INCATA: Linked Farms and Enterprises for Inclusive Agricultural Transformation in Africa and Asia

INCATA Project:

Preliminary results from Kenya's Aquaculture & Tomato Value Chains

Presented by Tegemeo Institute and Michigan State University

December, 2025

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RIMISP
Centro Latinoamericano para el Desarrollo Rural

Outline

- Aquaculture value chain
  - Reconnaissance survey
  - Meso inventory

- Tomato value chain
  - Reconnaissance survey
  - Meso inventory and survey of wholesale markets
  - Stacked surveys--- traders

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Findings from Aquaculture Reconnaissance Survey

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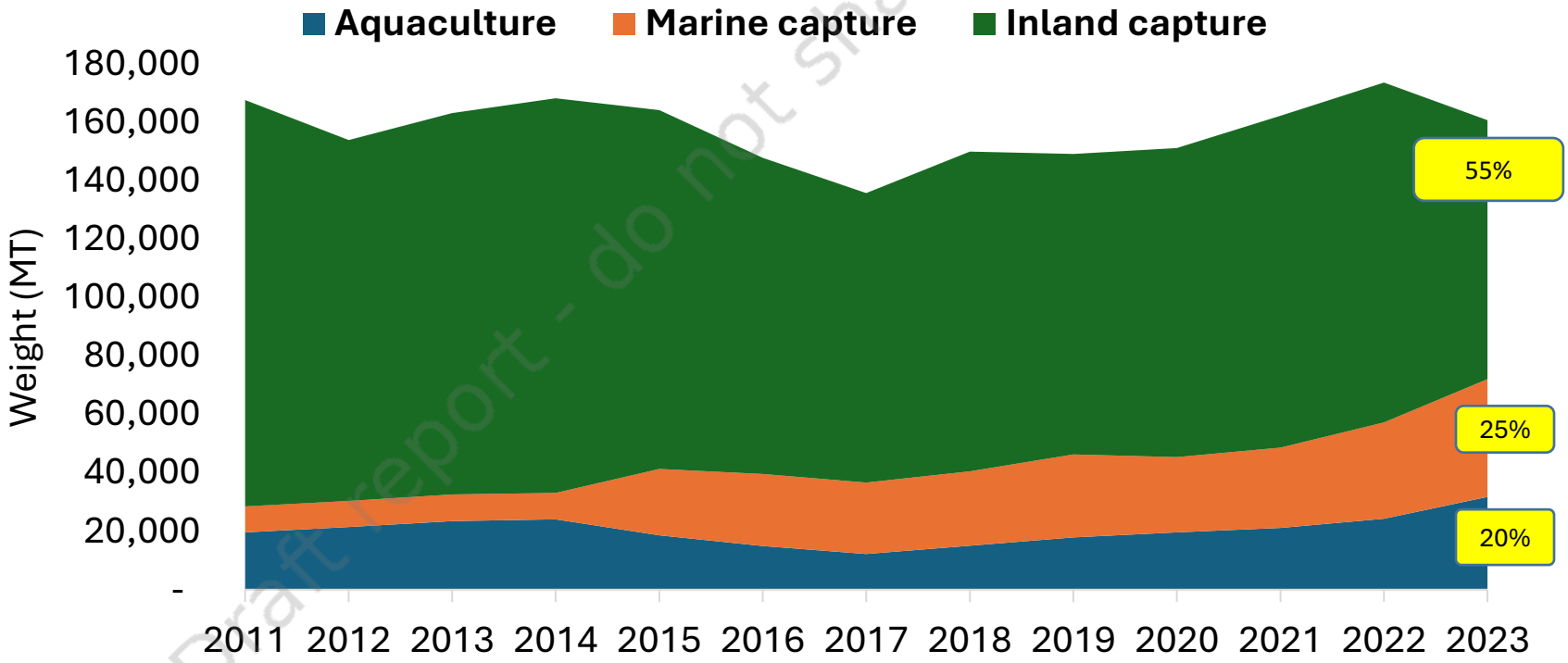
Fish production context in Kenya

Quantity of fish produced in Kenya by source, 2011-2023



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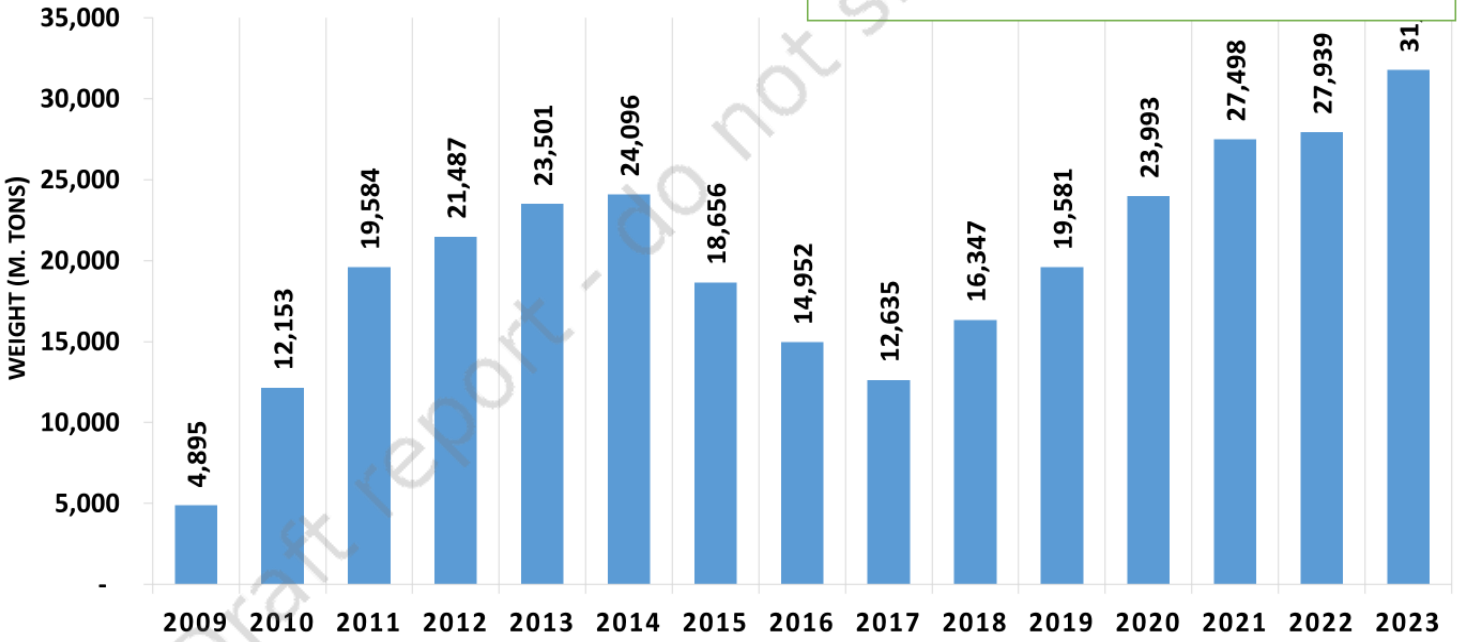
Data source: Kenya Fisheries Services, 2023

Trends in aquaculture production

Driven by economic stimulus program

Driven by supportive policies/incentives by Counties/donor projects



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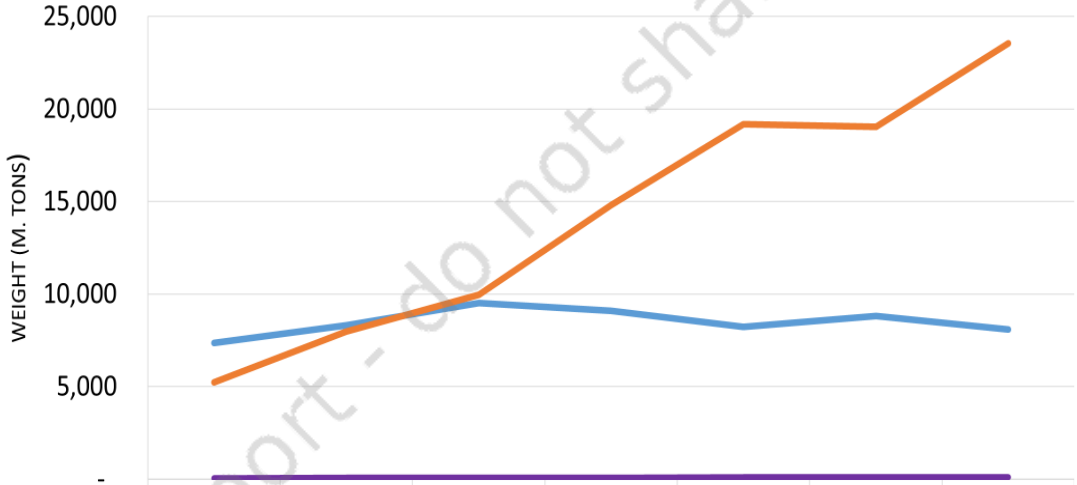
Source: Fish Statistical Bulletin 2023 (KeFS)

Trends of land-based ponds, cages and marine culture, 2017-2023



	2017	2018	2019	2020	2021	2022	2023
Pond culture	7,356	8,320	9,530	9,090	8,221	8,804	8,095
Cage culture	5,228	7,963	9,975	14,818	19,174	19,029	23,560
Marine culture	51	64	76	85	103	106	112

Source: Fish Statistical Bulletin 2023 (KeFS)

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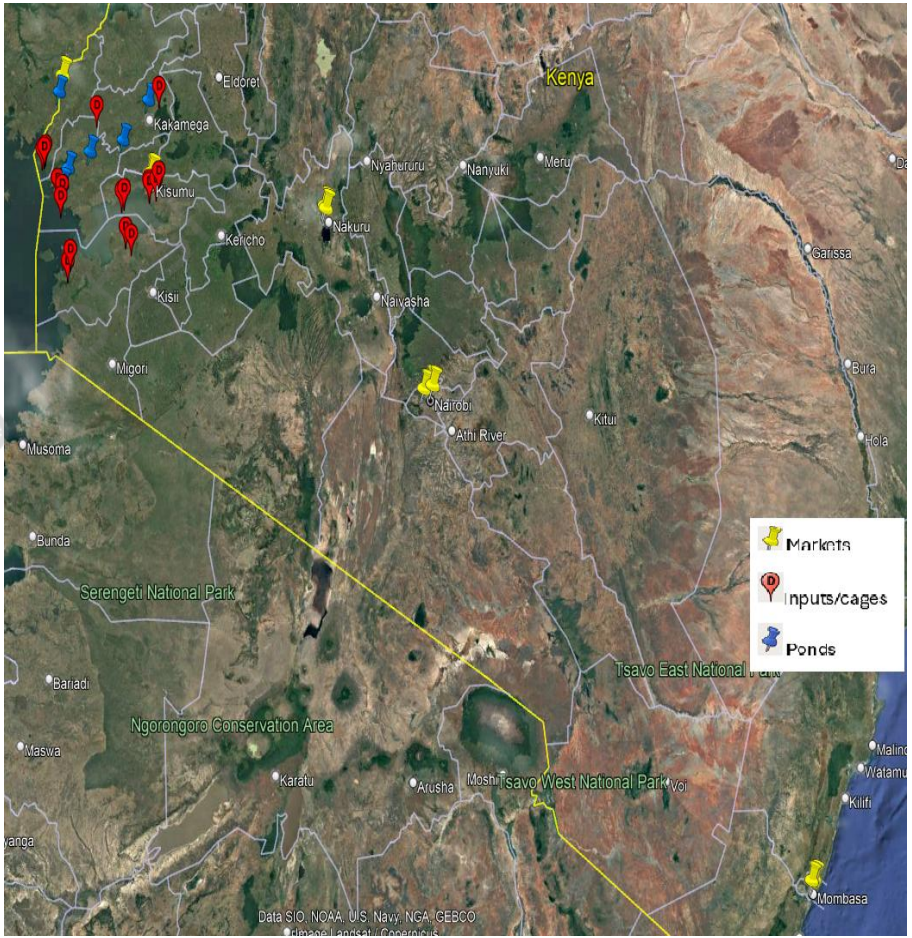
Locations visited during rapid reconnaissance

- The rapid reconnaissance study of the aquaculture value chain in Kenya was conducted between 10th February and 3rd March 2025

- The research team conducted 105 interviews across 9 counties with participants from various segments of the value chain actors: input suppliers, farmers, wholesalers, transporters, aggregators, processors, and cage fabricators



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Key findings: upstream

- Cage culture is a specialized emerging enterprise, generally capital intensive
- Increasing number of investor farms, vertically integrated, using imported technology from India, China
- Increasing number of hatcheries in the past five years
- Aquaculture skills are lacking among majority of farmers
- Fish feeds are available in specialized sales/retail outlets run by manufacturer or importers
- Increasing use of ICT (Mobile App platform) to support fish farming, input acquisition and fish marketing
- Most farmed fish in Nairobi is imported from Uganda, local production sold in regional markets in Western Kenya
- Pond based aquaculture farmers mainly supported by past and current governments (National and County) programs, or donor funded projects (e.g., KCSAP, ABDP, FFEPP-ESP)
- High reliance on cage managers, transporters, feeders and security especially among non-resident investor cage farmers

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Farmers (upstream)

Types of aquaculture

- Cage, pond-based & marine culture
- Cage culture is an emerging enterprise, generally capital intensive but skills are lacking among many farmers

Categories of cage culture farmers

- **Individual local farmers**: Majority were fishermen/investor fishermen, (small in terms of No. of cages)
- **Groups/cooperatives**- Mostly local supported through government/donor programs (small to medium)
- **Investor farmers/farms-** (Large companies or Individual farmers majority are non-locals)-Large in scale of operation

Types of cages

- Small cage -2X2 & 3X3 cubic meters (Capacity of 1000-2000 fingerlings)
- Medium cages 4X4 to 6X6 cubic meters (Capacity of 4000-6000 fingerlings)
- Emerging large circular HDPE cages with varying diameter from 10 to 50 meters (Capacity 40,000 to 500,000 fingerlings)

Pond-based culture

- Mainly individual farmers typically engaged in mixed farming
- Majority belong to common interest groups and supported by past and ongoing projects
- Most farmers own one pond with stocking capacity of 1,000 fish
- Primarily produce for subsistence. Surplus sold locally at the farmgate

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Input suppliers (upstream)

Hatcheries

- The production of fish seed (fish fries, fingerlings, juveniles and brood-stock) is a highly specialized process
- Large farm have hatcheries, sometimes sell fingerlings to other farmers
- Commercial hatcheries primarily producing for the market
- Most hatcheries are concentrated in production areas.
- **Cross-border sourcing** of fingerlings from Uganda

Also offer farmers extension advice and trainings to farmers and groups on:

- Feeding practices
- Ponds management

Fish feeds

- Fish feeds available in specialized outlets owned by manufacturers/importers
- Fish feeds also agrovets but not very common
- Feed mixing by a cooperative in Kiambu
- Some farmers use locally sourced feeds (Ochonga)
- Pond-based farmers also grow use vegetables and potato vines
- **Cross-Border sourcing**: Some farmers source feeds from Uganda

Cage construction

- Cage frames-metal bars rods, floater, sourced locally from hardware stores and shops
- Fish nets –sourced from two main suppler in Kisumu
- Local artisans fabricate the cages and mould anchors

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Key findings: midstream

- Increasing number of fish wholesalers in the past five years
- Increasing number of specialized transport vehicles available for hire
- Increasing use of ICT in fish trade
  - Social media (Facebook and WhatApp) for sales and marketing
  - Mobile money app for payment

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Midstream (wholesaling)

Two categories of wholesalers

- Vertically integrated investor farms
- Buying and selling wholesalers

Number of wholesalers has increased overtime due to

- The increasing demand for fish
- Supply sources have increased-- local farms in Kenya and huge supply from Uganda
- Growth in farmed fish sector and acceptance by consumers that farmed fish is as good as capture fish
- Perception that fish selling is a profitable business

Storage facilities

- Very few wholesalers have cold rooms
- All have freezers
- Most wholesalers sell all stock on the same day
- There is little investment in storage facilities (cold rooms)
- Some markets have freezers-hired by traders at a fee

Sales and marketing

- Sell to diverse buyers: smaller wholesalers, retailers, institutions and directly to consumers
- Some have multiple distribution outlets in various locations

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Midstream (transportation)

Vehicle and logistics

- Transportation vehicles used include insulated trucks, refrigerated trucks, shaded/enclosed trucks, public service vehicle (buses and nissans), probox (small vans), and motorcycles
- Motorcycles (boda boda) are used for shorter distances, especially from beach management units (BMUs) to local markets or at border markets for border crossing
- Increasing number of wholesalers are buying own specialized trucks for local dispatch
- Increasing number of specialized trucks (refrigerated/Insulated) are available for hire

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Findings from Aquaculture Meso Inventory

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Explosive sector growth (2014–2024)

