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AGRIFOOD SYSTEM DIAGNOSTICS

COUNTRY SERIES

Zambia's Agrifood System Structure and Drivers of Transformation

Xinshen Diao, Mia Ellis, Karl Pauw, and James Thurlow

International Food Policy Research Institute

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Four Parts to the Diagnostics

2019

- **Current structure**

What does Zambia's food system look like today?

- **Decomposing value chains**

How are different products contributing to the broader agrifood system?

2010-2019

- **Growth and market structure**

How is Zambia's agrifood system growing and transforming?

2019+

- **Future drivers of inclusive agricultural transformation**

Which value chains could be most effective?

Summary

Zambia's agrifood system (AFS) diagnostic results

Zambia's AFS has performed poorly

- Agriculture GDP lacked growth and off-farm AFS GDP grew modestly during 2010–2019

Food security is challenged by the weak growth in food crops and livestock

- Maize and root crops are the main staples for the poor, but their growth rates were negative
- Livestock, fish, pulses, and oilseeds are important for diet quality, but they all lacked growth

Looking forward, the structure of AFS growth will be crucial in driving development outcomes...

(e.g., poverty, dietary improvements, employment creation, and growth)

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

- Horticulture and maize are most effective at **reducing poverty**; cattle & dairy and horticulture are best for improving **diet quality**; export crops, maize, and other cereals have strong **employment effects**; and sugarcane and other livestock value chains have large **growth multiplier effects**

⇒ ***Jointly promoting horticulture, maize, other cereals, and export crops would offer an effective way to achieve multiple development outcomes...,***

... but lack of growth in some of these value chains in the past requires additional analysis to understand their growth challenges

Framework | Agrifood Systems (AFS)

Includes agriculture, plus all upstream/downstream sectors

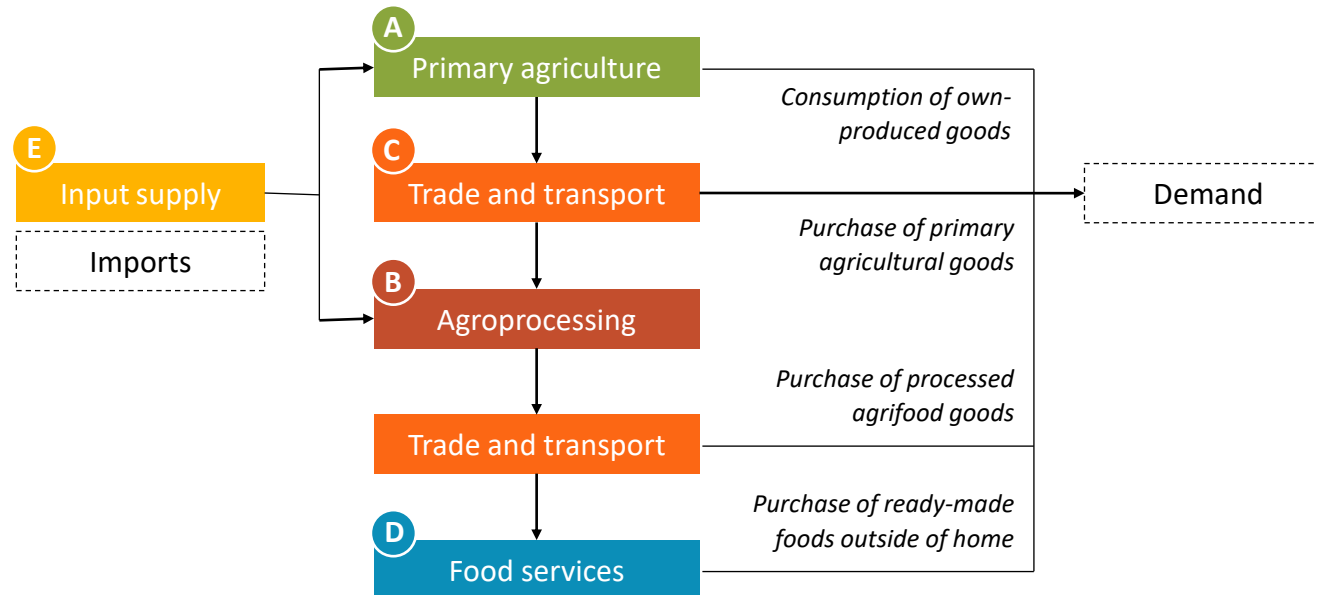
- Five major components (A to E)
- Same format as standard economywide datasets (e.g., national accounts)
- Allows us to measure AFS structure and performance using actual data

