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ORIGINAL CONTRIBUTION

Association between fish and shellfish consumption, n-3 polyunsaturated fatty acids, and gastric cancer risk: the Japan Public Health Center-based Prospective Study

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# Association between fish, shellfish, and n-3 polyunsaturated fatty acids consumption and gastric cancer risk

**Mayo Hirabayashi**

*National Cancer Center, Japan*
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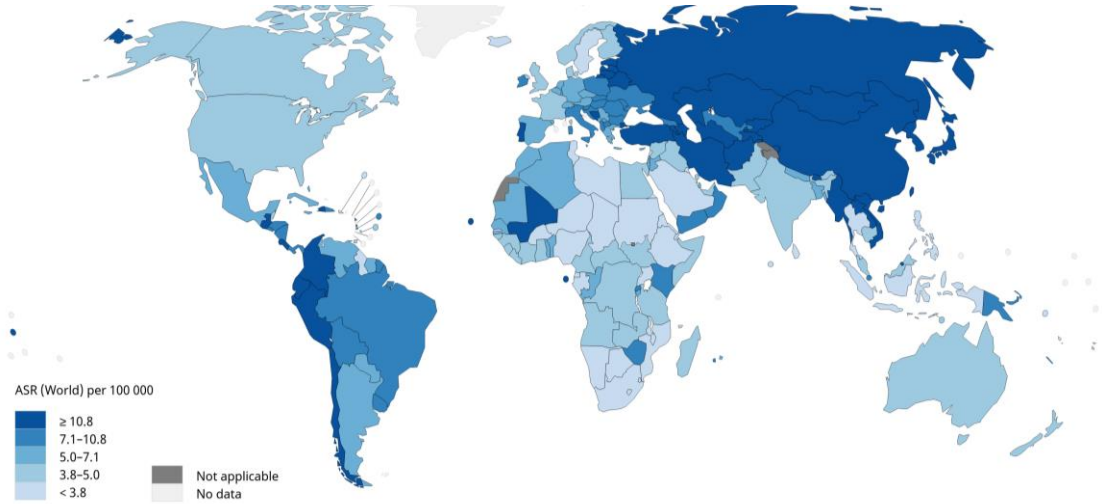
# Background

## Gastric cancer

- 5th most common and 4th most lethal cancer worldwide
- eastern Asia: 3rd most common cancer
- Main risk factor: *Helicobacter pylori* (*H.pylori*) infection

## Diet and gastric cancer risk

- Salted food, processed meat and alcohol consumption have been reported to increase gastric cancer risk
- n-3 polysaturated fatty acids (n-3 PUFA), found in fish and marine food may be lower gastric cancer risk
- Previous studies on the association between fish consumption and gastric cancer have been inconsistent




Source: GLOBOCAN 2020

| Suggested gastric cancer risk factors | |
|---|---|
| **Strong evidence** | • *Helicobacter pylori* (*H.pylori*)<br>• Salt preserved food<br>• Body fatness (cardia)<br>• Alcohol<br>• Smoking<br>• Occupational exposure |
| **Limited evidence** | • Grilled (broiled) /barbecued (charbroiled) meat and fish<br>• Processed meat (non-cardia)<br>• Low fruit intake |

# Aim

- To investigate gastric cancer risk associated with fish, shellfish, and n-3 PUFA consumption among Japanese adults

# Methods (1)

## Study population

- **J**apan **P**ublic **H**ealth **C**enter-based Prospective **Study** (the JPHC Study)
  - Cohort I (1990-) & II (1993-)
  - Those who responded to five-year follow-up self-administered questionnaire on dietary intake and lifestyle-related factors

