The 56th Annual meeting of Japanese Society of
Pediatric Allergy and Clinical Immunology (JSPACI)

The Japan Environment Children's Study (JECS) International Symposium

3ed Nov 2019, Chiba

# Environmental Factors related to the onset of allergic diseases examined in JECS

Yukihiro Ohya MD, PhD
Director of Allergy Center, National Center for Child Health and Development

**Japanese Society of Pediatric Allergy and Clinical Immunology**

## COI Disclosure

## Presenter: Yukihiro Ohya

☑ The author has no conflict of interest to disclose with respect to this presentation.

## Background of The Japan Environment Children's Study (JECS)

Post industrial revolution epidemic of non communicable diseases represented by allergic diseases and developmental disorders.
Global health concern about the environmental risk to children.

Danish National Birth Cohort, 1996–

Miami Declaration (1997) by G8 Environmental Minister

Norwegian Mother and Child Cohort Study, 1999–

G8 Environmental Ministers Meeting (Banff, 2002)

US National Children's Study, Vanguard, 2005– (cancelled)

**JECS planning started, 2006**

G8 Environmental Ministers Meeting (Syracusa, 2009) highlighted research on children's environmental health

**JECS pilot, 2009–**

**JECS, 2010–**

UK Life Study, 2015– (cancelled)

Korean birth cohort study (Ko-CHENS), 2015–

G7 Environmental Ministers Meeting (Toyama, 2016)

## Overview of the Japan Environment & Children's Study (JECS)

- Core Hypothesis: Exposure to ambient chemicals during the fatal stage and the early childhood adversely effects children's health
- Method: Birth cohort study
- Sample Size: Main Study: 100,000 pairs of mothers and children
  Sub-Cohort Study: 5,000 pairs of mothers and children
- Study Duration: 13 years (2011-2028) since recruitment (2011-2014)
- Expected outcomes:

(1) Identification of environmental factors with impacts on children's health

(2) Creation of sound environment for future generations

(3) Establishment of a framework for children's study

# Research organization

**Ministry of the Environment**

Cooperate

- Ministry of Health, Labor and Welfare
- Ministry of Education, Culture, Sports, Science and Technology
- Foreign countries currently with a cohort study

・Design environmental policies on the basis of the study results
・Budgeting

Supervise

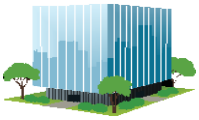
**National Core Center**
**(National Institute for Environment Studies)**

- Central role for implementation
- Data system management, specimen storage, and accuracy control.
- Support and supervise Unit Centers.

Conduct

**Medical Support Center**
**(National Center for Child Health and Development)**

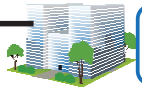
- Medical support
- Prepare a protocol for the measurements of outcomes.
- Guidance and support to health care professionals involved in the study.



**Local Governments**

Cooperate

- PR/for public awareness and participation.
- Recruit when the Mother-Child Health Handbook is issued.
- Supply administrative data in accordance with applicable legislation.



**Regional Centers**
**(at 15 locations nationwide)**

- Recruit participants and follow them up until age 13.
- Collect biological specimens and conduct questionnaire surveys .
- Communicate with participants through individual consultation.

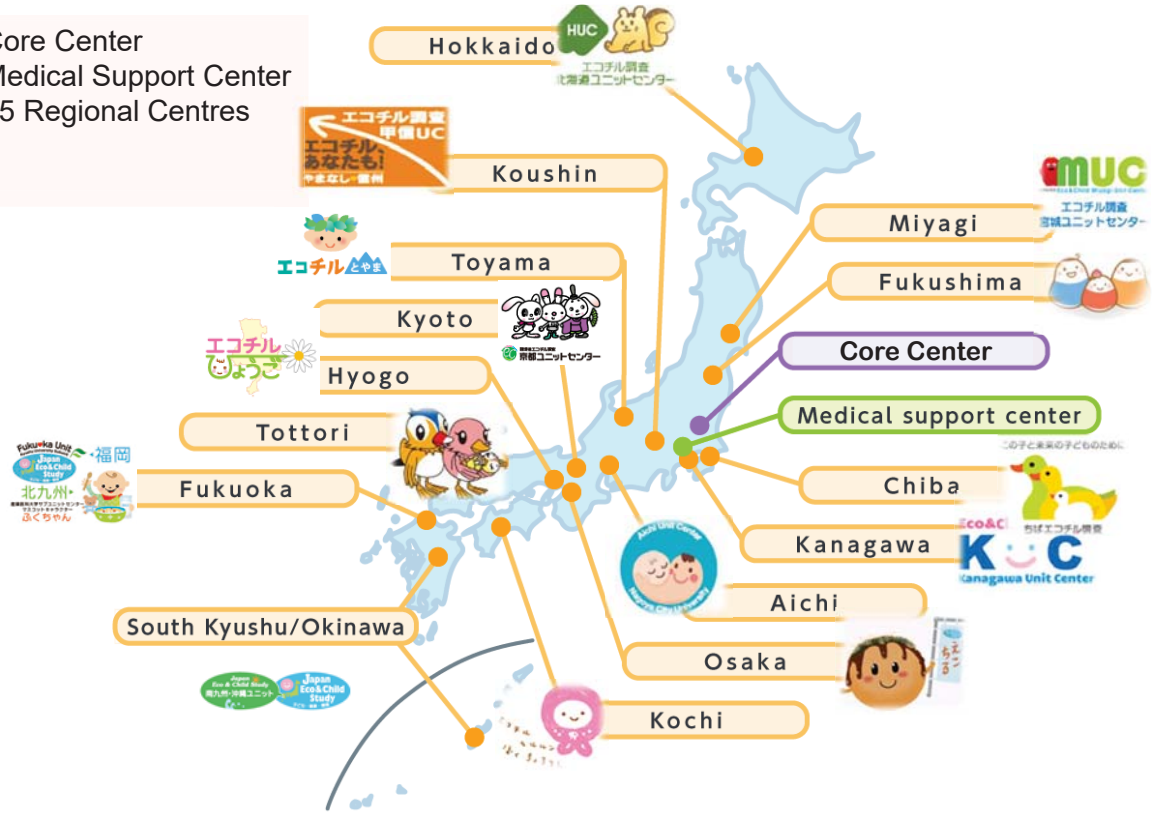
**Cooperating Local Medical Institutions**
**(Hospitals and Clinics)**

- Each regional center requests the cooperation of local medical institutions (university hospitals, general hospitals and clinics)
- Register participants (expected mothers) and collect biological specimens