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



Structure₂₀₁₀ | Zambia'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.)
- **Zambia estimates** indicate that
 - Official national accounts show agriculture is only 3.1% of total GDP, which is likely an underestimate
 - AFS makes up 15% of GDP (\$3.3 billion AgGDP+) ...
 - ... and half of total employment (2.9 million AgEMP+)
 - Off-farm components are much larger than on-farm components in GDP (more than two-thirds AgGDP+, but less than one-third AgEMP+)

GDP and employment in Zambia's agrifood system (2010)

	GDP (\$ billions)		Employment (millions of workers)	
Total economy	21.5	100%	5.6	100%
Agrifood system	3.3	15.4%	2.9	51.1%
Primary agric. (A)	0.7	3.1%	2.1	37.3%
Off-farm AFS	2.6	12.3%	0.8	13.8%
Processing (B)	0.6	2.8%	0.1	2.3%
Trade & transport (C)	0.5	2.5%	0.1	2.0%
Food services (D)	1.4	6.4%	0.5	9.0%
Input supply (E)	0.1	0.6%	0.0	0.5%
Rest of economy	18.2	84.6%	2.7	48.9%

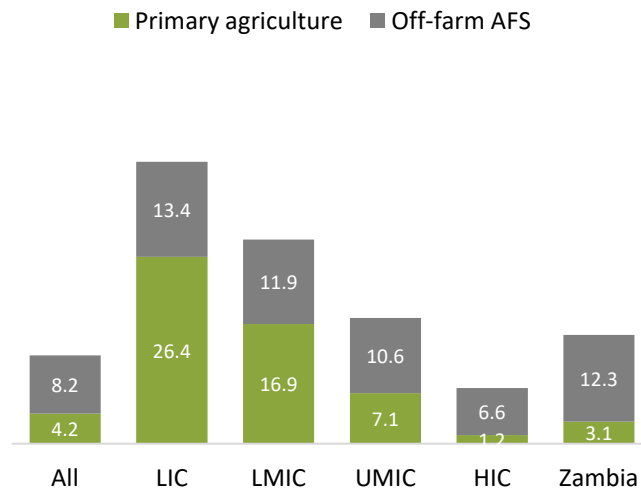
Structure₂₀₁₀ | Comparing to Other Countries

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

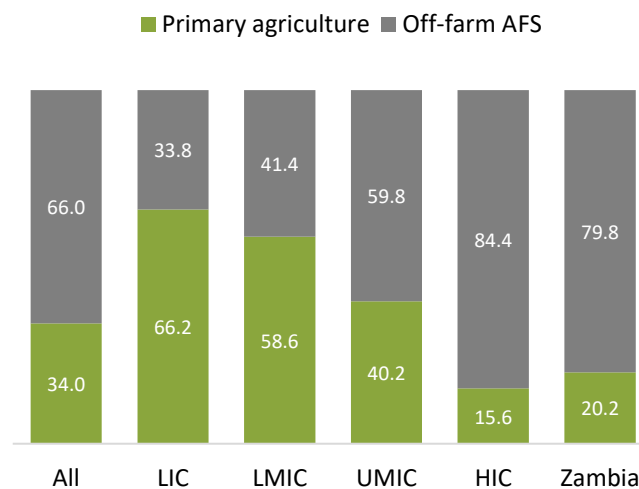
Zambia is a lower-middle-income country (LMIC)

- **A:** Zambia's AgGDP+ share of total GDP is much lower than most LMICs due to the extremely small share of agriculture in total GDP
- **B:** Zambia's primary agricultural share of AFS GDP is even smaller than the upper-middle-income countries (UMICs)
- **C:** Zambia's agro-processing and trade and transport are smaller than expected because of the extremely large share of food services

