BOSTON CONSULTING GROUP

Russia Ukraine conflict

IMPACT HORIZONS FOR AFRICAN FOOD SYSTEMS

FRENCH CHAMBER OF COMMERCE KENYA

Sep 2022

Executive Summary – Converging Crises

The current food crisis has many interconnected drivers which are only now becoming more clear and more concerning.
Currently there is a PRICE crisis. Consumer prices are driven by availability (and cost) of raw materials as well as other production inputs (esp. fuel prices).

SUPPLY – The availability and price of grains/oil seeds is the near-term focus - given the sizeable contribution to nutrition (~60-70% across Sub-Saharan Africa) and Russia and Ukraine's share of trade. Availability is driven by:

- **Domestic Production** - Across most crops, Sub-Saharan Africa's yields are around two-thirds lower than global averages. This is in large part due to low fertilizer application rates (7x lower than global average). Fertilizer is significantly more expensive than a year ago (~60% YoY in KE, NG). Drought (e.g., East Africa) and lack of predictable rain (96% of Sub-Saharan Africa's land is rainfed) also contribute to lower yields. Finally, 30-40% of food in Africa is wasted/lost before it reaches consumers.
- **Imports** – For most of the "big 3" grains (maize, wheat and rice), Sub-Saharan countries are not self-sufficient with some limited maize trade for surplus producing countries. Emerging export bans and restrictions across grains and edible oils will drive greater scarcity.
- **Substitution** – Globally, there has been a move in recent planting seasons towards less nitrogen intensive crops (e.g., soy instead of maize). In terms of product formulation, some level of substitution is possible (e.g., bread made with flours of other grains or roots and tubers) - *(not covered in this edition)*
- **Competition for Use** - There will likely be negative impacts on animal sourced foods as grains and oil seeds are diverted from animal feedstock towards human consumption (globally ~15% of grains go to animal feed) - *(not covered in this edition)*
- **Fuel** - High fuel prices and limited availability contribute to higher food prices due to increased production, logistics and processing costs.

DEMAND – Low purchasing power and high government debt are the other side of the crisis.

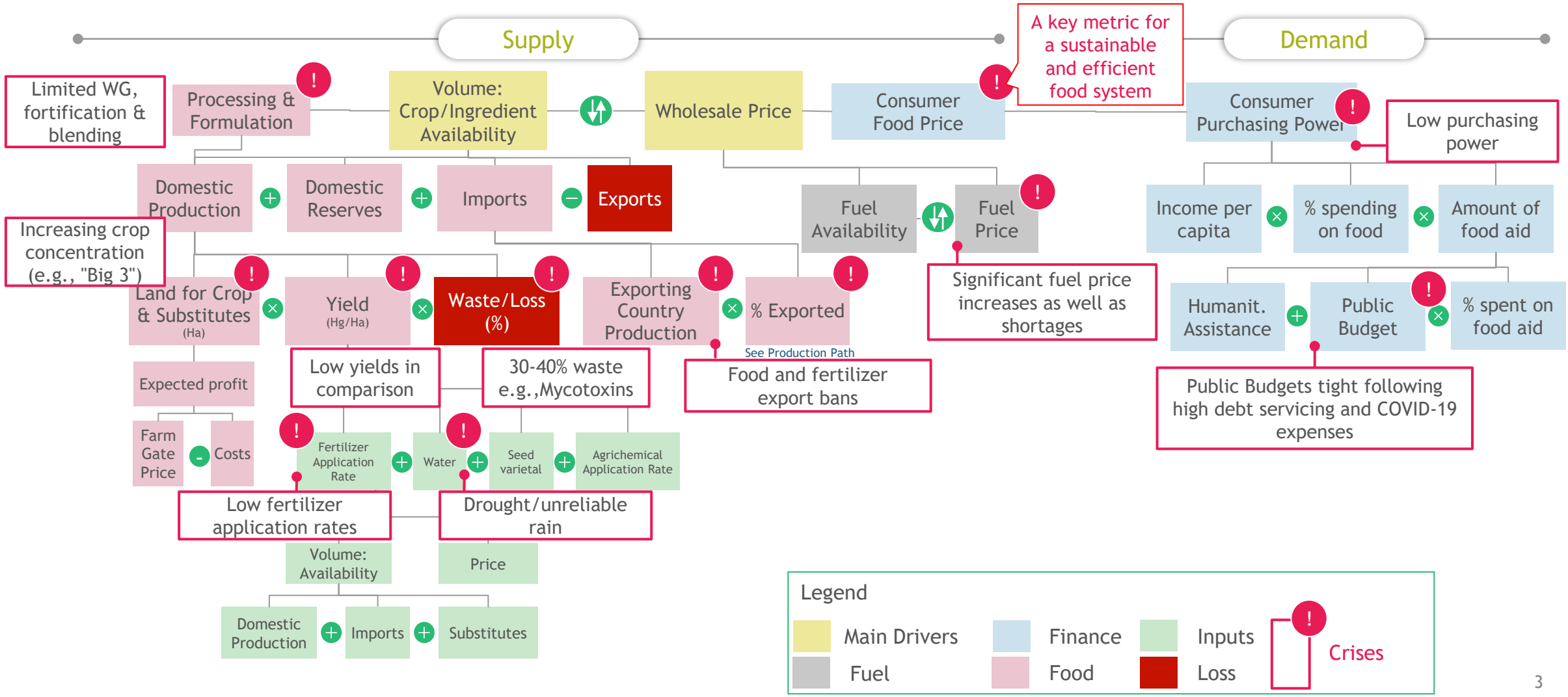
- **High share of consumer spending on food** - Consumers across SSA spend ~40-50% of their income on food. Higher food prices (inflation) put a particularly heavy additional strain on household income. Additionally, high fuel prices cause another dent on consumers' purchasing power. As seen in the 2008-09 global crisis, this could contribute to social and political unrest.
- **Limited government ability to intervene** - Governments have limited fiscal room to maneuver due to high debt levels from investments in infrastructure and responding to COVID-19. This pressure makes it all the more important that limited resources are directed towards the highest impact interventions for the most vulnerable populations.

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Converging Food Systems Crises

Copyright © 2022 by Boston Consulting Group. All rights reserved.

The pandemic, Russia's invasion of Ukraine, and supply chain disruptions are exacerbating African's converging food systems crises



Copyright © 2022 by Boston Consulting Group. All rights reserved.

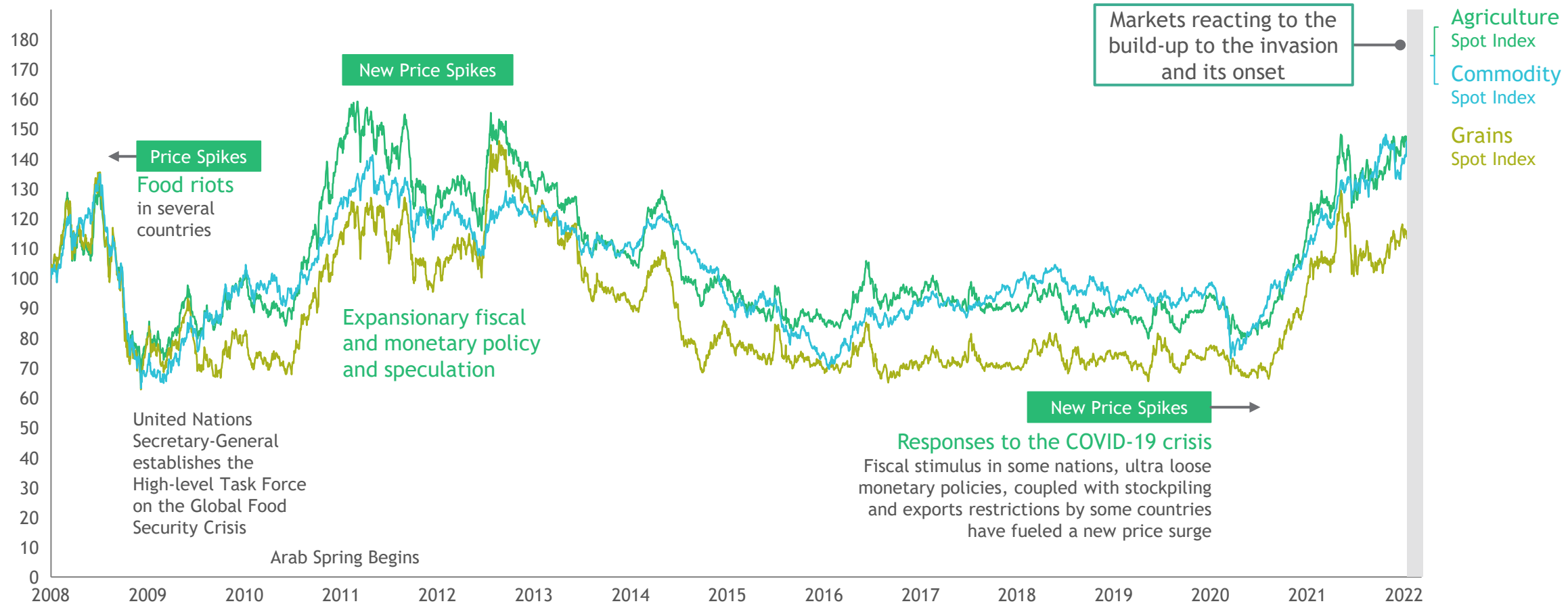
Consumer Prices: High consumer prices in Sub-Saharan Africa

High consumer prices

! Before the invasion, we were already at the historical high point in terms of global food prices

Copyright © 2022 by Boston Consulting Group. All rights reserved.

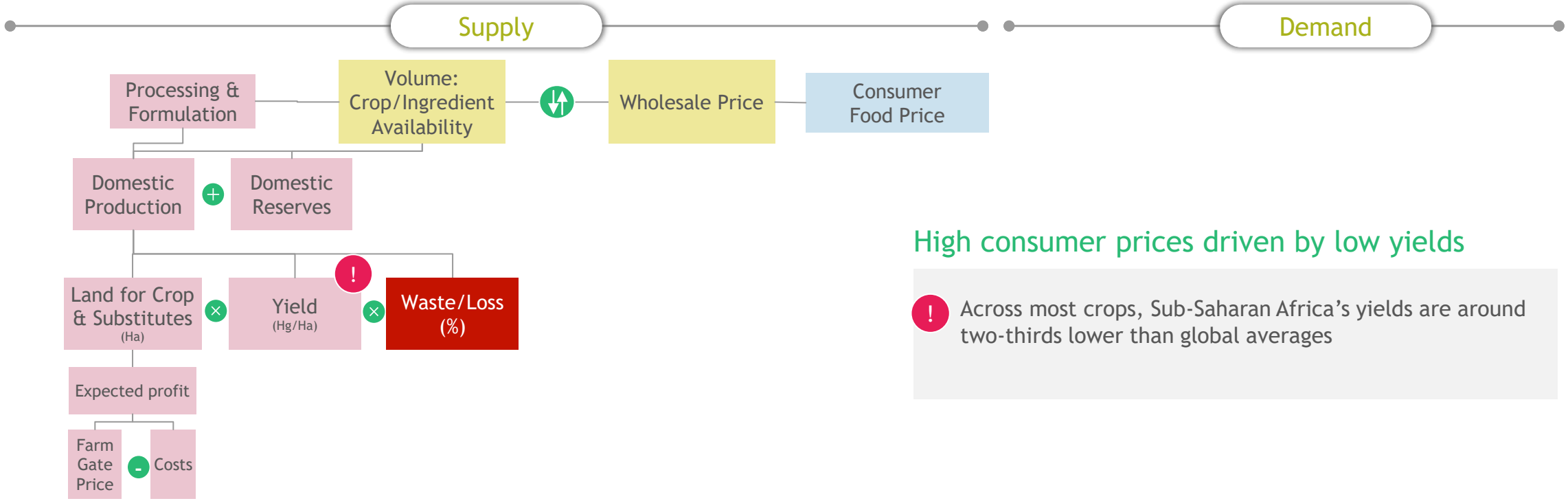
Before the invasion, we were already at the historical high point in terms of global food prices



Source: UNCTAD Secretariat based on data from Thomson Reuters (Bloomberg Commodity Index)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Yield: Sub-Saharan Africa's yields are around 2/3rd lower than global averages