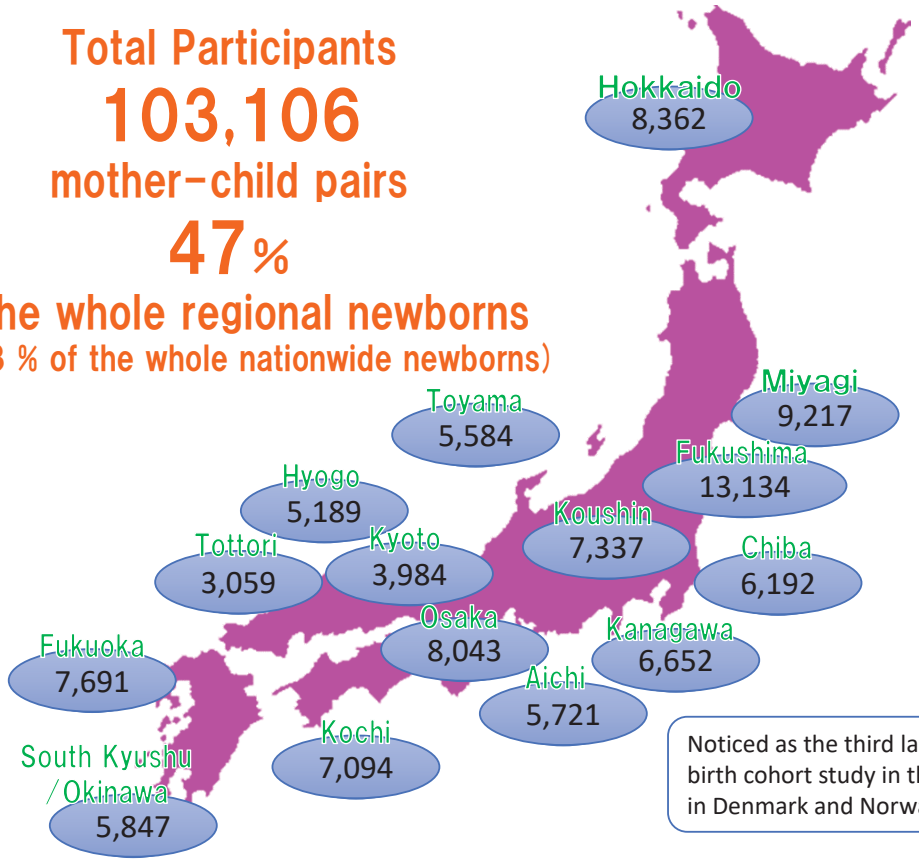
# Location of regional centers

- Core Center
- Medical Support Center
- 15 Regional Centres



# Recruited participants in each regional center

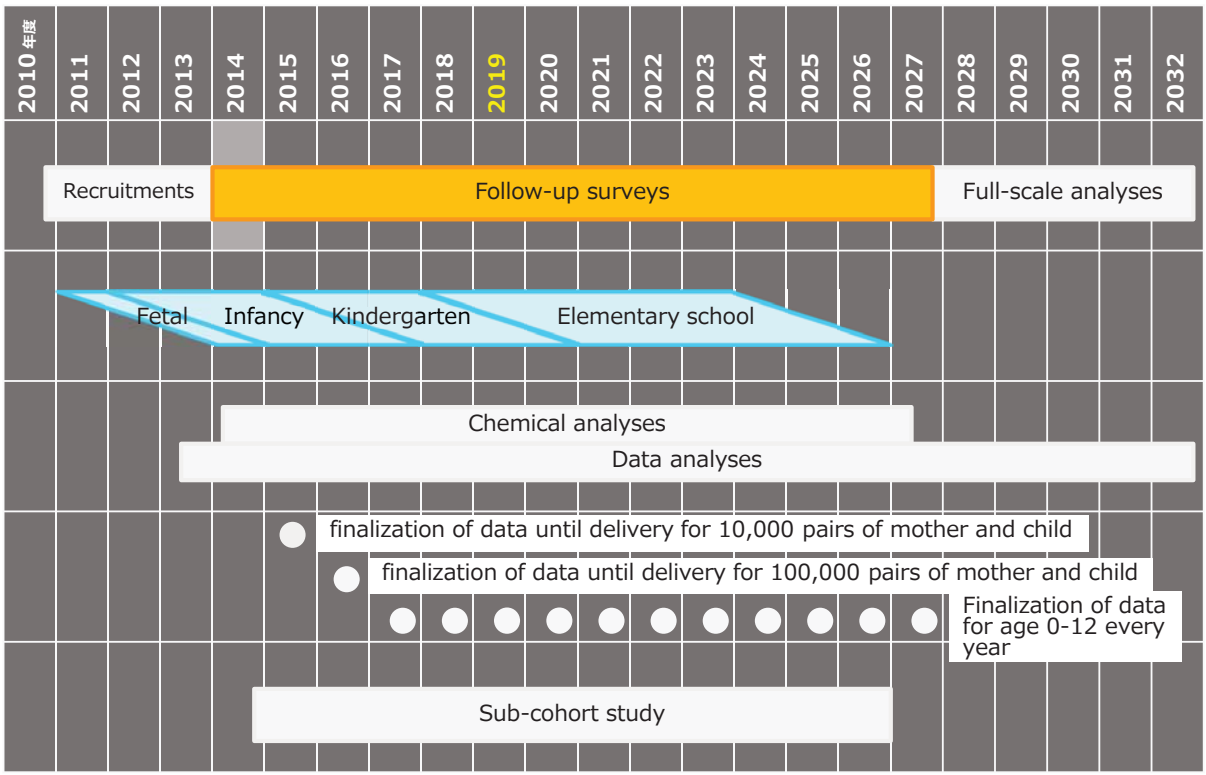
**Total Participants**
**103,106**
**mother-child pairs**
**47%**
**of the whole regional newborns**
**(ca. 3 % of the whole nationwide newborns)**