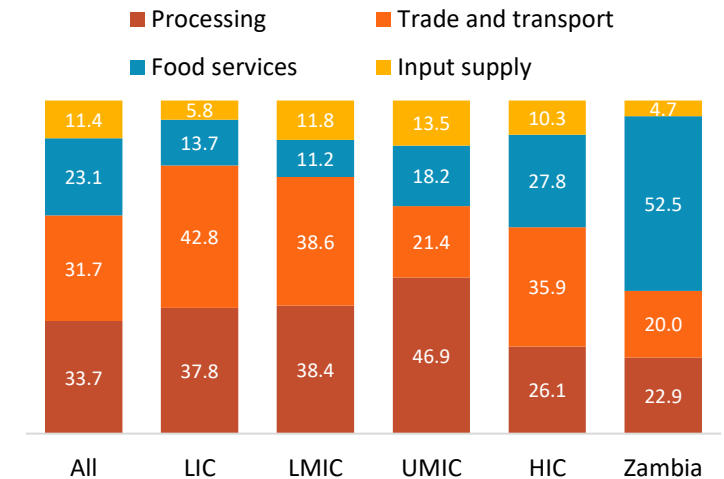
A Share of total GDP (%)



B Share of AFS GDP (%)



C Share of off-farm AFS GDP (%)