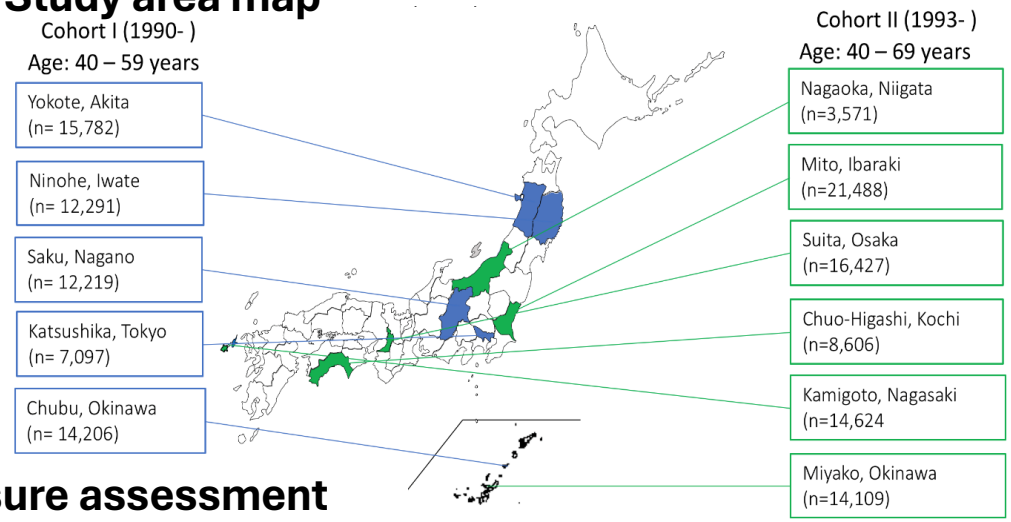
→ 38% provided blood samples

## Laboratory analysis

- *H.pylori* infection and atrophic gastritis (AG) defined using biomarkers
- Categorized to three groups:

| Categories | ***H.pylori* antibody*** *IgG ≥ 10 U/mL | **AG seropositivity*** *pepsinogen I ≤70ng pepsinogen I/II ratio ≤3.0 |
|---|---|---|
| ***H.pylori* -/AG -** | – | – |
| ***H.pylori* +/AG -** | – | + |
| ***H.pylori* +/AG +** | + | + |
| | + | – |

## JPHC Study area map




## Exposure assessment

| Items included in fish, shellfish and n-3 PUFA categories | |
|---|---|
| **Fish and shellfish** | canned tuna, salmon/trout, bonito/tuna, cod/flatfish, sea bream, horse mackerel/sardines, mackerel pike/mackerel, *shirasuboshi* (dried young sardines), *chikuwa* (Japanese fish cake), *kamaboko* (Japanese cured surimi (minced fish paste)), salted fish, salted fish roe, dried fish, eel, squid, octopus, prawn, short-necked clam, and viviparidae |
| **Fish** | canned tuna, salmon/trout, bonito/tuna, cod/flatfish, sea bream, horse mackerel/sardines, mackerel pike/mackerel, *shirasuboshi*, salted fish, dried fish, and eel |
| **Salted fish** | salted pike/mackerel, salted cod/flatfish, salted salmon/trout, salted fish roe, dried fish, and *shirasuboshi* |
| **n-3 PUFA rich fish** | salmon/trout, horse mackerel/sardines, mackerel pike/mackerel, eel, and sea bream |
| **n-3 PUFA** | eicosapentaenoic acid (EPA), docosapentaenoic acid (DPA), docosahexaenoic acid (DHA) |

# Methods (2)

## Outcome assessment

ICD for Oncology (3rd edition)

- Code C16.0 – 16.9: Malignant neoplasm of the stomach
- Information obtained from hospital medical records, population-based registry, or death certificates

## Statistical analysis

Person time calculation

- From the date of the 5-year follow-up survey to the date of gastric cancer diagnosis, move-out from the study area, death, or end of 2013

