- Support vision under conditions of poor lighting
- Integrity of all surface tissues (epithelia)
- Healthy immune system
- Role in embryonic growth and development
- Role in reproduction

(Tanumihardjo et al., 2016; WHO/FAO, 2004; IOM-FNB, 2001; Gilbert, 2013)
Vitamin A Deficiency (VAD)

- Primarily caused by diets chronically insufficient in Vitamin A
- Physiological disturbances including subclinical and clinical signs and symptoms which is reflected using the serum retinol level
Vitamin A Deficiency (VAD)

- Preventable blindness in children
- Impaired embryonic development
- Risk of morbidity and mortality from severe infections
- Risk of respiratory infection and diarrhea among children with mild to moderate VAD
- Impaired iron mobilization from stores
Population groups vulnerable to VAD

- Young Children
- Women of Reproductive Age
- Elderly
STRATEGIES TO ADDRESS VAD IN THE PHILIPPINES

- Vitamin A Supplementation
- Food Fortification

- Rice with Iron
- Flour with Vitamin A and Iron
- Refined Sugar and Cooking Oil with Vitamin A
STRATEGIES TO ADDRESS VAD IN THE PHILIPPINES

1. Vitamin A Supplementation

- Garantisadong Pambata program by the Department of Health
  - every 6 months for 6-59 months preschoolers
    - 100,000 IU for children 6-11 months old
    - 200,000 IU for children 12-59 months old
STRATEGIES TO ADDRESS VAD IN THE PHILIPPINES

1. Vitamin A Supplementation

- Supplementation among lactating mothers
  - 200,000 IU for breastfeeding mothers within 1 month of delivery
2. Food Fortification

- Republic Act No. 8976 or the Philippine Food Fortification Act of 2000

  - Mandatory fortification of staple foods i.e. rice, flour, refined sugar, and cooking oil
  - Voluntary fortification of processed foods i.e., noodles, snack foods
Vitamin A Status of Selected Population Groups in the Philippines: ENNS 2018
Guidelines used for the interpretation of Vitamin A Data (WHO/UNICEF/HKI/IVACG, 1972)

<table>
<thead>
<tr>
<th>VA Level</th>
<th>Serum Retinol</th>
<th>µg/dL</th>
<th>µmol/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deficient</td>
<td>&lt; 10</td>
<td>&lt; 0.35</td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>10 – 19</td>
<td>0.35 – 0.69</td>
<td></td>
</tr>
<tr>
<td>Acceptable</td>
<td>20 – 49</td>
<td>0.70 – 1.74</td>
<td></td>
</tr>
<tr>
<td>High</td>
<td>≥ 50</td>
<td>≥ 1.75</td>
<td></td>
</tr>
</tbody>
</table>
Prevalence cut-offs to define vitamin A deficiency in a population and its level of public health significance (WHO, 1996)

<table>
<thead>
<tr>
<th>Public Health Importance Degree of Severity</th>
<th>Serum or Plasma Retinol Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>2 - &lt; 10</td>
</tr>
<tr>
<td>Moderate</td>
<td>10 - &lt; 20</td>
</tr>
<tr>
<td>Severe</td>
<td>≥ 20</td>
</tr>
<tr>
<td>Age/Physiologic State</td>
<td>Number of Eligible</td>
</tr>
<tr>
<td>---------------------------------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>Children, 6 mos – 5 years old</td>
<td>11,771</td>
</tr>
<tr>
<td>Women of Reproductive Age (WRA), 15 to 49 years old</td>
<td></td>
</tr>
<tr>
<td>Non-pregnant/Non-Lactating Women</td>
<td>21,423</td>
</tr>
<tr>
<td>Pregnant Women</td>
<td>891</td>
</tr>
<tr>
<td>Lactating Mothers</td>
<td>2,447</td>
</tr>
<tr>
<td>Elderly, 60 years old and above</td>
<td>10,840</td>
</tr>
</tbody>
</table>
Children 6 months to 5 years old
Disaggregating the 6 mos-5 yo into two groups, children less than 1 yo had higher VAD prevalence than children 1-5 yo.