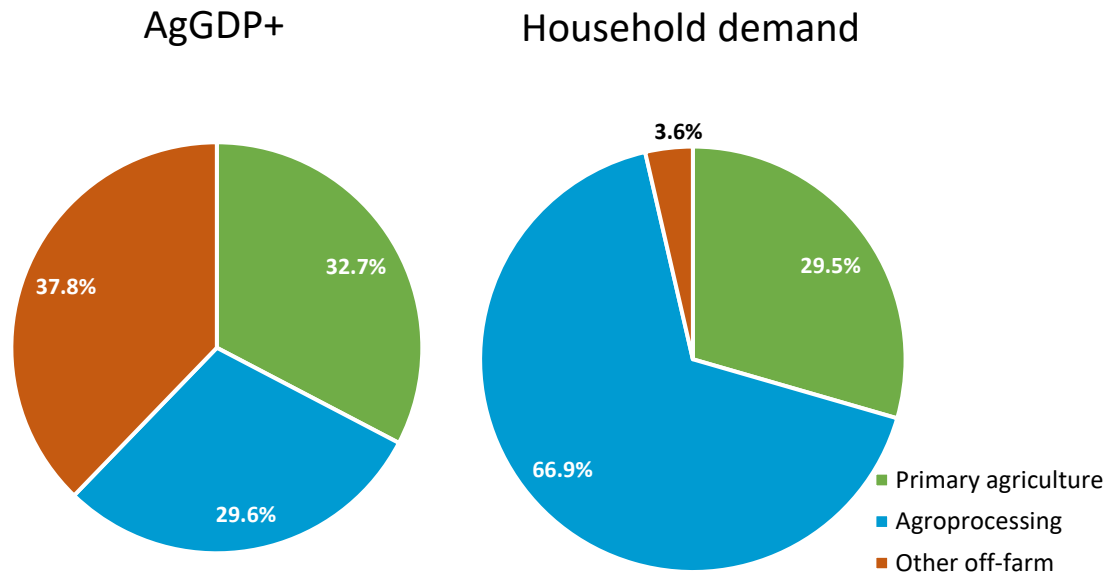


Structure₂₀₁₀ | Supply vs. Demand Sides of the Agrifood System

- 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

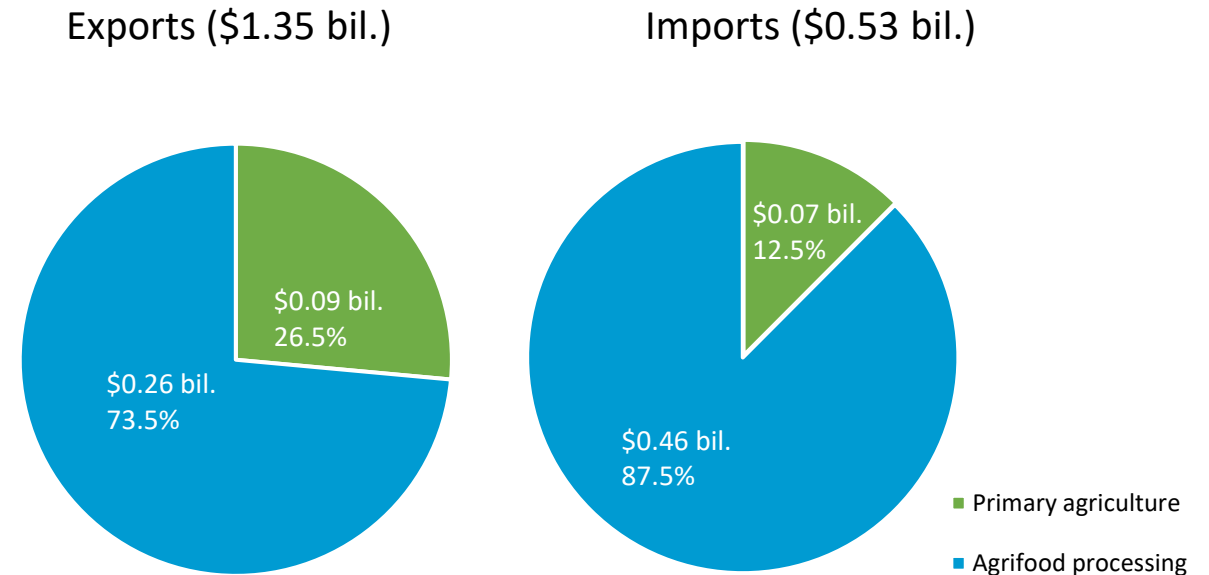
Agrifood GDP vs. consumption

Primary, processed, and other product shares (%)



Agrifood exports vs. imports

Primary and processed product shares (%)



Value Chains ₂₀₁₀ | 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 (> 7.0%)
 - **Importable** value chains have above-average import-demand ratios (> 11.4%)
 - **Less-traded** value chains make up the rest
 - Domestic market dominates AgGDP+ (55.4%) – six less-traded value chains; relatively smaller off-farm share (53.6%) and larger on-farm (primary) share (65.7% of total), with horticulture a significant exception
 - Only one exportable value chain group – export crops include tobacco, cotton, and coffee; relatively small share of AgGDP+ (12.9%)
 - Five importable value chains; pulses & oilseeds and sugar also have above-average export-output ratios
- ⇒ *Promoting some exportable value chains, pulses & oilseeds (importable), and horticulture (less traded) could be effective in driving agricultural transformation by boosting value added and employment in off-farm AFS*

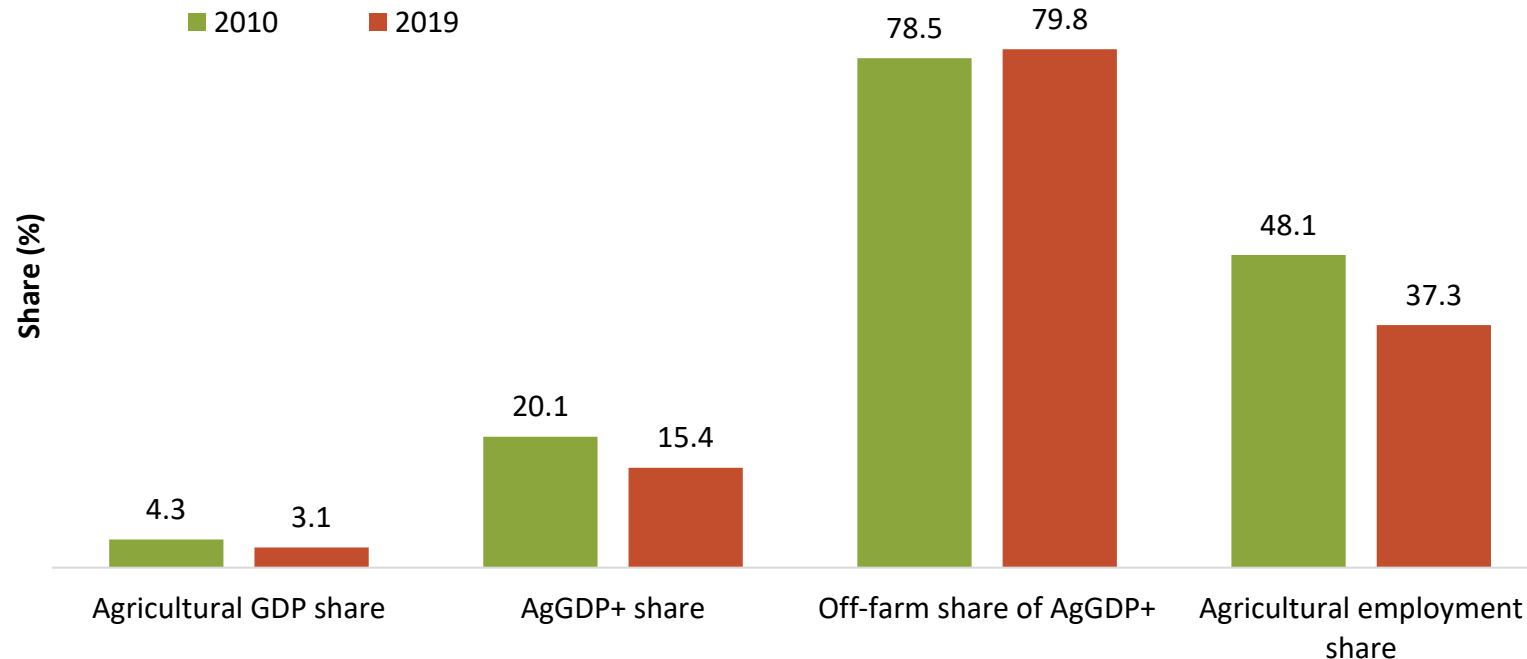
Breakdown of Zambia's agrifood system (2010)