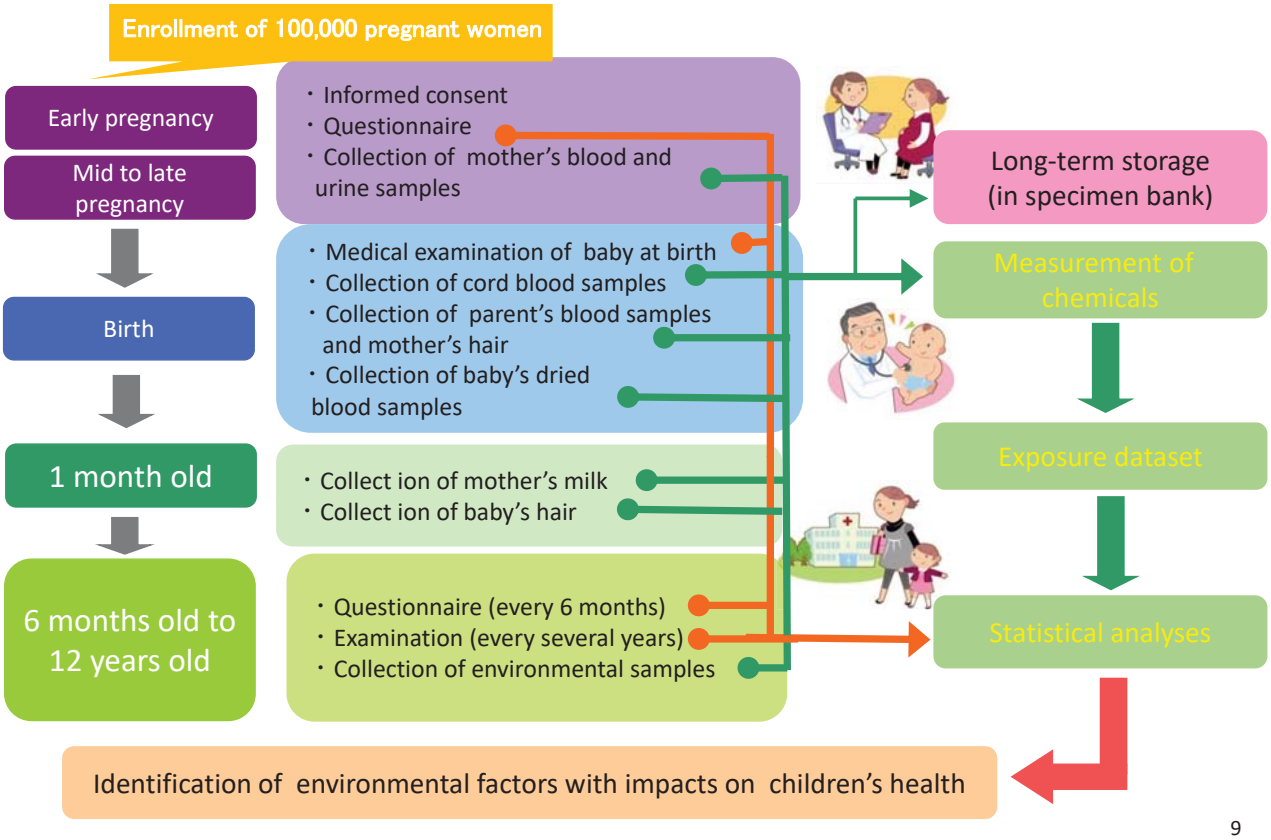

Noticed as the third largest 100,000-scale birth cohort study in the world, besides those in Denmark and Norway!



# Road map for JECS



# Sample collection






# Exposures of interest

| **Chemicals from environment/occupation** | **Metals, POPs, pesticide, organofluorine compounds, aroma compounds, phthalate metabolites, phenols, others** |
|---|---|
| Physical environment | Noise, heat, ionising radiation, housing condition, neighbourhood |
| Lifestyle | Stress, nutrition, daily rhythm, smoking and alcohol, infections, medications |
| Socio-economic status | Education, house-hold income, social bonding, community support |
| Genetics/-omics | Genomics, epigenetics, metabolomics, |

# Target compounds to be analyzed in bio-specimens

| Group | Target compounds |
|---|---|
| Metals | Lead, cadmium, total mercury, methyl mercury, arsenics and its compounds including, arsenobetaine, metylarsonic acid, dimethylarsinic acid, trimethylarsine oxide, etc. |
| Inorganic substances | Iodine, perchlorate, nitrate nitrogen, etc |
| Chlorinated POPs (Persistent organic pollutants) | Polychlorinated biphenysl (PCBs), hydroxylated polychlorinated biphenyl (OH-PCB), dioxins (PCDDs, PCDFs, Co-PCBs), pexachlorobenzene (HCB), pentachlorobennzene (PeCB), etc. |
| Pesticides (including pesticide-POPs) | Chlordanes, DDT and its metabolites (DDE, etc.), drin compounds for agriculture (dieldrin, etc.), heptachlor, hexachlorocyclohexaxne (HCH), mirex, chlordecone, toxaphene, organophophorus pesticide metabolites (DMP, DEP, DMTP, DETP, etc.), fenitrothion metabolite (methylnitrophenol), acephate metabolite (methamidophos), pyrethroid metabolites (PBA, DCCA, etc.), dithiocarbamate fungicide metabolites (ethylene thiourea, etc.), neonicotinoid metabolites, pentachlorophenol (PCP), atrazine, dymron, glyphosate, flutolanil, iprodione, flusulfamide, etc. |
| Brominated POPs | Polybromodiphenylethers (PBDEs), polybromobiphenyls (PBBs), hexabromocyclododecan (HBCD), etc. |
| Organofluorine compounds | Perfluorooctanoic acid (PFOA), perfluorooctane sulfonate (PFOS), perfluorononanoic acid (PFNA), etc. |
| Aroma compounds | Nitromusks, cyclic musks, etc. |
| Phthalate metabolites | Mono (2-ethylhexyl) phthalates, etc. |
| Phenols | Bisphenol A, Nonyphenols, Parabens, etc. |
| Others | Triclosan, benzophenone, N, N-diethyl-meta-toluamide (DEET), polyaromatic hydrocarbons (PAHs) and their metabolites (1-hydroxypyrene, 3-hydroxyphenanthrebe, etc.), cotinine, thiocyanate, dichlorobenzene, phytoestrogen, caffeine, pyridine, acrylamide, tributyl phosphate, tributoxyethl phosphate, 8-hydroxydeoxyguanosine (8-OHdG), etc. |

Kawamoto T et.al. BMC Public Health 2014: 14:25

# Cohorts consisting of JECS study

**Main Study** = 100,000

- Biological sample collection from mothers, children and fathers
- Questionnaire administration during pregnancy, at birth, 1 month, 6 month, and every 6 month after that until children reach 13 years of age
- Medical record, resident registry and school record transcription

**Sub-Cohort Study** = 5,000

- Home visit—Indoor and outdoor air quality, particulate matter, house dust, noise, dwelling inspection… at 1.5 and 3 years
- Psychological development test, physical examination, blood and urine collection at 2 years of age and every 2 years thereafter.

**Adjunct Studies** = participants recruited by each regional center
conducted by regional centers with extramural funding

**Pilot Study =** 400
to evaluate the feasibility, acceptability and cost of the proposed procedures and processes to be used in the Main Study

# Outcome variables of allergy

**Main Study** = 100,000
- Doctor diagnosed patient reported allergic history collected from questionnaire during pregnancy.
- Blood serum total IgE and allergen specific IgE (Immuno CAP) in pregnant mother and her partner (father)
- ISAAC questionnaire,

**Sub-Cohort Study** = 5,000
- In addition to Main study outcomes
- Atopic dermatitis diagnosed by UK working party diagnostic criteria
- FeNO2, Spirogram at 8, 10, and 12 years of age.
- Total IgE and allergen specific IgE (DLC methods) at 2, 4, 6, 10, 12 yrs.

**Adjunct Studies** = participants recruited by each regional center conducted by regional centers with extramural funding

**Pilot Study =** 400
- FeNO2, Spirogram at 6, 8, 10, and 12 years of age.
- Total IgE and allergen specific IgE (DLC methods) at 2, 4, 6, 10, 12 yrs

## Measured exposures and outcomes in the published works

### Main study
- Questionnaire in pregnancy
- Parental blood metals (Cd, Pb, Hg, Se, Mn) in pregnancy
- Parental serum IgE (specific and total) in pregnancy
- Birth weight and length of off-springs

### Adjunct study
- Maternal vit.D in pregnancy
- Desert dust exposed in Toyama, Kyoto, and Tottori regions

### Pilot study
- Allergenic proteins contained in house dust collected from children's bed sheets

# Publications related to allergic diseases

- Allergic profiles of mothers and fathers in the Japan Environment and Children's Study (JECS): a nationwide birth cohort study. Yamamoto-Hanada et al. World Allergy Organization Journal. 2017;10(1):24
- Having small-for-gestational-age infants was associated with maternal allergic features in the JECS birth cohort. Saito M et.al Allergy 2018 Sep;73(9):1908-1911
- Associations Between Metal Levels in Whole Blood and IgE Concentrations in Pregnant Women Based on Data From the Japan Environment and Children's Study. Tsuji M et.al. J Epidemiology 20180098
- Allergy and mental health among pregnant women in the Japan Environment and Children's Stud. Yamamoto-Hanada K et.al. JACI in Prac 2018;6:1421-1424
- Dietary intake of fish and ω-3 polyunsaturated fatty acids and physician-diagnosed allergy in Japanese population: The Japan Environment and Children's Study. Hamazaki K et.al. Nutrition 2019;61:194-201

