note: Value Chain Groups and Agricultural Sectors in Individual VC Groups

Value chain group and their share of AFS GDP	Individual products and their share of group's agriculture GDP
Rice (25.7%)	Rice 100%
Maize & other cereals (1.0%)	Maize 98.4% | Sorghum & millet0.4% | Wheat & barley 0.9%
Oilseeds (4.1%)	Groundnuts 66.3% | Other oilseeds 33.7%
Pulses (1.2%)	Pulses 100%
Root crops (5.1%)	Cassava 48.0% | Sweet potatoes 16.9% | Irish potatoes 27.5% | Other roots 7.6%
Horticulture (12.4%)	Vegetables 23.2% | Fruit bananas 12.9% | Other fruits 63.9%
Export crops (5.0%)	Cotton 10.2% | Nuts 8.0% | Cocoa 5.6% | Coffee 53.2% | Other crops 22.4%
Other crops (4.5%)	Sugarcane 82.8% | Tea 4.6% | Tobacco 12.6%
Cattle & raw milk (14.7%)	Cattle meat 27.3% | Raw milk 72.7%
Other livestock (6.6%)	Poultry 56.0% | eggs 19.9% | Small ruminants 14.6% | Other livestock 9.5%
Fish (11.5%)	Capture fisheries 100%
Forestry (7.5%)	Forestry 100%