Agriculture, Biodiversity, Nutrition and Health Challenges and Opportunities

Cristina Tirado von der Pahlen, DVM, MS, PhD
Chair of the IUNS Climate and Nutrition Task Force
UN Standing Committee for Nutrition WG on Climate Change
cristinatirado@ucla.edu
Challenges
Global Environmental and Climate Changes

- Climate change
  - Stratospheric ozone depletion
  - Land degradation
  - Health
    - Nutrition
    - Freshwater decline
  - Loss of Biodiversity ecosystem function
  - Diverse pathways
    - UV exposure
    - Altered precipitation
    - Decline in ecosystem services
    - Water quantity and safety
    - Agro-ecosystem Productivity
    - Conflict

Adapted from WHO
Feeding a growing population

By 2050 World population will grow to 9.2 billion = growth of 37%

Food production must increase by more than 70% and be sustainable
• about **800 million people** are chronically undernourished

• **1 billion adults** and **20 million children** are estimated to be overweight.

• In low income countries, **under- and over-nutrition co-exist along with micronutrient deficiencies** (the triple burden).
The nutrition transition

*Global diet: more calories, less diversity, more risks*

- Lack of fruits & vegetables
- Increased fats, sugars and processed/refined foods
- Energy rich but nutrient poor
Loss of agricultural biodiversity

A CENTURY AGO
In 1903 commercial seed houses offered hundreds of varieties, as shown in this sampling of ten crops.

SWEET CORN
307 varieties

LETTUCE

MUSkmelon
338

PEA
408

RADISH

SQUASH

SQUASH

TOMATO

CUCUMBER

80 YEARS LATER
By 1983 few of those varieties were found in the National Seed Storage Laboratory.*

* CHANGED ITS NAME IN 2001 TO THE NATIONAL CENTER FOR GENETIC RESOURCES PRESERVATION

SOURCE: RURAL ADVANCEMENT FOUNDATION INTERNATIONAL
Effects of Carbon Dioxide on Protein and Minerals

US Global Climate Change Research Program- Climate and Health Assessment 2015

Meinshausen et al. 2013

Average effect on 125 plant species and cultivars

Doubling of CO2 concentration from preindustrial levels

Opportunities to address these challenges

Agriculture
Biodiversity
Sustainable Diets
Nutrition-sensitive adaptation in the Agriculture sector

- Integrated family farming (synergies of agro-forestry horticulture, aquaculture and livestock systems)
- Education - local foods, biodiversity & micronutrient-rich foods
- Extension services - food diversity promotion - Good Agriculture Practices - **food safety** (e.g. pesticides, aflatoxins, food-borne diseases)
- Mangrove repopulation: Aqua-silviculture – **Disaster risk reduction**
Nutrition-sensitive Climate Smart agriculture

increase Ag biodiversity and diet diversity while reducing GHG

- Conservation Agriculture
- Agro-ecology
- Agro-forestry
- Rice Intensification/fish farming
- Silvi-culture
- Traditional breeds
Sustainable Diets are those diets with low Environmental impacts... protective and respectful of biodiversity and ecosystems... while optimizing natural and human resources.

FAO, 2010
Co-benefits of sustainable diets

- Healthy – **diet rich in fruits & vegetables (400gr/day) can save 2.7 million lives**
- Environmentally sustainable (e.g. legumes - soil N fixing)
- Biodiversity/ traditional crops/ indigenous diets /socio-cultural values
- Socially equitable
Advisory Committee on Sustainability & Food Safety
US Dietary Guidelines 2015

Values
- Culture of healthy living
- Embrace equitable solutions
- Support universal food security
- Encourage to steward natural resources
- Transparency in the work

Supply-Chain Participants
- Conserve natural resources
- Enhance biodiversity
- Use capital and labor responsibly
- Innovate in R&D

Consumers
- Sustainability & healthy diets
- Healthy dietary patterns
- Increased demand for sustainable food
- Minimize food waste

Policies
- Informed by best evidence
- Engage multiple sector stakeholders
- Local, regional, national, global
- Monitoring & accountability systems
- Align policies to promote health & sustainability

Sustainable Diets
- Consumers
- Policies
- Supply-Chain Participants
- Values
Food Technology and Food Safety
Neglected and Underutilized Species (NUS)

