



# “The Hidden revolution in the midstream of Africa’s food systems - Links to food safety and nutrition”

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SAWEDA LIVERPOOL-TASIE, THOMAS REARDON AND DAVE TSCHIRLEY

GLOBAL FOOD SECURITY CONFERENCE DECEMBER 3, 2017

# Food safety, nutrition and food security:

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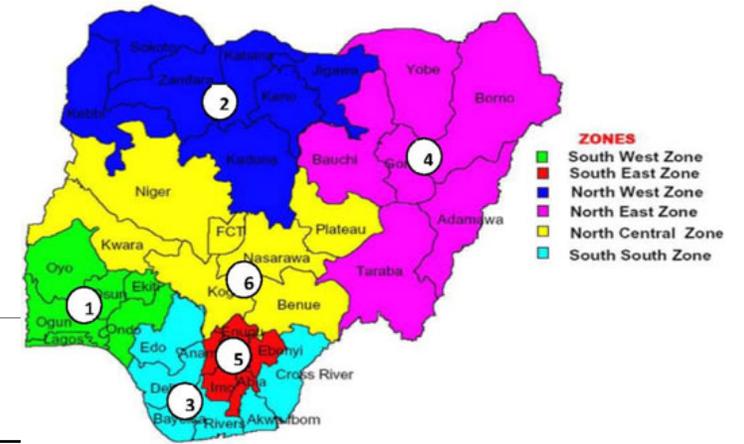
- Food security exists when all people, at all times, have physical access to sufficient, **safe and nutritious** food which meets their dietary needs and food preferences for an active and healthy life (Food and Agriculture Organization)
- Contaminated food could cause ailments which prevent the efficient use of even nutritious food (FAO, Amare, 2016)
- Contaminated food could cause diseases, affect the immune system and also affect growth and development ( Amare, 2016)

# Food systems transformation: What we now know?

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- **African food markets are rapidly expanding** (*Haggblade, 2011; Badiane, O and Makombe, T. 2015*)
- **African consumption patterns are increasingly diversified with increased consumption of animal protein and a heavy consumption of processed foods** (*Tschirley et al., 2015; Reardon et al., 2015; Liverpool-Tasie et al., 2016*)
- **The rapid transformation is not restricted to urban areas** (*Liverpool-Tasie et al (2016); Tschirley et al., 2015*)

# Data from Nigeria



**2015**

	Mean ( Rural)	Mean (Urban)
<b>Food budget shares</b>		
Own production	0.27	0.05
Purchased	0.73	0.95
<b>Purchased food budget shares</b>		
Unprocessed	0.36	0.35
Some Processed	0.64	0.65