Dramatic expansion in participation	Total number of cage farmers rose from 39 operators in 2014 to 2,737 operators in 2024
Exponential rise in production volume	Total volume surged from 24 metric tons (MT) in 2014 to 30,565 MT in 2024. The 2024 volume was 1,300 times that of 2014
Rapid emergence in key counties	Ten years ago, cage aquaculture was either non-existent or negligible in three of the four counties surveyed Siaya County accounted for a large proportion of the total growth in farmer numbers The development of cage aquaculture has been rapid and widespread around Lake Victoria in the last decade

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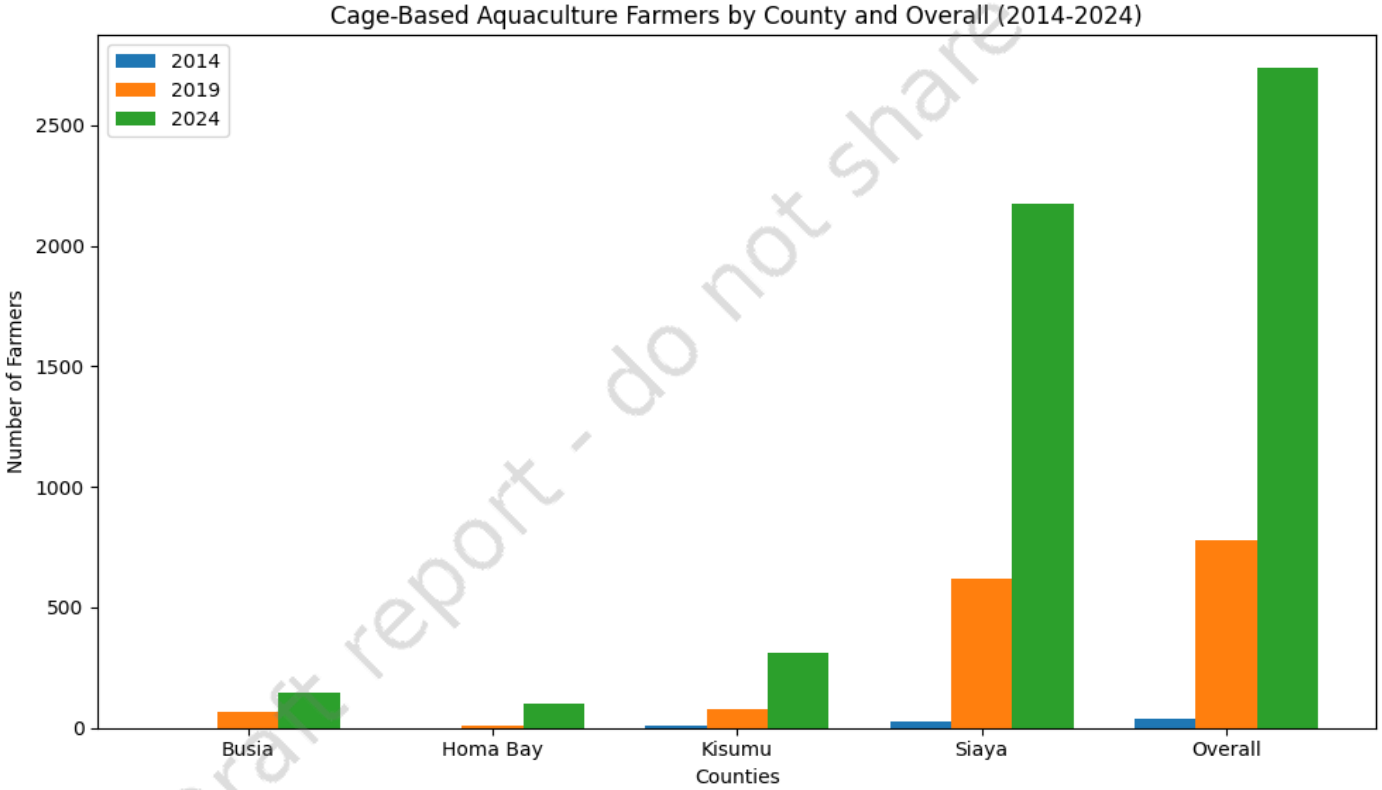

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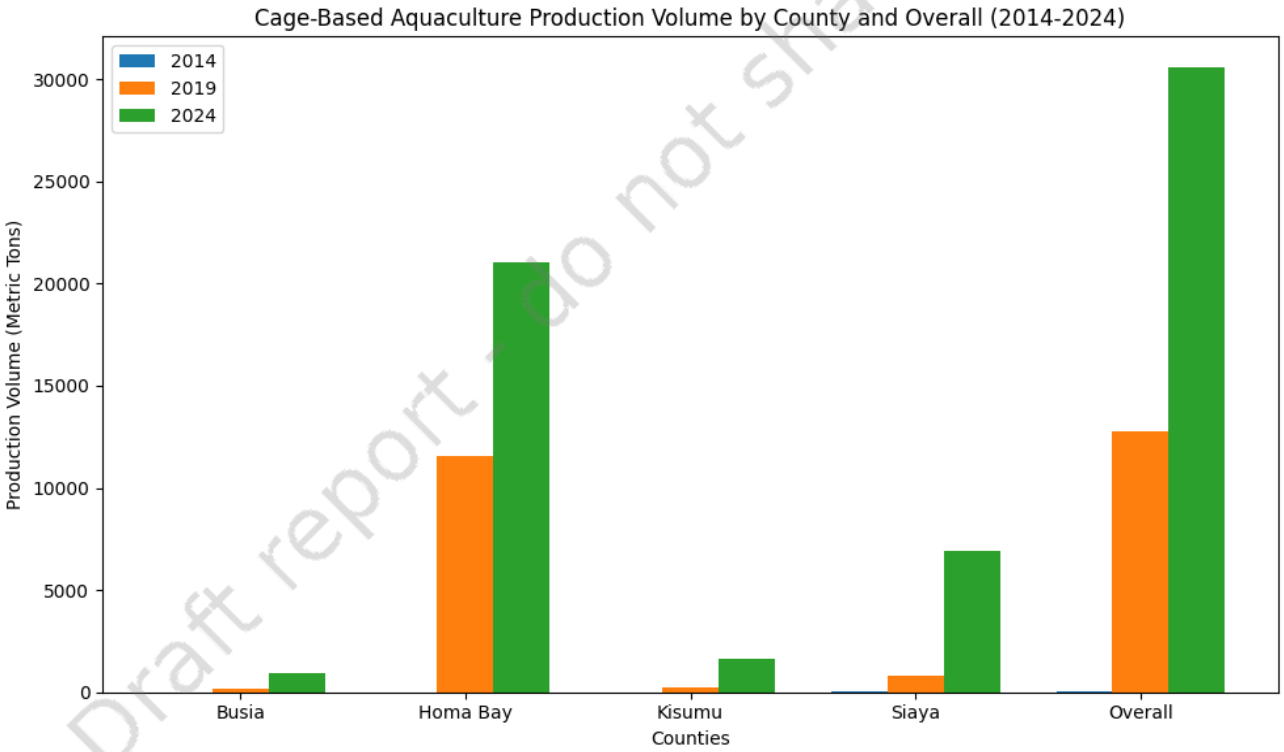

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Structural shift: industrialization vs. democratization

Numerical dominance of small operators	Small-scale cages have consistently dominated in terms of numbers, although their share has slightly decreased over time In 2024, 95.2% of all operators were small-scale
Production control by large operators	This is a highly concentrated sector where a very small number of large-scale operators control most of the total production volume Large operators (0.8% of total operators in 2024) controlled 68.1% of the total volume in 2024
Emergence of medium scale	There is a slow but steady diversification and scaling up Medium-scale operations showed a significant productivity advantage in 2024, comprising 4.0% of total operators but contributing 5.0% of total volume

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County-specific dynamics and specialization

Homa Bay: Large-scale industrialization	In 2024, only 1.0% of its operators were large-scale, yet they accounted for an astounding 95.7% of the county's total production volume This rapid development, particularly with strong large-scale dominance, is a notable phenomenon.
Siaya: Small-scale volume backbone	Siaya presents a contrasting picture where small-scale operations contribute significantly to the county's total volume In 2024, 96.9% of Siaya's operators were small-scale, contributing 85.9% of the county's total production volume
Diversifying counties (Busia & Kisumu)	Busia and Kisumu show an emerging diversification in production scale In 2024, Busia's total volume was produced by small (47.2%), medium (33.4%), and large (19.4%) operators In both Busia and Kisumu, large cages only appeared in 2024

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Pond-Based Aquaculture Production (2014–2024)

Substantial growth and persistent small-scale dominance

Growth in farmer numbers	The sector experienced substantial overall growth in the number of pond-based farmers, which more than doubled during the 10-year period The total number of farmers grew from 9,005 in 2014 to 18,957 in 2024
Numerical structure	The sector is characterized by the persistent dominance of small-scale farmers, who represented over 89% of all producers across the entire 2014–2024 period In 2024, small-scale farmers accounted for 89.4% of the total number of operators
Volume growth	Pond-based aquaculture production showed significant overall growth in volume, increasing from 365.7 metric tons in 2014 to 1,789.7 metric tons in 2024
Small-scale production backbone	Unlike the cage sector, small-scale farmers consistently contribute the largest share to the total pond-based production volume In 2024, they accounted for 84.9% of the total volume

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Nascent commercialization and shifting scale contributions

Medium-scale emergence	The share of medium-sized farmers in total production volume showed a consistent increase, rising from 8.4% in 2014 to 13.4% in 2024 They comprise 9.4% of all producers Kisumu showed a significant shift towards medium-sized farms, moving from 100% small farmers in 2014 to having an 18.9% share of medium farmers by 2024 This indicates a slow but steady scaling up and a greater productivity advantage among medium-sized operations
Large-scale growth	There is a small but growing presence of large-scale farmers, indicating a nascent development toward larger commercial pond operations Their share of total volume increased from 0.9% in 2014 to 1.7% in 2024 While minimal, this growth suggests the sector is diversifying
Declining small-scale relative dominance	Although small farmers are still the backbone of production, their relative share of the total volume is gradually decreasing, falling from 90.7% in 2014 to 84.9% in 2024 This decline suggests that the growth rate of medium and large operations is outpacing that of small-scale production

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County-specific specialization and emerging large players

Kakamega	Small-scale production volume was 84.8% Consistently had large farmers The large-scale production volume increased slightly (from 6.2% in 2014 to 7.2% in 2024), making it a leader in large-scale pond volume
Siaya	Small-scale production volume was 79.9% Showed a strong contribution from medium-sized farmers (17.5%) and the late emergence of large-scale production volume (2.6%) by 2024, having none previously
Kisumu & Kisii	Production volume dominated by small-scale (65.1% and 69.2%, respectively) Demonstrated strong contributions from medium-sized farmers (34.9% for Kisumu; 30.8% for Kisii) in 2024
Busia	Small-scale production volume was 90.9% Showed the late emergence of large farms (0.3% of farmers) and large-scale production volume (0.4%) by 2024

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Explosive growth and maturation of support services

Rapid sector expansion	There was a massive increase in the number of all four supporting actor categories between 2014 and 2024 The supporting ecosystem matured rapidly, especially in the last 5 years (2019-2024) The rapid increase in all support roles is mainly attributed to more investor farmers entering cage farming and an increasing number of large companies investing in cage-based aquaculture
Feeder domination	Feeders saw the largest numerical increase, growing from 35 total individuals in 2014 to 952 in 2024
Specialized infrastructure growth	Cage fabricators experienced tremendous proportional growth, increasing from only 2 individuals in 2014 to 107 in 2024 Signals rising demand for specialized cage construction and maintenance services
Management scaling	The total number of cage managers increased significantly, rising from 20 in 2014 to 302 in 2024

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Regional specialization and operational concentration

Infrastructure and management hub	Siaya county exhibits the highest numbers for essential management and infrastructure roles in 2024 It leads in the number of cage fabricators (63), accounting for more than half of the total across the four counties It also leads in cage managers and security personnel
Leading feeder operations	Homa bay county leads in the number of feeders (293) in 2024, closely followed by Kisumu (266) and Siaya (263)
Rapid emergence of service providers	Homa bay county showed a complete absence across all four categories of actors in 2014 However, by 2024, it rapidly established a significant support structure, hosting the largest number of feeders (293) and substantial security personnel (66)
Feeder-to-manager ratio	Ratio of feeders to managers in 2024 is approximately 3:1 This suggests that management roles are fewer and potentially oversee multiple feeder operations

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Exponential overall growth and market professionalization

Overall expansion	**Data reveals a dramatic expansion and professionalization of the overall input supply market** **Total number of all input suppliers across the nine surveyed counties increased nearly tenfold over the decade (from 22 in 2014 to 218 in 2024)**
Dominance of feed distribution	**Fish feed distribution (feed stockists) represents the most significant structural component of the supply chain in 2024, accounting for nearly half of the total input suppliers**
Hatchery growth	**Hatcheries also saw strong growth, increasing from 14 in 2014 to 62 in 2024** **This reflects the rising need for commercially supplied fingerlings to support the expanding aquaculture production**

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Emergence of localized production and specialized equipment supply

Specialized equipment boom	**Suppliers of nets, dam liners, and floaters—specialized equipment crucial for cage culture—increased twentyfold over the ten years (from 2 in 2014 to 40 in 2024)** **Siaya County leads the region in specialized infrastructure, possessing the highest number of providers of nets/dam liners/floaters in 2024---consistent with the higher number of cage farmers and cage production volumes** **This tremendous growth is linked to the explosion in cage culture, which requires this specialized infrastructure**
Rise of feed millers	**The sector saw the emergence of localized feed production** **Feed millers were absent in 2014 but grew to 4 suppliers in 2019 and reached 9 suppliers in 2024**

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Market expansion and growing commercial consolidation

Overall market expansion	**Total number of fish wholesalers across all surveyed counties grew significantly, rising by about 1.6 times between 2014 and 2024** **This growth demonstrates a substantial increase in the capacity of the wholesale sector, necessary to handle the growing volume of aquaculture production**
Numerical dominance of small wholesalers	**Small wholesalers still dominate the market numerically, but their aggregate share of total wholesalers decreased from 91.5% in 2014 to 85.7% in 2024**
Structural shift to commercialization	**Relative share of medium and large enterprises increased significantly, indicating a gradual process of commercial consolidation** **Medium wholesalers rose from 5.4% in 2014 to 10.4% in 2024** **Large wholesalers rose from 3.1% in 2014 to 3.9% in 2024**

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Regional specialization and wholesaler structure

Primary urban large-scale hub	Nairobi (the urban hub) has the lowest share of small wholesalers (70.6% in 2024) and the highest share of large wholesalers (12% in 2024) This structure suggests Nairobi handles large volumes for distribution to its high-consumption areas
Unique structure in a consumption area	Mombasa developed a unique structure in 2024, split evenly between 50% small and 50% medium wholesalers. This is notable given that in 2014, medium wholesalers made up an overwhelming 85.7% of the total.
Emergence of large wholesalers in production regions	Counties near production centers are developing larger businesses. For example, Kisii had 8.9% large wholesalers in 2024 (none in 2014), reflecting its role as a key consumption center due to its high population.
Persistence of small wholesaling	The structural transition is not uniform; several counties, including Bungoma, Trans Nzoia, Uasin Gishu, and Vihiga, remained entirely composed of 100% small wholesalers in 2024.