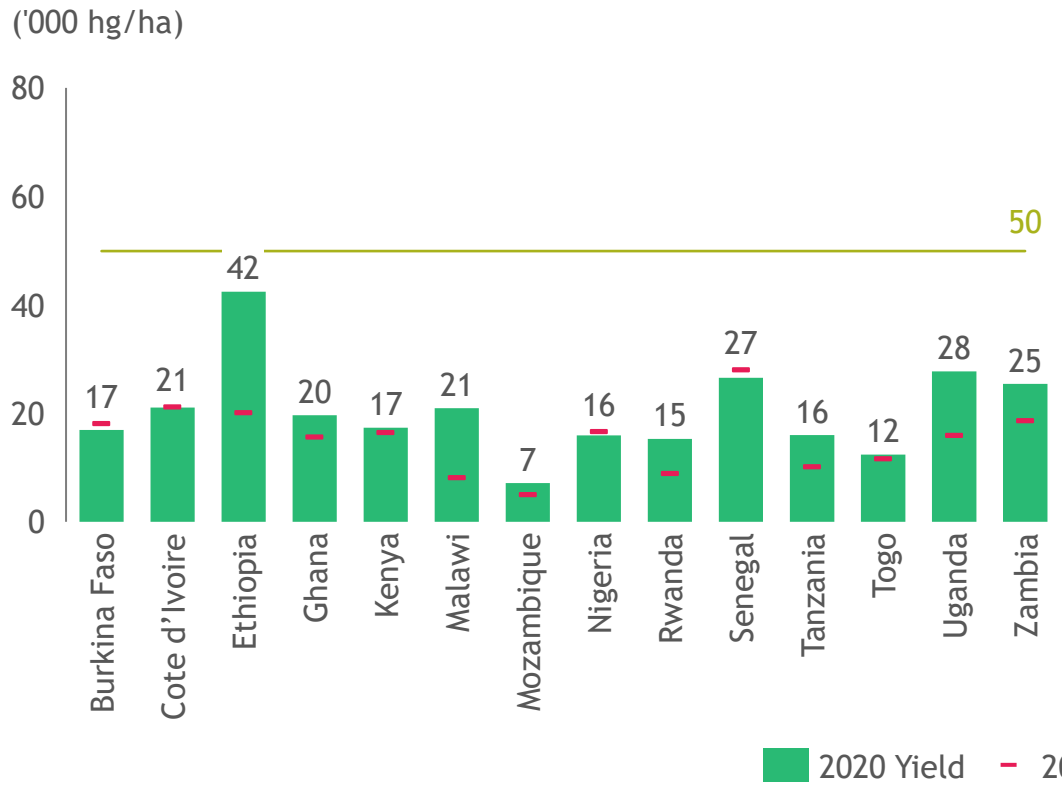
High consumer prices driven by low yields

Across most crops, Sub-Saharan Africa's yields are around two-thirds lower than global averages

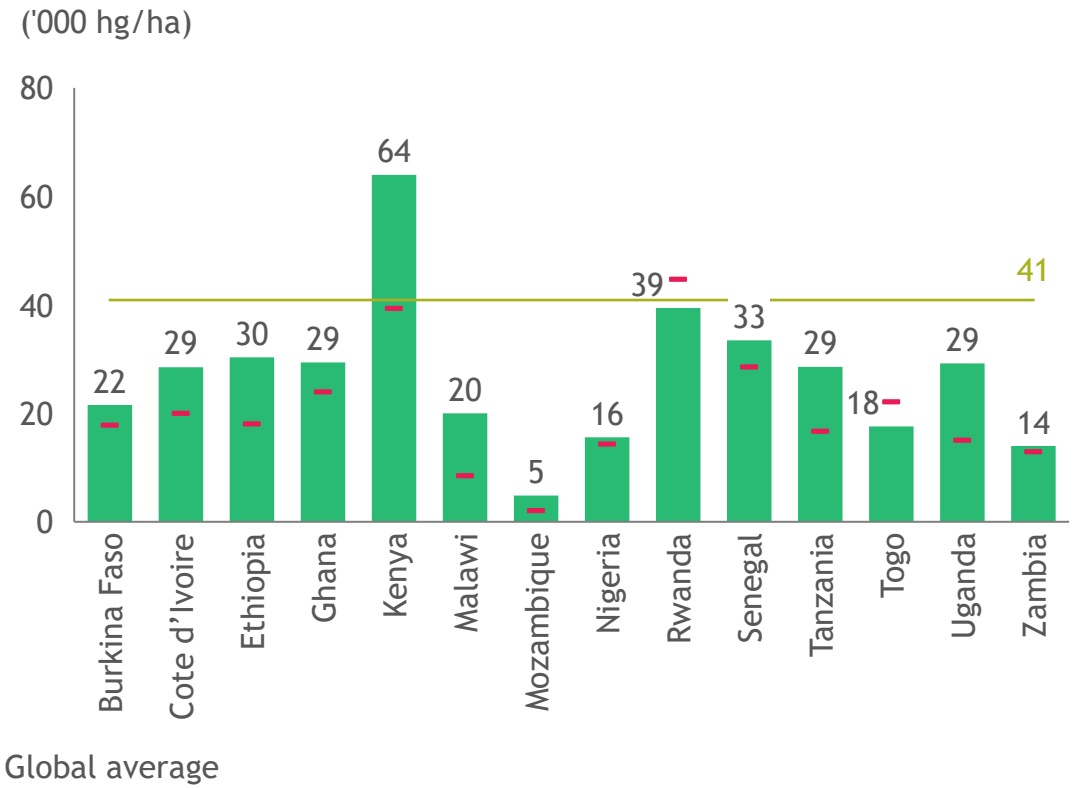
Copyright © 2022 by Boston Consulting Group. All rights reserved.

Many Sub-Saharan African countries are still far below global average yields on very relevant grain crops

Maize yields in selected SSA countries



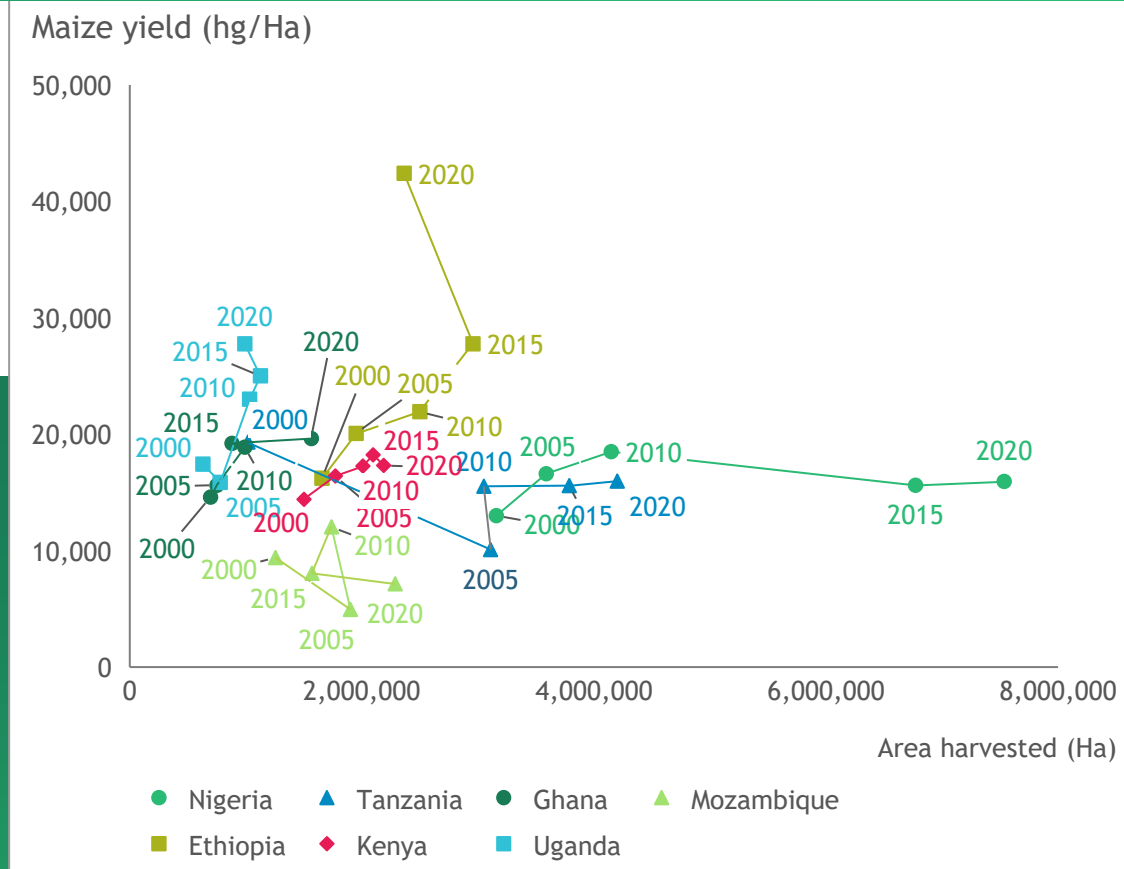
Rice yields in selected SSA countries



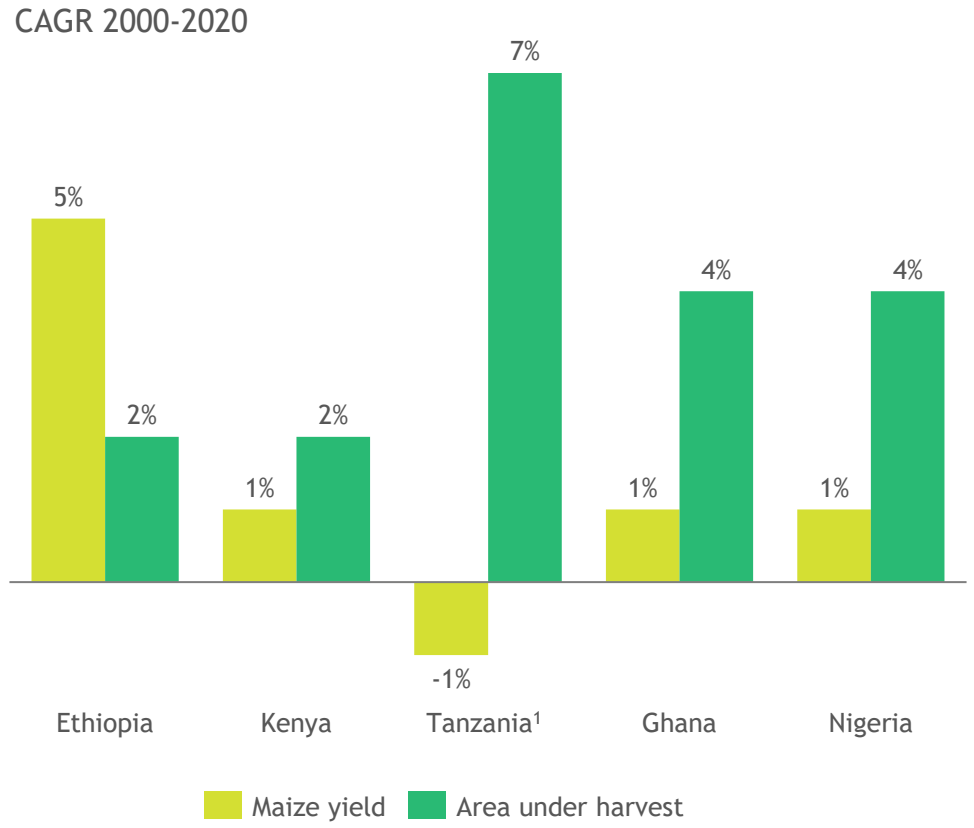
Source: FAOSTAT (2020)

Growth for many has been from land expansion (extensification)

Change in maize yield to area harvested from 2000-2020

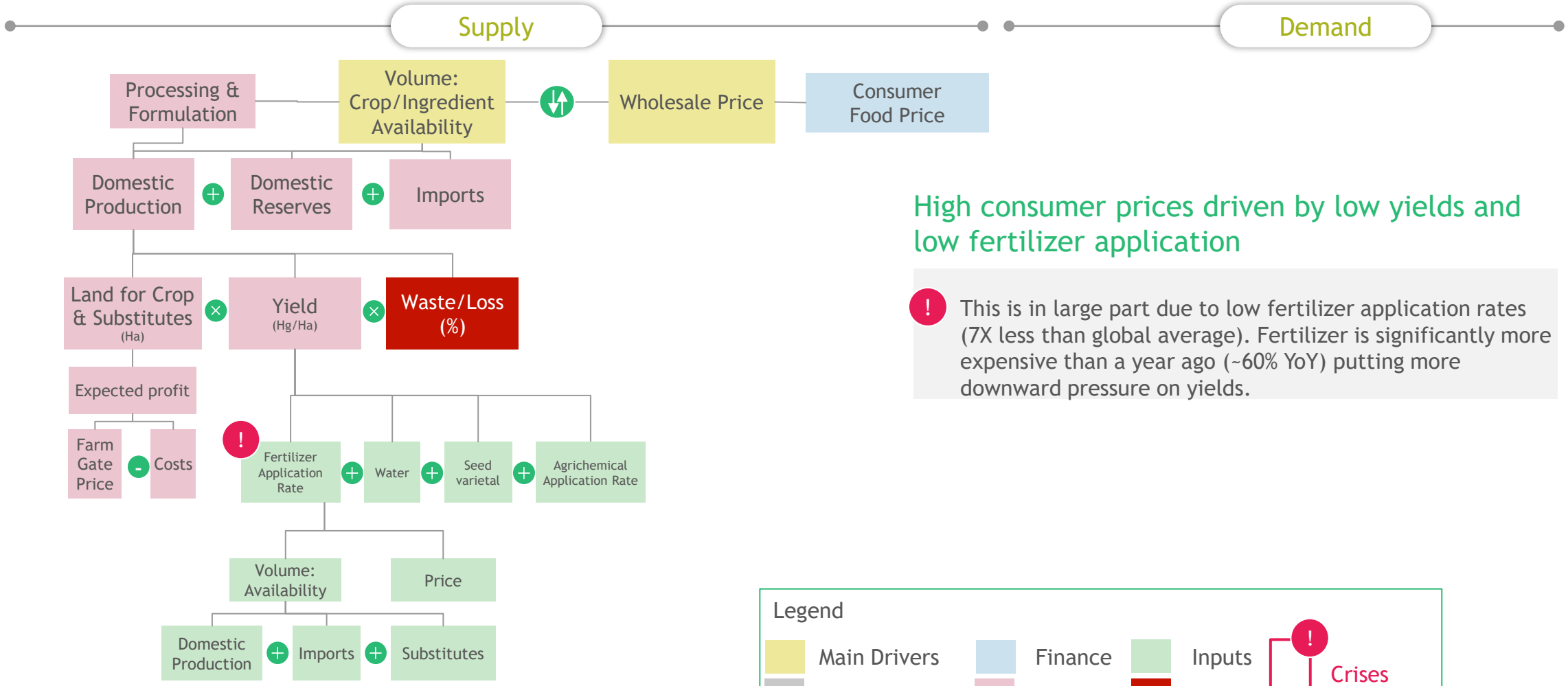


Comparison of growth of maize yield to area harvested in selected African countries



1. Tanzania experienced negative yield growth compared to the starting point in 2000. "*With uncertain seasonal rainfall and high fertilizer costs, some farmers may not to apply any fertilizer at all. Consequently, maize yields will be low, even with good seasonal rains*" extract from Narrowing Maize Yield Gaps Under Rain-fed conditions in Tanzania: Effect of Small Nitrogen Dose, 2014
Source: FAOSTAT (2020)

Fertilizer: High consumer prices in Sub-Saharan Africa mainly driven by low yields linked to low fertilizer application rates



High consumer prices driven by low yields and low fertilizer application

! This is in large part due to low fertilizer application rates (7X less than global average). Fertilizer is significantly more expensive than a year ago (~60% YoY) putting more downward pressure on yields.

