

Fish in the Filipino Diet Benefits and Pitfalls

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- Fish is part of the typical diet of every Filipino.
- Top 5 food groups based on the mean one-day per capita food consumption:

1. Cereal & Cereal products
2. Fish & Fish Products
3. Meat & Meat Products
4. Vegetables
5. Miscellaneous

(2015 Household Food Consumption Survey, FNRI-DOST)



BENEFITS OF FISH CONSUMPTION



- “Fish is loaded with nutrients and the best source of omega-3 fatty acids.”

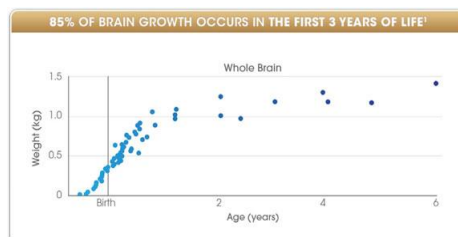
- Benefits of omega-3 fatty acids:
 1. Decreases the risk for heart diseases
 2. Decreases the risk for some types of cancers
 3. Decreases the risk for Type 1 DM
 4. Delays cognitive decline in old age
 5. Prevents depression
 6. Assists in brain development



- The specific LCPUFA (omega-3) attributed to neural development is DHA.
 - cell differentiation, synaptogenesis, and synaptic recognition

- Brain development starts in utero.

- 85% of brain growth occurs during the first 3 years of life.



- Infants obtain DHA through placenta transfer, with levels dependent on maternal supply.
- Following birth, infants receive DHA through breast milk.

Martinez M. *J Pediatr.* 1992; 120:S129-S138.

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Taylor & Francis
 Healthsciences


Docosahexaenoic acid level of the breast milk of some Filipino women

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This study was conducted to determine the docosahexaenoic acid (DHA) level of the breast milk of 100 Filipino women as affected by diet. The subject distribution was patterned after the 1997 Family and Income Expenditure Survey of the National Statistics Office regarding the total number of families, and the total and average family income and expenditures by income class in an urban area. The subjects were asked to complete a 3-day food record and food frequency questionnaire to ascertain the nutrient content of their food intake and approximate eating habits. Hind milk was drawn manually by means of a fabricated glass breast pump and collected in polypropylene vials. The milk samples were stored in a freezer maintained at $-25 \pm 2^\circ\text{C}$ until they were transported to the University of Montreal for fatty acid composition. The milk was methylated using the Lepage and Roy method. The obtained fatty acid methyl esters were analyzed by gas chromatography. Results showed that the milk samples contain an average of 188.34 μg DHA/ml milk, while %DHA of the samples is 0.65%. Regression analysis revealed that mean protein intake of the subjects was a determinant of the DHA level in the milk samples.

Table 1. DHA level in the breast milk of the participants (n=100)

| Parameter | Mean | SD | Range |
|--|--------|--------|----------------|
| DHA (μg) per ml breast milk | 188.34 | 138.95 | 45.70 – 991.98 |
| DHA (μg) per μg total fatty acids (%DHA) | 0.65 | 0.49 | 0.15 – 3.16 |



The general recommendation for DHA concentration in breast milk is 0.2% to 0.4% of fatty acids.
 (Abad-Jorge A. Today's Dietitian. 2008. 10:66)

| Asian | | | Western | | |
|--------------------------|----------------|------------------|-----------------|----------------|------------------|
| Nationality (n) | Year Conducted | DHA level | Nationality (n) | Year Conducted | DHA level |
| Filipino (100) | 2001 | 0.65 \pm 0.49a | Italian (73) | 2002 | 0.35 \pm 0.06b |
| Hong Kong Chinese (51) | 1997 | 0.56 \pm 0.23a | Canadian (198) | 1997 | 0.14 \pm 0.10b |
| Japanese (53) | 1995 | 0.53 \pm 0.10b | Dutch (12) | 1996 | 0.18 \pm 0.12b |
| Malay (26) | 1985 | 0.90 \pm 0.29b | Spanish (40) | 1996 | 0.34c |
| Chinese in Malaysia (15) | 1985 | 0.71 \pm 0.14b | Australian (23) | 1995 | 0.19 \pm 0.10b |
| Indians in Malaysia (10) | 1985 | 0.90 \pm 0.36b | French (10) | 1995 | 0.32 \pm 0.08b |
| | | | UK (21) | 1992 | 0.37 \pm 0.06b |