	Share of total GDP (%)			Exports / output (%)	Imports / demand (%)
	Total AFS	Primary agric.	Off-farm AFS		
Total	100	100	100	7.0	11.4
Exportable	12.9	4.4	17.0	20.2	9.4
Export crops	12.9	4.4	17.0	20.2	9.4
Importable	27.7	30.0	28.2	10.6	24.3
Other cereals	4.2	4.0	4.6		40.0
Pulses & oilseeds	4.6	7.6	3.1	44.1	55.8
Sugar	6.7	1.0	9.5	8.6	17.4
Other crops	0.1	0.0	0.1		78.6
Fish	10.1	18.6	5.9	1.1	21.0
Less traded	55.4	65.7	53.6	4.0	4.9
Maize	12.3	15.2	10.8	5.3	2.3
Roots	4.0	7.5	2.3	0.6	2.4
Horticulture	10.6	6.7	12.5	2.3	9.5
Cattle & dairy	14.4	14.4	14.4	3.6	6.2
Other livestock	6.2	11.9	3.5	0.8	1.6
Forestry	8.0	10.1	7.0	6.6	5.5

Growth₂₀₁₀₋₂₀₁₉ | Agrifood System Performance

- **Part 3** analyzes structural change in the AFS and the contribution of different value chains to AFS growth
 - Zambia's AFS lacked transformation in 2010-2019
 - Agriculture accounted for only a small part of total GDP, which is possibly due to an underestimation of agriculture
 - Share of off-farm components in AFS GDP rose modestly
 - Share of agricultural employment fell significantly (48% to 37%)
 - An indication of structural change in the economy and improvement in agricultural productivity

Agricultural GDP, agrifood system GDP, and employment shares (2010–2019)



Growth₂₀₁₀₋₂₀₁₉ | Value Chain Performance

- **Zambia's AFS has been stagnant**
- Growth was negative or close to zero for most food crop and livestock value chains
 - All importable value chains and five out of six less-traded value chains had negative or close to zero growth in their total AFS GDP or in primary agriculture GDP
 - The export crop value chain, including tobacco, cotton and coffee, and horticulture (less traded value chain) are the only value chains with growth rates above population growth rate (3.2% p.a.) in primary agriculture GDP
- The poor performance of AgGDP+ was led by negative growth in primary agriculture (-0.4%)
- The poor performance of AFS exacerbates food insecurity
 - Maize and root crops are the main staples for the poor, but their growth rates were negative
 - Livestock, fish, and pulses & oilseeds are important for nutrition, but they all lacked growth

Value chain growth in Zambia (2010-2019)

	Average annual GDP growth rate (%)			
	Total AFS	Primary agric.	Off-farm AFS	Processing
Total AFS	0.3	-0.4	0.8	4.1
Exportable	3.5	6.3	3.2	4.6
Export crops*	3.5	6.3	3.2	4.6
Importable	-0.8	-1.6	-0.4	2.8
Other cereals	1.6	0.0	1.8	5.5
Pulses & oilseeds	-0.4	1.6	-2.4	4.4
Sugar	0.7	1.9	0.6	2.4
Other crops	0.0	-0.6	0.1	
Fish	-3.0	-2.9	-3.0	-3.4
Less traded	0.2	-0.2	0.5	5.1
Maize	-0.3	-1.5	0.5	4.5
Root crops	-1.2	1.2	-4.0	4.1
Horticulture*	1.8	5.6	1.1	4.7
Cattle & dairy	1.0	0.9	1.1	4.4
Other livestock	-0.2	-0.7	0.6	4.1
Forestry	-1.1	-2.7	0.2	8.6