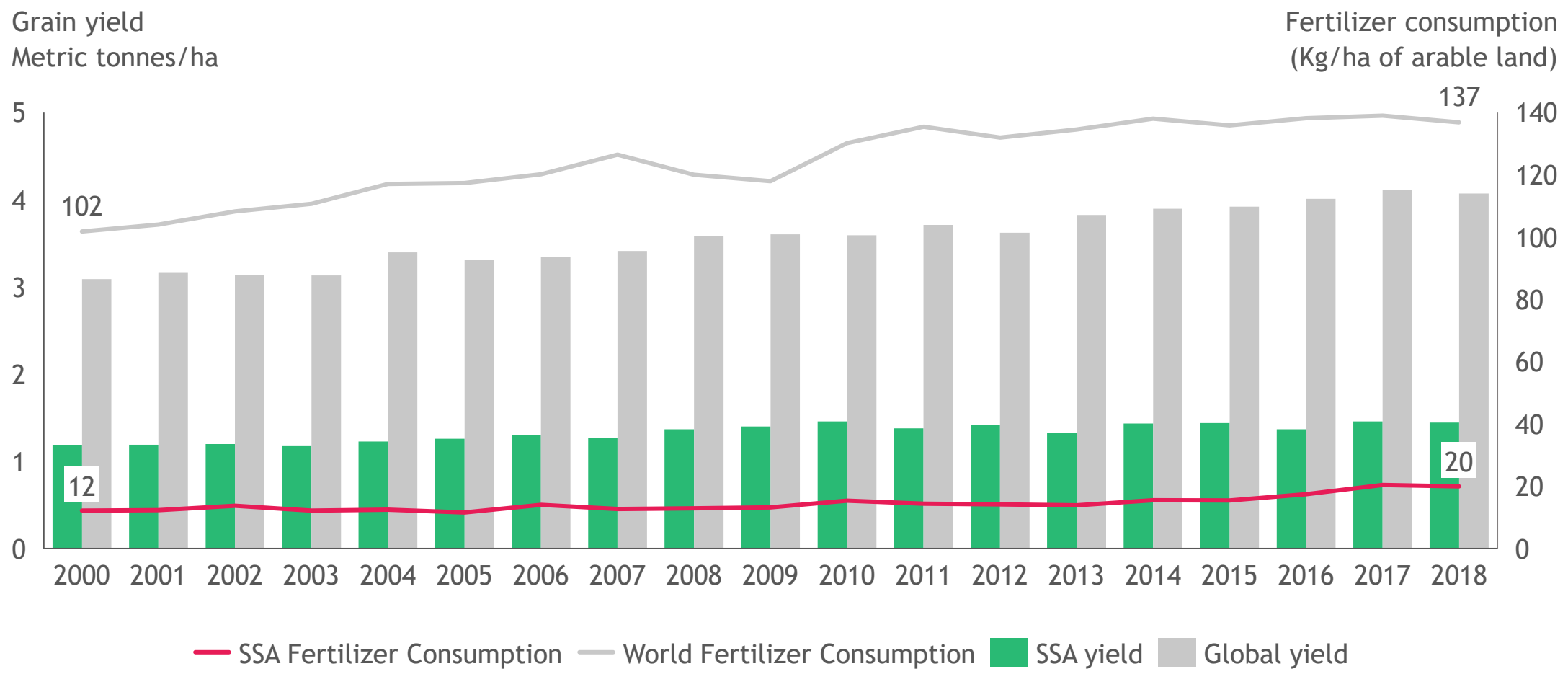
Legend

Main Drivers | Finance | Inputs | Crises

Fuel | Food | Loss

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Africa's use of fertilizer and grain productivity has always been very low

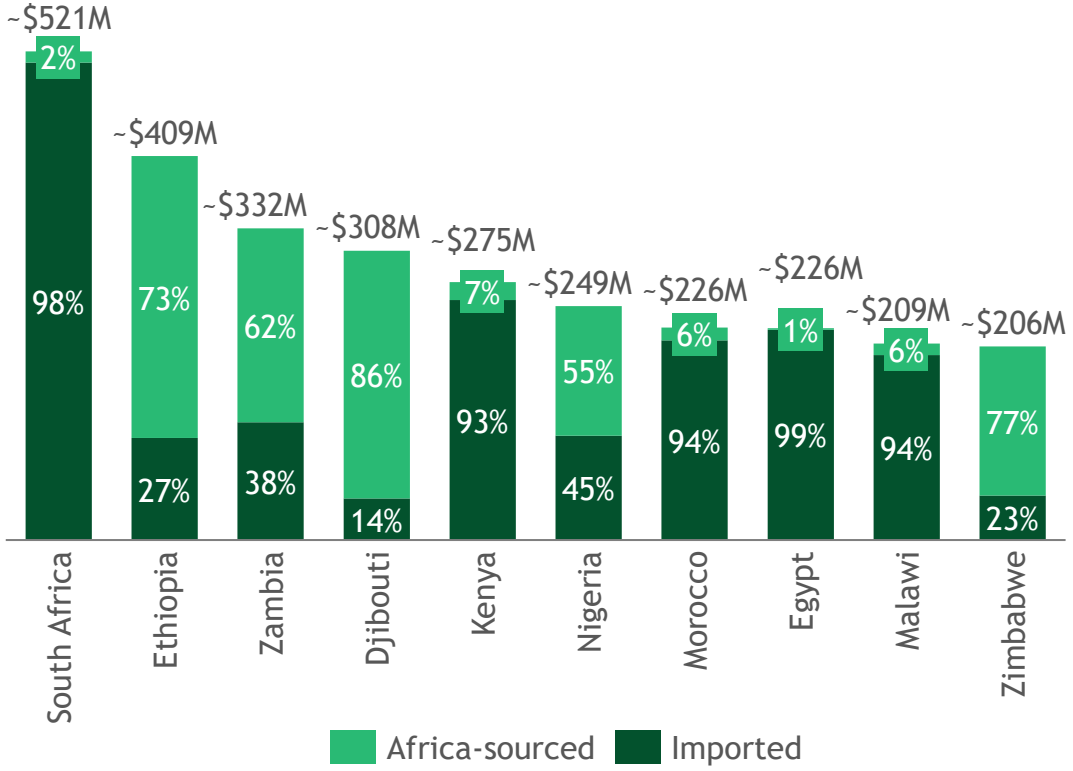


Source: World Bank, FAO STAT

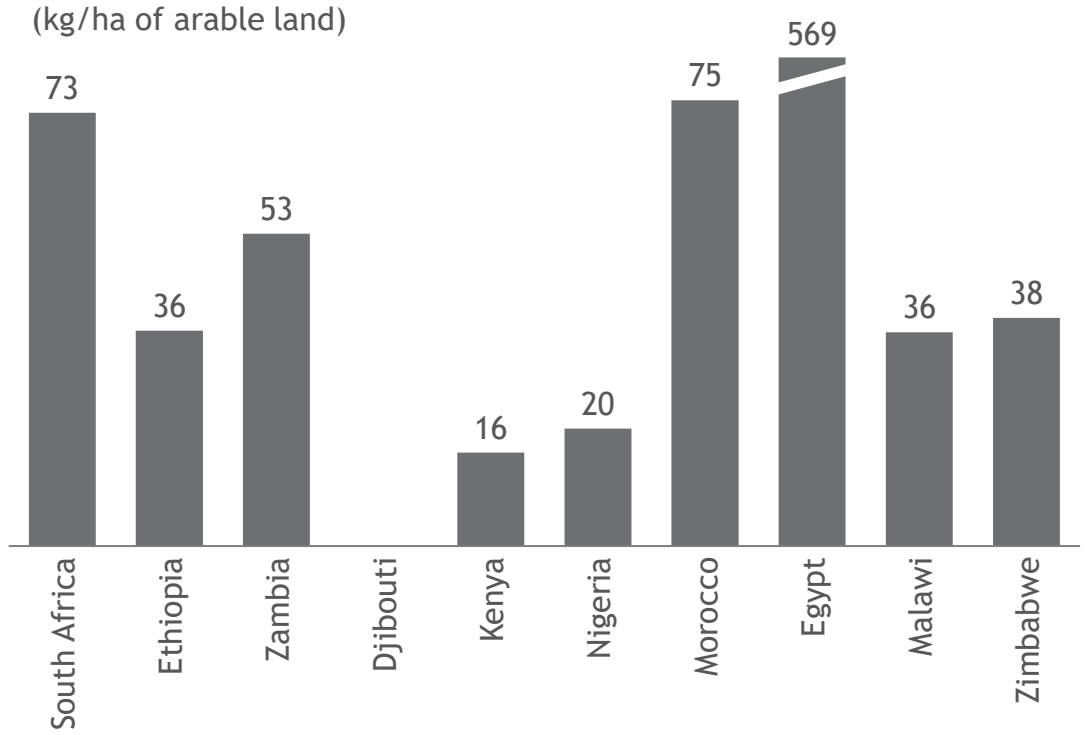
Copyright © 2022 by Boston Consulting Group. All rights reserved.

Imports dominate African countries fertilizer supply, with countries with highest import proportion tending to have higher fertilizer consumption rates

Fertilizer import value ($M) by origin, 2020[1]

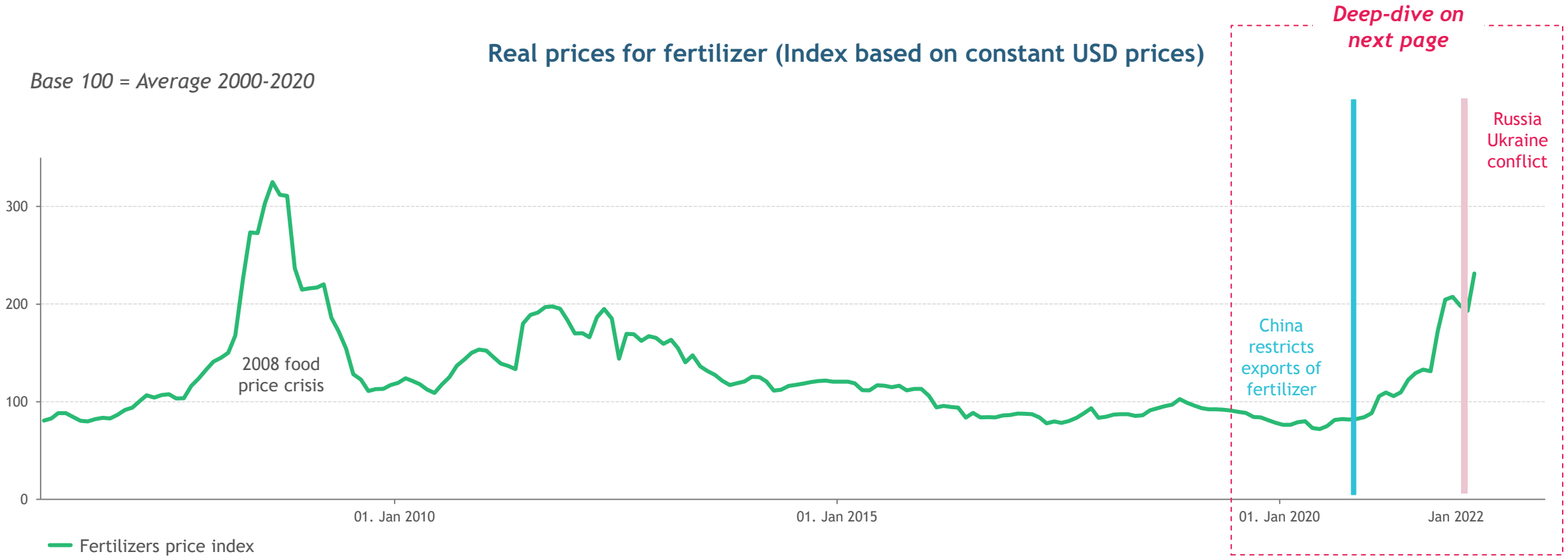


Fertilizer consumption, 2018[2]



1. Top 10 importers of fertilizer, representing ~66% of national imports across the continent based on analysis of HS92 exports and imports 2. World Bank, 2018
Source: OEC 2020, World Bank

