

# The importance of fish as healthy food during COVID-19 Pandemic and New Normal

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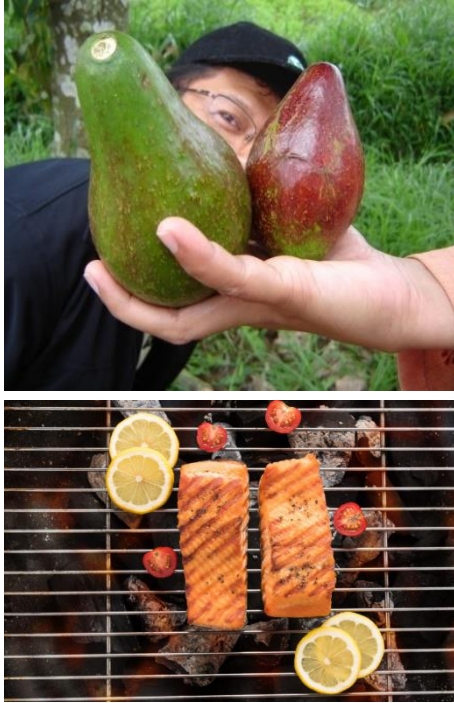
*Secretary General of Federation of Asian Nutrition Societies (FANS)*



Presented on Webinar Seafood Trade Corridor  
Indonesia Food Safety Institute, 09 July 2020



# Presentation outline



- Introduction: Knowing COVID-19 and Its Transmission
- Protection from COVID-19
- The Role of Fish as Part of Healthy Diet
- Scientific Facts of Nutrition and Health Benefits of Fish Consumption
- EFA's Consumption in Indonesia
- Conclusion

*INCREASED FISH CONSUMPTION*



## Introduction: Knowing COVID-19 and Its Transmission

# Introduction

- Fisheries and aquaculture provide nutritious food for hundreds of millions of people around the world and livelihoods for over 10% of the world's population (OECD 2020)
- With the COVID-19 pandemic, all aspects of fish supply chains are strongly affected, with jobs, incomes and food security at risk.
- Changes in food consumption and difficulties in reaching consumers are significantly impacting demand and prices
- Meanwhile, during the COVID-19 pandemic, people need to ensure their immune function work properly to prevent from getting virus transmitted by consuming adequate and balanced diet including fish inside.



# COVID-19 and Its Transmission

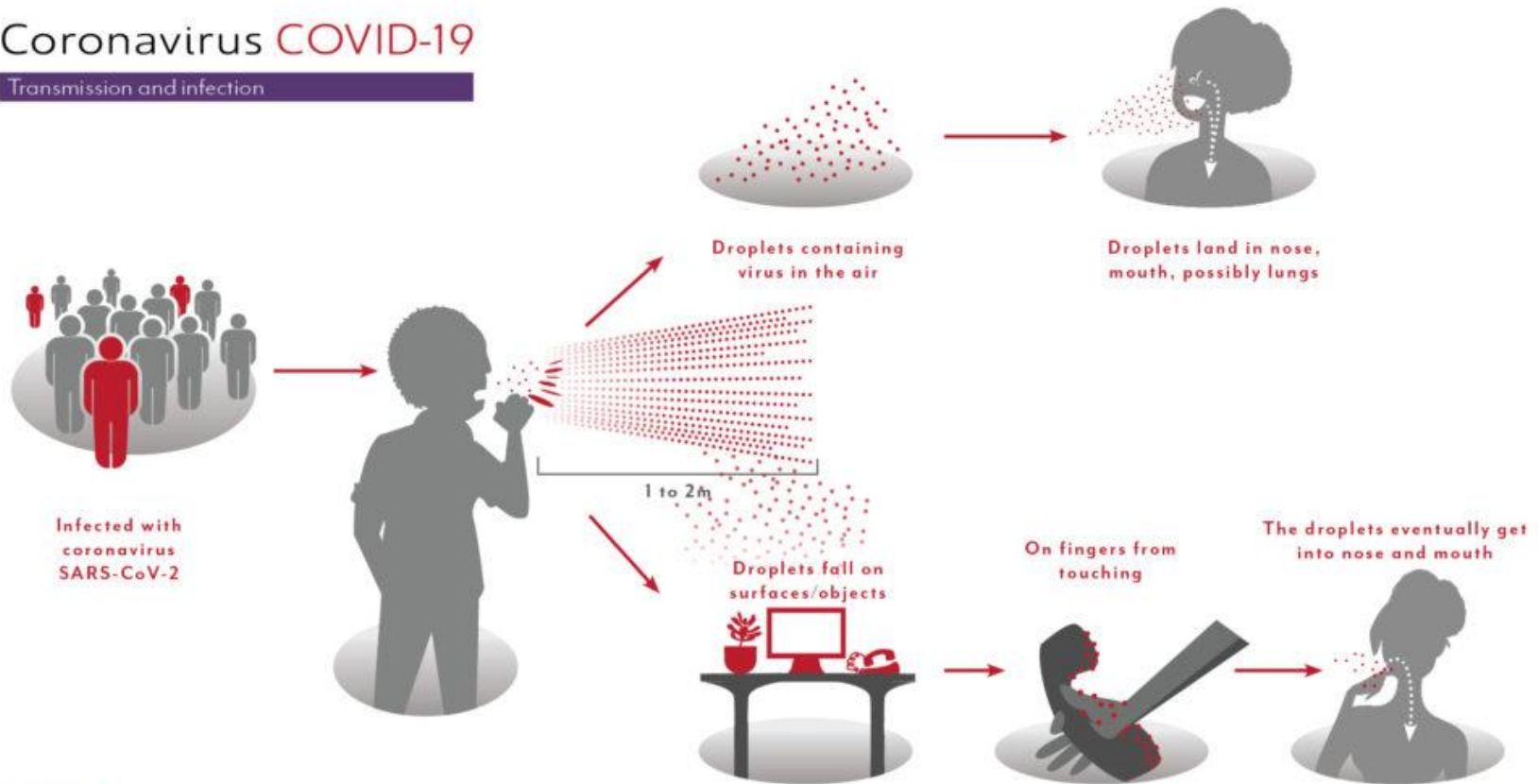
- The coronavirus disease 19 (COVID-19) is a highly transmittable and pathogenic viral infection caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which emerged in Wuhan, China and spread around the world.
- Genomic analysis revealed that SARS-CoV-2 is phylogenetically related to severe acute respiratory syndrome-like (SARS-like) bat viruses, therefore bats could be the possible primary reservoir.
- The intermediate source of origin and transfer to humans is not known, however, the rapid human to human transfer has been confirmed widely.

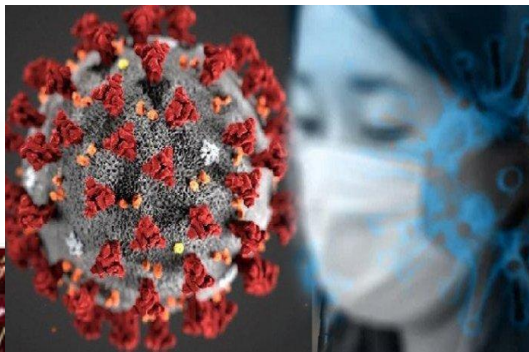
# Route of COVID-19 Transmission

- The main route is through the contact from human to human
  - direct contact with respiratory droplet (from cough and sneezing)
  - virus transmit directly from person to person when person with COVID-19 coughing, sneezing or talking.
  - The droplet reach nose, mouth, and eyes
- Alternatively, since the respiratory droplet is too heavy, the droplet will drop on objects and surfaces around the person with COVID-19 and then the other person will touch this object

# Coronavirus COVID-19

Transmission and infection





## Protection from COVID-19



# How to Protect from COVID-19

- Until now, there is no clinically approved antiviral drug or vaccine available to be used to combat COVID-19. Therefore,
  - Avoid from getting transmitted
  - Make sure the immune system already available in the body work
- WHO suggested the basic hygiene practices:
  - Hand washing
  - Wearing mask
  - Keep away hand and finger from mouth, nose and eyes
  - Avoid crowd
- Nutritionist and public health practitioners are stressing on the importance of balanced nutrition intake including antiviral foods in the diet

# Nutritionist Advices

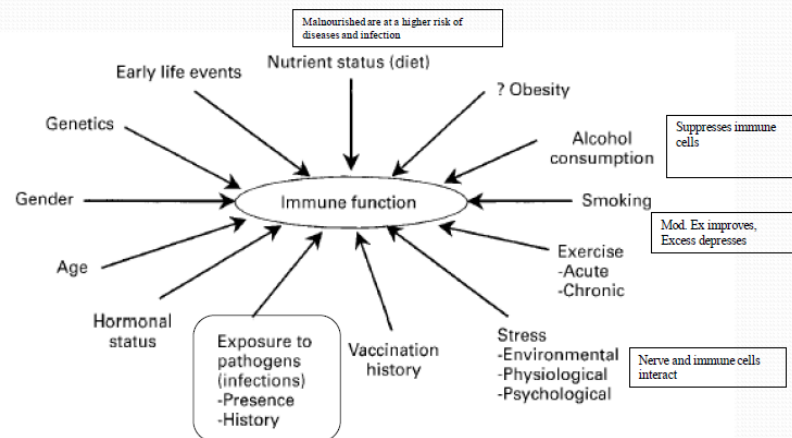


- Eat a balanced and varied diet
- Establish a routine and practice mindful eating
- Keep hydrated
- Practice safe food hygiene
- Stay active at home
- Get enough quality sleep
- Get information from trustworthy sources