Both groups having “moderate” level of VAD prevalence.

- The overall mean SR indicate “acceptable” level (20-49µg/dL) of vitamin A concentration.
- VAD prevalence indicates public health concern of “moderate” level (10 – <20%)
Prevalence of Vitamin A deficiency among children, 6 months to 5 years old by single age:
Philippines, 2018

<table>
<thead>
<tr>
<th>Age</th>
<th>No. of Participants</th>
<th>% Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mos - 5 y</td>
<td>5,050</td>
<td>16.9</td>
</tr>
<tr>
<td>6 mos - &lt; 1 y</td>
<td>307</td>
<td>17.9</td>
</tr>
<tr>
<td>1 y</td>
<td>734</td>
<td>22.2</td>
</tr>
<tr>
<td>2 y</td>
<td>808</td>
<td>16.1</td>
</tr>
<tr>
<td>3 y</td>
<td>967</td>
<td>14.3</td>
</tr>
<tr>
<td>4 y</td>
<td>1,112</td>
<td>16.2</td>
</tr>
<tr>
<td>5 y</td>
<td>1,122</td>
<td>17.0</td>
</tr>
</tbody>
</table>
Prevalence of vitamin A deficiency among children, 6 months to 5 years old by place of residence: Philippines, 2018

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Children, 6 mos – 5 yo</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL AREAS</td>
<td>19.5 %</td>
</tr>
<tr>
<td>URBAN AREAS</td>
<td>13.7 %</td>
</tr>
</tbody>
</table>
Prevalence of vitamin A deficiency among children, 6 months to 5 years old by wealth quintile: Philippines, 2018

- Highest VAD prevalence among the poorest and lowest among the richest
Trend in VAD among children, 6 months to 5 years old

- Steep reduction in VAD prevalence from 2003 to 2018
- VAD prevalence in 2018 was of "moderate" public health concern

Note: The reduction in VAD prevalence from 2013 to 2018 was not significant
Women of Reproductive Age (15-49 yo)
Mean serum retinol and prevalence of VAD among Non-pregnant/Non-lactating Women of Reproductive Age: Philippines, 2018

- The mean SR indicates “acceptable” (20-49µg/dL) vitamin A concentration.
- The prevalence indicates that VAD was of low public health concern.

Non-pregnant/Non-lactating women

41.5 µg/dL

1.3%
Prevalence of vitamin A deficiency among non-pregnant/non-lactating women of by place of residence: Philippines, 2018

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Non-pregnant/Non-lactating women</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL AREAS</td>
<td>1.5 %</td>
</tr>
<tr>
<td>URBAN AREAS</td>
<td>1.1 %</td>
</tr>
</tbody>
</table>
Prevalence of vitamin A deficiency among non-pregnant/ non-lactating women of reproductive age by wealth quintile: Philippines, 2018

- VAD prevalence was highest among the poorest and lowest among the richest.
Mean serum retinol and prevalence of VAD among Pregnant Women: Philippines, 2018

- The mean SR indicate “acceptable” level (20-49µg/dL) of vitamin A concentration.
- VAD prevalence indicate public health concern of “mild” level (2 – <10%).

Pregnant women

36.5 µg/dL

3.2%
Trend in VAD among pregnant women

- Consistent reduction in VAD prevalence from 1998 to 2018
- VAD prevalence was of “mild” public health concern in 2018

Note: 1. The reduction in VAD prevalence from 2013 to 2018 was not significant
   2. The sample size for Pregnant Women is not enough for disaggregation (place of residence and wealth quintile)
Mean serum retinol and prevalence of VAD among Lactating Mothers: Philippines, 2018

- The mean SR indicate “acceptable” level (20-49μg/dL) of vitamin A concentration.
- VAD prevalence indicate public health concern of “mild” level (2 – <10%).
Prevalence of vitamin A deficiency among lactating mothers by place of residence: Philippines, 2018