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Massive expansion and structural shift towards micro-enterprises

Massive expansion of the transport workforce	Total number of fish transporters increased sixfold between 2014 and 2024 and doubled between 2019 and 2024 This growth is essential to support the substantial increase in aquaculture production volume.
Structural shift to micro-transporters	There is a clear shift towards smaller operators, indicating potential fragmentation of the transport service and ease of entry Micro-transporters (mainly motorbikes) now represent the largest proportional share of the market, growing from 34.2% in 2014 to 56.2% in 2024
Decline in small transporter share	Conversely, the share of small transporters (public transport and probox (small multipurpose commercial vans)) decreased significantly, dropping from 61.2% in 2014 to 39.0% in 2024
Stable, small share of large transporters	The share of large transporters (lorries > 3.5 tons), which often utilize insulated/refrigerated equipment, remained relatively small and stable, accounting for 4.8% in 2024

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Regional specialization and structural variation

Largest hub with structural reversal	Nairobi has the highest total number of transporters in 2024 It displays a highly micro-focused structure in 2024, with 71.4% being micro-transporters This is a sharp reversal from 2014, where large transporters dominated at 58.3% and micro-transporters were non-existent, signaling a fundamental shift toward localized delivery networks
Major micro-transport hubs	Siaya, Busia, Kisumu, and Kisii are all major transport hubs, with Siaya and Busia having high total numbers Busia shows a particularly high concentration of micro-transporters (78.2% in 2024), reflecting its potential role as a key border or aggregation point
Concentration of large transporters	Large transporters are rare but concentrated in key trade locations, with Nairobi (11.9%) and Homa Bay (16.7%) having the highest shares in 2024. These are generally insulated/refrigerated lorries
Dominance of small transporters in specific counties	Some counties, including Kakamega, Bungoma, Vihiga, Uasin Gishu, and Trans Nzoia, are entirely dominated by small transporters This suggests these regions may not have seen the proliferation of micro-operators or their transport needs require a slightly larger capacity vehicle

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Findings from Tomato Rapid Reconnaissance Survey

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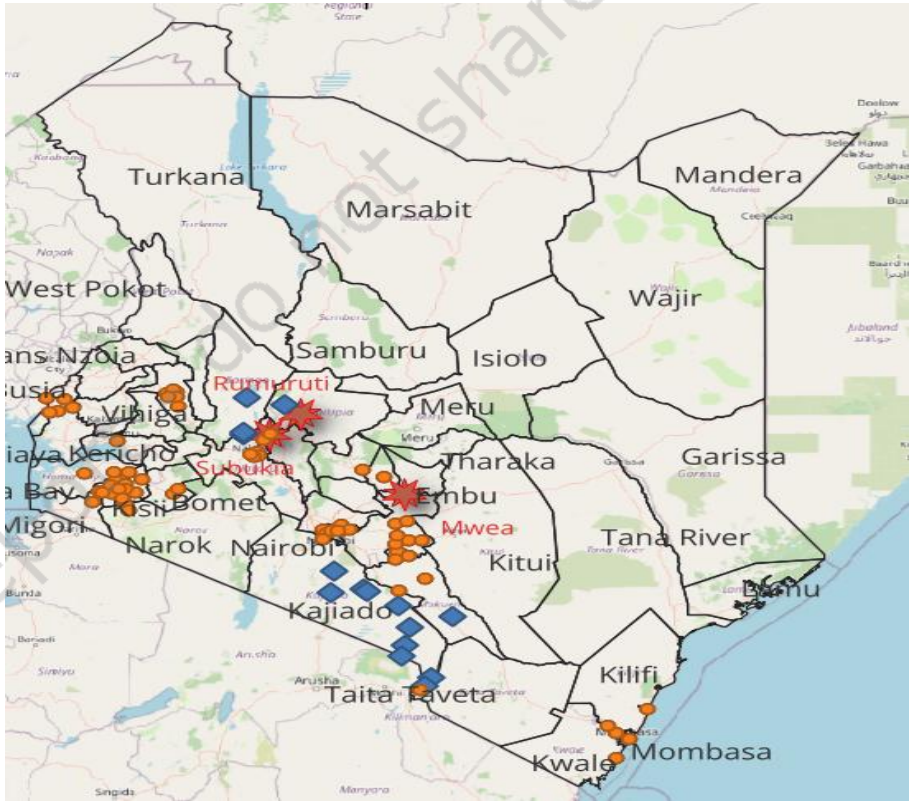
Locations for tomato rapid reconnaisance

- The rapid reconnaissance study of the tomato value chain in Kenya was done between September 16th and October 12th.
- The research team conducted 151 interviews across 14 counties with participants from various segments of the tomato value chain: input suppliers, farmers, wholesalers, brokers, transporters, processor, and crate maker/repairer.



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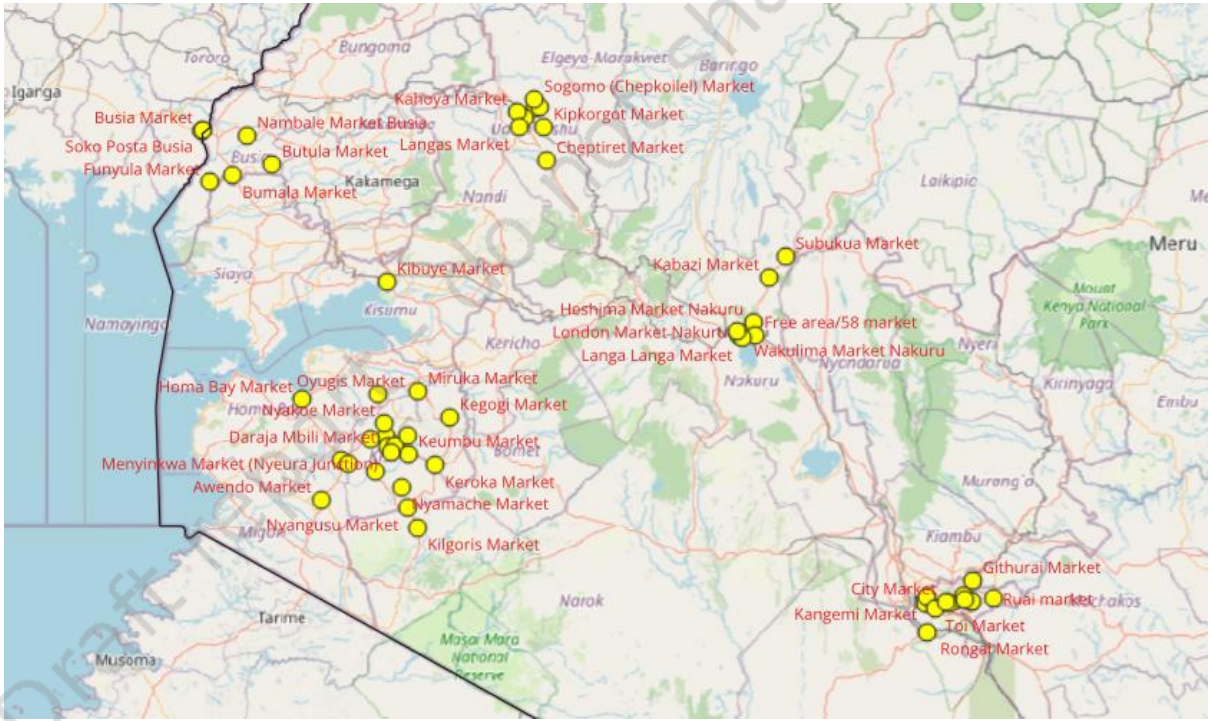
Tomato wholesale markets



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Counties and RR value chain actors visited

	Western region (Nakuru, Baringo, Uasin Gishu, Kisumu, Busia, Kisii counties)			**Central region** (Kirinyaga, Embu, Nairobi counties)			**Southeast region** (Machakos, Kajiado, Taita Taveta counties)			**Coast region** (Mombasa, Kilifi counties)			**TOTAL**
	Micro	Small	Medium	Micro	Small	Medium	Micro	Small	Medium	Micro	Small	Medium	
Input suppliers		3	2					8	3				**16**
Farmers		13	2		1	1		7	16				**40**
Transporters	1		6				1	2	4			1	**15**
Wholesalers		11	18	2	4	5		17	6		2	3	**68**
Brokers		7			1	1						1	**10**
Graders													**0**
Crate makers/ repairers											1		**1**
Processor			1										**1**
TOTAL													**151**

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- Farmers:
  - Small - <5 acres
  - Medium - 5-50 acres
  - Large - >50 acres
- Wholesalers:
  - Small – Probox (small van) or less
  - Medium – Lorry+
- Transporters:
  - Micro – *bodaboda*
  - Small – Probox /canter
  - Medium - Lorry
- Input suppliers
  - Small - retailing
  - Medium - retailing & wholesaling

Upstream (production and input supply)

Tomato production context and expansion

- Tomato production in Kenya has increased in the past five years, due to more farmers and expansion into non-traditional growing areas. This is attributed to limited off-farm employment opportunities, (especially after Covid-19 pandemic in 2020 when some people lost jobs) and the high returns to tomato farming.

- Production has expanded to semi-arid and warmer areas in Kajiado, Baringo, and Machakos counties, which have larger land sizes and irrigation water sources. These areas have also witnessed improved road access in the past 10 years.

- Tomato production is capital-intensive, costing between KES 250,000 – KES 450,000 ($1,940 - $3,500) per acre. This has partly led to sharecropping arrangements, especially in non-traditional areas, where investors provide capital and farmers manage day-to-day operations.

- Most tomatoes are grown under irrigation (furrow irrigation, boreholes, hired irrigation pipes). Investors develop water access through simple excavation methods.

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Upstream (production and input supply)

Transformation of Kenya's tomato sector: Input supply and service specialization

- Farmers prefer using hybrid seeds and purchasing seedlings from specialized nurseries, which have become more prevalent.
- This has led to an interesting market adaptation: the **emergence of specialized seedling propagators**. Traditionally, farmers would buy seeds and manage their own nurseries. However, given the high cost of hybrid seeds, farmers have found it too risky to handle propagation themselves - if something goes wrong, the loss is substantial.
- Most farmers rely on local agro-dealers for inputs. However, some large farmers buy inputs directly from manufacturers. In addition to selling inputs, agro-dealers provide extension advice to farmers mainly on application of agrochemicals and fertilizer.
- **Competition in the input supply sector is increasing**, with manufacturers and distributors supplying directly to some large-scale farmers, posing a challenge to smaller input suppliers. Some input suppliers offer credit to farmers, particularly those with whom they have long-standing relationships.

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Upstream (Production and input supply)

Input suppliers (upstream)

- Sell **diverse range of inputs**:
  - **Seeds**: Both traditional and hybrid tomato
  - **Seedlings**: Preferred by farmers.
  - **Fertilizers**
  - **Pesticides** and **fungicides**
  - **Other Agrochemicals**, e.g. foliar feeds, bio-stimulants
  - **Equipment** e.g. knapsack sprayers.
- Also offer farmers **extension advice**:
  - On-farm and in-shop advice on the proper use of agrochemicals
  - Information on pest and disease management strategies
  - Fertilizer application rates and timing

- Major sources **of inputs**:
  - **Naivasha**: Known for seedling propagators and agricultural input distributors
  - **Nakuru**: A major agricultural center with a concentration of input sellers, offering a wide range of products, including fertilizers, pesticides, and equipment.
  - **Thika**: Home to Ona Seedlings, a prominent supplier of tomato seedlings.
  - **Mwea**: Another significant agricultural region with suppliers of tomato seedlings and other inputs.
  - **Kitui, Matuu and Machakos**: Sources of inputs for various agro-dealers in Machakos

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Upstream (Production and Input Supply)

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Farmers (upstream)

- **Farming practices and arrangements**
  - **Independent Farming**: Many farmers, especially in Nakuru and Kirinyaga Counties, cultivate tomatoes independently on owned or rented land.
  - **Sharecropping**: Sharecropping is a common practice, particularly in Kajiado County, where investors provide capital and resources while "farmers" manage the day-to-day operations.
  - **Scale of Production**: The scale of tomato production varies significantly, from small-scale farmers operating on <1 acre to large-scale farmers managing hundreds of acres (e.g. 600acres)

- **Irrigation:**
  - Most of the tomatoes are grown under irrigation
  - **Furrow Irrigation**: along water bodies like rivers and canals
  - **Boreholes**: Some large-scale farmers
  - **Hired Irrigation Pipes**: In some areas, farmers hire irrigation pipes to access water.
- **Cost of production:** Varies depending on factors like farm size, inputs, and water access
  - Labor is a significant cost

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The role of brokers, market intermediation and vertical integration

- Brokers connect farmers with wholesalers who buy tomatoes at the farm gate. These brokers are essential intermediaries with knowledge of local markets, farming seasons, and pricing dynamics.
- The number of tomato traders in wholesale markets has increased due to increasing demand, limited off-farm employment, job losses due to the COVID-19 pandemic, and the perception that tomato wholesaling is a profitable business.
- Many wholesalers enter the market after gaining retail experience or observing successful friends and family members in tomato wholesaling. **Some have become farmer-traders (vertical integration).**
- Tomato sources for wholesalers have shifted over time, influenced by changes in production areas and transportation costs.
- Wholesaling operates on a spot market basis, with prices negotiated on the spot and fluctuating based on supply, demand, and quality.
- Market-based brokers sell tomatoes on behalf of wholesalers to different categories of buyers including retailers, institutions and consumers, earning commissions per crate or vehicle-load sold. They sometimes sell on credit to retailers with whom they have established trust.

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Wholesalers (midstream)

- **Number of wholesalers has increased overtime** due to
  - The **increasing demand for tomatoes**
  - **Limited off-farm employment opportunities**, leading people to seek alternative income sources
  - **Perception that tomato wholesaling is a profitable** business
  - **The relatively low start-up capital required** compared to other businesses, such as farming

Increase in the number of wholesalers has led to **increased competition in the market**

- **Challenges and Future Prospects**:
  - Wholesalers face numerous challenges, including **market glut**, **price fluctuations**, **high transportation costs**, **competition**, and **credit defaults**
  - Some express concerns about the increasing number of tomato farmers and the potential for oversupply to further depress prices
  - Despite these challenges, many wholesalers remain optimistic about the future of the trade, citing growing demand and the potential for continued profitability

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Transportation and market operations in Kenya's tomato trade

- Some wholesalers operate in multiple markets, which often have designated market days, leading to the same traders operating across different markets that are in close proximity.
- There is minimal tomato wastage in wholesale markets. Tomatoes with reduced quality due to prolonged storage are sold at lower prices.
- Transportation methods for tomato include lorries, canters, pick-up trucks, small vans (Probox), and motorcycles. The choice depends on quantity, distance, and road conditions.
- An increasing number of wholesalers and large-scale farmers are purchasing their own transport vehicles to use and hire out to fellow traders and farmers. Smaller wholesalers often collectively hire a lorry to transport tomatoes from farms to the market.
- Motorcycle use is rising for local deliveries and cross-border trade, especially in Busia market at the Kenya-Uganda Border.
- Some specialization exists in transport services, with some transporters exclusively doing tomato transportation due to long-term relationships with tomato wholesalers.

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Findings from Tomato Meso Inventory and Wholesale Market Survey

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Tomato Meso Inventory: Actor Types in the Survey

Actor	Defining characteristic	Size category	Definition
Input suppliers (of seeds & agro-chemicals)	Level of operation	Small	Retailing only
		Medium	Retailing & wholesaling
		Large	Wholesaling only
Input suppliers (of seedlings)	Propagation and sale of tomato seedlings		Selling seedlings to farmers
Farmers	Total area of tomato production	Small	<5 acres
		Medium	5-50 acres
		Large	>50 acres
Farm-based brokers	Brokers at the farm		Connect farmers and wholesalers on commission
Wholesalers	Volume of tomato consignment handled in market at a time	Small	Probox load or less
		Medium	From canter load up to one lorry load
		Large	More than one lorry load
Farmer cum wholesaler	Selling own produced tomato in wholesale market		Farmer who sells directly to wholesale market
Market-based brokers	Brokers at the market		Sell on behalf of wholesalers at the market on commission
Transporters	Type/ number of transport vehicles	Micro	Bodaboda (motorcycle or bicycle)
		Small	Probox
		Medium	Canter or one lorry
		Large	More than one lorry

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Distribution of Tomato Production Areas

Working with: MICHIGAN STATE UNIVERSITY, EGERTON UNIVERSITY, INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE IFPRI

There are 3 cradles/clusters (initial areas of production) namely

- First cluster – Kabazi/Subukia (Northwest of Nairobi)
- Second cluster – Mwea East and Mwea West (Northeast of Nairobi)
- Third cluster - Naroosura (Southwest of Nairobi)

- Production began in Kabazi/Subukia where there was a processing plant
- Production has expanded to two clusters (Mwea and Naroosura)

Factors that have influenced spread of tomato production include

- Availability of large sizes of land
- Access to water for irrigation
- Increase in tomato consumption
- Farmers are abandoning crops like maize for high value crops like tomatoes

