THE PHILIPPINE FOOD SYSTEMS: CHALLENGES AND OPPORTUNITIES IN THE 21ST CENTURY

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Food technology

The application of food science and related fields in post harvest handling, preparation, processing, packaging, storage and distribution for the improvement of food security and well being of individuals, families and institutions. It includes the social, cultural, economic, managerial and environmental aspects of food systems (FST Section, FSN Department 2003)
Nutrition 230

• Food science and nutrition topics related to **food systems**, **food security** and **food safety**.

• Elective course for graduate students from the DFSN and other departments of CHE
Food Security: The Challenge of Feeding 9 Billion People

H. Charles J. Godfray,1* John R. Beddington,2 Ian R. Crute,3 Lawrence Haddad,4 David Lawrence,5 James F. Muir,6 T. J. Pretty,7 Sherman Robinson,8 Sandy M. Thomas,9 Camilla Toulmin10

12 FEBRUARY 2010 VOL 327 SCIENCE www.sciencemag.org

Feeding nine billion in 2050

FAO and CGIAR conference to address research priorities for ensuring food and nutrition security for the world’s poorest
Challenge of feeding 142 million Filipinos in 2045
WHAT ARE FOOD SYSTEMS?
FOOD SYSTEMS

• Include all stages of keeping populations fed (Welvaert, 2016):

  Growing
  Harvesting
  Processing
  Transforming
  Packing
  Marketing
  Consuming

Disposing of foods
FOOD SYSTEMS

• A broader perspective of food systems involve:
  ✓ interactions between and within biogeophysical and human environments
  ✓ the activities themselves
  ✓ the outcomes of these activities (contributions to food security, environmental security and social welfare)
  ✓ other determinants of food security

Ericksen, 2008
FS$^3$ of FOOD SYSTEMS

Villarino, unpublished
FS³ of FOOD SYSTEMS

• Important elements of the 17 SDGs of the UN (UN, 2015)

• Goals 2 & 12

• Important role in the other goals due to interrelationships of these goals
FS³ of FOOD SYSTEMS

• Food systems must achieve and maintain the FS³ not only to safeguard the health and well-being of individuals but their immediate environment, i.e., families and institutions, for the benefit of national and global communities.
FS³ of FOOD SYSTEMS

Physical availability of food  Economic and physical access to food

Food sustainability

Food Security

Food utilization (food safety)  Stability of other dimensions over time
MODELS OF FOOD SYSTEMS

- Linear
- Circular
- Combined
MODELS OF FOOD SYSTEMS

Linear model of food systems (based on abridged definition of Welvaert, 2016)
MODELS OF FOOD SYSTEMS

Linear model of food systems (Kickbusch, 2010)
MODELS OF FOOD SYSTEMS

Linear model of food systems adapted from Ericksen (2008)
MODELS OF FOOD SYSTEMS

Circular models of food systems
MODELS OF FOOD SYSTEMS

Combined model of food systems
(Ericksen, 2008)
TYPES OF FOOD SYSTEMS

- Traditional
- Modern
- Mixed
LEVELS OF FOOD SYSTEMS

GLOBAL
NATIONAL
REGIONAL
LOCAL
HOUSEHOLD
INDIVIDUAL
LEVELS OF FOOD SYSTEMS

- Individual

Physical
Psychological
Physiological
Social
Economic
FACTORS

Life experiences
LEVELS OF FOOD SYSTEMS

• Individual
  ❖ Drives the market

FILIPINOS FLOCK TO FASTFOOD RESTAURANTS AND CONVENIENCE STORES TO GET THEIR MEALS

DEMographics  |  12-19-2014

There are now fewer shopping baskets containing food items that need to be cooked at home as Filipinos go to fast food restaurants and convenience stores to grab a meal.

Nielsen, 2014
LEVELS OF FOOD SYSTEMS

• Individual
LEVELS OF FOOD SYSTEMS

- Individual

**Street Food Fare Finders**

- 27% of global respondents who eat away from home say they eat **street food**.

- Countries in Asia-Pacific make up nine of the top 10 countries that dine out at **street food vendors**.

**Countries that exceed global average**

- **Malaysia**: 51%
- **Taiwan**: 50%
- **Vietnam**: 48%
- **Indonesia**: 44%
- **China**: 43%
- **Singapore**: 43%
- **Hong Kong**: 38%
- **Thailand**: 38%
- **India**: 36%
- **Germany**: 34%
- **Philippines**: 30%
- **Mexico**: 30%
- **Pakistan**: 29%
Levels of food systems

• Trends in Filipinos’ nutritional and health status (FNRI, 2015)
Levels of food systems

- Ten leading causes of deaths in 2013 (PSA, 2016)

<table>
<thead>
<tr>
<th>Diseases of the heart</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diseases of the vascular system</td>
</tr>
<tr>
<td>Malignant neoplasms</td>
</tr>
<tr>
<td>Pneumonia</td>
</tr>
<tr>
<td>Accidents</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
</tr>
<tr>
<td>Tuberculosis</td>
</tr>
<tr>
<td>Chronic lower respiratory diseases</td>
</tr>
<tr>
<td>Nephritis, nephrotic syndrome</td>
</tr>
<tr>
<td>Certain conditions originating in perinatal period</td>
</tr>
</tbody>
</table>

65% of deaths caused by NCDs
Levels of food systems

- Ten leading causes morbidity in 2013 (PSA, 2016)

<table>
<thead>
<tr>
<th>Disease</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute respiratory infection</td>
</tr>
<tr>
<td>ALTRI &amp; pneumonia</td>
</tr>
<tr>
<td>Hypertension</td>
</tr>
<tr>
<td>Bronchitis</td>
</tr>
<tr>
<td>Influenza</td>
</tr>
<tr>
<td>Urinary tract infection</td>
</tr>
<tr>
<td>Acute water diarrhea</td>
</tr>
<tr>
<td>TB respiratory</td>
</tr>
<tr>
<td>Acute febrile illness</td>
</tr>
<tr>
<td>Dengue fever</td>
</tr>
</tbody>
</table>
LEVELS OF FOOD SYSTEMS

• Individual

Health is Filipinos' top personal concern for 3 years now – Pulse Asia

As for urgent national concerns, stable prices of commodities and improving workers' pay top Filipinos' list, according to the national survey in December

Jodesz Gavilan @jodeszgavilan
Published 7:23 PM, January 11, 2016
Updated 12:23 PM, January 12, 2016

Fortified with micronutrients
High in protein and dietary fiber
More fruits and vegetables
Non-GMO
No artificial colors and flavors
Low in cholesterol, salt, fat, sugar & CHO

HEALTHY ATTRIBUTES OF FOOD FILIPINOS ARE LOOKING FOR (Nielsen, 2015)
LEVELS OF FOOD SYSTEMS

• Household
  ▶ Extension of the individual level
Levels of food systems

- Trends in Filipino household consumption pattern (1978-2013)

-FNRI, 2015
LEVELS OF FOOD SYSTEMS

• Household
  ❖ More than 1/3 of Filipino households take their meals outside their homes (FNRI, 2015)
LEVELS OF FOOD SYSTEMS

• Household

More and more Filipino households “eat out” or consume food prepared away from home (FAFH) (Rufino, 2015)
LEVELS OF FOOD SYSTEMS

• Local
  ❖ Farm to the consumer or to institutions in the same geographic location as the farm
  ❖ Food reaches the users without travelling too far or does not go through various levels of marketing i.e., middlemen in processing, packaging, transporting and selling
LEVELS OF FOOD SYSTEMS