Main study

- Effect of desert dust exposure on allergic symptoms. A natural experiment in Japan. Kanatani KT et.al. Ann Allergy Asthma Immunol 2016;116:425-30.
- Association between vitamin D deficiency and allergic symptom in pregnant women. Kanatani KT et.al. Plos one 14(4) e0214797

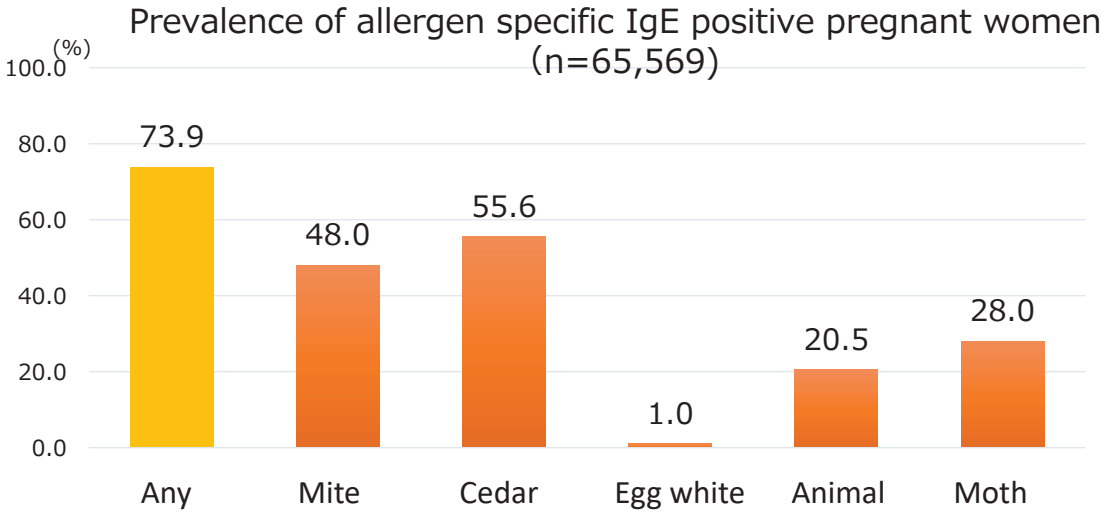
Adjunct study

- Egg antigen was more abundant than mite antigen in children's bedding: Findings of the pilot study of the Japan Environment and Children's Study (JECS). Kitazawa H et.al. Allergol Int 2019 68: 391-393.

Pilot study



# Three quarters of pregnant women who joined JECS have allergic diathesis



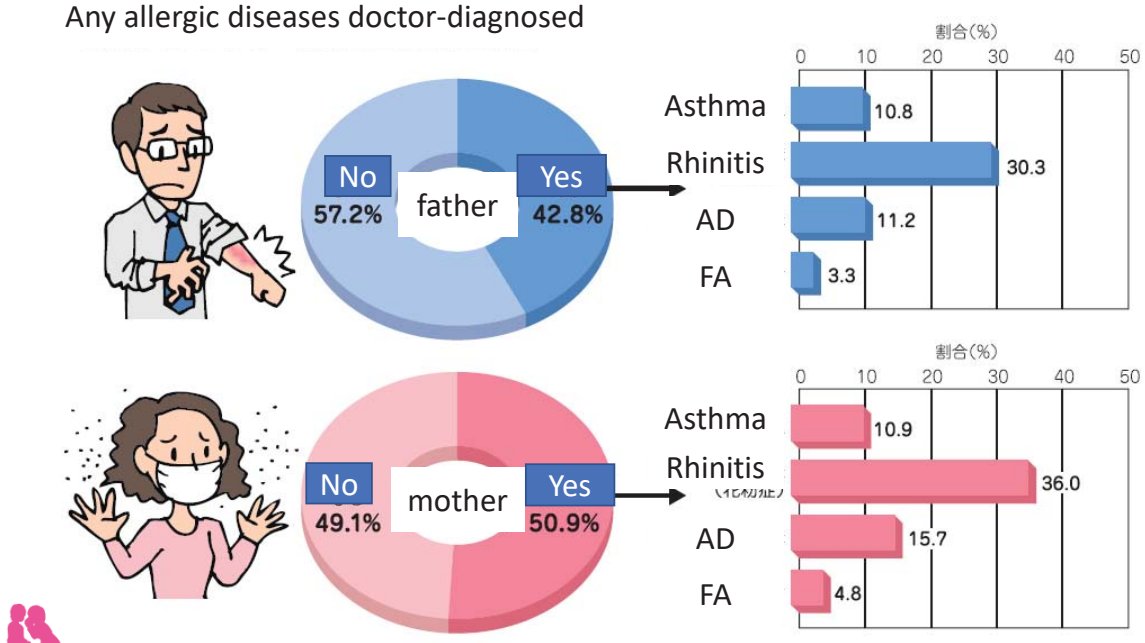

73.9 % pregnant women were sensitized to any allergen. JCP showed the highest prevalence 55.6%. House dust mite was sensitized in 48% of them.

JECS
Japan Environment and Children's Study

Yamamoto-Hanada et al. World Allergy Organization Journal. 2017;10(1):24.

# About half parents of participants have history of any allergic diseases

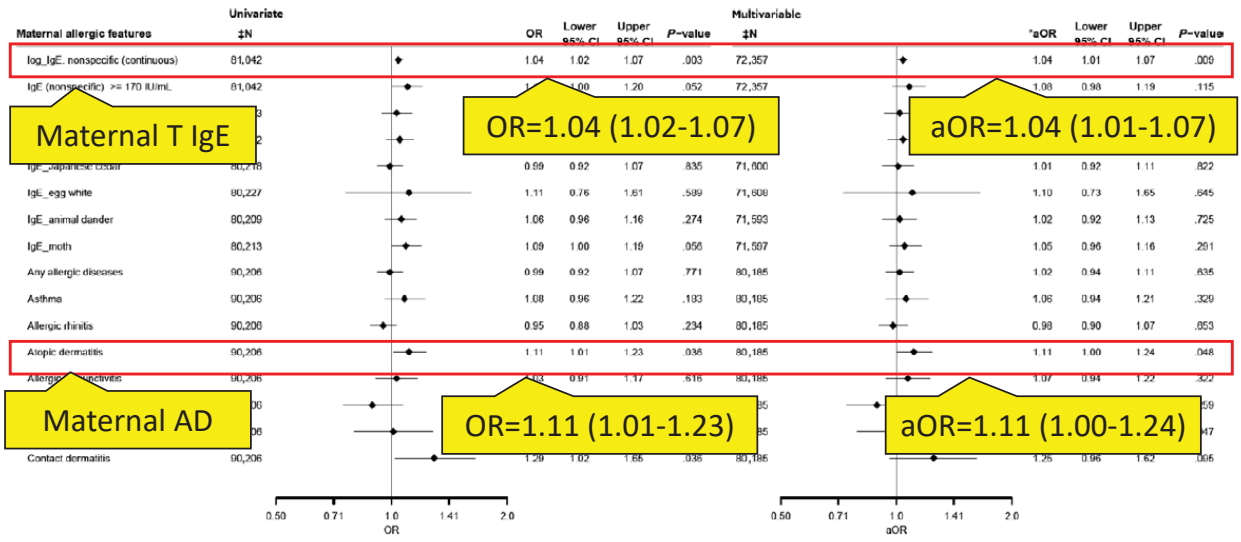
Any allergic diseases doctor-diagnosed




Japan Environment and Children's Study

Yamamoto-Hanada et al. World Allergy Organization Journal. 2017;10(1):24.