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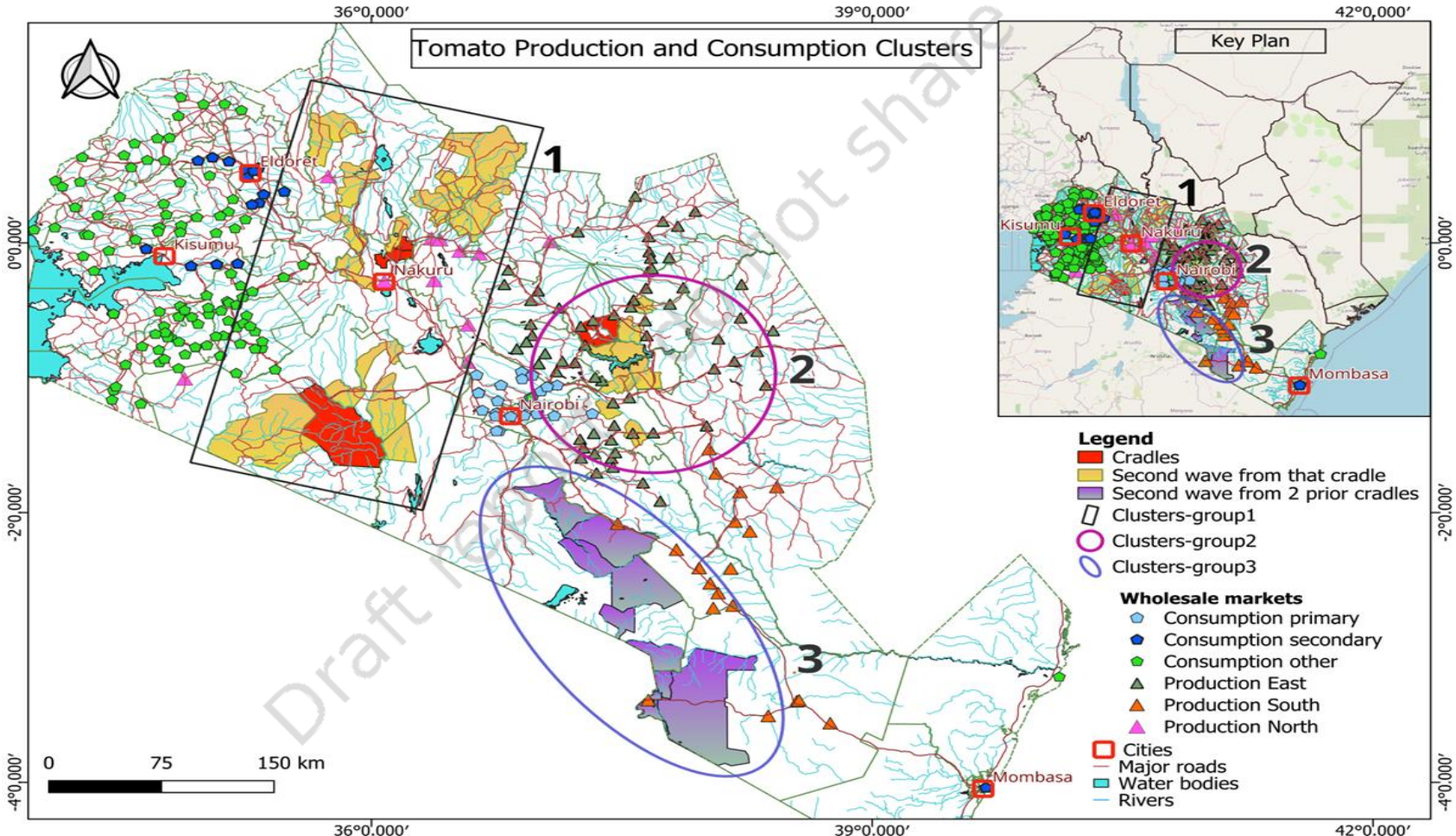
Kenya clusters



Distribution of Tomato Production Areas

Other clusters came up in the second wave due to

- High demand for tomato due to population growth and increase in urbanization
- Investors in the three cradles are investing in these areas
- Access to water in dams, rivers
- Increase in pest and disease and decline in soil fertility in the first 3 clusters
- Decrease in land sizes due to land fragmentation in the 3 three clusters
- Increase in land cost in the 3 three clusters
- Availability of new varieties (such as hybrid, determinate, disease resistant)
- Availability of imported (from China) pumps and power generators
- Availability of imported agrochemicals (imported and locally produced)

- Expansion of tomato production has resulted in increase in other actors in the value chain such as input suppliers (agro-inputs shops and propagators), rural assemblers/brokers, graders, transporters, and wholesalers.

- Thers is emergence of agro-shops and propagators in producing areas. In the past, farmers relied on established propagators such as Plantech and Growtech

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Distribution of tomato consumption areas

There are 3 clusters of consumption areas

- Primary consumption – Nairobi metropolitan
- Secondary consumption – consist of cities such as Mombasa, Kisumu and Eldoret
- Other consumption areas – consist of major towns such as Kisii, Migori, Trans-Nzoia, Kitui, Bungoma, Siaya, Vihiga, Nandi, Kakamega, Busia, Kilifi, Bomet, Kericho, Nyamira

- There are 236 markets in 2025 compared to 234 in 2020 and 2015 distributed in the 3 consumption areas.

- **Increase in employment:** The number of wholesalers, market-based brokers, market-based loaders and transporters have increased over the 10 years. Increased demand due to rise in population, and loss of jobs during covid19 are the major reasons for the increase in wholesalers.

- About 68% of the wholesalers were small-scale, 19% were medium scale, 4% were large scale and 9% were farmers cum wholesalers. This shows there is diversity in the wholesale markets.

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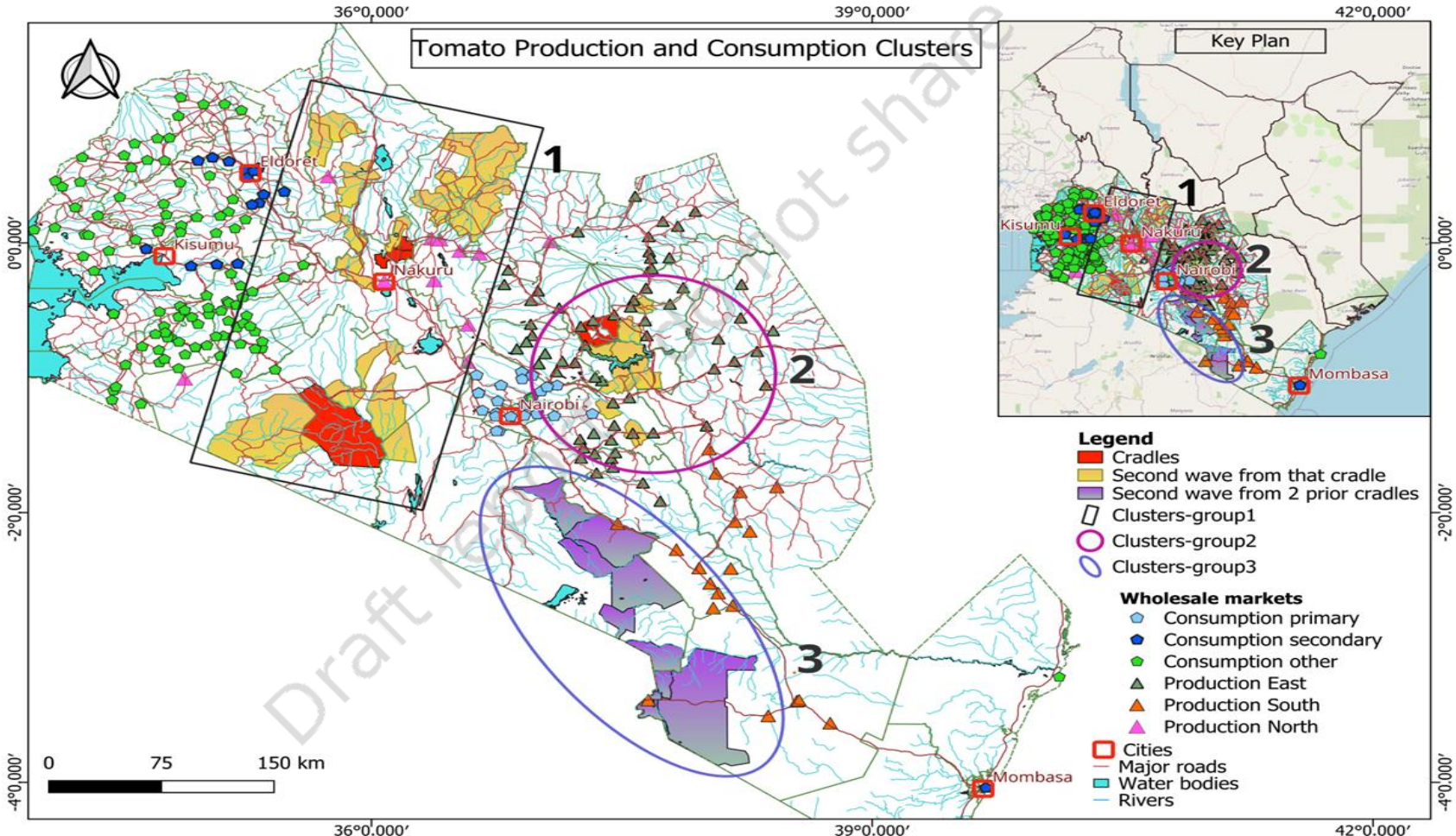
Kenya clusters



Wholesale Markets: Sample & Characteristics

- **Sample**: 239 wholesale markets--- 210 with tomato wholesaling only, 19 with both tomato and fish wholesaling and 5 with fish wholesaling only.
- **Diversification/inclusivity**: Markets consists of wholesalers, wholesaler-farmers and retailers
- 90% of the markets have regulation by either by government/government-related body or traders/management committee by traders
- Most markets operate in community owned land (82%)
- More than half of the markets have an association with an average of 398 members. These associations resolve disputes, set rules and terms of trade, represent member interests, provide financial services and assist in time of shocks

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Wholesale Markets: Sample & Characteristics

Some markets were established by government (46%), entrepreneurs (10%), local community (7%). Others were formalized from a pre-existing market (38%), split from original market (6%) or moved to a new location (5%)

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Wholesale Markets: Characteristics

- Traders in wholesale markets pay about KES 500 as joining fees with an annual cost of about KES20,000
- However, 75% of the markets do not allow new entrants due to lack of space
- Private entrepreneurs/market administration (55%) and government/government body (31%) control who can trade in a market
- Gender composition: 99% of the markets have women wholesalers with 75% belonging to an association.
- Waste management in markets is well organized
  - 83% have the waste collected and sent somewhere else
  - 15% burn the waste

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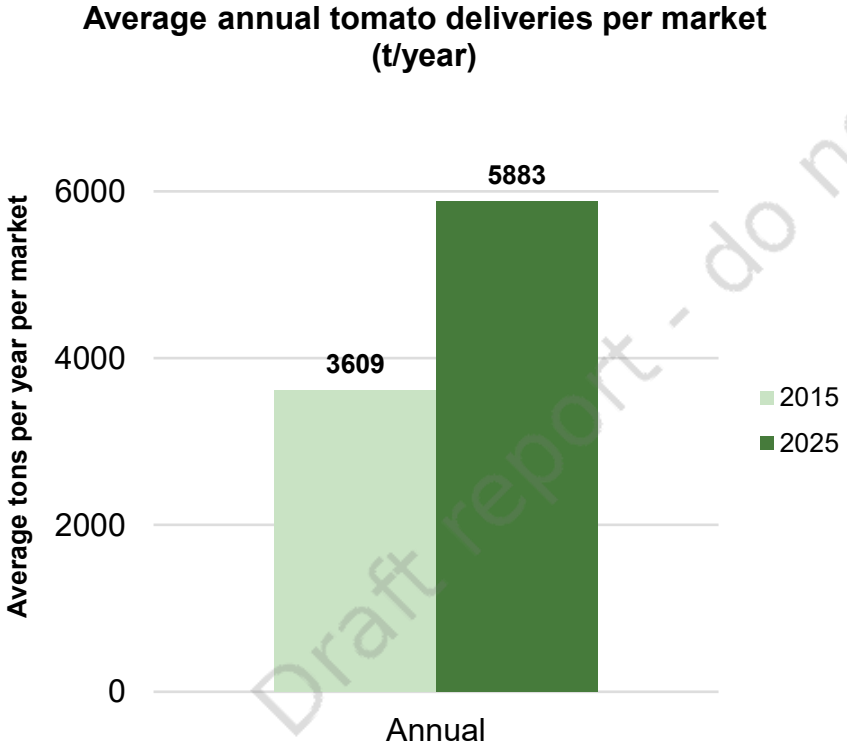
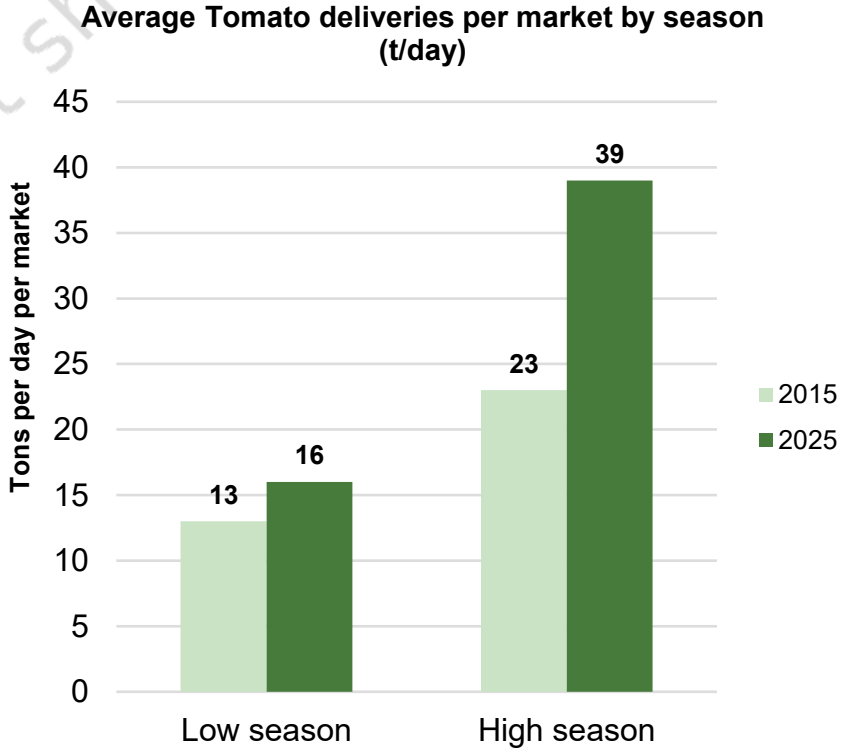
Wholesale Markets: Survey results

Increase in tomato deliveries from 3,609tons to 5,883 tons annually. The deliveries increased by 3 tons during low season and 16 tons in high season





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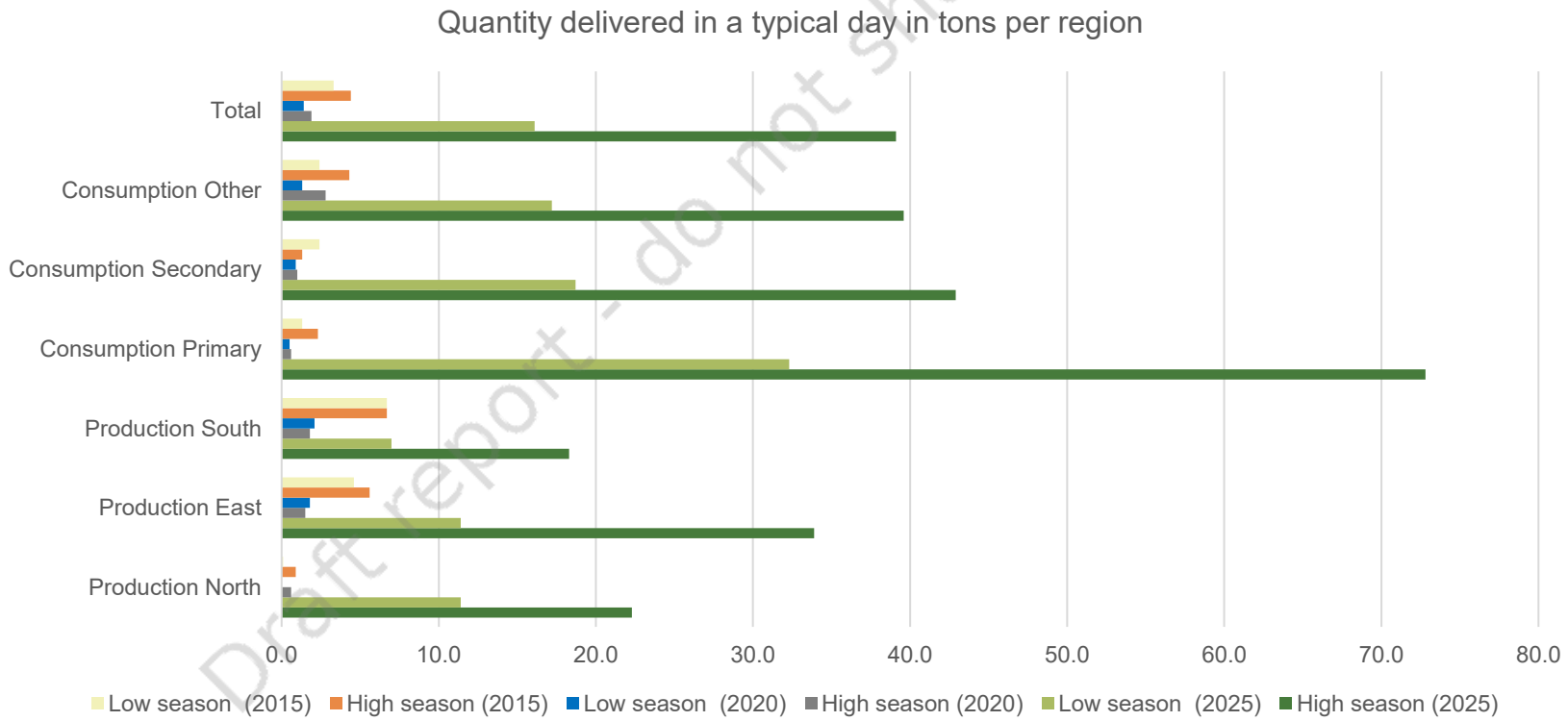
Wholesale Markets: Survey results