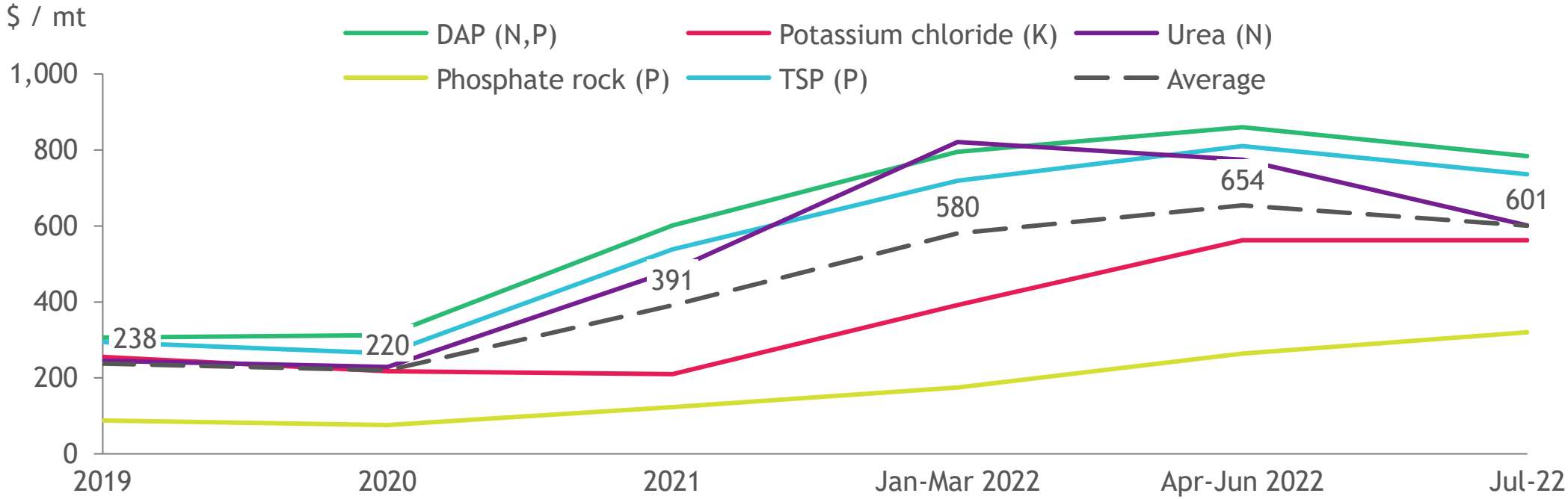
Global fertilizers/input prices (long term)| Prices saw a stark increase starting 2020 that continued into 2021-2022 because of global supply shocks



1 World Bank Group (2022) 2. IFPRI (2022) 3. World Grain (2022)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Global fertilizers/input prices (short term)| Prices saw a stark increase in 2021 & H1 of 2022, in H2 of 2022 a slight decline is seen due to reduced demand



Price remains 2.5x of 2019-2020

Price increase in 2021 driven by:
- Supply chain disruptions[1] (China export ban)
- High raw material prices[2]

Price increase in H1-2022 driven by further supply chain disruptions:[3]
- Sanctions post Russia-Ukraine conflict
- Continued ban from China

Price decline in H2-2022 driven by reduced demand:
- Farmers shifting to crops requiring less fertilizer[4]
- Reduced demand for urea and DAP in India as buyers await clarification on subsidy[5]

Note: Average is based on simple average of all prices
1. IFPRI (2022) 2.Fitch Ratings (2022) 3.CNN Business (2022) 4 USDA (2022) 5. The Hindu 6. World Bank Group Commodity Prices (2022)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

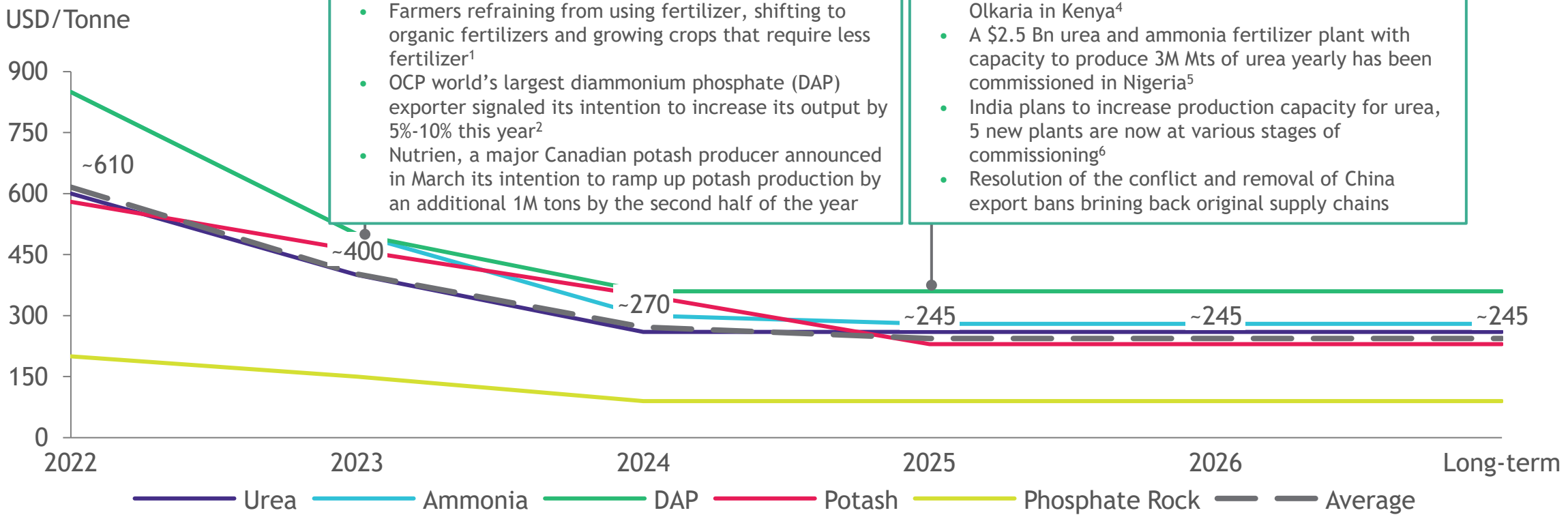
Global fertilizers price outlook | Key fertilizer prices are likely to see a slight decrease in 2023, before returning to pre-conflict figures globally in 2025

Short term decrease in fertilizer prices in 2023 is likely attributed to (but still higher, ~1.5x of 2019-2020 prices):

- Farmers refraining from using fertilizer, shifting to organic fertilizers and growing crops that require less fertilizer[1]
- OCP world's largest diammonium phosphate (DAP) exporter signaled its intention to increase its output by 5%-10% this year[2]
- Nutrien, a major Canadian potash producer announced in March its intention to ramp up potash production by an additional 1M tons by the second half of the year

Long-term decrease in fertilizer prices is likely attributed to increase in production capacity over time:

- Kengen is planning to set up a fertilizer plant at Olkaria in Kenya[4]
- A $2.5 Bn urea and ammonia fertilizer plant with capacity to produce 3M Mts of urea yearly has been commissioned in Nigeria[5]
- India plans to increase production capacity for urea, 5 new plants are now at various stages of commissioning[6]
- Resolution of the conflict and removal of China export bans brining back original supply chains



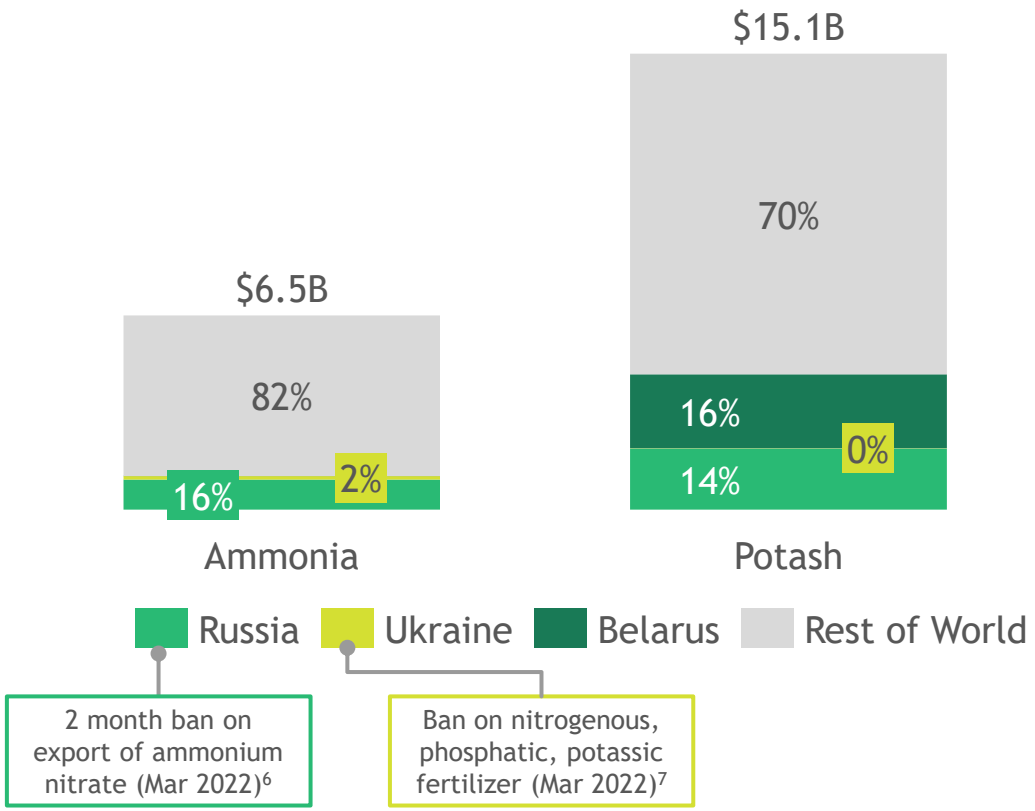
High prices in 2023 would continue to impact production leading to food shortages in 2024 (considering the long rain harvest cycle in Q3-Q4 of 2023 and accounting for the transportation & processing of maize and shelf life of flour), requiring medium to long term solutions to be put in place

1. USDA (2022) 2. Morocco World News(2022) Available Here 3. Nutrien (2022) 4. Business Daily (2022) Available Here 5.CNN Business(2022) Available Here 6. IFPRI (2022) 7. Business wire(2022) Available Here 8. Fitch Ratings (2022)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Now usage might decrease even further as prices rise due to export restrictions from exporters: Russia, Ukraine & Belarus provide ~20-30% of global fertilizer

Fertilizer export value, 2020[1]



Agriculture was already under pressure:

- Ammonia prices increased >210% (Sept 20-21)[2]
- China limited fertilizer exports (Jul 2021), particularly phosphates, reducing exports by 26.3%(compared to previous month) exacerbating global shortages[3]
- Global fertiliser prices rose >68% (Sept 20-21)[4]

Global fertilizer prices have continued to rise since the start of the invasion:

- **+20.7% in global prices** since invasion started[4], prices are 2-3X higher than in 2021[5]
- Farmers could **minimize fertilizer use** or pivot to fertilizer-light crops as long rains planting season approach

Second order effects:

- Compounding effect of other shortages (e.g., fuel, below-average rains) **will limit farmer spending on fertilizers and impact staple crop production**

1. Analysis of 2020 exports of ammonia and potassic fertilizer data 2. Farm Bureau, 2021 3. FastMarkets.com 4. Fertilizer price index(Feb-Mar 2022) and (Sept. 20- Sept. 2021), from World Bank Commodity Markets Review, accessed via Ycharts 5. Fertilizer price index (Jan 2021, Mar 2021 and Mar 2022) 6. ICIS, Reuters 7. WTO, Reuters
Source: Observatory of Economic Complexity, 2020

Case study impact on Kenya of fertilizer price increase | Fertilizer price increases will cause a 400k Mt drop in 2022 maize production

~70%
increase in fertilizer price (2021-2022)[1]

~65%
increase in the price of maize prior to subsidy (2021-2022)[2]

400k MT
reduction in national maize production (2021-2022)[3]

4-5 Mn
people's annual maize consumption reduction

1. Africafertilizer.org: Country dashboard for Kenya 2. CapitalFM: Maize flour prices set to go down June 2022 accessed July 2022 3. BCG Insights