Maternal atopic dermatitis and higher total IgE were positively associated with Small for Gestational age (SGA) of off-springs




Yamamoto-Hanada K et.al. Allergy 2018;73(9):1908-1911.

Journal of Epidemiology

Original Article J Epidemiol 2019

# Associations Between Metal Levels in Whole Blood and IgE Concentrations in Pregnant Women Based on Data From the Japan Environment and Children's Study

Mayumi Tsuji[1], Chihaya Koriyama[2], Yasuhiro Ishihara[3], Megumi Yamamoto[4], Kiwako Yamamoto-Hanada[5], Kumiko Kanatani[6], Yu Ait Bamai[7], Kazunari Onishi[8], Ayako Senju[9,10], Shunsuke Araki[10], Eiji Shibata[11], Seiichi Morokuma[12], Masafumi Sanefuji[12], Hiroshi Kitazawa[5], Mayako Saito[5], Masakazu Umezawa[13], Atsuto Onoda[14,15], Koichi Kusuhara[9,10], Rie Tanaka[1], Toshihiro Kawamoto[1], and the Japan Environment & Children's Study Group

[1]Department of Environmental Health, School of Medicine, University of Occupational and Environmental Health, Fukuoka, Japan
[2]Department of Epidemiology and Preventive Medicine, Kagoshima University Graduate School of Medical and Dental Sciences, Kagoshima, Japan
[3]Laboratory of Molecular Brain Science, Graduate School of Integrated Arts and Sciences, Hiroshima University, Hiroshima, Japan
[4]Department of Environment and Public Health, National Institute for Minamata Disease, Kumamoto, Japan
[5]Medical Support Center for Japan Environment and Children's Study, National Center for Child Health and Development, Tokyo, Japan
[6]Department of Health Informatics, Graduate School of Medicine and Public Health, Kyoto University, Kyoto, Japan
[7]Department of Public Health, Hokkaido University Graduate School of Medicine, Sciences, Hokkaido, Japan
[8]Center for Birth Cohort Studies, Interdisciplinary Graduate School of Medicine, University of Yamanashi, Yamanashi, Japan
[9]Japan Environment and Children's Study, UOEH Subunit Center, University of Occupational and Environmental Health, Fukuoka, Japan
[10]Department of Pediatrics, School of Medicine, University of Occupational and Environmental Health, Fukuoka, Japan
[11]Department of Obstetrics and Gynecology, School of Medicine, University of Occupational and Environmental Health, Fukuoka, Japan
[12]Research Center for Environmental and Developmental Medical Sciences, Kyushu University, Fukuoka, Japan
[13]Department of Materials Science and Technology, Faculty of Industrial Science and Technology, Tokyo University of Science, Tokyo, Japan
[14]Division of Neonatology, Center for Maternal-Neonatal Care, Nagoya University Hospital, Nagoya, Japan
[15]Postdoctoral Fellow of Japan Society for the Promotion of Science, Tokyo, Japan

Received May 14, 2018; accepted October 16, 2018; released online January 12, 2019

## Results of multivariable analysis in the relationship between quartile concentration of Hg in pregnant women and allergen-specific IgEs

| Hg (ng/g) | Animal dander | HDM | JCP |
|---|---|---|---|
| Q1 (≤2.55) | 1.00 (referent) | 1.00 (referent) | 1.00 (referent) |
| Q2 (2.56–3.61) | 0.91 (0.82–1.00) 0.057 | 1.06 (0.96–1.18) 0.214 | 0.93 (0.83–1.05) 0.238 |
| Q3 (3.62–5.11) | 0.98 (0.89–1.08) 0.734 | 1.23 (1.12–1.36) <0.001 | 0.88 (0.78–0.99) 0.031 |
| Q4 (≥5.12) | 0.86 (0.78–0.95) 0.003 | 1.35 (1.22–1.49) <0.001 | 0.81 (0.72–0.92) 0.001 |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Q3 (169–181) | 1,948 | 1,663 | 0.91 (0.82–1.01) | 0.063 | 1,593 | 2,018 | 1.17 (1.06–1.30) | 0.002 | 2,912 | 699 | 0.88 (0.78–1.00) 0.046 |
| Q4 (≥182) | 2,025 | 1,761 | 0.94 (0.85–1.04) | 0.233 | 1,619 | 2,167 | 1.26 (1.14–1.39) | <0.001 | 3,033 | 753 | 0.95 (0.84–1.07) 0.414 |
| **Mn** | | | | | | | | | | | |
| Q1 (≤12.4) | 1,856 | 1,628 | 1.00 (referent) | | 1,550 | 1,934 | 1.00 (referent) | | 2,711 | 773 | 1.00 (referent) |
| Q2 (12.5–15.1) | 1,924 | 1,704 | 1.01 (0.92–1.12) | 0.793 | 1,666 | 1,962 | 0.97 (0.87–1.07) | 0.494 | 2,900 | 728 | 0.87 (0.77–0.98) 0.024 |
| Q3 (15.2–18.4) | 1,907 | 1,754 | 1.03 (0.94–1.14) | 0.519 | 1,614 | 2,047 | 1.03 (0.93–1.14) | 0.594 | 2,941 | 720 | 0.83 (0.74–0.94) 0.002 |
| Q4 (≥18.5) | 1,919 | 1,716 | 1.01 (0.92–1.12) | 0.794 | 1,623 | 2,012 | 1.02 (0.92–1.13) | 0.681 | 2,886 | 749 | 0.90 (0.79–1.01) 0.070 |

IgE, immunoglobulin E.
[a]Odds ratios and corresponding 95% confidence intervals and *P* values were obtained using multivariable logistic regression analysis adjusted for age, BMI, allergic diseases (asthma, allergic rhinitis, atopic dermatitis, allergic conjunctivitis, food allergy, drug allergy), smoking during pregnancy, smoking habits of partner, alcohol consumption during pregnancy, owning pets, month of T1 blood sampling, and geographic region.