• Local
  ❖ Locavores-eat food from local sources
  ❖ Farm to table
LEVELS OF FOOD SYSTEMS

• Local

Benefits from consuming locally sourced foods (Martinez, 2010)

- Potential to positively impact the local economy
- Health benefits from improved nutrition, obesity prevention, and reduced risk of chronic diet-related disease
- Reduction of food insecurity in the community
- Less GHGs due to less food miles and energy use
LEVELS OF FOOD SYSTEMS

• Regional

Vegetable dishes

Coconut dishes and delicacies

Dried fish and mango

Fruits; cacao
LEVELS OF FOOD SYSTEMS

• National
  - Managed by the government and involves laws, policies and standards on food
  - DA, DOH, DOST, DTI
  - Food Safety Act of 2013 (RA 10611, 2013), an “Act to strengthen the food safety regulatory system in the country to protect consumer health and facilitate market access of local foods and food products, and for other purposes”.
LEVELS OF FOOD SYSTEMS

• National
  ❖ May also be described by agriculture and culture
LEVELS OF FOOD SYSTEMS

• Global

Globalizing the Cheeseburger

**Vinegar**
- Argentina
- Australia
- Austria
- Belgium
- Brazil
- Canada
- China
- Chile
- Colombia
- Denmark
- Dom. Rep
- France
- Germany
- Greece
- Hong Kong
- Israel
- Italy

**Garlic Powder**
- Japan
- S. Korea
- Lebanon
- Peru
- Poland
- Portugal
- Serbia
- Philippines
- Russia
- S. Africa
- Singapore
- Spain
- Sweden
- Turkey
- Taiwan
- U.K.

**Tooths**
- Belgium
- Canada
- China
- Colombia
- Costa Rica
- Guatemala
- Israel
- Mexico
- Morocco
- Netherlands
- New Zealand
- Poland
- Spain

**Beef**
- Australia
- Canada
- Chile
- Costa Rica
- Honduras
- Japan
- Mexico
- Nicaragua
- New Zealand
- Uruguay

**Wheat Gluten**
- Australia
- Belgium
- Canada
- China
- Czech Rep.
- France
- Germany
- Kazakhstan
- Lithuania
- Netherlands
- Poland
- Russia
- Switzerland
- Thailand
- U.K.

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WHAT ARE THE CHALLENGES IN PHILIPPINE FOOD SYSTEMS?
CHALLENGES

- Economic Issues
- Environmental Issues
- Political Issues
- Social Issues
ECONOMIC ISSUES

- The 3GF (food, fuel and financial) crises of 2008
- Rise of the middle class
- Urbanization
- International trade
The 3GFs of 2008

Food crisis

Fuel crisis

Financial crisis

IMPACTS:

- High prices of staples
- High processing and distribution cost
- Low purchasing power due to high prices of food and unemployment
- Increased cases of hunger and malnutrition
The 3GFs of 2008

- Food crisis

The “near-perfect storm” model of the global food crisis (Headey and Fan, 2010)

Note: Boxes in green denote less significant, crop-specific causes. The rise in oil prices and decline of the US dollar are shown together because they are universal factors that may be causally related.
The 3GFs of 2008

- Fuel crisis
  - Stagnation in global production of oil and strong demand (Hamilton, 2009)

30%: unleaded gasoline
34%: diesel

2006

2008
The 3GFs of 2008

- Financial crisis

Mishkin (2011)
The 3GFs of 2008

• Financial crisis

• Loss of livelihood
• GDP growth 7.1% to 3.8%
• Remittances of OFW affected

Mishkin (2011)
The 3GFs of 2008

The interrelated impacts of the 2008 3GF (global financial, food and fuel) crises on Philippine food systems (constructed by the author)
The 3GFs of 2008

GLOBAL HUNGER INDEX

24.6% - underweight
26.3% - stunted
The 3GFs of 2008

The FAO food price index and specific commodity indices (FAO, 2018)
The 3GFs of 2008

The average retail price of food commodities in the Philippines from 2006 to 2016 (PSA, 2018)
The 3GFs of 2008

Pump prices of diesel fuel and gasoline from 2006 to 2018 (Word Bank, 2018; DOE, 2018)
The 3GFs of 2008

FAO food index vs SWS hunger incidence* (r=0.864, p=0.027);
Fuel prices vs SWS hunger incidence (r=0.971, p=0.001);
Peso-dollar exchange rates vs SWS hunger incidence (r=-0.943, p=0.005)

*Number of households
The 3GFs of 2008

TRAIN TAX LAW

Lowering the Personal Income Tax (PIT)
Simplifying the Estate and Donor’s Tax
Expanding the Value-Added Tax (VAT) Base
Increasing the Excise Tax of Petroleum Products
Increasing the Excise Tax of Automobiles
Introducing the Increase the Tax of Sugar-Sweetened Beverages

TAX REFORM FOR ACCELERATION AND INCLUSION
The 3GFs of 2008

### DRINKS USING SUGAR AND ARTIFICIAL SWEETENERS
- P6 per liter

### DRINKS USING HIGH FRUCTOSE CORN SYRUP
- P12 per liter

### EXEMPTED
- **Milk**
  - (Plain milk, infant formula milk, growing up milk, powdered, ready to drink, flavored, fermented)
- **Instant coffee**
  - 100% natural fruit and vegetable juices
  - Meal replacement
  - Medically indicated beverages
  - Sweetened beverages using coco sugar and stevia

<table>
<thead>
<tr>
<th>FUEL (PER LITER)</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIESEL</td>
<td>P2.50</td>
<td>P4.50</td>
<td>P6</td>
</tr>
<tr>
<td>LPG</td>
<td>P1</td>
<td>P2</td>
<td>P3</td>
</tr>
<tr>
<td>GAS</td>
<td>P7</td>
<td>P9</td>
<td>P10</td>
</tr>
</tbody>
</table>

#### Headline Inflation Rates in the Philippines, All Items

- **2012=100**
- **3.9%**
March 6, 2018

MANILA – Measures to curb inflation and cushion its impact on the poor are urgently needed, the National Economic and Development Authority said, as the inflation rate for February 2018 reached the upper band of the government’s target.

The Philippine Statistics Authority reported that February 2018 inflation was at 3.9 percent, with faster increases in the price of food and non-alcoholic beverages (4.8%), transport (5.8%), alcoholic beverages and tobacco (16.9%), furnishing, household equipment, and routine maintenance of the house (2.5%), restaurant and miscellaneous goods and services (2.5%), and clothing and footwear (2.6%).
The 3GFs of 2008

While still within the 2.0-4.0 percent target of the government, Socioeconomic Planning Secretary Ernesto M. Pernia said that the government should remain vigilant and prepared to implement measures that will mitigate the upside risks to inflation.