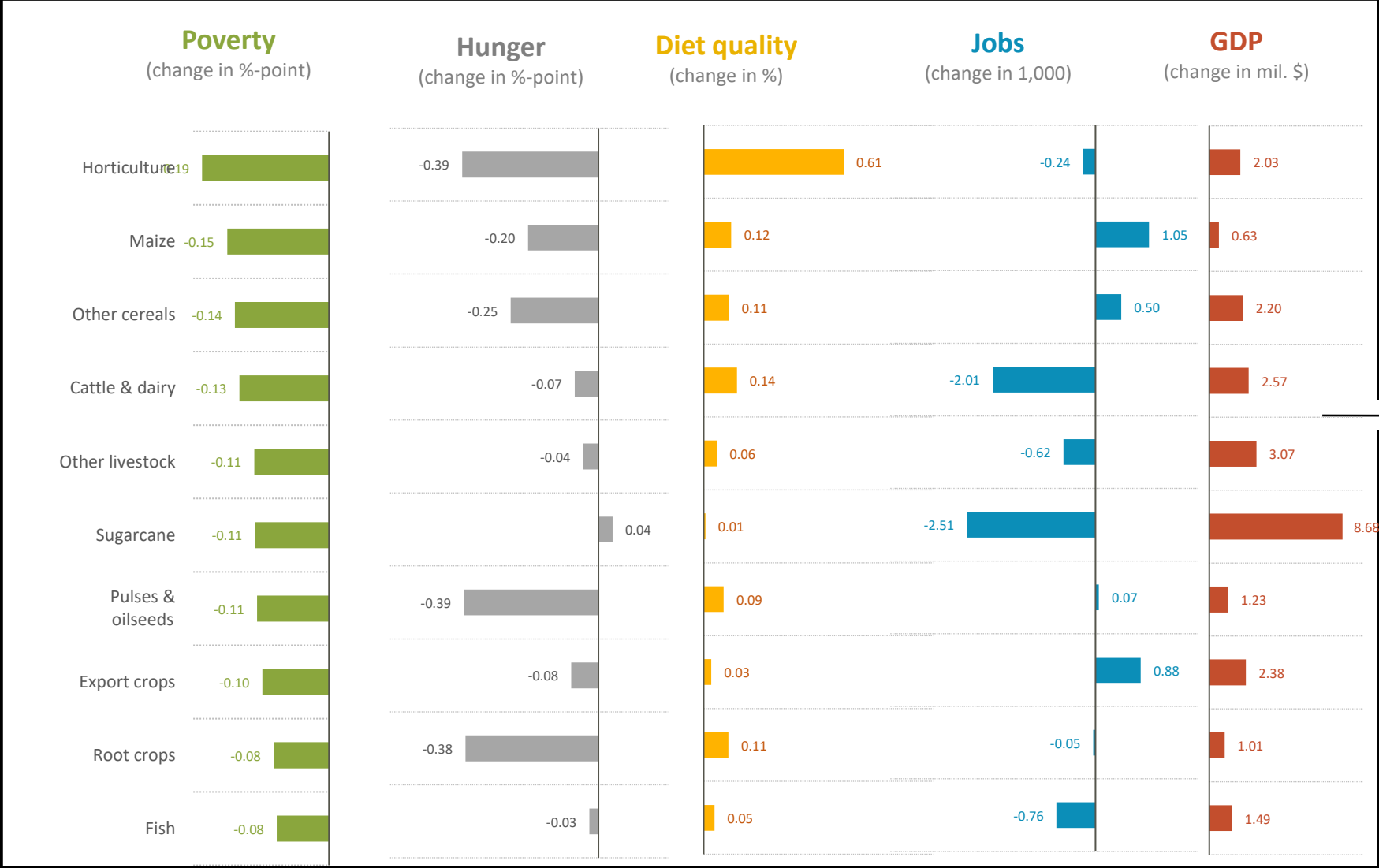
Future Drivers₂₀₁₉₊ | Modeling Faster Growth

- 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 effect within value chain 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