Tsuji M et.al. J Epidemiol 2019

# Allergy and mental health among pregnant women in the Japan Environment and Children's Study

Yamamoto-Hanada K et.al. JACI in Prac 2018;6:1421-1424

Participants: pregnant women (main study)

Outcome variables: K-6* in pregnancy
SF8(MCS*)
SF8(PCS*)

Exploratory variables: TIgE, sIgE in pregnancy
past history of allergic diseases

*
K-6: Kessler's K-6 Non-Specific Psychological Distress Scale
MCS: mental component summary
PCS: physical component summary

Depression of pregnant women was associated with higher titer of House Dust Mite, animal allergens mix, moth, any allergic diseases (Asthma, Eczema, rhino-conjunctivitis, Food allergy, Drug allergy and contact dermatitis)

| K-6 (≥5) Any depression | None (reference) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | log_IgE. nonspecific (continuous) | **1.02** | **1.01** | **1.03** | **.0001** | 1.01 | 1.00 | 1.02 | .051 |
| | IgE (nonspecific) ≥170 UA/mL | **1.05** | **1.01** | **1.09** | **.0112** | 1.05 | 0.98 | 1.05 | .429 |
| | IgE_sensitization to any specific allergen | 1.02 | 0.98 | 1.05 | .2901 | 1.01 | 0.97 | 1.05 | .623 |
| | IgE_*Der p 1* | **1.06** | **1.03** | **1.10** | **<.0001** | **1.05** | **1.02** | **1.08** | **.001** |
| | IgE_Japanese cedar | 1.00 | 0.97 | 1.04 | .7775 | 0.98 | 0.95 | 1.02 | .279 |
| | IgE_egg white | 1.04 | 0.89 | 1.21 | .6205 | 1.02 | 0.88 | 1.19 | .796 |
| | IgE_animal allergen mixes | **1.08** | **1.04** | **1.12** | **.0001** | **1.05** | **1.01** | **1.09** | **.021** |
| | IgE_moth | **1.06** | **1.02** | **1.09** | **.0012** | **1.05** | **1.01** | **1.08** | **.009** |
| | Any allergic diseases | **1.23** | **1.19** | **1.27** | **<.0001** | **1.25** | **1.21** | **1.29** | **<.000** |
| | Asthma | **1.31** | **1.25** | **1.37** | **<.0001** | **1.28** | **1.22** | **1.34** | **<.000** |
| | Allergic rhinitis | **1.18** | **1.14** | **1.21** | **<.0001** | **1.20** | **1.17** | **1.24** | **<.000** |
| | Eczema | **1.18** | **1.14** | **1.23** | **<.0001** | **1.17** | **1.12** | **1.22** | **<.000** |
| | Allergic conjunctivitis | **1.28** | **1.22** | **1.35** | **<.0001** | **1.32** | **1.26** | **1.39** | **<.000** |
| | Food allergy | **1.35** | **1.26** | **1.44** | **<.0001** | **1.33** | **1.24** | **1.42** | **<.000** |
| | Drug allergy | **1.28** | **1.17** | **1.40** | **<.0001** | **1.35** | **1.23** | **1.48** | **<.000** |
| | Contact dermatitis | **1.45** | **1.31** | **1.61** | **<.0001** | **1.55** | **1.40** | **1.72** | **<.000** |

Yamamoto-Hanada K et.al. JACI inPrac 2018;6:1421-1424

Severe depression of pregnant women was associated with higher titer of sIgE to Egg white, Asthma, Eczema, Allergic conjunctivitis, Food allergy and Contact dermatitis

| | | Univariate | | | | Multivariate | | | |
|---|---|---|---|---|---|---|---|---|---|
| Outcome | Allergy features | OR | Lower 95% CI | Upper 95% CI | *P* value | aOR | Lower 95% CI | Upper 95% CI | *P* value |
| K-6 (≥13) Severe depression | None (reference) | | | | | | | | |
| | log_IgE. nonspecific (continuous) | **1.03** | **1.01** | **1.06** | **.0172** | 1.01 | 0.98 | 1.04 | .4935 |
| | IgE (nonspecific) ≥170 UA/mL | **1.16** | **1.06** | **1.27** | **.0015** | 1.08 | 0.98 | 1.18 | .1124 |
| | IgE_sensitization to any specific allergen | 0.96 | 0.88 | 1.05 | .3217 | 0.94 | 0.86 | 1.03 | .1855 |
| | IgE_*Der p 1* | 1.04 | 0.96 | 1.12 | .3514 | 1.01 | 0.93 | 1.09 | .8083 |
| | IgE_Japanese cedar | 0.93 | 0.86 | 1.01 | .0892 | 0.90 | 0.83 | 0.98 | .0134 |
| | IgE_egg white | **1.57** | **1.14** | **2.16** | **.0059** | **1.53** | **1.11** | **2.11** | **.0010** |
| | IgE_animal allergen mixes | 1.08 | 0.98 | 1.19 | .1052 | 1.03 | 0.93 | 1.13 | .6135 |
| | IgE_moth | **1.11** | **1.02** | **1.21** | .0180 | 1.08 | 0.99 | 1.17 | .1023 |
| | Any allergic disease | **1.20** | **1.11** | **1.30** | **<.0001** | **1.25** | **1.15** | **1.35** | **<.0001** |
| | Asthma | **1.57** | **1.41** | **1.75** | **<.0001** | **1.49** | **1.34** | **1.66** | **<.0001** |
| | Allergic rhinitis | 1.05 | 0.97 | 1.14 | .2025 | **1.11** | **1.02** | **1.20** | **.0132** |
| | Eczema | **1.22** | **1.11** | **1.35** | **<.0001** | **1.22** | **1.10** | **1.35** | **.0002** |
| | Allergic conjunctivitis | **1.18** | **1.05** | **1.34** | **.0073** | **1.26** | **1.12** | **1.43** | **.0002** |
| | Food allergy | **1.44** | **1.23** | **1.69** | **<.0001** | **1.40** | **1.20** | **1.64** | **<.0001** |
| | Drug allergy | **1.38** | **1.11** | **1.71** | **.0032** | **1.54** | **1.24** | **1.91** | **<.0001** |
| | Contact dermatitis | **1.35** | **1.06** | **1.73** | **.0163** | **1.53** | **1.19** | **1.96** | **.0008** |

Yamamoto-Hanada K et.al. JACI inPrac 2018;6:1421-1424

Physical aspect of quality of life (SF8-PCS) in pregnant women with any allergic disease (asthma, eczema, allergic rhino-conjunctivitis, food allergy, drug allergy and contact dermatitis) was worse than those without allergic disease.

**TABLE II.** Univariate and multivariate linear regression results for allergic features associated with quality of life (SF-8) in pregnan women across Japan (n = 77,639)