“The transitory impact of the TRAIN Law and the continued depreciation of the Philippine peso will mainly influence price movements in the coming months, and we must ensure that mitigating measures should be in place”, the NEDA official said. (NEDA, 2018)
The 3GFs of 2008

### Fuel Tax Hike

#### May Affect Grocery Items

<table>
<thead>
<tr>
<th>BASIC GOODS</th>
<th>WEIGHT</th>
<th>CURRENT SRP</th>
<th>SRP W/ TAX</th>
<th>INCREASE</th>
</tr>
</thead>
<tbody>
<tr>
<td>sardines</td>
<td>155g</td>
<td>13.45</td>
<td>13.49</td>
<td>.04</td>
</tr>
<tr>
<td>meat loaf</td>
<td>170g</td>
<td>18.40</td>
<td>18.44</td>
<td>.04</td>
</tr>
<tr>
<td>corned beef</td>
<td>175g</td>
<td>33.50</td>
<td>33.57</td>
<td>.07</td>
</tr>
<tr>
<td>coffee refill</td>
<td>25g</td>
<td>19.70</td>
<td>19.74</td>
<td>.04</td>
</tr>
<tr>
<td>coffee refill</td>
<td>50g</td>
<td>39.40</td>
<td>39.48</td>
<td>.08</td>
</tr>
<tr>
<td>powdered milk</td>
<td>150g</td>
<td>50.00</td>
<td>50.10</td>
<td>.10</td>
</tr>
<tr>
<td>instant noodles</td>
<td>55g</td>
<td>7.30</td>
<td>7.33</td>
<td>.03</td>
</tr>
<tr>
<td>pandesal</td>
<td>250g</td>
<td>21.50</td>
<td>21.56</td>
<td>.06</td>
</tr>
<tr>
<td>loaf bread</td>
<td>600g</td>
<td>62.00</td>
<td>62.18</td>
<td>.18</td>
</tr>
<tr>
<td>condensed milk</td>
<td>300ml</td>
<td>54.50</td>
<td>54.61</td>
<td>.11</td>
</tr>
<tr>
<td>evaporated milk</td>
<td>410ml</td>
<td>38.15</td>
<td>38.23</td>
<td>.08</td>
</tr>
<tr>
<td>toilet soap</td>
<td>50g</td>
<td>27.50</td>
<td>27.54</td>
<td>.04</td>
</tr>
<tr>
<td>detergent soap</td>
<td>150g</td>
<td>20.00</td>
<td>20.04</td>
<td>.04</td>
</tr>
<tr>
<td>cement</td>
<td>40kg</td>
<td>205</td>
<td>206.57</td>
<td>1.57</td>
</tr>
</tbody>
</table>

*Source: DTI*
Rise of the middle class

About AmBisyon Natin 2040

AmBisyon Natin 2040 represents the collective long-term vision and aspirations of the Filipino people for themselves and for the country in the next 25 years. It describes the kind of life that people want to live, and how the country will be by 2040. As such, it is an anchor for development planning across at least four administrations.

330 participants and 42 FGDs
June 5 to August 5, 2015
Rise of the middle class

Realizing the AmBisyon

All sectors of society, whether public or private, should direct their efforts towards creating opportunities for Filipinos to enjoy a matatag, maginhawa at panatag na buhay. Government, in particular, must use its tools of fiscal, monetary and regulatory policies to steer the development path towards enabling Filipinos to attain their AmBisyon. This pertains to all dimensions of development: economic, human and physical capital, institutional, social and cultural.

By 2040, the Philippines is a prosperous middle class society where no one is poor. People live long and healthy lives and are smart and innovative. The country is a high-trust society where families thrive in vibrant, culturally diverse, and resilient communities.

Filipinos live in a prosperous, predominantly middle class society where no one is poor.
Rise of the middle class

Rise of the middle class

• Filipino middle class households

Albert et al., 2015; PSA, 2012; 2015
Rise of the middle class

• Filipino families’ food expenditure

(PSA, 2012; 2015)
Rise of the middle class

SWS, 2018
Rise of the middle class

• Trends in Filipinos’ nutritional status (FNRI, 2015)
Rise of the middle class

- Trends in Filipino household’s dietary intakes (FNRI, 2015)

<table>
<thead>
<tr>
<th>Energy and Nutrients</th>
<th>2008 Mean Intake</th>
<th>Proportion of households that met RENI</th>
<th>2013 Mean Intake</th>
<th>Proportion of households that met RENI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy (kcal)*</td>
<td>1867</td>
<td>33.1</td>
<td>1810</td>
<td>34.8</td>
</tr>
<tr>
<td>Protein (g) **</td>
<td>57.1</td>
<td>56.7</td>
<td>56.5</td>
<td>59.7</td>
</tr>
<tr>
<td>Iron (mg) **</td>
<td>9.7</td>
<td>13.5</td>
<td>9.4</td>
<td>15.1</td>
</tr>
<tr>
<td>Calcium (g) **</td>
<td>0.42</td>
<td>11.5</td>
<td>0.39</td>
<td>11.0</td>
</tr>
<tr>
<td>Vitamin A (mcg RE) **</td>
<td>451.6</td>
<td>21.5</td>
<td>519.5</td>
<td>27.3</td>
</tr>
<tr>
<td>Thiamin (mg) **</td>
<td>0.85</td>
<td>34.5</td>
<td>0.82</td>
<td>35.8</td>
</tr>
<tr>
<td>Riboflavin (mg) **</td>
<td>0.73</td>
<td>19.7</td>
<td>0.75</td>
<td>23.3</td>
</tr>
<tr>
<td>Niacin (mg) **</td>
<td>21.3</td>
<td>89.0</td>
<td>18.3</td>
<td>29.5</td>
</tr>
<tr>
<td>Vitamin C (mg) **</td>
<td>47.1</td>
<td>30.2</td>
<td>43.9</td>
<td>83.5</td>
</tr>
</tbody>
</table>

* 100% RENI ** 80% RENI
Note: Using 2002 RENI
Rise of the middle class

• Income and food consumption (Adam Drewnowski & Darmon, 2005; Mullie et al., 2010; Kearney 2010)
Rise of the middle class

- Filipino household food consumption profile

Daily food value (per capita)

<table>
<thead>
<tr>
<th>Weigh (g)</th>
<th>Poor</th>
<th>Middle class to rich</th>
</tr>
</thead>
</table>

Daily mean capita food consumption

<table>
<thead>
<tr>
<th>Weigh (g)</th>
<th>Poor</th>
<th>Middle class to rich</th>
</tr>
</thead>
</table>
Rise of the middle class

- Filipino households’ food consumption pattern (per capita)

[Bar chart showing weight (g) for different food categories: Cereal and cereal products, Vegetables, Fish and Fish Products, Meat and Meat Products, Milk and Milk Products, Fruits, Poultry, Eggs. The chart compares poor families to middle class to rich families.]
Rise of the middle class

• Filipino households’ food consumption pattern

Per capita consumption of Filipino households per day

FNRI, 2015
Rise of the middle class

- Filipino households’ energy and nutrient intakes

**Filipino household energy and macronutrient intake**

FNRI, 2015
Rise of the middle class

- Filipino households’ nutrient intakes

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Poor (mg)</th>
<th>Middle to rich (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>8.3</td>
<td>10.07</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.37</td>
<td>0.41</td>
</tr>
<tr>
<td>Thiamin</td>
<td>0.71</td>
<td>0.9</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.62</td>
<td>0.84</td>
</tr>
<tr>
<td>Niacin</td>
<td>16</td>
<td>19.7</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>42.35</td>
<td>45.2</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>250.8</td>
<td>598.9</td>
</tr>
</tbody>
</table>

*FNRI, 2015*
Rise of the middle class

- Filipinos’ nutritional status (overweight/obesity) (FNRI, 2015)

![Bar chart showing nutritional status by age and income group]