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Lactating mothers</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL AREAS</td>
<td>2.7 %</td>
</tr>
<tr>
<td>URBAN AREAS</td>
<td>1.7 %</td>
</tr>
</tbody>
</table>
Prevalence of vitamin A deficiency among lactating mothers by wealth quintile: Philippines, 2018

- VAD was more prevalent among the poorest and lowest among the richest
Trend in VAD among lactating mothers

- Steady decline in VAD prevalence from 2003 to 2018
- VAD prevalence was of “mild” public health concern in 2018

Note: The reduction in VAD prevalence from 2013 to 2018 was not significant
Elderly $\geq$ 60 years old
Mean serum retinol and prevalence of VAD among the elderly, 60 years old and above: Philippines, 2018

The mean SR indicate "high" (≥50 µg/dL) vitamin A concentration.

VAD prevalence indicate low public health concern.

Elderly ≥ 60y

51.1 µg/dL

1.1%
Prevalence of vitamin A deficiency among the elderly, 60 years old and above by place of residence: Philippines, 2018

<table>
<thead>
<tr>
<th>Place of Residence</th>
<th>Elderly, 60 yo and above</th>
</tr>
</thead>
<tbody>
<tr>
<td>RURAL AREAS</td>
<td>1.2 %</td>
</tr>
<tr>
<td>URBAN AREAS</td>
<td>0.9 %</td>
</tr>
</tbody>
</table>
Prevalence of vitamin A deficiency among the elderly, 60 years old and above by wealth quintile: Philippines, 2018

Highest VAD prevalence was observed among the poorest and lowest among the richest.
What population group mostly affected by VAD in the Philippines?
### Mean serum retinol and prevalence of VAD by age and physiological state: Philippines, 2018

<table>
<thead>
<tr>
<th>Category</th>
<th>Serum Retinol (µg/dL)</th>
<th>Prevalence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Children, 6 mos – 5 years old</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Children 6 mos-&lt;1 y</td>
<td>25.8</td>
<td>17.9%</td>
</tr>
<tr>
<td>Children 1-5 y</td>
<td>27.5</td>
<td>16.9%</td>
</tr>
<tr>
<td>Women of Reproductive Age (15 – 49 years old)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-pregnant/Non-lactating</td>
<td>41.5</td>
<td>1.3%</td>
</tr>
<tr>
<td>Pregnant women</td>
<td>36.5</td>
<td>3.2%</td>
</tr>
<tr>
<td>Lactating mothers</td>
<td>40.6</td>
<td>2.3%</td>
</tr>
<tr>
<td>Elderly</td>
<td>51.1</td>
<td>1.1%</td>
</tr>
</tbody>
</table>
Focus on the 6 months – 5 years old children

1. Food consumption
   a. Mean intake of selected food groups
   b. Ten most commonly consumed foods with VA
   c. Mean intake of selected vitamin A rich foods
   d. Total mean intake of vitamin A

2. Nutritional status

3. Prevalence of anemia

4. Non-Participation to VAS program

5. Participation to VAS program

6. Household Food Security
1. Food Consumption

a. Mean one day intake of selected food groups

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Not VA deficient</th>
<th>VA Deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cereal and Cereal Products</td>
<td>24.6*</td>
<td>15.4</td>
</tr>
<tr>
<td>Fish, Meat and Poultry</td>
<td>63.4</td>
<td>42.7</td>
</tr>
<tr>
<td>Vegetables</td>
<td>16.0</td>
<td>16.6</td>
</tr>
<tr>
<td>Fruits</td>
<td>2.1</td>
<td>1.6</td>
</tr>
</tbody>
</table>