# Diet diversification

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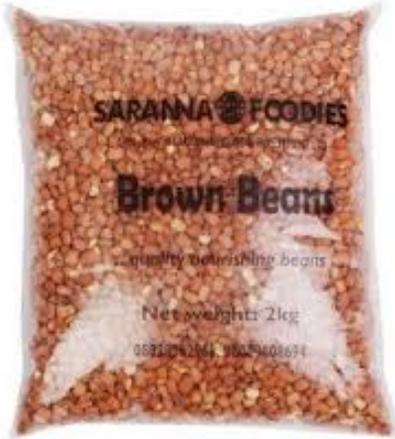
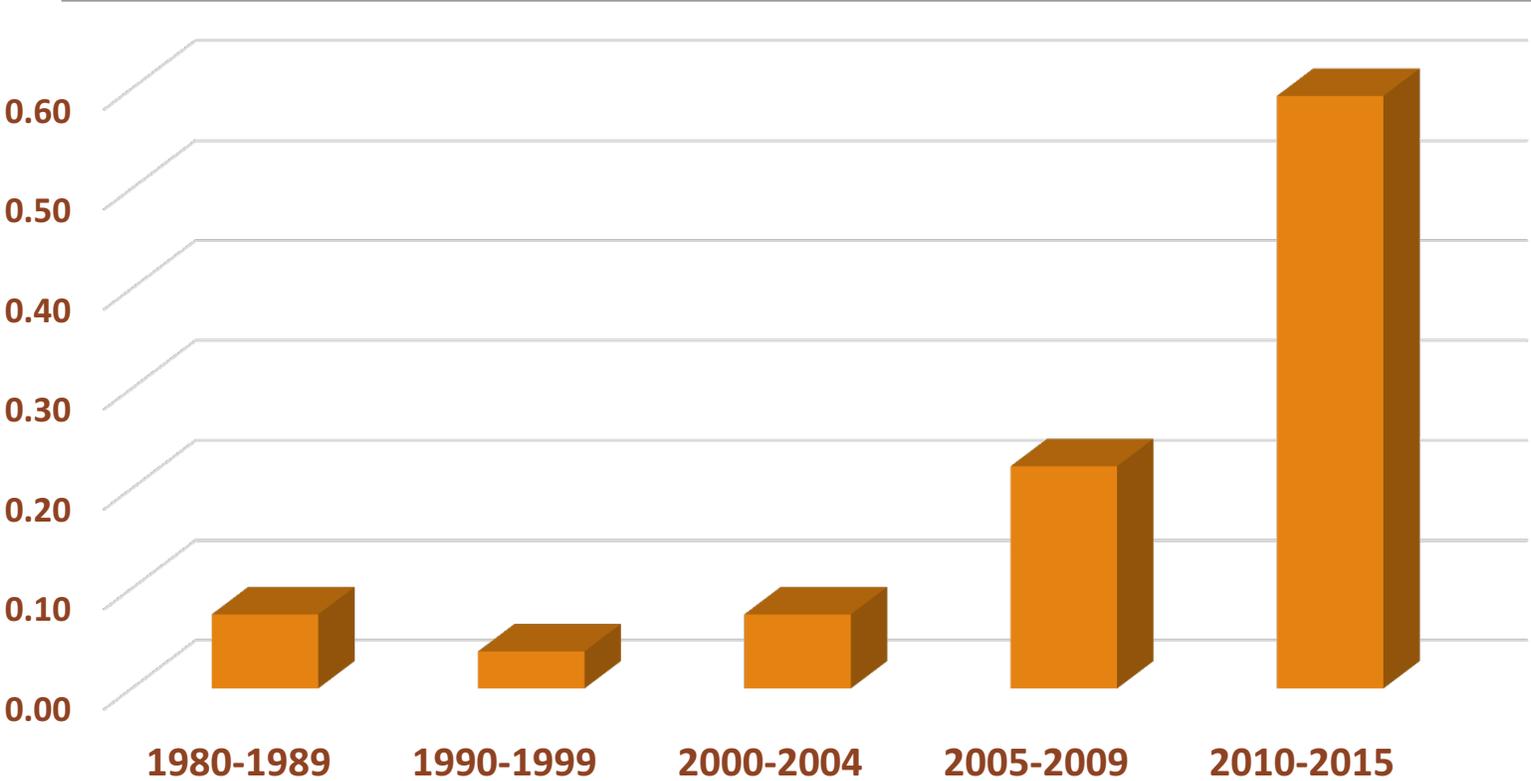
- Animal protein accounts for 20% of food budget share, fruits and vegetables about 10% and nuts and oils about 15% (LSMS, 2015)
- **In Nigeria, the average fish consumption almost doubled in the past two decades** from about 7.6 kg per capita between 1999 -2001 (according to the National Oceanic and Atmospheric Administration) to 14.2kg according to the 2015 LSMS-ISA data.
- Between 2003 and 2015, **the volume of feed** used in Nigeria increased from 300 thousand to 1.8 million tons a year; a 600% increase (USDA, 2015)

# How is this growing demand being met?

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- ❖ **Imports** - (Nexus between urbanization, processed food consumption and imports- debate of the 1980's)
  
- ❖ **Domestic supplies:**
  - ❖ Rapid growth and modernization of the midstream
    - ❖ Rapidly growing small and medium scale processing firms

# Start up year of processed food businesses in Nigeria (grain)



# Domestic supply plays a very important role

## Domestic share of volume of products sold in a week by retail outlet type

	Kaduna			Ibadan		
	Rice	Maize	Fruit juices (liquid)	Rice	Maize	Fruit juices (liquid)
Stalls in wet markets	0.30	0.83	0.99	0.11	0.67	0.98
Grocery stores	0.25	0.86	0.97	0.40	0.64	0.96
Small non service stores	0.13	0.82	0.97	0.10	0.57	0.95
Independent supermarkets	0.109	0.513	0.727	0.05	0.55	0.71
Nigerian Chain stores				0.18	0.40	0.60

# Nutrition, food safety and food system transformation

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## Opportunities

- Potential for reduced cost of food and reduced effect of seasonality on food supply due to modernization of the processing and distribution systems (e.g. cold storage, low level processing to prevent wastage) – Reardon et al.(2017)
- Increased opportunity for income generation and employment from SME and MSMEs that are part of a domestic response (Tschirley et al. 2015)
- Improved opportunities for **fortification** as well as for the **adoption of on farm technologies** → improved productivity as a response to backward linkages from processors. (Tschirley et al. 2015)
- [Issues with food safety](#)

## Challenges

- Concerns about diet quality with the rise of fast food and ultra-processed foods with high fat, sugar and salt content (leading to obesity and health issues- diabetes (Popkin et al. 2014 ;Popkin and Reardon 2017).
- [Issues with food safety: poor quality of processed goods alongside a poor regulatory systems](#)

# Case study: Aflatoxins along the maize/poultry value chain

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- ❖ Aflatoxins are highly toxic metabolites produced by the toxigenic species of *Aspergillus*, they usually contaminate agricultural produces including maize and peanuts on the fields, in storage and in final products
- ❖ Four common aflatoxins have been reported to be present in agricultural produce: Aflatoxin B1 (AFB1), Aflatoxin B2 (AFB2), Aflatoxin G1 and Aflatoxin G2. However, AFB1 has been proven to be the most toxic (Bhat and Vasanthi, 2003; Da costal et al., 2010).