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Poorest</th>
<th>Poor</th>
<th>Middle</th>
<th>Rich</th>
<th>Richest</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 y</td>
<td>2.8</td>
<td>3.5</td>
<td>4.3</td>
<td>6.1</td>
<td>10.7</td>
</tr>
<tr>
<td>5.08-10.0 y</td>
<td>2.8</td>
<td>4.5</td>
<td>6.5</td>
<td>13</td>
<td>25.5</td>
</tr>
<tr>
<td>10.08-19 y</td>
<td>3</td>
<td>4.4</td>
<td>6.5</td>
<td>10.9</td>
<td>20</td>
</tr>
<tr>
<td>20 y &amp; above</td>
<td>17.2</td>
<td>25</td>
<td>29.7</td>
<td>36.4</td>
<td>44.2</td>
</tr>
</tbody>
</table>
Rise of the middle class

- Filipino adults’ risk factors for NCDs (FNRI, 2015)
Rise of the middle class

Obesity
Risk for NCDs
Environmental problems*
Rise of the middle class

- Filipino households’ food wastes

*FNRI, 2015*
Rise of the middle class

- Increase in take home pay with TRAIN Law

| ANNUAL SALARY                          | TAX SCHEDULE  
|                                      | (2018 - 2022) | TAX SCHEDULE  
<table>
<thead>
<tr>
<th></th>
<th></th>
<th>(2023 ONWARDS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not over P250,000</td>
<td>0%</td>
<td>0%</td>
</tr>
<tr>
<td>Over P250,000 but not over P400,000</td>
<td>20% of the excess over P250,000</td>
<td>15% of the excess over P250,000</td>
</tr>
<tr>
<td>Over P400,000 but not over P800,000</td>
<td>P30,000 + 25% of the excess over P400,000</td>
<td>P22,500 + 20% of the excess over P400,000</td>
</tr>
<tr>
<td>Over P800,000 but not over P2 million</td>
<td>P130,000 + 30% of the excess over P800,000</td>
<td>P102,500 + 25% of the excess over P800,000</td>
</tr>
<tr>
<td>Over P2 million but not over P8 million</td>
<td>P490,000 + 32% of the excess over P2 million</td>
<td>P402,500 + 30% of the excess over P2 million</td>
</tr>
<tr>
<td>Over P8 million</td>
<td>P2,410,000 + 35% of the excess over P8 million</td>
<td>P2,202,500 + 35% of the excess over P8 million</td>
</tr>
</tbody>
</table>
Urbanization

2014: 54% (UN, 2014)
2010: 45.3% (PSA, 2016)
2007: 42.4% (PSA, 2016)
2050: 64%
Urbanization

2012 to 2013
AS: 31% ↓
A&FSE: 72% ↑
FP: 37% ↑

1991 to 2002
FA: 9.97 to 9.56 M Ha
AFA: 2.16 to 1.98 Ha

2013 to 2015
Agricultural crops: 50% ↓
Livestock: 5% ↑
Poultry: 6% ↑
Meat product import: 37% ↑

PSA, 2016
Urbanization

2012: 1871 (FM)++

1.3 M*

18-50 sq m**

2-4 h***

Urbanization

2016: 4478 SM, HM & CS
2015: 84250 FSE

2015: 61% of total retail food sales came from MOM & POP (sari-sari) stores

(USDA FAS, 2016)
Urbanization

- Urban households’ consumption pattern (per capita)

Rural: 846 g
Urban: 862 g

FNRI, 2015
Urbanization

• Urban households’ consumption pattern (per capita)

FNRI, 2015
Urbanization

• Urban households’ energy and nutrient intakes (per capita)

FNRI, 2015
Urbanization

• Urban household nutrient intakes (per capita)

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Rural (per capita)</th>
<th>Urban (per capita)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Iron</td>
<td>9</td>
<td>9.7</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.41</td>
<td>0.39</td>
</tr>
<tr>
<td>Thiamin</td>
<td>0.77</td>
<td>0.88</td>
</tr>
<tr>
<td>Riboflavin</td>
<td>0.67</td>
<td>0.82</td>
</tr>
<tr>
<td>Niacin</td>
<td>17.3</td>
<td>19.1</td>
</tr>
<tr>
<td>Vitamin C</td>
<td>45</td>
<td>42.9</td>
</tr>
<tr>
<td>Vitamin A</td>
<td>416</td>
<td>613.7</td>
</tr>
</tbody>
</table>

FNRI, 2015
# Urbanization

<table>
<thead>
<tr>
<th>Nutrient</th>
<th>Urban</th>
<th>100% of energy recommendation/EAR for Nutrients</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Energy (kcal)</em></td>
<td>1808</td>
<td>31.5</td>
</tr>
<tr>
<td>Protein (g)</td>
<td>58.6</td>
<td>67.3</td>
</tr>
<tr>
<td>Iron (g)</td>
<td>9.7</td>
<td>9.9</td>
</tr>
<tr>
<td>Calcium (g)</td>
<td>0.39</td>
<td>14.2</td>
</tr>
<tr>
<td>Vitamin A (mcg RE)</td>
<td>613.7</td>
<td>29.1</td>
</tr>
<tr>
<td>Thiamin (mg)</td>
<td>0.88</td>
<td>40.6</td>
</tr>
<tr>
<td>Riboflavin (mg)</td>
<td>0.82</td>
<td>26.4</td>
</tr>
<tr>
<td>Niacin (mg)</td>
<td>19.1</td>
<td>89.7</td>
</tr>
<tr>
<td>Vitamin C (mg)</td>
<td>42.9</td>
<td>31.7</td>
</tr>
<tr>
<td>Fats (g)</td>
<td>43</td>
<td>32</td>
</tr>
<tr>
<td>Carbohydrates (g)</td>
<td>296</td>
<td>327</td>
</tr>
</tbody>
</table>

FNRI, 2015
Urbanization

Triple burden of malnutrition and diseases
Urbanization

*Triple burden of malnutrition*: undernutrition, micronutrient deficiencies and obesity and overweight (*FAO, 2013*)
Urbanization

*Triple burden of diseases*: communicable diseases (caused by microbiological agents), noncommunicable diseases (caused by consumption and lifestyle practices), and diseases related to rapid urbanization and industrialization (e.g. substance abuse, mental illness) *(Ortiz & Ebrigo, 2017)*
Urbanization

### Overweight/Obesity

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-5 y</td>
<td>4.1</td>
<td>5.9</td>
</tr>
<tr>
<td>5.08-10 y</td>
<td>5.8</td>
<td>12.7</td>
</tr>
<tr>
<td>10.08-19</td>
<td>5.5</td>
<td>11.3</td>
</tr>
<tr>
<td>20 y &amp; above</td>
<td>25.8</td>
<td>36.1</td>
</tr>
</tbody>
</table>

### Risk factors for NCDs (adults)

<table>
<thead>
<tr>
<th>Factor</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elevated BP</td>
<td>22.1</td>
<td>22.4</td>
</tr>
<tr>
<td>High FBG</td>
<td>4.6</td>
<td>6.4</td>
</tr>
<tr>
<td>Borderline to High Cholesterol</td>
<td>43.4</td>
<td>50.6</td>
</tr>
<tr>
<td>LDL</td>
<td>45.4</td>
<td>49.4</td>
</tr>
<tr>
<td>HDL</td>
<td>74.5</td>
<td>67.8</td>
</tr>
<tr>
<td>High Triglyceride</td>
<td>36.2</td>
<td>40.9</td>
</tr>
</tbody>
</table>