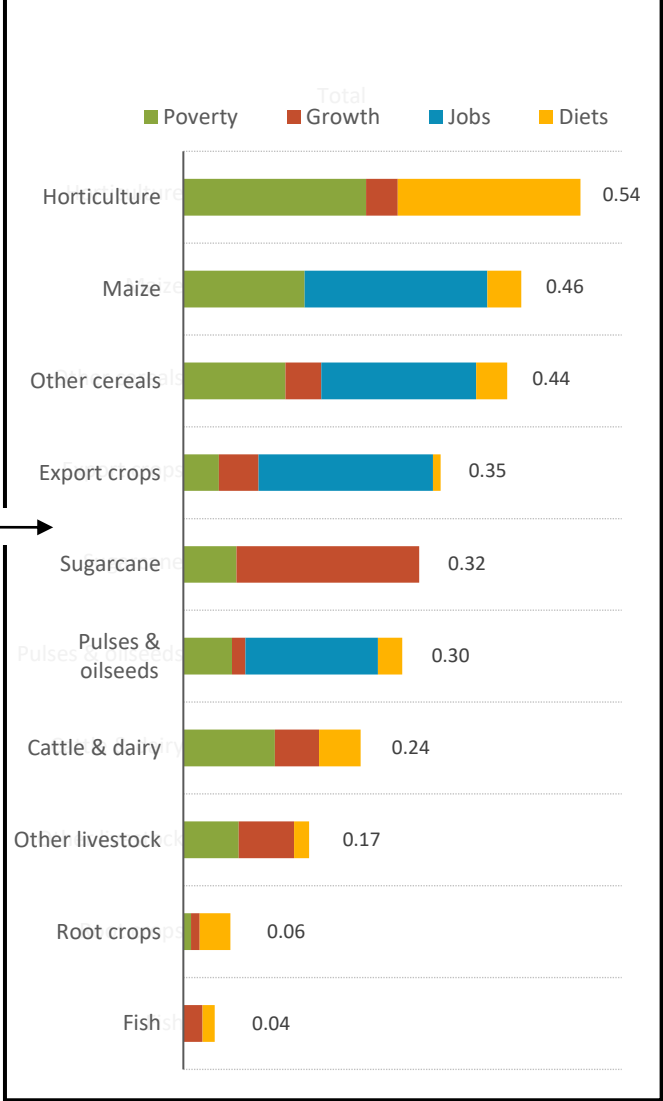
Individual outcomes

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



Average across outcomes

(averaged normalized scores, reordered)



Future Drivers₂₀₁₉₊ | Key Messages

AFS growth is **pro-poor**

- Growth led by most value chains reduces poverty, but horticulture, maize, and other cereals are most effective

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

- Most value chains reduce hunger; horticulture, pulses & oilseeds, and root crops are 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
- Maize is the most effective value chain for creating jobs in the overall economy and within the AFS

Agricultural growth has strong **growth** multiplier effect generating income beyond agriculture

- Sugarcane, the two livestock value chains, and export crops have stronger growth multiplier effects for total GDP

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

- No single value chain group is the most effective in achieving all the development outcomes we consider
- Horticulture, maize, other cereals, and export crops rank highly in the combined outcome scores for poverty, diet, jobs, and growth
- Promoting these value chains would offer an effective way to achieve broad-based outcomes, but lack of growth in some of these value chains in the past requires additional analysis to understand their growth challenges

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

Value chain group and their share of AgGDP+	Individual products and their share of group's agriculture GDP
Maize (12.3%)	Maize 100%
Other cereals (6.3%)	Sorghum & millet 9.5% Rice 34.5% Wheat & barley 56.0%
Oilseeds and pulses (4.6%)	Groundnuts 37.3% Other oilseeds 32.2% Pulses 30.5%
Roots (4.0%)	Cassava 82.0% Potatoes 18.0%
Horticulture (10.6%)	Vegetables 82.2% Fruits 17.8%
Sugar (6.7%)	Sugarcane 100%
Export crops (12.9%)	Tobacco 74.8% Cotton & fibers 20.3% Coffee 4.9%
Other crops (0.1%)	Other crops 100%
Cattle and dairy (14.4%)	Cattle meat 61.7% Raw milk 38.3%
Other livestock (6.2%)	Poultry meat 26.1% Eggs 21.6% Other livestock 52.3%
Fish (10.1%)	Fish 100%
Forestry (8.0%)	Forestry 100%