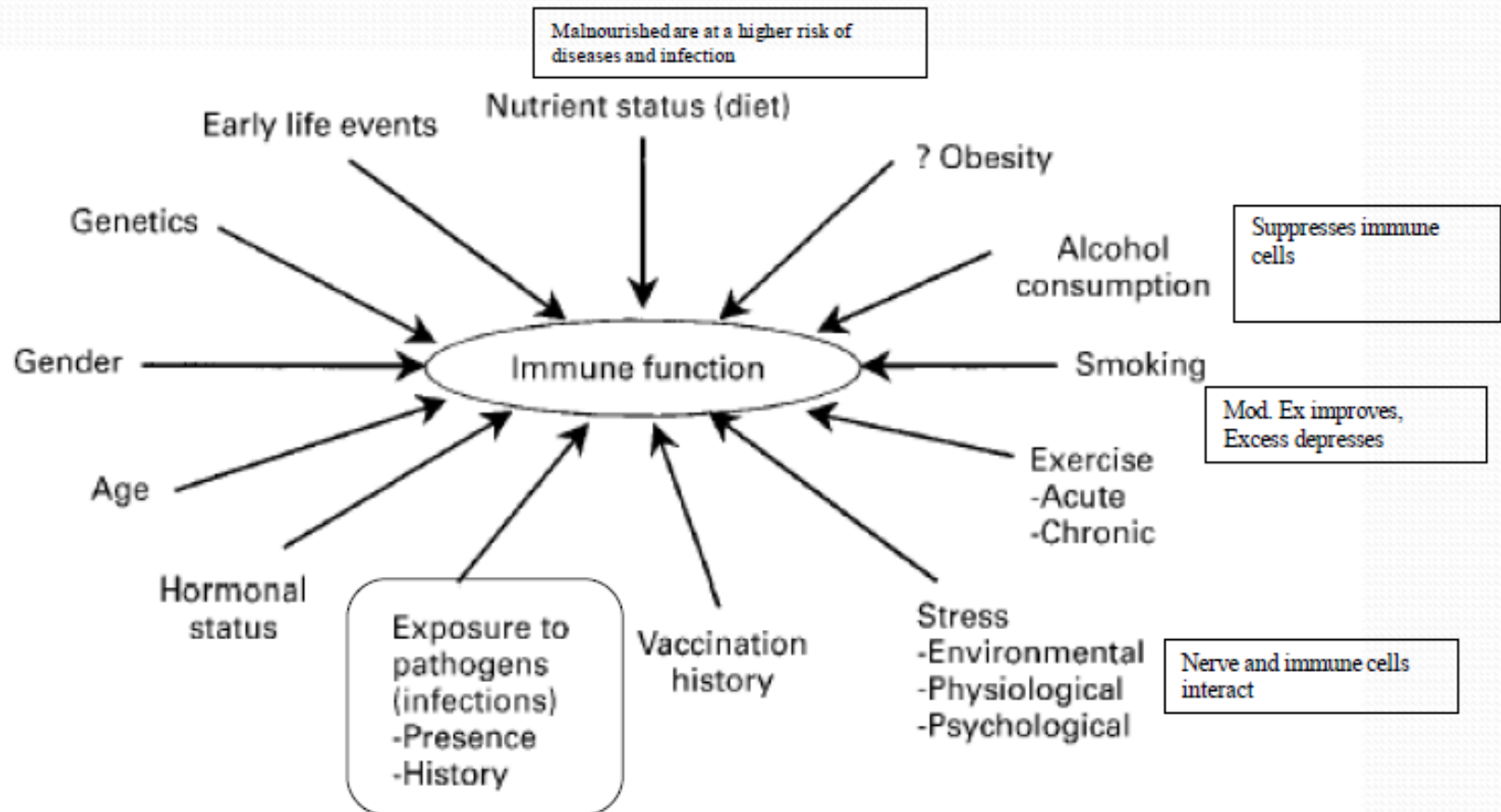
# Factors Influencing Immune System

- The vulnerability of a person on a disease depend on his/her immune system function
- People with optimum immune system will not easily get sick or transmitted
- The immune system depend on several factors as follows:

*Factors Influencing the Immune system*



## Factors Influencing the Immune system



# Enhancing Immune System

- Maintain good nutritional status by applying balanced nutrition pattern
- Consuming functional/nutraceutical food and or food supplement
- Avoiding from consuming unsafe food as it will reducing the immune system
- Practicing intermitten fasting



# Balanced Nutrition and Optimum Immunity



Sumber: Kementerian Kesehatan RI

BALANCED  
NUTRITION

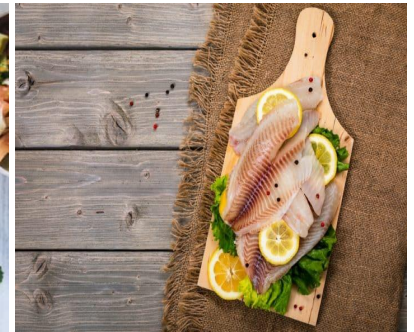


OPTIMUM  
IMMUNITY

# Good Nutrition and Immune System



- No single food nor food supplement that can meet all body requirement on nutrients and prevent any disease
- Need adequate intake of various, balanced nutrition and safe food
- Several nutrients in the foods may have specific function in enhancing immune system such as: Vitamin A, C, D, E, B6, B12, Folate, Fe, Mg, Se, Iodine, Zinc, Calcium (Ca) and potassium (K)



# The Role of Fish as Part of Healthy Diet & The Benefits of Fish Consumption during COVID-19 Pandemic and New Normal

# The Nutrition of Fish

- Fish is part of healthy diet
  - Fish consumption provides many clear nutrition benefits
- Fish provide high quality protein, minerals and trace elements, fat soluble vitamins, and essential fatty acids, including long chain unsaturated fatty acid omega-3 (FAO, 2010).
- Dietitian suggests to consume at least 2 serving @115 g or one serving @ 230 g of fish per week.





## Example: Presto Bandeng (Mikfish)

- Contain high protein
- High vitamin A to maintain eye health and for immunity
- High phosphor and calcium to maintain bone and teeth health and prevent the osteoporosis
- Contain omega-3 fatty acid for brain and intelligence





# Nutrient Content of Bandeng (Milkfish)

- Energy 129 kkal,
- protein 20 gr,
- Fat 4.8 gr,
- calcium 20 mg,
- phosphor 150 mg,
- Iron 2 mg,
- vitamin A 150 SI
- vitamin B1 0.05 mg
- Vit E 20 mg
- EPA 180 mg
- DHA 120 mg
- High digestibility
- Suitable consumed by any age of consumer
  - Fulfill body requirement on protein
  - Protect and maintain health
  - Prevent diseases due to micronutrient deficiencies
  - Low cholesterol
  - Prevent for heart disease
  - Prevent from depression

# Nutrient Content of Bandeng Presto (per 100 g)

• energy	296 kilokalori
• protein	17,1 gram
• carbohydrat	11,3 gram
• lemak	20,3 gram,
• calsium	1422 milligram
• phosphor	659 milligram
• iron	1,9 milligram
• retinol	6 ug
• vitamin B1	0,14 milligram
• Vitamin C	69.09 mg
• Caroten total	400
• Ca	1422 milligram
• P	659 mg
• Fe	1.9 mg
• ARA	0.06 mg
• EPA	0.08 mg
• DHA	0.18 mg



TKPI 2009

# The Benefits of Fish Consumption



- Many benefits could be obtained from consuming fish especially during pandemic COVID-19
- Luckily, fish consumption (kg/capita/year) in Indonesia has been increasing during the last five years: 38,14 kg (2014) per kapita, 40,9 kg (2015), 43,88 kg (2016), 47,12 kg (2017), 50 kg (2018) and 54,49 kg (2019)
- The following slides will explain some main fish nutrients that may improve immune function



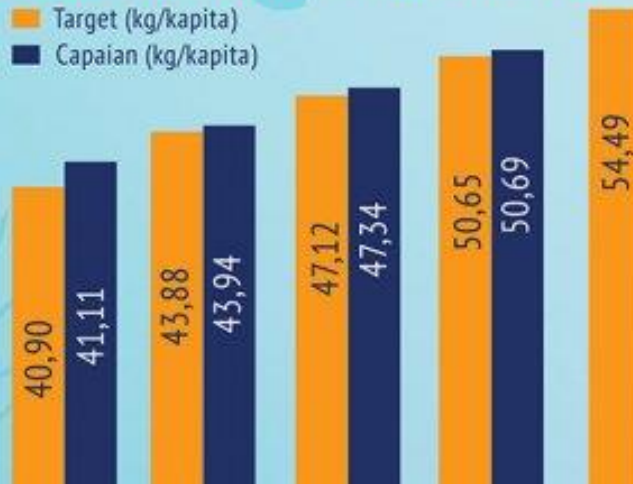
# KONSUMSI IKAN TERUS MENINGKAT

Konsumsi ikan per kapita Indonesia terus meningkat dari tahun ke tahun. Tapi jika dibandingkan dengan negara-negara lain, angkanya masih tergolong rendah meski kita memiliki wilayah perairan yang begitu luas. Apa upaya pemerintah untuk mendorong masyarakat agar lebih banyak memakan ikan?