Copyright © 2022 by Boston Consulting Group. All rights res

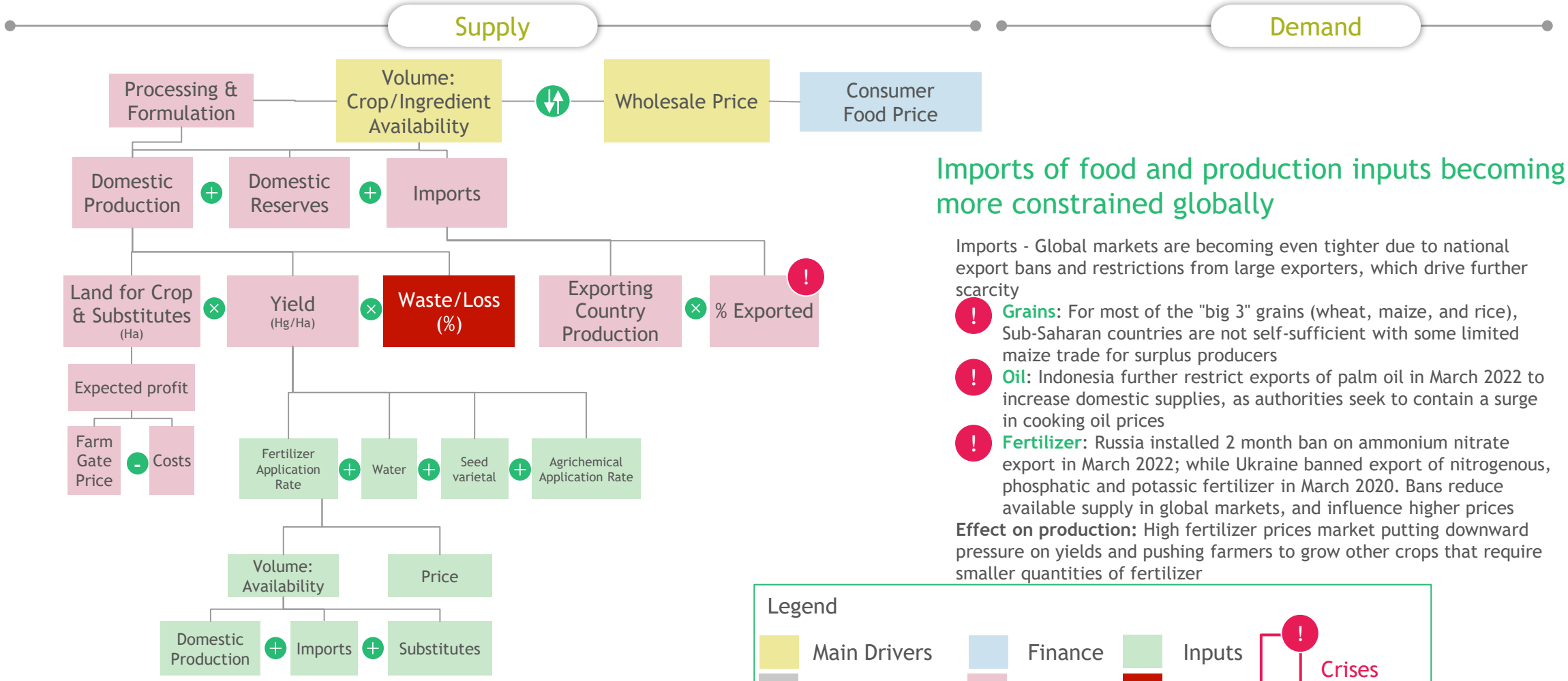
Impact on maize production (Kenya) | Increase in fertilizer prices estimated to impact high maize producers and already vulnerable counties

		Estimated Maize Production for 2022 based on actual fertilizer price changes (i.e. ~70%)			Actual for 2019	
County	Contribution to Total (%)	Revised Maize Production MT	Absolute Drop in Production (2021-2022) MT	Drop in Production (2021 - 2022) %	% People in poverty	% Children Aged 0-14
Trans Nozi	12%	335,424	53,844	-14%	37%	43%
Uasin Gishu	10%	271,293	49,874	-16%	63%	37%
Bungoma	7%	198,070	42,457	-18%	44%	44%
Narok	6%	182,400	26,788	-13%	73%	49%
Nakuru	6%	159,338	25,225	-14%	45%	38%
Kakamega	5%	149,865	26,279	-15%	52%	42%
Nandi	5%	144,648	29,695	-17%	27%	39%
Kisii	3%	97,194	12,689	-12%	35%	40%
Homa Bay	3%	87,228	6,061	-6%	70%	45%
Siaya	3%	82,374	5,553	-6%	66%	41%
Meru	3%	75,298	7,187	-9%	55%	35%
Migori	3%	74,654	7,100	-9%	30%	46%
Machakos	2%	70,131	4,496	-6%	3%	33%
Elgeyo Marakwet	2%	69,135	9,866	-12%	44%	42%
Kericho	2%	67,748	12,580	-16%	43%	39%
Makueni	2%	62,372	4,354	-7%	75%	35%
Nyamira	2%	54,429	6,840	-11%	22%	39%
West Pokot	2%	51,681	5,948	-10%	0%	51%
Baringo	2%	48,363	5,219	-10%	2%	44%
Kisumu	2%	47,175	3,610	-7%	60%	39%
Busia	2%	47,061	5,454	-10%	62%	42%
Muranga	2%	44,594	4,682	-10%	60%	32%
Bomet	2%	43,307	7,128	-14%	55%	42%
Kwale	1%	36,388	1,440	-4%	21%	45%
Laikipia	1%	35,937	4,004	-10%	26%	38%
Kirinyaga	1%	33,986	3,049	-8%	70%	29%
Vihiga	1%	30,619	4,043	-12%	62%	39%
Kilifi	1%	30,070	2,126	-7%	39%	42%
Embu	1%	27,899	1,792	-6%	35%	31%
Nyeri	1%	26,962	3,376	-11%	71%	30%
Kiambu	1%	26,650	3,603	-12%	54%	31%
Lamu	1%	25,882	1,122	-4%	29%	39%
Kitui	1%	25,792	1,220	-5%	43%	39%
Kajiado	1%	23,985	1,564	-6%	67%	39%
Tharaka Nithi	1%	23,097	1,044	-4%	61%	33%
Nyandarua	1%	18,570	2,160	-10%	53%	36%
Taita Taveta	0%	9,209	408	-4%	69%	34%
Tana River	0%	6,043	187	-3%	64%	48%
Samburu	0%	4,408	157	-3%	70%	49%
Turkana	0%	3,019	115	-4%	64%	45%
Nairobi	0%	640	71	-10%	64%	30%
Isiolo	0%	630	23	-4%	68%	45%
Mandera	0%	614	24	-4%	84%	55%
Marsabit	0%	535	15	-3%	74%	47%
Mombasa	0%	333	21	-6%	69%	33%
Wajir	0%	272	0	0%	62%	50%
Garissa	0%	173	9	-5%	57%	46%
Total		**2,855,496**	**394,504**	**-12%**		

Note: Analysis for production volume (in MT) only
Source: WFP (2022), BCG Analysis, KNBS, MoALFC Kilimo and KAMIS websites, AfricaFertilizer.org (n.d.), FUBC in Kenya (2015), WBG WDI (2022),

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Imports: Import volumes depend on production and policies by exporting countries



Imports of food and production inputs becoming more constrained globally

Imports - Global markets are becoming even tighter due to national export bans and restrictions from large exporters, which drive further scarcity

- **Grains**: For most of the "big 3" grains (wheat, maize, and rice), Sub-Saharan countries are not self-sufficient with some limited maize trade for surplus producers
- **Oil**: Indonesia further restrict exports of palm oil in March 2022 to increase domestic supplies, as authorities seek to contain a surge in cooking oil prices
- **Fertilizer**: Russia installed 2 month ban on ammonium nitrate export in March 2022; while Ukraine banned export of nitrogenous, phosphatic and potassic fertilizer in March 2020. Bans reduce available supply in global markets, and influence higher prices

Effect on production: High fertilizer prices market putting downward pressure on yields and pushing farmers to grow other crops that require smaller quantities of fertilizer

Legend

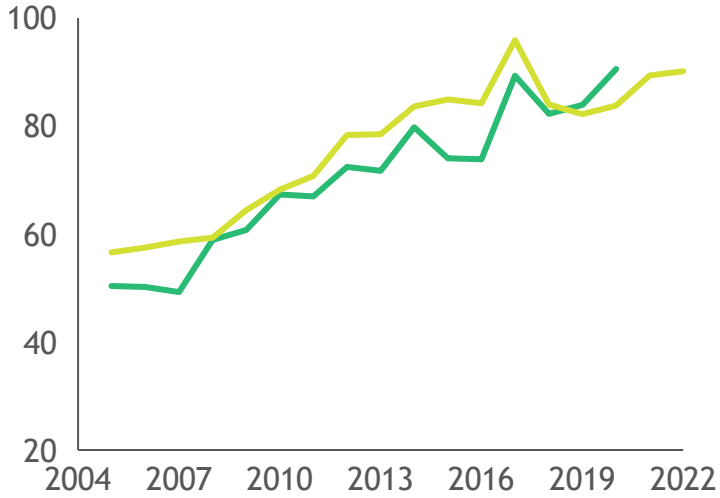
Main Drivers | Finance | Inputs | Crises

Fuel | Food | Loss

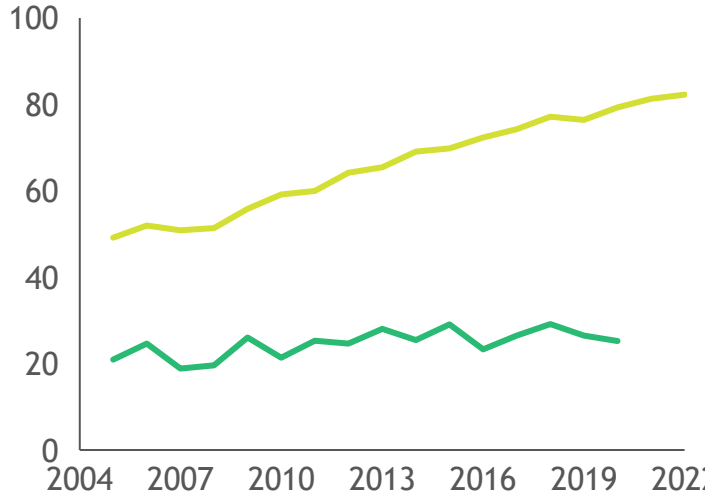
Copyright © 2022 by Boston Consulting Group. All rights reserved.

Over the past 2 decades, imports filled gaps between grain production and consumption, creating added exposure for net-importing countries

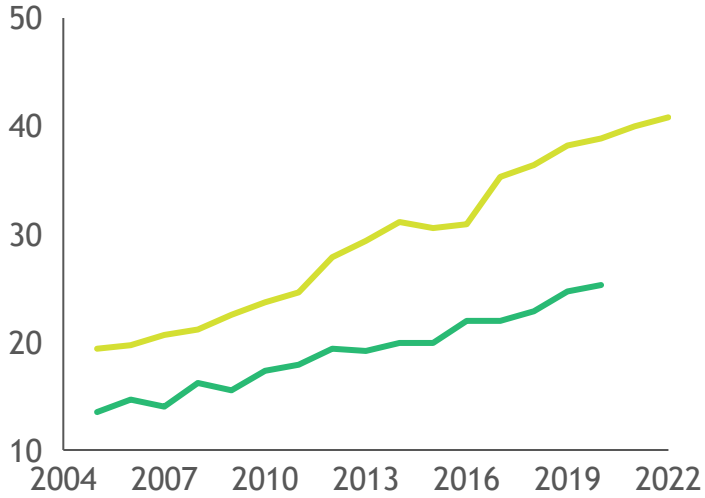
Maize (millions tonnes)



Wheat (millions tonnes)



Rice (millions tonnes)



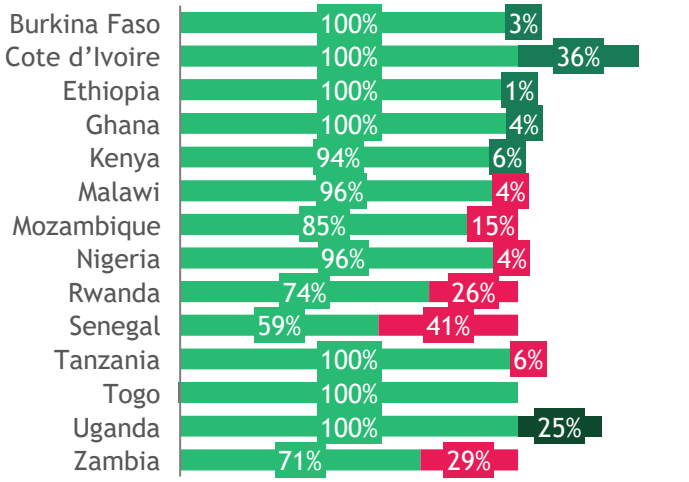
Over the past 20 years, grain consumption in Africa outpaced production across top 3 consumed grains, with fast-growing gaps for wheat and rice

Source: FAO, Grain; USDA World Markets and Trade(2007-2022)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Vast majority of SSA countries are reliant on grain imports to fill production shortfall today, especially in wheat

Maize: Most countries in SSA are at or close to self sufficiency[1]

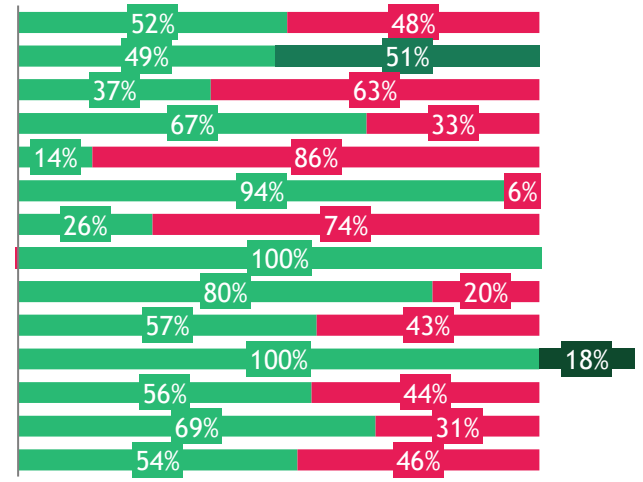


Maize (34% of total grain consumption in SSA[2])

Wheat: High dependency on imports across all countries but Zambia

Wheat (18% of total grain consumption in SSA[2])