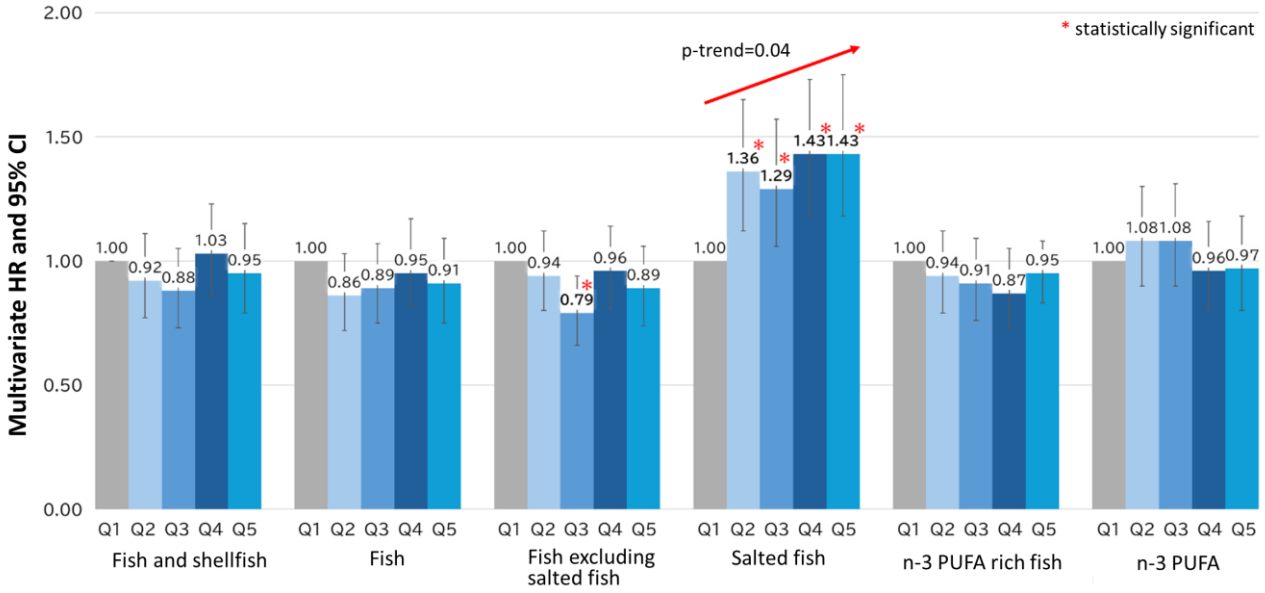
Hazard ratios (HRs)

- Cox proportional hazards regression model
- Adjusted for potential confounding factors
  → age, metabolic equivalent of task (METs), body-mass index (BMI), total energy, meat consumption, vegetable consumption, alcohol consumption, smoking status, history of diabetes, use of anti-cholesterol drugs, history of gastric ulcer, and family history of gastric cancer
- Conducted a sensitivity analysis by *H.pylori* and AG status

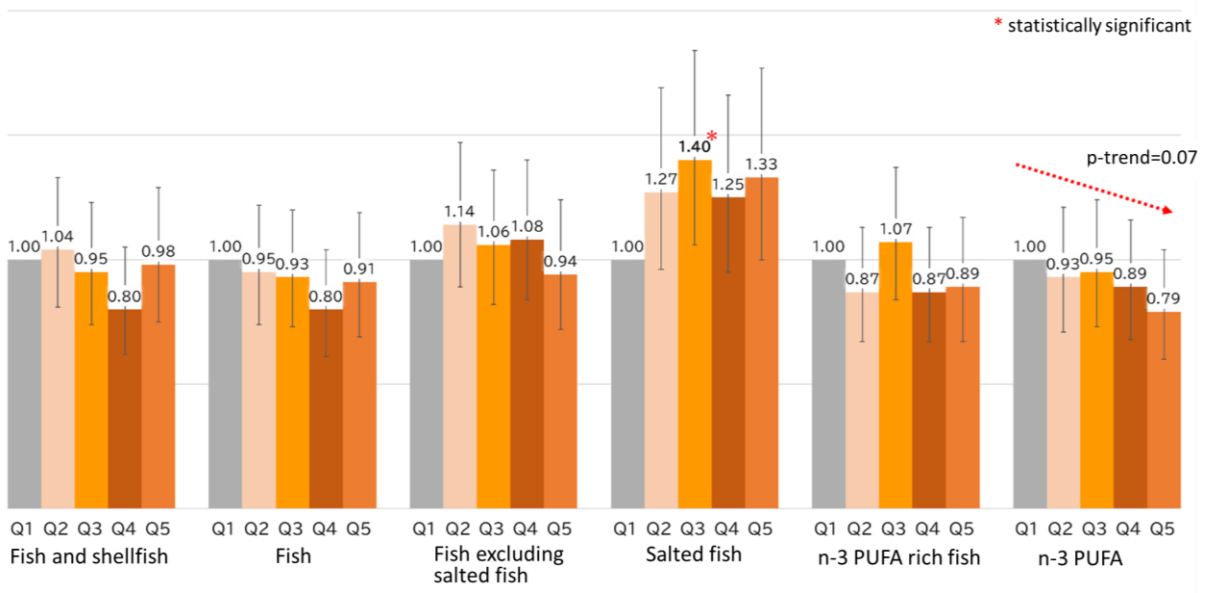
# **Results (1)** – gastric cancer risk by fish and shellfish consumption for Japanese men and women