| | | Univariate | | | | Multivariate | | | |
|---|---|---|---|---|---|---|---|---|---|
| Outcome | Allergy features | Coefficient | Lower 95% CI | Upper 95% CI | *P* value | Coefficient | Lower 95% CI | Upper 95% CI | *P* valu |
| SF-8 (PCS) | None (reference) | | | | | | | | |
| | log_IgE.nonspecific (continuous) | **0.039** | **0.003** | **0.075** | **.0345** | 0.010 | −0.026 | 0.046 | .581 |
| | IgE (nonspecific) ≥170 UA/mL | **0.163** | **0.041** | **0.285** | **.0087** | 0.163 | −0.062 | 0.181 | .337 |
| | IgE_sensitization to any specific allergen | −0.043 | −0.16 | 0.074 | .4721 | −0.034 | −0.151 | 0.083 | .565 |
| | IgE_*Der p* 1 | −0.099 | −0.202 | 0.004 | .0607 | **−0.145** | **−0.247** | **−0.042** | **.005** |
| | IgE_Japanese cedar | 0.012 | −0.092 | 0.115 | .8232 | 0.024 | −0.084 | 0.132 | .666 |
| | IgE_egg | 0.174 | −0.341 | 0.689 | .5076 | 0.184 | −0.327 | 0.695 | .480 |
| | IgE_animal allergen mixes | 0.031 | −0.096 | 0.158 | .6333 | −0.029 | −0.157 | 0.098 | .651 |
| | IgE_moth | −0.051 | −0.165 | 0.064 | .3875 | −0.089 | −0.203 | 0.025 | .126 |
| | Any allergic disease | **−0.904** | **−1.007** | **−0.801** | **<.0001** | **−0.840** | **−0.942** | **−0.738** | **<.000** |
| | Asthma | **−0.934** | **−1.100** | **−0.769** | **<.0001** | **−1.006** | **−1.170** | **−0.841** | **<.000** |
| | Allergic rhinitis | **−0.827** | **−0.934** | **−0.721** | **<.0001** | **−0.756** | **−0.863** | **−0.650** | **<.000** |
| | Eczema | **−0.606** | **−0.747** | **−0.465** | **<.0001** | **−0.587** | **−0.727** | **−0.447** | **<.000** |
| | Allergic conjunctivitis | **−1.105** | **−1.275** | **−0.934** | **<.0001** | **−1.025** | **−1.195** | **−0.855** | **<.000** |
| | Food allergy | **−1.19** | **−1.429** | **−0.952** | **<.0001** | **−1.187** | **−1.424** | **−0.949** | **<.000** |
| | Drug allergy | **−1.705** | **−2.025** | **−1.386** | **<.0001** | **−1.501** | **−1.819** | **−1.184** | **<.000** |
| | Contact dermatitis | **−1.501** | **−1.868** | **−1.133** | **<.0001** | **−1.353** | **−1.719** | **−0.988** | **<.000** |

Yamamoto-Hanada K et.al. JACI inPrac 2018;6:1421-1424

Mental aspect of quality of life (SF8-MCS) in pregnant women with any allergic disease (asthma, eczema, allergic rhino-conjunctivitis, food allergy, drug allergy and contact dermatitis) was also worse than those without.

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| SF-8 (MCS) | None (reference) | | | | | | | |
| | log_IgE. nonspecific (continuous) | **−0.046** | **−0.082** | **−0.010** | **.0115** | −0.022 | −0.058 | 0.014 | .2290 |
| | IgE (nonspecific) ≥170 UA/mL | −0.113 | −0.233 | 0.008 | .0664 | −0.113 | −0.159 | 0.081 | .5252 |
| | IgE_sensitization to any specific allergen | −0.021 | −0.137 | 0.095 | .7242 | 0.007 | −0.109 | 0.123 | .9085 |
| | IgE_*Der p* 1 | **−0.125** | **−0.227** | **−0.023** | **.0160** | −0.091 | −0.192 | 0.011 | .0799 |
| | IgE_Japanese cedar | −0.038 | −0.140 | 0.064 | .4690 | 0.004 | −0.103 | 0.111 | .9380 |
| | IgE_egg | −0.32 | −0.828 | 0.189 | .2177 | −0.253 | −0.758 | 0.252 | .3265 |
| | IgE_animal allergen mixes | −0.113 | −0.239 | 0.012 | .0772 | −0.027 | −0.153 | 0.099 | .6764 |
| | IgE_moth | −0.066 | −0.179 | 0.047 | .2521 | −0.029 | −0.142 | 0.084 | .6161 |
| | Any allergic disease | **−0.514** | **−0.615** | **−0.412** | **<.0001** | **−0.56** | **−0.661** | **−0.459** | **<.0001** |
| | Asthma | **−0.574** | **−0.738** | **−0.410** | **<.0001** | **−0.513** | **−0.676** | **−0.350** | **<.0001** |
| | Allergic rhinitis | **−0.424** | **−0.529** | **−0.318** | **<.0001** | **−0.489** | **−0.594** | **−0.383** | **<.0001** |
| | Eczema | **−0.385** | **−0.524** | **−0.246** | **<.0001** | **−0.375** | **−0.514** | **−0.237** | **<.0001** |
| | Allergic conjunctivitis | **−0.599** | **−0.768** | **−0.430** | **<.0001** | **−0.676** | **−0.844** | **−0.508** | **<.0001** |
| | Food allergy | **−0.576** | **−0.811** | **−0.340** | **<.0001** | **−0.527** | **−0.761** | **−0.292** | **<.0001** |
| | Drug allergy | **−0.676** | **−0.992** | **−0.360** | **<.0001** | **−0.799** | **−1.113** | **−0.484** | **<.0001** |
| | Contact dermatitis | **−0.783** | **−1.146** | **−0.420** | **<.0001** | **−0.933** | **−1.294** | **−0.572** | **<.0001** |

Adjustors for multivariate analysis: maternal age, place of residence, marital status, having another child, history of abnormal pregnancy, current smoking status, employment status, and maternal education level. Statistically significant results shown in bold font.

Yamamoto-Hanada K et.al. JACI inPrac 2018;6:1421-1424

Contents lists available at ScienceDirect

Nutrition

journal homepage: www.nutritionjrnl.com

Applied nutritional investigation

# Dietary intake of fish and ω-3 polyunsaturated fatty acids and physician-diagnosed allergy in Japanese population: The Japan Environment and Children's Study

Kei Hamazaki M.D., Ph.D. [a,b,*], Akiko Tsuchida M.Sc. [a,b], Ayako Takamori Ph.D. [1,b], Tomomi Tanaka M.D., Ph.D. [b,c], Mika Ito M.D., Ph.D. [d], Hidekuni Inadera M.D., Ph.D. [a,b], Japan Environment and Children's Study (JECS) Group [†]

[a] *Department of Public Health, Faculty of Medicine, University of Toyama, Toyama, Japan*
[b] *Toyama Regional Center for JECS, University of Toyama, Toyama, Japan*
[c] *Department of Pediatrics, Faculty of Medicine, University of Toyama, Toyama, Japan*
[d] *Department of Obstetrics and Gynecology, Faculty of Medicine, University of Toyama, Toyama, Japan*

Hamazaki K et.al. Nutrition 2019:61:194-201

# Fish and ω-3 PUFA intake were associated with increased risk for some allergic diseases except asthma

Any of four allergies

| | | | | | | |
|---|---|---|---|---|---|---|
| Fish intake (Median g/d) | 7.3 | 20.3 | 31.7 | 45.9 | 76.0 | |
| n | 15 741 | 15 561 | 15 918 | 15 689 | 15 712 | |
| Cases | 7409 | 7612 | 7969 | 7975 | 7889 | |
| OR | 1.00 | 1.08 (1.031.13) | 1.13 (1.081.18) | 1.16 (1.111.22) | 1.13 (1.081.19) | <0.0001 |
| aOR | 1.00 | 1.05 (1.001.10) | 1.08 (1.041.13) | 1.11 (1.061.16) | 1.07 (1.021.12) | 0.0007 |
| ω3PUFA (Median g/d) | 0.91 | 1.37 | 1.75 | 2.21 | 3.13 | |
| n | 15694 | 15734 | 15637 | 15867 | 15689 | |
| Cases | 7428 | 7744 | 7819 | 8025 | 7837 | |
| OR | 1.00 | 1.08 (1.031.13) | 1.11 (1.061.16) | 1.14 (1.091.19) | 1.11 (1.061.16) | <0.0001 |
| aOR | 1.00 | 1.04 (1.001.09) | 1.06 (1.011.11) | 1.07 (1.021.13) | 1.03 (0.971.09) | 0.11 |