Rice: Only Nigeria and Tanzania are self-sufficient in production



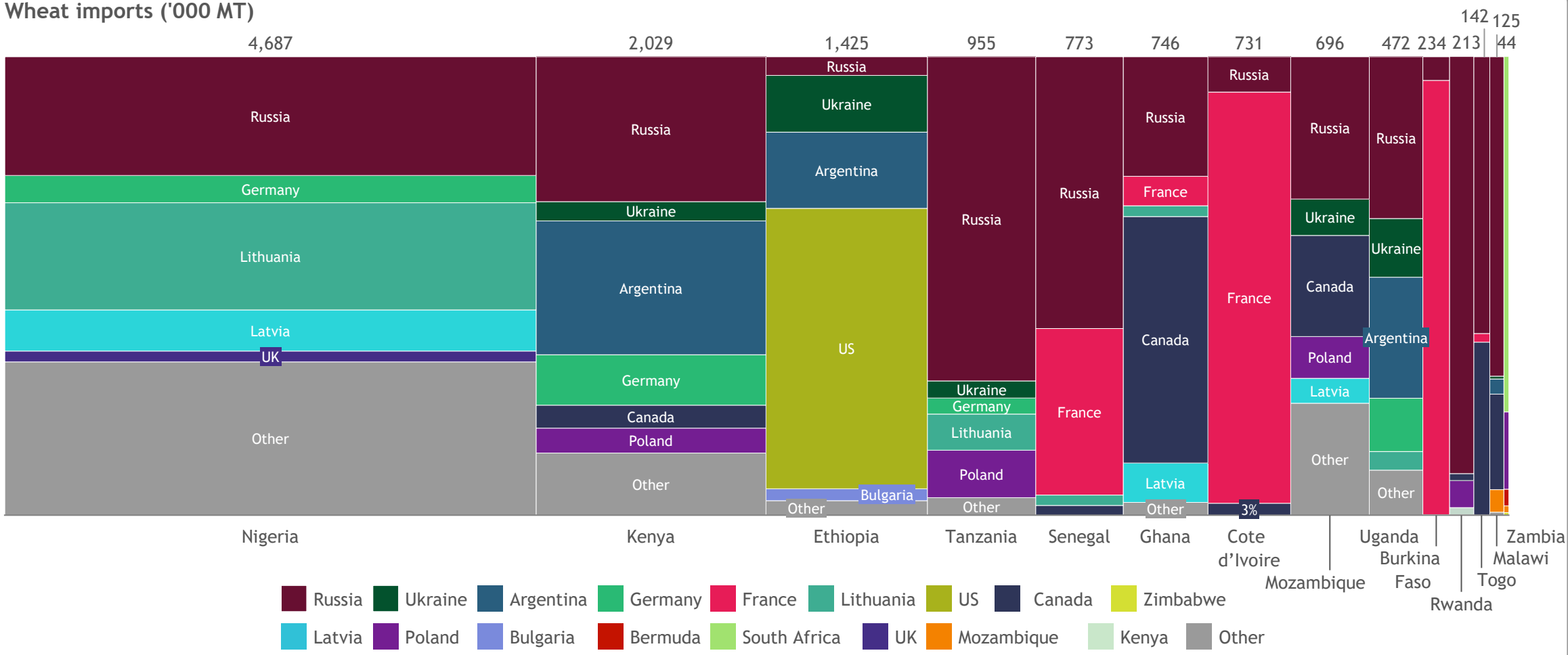
Rice (28% of total grain consumption in SSA[2])

Production Exports Imports

1. Production (MT)/ Consumption (MT); Consumption includes food, animal feeds, processing, other uses (non-food), tourist consumption and losses 2. Sub-Saharan Africa
Source: FAOSTAT (2019)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

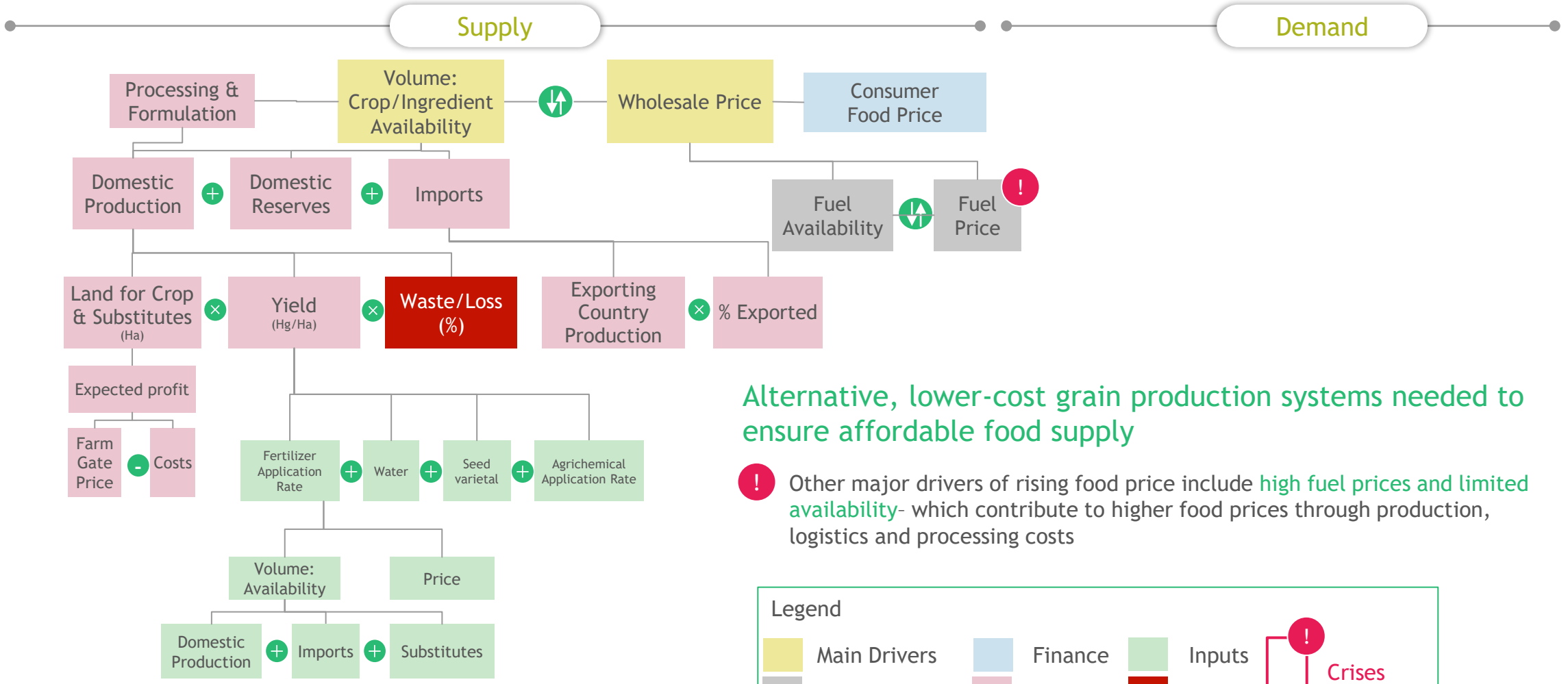
Deep Dive—Wheat Imports: Many countries are highly reliant on wheat imports from Russia, but a wide range of other countries provide the remainder



Source: FAOSTAT 2020, OEC 2020

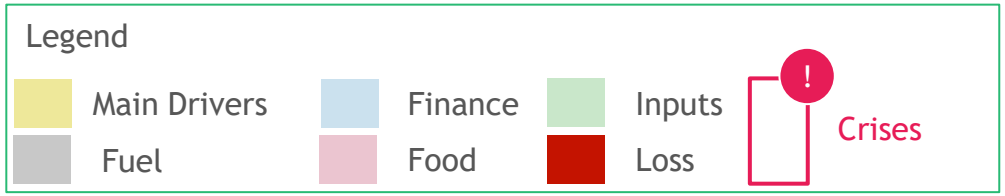
Copyright © 2022 by Boston Consulting Group. All rights reserved.

Fuel: Wholesale food prices influenced by fuel price and availability, as well as opportunities for substitution and competition for other uses



Alternative, lower-cost grain production systems needed to ensure affordable food supply

! Other major drivers of rising food price include high fuel prices and limited availability- which contribute to higher food prices through production, logistics and processing costs

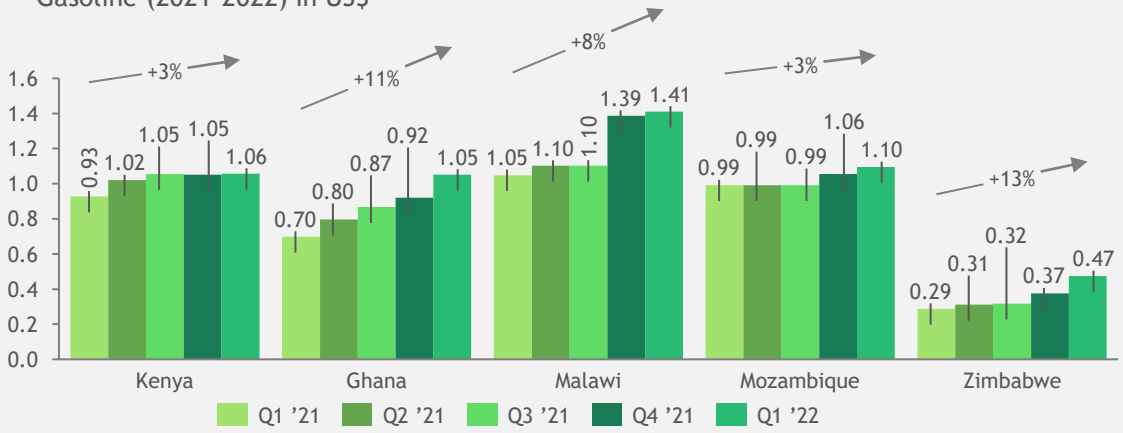


Copyright © 2022 by Boston Consulting Group. All rights reserved.

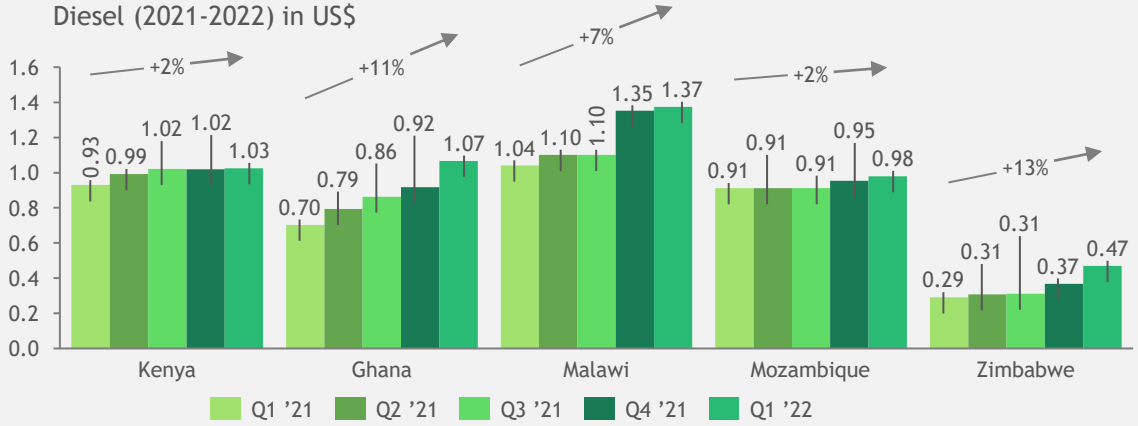
Rising fuel prices exacerbate the food crisis by adding to costs along the value chain and putting additional strain on household incomes

Fuel prices have risen consistently over the past year

Gasoline (2021-2022) in US$



Diesel (2021-2022) in US$



Source: Global Petrol Prices (accessed 05 May April 2022), May 2022 exchange rate (local currency converted to US$ for standardization)

The EastAfrican
SATURDAY APRIL 09 2022

East Africa faces crises as fuel, commodity prices go up raising the cost of living