## KONSUMSI IKAN MASYARAKAT INDONESIA

Target (kg/kapita)  
Capaian (kg/kapita)



## KONSUMSI IKAN DI NEGARA LAIN

(kg/kapita/tahun)

41  
Indonesia

70  
Malaysia

80  
Singapura

100  
Jepang

## PERTUMBUHAN PRODUKSI PERIKANAN

TRIWULAN III 2015-2018

Produksi Ikan (juta ton)



Antara, 2020



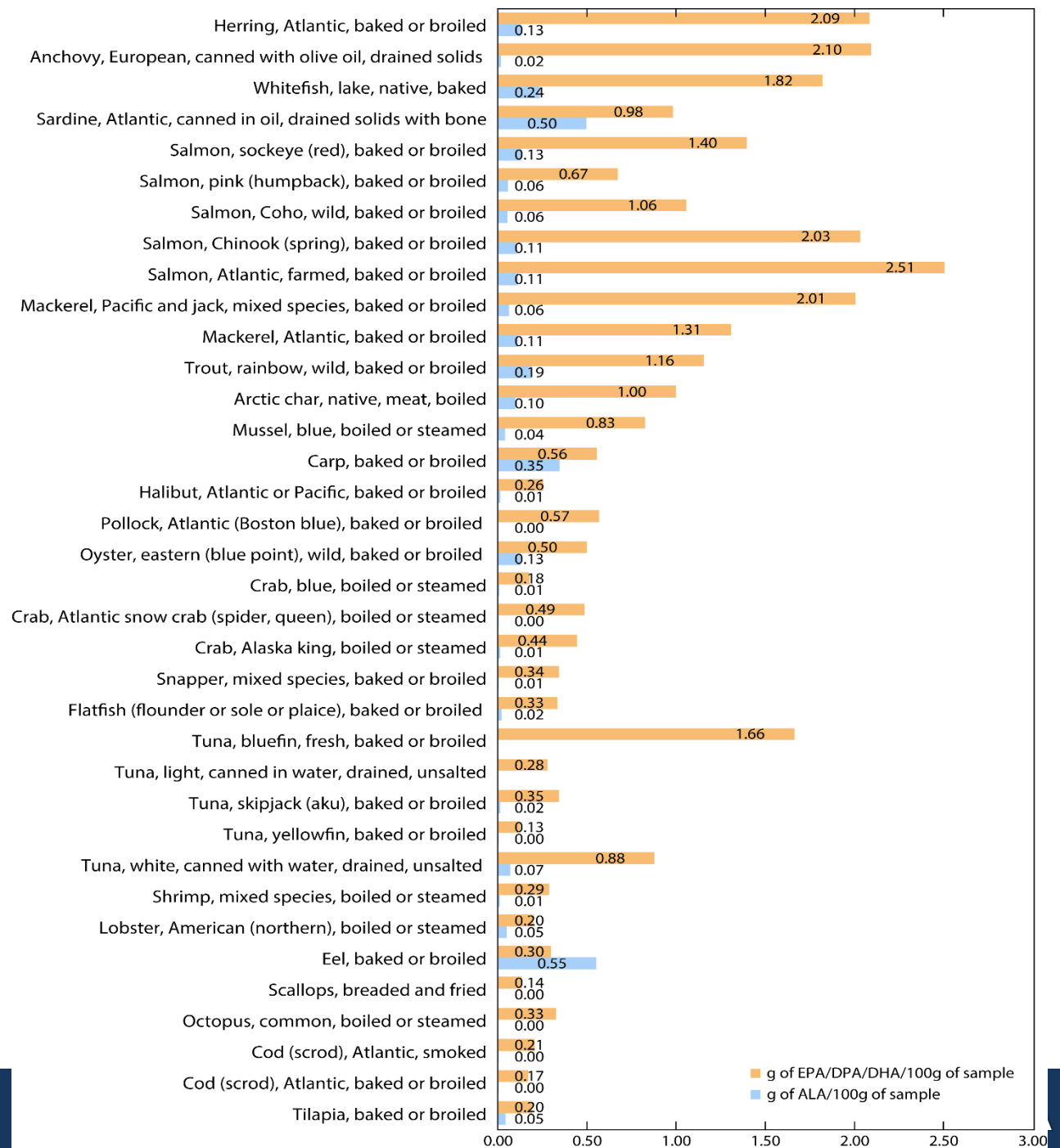
# 1. Omega-3 Fatty Acids

- Essential in human nutrition and has been proven to be involved in many metabolic functions
  - Essential Fatty Acids (EFAs)
  - Poly-unsaturated fatty acids (PUFA)
- Important role in production of substances regulating immunity in the body and protecting the body from damage due to over-reacting to infection.
- Have anti-inflammation effect, reducing platelet aggregation and essential part of cell membrane, cardiovascular system, brain, and nerve tissues
- The omega-3 content varies among different fish





$\alpha$ -Linolenic acid (ALA), docosahexaenoic acid (DHA), and eicosapentaenoic acid (EPA) content of fish and seafood (Health Canada 2016).

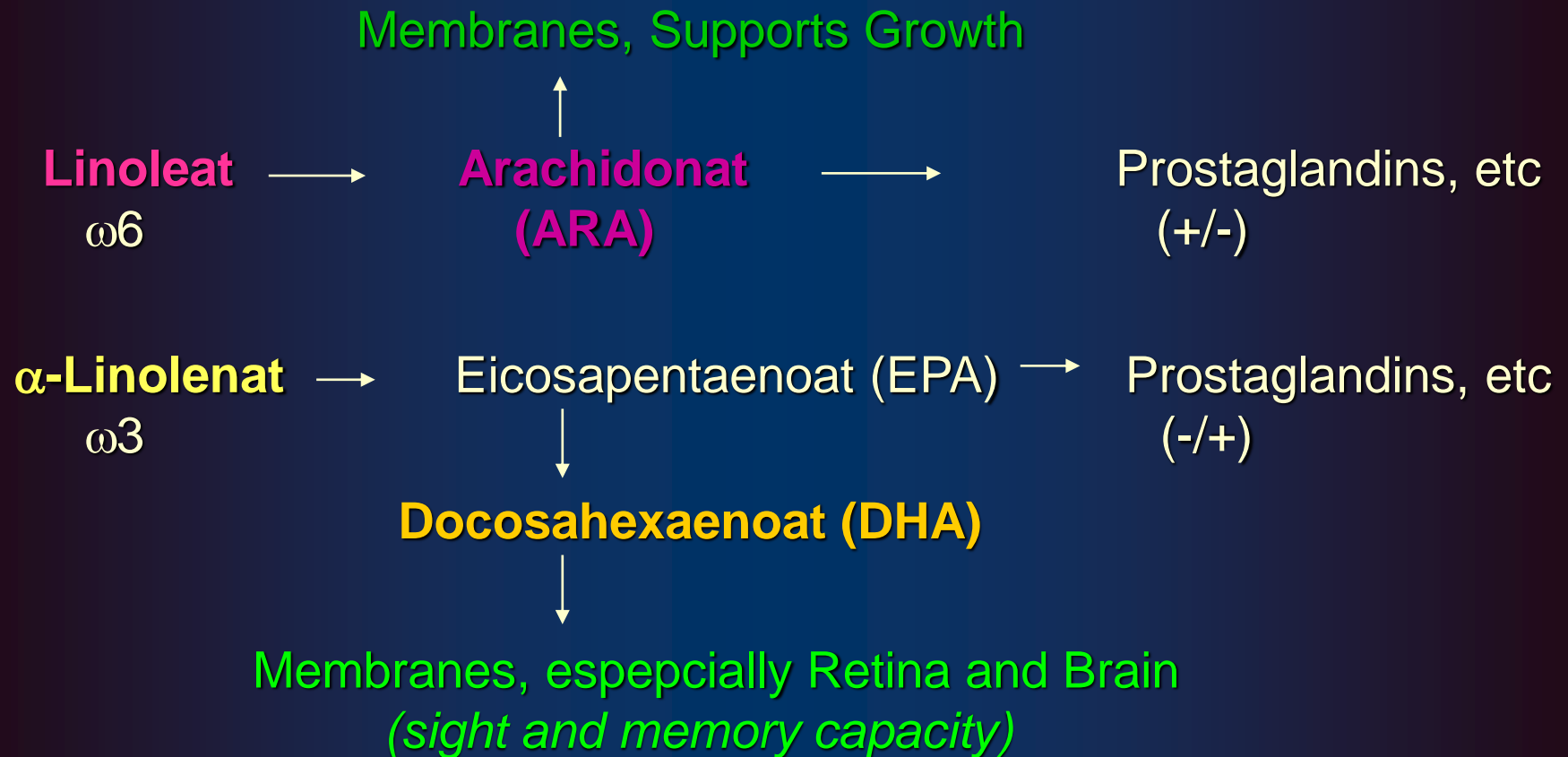


# EFAs and PUFA Functions

- Proper development and functioning of the brain and nervous system
- Formation of healthy cell membranes
- Production of hormone-like substances called Eicosanoids that are responsible for regulating blood pressure, blood viscosity, vasoconstriction, immune and inflammatory responses.