Consumption primary had the highest increase (72.8tons) while production south had the lowest (18.3 tons)



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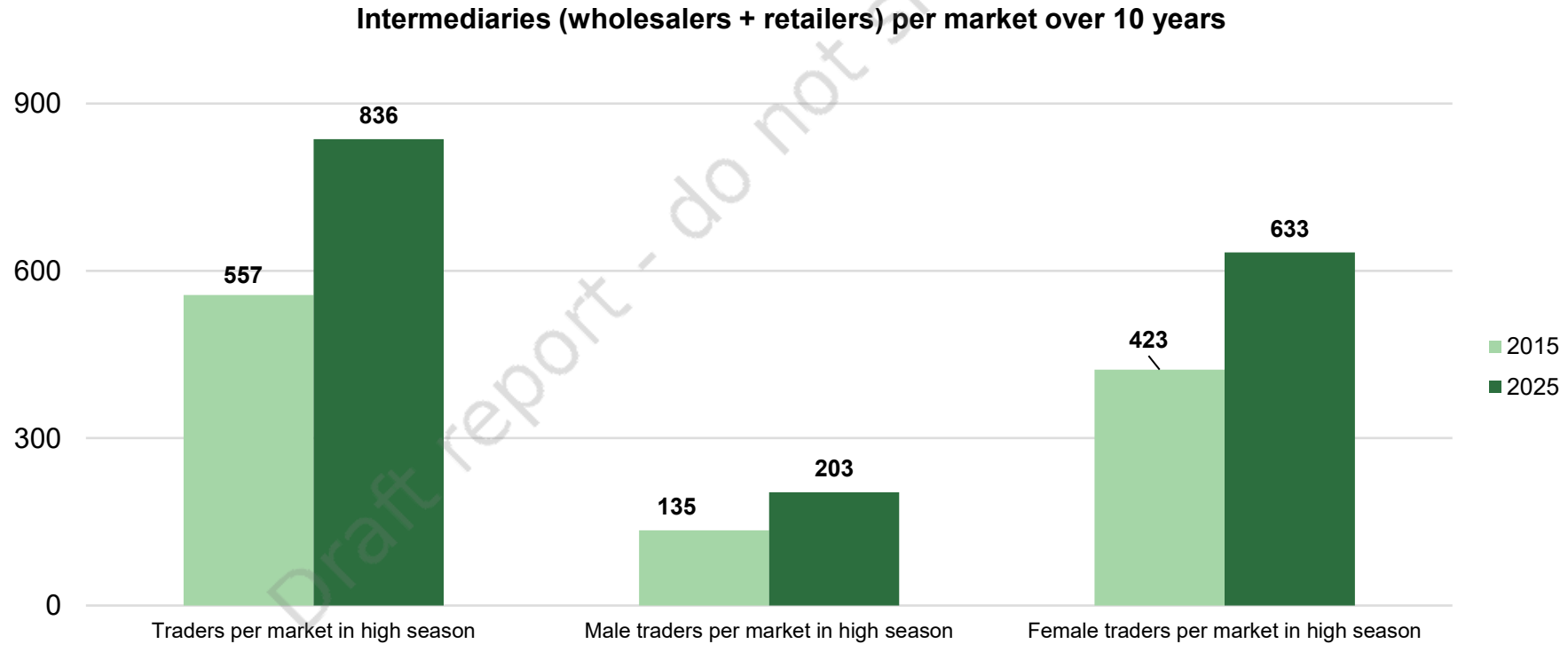
Wholesale Markets: Survey results

There was an increase in traders per market (50%) in 10 years. The increase was driven by increase in both male and female traders



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Wholesale Markets: Survey results

Increase in wholesalers (60%), driven by growth of male wholesalers (48%) and female wholesalers (67%)

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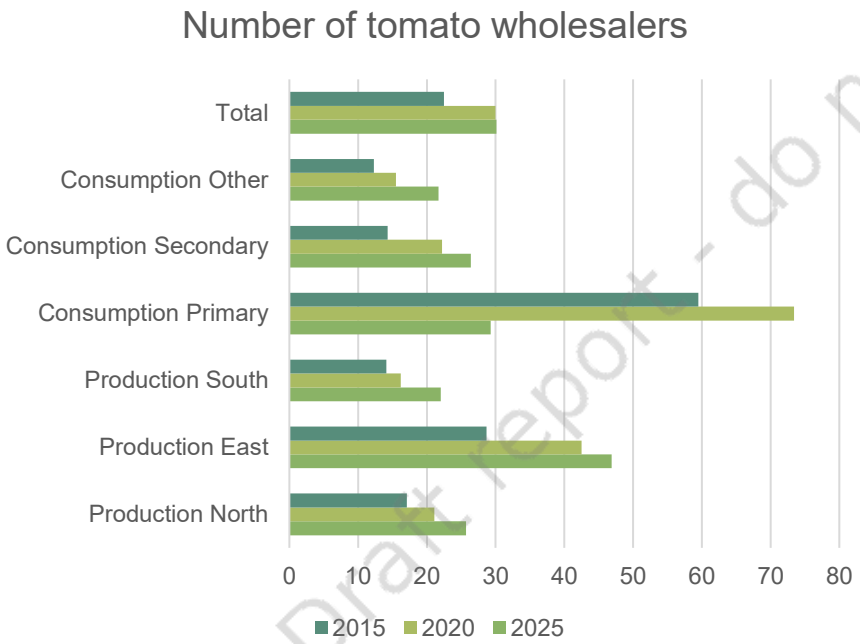
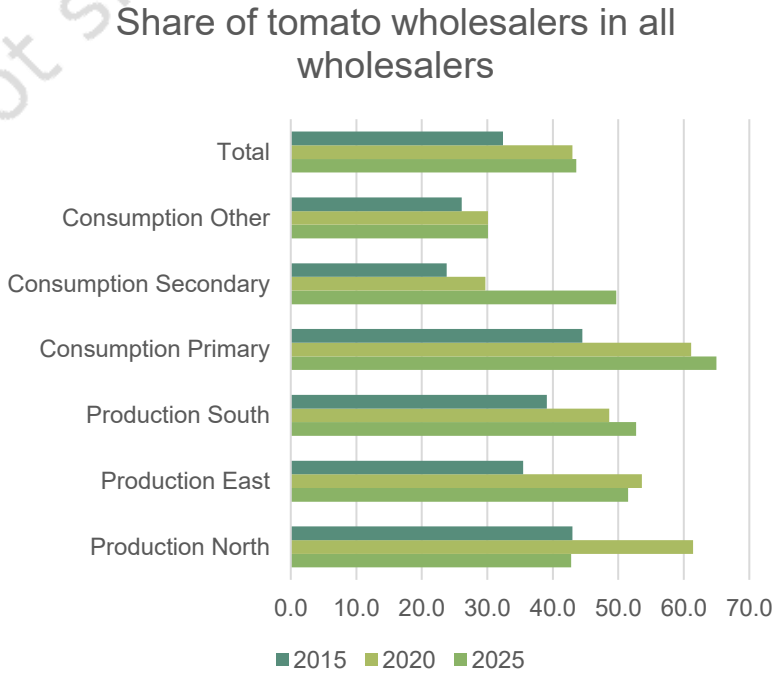
Wholesale Markets: Survey results

Number and share of wholesalers in the markets

Consumption primary had the highest share of wholesalers in 2025 (65%) whereas consumption other had the lowest (30%)





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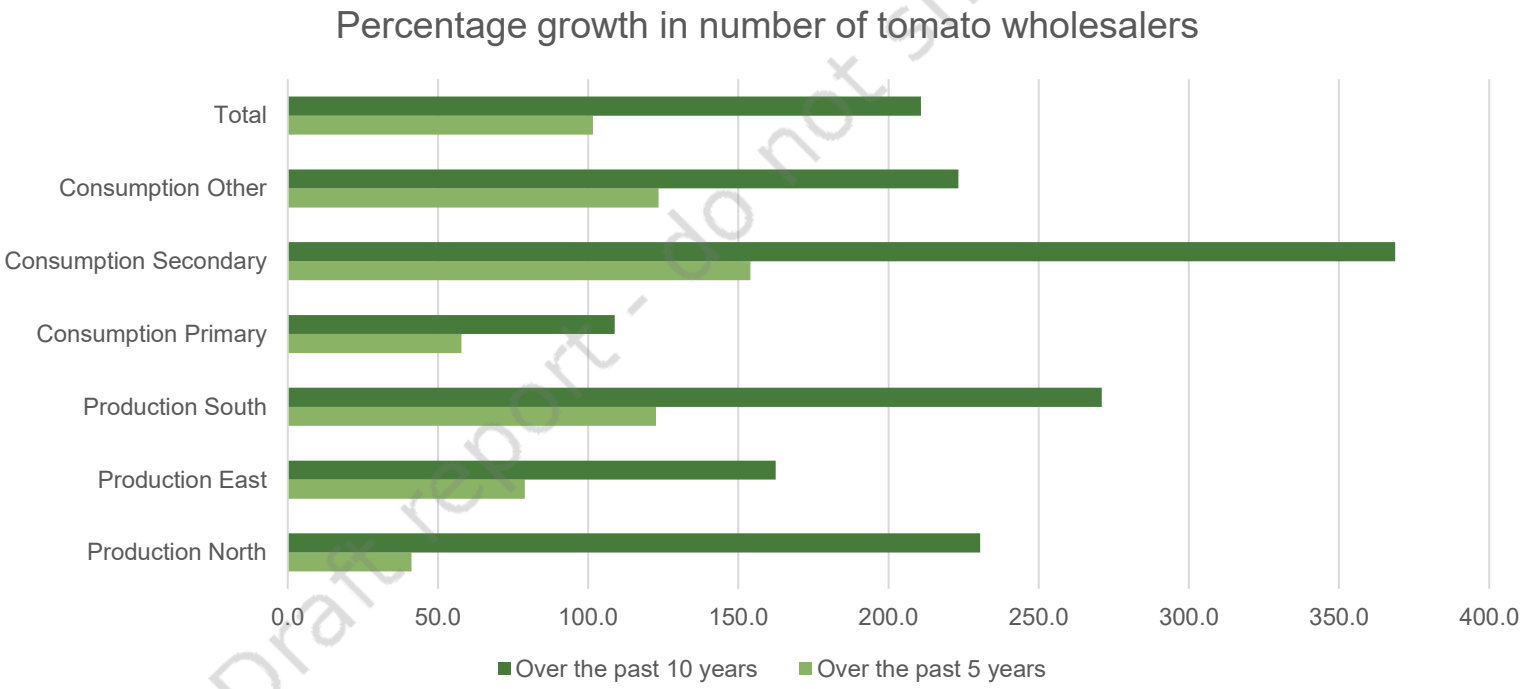
Wholesale Markets: Survey results

Consumption secondary had the highest percentage growth in wholesalers whereas consumption primary had the lowest (108%). This suggests growth in wholesalers over 10 years



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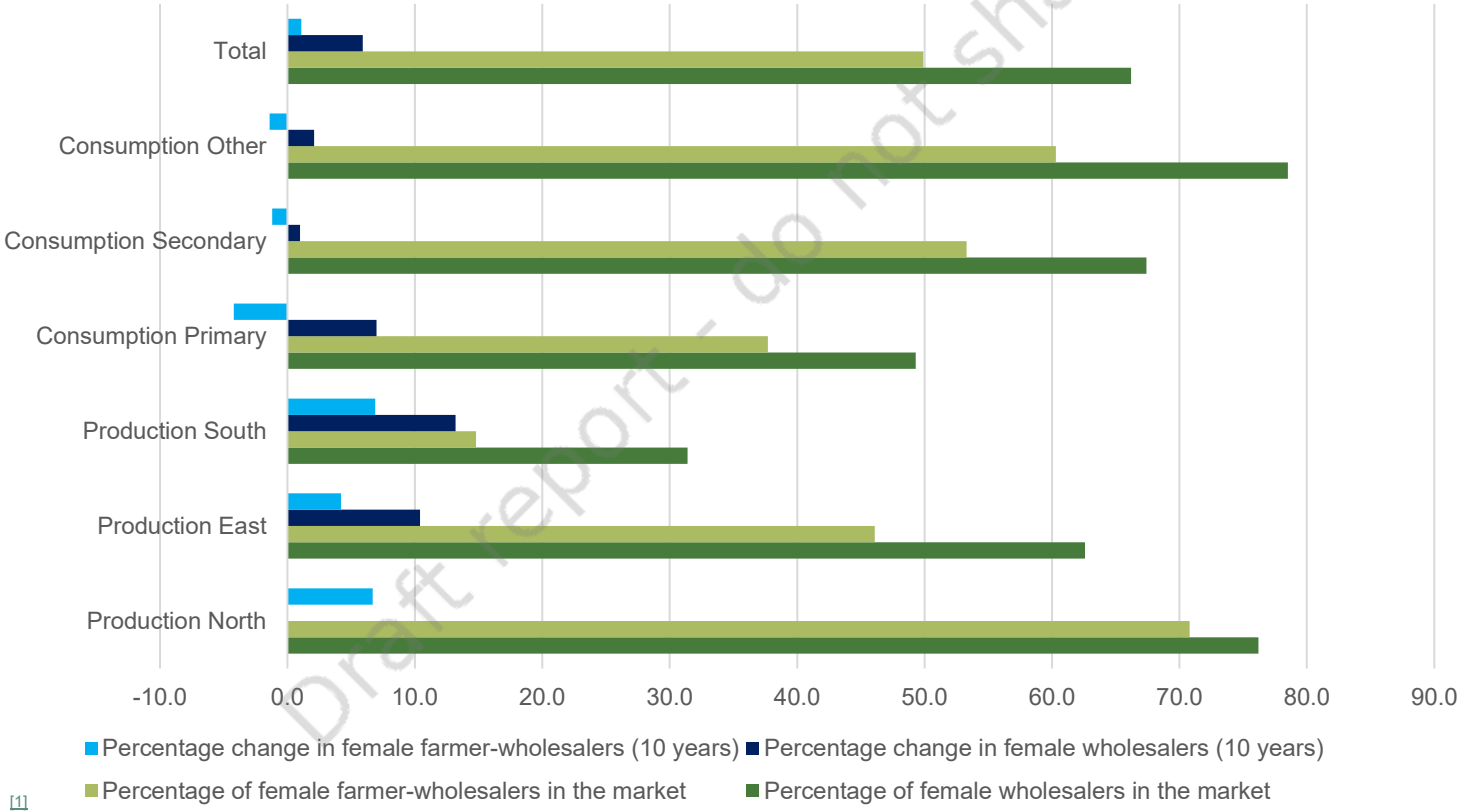
Wholesale Markets: Survey results

Percentage growth in female tomato wholesalers per region



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Wholesale Markets: Survey results

Increase in retailers per market over 10 years (high season)