BUSINESS DAY
Apr 28, 2022

Nigerian farmers warn as fertiliser, diesel price hikes bite

BUSINESSTECH
7 April 2022

South African consumers are running out of ways to survive amid constant price hikes

farmer's weekly
1 December 2021 | 1:24 pm

Fuel price hike could lead to job losses in farm sector

ALJAZEERA
28 Apr 2022

IMF: Rising food and fuel prices stoke risk of unrest in Africa

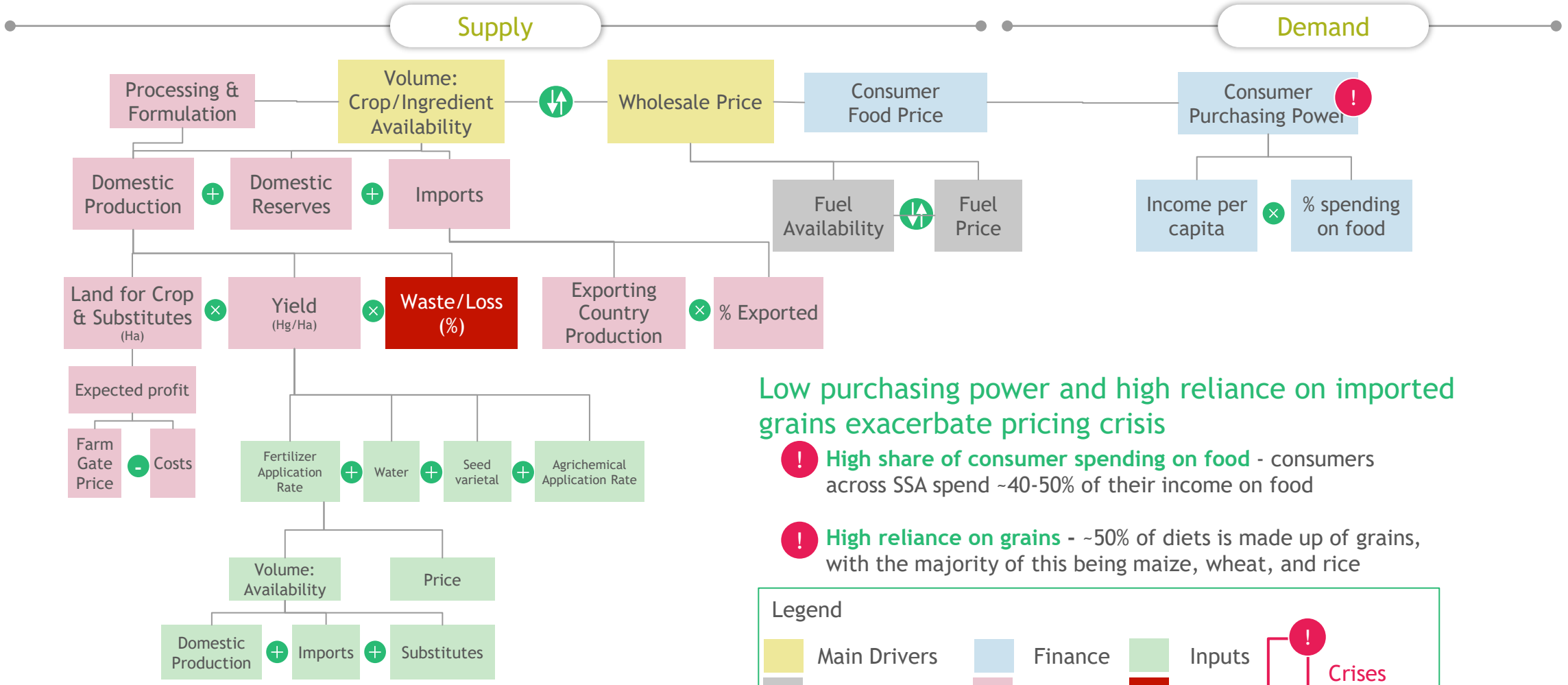
BUSINESS DAILY
THURSDAY MAY 05 2022

NCPB releases maize stocks to tame flour price

BBC NEWS
27 April

Ukraine war: Russia halts gas exports to Poland and Bulgaria

Price/Availability: High prices of food products are particularly dire for SSA consumers as large amount of household income goes towards food spent



Low purchasing power and high reliance on imported grains exacerbate pricing crisis

- **High share of consumer spending on food** - consumers across SSA spend ~40-50% of their income on food
- **High reliance on grains** - ~50% of diets is made up of grains, with the majority of this being maize, wheat, and rice

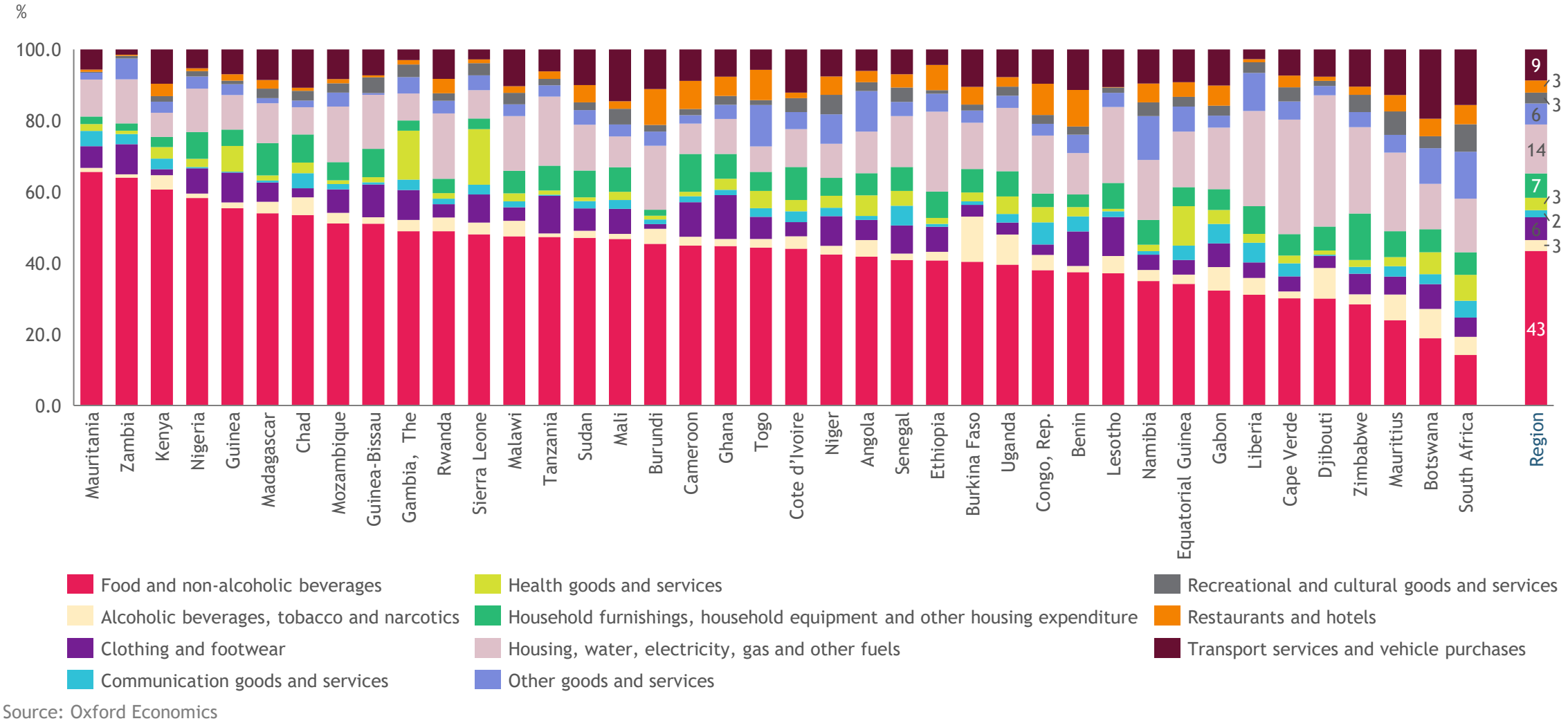
Legend

Main Drivers | Finance | Inputs | Crises

Fuel | Food | Loss

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Consumers across SSA spend on average 43% on food and beverages



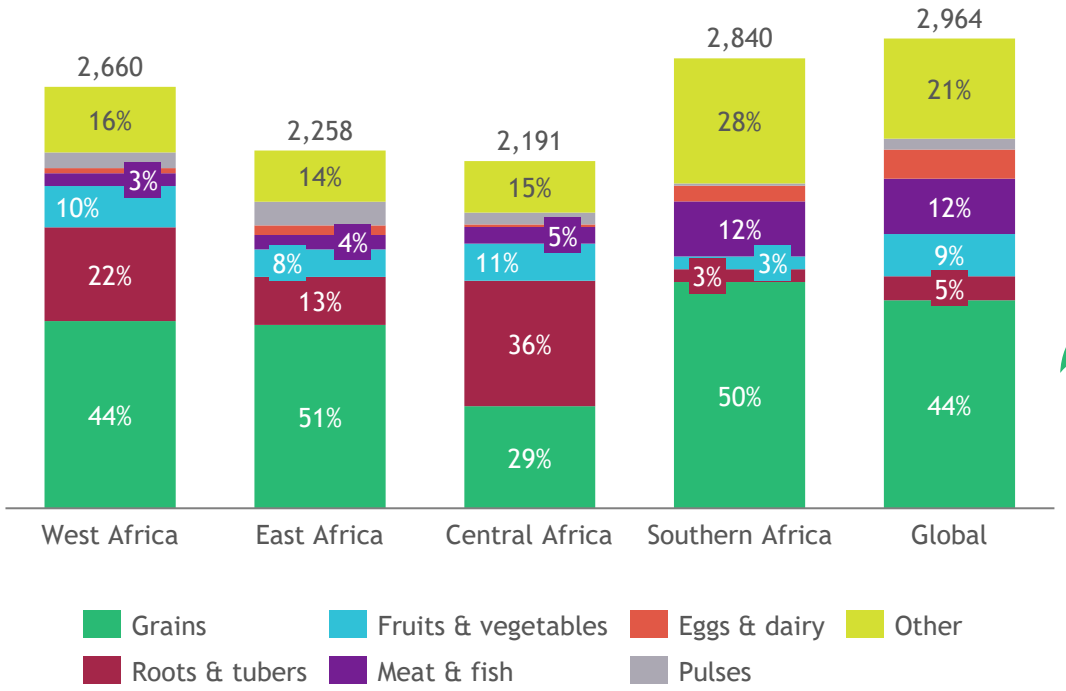
Source: Oxford Economics

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Grains form an integral part of diets in SSA with maize, rice and wheat taking the lead

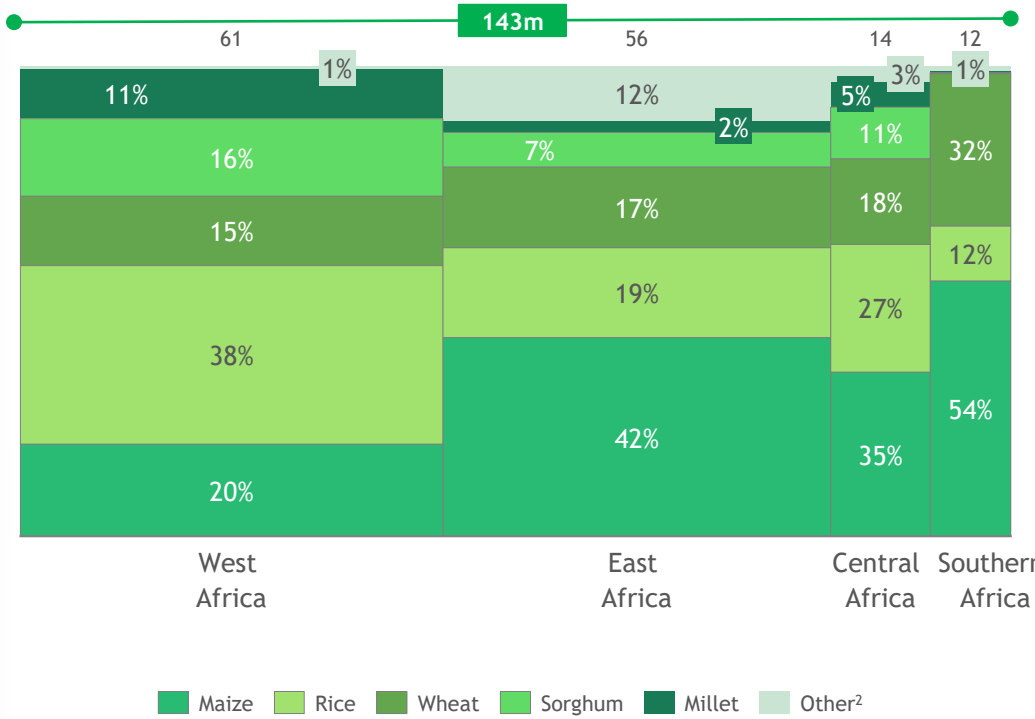
Grain consumption amounts to ~45% of average daily caloric intake on average in SSA…

Calories per capita per day (kCal and %), 2019



…with maize, rice and wheat dominating the consumption across SSA.