- 90,504 Japanese (42,328 men, 48,176 women) for the main analysis
  →2,701 gastric cancer cases (1,868 men and 833 women)
- Gastric cancer risk associated with salted fish consumption for men and women
- Weak decrease in gastric cancer risk for n-3 PUFA among women

Men




Women

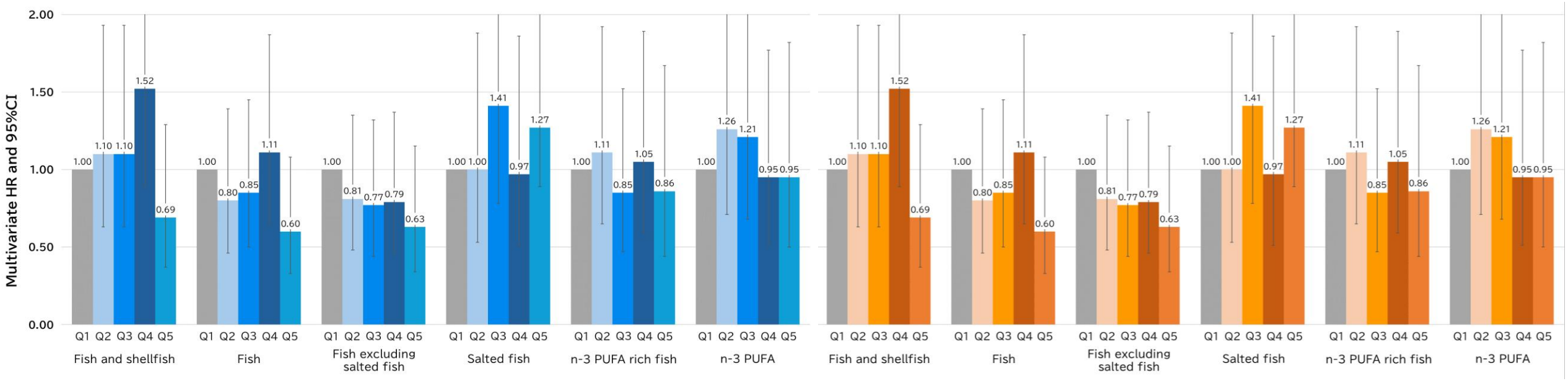


# **Results (2)** – gastric cancer risk by fish and shellfish consumption for Japanese men and women considering *H.pylori* and AG status

- 17,583 Japanese (6,192 men, 11,391 women) had information on *H.pylori* and AG
→ 482 gastric cancer cases (288 men and 194 women)
- None of the fish or shellfish categories were associated with gastric cancer risk when *H.pylori* and AG were taken into consideration

Men

Women



# Discussion

1. **Gastric cancer risk increased for both men and women who ate high quantities of salted fish**
   - High salt concentration may damage gastric mucosa, leading to inflammation and erosion
     → possibly enhancing food-derived carcinogenic effects and *H.pylori* colonisation
2. **n-3 PUFA consumption showed a decrease in gastric cancer risk trend among women**
   - n-3 PUFA gets metabolised into bioactive compounds, which help suppress inflammation
     → anti-inflammatory and immune-regulatory effects of n-3 PUFA may reduce gastric cancer risk
3. **The associations from the main analysis diminished once *H.pylori* and AG were taken into consideration**
   → *H.pylori* infection is the strongest risk factor for gastric cancer

# Conclusion

Our results suggest that:

1. Salted fish increases gastric cancer risk for Japanese men and women
2. n-3 PUFA marginally decreases gastric cancer risk for Japanese women

Questions? Suggestions?

mhirabay@ncc.go.jp

Thank you ☺