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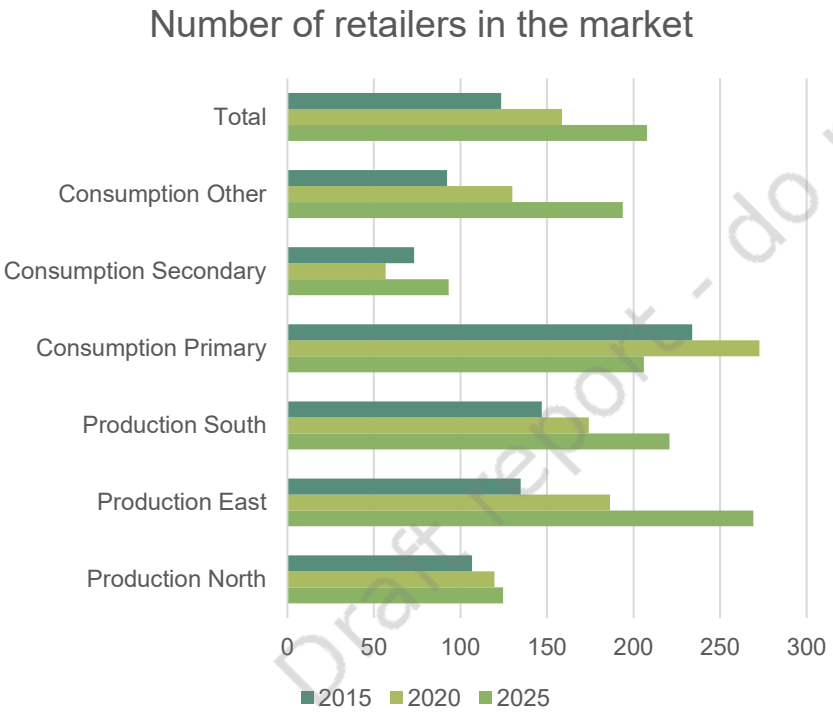
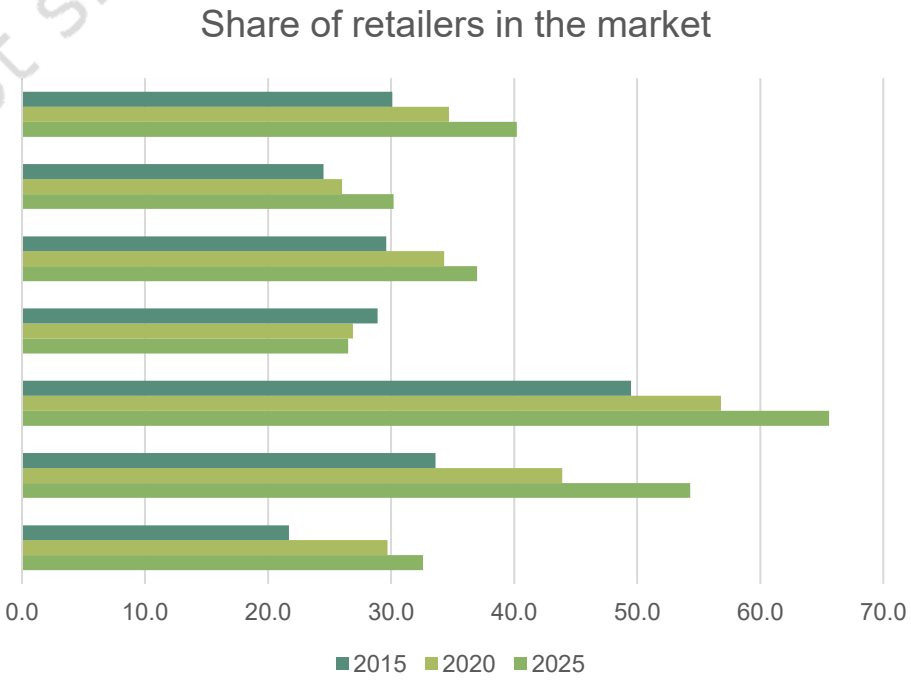
Wholesale Markets: Survey results

Retailers per market over 10 years per region





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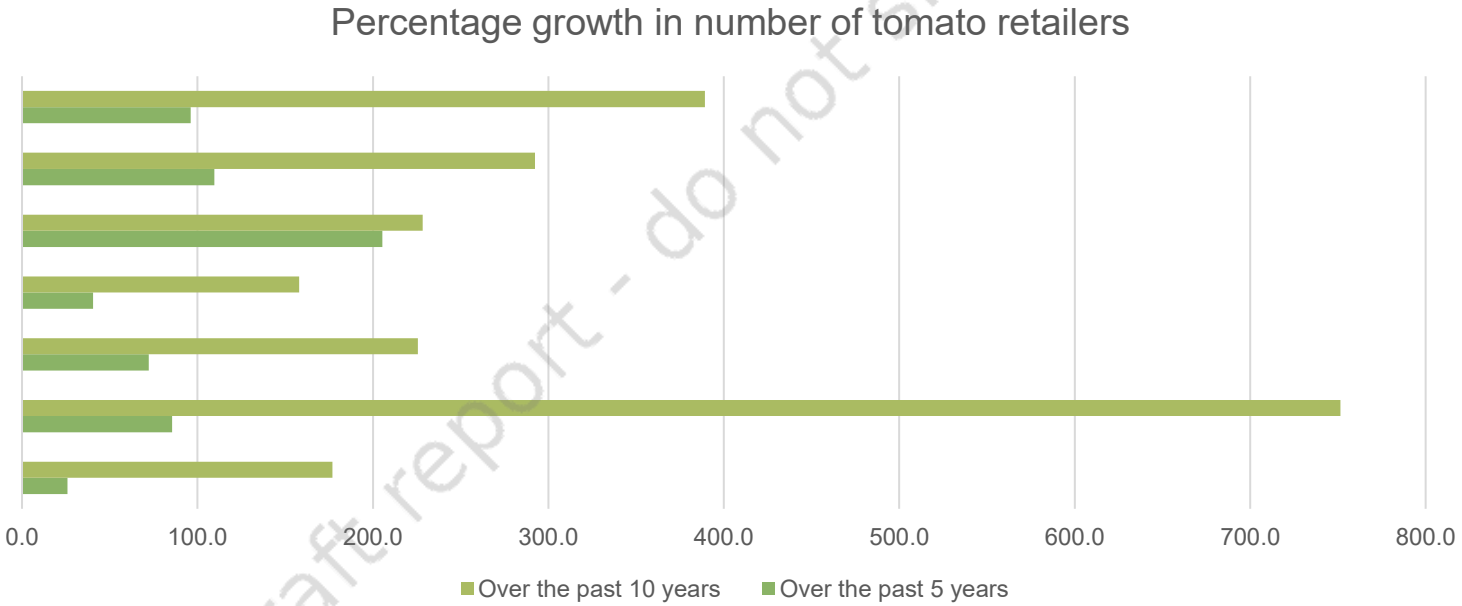
Kenya Wholesale Markets: Survey results

Percentage growth in number of tomato retailers per region



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Wholesale Markets: Survey results

Growth is not just about horizontal expansion (new markets), but perhaps more powerfully about vertical deepening (richer ecosystems around existing markets). This densification is a key source of long-term competitiveness and innovation.

Type of business/service	2015	2025	Change in average (%)
Number of markets	210	234	
Upstream			
Agricultural input shops	153	588	284
Agricultural machinery shops	4	16	300
Borewell drilling businesses	1	3	200
Midstream/Downstream			
Private cold storage businesses	0	22	-
Package sellers	487	1030	111
Transport logistics	42	164	290
Bank branches	77	53	-31
ATMs	63	67	6

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Wholesale Markets: Survey results

More women are participating in both wholesale (64%) and retail (80%) markets

Kenya	In tomato wholesale markets who are... N = 234
Number of wholesalers	179
% of women in wholesalers	64
Number of retailers	657
% of women in retailers	80
% of women in all intermediaries	78

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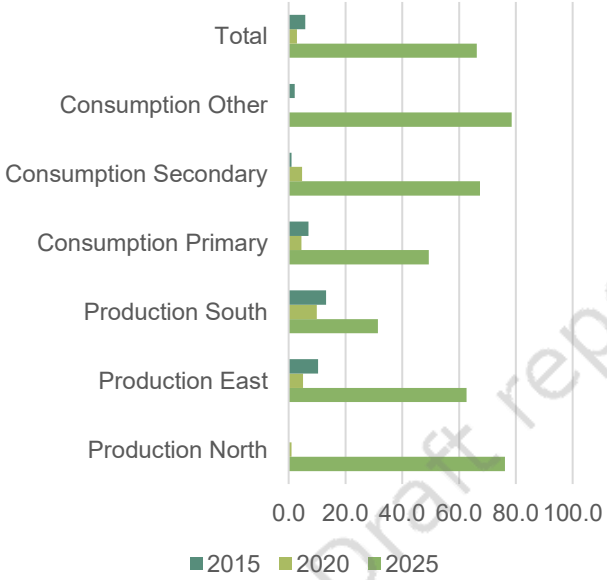
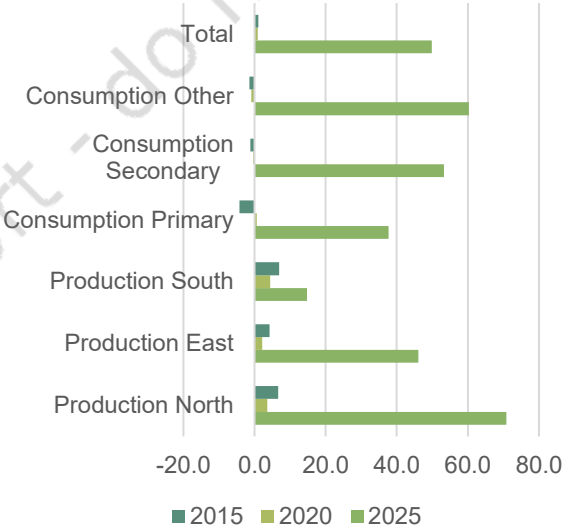
Wholesale Markets: Survey results

Increase in women participating as wholesalers in the market with production north having highest increase and production south with minimal increase. There was no major difference in increase of retailers in all the regions

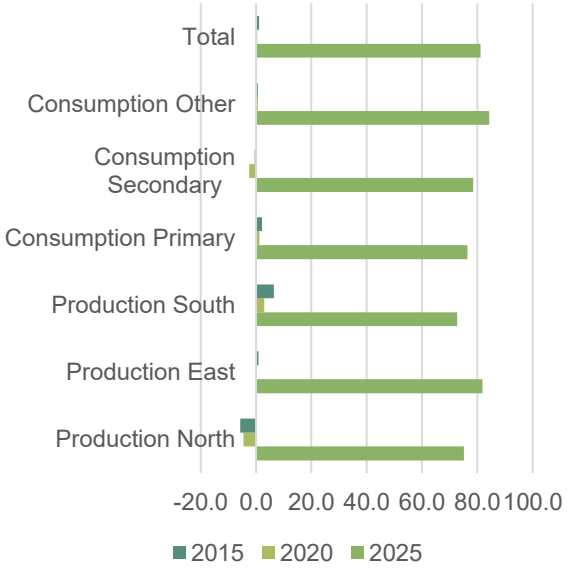
Percentage of female wholesalers in the market per region



Percentage of female farmer-wholesalers in the market per region



Percentage of female retailers in the market per region



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Wholesale Markets: Survey results

- Improved market infrastructure (87% and 79% of markets have toilets and electricity respectively).
- However, sanitation is a major bottleneck — with 143 traders per toilet. This indicates overcrowding and inadequate sanitation facilities which may result to hygiene and health risks are high.
- Electricity is widely accessible (79%) with an average of 22 hours per day
- About 29% of the markets have no water indicating a major constraint for sanitation and post harvest handling
- Markets rarely use solar as a source of energy – indicating underutilized used of renewable energy

Infrastructure challenges in Kenya's markets	Kenya
Market has a toilet (%)	87
Trader-toilet ratio (avg.)	143
Market has electricity from the grid (%)	79
Average number of hours per day market has electricity (cond. Avg.)	22
Market has electricity from solar (%)	31
Market has no water (%)	29
Market has pipe borne water (%)	62

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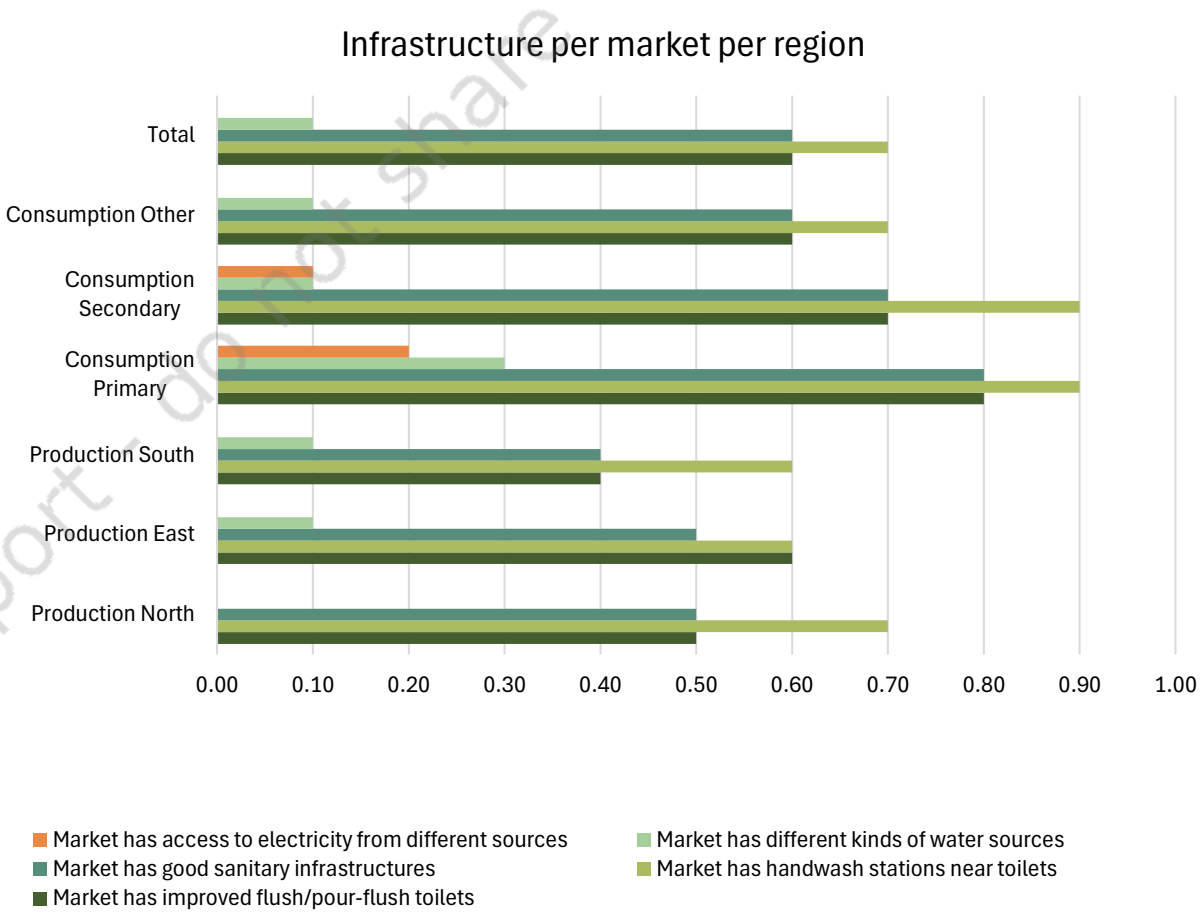
Wholesale Markets: Survey results

- Consumption regions consistently have better infrastructure than production regions across all indicators.
- Consumption Primary (likely major urban centers like Nairobi) leads in almost every category.

- Production regions lag significantly, especially in sanitation (toilets, handwash stations) and electricity with Production South with poorest Infrastructure

- Improved toilets and good sanitary infrastructure are markedly better in consumption zones.

- Electricity Access is Moderately Developed ranging from ~0.4 in some production areas to ~0.8 in primary consumption zones



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Wholesale Markets: Actors & Transport Logistics

- In some markets (e.g. Kangemi), the market-based wholesalers act as brokers to farmer-wholesalers at a fee. In other markets, there were brokers based at the market who sell tomatoes on behalf of the owners at a commission.

- In some markets there are loaders who specialize in tomatoes, however, in many markets the loaders deal with all the commodities.

- Traders use probox (small van), pickups, lorries, tuk-tuk (3-wheelers) and motorcycles as the mode of transport. The most commonly used mode of transport was small-scale (Probox) (54%), followed by micro (motorcycle) (31%), medium scale (pickups) (11%) and large scale (lorries) (4%).

- Proboxes are preferred by traders who move from one market to another and do not have lots of tomatoes

- Motorcycles and tuk-tuk are preferred for short distances, and light loads

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Overview: Stacked Surveys

- Stacked surveys were done in the tomato value chain among
    - 903 wholesale traders across 26 counties
    - 414 input suppliers: includes 403 agro shops across 11 counties and 11 propagators across 6 counties
    - 906 producers spread across 9 counties

- Preliminary results for traders are presented in this report
- Analysis for input supplier survey is expected to commence
- Data cleaning for producer survey is on-going

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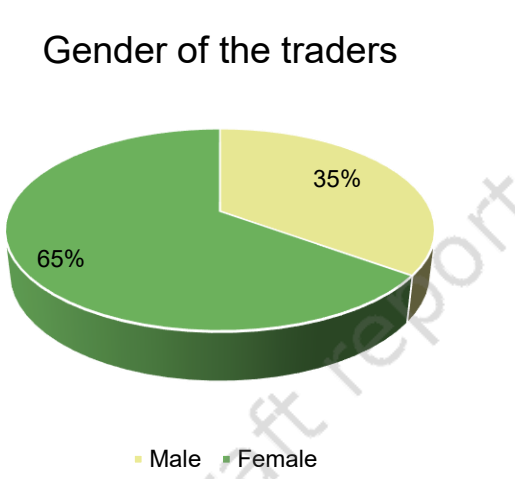
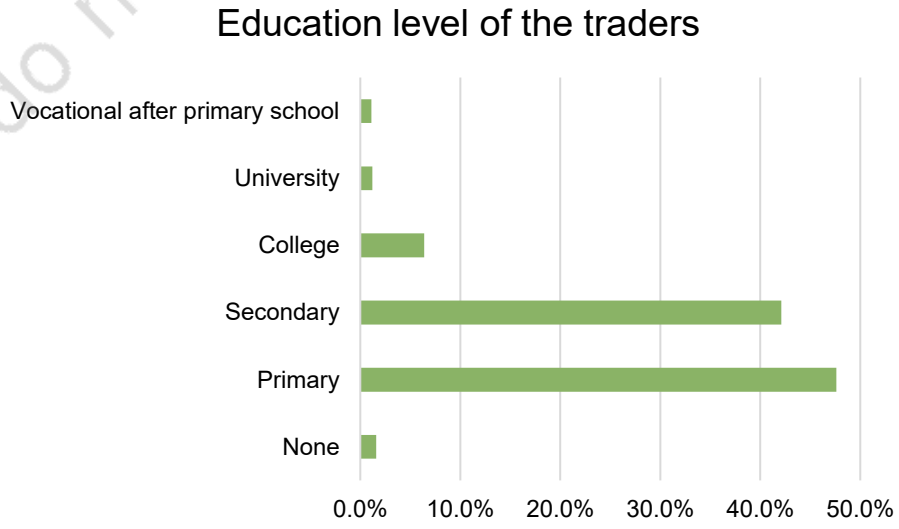
Trader Characteristics

- The mean age of traders is 43 years
- Women make up 65% of traders, while men account for the remaining 35%.
- Nearly all traders have completed basic education: 48% have a primary education and 42% have a secondary education.