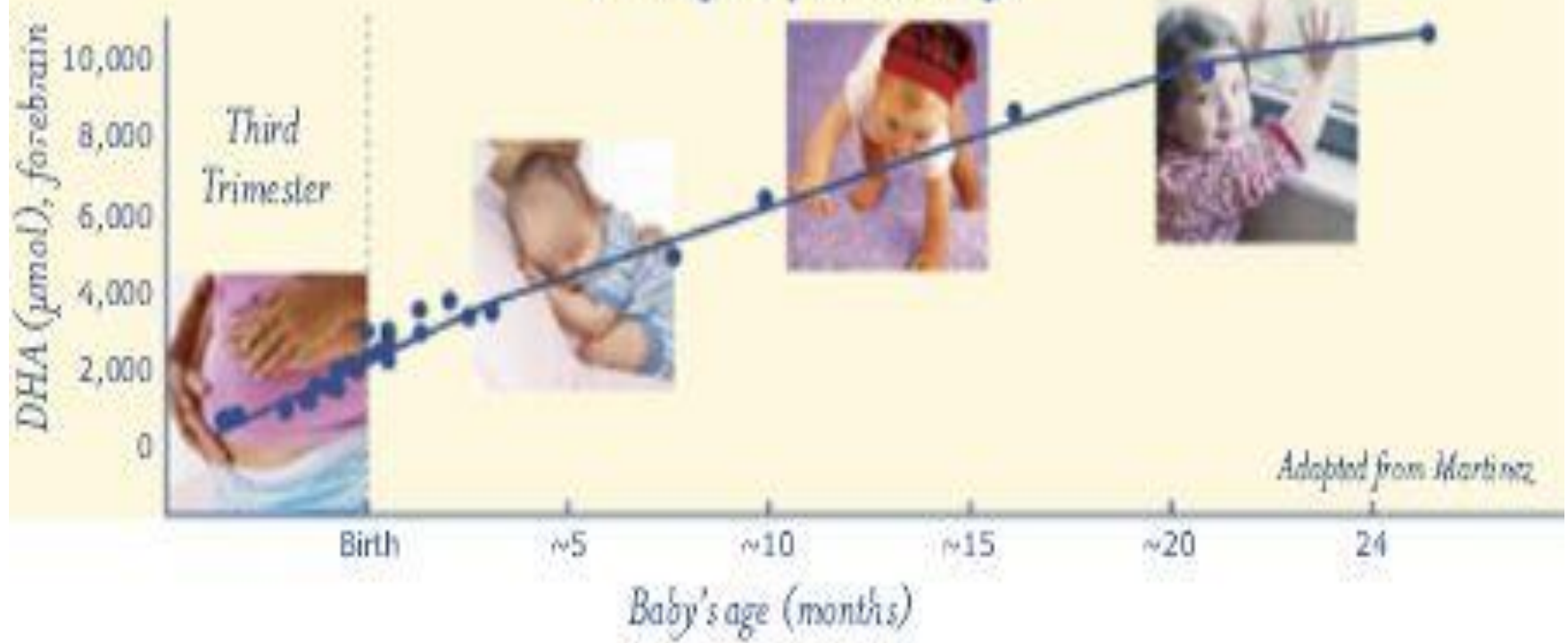


## Linoleic and Linolenic will be converted into DHA and ARA: Building Blocks of Growing Brain



Note: Linoleic and  $\alpha$ -linolenic are precursor of ARA and DHA,.

## DHA levels in the brain increase substantially from the third trimester through 2 years of age



[Enlarge Image](#)



# Side Effects of EFAs Deficiency

- impaired growth
- immune and mental deficiencies
- weakness
- hemorrhagic dermatitis
- skin atrophy
- scaly dermatitis
- dry skin
- high blood pressure
- high triglycerides
- hemorrhagic folliculitis
- hematologic disturbances (ex: sticky platelets)
- impaired vision
- tingling sensations
- mood swings
- edema

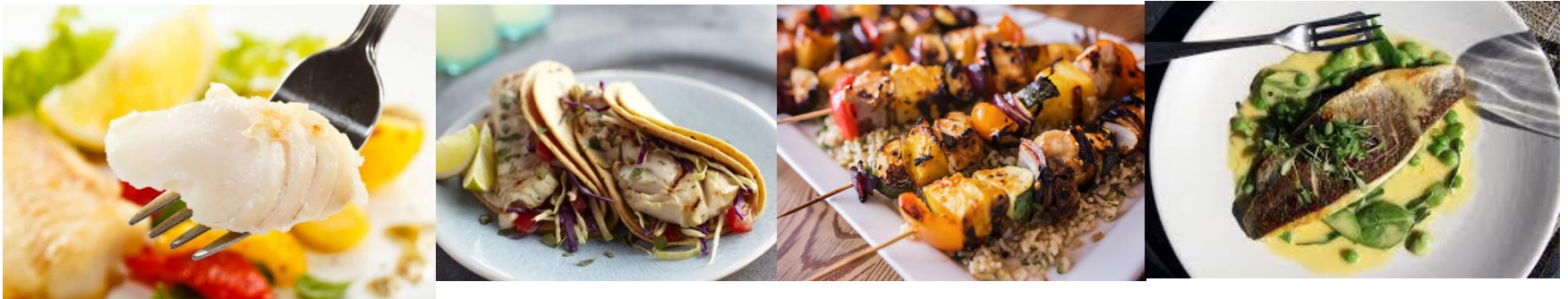
# Biochemical and Physical Signs and Symptoms of Essential Fatty Acid Deficiency

Biochemical	Physical
<ul style="list-style-type: none"><li>• Elevated triene:tetraene ratio</li><li>• Elevated liver function tests</li><li>• Hyperlipidemia</li><li>• Thrombocytopenia</li><li>• Altered platelet aggregation</li></ul>	<ul style="list-style-type: none"><li>• Dry, scaly rash</li><li>• Hair loss</li><li>• Hair depigmentation</li><li>• Poor wound healing</li><li>• Growth restriction in children</li><li>• Increased susceptibility to infection</li></ul>

A deficiency of essential fatty acids—either omega-3s or omega-6s—can cause rough, scaly skin and dermatitis . Plasma and tissue concentrations of DHA decrease when an omega-3 fatty acid deficiency is present. However, there are no known cut-off concentrations of DHA or EPA below which functional endpoints, such as those for visual or neural function or for immune response, are impaired.

## 2. Protein

- Protein play important role in immune system especially for healing and recovering from disease.
- Seafood and fish from aquaculture contain high quality protein including complete essential amino acids for human → complete protein source



### 3. Vitamin A

- Vitamin A help regulate immune system and protect from infection by keeping the skin and tissue in the respiratory system is healthy
- Also known as anti-inflammation vitamin due to its critical role in enhancing immune system.
- Oily Fish like salmon, king mackerel, cod, tuna are good source of vitamin A



## 4. Vitamin B

- B vitamins like B2, B6 and B12 help in keeping the immune system working properly
  - By regulating inflammation
  - While supporting red and white blood cell formation
    - to keep the oxygen flowing while fighting against disease
- Seafood, both fish and clam contain various B vitamins





# 5. Vitamin D

- Vitamin D play important role as part of innate antimicrobial response
  - Help keeping the immune system function properly
- Seafood of choices as good vitamin D source: sardines, salmon, herring and tuna.



## 6. Iodine

- Iodine is fuel providing power for all metabolic activities in the body
- Since the immune system rely on the proper function of metabolism to keep healthy, iodine is useful to ensure the immune response is being active
- Iodine is found in adequate number in seafood like cod, scallops, lobster, seabass, and shrimp.



# 7. Magnesium and Selenium

- **Magnesium** help in regulating immune cell formation
- Source: salmon, mackerel and halibut
- **Selenium:** antioxidant which help in reducing oxidative stress level in the body → reducing inflammation and enhancing immunity
- All seafood contain selenium
  - Good choices: tuna, sardines, clams, halibut, dan shrimp



## 8. Potassium and Calcium

- Potassium indirectly controls the calcium and signaling immune cells.
- Calcium source fish: sardines, salmon and shrimp
- Good potassium source: halibut, tuna, cod and snapper, nila and mujair (tilapica)



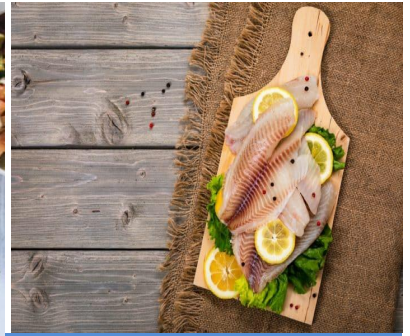


## 9. Zinc

- Zinc helps immune system work properly and aids wound healing
- Zinc found in all body cells
- Help immune system against bacterial and virus attack
- The body also need zinc to make protein and DNA, genetic material in cell
- Good sources Shellfish like oysters, crab and lobster. Also sardines, salmon, flounder and sole.







# Scientific Facts about Nutrition and Health Benefits of Fish Consumption

# Scientific Facts about Nutrition and Health

## Benefits of Fish Consumption



- Premature and retarded growth babies were born with LC-PUFAs (ARA, DHA) deficit
- DHA deficit in brain was found to affect the sight and cognitive development on premature and low birth weight babies
- Fish consumption by the mother during pregnancy and after birth was associated with higher mental development score
- As far as the fish is not contaminated, eating fish moderately during pregnancy and during lactating may provide benefits on child growth and development



Epidemiology. 15(4):394-402, July 2004.

# DHA & ARA are Abundant in Brain and Eyes Membran cell



- Brain dry material: 50-60% fat<sup>1</sup>
- DHA represents
  - ~33% of fatty acid in specific phospholipid of “brain gray matter”<sup>2</sup>
  - Up to 65% of total fatty acids in specific phospholipid of certain membrane in eyes<sup>2</sup>

1. Crawford MA. *Am J Clin Nutr.* 1993;57(suppl):703A-710S.
2. Neuringer M, et al. *Annu Rev Nutr.* 1988;8:517-541.



- Research published in Pediatrics edition August 2001 found that addition of DHA and ARA on formula had benefits on sight, movement, and word vocabulary of baby
- Research in England indicated that increased fish consumption or omega-3 fatty acid intake during pregnancy, increased the fetus growth rate



- There were evidents that DHA and other fatty acids may help in preventing main depression, polar disease and even [schizophrenia](#).