Triple burden of malnutrition and diseases
Urbanization

Overweight/Obesity by age and economic level in urban areas

- <5 Poor
- <5Midtorich
- 5.08-10 P
- 5.08-10 M
- 10.08-19 P
- 10.08-19 M

Triple burden of malnutrition and diseases
Urbanization

Underweight
- 0-5P
- 0-5MR
- 5 to 10 P
- 5-10 MR

Stunting
- <5 P2
- 5 to 10 P2
- 5-10 MR3
- 10 to 19 P
- 10 to 19 M

Wasting
- <5 P3
- 5 to 10 P3
- 5-10 MR4
- 10 to 19 P2
- 10 to 19 M3
Urbanization

Food wastes

Rural  Urban
# International trade

## Opportunity
- Increases food supply
- Contribute to higher income
- Smooth out food deficits and surpluses
- Restrictions: negative impact to food security

## Threat
- Food sovereignty and right to determine shape of food systems
- Risks of liberalized trade-uneven

*Clapp, 2015*
International trade

Member of the World Trade Organization (WTO) since January 1995 and the General Agreements on Tariffs and Trade since December 1979

Free Trade Agreements (FTAs) with the: (1) ASEAN Free Trade Area (AFTA), (2) ASEAN, (3) ASEAN plus Six (ASEAN +6), (4) ASEAN in Trade Goods Agreement (ATIGA), (5) European Free Trade Association (EFTA), and (6) Philippine-Japan Economic Partnership Agreement (PJEPA)
International trade

WHY DO WE NEED TO IMPORT RICE

2017: 1.7 MMT (USDA, 2018)

PHP 12.41 per kg
PHP 6.53 per kg

Dawe et al., 2006; Dawe, 2014
International trade

• QR limit rice imports to protect local rice producers and to boost rice self-sufficiency (Briones, Galana & Tolin, 2017).

• QR specify the Minimum Access Volume (MAV) of 805,200 MT will be imposed a 35% in-quota tariff while in excess, the out-of-quota tariff is 50% (US export, 2016).

• QR expired in July 01, 2017 but extended for another 3 years (EO 23, 2017).
International trade

Opportunities

35% import tariffs

Imports (2017-2022)
4.4 MMT/y = P27-28 B

Palay = P 4.56/kg
Rice = P 6.97/kg

P 19,000.00/y farmer with 2 ha for rice farming

Briones et al., 2017; Briones & Tolin, 2015;
International trade
International trade

Farmers not ready for a post-QR due poor agricultural infrastructure and our country’s vulnerability to natural disasters and climate-change

Rice cartels will take advantage of the situation and that smuggling will proliferate

Coronaton, 2015; Mendoza, 2017
International trade

• Non-tariff measures (NTMs)
  ❖ Sanitary and Phytosanitary (SPS)
    ❖ set out the basic rules for food safety and animal and plant health standards
    ❖ harmonize SPS measures through international standards with the FAO/WHO Codex Alimentarius
  ❖ Technical Barriers to Trade (TBT)
    ❖ ensure that technical regulations, standards, and conformity assessment procedures are non-discriminatory and do not create unnecessary obstacles to trade
International trade

SPS & TBT

Bases of the implementation of food safety standards for domestic and international trade in all member countries of the WTO.

Aldaba, 2012
International trade

• Food miles

(Stancu & Smith, 2006).

• energy use and contribution to climate change
• dependence on fossil fuels
• traffic congestion
• social and economic impacts on rural communities and developing countries
International trade

• Food miles

Local products may lead to more GHG emissions compared to imported food (Lewis & Mitchell 2014)

Bulk of GHG emissions from food are in the production phase (Weber & Matthews, 2008)

Shifting < one day /wk cal from red meat and dairy products to chicken, fish, eggs or a vegetable-based diet less GHG (Weber & Matthews, 2008)

Local foods only reduces global emissions when undertaken in regions with relatively low emissions (Avetisyan et al., 2014)
ENVIRONMENTAL ISSUES

Natural disasters
Climate change
Solid wastes
Food losses and wastes
Natural disasters

Typhoon belt in the Pacific and Pacific Ring of Fire

4th among countries hit by the highest number of disasters from 1995-2015 affecting 130 million people (CRED & UNSIDR 2015).

27.69 WorldRisk Index and ranks 3rd amongst 171 countries based on exposure to natural hazards, vulnerability to hazards, coping capacities and adapting capacities as presented in the WorldRiskReport 2017 (Schrader, 2017).
Natural disasters

- Can disrupt the entire food system from production, processing, marketing, distribution and preparation of food

2006 -2013
75 disasters
25% damage & losses in agriculture= 3.8 B USD

FAO, 2015
Natural disasters

**Typhoon Yolanda**

2013

- People affected
- 16.08 M people
- 6,300 were killed

- Damages:
  - Property and agriculture: PhP 95.48 billion.

**Mayon Volcano eruption**

2018

- People affected
- 84.4 Th people

- Damages
  - Agriculture and fisheries: 3.2 M USD
  - Livestock and poultry: 512 Th USD

_NDRMMC, 2013; UN OCHA, 2018_
Natural disasters

- Paddy rice production at provincial level
- Paddy rice production at national level
- Food security of households
  - meal proportioning, reducing number of meals by children or skipping meals for whole day

Israel & Briones, 2013
Natural disasters

• Households that are directly affected by disasters seek shelter in evacuation centers, which are normally crowded and lack food and sanitation which eventually breed diseases and cause malnutrition (Briones et al., 2017).
Climate Change

13th-most climate vulnerable among 186 countries by Verisk Maplesoft (Oxford Business Group, 2016)

5th in the Global Climate Risk Index (CRI) by Greenwatch (Kreft et al., 2016)
Climate Change

• One of the main drivers of climate change is the greenhouse gases (GHGs)
Climate Change

- **Carbon footprint** total amount of GHGs
Climate Change

- Philippine carbon footprint = 0.39% of global emissions as of 2012 (WRI, 2015)
Climate Change

- Two-way relationship of food systems and climate change

Vermeulen et al., 2012
Climate Change

1990-2014

Production
• 14146 CO$_2$Eq*

Industrial
• 6167.23 CO$_2$Eq

Wastes
• 13164.21 CO$_2$Eq

*rice cultivation (61.2%), enteric fermentation (14.4%) manure management (6.8%), synthetic fertilizers (6.6%), manure left on pasture (5%), crop (3%), manure applied to soils (2.1%) and burning crop residues

FAO, 2018
Climate Change

PoUR

Population growth
Urbanization
Rising incomes

Changes in consumption patterns

Increase in GHG emissions from:

Population growth
Urbanization
Rising incomes
Climate Change

PoUR

Population growth
Urbanization
Rising incomes

Changes in consumption patterns

Increase in GHG emissions from:

- Increased demand for cereals and animal-based products
- Increased demand for processed and packaged foods
- Increased demand for FAFH

GHG emissions: High meat eaters > medium meat eaters > low meat eaters > fish eaters > vegans (Scarborough et al., 2013)
Climate Change

PoUR

Population growth
Urbanization
Rising incomes

CHANGES IN CONSUMPTION PATTERNS

- Increased demand for cereals and animal-based products
- Increased demand for processed and packaged foods
- Increased demand for FAFH

INCREASE IN GHG EMISSIONS FROM:

- Increase in agricultural activities and outputs i.e., rice and livestock
- Increase processing, packaging and distribution activities
- Increase in packaging and food wastes

GHG emissions: High meat eaters > medium meat eaters > low meat eaters > fish eaters > vegans (Scarborough et al., 2013)
Climate Change

(PAGASA, 2011)