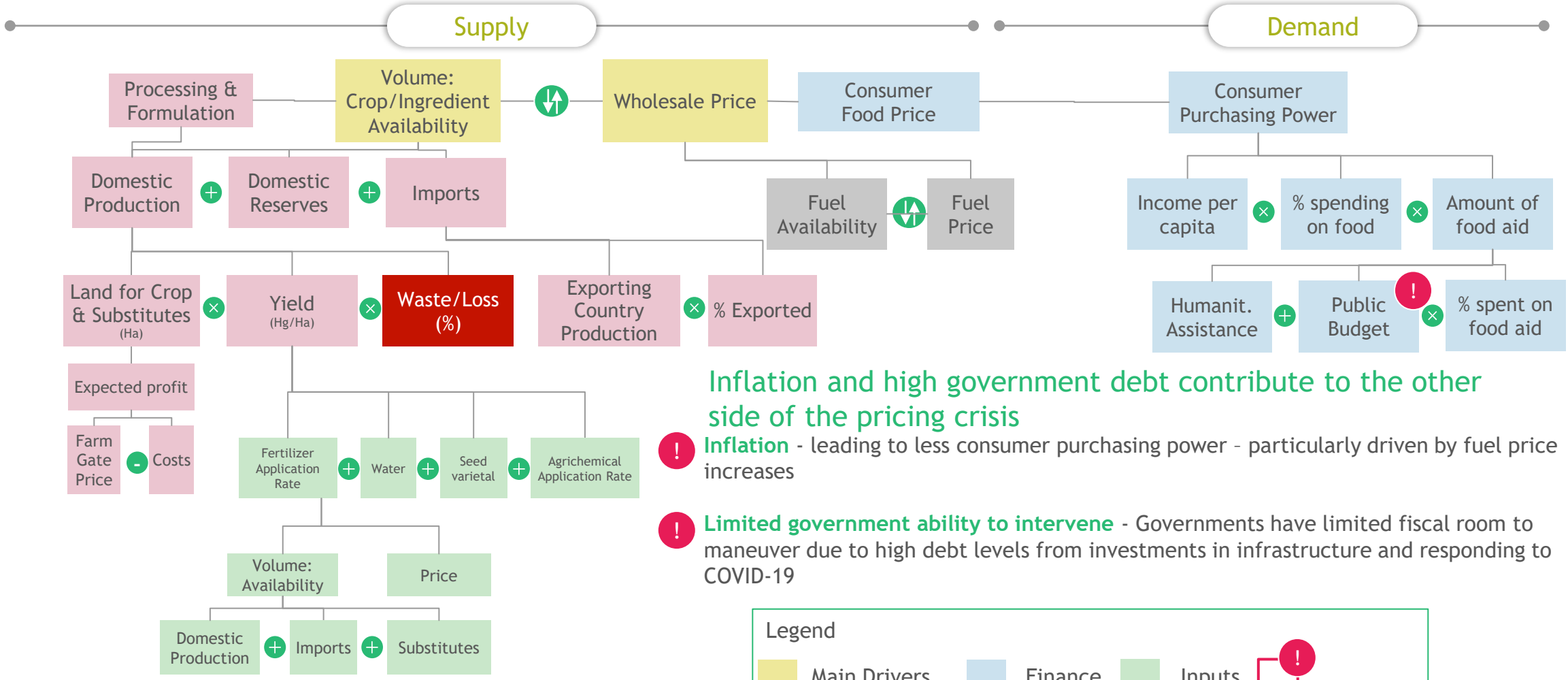
Consumption[1] in million MT, 2019



1. Consumption only included human consumption 2. Other includes barley, oats, rye and other grains
Source: FAOSTAT

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Macroeconomic context: Purchasing power of consumers is driven by incomes as well as level of food assistance that the government/donors can provide



Inflation and high government debt contribute to the other side of the pricing crisis

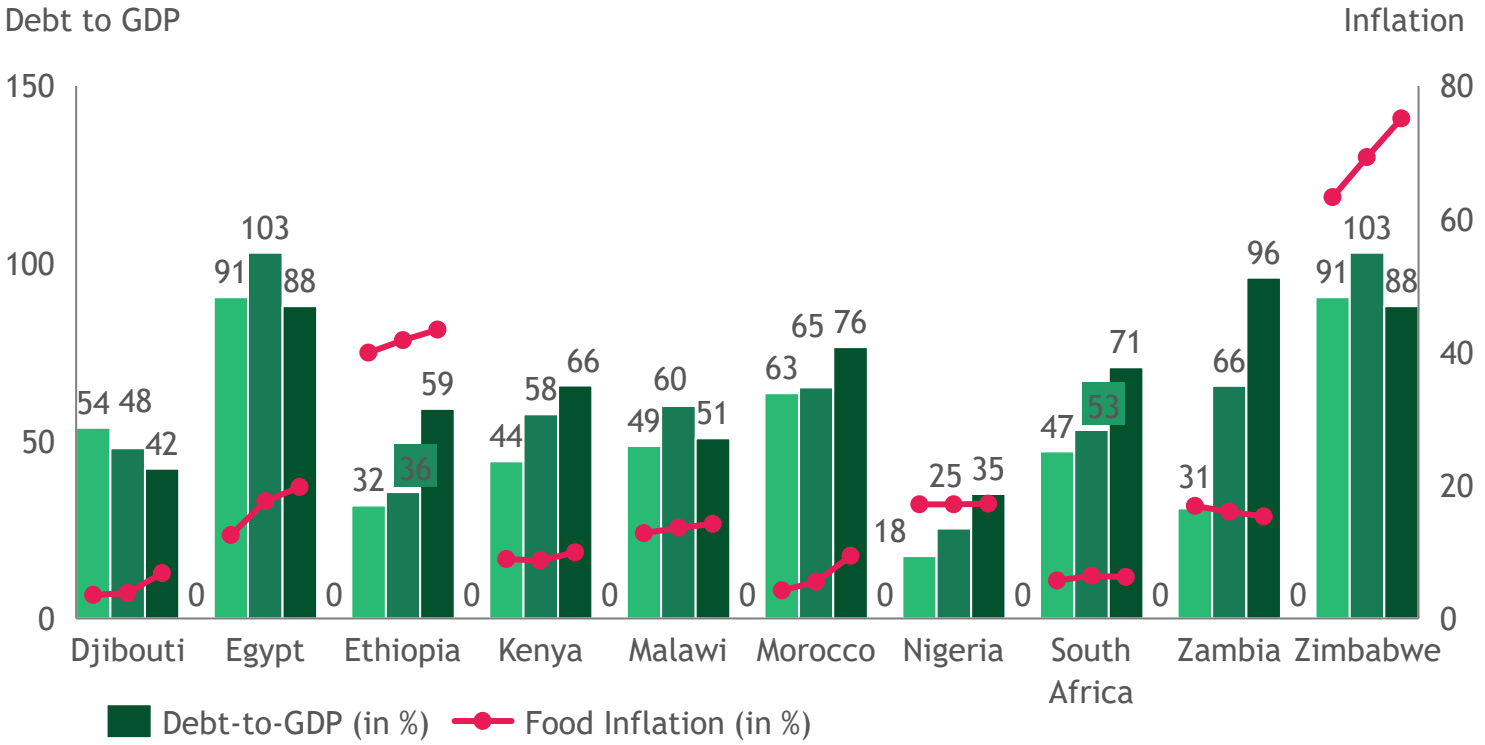
- **Inflation** - leading to less consumer purchasing power – particularly driven by fuel price increases
- **Limited government ability to intervene** - Governments have limited fiscal room to maneuver due to high debt levels from investments in infrastructure and responding to COVID-19

Legend: Main Drivers, Fuel, Finance, Food, Inputs, Loss, Crises

Copyright © 2022 by Boston Consulting Group. All rights reserved.

High debt levels and other macroeconomic factors are making it hard for African governments to respond

Debt levels and inflation rate[5] across African countries



Countries represent top 10 importers of fertilizer, (~66% of national imports across Africa) based on analysis of HS92 exports and import
1. IMF 2021: "The G20 Common Framework for Debt Treatments Must Be Stepped Up" 2. Carnegie Endowment, IMF 3. Economics Help 4. Aljazeera, 2021 5. Inflation rate shows a broad rise or fall in prices that consumers pay for a standard basket of goods.
Sources: Trading Economics, Oxford Economics, WFP Report: March 2022, Implications of conflict in Ukraine on Eastern Africa

Many countries facing unsustainable debt:

- ~60% of low-income countries were in or at high risk of debt distress in 2021, compared with 30% in 2015[1]
- 23 African countries either bankrupt or at high risk of debt distress (April 2022)[2]

Inflation affecting domestic food prices:

- Countries with inflation rates well above 10% mark indicating "running inflation"[3]
- Sudan is experiencing >250% annual inflation, correlated with soaring food prices and shortages[4]

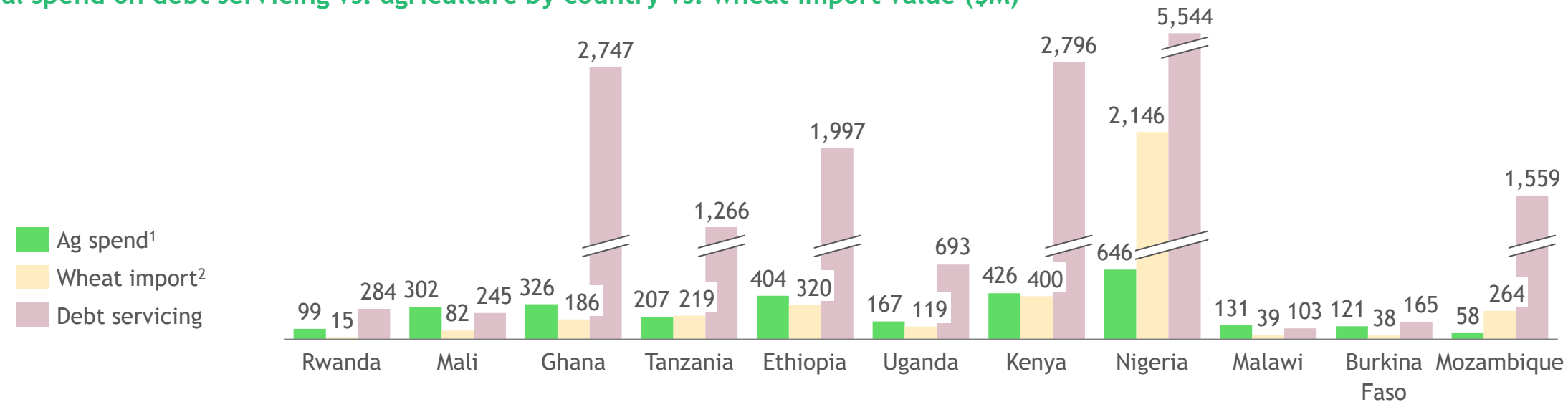
Second order effects:

- Countries face tradeoffs e.g., debt servicing vs. food subsidies or building reserves for critical food imports
- Debt service sucking up increasingly large proportions of budgets and revenues, a wave of defaults in the world's most vulnerable countries is likely

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Countries are constricted to spend on agriculture due to high costs of debt servicing and imports

Annual spend on debt servicing vs. agriculture by country vs. wheat import value ($M)



Multiple of ag. spending	Rwanda	Mali	Ghana	Tanzania	Ethiopia	Uganda	Kenya	Nigeria	Malawi	Burkina Faso	Mozambique
Wheat imports	0.2X	0.3X	0.6X	1.1X	0.8X	0.7X	0.9X	3.3X	0.3X	0.3X	4.6X
Debt serving	3X	1X	8X	6X	5X	4X	7X	9X	1X	1X	27X

1. Includes general government spending in Agriculture, forestry, fishing for most recent year from which data was available (2019) 2. Observatory of Economic Complexity (2020)
Sources: All ag spend data: FAOSTAT, Kenya Ag spend from National Potato Council of Kenya (NPCK): "The 2019/2020 Kenya Budget in relation to agriculture"; Debt servicing data from The World Bank – "Debt service on External Debt"(2020)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Actions to Take

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Actions: African governments need to urgently establish decision support units to help stakeholders navigate through the crises

Aligned and coordinated decision support led by an interdisciplinary Emergency Response Unit per country

Livelihoods & Social Safety Nets

Use of direct cash transfers for immediate increase in purchasing power for most at risk

Humanitarian assistance for the most vulnerable (below poverty line; school feeding recipients)

Institute time bound minimum support prices for key grains + fuel subsidy

Securing Alternative Supply and Substitutes

Different trade routes/partners for alternative sources of grains and substitute grains leveraging RECs for regional trade

Reduction of import duties on alternate sources of grains and substitute grains; time bound tax exemption for industry players e.g., processors

Production of wholegrain and blended products to increase nutrient dense food production

Maximizing Production

Reforms to improve land, labor, and fertilizer allocation to drive production of alternative grains (esp. rice, maize, sorghum)
Subsidies for seeds and fertilizers

Incentives for farmers to produce substitute grains

Invest in local infrastructure e.g., roads, storage, distribution

Success Factors for each time horizon

Resource Allocation	Segmentation to direct resources to most vulnerable/at-risk
Distribution Channels	Physical locations and logistics for food aid Digital channels (mobile payments, e-wallets) for direct cash transfers
Return on Investment	Return on investment for each proposed intervention

Near-term (1-2 months) Medium-term (4-6 months) Long-term (12-18 months)

Copyright © 2022 by Boston Consulting Group. All rights reserved.

Disclaimer

The services and materials provided by Boston Consulting Group (BCG) are subject to BCG's Standard Terms (a copy of which is available upon request) or such other agreement as may have been previously executed by BCG. BCG does not provide legal, accounting, or tax advice. The Client is responsible for obtaining independent advice concerning these matters. This advice may affect the guidance given by BCG. Further, BCG has made no undertaking to update these materials after the date hereof, notwithstanding that such information may become outdated or inaccurate.

The materials contained in this presentation are designed for the sole use by the board of directors or senior management of the Client and solely for the limited purposes described in the presentation. The materials shall not be copied or given to any person or entity other than the Client ("Third Party") without the prior written consent of BCG. These materials serve only as the focus for discussion; they are incomplete without the accompanying oral commentary and may not be relied on as a stand-alone document. Further, Third Parties may not, and it is unreasonable for any Third Party to, rely on these materials for any purpose whatsoever. To the fullest extent permitted by law (and except to the extent otherwise agreed in a signed writing by BCG), BCG shall have no liability whatsoever to any Third Party, and any Third Party hereby waives any rights and claims it may have at any time against BCG with regard to the services, this presentation, or other materials, including the accuracy or completeness thereof. Receipt and review of this document shall be deemed agreement with and consideration for the foregoing.

BCG does not provide fairness opinions or valuations of market transactions, and these materials should not be relied on or construed as such. Further, the financial evaluations, projected market and financial information, and conclusions contained in these materials are based upon standard valuation methodologies, are not definitive forecasts, and are not guaranteed by BCG. BCG has used public and/or confidential data and assumptions provided to BCG by the Client. BCG has not independently verified the data and assumptions used in these analyses. Changes in the underlying data or operating assumptions will clearly impact the analyses and conclusions.

Copyright © 2022 by Boston Consulting Group. All rights reserved.