- There was relationship between eating fish and mental health especially in preventing post birth delivery depression

- One study published in the Journal of Affective Disorders Oktober 2001 edition, found the inverse relationship between eating fish and depression after giving birth in 23 countries.



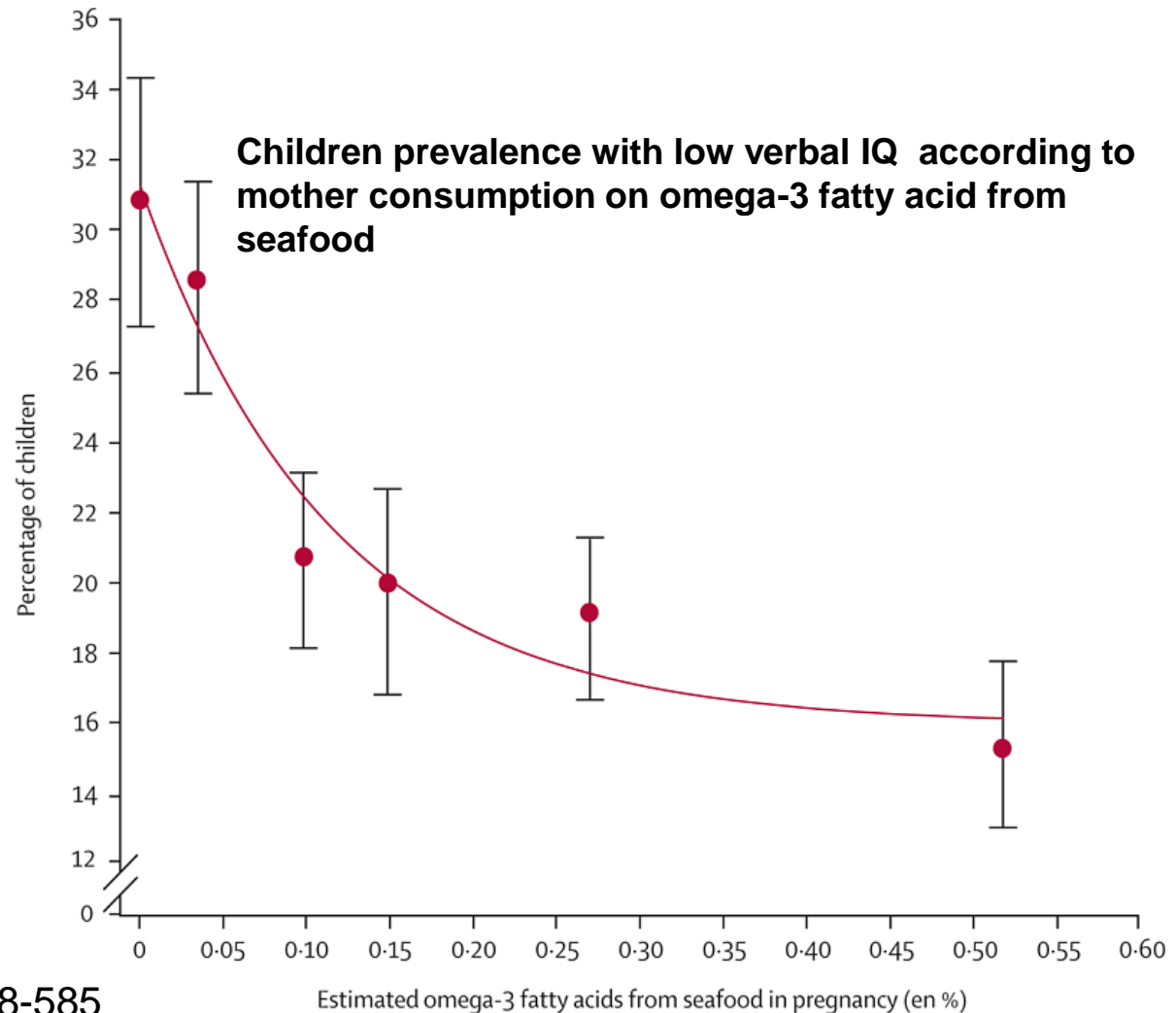
- Omega-3 fatty acid affected the mood, personality, and behavior of the mother according to study at University of Pittsburgh School of Medicine



[Rogers I, Emmett P, Ness A, Golding J](#)  
*J Epidemiol Community Health* 2004; 58:486-92.



- Woman who eat seafood during pregnancy may boost the IQ of baby born (Lancet)



*The Lancet* 2007; **369**:578-585



- The study of Hibbeln et al concluded that pregnant women who ate fish or seafood more than 340 g per week had more intelligent child with better developmental skill.
- Children whose mother did not eat seafood had lower verbal IQ score compared to those whose mother ate seafood.
- Eating fish two or three times a week is suggested as part of healthy balanced diet during pregnancy and also suggested for all family members.



immune system  
fresh and unprocessed  
your body needs. Drink enough water  
obesity, heart disease, stroke, diabetes and

## Eat fresh and unprocessed foods every day

- » Eat fruits, vegetables, legumes (e.g. lentils, beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat, brown rice or cassava), and foods from animal sources (e.g. meat, fish, eggs and milk).
- » Daily, eat: 2 cups of fruit (4 servings), 2.5 cups of vegetables (5 servings), 180 g of grains, and 160 g of meat and beans (red meat can be eaten 1-2 times per week, and poultry 2-3 times per week).
- » For snacks, choose raw vegetables and fresh fruit rather than foods that are high in sugar, fat or salt.
- » Do not overcook vegetables and fruit as this can lead to the loss of important vitamins.
- » When using canned or dried vegetables and fruit, choose varieties without added salt or sugar.

## Eat moderate amounts of fat and oil

- » Consume unsaturated fats (e.g. found in fish, avocado, nuts, olive oil, soy, canola, sunflower and corn oils) rather than saturated fats (e.g. found in fatty meat, butter, coconut oil, cream, cheese, ghee and lard).
- » Choose white meat (e.g. poultry) and fish, which are generally low in fat, rather than red meat.
- » Avoid processed meats because they are high in fat and salt.
- » Where possible, opt for low-fat or reduced-fat versions of milk and dairy products.
- » Avoid industrially produced trans fats. These are often found in processed food, fast food, snack food, fried food, frozen pizza, pies, cookies, margarines and spreads.

## Drink

- » Water
- » Water
- » Water

# Nutrition advice for adults during COVID-19

## Eat more unsaturated fats

(fish, avocado, nuts, olive oil, soy, canola, sunflower and corn oils)

## Eat less saturated fats

(fatty meat, butter, coconut oil, cream, cheese, ghee and lard)

## Don't eat industrially produced trans fats

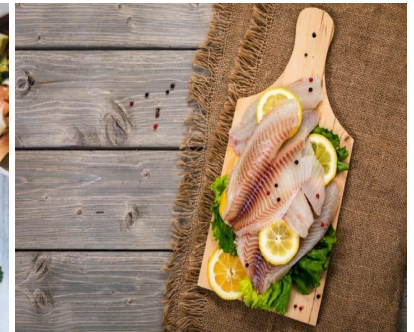
(processed food, fast food, snack food, fried food, frozen pizza, pies, cookies, margarines and spreads)



World Health Organization

REGIONAL OFFICE FOR THE Eastern Mediterranean

#COVID19  
#CORONAVIRUS



# Research on EFAs Consumption in Indonesia



# List of Foods High in EFAs in Indonesia

Type of food (mg/100 g)	Linoleic Acid	Linolenic Acid	EPA	DHA
Catfish	1147.5	77.6	36.9	145.5
Sardinella/lemuru	37.7	12.6	472.8	623
Canned sardines with tomato sauce	45.8	15.1	568.5	362.5
Packaged palm oil	9660	0	0	0
Tofu	3911.3	533	0	0
Roasted pork	4857.1	448.8	0	16
Fried tempe	4360.4	398.1	0	0
EFA fortification formula milk for pregnant women	394.1	46.4	11.6	49.8