Dried vegetables and fruits

Pressure-popping

Noodles made from sorghum and millets

Bioversity International
Sustainable food production and consumption
“As the global population surges towards a predicted 9.1 billion people by 2050, western tastes for diets rich in meat and dairy products are unsustainable” “global shift towards a vegan diet is vital to save the world from hunger, fuel poverty and the worst impacts of climate change”
Global diets link environmental sustainability and human health

Tilman & Clark, Nature 2014

Effect of diets on annual per capita GHG emissions

Per capita reductions being 30%, 45% and 55% for the Mediterranean and pescetarian and vegetarian diets, respectively.
Reduction of in relative risk of health conditions relative to conventional-omnivorous diets

(Tilman & Clark, Nature 2014)
**Towards Environmentally Sound Dietary Guidelines**  
**Swedish National Food Agency (2009)**

<table>
<thead>
<tr>
<th>Food Category</th>
<th>Recommendation</th>
</tr>
</thead>
</table>
| Meat (beef, lamb, pork)       | Eat less, reduce portion size.  
                               | Eat locally produced and grass fed animals                                   |
| Fish and shellfish            | choose seafood with sustainable eco-labels                                    |
| Fruits, vegetables            | Seasonal and locally produced  
                               | Pesticide free                                                              |
| Potatoes, cereals             | Locally grown – reduce rice intake                                           |
| Cooking fat                   | Choose rape seed and olive oil– reduce palm                                   |
| Water                         | Choose tap water  
                               | Locally produced/packed                                                     |
Sustainable consumption and production
## Nutrition Indicators – SDGs (UNSCN, 2015)

<table>
<thead>
<tr>
<th>AREA</th>
<th>PRIORITY INDICATOR</th>
<th>SDGs AND TARGETS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>GLOBAL NUTRITION TARGETS</strong> endorsed by Member States at the 65th World Health Assembly (WHA 2012)</td>
<td>Prevalence of stunting (low height-for-age) in children under 5 years of age</td>
<td>Goal 2, Target 2.2</td>
</tr>
<tr>
<td></td>
<td>Prevalence of wasting (low weight-for-height) in children under 5 years of age</td>
<td>Goal 2, Target 2.2</td>
</tr>
<tr>
<td></td>
<td>Percentage of infants less than 6 months of age who are exclusively breast fed</td>
<td>Goal 2, Target 2.2 and Target 2.1 and Goal 3, Target 3.2</td>
</tr>
<tr>
<td></td>
<td>Percentage of women of reproductive age (15-49 years of age) with anaemia</td>
<td>Goal 2, Target 2.2 and Goal 3, Target 3.1</td>
</tr>
<tr>
<td></td>
<td>Prevalence of overweight (high weight-for-height) in children under 5 years of age</td>
<td>Goal 2, Target 2.2 and Goal 3, Target 3.4</td>
</tr>
<tr>
<td></td>
<td>Percentage of infants born with low birth weight (&lt; 2,500 grams)</td>
<td>Goal 2, Target 2.2 and Goal 3, Target 3.2</td>
</tr>
</tbody>
</table>

- **Dietary Diversity**
  - The percentage of women, 15-49 years of age, who consume at least 5 out of 10 defined food groups | Goal 2, Target 2.1 |

- **Policy**
  - Percentage of national budget allocated to nutrition | Goal 2, Target 2.2a |
**Minimum Dietary Diversity – Women**

**Global Dietary Diversity Indicator for Women**

<table>
<thead>
<tr>
<th>MDD-W food groups</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. All starchy staple foods</td>
<td>6. Eggs</td>
</tr>
<tr>
<td>2. Beans and peas</td>
<td>7. Vitamin A-rich dark green leafy vegetables</td>
</tr>
<tr>
<td>3. Nuts and seeds</td>
<td>8. Other vitamin A-rich vegetables and fruits</td>
</tr>
<tr>
<td>4. Dairy</td>
<td>9. Other vegetables</td>
</tr>
<tr>
<td>5. Flesh foods</td>
<td>10. Other fruits</td>
</tr>
</tbody>
</table>

EU, FAO, FANTA III, USAID, 2014
Mainstreaming nutrition & health at the UNFCCC