- Country will get warmer
- Warmer and drier summer months
- Temperature will rise by 0.9-11°C in 2020 and 1.8-2.2°C in 2050
- Seasonal mean temperatures will increase
- Southwest and northeast monsoons including last quarter of the year will get wetter leading to flooding
- No. of dry days (>2.5 mm of rain) will increase
- Heavy daily rainfall (>300 mm) events will continue to increase in Luzon and Visayas

Possible Impacts on Philippine Food System

**WATER RESOURCES**
- Irrigation will be affected
- Energy from dams will decrease
- Increased flooding and landslides

**AGRICULTURE**
- Decreased yields
- Increased incidences of diseases in plants and animals

**FORESTRY**
- Forest fires
- Loss of livelihood

**COASTAL RESOURCES**
- Decreased yields
- Loss in income

**HUMAN HEALTH**
- Higher morbidity and mortality from water-based and vector borne diseases
- Increased health risk for children, elderly
- Poorer air quality in urbanized areas
- Severe malnutrition
Climate Change

- Country will get warmer
- Warmer and drier summer months
- Temperature will rise by 0.9-11°C in 2020 and 1.8-2.2°C in 2050
- Seasonal mean temperatures will increase
- Southwest and northeast monsoons including last quarter of the year will get wetter leading to flooding
- No. of dry days (>2.5 mm of rain) will increase
- Heavy daily rainfall (>300 mm) events will continue to increase in Luzon and Visayas

Possible Impacts on Philippine Food System

- Decrease GPV of agriculture by 40% in 2050 (Dait, 2013)
- Incidences of foodborne illnesses increases (Tirado et al., 2010)
- Malnutrition and hunger increase (FAO, 2016)
Solid wastes

(NSWMC, 2015)
Solid wastes

400 g daily mean per capita *

2025 @ 47.3% urbanization rate
900 g daily mean per capita ** in urban areas

28.4 MMT

*NSWMC, 2015; **World Bank, 2012
Solid wastes

Solid Waste Exposure Pathway (NSWMC, 2015)
1/3 or 1.3 billion tons is lost or wasted annually (Gustavsson et al., 2011).
Food losses and wastes

Postharvest

1 to 14 g per capita per day**

9-37%*

Household

Can feed additional 346 Th to 4.68 M Filipinos a day

Retail

17 g: lunch ***

Food losses and wastes

Adverse Environmental Impacts

- Waste of natural resources
- 10% of the world’s total energy consumption
- >3.3 gigatonnes of CO₂Eq per year

Economic losses
High prices of food
POLITICAL ISSUES

- Armed conflicts
- Corruption
Armed conflicts

MAOIST

MORO

5 DECADES OF FIGHTING

(Ferrer & Cabangbang, 2012).
Armed conflicts

• The irony of Mindanao

- 2nd largest group of islands in the Philippines
- Home to almost 1/4 of the country’s population
- 1/3 of land devoted to agriculture with 8 major river basins, and most regions outside the typhoon belts
- 40% of the country’s food requirements
- >30% of national food trade, being a major producer of pineapple, banana and coffee

(NEDA, 2010.)
Armed conflicts

• The irony of Mindanao

High prevalence of malnutrition:
Zamboanga Peninsula: 38.7% stunted pre-school children; 44.3% stunted 6-10 y.o.
SOCCKSARGEN: 36.3% stunted pre-school children; 41.9% wasted adolescents
ARMM: 42.6% wasted adolescents

(FNRI, 2015)
Armed conflicts

• Case of Marawi

Damaged PhP 8 billion of infrastructures and properties (LCP, undated)

Economic loss ~PhP 4 billion (LCP, undated)

Displaced more than 77,000 families or 353,000 individual (UNHCR, 2017)
Armed conflicts

• Case of Marawi

EFFECTS ON FOOD SYSTEMS OF MARAWI RESIDENTS:

1. Loss of livelihood
2. Malnutrition and hunger which led to death
Corruption

111th out of 176 = score of 34/100 in the 2017 Corruption Perceptions Index (Transparency International, 2017),

34th out of 214 countries in the Control of Corruption under the 2016 Worldwide Governance Indicators (The World Bank Group, 2018)

Lost an average of $9.02 billion per year from 2004-2013 on illicit financial flow, ranking 19th amongst developing countries (Kar and Spanjers, 2015).
Corruption

• Smuggling
  ❖ **Rice**: 4.34 billion MT valued at 1.2 billion USD from 1986 to 2009
  ❖ **Other smuggled food**: 2.1 million MT equivalent to 1.3 million USD

*SEARCA, 2014*
Corruption

6-M kilos of ‘expired’ imported pork smuggled to PH, says SINAG

MANILA, Philippines—The Samahang Industriya ng Agrikultura (SINAG) disclosed Tuesday that nearly six million kilos of expired imported meat that did not undergo required quarantine tests and food safety examinations may have been smuggled into the Philippines.

In a statement, SINAG said data obtained from Bureau of Customs (BOC) sources showed that 121.6 million kilos of imported pork meat were expected to arrive this year. However, official

SEARCA, 2014
SOCIAL ISSUES

Population growth and changing demographics
Infrastructure
Migration
Population growth and changing demographics

2018: 100 M

2045: 142 M

50%

PSA, 2014
## Population growth and changing demographics

The projected amounts of food needed in 2045 to feed 142 million Filipinos

<table>
<thead>
<tr>
<th>Food items</th>
<th>Per year (MMT)</th>
<th>Per day (TMT)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rice and Rice Products</td>
<td>15.48</td>
<td>42.46</td>
</tr>
<tr>
<td>Corn and Corn Products</td>
<td>1.14</td>
<td>3.27</td>
</tr>
<tr>
<td>Starchy Roots and Tubers</td>
<td>0.71</td>
<td>1.99</td>
</tr>
<tr>
<td>Sugars and Syrups</td>
<td>0.57</td>
<td>1.70</td>
</tr>
<tr>
<td>Fats and Oils</td>
<td>0.71</td>
<td>2.13</td>
</tr>
<tr>
<td>Fish and Fish Products</td>
<td>5.68</td>
<td>15.48</td>
</tr>
<tr>
<td>Meat and Meat Products</td>
<td>3.41</td>
<td>9.23</td>
</tr>
<tr>
<td>Poultry</td>
<td>1.70</td>
<td>4.69</td>
</tr>
<tr>
<td>Eggs</td>
<td>1.28</td>
<td>2.27</td>
</tr>
<tr>
<td>Milk and Milk Products</td>
<td>2.27</td>
<td>6.39</td>
</tr>
<tr>
<td>Dried Beans, Nuts and Seeds</td>
<td>0.43</td>
<td>1.28</td>
</tr>
<tr>
<td>Vegetables</td>
<td>5.96</td>
<td>16.19</td>
</tr>
<tr>
<td>Fruits</td>
<td>2.13</td>
<td>5.82</td>
</tr>
<tr>
<td>Beverages</td>
<td>1.14</td>
<td>3.27</td>
</tr>
</tbody>
</table>

1. Based on the mean capita consumption of Filipino households (FNRI, 2015a)
2. In raw and processed as purchased form
Population growth and changing demographics

PoUR

Triple threats

Pressures on: production, processing, distribution and disposal

Food system
Population growth and changing demographics

• Increase in the elderly population
• Shrinking household size
• Change in household structure
Population growth and changing demographics