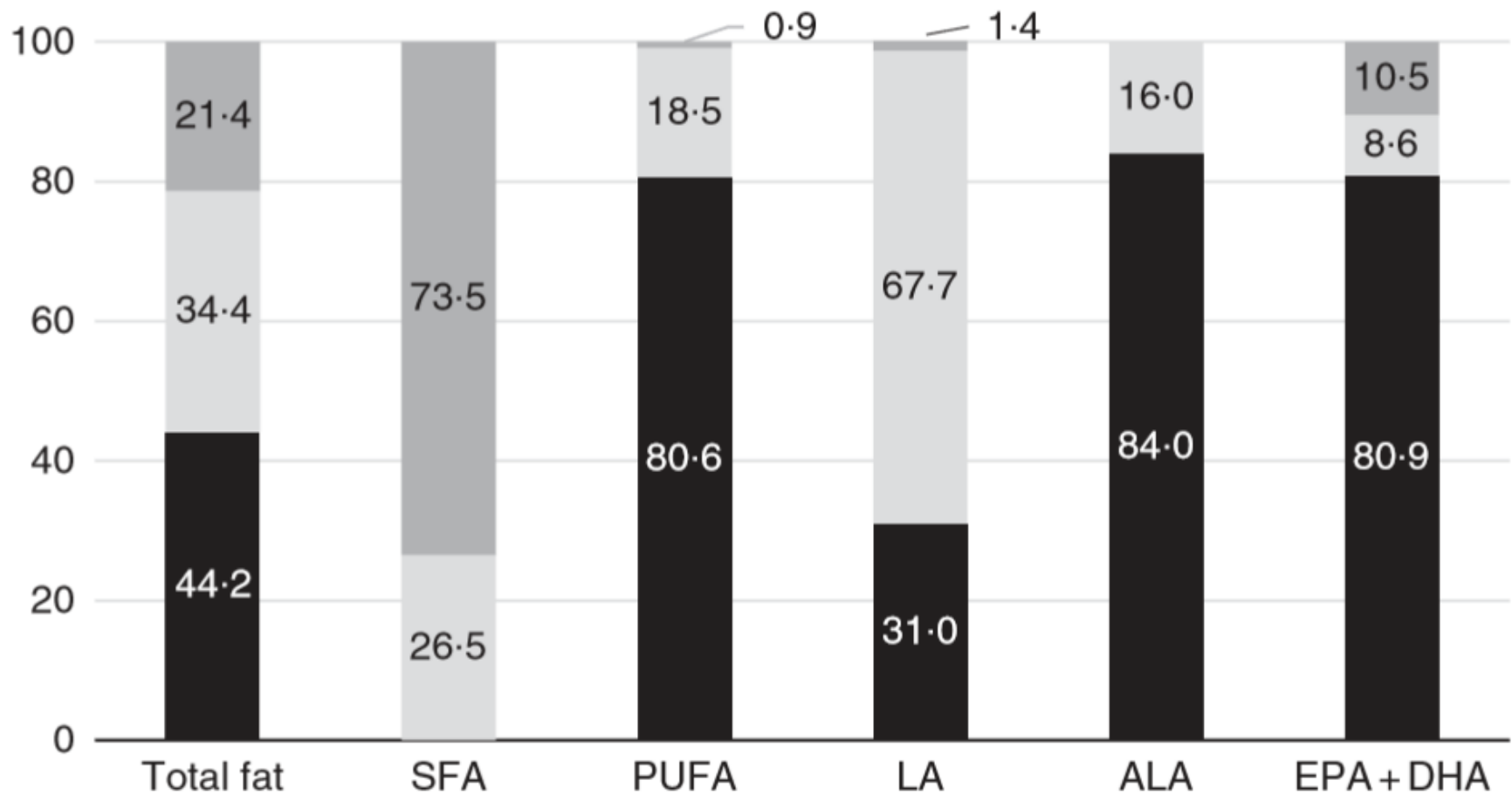


**Table 3.** Percentage contribution of different food groups to fat and fatty acid intakes among Indonesian children\*

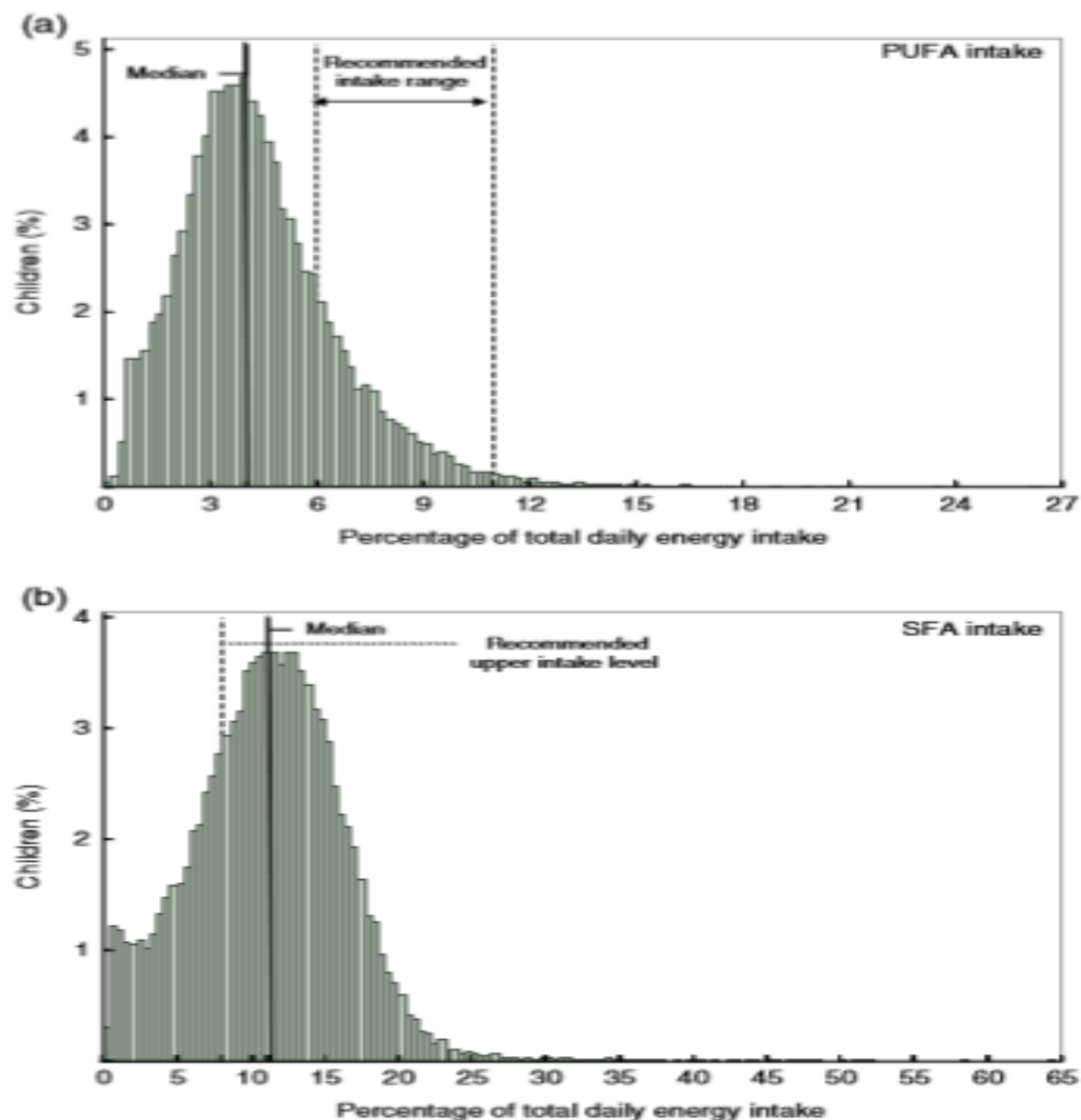
	Total fat	SFA	PUFA	LA	ALA	DHA + EPA
Oils and fats	37.3	45.6	23.4	27.3	4.4	0.5
Cereals and tubers	14.3	13.7	16.5	17.8	10.5	0.5
Snacks	14.3	16.0	10.4	11.2	4.1	1.1
Eggs	8.1	6.0	8.1	8.1	2.5	5.1
Legumes, nuts and seeds	6.2	1.6	19.7	20.8	26.4	0.1
Fish	6.1	3.7	9.1	5.7	6.0	91.2
Meat, poultry	4.4	3.0	4.1	4.1	3.2	0.5
Vegetable dishes, soup, etc.	4.2	4.0	6.4	3.1	38.4	0.2
Milk and dairy products	3.6	5.0	1.3	1.0	3.8	0.1
Fruits	0.2	0.1	0.3	0.2	0.3	0.0
Spices	0.8	0.9	0.7	0.7	0.3	0.6
Drinks, sugar and others	0.3	0.5	0.1	0.1	0.0	0.0

LA, linoleic acid; ALA,  $\alpha$ -linolenic acid.

\* Data are based on a single 24-h recall.