* Significant at *p*-value < 0.05
1. Food Consumption

b. Top ten sources of vitamin A

<table>
<thead>
<tr>
<th>Source</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Egg, chicken, whole</td>
<td>32.1</td>
</tr>
<tr>
<td>Milk, pwdr, filled, inst</td>
<td>30.4</td>
</tr>
<tr>
<td>Sausage, hotdog</td>
<td>12.4</td>
</tr>
<tr>
<td>Chicken, white meat</td>
<td>11.0</td>
</tr>
<tr>
<td>Pork Boston butt, lean</td>
<td>10.4</td>
</tr>
<tr>
<td>Cracker, salted</td>
<td>9.5</td>
</tr>
<tr>
<td>Squash, fruit</td>
<td>8.9</td>
</tr>
<tr>
<td>Cookies, sandwich type, cream filled</td>
<td>8.8</td>
</tr>
<tr>
<td>Choc-flvr energy drink, pwdr</td>
<td>8.5</td>
</tr>
<tr>
<td>Bread, pan de monay</td>
<td>7.5</td>
</tr>
</tbody>
</table>
b. Mean intake of children (in grams)

- Milk, pwdr, filled, inst: 127.3 grams
- Egg, chicken, whole: 94.6 grams
- Choc-flvr energy drink, pwdr: 22.3 grams
- Pork Boston butt, lean: 7.4 grams
- Cookies, sandwich type, cream filled: 4.2 grams
b. Mean intake of children (in grams)

- Squash, fruit: 1.3 grams
- Chicken, white meat: 1.2 grams
- Sausage, hotdog: 0.4 grams
- Bread, pan de monay: 0.07 grams
- Cracker, salted: 0.02 grams

Not VA Deficient
VA Deficient

Department of Science and Technology
FOOD AND NUTRITION RESEARCH INSTITUTE
1. Food Consumption

c. Mean 1-day intake of selected Vitamin A-rich foods (in grams)

- Liver: 30.0* grams
- Bread and Bakery Products: 19.2* grams
- Green leafy and yellow vegetables: 15.8 grams
- Fats and Oil: 0.2 grams
- 0.03 grams

* Significant at p-value<0.05
### 1. Food Consumption

#### d. Total mean vitamin A intake

<table>
<thead>
<tr>
<th></th>
<th>Not VA deficient</th>
<th>Vitamin A deficient</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mean vitamin A</strong></td>
<td>300.4 μg RE*</td>
<td>210.8 μg RE</td>
</tr>
</tbody>
</table>

- Children who are not **vitamin A deficient** have significantly higher total mean VA intake compared with **vitamin A deficient** children \((p<0.05)\).
Proportion of children meeting the EAR for vitamin A: Philippines, 2018

Not VA Deficient: 44.3%*

Vitamin A deficient: 32.2%

* Significant at $p$-value$<0.05$
2. Nutritional Status

Undernutrition was higher among vitamin A deficient children.

* Significant at $p$-value $< 0.05$
3. Prevalence of anemia

Anemia was significantly higher among vitamin A deficient children.

* Significant at $p$-value $<0.05$
4. Non-Participation in vitamin A supplementation

- Non-participation in VAS program was slightly higher among vitamin A deficient children.

![Bar chart showing non-participation in VAS program among different groups:]

- All: 30.7%
- Not VA Deficient: 29.8%
- VA Deficient: 35.2%
5. Participation in VAS Program

- Majority of children, (non vitamin A deficient and vitamin A deficient) had participated in VAS program only once in the past 12 months.
- Proportion of children who received VAS twice was slightly higher among none Vitamin A deficient than vitamin A deficient children.
6. Household Food Security

A higher proportion of vitamin A deficient children belonged to food insecure households.

* Significant at p-value<0.05
SUMMARY

- Among children 6 months – 5 years old VAD prevalence was of “moderate” public health concern;

- By single age group, 1 year old children were mostly affected with “severe” VAD level;

- Among pregnant women and lactating mothers, VAD prevalence was of “mild” public health concern;
SUMMARY

- VAD was of “low” public health concern among non-pregnant/non-lactating mothers and elderly;
- VAD was higher in rural than urban areas; and
- VAD was more prevalent among households in the poorest wealth quintile.
Vitamin A deficient children have:

- Lower food consumption;
- Higher prevalence of undernutrition;
- Higher anemia prevalence;
- Higher participation in VAS program once a year;
- Slightly lower proportion who received VAS 2x; and
- Belonged to food insecure households
thank you