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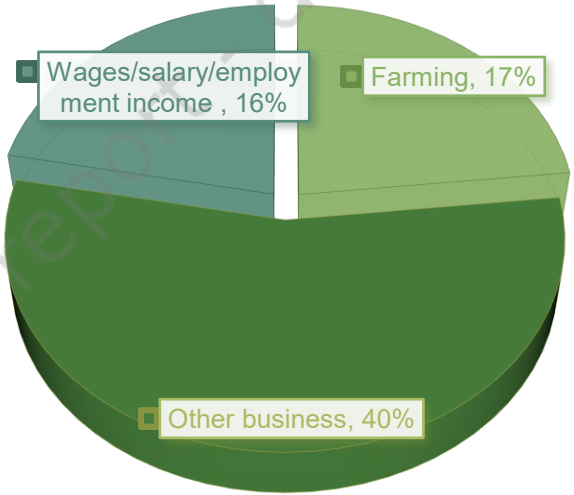
Trader Characteristics

- About 67% of the tomato traders have agricultural land with an average of 5 members per household

- Access to startup capital - Traders primarily sourced startup capital from three main areas: other business ventures (40%), agricultural earnings (17%), and wages/salary/employment income (16%).



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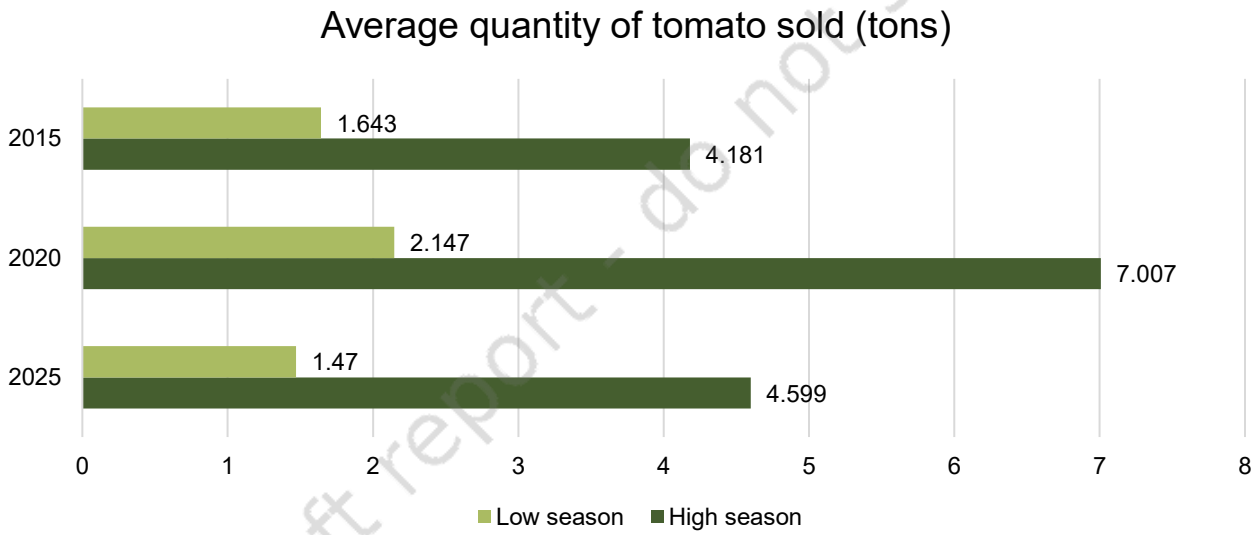
Trader: survey results

Average tomato sales rose in 2020 but fell in 2025, a trend observed in both high and low seasons.



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Trader: survey results

Why choose to buy this "lot" from the most recent supplier?

- More than half of all wholesalers (58%) choose suppliers based on product quality, especially in urban markets (61%)
- Urban wholesalers prioritize availability of tomatoes (55%), trusted relationships (30%), and consistent partnership (22%)
- Rural wholesalers depend more on brokers for market linkages (25%) and are more price-sensitive (20%)
- Almost no wholesalers extend cash loans (0.3%) or input loans (0.1%) to suppliers, indicating **limited vertical financial integration**

Kenya	% Wholesaler	% Urban wholesalers	% Rural Wholesalers
Relative	0.7	2	0.5
Trusted person	24.9	29.7	24.3
I can repay with a delay	7.5	0	8.5
High quality product	57.6	61.4	57.1
Low price	20.2	8.9	21.6
Convenient location	6.9	8.9	6.6
Regular trading partner	16.9	21.8	16.3
I gave them a cash loan	0.3	1	0.2
I loaned them ag inputs	0.1	0	0.1
They deliver to me	4.7	0	5.2
Sells multiple commodities/ has variety	0.3	0	0.4
Tomato was readily available	30.8	54.5	27.8
Broker/trader linked me to seller	25.2	2	28.2
Other	0.0	0.0	0.0

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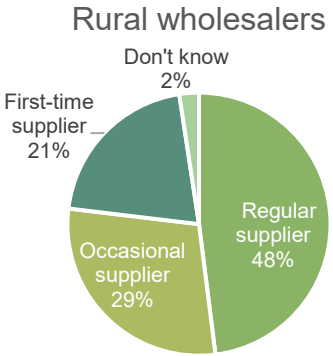
Trader: survey results



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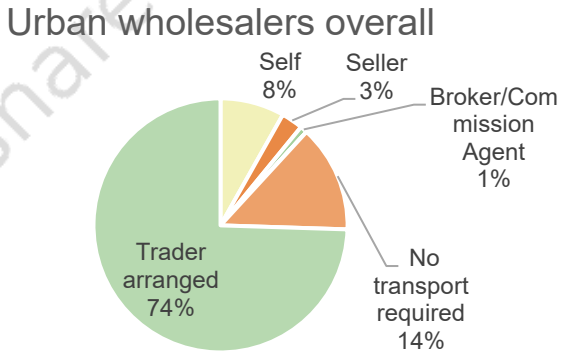
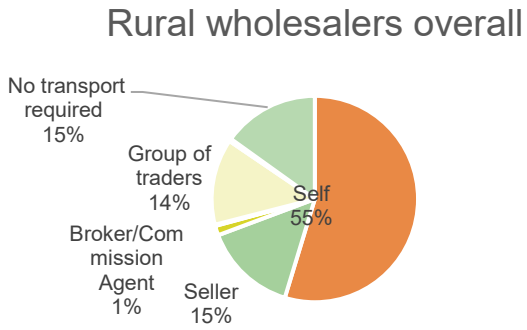
- Wholesalers have regular relations with suppliers (50%).
- 67% of urban wholesalers source from regular suppliers, indicating stable, repeat transactions and trusted relationships. Only 25% use final-time suppliers, and a small share (8%) use occasional suppliers. This indicates stability in tomato supply, trust and consistency in tomato supply.
- Rural wholesalers - 46% source from regular suppliers—substantial, but notably lower than in urban areas. 21% use final-time suppliers, and 33% rely on occasional suppliers, reflecting seasonal, or opportunistic sourcing.

Trader: survey results

Who organized the transport for collecting goods

- Rural wholesalers organized their own transport (55%),
- Urban traders arranged their own transport (74%)
- About 15% of the rural and urban wholesalers do not require transport
- Brokers play a minimal role in transport (1%)





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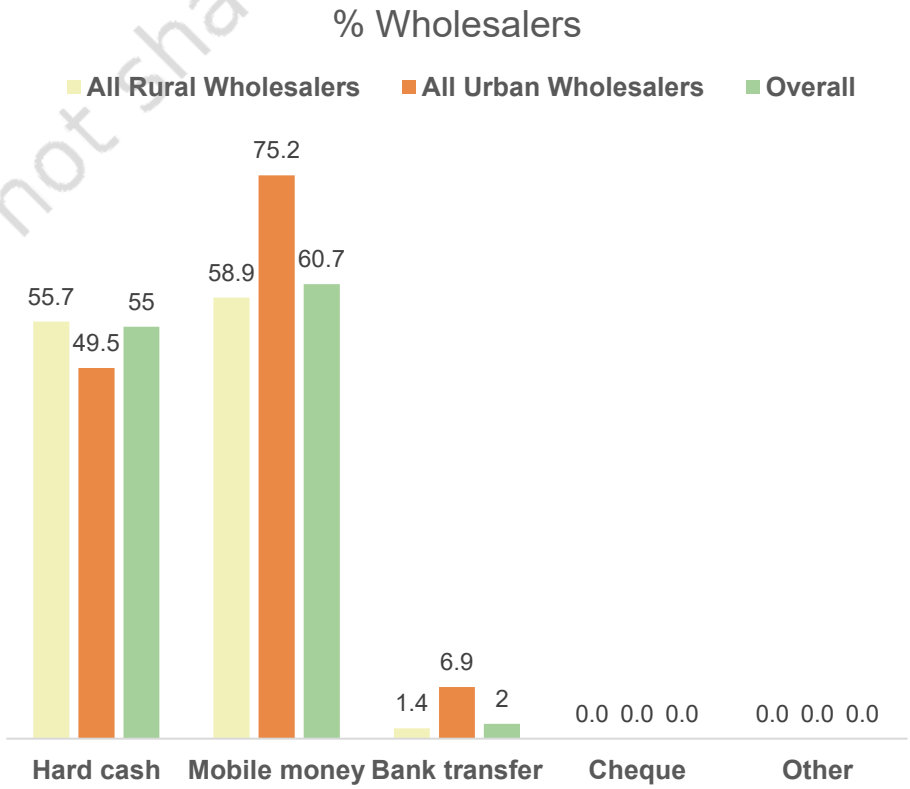
Trader: survey results

Modes of payment to supplier

- Mobile money is the dominant payment mode (61%) – particularly for urban wholesalers (75%). About 60% for rural wholesalers use this mode of payment – this indicates adoption of digital payments across rural and urban wholesalers
- About 50% of the wholesalers use cash to make payments
- Wholesale trade in Kenya use mobile money and cash, with limited use of bank transfer and cheques



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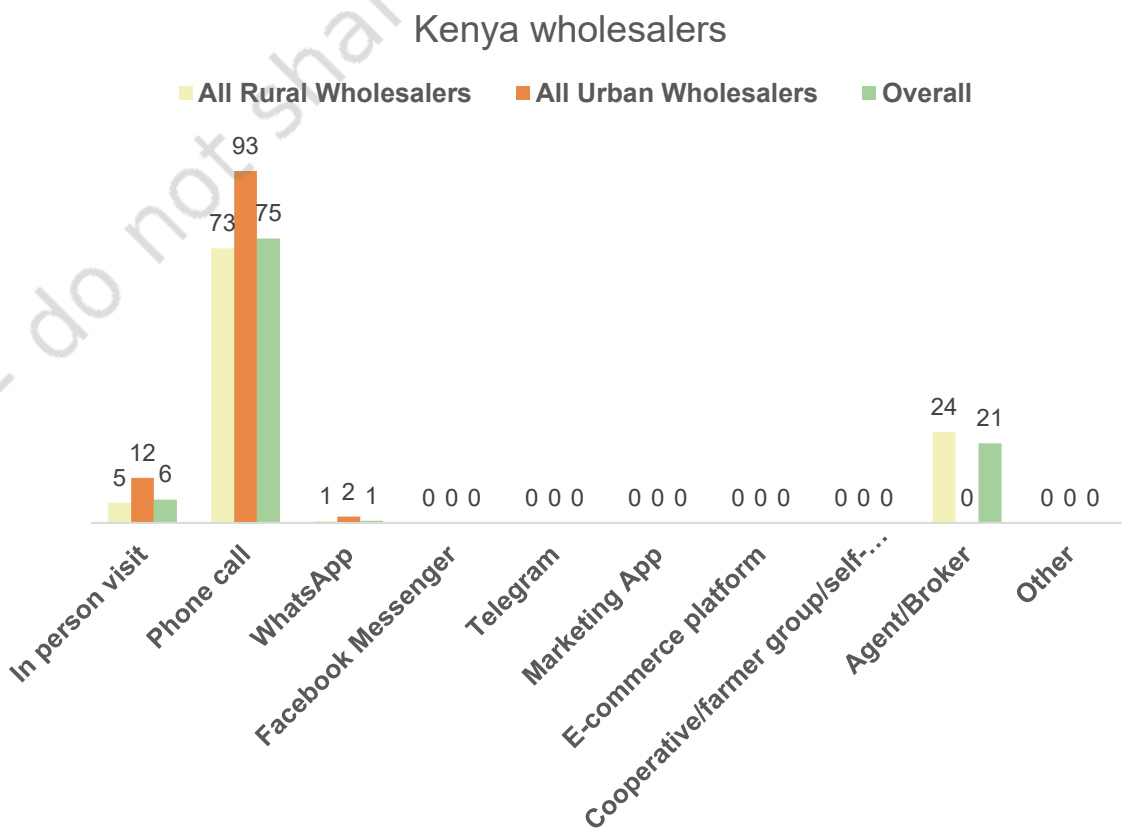
Trader: survey results
How did the most recent supplier contact you?

- Phone calls are by far the most commonly used channel across all groups (75%). Usage is highest among urban wholesalers (93%), followed by rural wholesalers (73%).
- In-person visits are used by a small minority (6%): 12% of urban, 5% of rural
- A notable share of rural wholesalers (24%) rely on agents/brokers, compared to 0% among urban wholesalers.
- Wholesale trade in Kenya remains highly traditional and phone-centered, with very limited digital transformation.