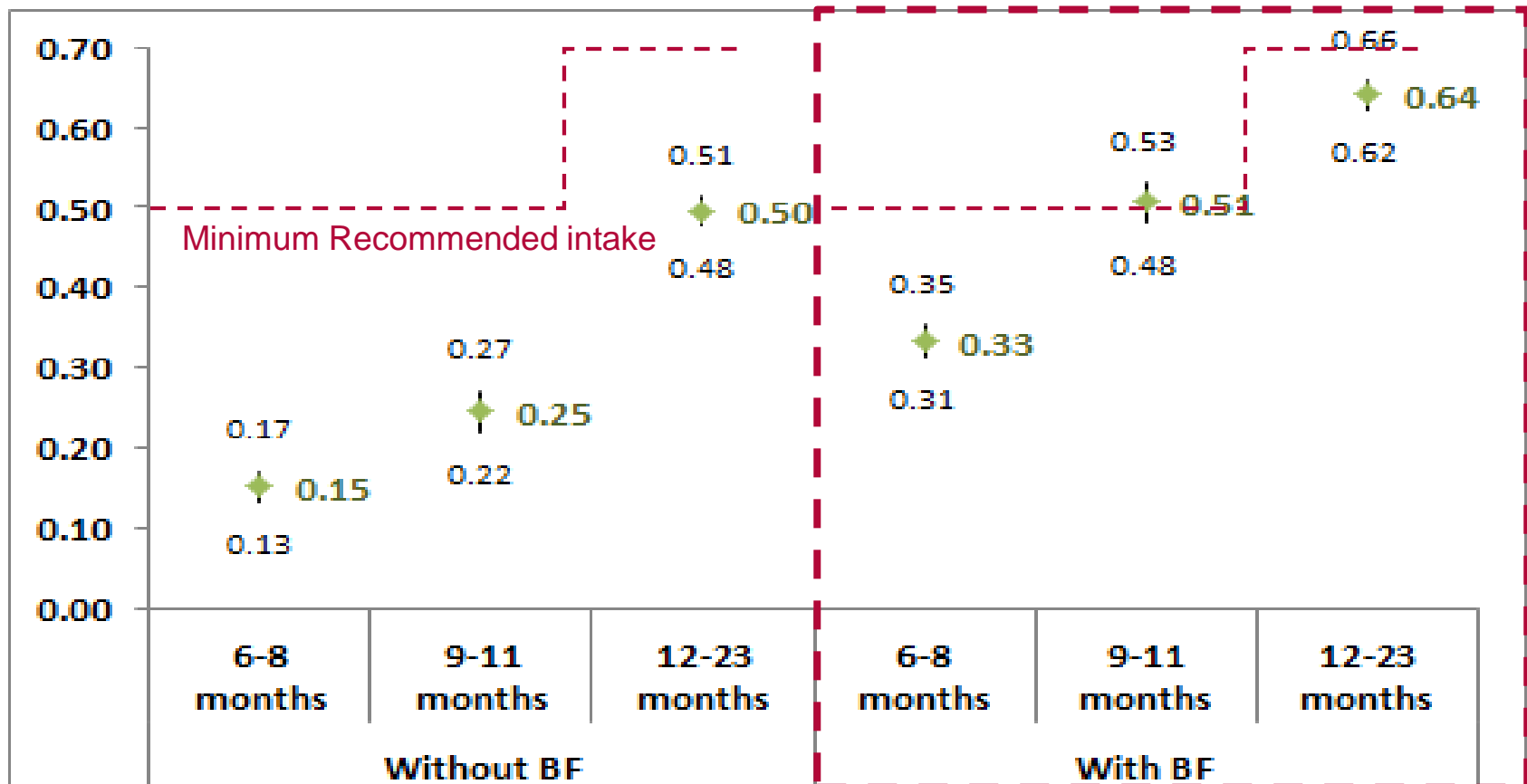


**Fig. 1.** Percentage of Indonesian children with total fat or fatty acid intakes below (■), at (□) or exceeding (■) Food and Agriculture Organization/World Health Organization<sup>(2)</sup> recommendations. Data are based on a single 24-h recall. ALA,  $\alpha$ -linolenic acid; LA, linoleic acid.



**Fig. 2.** Distribution of Indonesian children's intake of (a) total PUFA and (b) SFA. Data are based on a single 24-h recall in the context of Food and Agriculture Organization/World Health Organization<sup>(2)</sup>-recommended intake levels.

# Estimation of Omega-3 Intake of Infant in Indonesia



From 24 hr recall of RISKESDAS 2010 and 2014 IPB study of foods frequently consumed by pregnant mothers and BADUTA. BF = Breast Feeding

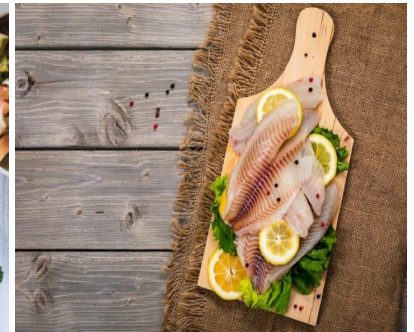
# Conclusion & Recommendation from Fatty Acid Study in Indonesia

- Omega 3 and Omega 6 intake of Indonesian children and Infant still below recommended Adequate Minimum Intake
- Continuing breast feed of infants 6 – 24 months old increase significantly intake of Omega 3 and Omega 6
- Children as well as mothers should be educated to increase consuming food high in EFAs and other PUPAs such as fish, tempeh, etc.

## Recommendation:

- Increasing awareness among policy makers, educators, women at reproductive age and caregivers about EFA's and the reasons why they are important.
- Recommending the use of foods that are rich in omega 3 and omega 6 such as fish in the preparation of home made complementary foods





## Conclusion

# Conclusion

- During COVID-19 pandemic and facing new normal, people need to maintain the immune system function properly
- To maintain the immune system function properly, people need to consume various, balance, nutritious and safe food
- Many nutrition and health benefits of fish consumption and therefore, fish should be part of healthy diet especially during COVID-19 pandemic to enhance immune function and other health benefits
- Essential fatty acid like omega-3 consumption in Indonesia especially among children is still low and therefore, fish consumption need to be continuously endorsed.



# TERIMA KASIH

## Thank you



**Informasi lebih lanjut:**

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# Recommended Adequate Intake for Infants & Children

- The American Academy of Pediatrics recommends at least 2.7% of total kilocalories in the form of linoleic acid.
- Of note, human milk provides 3.5% to as high as 12% of total kilocalories in the form of linoleic acid depending on the fat composition of the maternal diet.

AI for Infants and Children		
Age	Omega 3	Omega 6
0-6 mos	0.5 gr/day	4.4 gr/day
7-12 mos	0.5 gr/day	4.6 gr/day
1-3 yrs	0.7 gr/day	7 gr/day
4-8 yrs	0.8 gr/day	10 gr/day

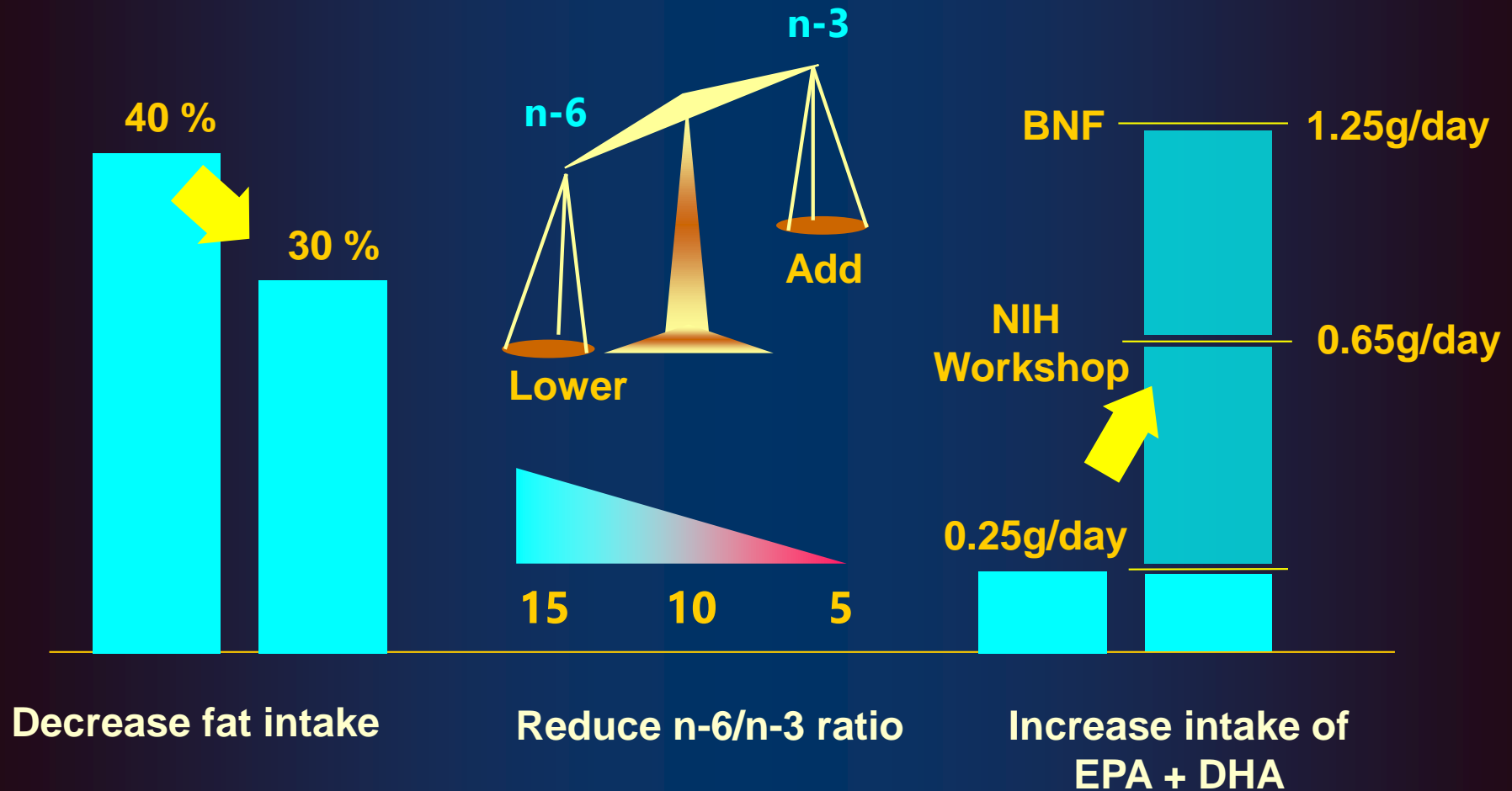


# Adequate Intake (AI) of EFAs

- AI linoleic for children : 7 g/day
- AI linoleic for pregnant and lactating women : 13 g/day
- AI linolenic for children : 0.7 g/day
- AI linolenic for pregnant and lactating women : 1.3 g/day and 1.3 g/day, respectively (IOM 2005)
  
- AI EPA for children : 100 – 118 mg/day
- AI EPA for women : 50 – 150 mg/day
- AI DHA for children : 100 -118 mg/day
- AI DHA for pregnant : 100 mg/day
- AI DHA for lactating women : 60 – 70 mg/day (EFSA 2012)