- Increase in the elderly population

<table>
<thead>
<tr>
<th>Year</th>
<th>Population</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010</td>
<td>6.3 M</td>
</tr>
<tr>
<td>2020</td>
<td>9.5 M</td>
</tr>
<tr>
<td>2025</td>
<td>10.2 M</td>
</tr>
</tbody>
</table>

13.6% are poor in 2015

PSA, 2015
Population growth and changing demographics

- Increase in the elderly population
  - Vulnerable to malnutrition (WHO, 2018)
  - Decrease in appetite due to Dysphagia (difficulty in swallowing), and ageing-related taste, olfaction and vision impairments (Rothenberg & Wendin, 2015)
  - Texture modification to make food acceptable (Funami, 2016)
Population growth and changing demographics

- Increase in the elderly population
  - Filipino senior citizens’ food consumption

< 1/5 of met the Estimated Average Requirements (EAR) for energy (17.4%), iron (8.9%), calcium (7%), vitamin A (14.1%), vitamin C (17.1%), thiamin (15.8%), and riboflavin (10%)
Population growth and changing demographics

• Increase in the elderly population
  ❖ Ageing agricultural sector

48 to 55 years old

NEDA, 2017
Population growth and changing demographics

• Decrease in household size & change in structure

<table>
<thead>
<tr>
<th>Year</th>
<th>Household size</th>
<th>No. of single (5%), widowed (5%), divorced/separated (14%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>4.8</td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>4.4</td>
<td></td>
</tr>
</tbody>
</table>

Mean capita consumption per member

PSA, 2018
Population growth and changing demographics

- Decrease in household size & change in structure

**SINGLE OR ONE-PERSON HOUSEHOLD (OPH)**

- 2011: 242 million or 13% of the total households (Shin-Hyun, 2012)
- 2017: 300 million or 15% of total households (Chamie, 2017).
- 5% OPH in 2008 which is roughly 5.02 million in 2015 (based on PSA projected population growth) (UNFPA, 2012)
Population growth and changing demographics

- Decrease in household size & change in structure

Chakraborty et al., 2016
Infrastructure

OECD, 2017

significant post-harvest losses, i.e. around 15% for rice, 7% for corn, 16-40% for vegetables and 5-48% for fruits

susceptible to damage from flooding and extreme weather events and are often not passable during the wet season

physical constraints to port infrastructure results to high inter-island shipping costs
The main problems of road infrastructure in Metro Manila include low-quality public transport, traffic congestion, poor road network quality, and inadequate network quality (NEDA, 2017).

According to JICA (2014), the economic cost of traffic congestion in Metro Manila will reach PhP 6 billion a day by 2030 if there is no intervention, which will have a greater effect on low-income earners.
Infrastructure

• Metro Manila road infrastructure
  • low-quality public transport, traffic congestion, poor road network quality and inadequate network quality (NEDA, 2017).  

• Economic cost of traffic congestion in Metro Manila will reach PhP 6 billion a day by 2030 if there is no intervention (JICA, 2014)
Migration

“Migration is a worldwide phenomenon” - FAO, 2017c

2015
244 million
international migrants

2013
More than 10 million Filipinos abroad are with permanent, temporary and illegal status. 25% are considered OFWs.

2010
Approx. 173 million international migrants globally

UN 2015; CFO, 2013; PSA, 2014
Migration

Remittances from OFW are one of the main drivers of the Philippine economy.

2016
PhP 202.3 billion
remittances from OFW=
10.2% of the GDP

(World Bank 2017)
Migration

Improved purchasing power positive effects on per capita calorie consumption and food diversity (Nguyen & Winters, 2011)

Consumption of more food, access to more expensive food and shift towards a more diversified, high-protein and micronutrient-rich diet (Karamba, Quiñones, & Winters 2011)

Enhanced child growth patterns (Azzarri & Zezza, 2011)

No effect on total food expenditures per capita, and minimal effect on food expenditure pattern; shift on food consumption in high migration regions towards potentially less nutritious foods such as sugar, beverages and food eaten outside home (Romano & Traverso, 2017)
Migration

Families of Filipino migrants spend their remittances on basic commodity such as food, clothing and shelter (Rispens-Noel, 2018; Aldaba & Opiniano, 2008)

Number of OFWs per region vs mean capita daily food consumption of Filipino households and intake of cereal products, fats and oils, meat and dairy products in 2013 (PSA, 2017; FNRI, 2015)
WHAT ARE THE OPPORTUNITIES IN PHILIPPINE FOOD SYSTEMS?
Opportunities

• Science, technology & innovation (STI)
• Sustainable food systems (SFS)
• Research & trade cooperation (RTC)
Science, technology and innovation (STI)

FOOD MEGATRENDS
and examples of opportunities for research and collaboration (Augustin et al., 2016).
## Science, technology and innovation (STI)

<table>
<thead>
<tr>
<th>Sector</th>
<th>R&amp;D Programs</th>
<th>R&amp;D Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>National Integrated Basic Research Agenda (NIBRA)</td>
<td>Food and nutrition security</td>
<td>Epidemiology of food and feed-borne contaminants</td>
</tr>
<tr>
<td></td>
<td>Food safety and biodiversity studies</td>
<td>Diseases and pathogens of important crops</td>
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<td>Epidemiology of food and feed-borne contaminants</td>
<td>Safety analysis of raw and processed foods</td>
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<td>Health</td>
<td>Functional foods</td>
<td>Development of functional foods (e.g. guyabano, malunggay, sweet potato)</td>
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<td></td>
<td>Nutrition and food safety</td>
<td>Fortified multi-nutrient growth products and rice extrudate</td>
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<td></td>
<td>Disaster risk reduction-health</td>
<td>Ready to use therapeutic foods and food for emergencies</td>
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<td></td>
<td>Climate change adaptation-health</td>
<td>Omic Technologies for Health and Wellness</td>
</tr>
</tbody>
</table>

Examples of the priority research and development (R&D) programs and projects under the DOST’s HNRDA 2017-2022 that pertain to Philippine food systems.
## Science, technology and innovation (STI)

<table>
<thead>
<tr>
<th>Sector</th>
<th>R&amp;D Programs</th>
<th>R&amp;D Projects</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Agriculture Aquatic and Natural Resources (AANR)</strong></td>
<td>Postharvest, processing and product development</td>
<td>Postharvest, processing and product development of priority commodities (e.g. legumes, cacao, rootcrops, goat)</td>
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<tr>
<td></td>
<td>Applied genomics</td>
<td>Application of genomics in breeding and selection</td>
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<td>Development of standards</td>
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<td><strong>Industry and Emerging Technology</strong></td>
<td>Food and Nutrition Security</td>
<td>Rapid test kits for contaminants</td>
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<td>Intelligent Transportation Solutions</td>
<td>Value-adding of fishery by-products</td>
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<td>Smart and green packaging technology</td>
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<td></td>
<td></td>
<td>Cost-effective alternative mass transport systems and components</td>
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<td>Commuters and public utility vehicle information systems</td>
</tr>
</tbody>
</table>

Examples of the priority research and development (R&D) programs and projects under the DOST’s HNRDA 2017-2022 that pertain to Philippine food systems.
### Science, technology and innovation (STI)

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<td>Disaster Risk Reduction and Climate Change</td>
<td>Warning and risk assessment</td>
<td>Web-based and mobile phone-based warning and information</td>
</tr>
<tr>
<td>Adaptation</td>
<td>Technology Development and Application for Climate Change Mitigation and Adaptation</td>
<td>Impact-based/risk-based modelling and forecasting</td>
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<tr>
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<td></td>
<td>Microbial Biotechnology for Sustainable Waste Management and Alternative Energy Source</td>
</tr>
</tbody>
</table>