# Case study: Aflatoxins along the maize/poultry value chain

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## Aflatoxin effects on humans

- ❖ **30%** of liver cancer cases in Africa ( Amare, 2016)
- ❖ **40%** of commodities in local African markets exceed allowable levels in foods (Amare,2016)
- ❖ Long term exposure to aflatoxins can also result to child stunting, immune system suppression and reduction of life-expectancy (Bandyopadhyay *et al.*, 2007; Hernandez-Vargas *et al.*, 2015; Williams *et al.*, 2004).
- ❖ Women can expose their unborn child to aflatoxin during pregnancy and through breast feeding as a result of consuming aflatoxin contaminated foods (Gong *et al.*, 2003; Oluwafemi and Ibeh, 2011)

# Case study: Aflatoxins along the maize/poultry value chain

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## Aflatoxin effects on animals

- ❖ Aflatoxin exposure affects animals because most of the grains (affected by aflatoxins) are typically compounded as feeds for animals' consumption.
- ❖ Aflatoxin can cause damage to animals' organ system such as liver damage, gastrointestinal dysfunction, reduced productivity, decrease reproductive performance, decrease feed utilization and efficiency, birth defects, tumors and suppress their immune system therefore increasing their chances of being infected by various diseases (Akande et al., 2006; Cortyl, 2008)
- ❖ This consequently can affect the productivity of the livestock sector

# Some research areas (Set A):

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- ❖ **Basic questions about how the presence and levels of aflatoxins grow along the value chain...from production to storage, to processing to retail and how this varies by processor type? (domestic, foreign but locally based and imports)**
- ❖ On the production side some are focusing on how to address it on farm (pre-harvest) with biological controls such as Aflasafe
- ❖ On the processing side, some in the field of biochemistry and food science are looking at the presence of these mycotoxins in various foods
- ❖ **But with the nature of the problem (along the entire value chain) and the structure of the foods systems in many developing countries particularly SSA could we learn more by working together? Examples:**
- ❖ *Do solutions targeted at production carry through to the final product given the role played by post harvest storage and distribution in the accumulation of these mycotoxins?*
- ❖ *What are the cost implications of the proposed processes (e.g. extrusion, proper fermentation) on processors and what is likely necessary to foster the adoption of these practices*

# Research areas (Set B continued):

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- ❖ **Many of the solutions to aflatoxin presence and growth involve costs for adopting necessary technologies at production and or additional storage and handling practices**
- ❖ What are the economic incentives faced by economic actors to adopt the said technologies and practices?
  - ❖ Do farmers get a premium on their maize if they adopt biological control technology?
  - ❖ Do wholesalers and retailers get a premium from customers (final consumers or processors) for selling maize certified to meet health standards?
  - ❖ Can we design value chains that can incorporate such a premium?

# Research areas (Set B continued):

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- ❖ **Are consumers aware about aflatoxins and their health effects?**
- ❖ **What effect does information have on consumers' willingness to pay for certified maize/products?**
  - ❖ *How important is the source of certification on this willingness to pay?*
  - ❖ *What about other actors along the chain? ( processors for feed and for food)*
  - ❖ *What is the role of policy and regulation?*

These are some areas applied economists can come in ...to work with colleagues in food science and other fields to better understand the economic incentives behind the development of appropriate tools and systems to understand and appropriately deal with the rapidly changing food systems in SSA

# Thank you!

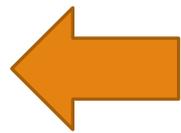
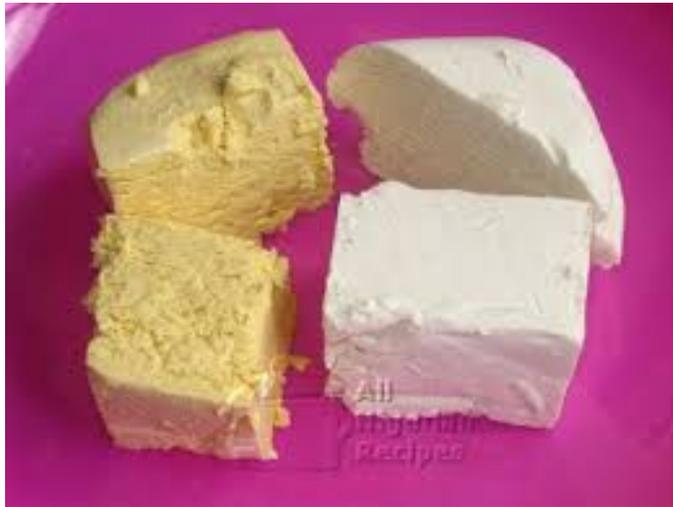


# Fura da nono!



Source: Aisha Ibrahim

# Maize based cereals



15 ppb

<4 ppb

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