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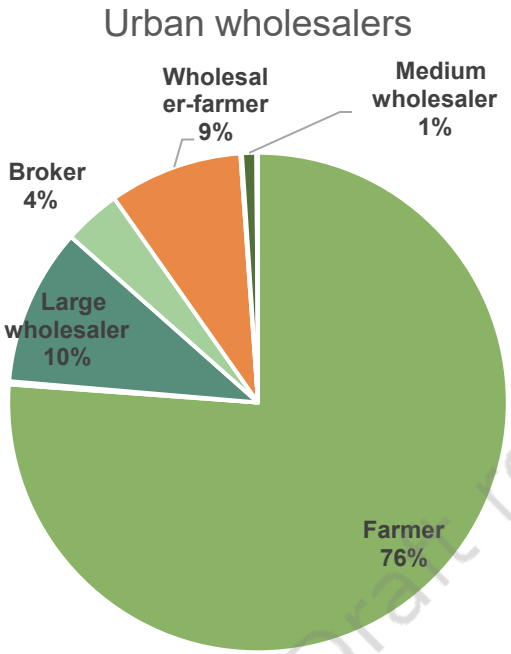
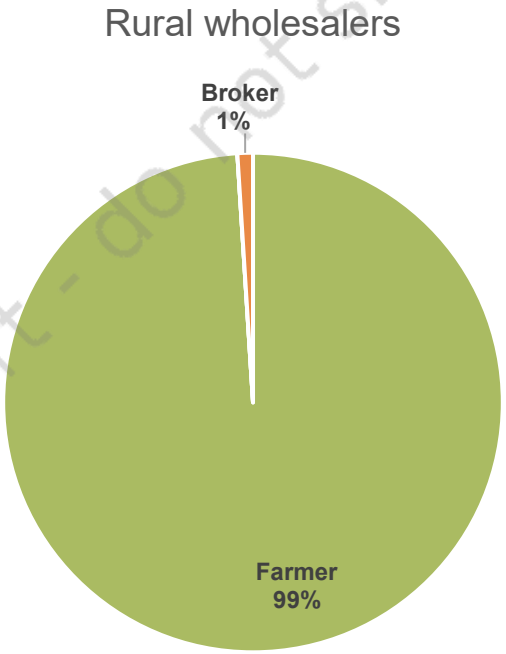
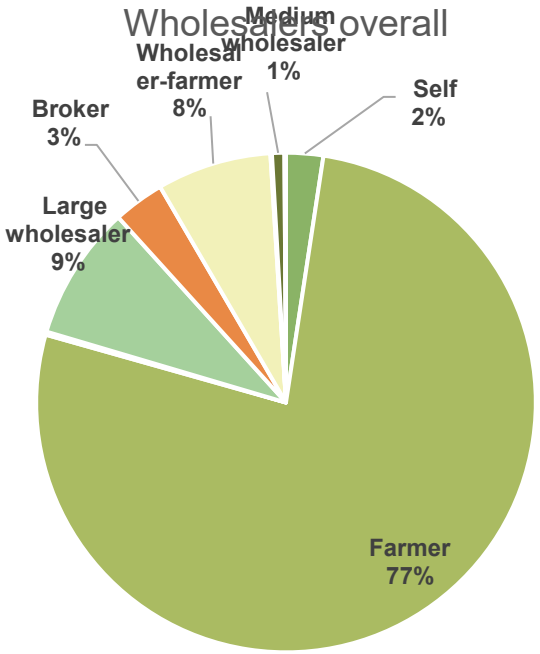
Trader: survey results

Wholesalers directly source from farmers (77%)







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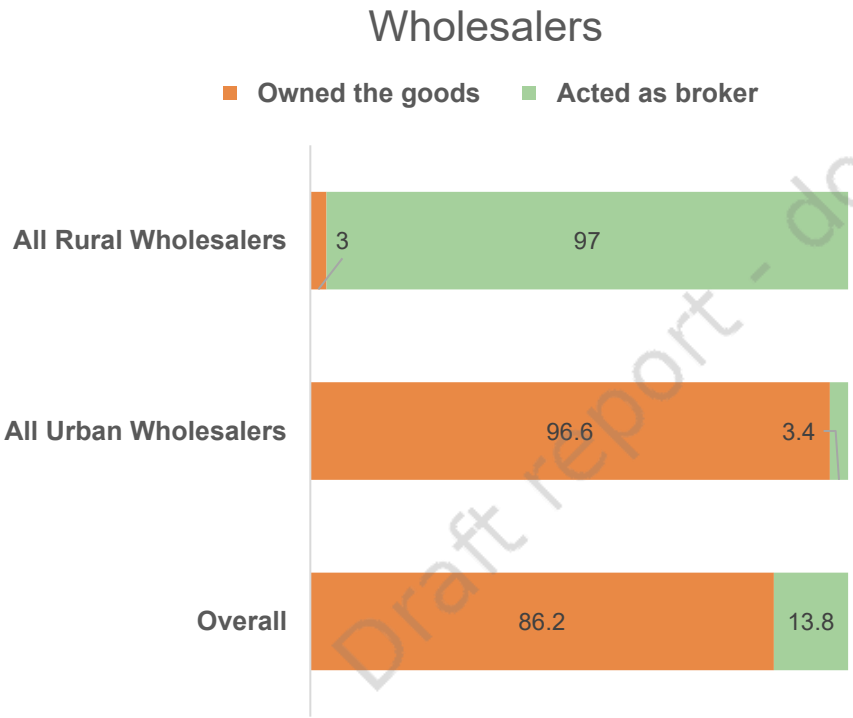
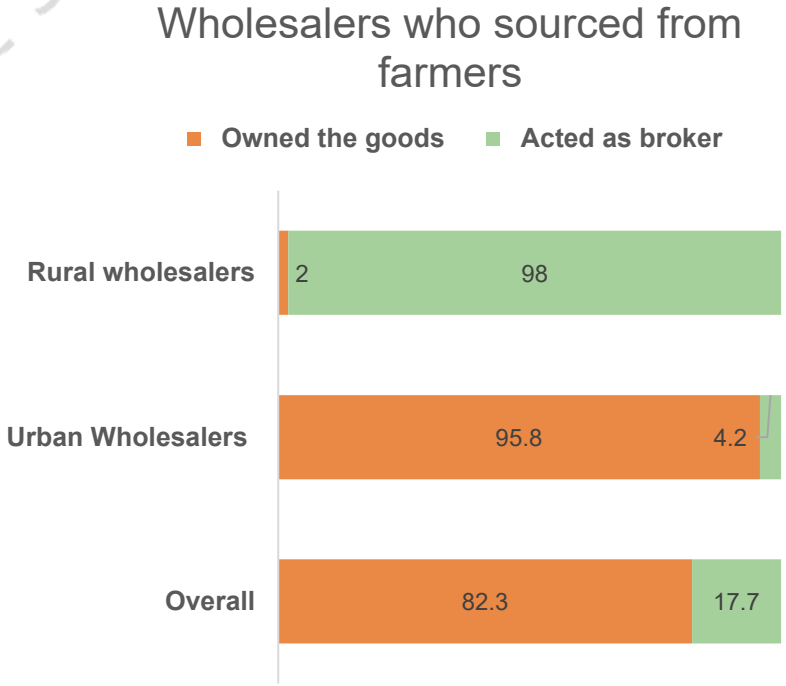
Trader: survey results

Wholesalers directly source from farmers





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Trader: survey results

- 3PLS is the most used mode of transport (52%) especially for rural wholesalers (55%).
- Urban wholesalers mostly use other sources of transport (70%)
- Self organized transport is less common while sellers sometimes arrange transport (10%)

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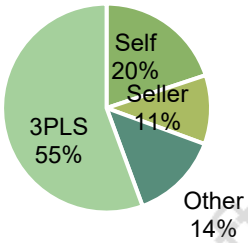
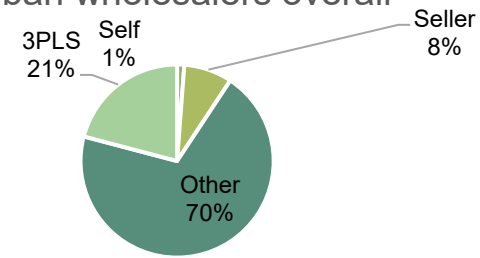
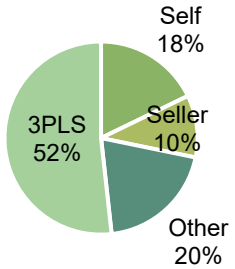
Rural wholesalers overall



Urban wholesalers overall



Wholesalers overall

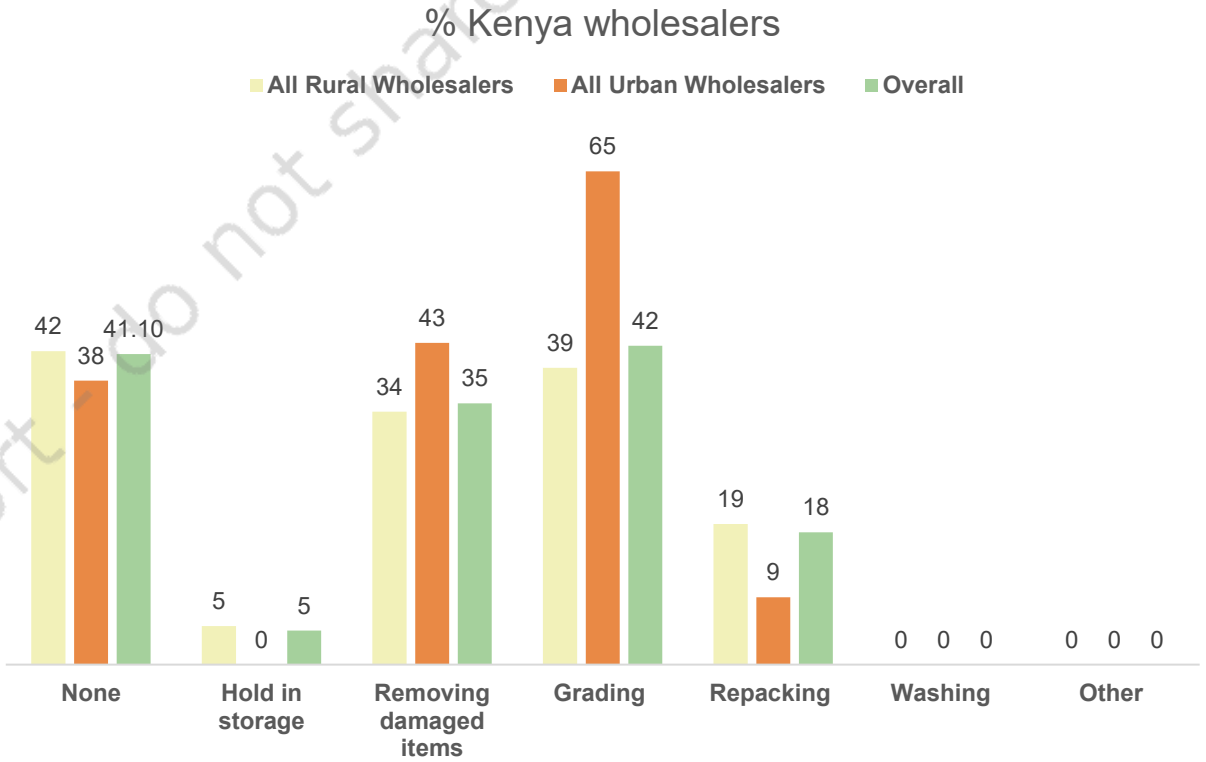


Trader: survey results

Procedure after receiving the goods from seller

- Over 40% of wholesalers do nothing after receiving tomatoes, indicating limited post-harvest handling or value addition

- Urban wholesalers are more likely to remove damaged items (43% vs. 34% rural), possibly due to higher quality expectations in urban markets.



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Trader: survey results

Business have online presence via any platform?

- Very few traders have online presence (94%) indicating that the vast majority of tomato trading still operates through traditional, offline channels.

- Only 5.9% of all wholesalers use social media (Facebook, WhatsApp, etc.). Urban wholesalers are more than 3x as likely to use social media (21.8%) compared to rural wholesalers (7.6%).

Kenya	% Wholesalers	% Urban wholesalers	% rural wholesalers
A website	0.0	0.0	0.0
Digital Directories and lists (Classifieds)	0.0	0.0	0.0
Social media (e.g. Facebook, WhatsApp)	5.9	21.8	7.6
Platforms (e.g. Mkulima young, Soko Yetu etc)	0.0	0.0	0.0
Location and description on Google map, etc.	0.0	0.0	0.0
I have no online presence	94.1	78.2	92.4

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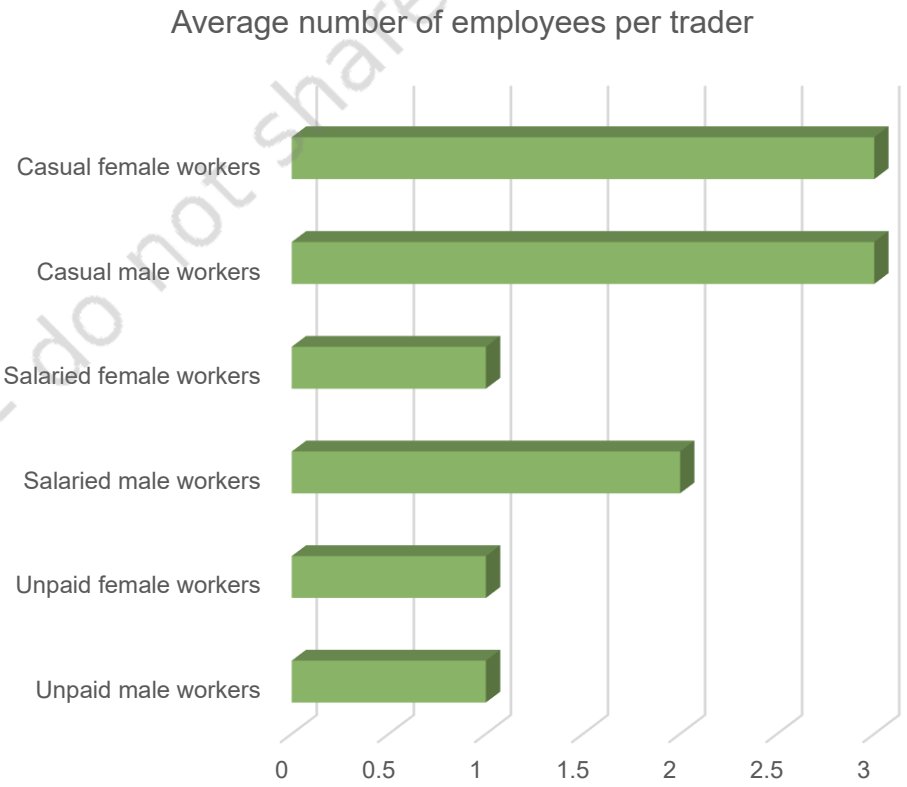
Trader: survey results

Employment

- Traders employ more casual (average of 3) compared to salaried. This implies that tomato trading sector relies on flexible, low-commitment labor arrangements, which may help traders manage seasonal fluctuations and price volatility.

- Women are more involved in casual labor, but are underrepresented in salaried positions.



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Trader: survey results

Challenges

Fluctuation of market prices is the dominant issue affecting 62% of the traders. Delayed payments (36%) and high transport cost (30%) are also critical challenges faced by traders

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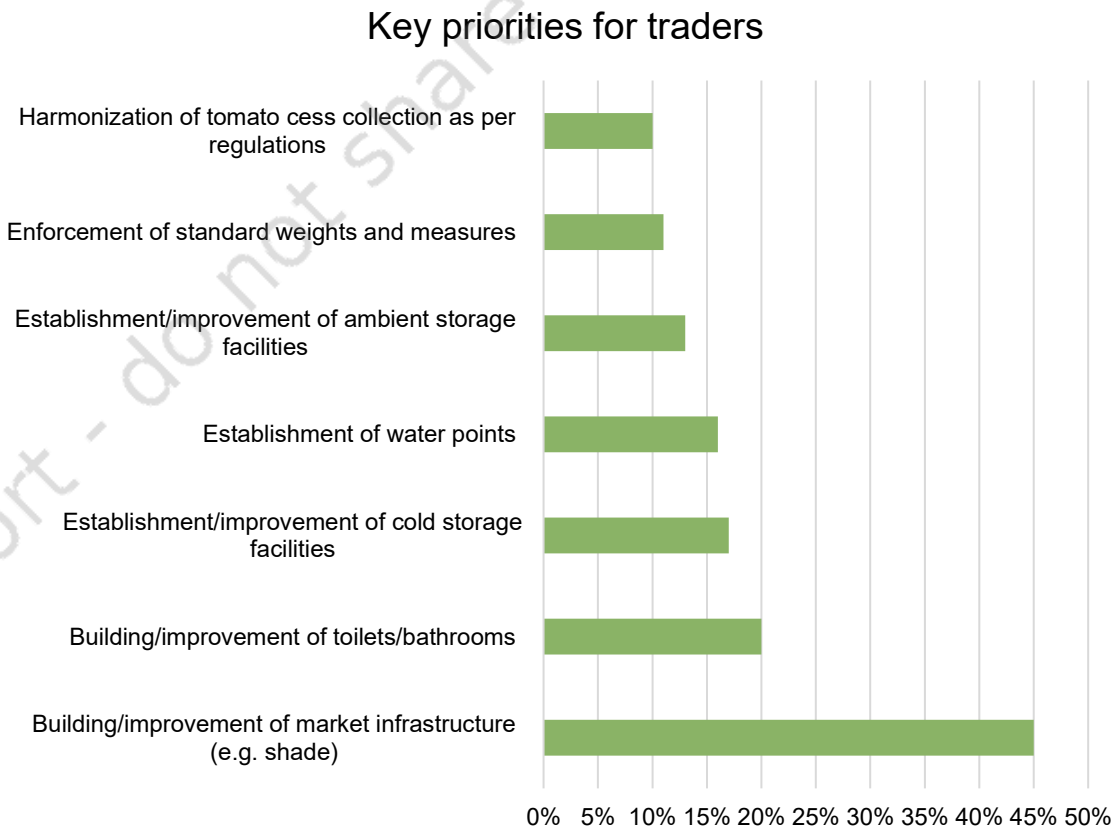
Trader: survey results

Key priorities for traders

Market infrastructure (45%) and sanitation (toilets) (20%) are the highest priorities, indicating that basic conditions of the markets need urgent improvement.

Traders rank cold storage (17%) higher than ambient storage (13%), reflecting a need to reduce post-harvest losses and manage price volatility by extending shelf life.



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INCATA: Linked Farms and Enterprises for Inclusive Agricultural Transformation in Africa and Asia

INCATA Project: Preliminary results

December, 2025

RIMISP
Centro Latinoamericano para el Desarrollo Rural

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