# General Recommendation of Fat and PUFA intakes

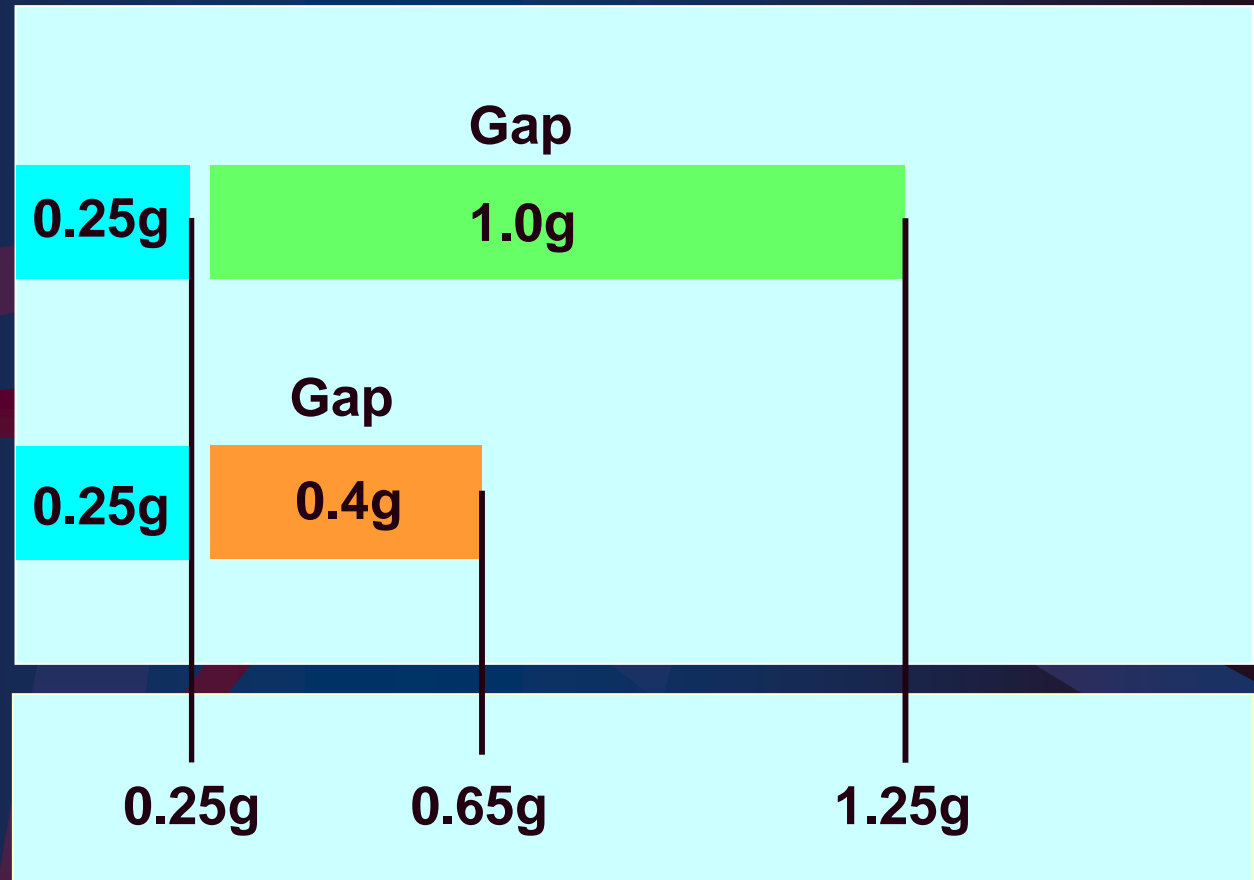


# Gap of EPA/DHA

Recommendasi  
BNF 1992

NIH Workshop  
1999

Actual intake

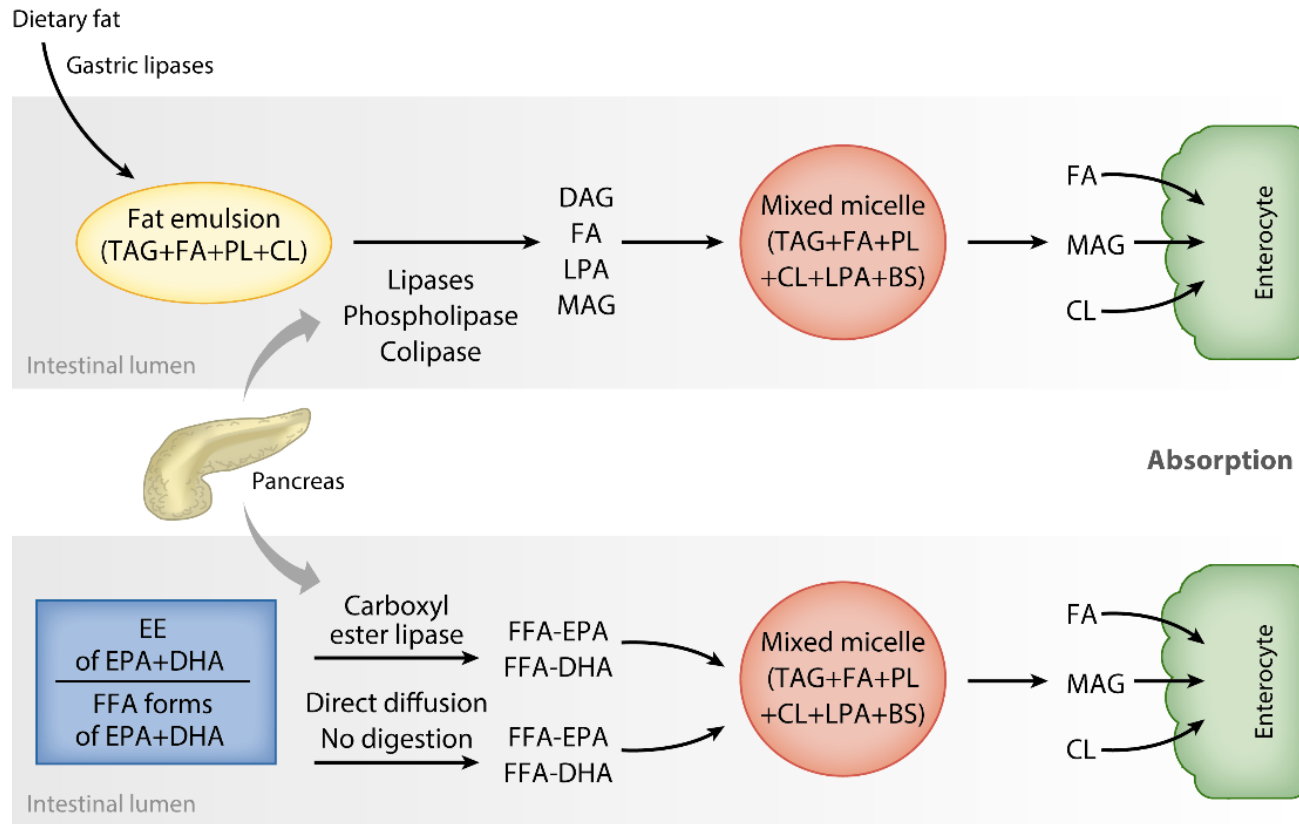


EPA + DHA intake (gram)

**Table 1** Omega-3 polyunsaturated fatty acid content of marine sources

Marine sources	EPA (%)	DHA (%)	DPA (%)	Reference
Fish				
Menhaden oil	18.3	9.6	1.8	Ackman 2005
Herring oil	7.5	6.8	0.75	
Cod liver oil	12.2	12.7	1.7	Copeman & Parrish 2004
Cod flesh oil	19.1	32.6	2	
Capelin oil	9.3	4.1	0.9	
Skipjack tuna oil	11.1	29.1	0	Tanabe et al. 1999
Butterfish oil	5.1	10.8	2.4	Budge et al. 2002
Yellowtail flounder oil	15	18.7	3.3	
Winter flounder oil	14.4	20.1	3.8	
Haddock oil	14.8	24.8	1.9	
Halibut oil	9.6	30.6	2.6	
Mackerel oil	8	19.3	1.6	
Salmon oil	6.2	9.1	1.8	Aursand et al. 1994
Marine mammals				
Bearded seal oil	9.27	13.38	4.76	Shahidi 1998
Grey seal oil	5.23	7.12	4.94	
Harbor seal oil	9.31	7.76	4.22	
Harp seal oil	6.41	7.58	4.66	
Hooded seal oil	4.29	7.47	3.48	
Ringed seal oil	10.57	26.19	14.55	
Crustaceans				
Shrimp	15.26	11.37	0.74	Budge et al. 2002
Red crab	12.13	11.93	2.25	
Rock crab	20.74	10.35	2.06	
Lobster	17.04	7.69	1.29	
Bivalves				
Surf clam	22.9	14.3	Trace	Copeman & Parrish 2004
Greenland cockle	22.6	16.5	0.1	
Blue mussel	19.6	13.2	0	
Icelandic scallop	26.9	25.9	0	
Cephalopods				
Common octopus	16.1	20.6	1.8	Arts et al. 2001
European squid	14.3	31.6	0.4	
Squid	13.9	16.9	1.3	

# A schematic representation of dietary fat digestion and absorption of ethyl ester (EE) and (FFA) forms of (EPA) and (DHA).



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BS, bile salt; CL, cholesterol; DAG, diacylglycerol; FA, fatty acid; LPA, lysophosphatidic acid; MAG, monoacylglycerol; PL, phospholipid; TAG, triacylglycerol.