a = mean \pm SD; b = mean \pm SEM; c = mean

Table 3. Number of participants who consume known kinds of fish

| Fish | Never | 1x/y | <1/m | 1-3x/m | 1-2x/w | 3-4x/w | 5-6x/w | Daily |
|------------|-------|------|------|--------|--------|--------|--------|-------|
| Bangus | 3 | 3 | 14 | 20 | 34 | 15 | 9 | 2 |
| D. Bukid | 17 | 13 | 30 | 22 | 14 | 1 | 2 | 1 |
| Dilis | 16 | 11 | 37 | 18 | 10 | 4 | 2 | 2 |
| Galunggong | 2 | 4 | 22 | 19 | 28 | 18 | 4 | 1 |
| Hasa-hasa | 24 | 11 | 24 | 15 | 13 | 7 | 3 | 0 |
| Hito | 56 | 13 | 23 | 5 | 1 | 0 | 1 | 0 |
| Lapu-lapu | 39 | 17 | 2 | 9 | 1 | 3 | 0 | 1 |
| Sapsap | 20 | 17 | 34 | 16 | 7 | 4 | 1 | 0 |
| Tanigue | 43 | 12 | 24 | 15 | 5 | 0 | 1 | 0 |
| Tilapia | 2 | 1 | 12 | 26 | 21 | 27 | 8 | 1 |

Food Sci. Technol. Res., 11 (1), 127–133, 2005

Milkfish (*Chanos chanos* Forskaal) Consumption in the Philippines and the Docosahexaenoic Acid Level of the Cooked Fish

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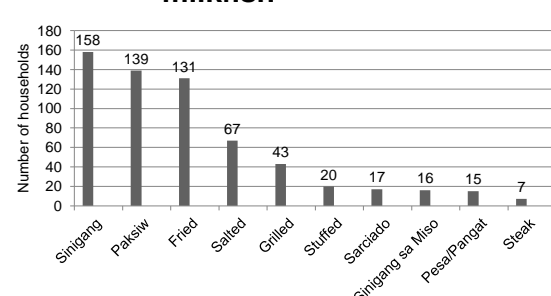
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Milkfish consumption and the effects on the proximate composition and docosahexaenoic acid (DHA) level of three cooking methods (Paksiw, Sinigang and fried) used to prepare milkfish were determined. Total moisture content, crude fat, crude protein and the total ash of the dishes were analyzed. Fatty acid methyl esters (FAMES) were analyzed through gas chromatography. Results showed that milkfish is eaten once to twice a week by Filipino households. Proximate analysis revealed that *Paksiw* had the highest moisture content, and *Sinigang* had the highest crude fat content. *Sinigang* had a significantly lower crude protein content compared to raw fish, fried fish had the highest crude protein on a wet basis and *Paksiw* on a dry basis. The DHA level for *Paksiw* was not significantly different from raw milkfish, but DHA level for *Sinigang* and fried milkfish were significantly different from the raw sample. Different cooking methods can thus cause changes in the proximate composition and DHA content of milkfish.

Key words: Docosahexaenoic Acid (DHA), Milkfish, proximate composition, fatty acid composition, milkfish consumption

Figure 1. Top 10 common cooking methods applied to milkfish



| Cooking Method | Number of Households |
|------------------|----------------------|
| Sinigang | 158 |
| Paksiw | 139 |
| Fried | 131 |
| Salted | 67 |
| Grilled | 43 |
| Stuffed | 20 |
| Sari-sari | 17 |
| Sinigang sa Miso | 16 |
| Pesar/Pangat | 15 |
| Steak | 7 |

Table 4. DHA content of raw, Paksiw, Sinigang, and fried milkfish as percent weight of total fatty acids

| Fatty acid | Raw | Paksiw | Sinigang | Fried |
|------------|----------------------|-----------------------|----------------------|----------------------|
| DHA (%w/w) | 1.63 ± 0.06 b | 1.27 ± 0.13 ab | 0.73 ± 0.01 a | 0.50 ± 0.01 a |

Values are means of two trials. Calculated on %(w/w) of total fatty acids.

Values in the same row bearing different letters are significantly different at $\alpha = 0.05$.



Fat intake during pregnancy and lactation

- Pregnant and lactating women are recommended to consume 20% to 30% of their energy intake from fats.