Examples of the priority research and development (R&D) programs and projects under the DOST’s HNRDA 2017-2022 that pertain to Philippine food systems.
Sustainable Food Systems (SFS)
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Aims to lessen food wastage and contribute to the improvement of the implementation of SCP processes in the foodservice sector (WWF, 2017)
Sustainable Food Systems (SFS)

• *Philippine Good Agricultural Practices (PhilGAP) Certification Program*
  
  ❖ Good agricultural practices (GAP) refer to practices that address environmental, economic and social sustainability for on-farm processes, and which result in safe and quality food and nonfood agricultural products (FAO, 2008).
Sustainable Food Systems (SFS)

• National Organic Agriculture Program (NOAP, RA 10068)
  ❖ promotion and commercialization of organic farming practices,
  ❖ cultivation and adoption of production and processing methods which have already been developed, or to be developed,
  ❖ continuing research and upgrading thereof, the capacity building of farmers and the education of consumers thereon, the extension of assistance to LGUs, POs, NGOs and other stakeholders
  ❖ documentation and evaluation of the program
Sustainable Food Systems (SFS)

• *Gulayan sa Paaralan Progam (GPP)*
  - Supports the hunger mitigation initiatives of the government and encourages public elementary and secondary schools to establish school gardens to ensure continuous supply of vegetables for the School-Based Feeding Program, and other feeding programs
  - Appreciation of agriculture as a life support system
Sustainable Food Systems (SFS)

• National Agri-fishery Mechanization Program (NAFMP, RA 10601)
  ❖ Mechanization
    ✓ can possibly enhance the agricultural uplands, hilly production system
    ✓ reduce or minimize postharvest losses
    ✓ reduce pressures in the environment that would in turn achieve food security
Sustainable Food Systems (SFS)

• **Food Donation Act (RA 9803, 2009)/ Food Surplus Act (HB 2469)/ Zero Food Waste Act (SBN 357)**

  ❖ The Food Donation Act of 2009 is an act to encourage the donation of food for charitable purposes to alleviate national poverty and reduce food wastage (RA 9803, 2009)
Sustainable Food Systems (SFS)

- **Food Donation Act (RA 9803, 2009)/ Food Surplus Act (HB 2469)/ Zero Food Waste Act (SBN 357)**
  - *Food Surplus Act (HB 2469)/ Zero Food Waste Act (SBN 357)* - promote, facilitate, and ensure the reduction of food waste through redistribution and recycling
  - Requires food-related businesses (e.g. food manufacturers, supermarkets, restaurants, cafeterias, and hotels) to donate edible food wastes which are unadultered and in good condition to food banks.
Sustainable Food Systems (SFS)
Section 5. Food-related Business Waste Reduction Strategy. — Food-related businesses such as food manufacturers, supermarkets, restaurants, cafeterias, and hotels are hereby required to:

a. Submit an initial report to the DSWD and DENR that contains data on the amount (in tons) of its edible and inedible food waste in the past year, organized according to the manner of disposal, including donation, composting or discarding.

b. Submit an annual report to the DSWD and DENR that contains data on the amount (in tons) of its edible and inedible food waste in the immediately precedent year, organized according to the manner of disposal, including donation, composting, or discarding.

c. Enter into a contract with food banks to redistribute edible food waste to the food insecure.

d. Shoulder the costs of transporting edible food waste from business location to the food bank’s warehouse or distribution center.

e. Ensure that edible food waste is unadulterated and in good condition upon arrival at the food bank’s distribution center.

f. Enter into a contract with waste management and recycling enterprises to recycle inedible food waste into fertilizer or compost.

g. Shoulder the costs of transporting inedible food waste from collection areas to waste management sites.

h. Reach and maintain food waste levels at the target set by the DENR.
Hunger is often not a food problem; it's a logistics problem. Approximately 15-30% of food in emerging economies is wasted. Each year billions of pounds of food go to waste, while 1 in 4 people are malnourished. Food banking systems capture surplus food and deliver it to the people who need it most, engaging all sectors of society (governments, business, and civil) in the process. Food banks acquire donated food, much of which would otherwise be wasted, from farms, manufacturers, distributors, retail stores, consumers, and other sources, making it available to those in need through an established network of community agencies. These agencies include school feeding programs, food pantries, soup kitchens, AIDS and TB hospices, substance abuse clinics, after-school programs, and other nonprofit programs that provide food to the hungry.

How Food Banking Works

1 in 4 People Are Malnourished
Research & trade cooperation

• Goal 17: Revitalize the global partnership for sustainable development
  • Finance
  • Technology
  • Capacity-building
  • Trade
  • Systemic issues
Research & trade cooperation

- National collaboration schemes
Research & trade cooperation

- National collaboration schemes
Research & trade cooperation

Accelerated R&D Program for Capacity Building of Research and Development Institutions and Industrial Competitiveness

NICER  RDLead
Accelerate industrial competitiveness by capacitating HEIs in the Regions to undertake quality research that will promote regional development

Employ experts with strong leadership, management and innovative policy-making proficiencies to be in charge of strengthening the research capabilities of the HEIs

CRADLE  BIST
Create a synergistic relationship between the academe and the industry with the goal of invigorating R&D

Level-up the Philippine Industrial Sector through the industry R&D, and acquisition of strategic and relevant technologies to enhance their technology level and production processes.

Science for Change Program (S4CP)
DEPARTMENT OF SCIENCE AND TECHNOLOGY
Research & trade cooperation

- International collaboration schemes

1. Increase engagement of international talents to optimize the delivery of quality instruction as well as the quality and quantity of research and innovations (p. 156); and
2. Intensify international cooperation in STI (p. 225)
Research & trade cooperation

- International collaboration schemes
Research & trade cooperation

- International collaboration schemes
  - public-private collaboration
  - talent mobility, people to people connectivity, and inclusiveness
  - enterprises support
  - public awareness and STI enculturation
Research & trade cooperation

- International collaboration schemes
  - building science capacity
  - promoting enabling environment for innovation
  - enhancing regional science and technology connectivity
Research & trade cooperation

• Trade cooperation
  - Universal, rules-based, open, non-discriminatory and equitable multilateral trading system under WTO, including through the conclusion of negotiations under its Doha Development Agenda
  - Increase the exports of developing countries with a target of doubling the least developed countries’ share of global exports by 2020;
Research & trade cooperation

• Trade cooperation
  ❖ Timely implementation of duty-free and quota-free market access on a lasting basis for all least developed countries, consistent with WTO decisions
Summary

- Philippine food systems - challenges

- Dependent on food and fuel prices, financial elements and international trade
- Influenced by consumption patterns due to rising incomes & urbanization
- Vulnerable to disasters (natural and man-made) and climate change
- Generate losses and wastes with environmental, social and economic costs
- Tremendous pressure from population growth and changing demographics
- Inefficiencies due to poor infrastructure
Summary

• Philippine food systems- opportunities
How can we feed 142 million Filipinos in 2045?
We all need to pitch in and do our share for a better Philippine food system that hopefully can be enjoyed by the next generation of Filipinos.
ACKNOWLEDGMENTS

Nutrition 230 students
References

References

References

References

- Romano, D., & Traverso, S. (2017). Disentangling the effect of international migration on household food and nutrition security. Italy: DISEI - Università degli Studi di Firenze.
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THANK YOU FOR LISTENING.