- FAO & WHO recommend 1 to 2 servings/week of fish to provide 200-500mg of n-3 PUFA. (FAO/WHO, 2011)



PITFALLS OF FISH CONSUMPTION



- “Fish may contain mercury & other contaminants that may have risk for health.”
- Mercury is a cumulative neurotoxin that is present in the environment through a variety of sources:
 - Volcanic activity
 - Mining activities
 - Dental amalgams
 - Use of traditional herbal medicines
 - Consumption of long-lived and high in the food chain fish



Table 5. Omega-3 and mercury content from selected fish and shellfish varieties

| Seafood item | N-3 (mg/100g) | Hg ($\mu\text{g}/100\text{g}$) |
|-----------------------|---------------|----------------------------------|
| Sardines | 1190 | 2 |
| Salmon | 1180 | 2 |
| Herring, anchovies | 2020 | 5 |
| Shrimp | 350 | 1 |
| Pollock | 530 | 4 |
| Clams | 200 | 2 |
| Tilapia | 90 | 1 |
| Flounder, Sole | 300 | 8 |
| Tuna, canned Albacore | 860 | 35 |
| Tuna, canned Light | 270 | 13 |
| Cod | 160 | 9 |
| Lobster | 200 | 11 |
| Swordfish | 900 | 100 |
| Shark | 690 | 98 |
| Orange Roughly | 30 | 57 |

Groth E. Environmental Research. 2017. 152:386-406



- Consumption of fish is associated with higher levels of mercury but also a good source of omega-3.

- Balancing the beneficial effects of fish with the potentially detrimental effects of mercury is then a difficult task.

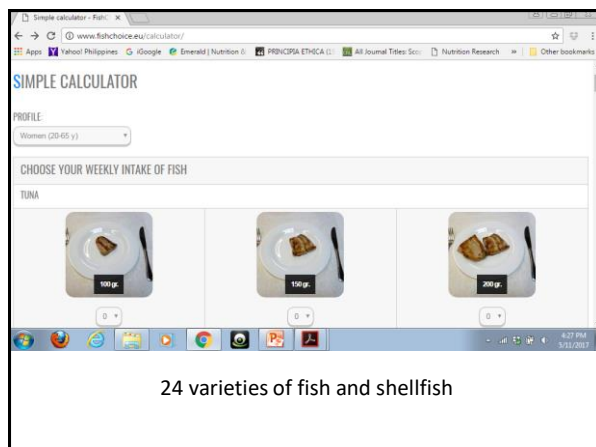
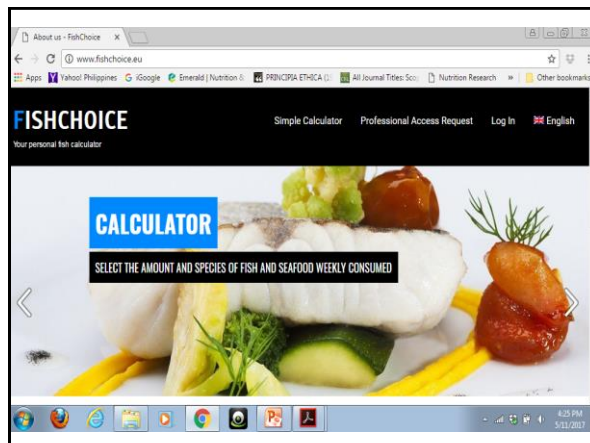
- What can be done?



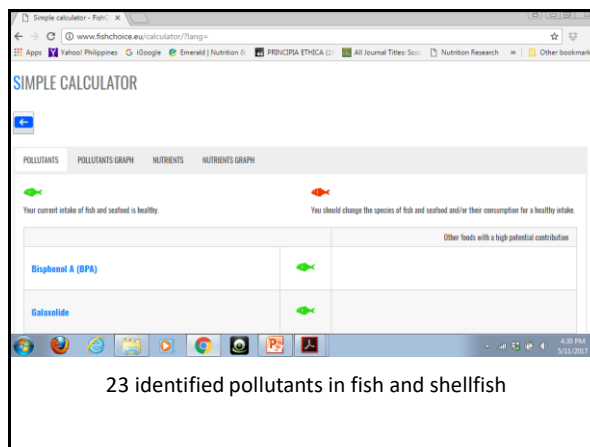
FishChoice

- An online nutrition education tool (<http://www.fishchoice.eu/>)
- Aimed at assessing food safety issues related to priority contaminants present in seafood as a result of environmental contamination and evaluating their impact on public health.

Vilavert L et al Food and Chemical Toxicology. 2017. 104:79-84



24 varieties of fish and shellfish



23 identified pollutants in fish and shellfish

Conclusion and Recommendations

- It is possible to choose fish species that are good or excellent sources of omega-3 and low in MeHg.
- Continuous update on the pollutants present in fish because fish is a significant part of the daily Filipino diet.
- Presence of an effective strategy of educating the public about their fish choices.



Maraming salamat po!

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