Hamazaki K et.al. Nutrition 2019:61:194-201

## Mothers

Allergic rhinitis

Allergic conjunctivitis

| Fish intake | Quintile for fish intake | | | | | |
|---|---|---|---|---|---|---|
| | 1 (low) | 2 | 3 | 4 | 5 (high) | $P_{trend}$ |
| Median intake of fish*, g/d | 7.3 | 20.3 | 31.7 | 45.9 | 76.0 | |
| All participants, n | 15 741 | 15 561 | 15 918 | 15 689 | 15 712 | |
| Any of four allergies | | | | | | |
| Cases, n | 7409 | 7612 | 7969 | 7975 | 7889 | |
| Crude odds ratio | 1.00 | **1.08 (1.03–1.13)** | **1.13 (1.08–1.18)** | **1.16 (1.11–1.22)** | **1.13 (1.08–1.19)** | **<0.0001** |
| Adjusted odds ratio† | 1.00 | **1.05 (1.00–1.10)** | **1.08 (1.04–1.13)** | **1.11 (1.06–1.16)** | **1.07 (1.02–1.12)** | **0.0007** |
| Asthma | | | | | | |
| Cases, n | 1767 | 1611 | 1678 | 1746 | 1800 | |
| Crude odds ratio | 1.00 | **0.91 (0.85–0.98)** | 0.93 (0.87–1.00) | 0.99 (0.92–1.06) | 1.02 (0.95–1.10) | 0.12 |
| Adjusted odds ratio | 1.00 | 0.94 (0.87–1.01) | 0.97 (0.90–1.04) | 1.03 (0.96–1.11) | 1.05 (0.97–1.13) | **0.03** |
| Allergic rhinitis or pollinosis | | | | | | |
| Cases, n | 5401 | 5561 | 5905 | 5915 | 5891 | |
| Crude odds ratio | 1.00 | **1.06 (1.02–1.12)** | **1.13 (1.08–1.18)** | **1.16 (1.11–1.21)** | **1.15 (1.10–1.20)** | **<0.0001** |
| Adjusted odds ratio | 1.00 | 1.02 (0.98–1.07) | **1.06 (1.01–1.11)** | **1.08 (1.03–1.13)** | **1.06 (1.01–1.11)** | **0.005** |
| Allergic conjunctivitis | | | | | | |
| Cases, n | 1443 | 1547 | 1653 | 1653 | 1700 | |
| Crude odds ratio | 1.00 | **1.09 (1.01–1.18)** | **1.15 (1.07–1.24)** | **1.17 (1.08–1.26)** | **1.20 (1.12–1.29)** | **<0.0001** |
| Adjusted odds ratio | 1.00 | 1.06 (0.98–1.14) | **1.09 (1.01–1.18)** | **1.10 (1.02–1.19)** | **1.14 (1.06–1.24)** | **0.0008** |
| Cases, n | 2439 | 2505 | 2537 | 2579 | 2546 | |
| Crude odds ratio | 1.00 | 1.05 (0.98–1.11) | 1.03 (0.97–1.10) | **1.07 (1.01–1.14)** | 1.05 (0.99–1.12) | 0.06 |
| Adjusted odds ratio | 1.00 | 1.05 (0.99–1.12) | 1.05 (0.98–1.11) | **1.09 (1.02–1.16)** | **1.07 (1.00–1.14)** | **0.02** |

| ω3PUFA intake | Quintile for ω−3 PUFA intake | | | | | |
|---|---|---|---|---|---|---|
| | 1 (low) | 2 | 3 | 4 | 5 (high) | $P_{trend}$ |
| Median intake of ω-3 PUF*, g/d | 0.91 | 1.37 | 1.75 | 2.21 | 3.13 | |
| All participants, n | 15 694 | 15 734 | 15 637 | 15 867 | 15 689 | |
| Any of four allergies | | | | | | |
| Cases, n | 7428 | 7744 | 7819 | 8025 | 7837 | |
| Crude odds ratio | 1.00 | **1.08 (1.03–1.13)** | **1.11 (1.06–1.16)** | **1.14 (1.09–1.19)** | **1.11 (1.06–1.16)** | **<0.0001** |
| Adjusted odds ratio | 1.00 | 1.04 (1.00–1.09) | **1.06 (1.01–1.11)** | **1.07 (1.02–1.13)** | 1.03 (0.97–1.09) | 0.11 |
| Asthma | | | | | | |
| Cases, n | 1797 | 1661 | 1645 | 1743 | 1756 | |
| Crude odds ratio | 1.00 | **0.91 (0.85–0.98)** | **0.91 (0.85–0.98)** | 0.95 (0.89–1.02) | 0.97 (0.91–1.05) | 0.9 |
| Adjusted odds ratio | 1.00 | 0.94 (0.87–1.01) | 0.93 (0.86–1.00) | 0.97 (0.90–1.04) | 0.95 (0.87–1.04) | 0.4 |
| Allergic rhinitis or pollinosis | | | | | | |
| Cases, n | 5371 | 5668 | 5806 | 5988 | 5840 | |
| Crude odds ratio | 1.00 | **1.08 (1.03–1.13)** | **1.14 (1.08–1.19)** | **1.16 (1.11–1.22)** | **1.14 (1.09–1.19)** | **<0.0001** |
| Adjusted odds ratio | 1.00 | 1.04 (0.99–1.09) | **1.07 (1.02–1.12)** | **1.08 (1.03–1.14)** | 1.04 (0.98–1.10) | **0.04** |
| Allergic conjunctivitis | | | | | | |
| Cases, n | 1455 | 1573 | 1650 | 1704 | 1614 | |
| Crude odds ratio | 1.00 | **1.09 (1.01–1.17)** | **1.15 (1.07–1.24)** | **1.18 (1.09–1.27)** | **1.12 (1.04–1.21)** | **0.0003** |
| Adjusted odds ratio | 1.00 | 1.05 (0.98–1.14) | **1.11 (1.02–1.20)** | **1.13 (1.04–1.22)** | 1.09 (0.99–1.20) | **0.02** |
| Cases, n | 2468 | 2499 | 2572 | 2554 | 2513 | |
| Crude odds ratio | 1.00 | 1.01 (0.95–1.07) | 1.06 (0.99–1.12) | 1.03 (0.97–1.09) | 1.02 (0.96–1.09) | 0.4 |
| Adjusted odds ratio | 1.00 | 1.01 (0.95–1.08) | 1.05 (0.99–1.12) | 1.03 (0.96–1.10) | 1.03 (0.95–1.11) | 0.4 |

Hamazaki K et.al. Nutrition 2019:61:194-201

# Fathers

Fish intake

| | Quintile for fish intake | | | | | |
|---|---|---|---|---|---|---|
| | 1 (low) | 2 | 3 | 4 | 5 (high) | $P_{trend}$ |
| Median intake of fish*, g/d | 4.7 | 20.7 | 35.5 | 53 | 90 | |
| All participants, n | 8481 | 8654 | 8582 | 8552 | 8562 | |
| Any of four allergies | | | | | | |
| Cases, n | 3397 | 3651 | 3702 | 3676 | 3571 | |
| Crude odds ratio | 1.00 | **1.09 (1.03–1.16)** | **1.14 (1.07–1.21)** | **1.13 (1.06–1.20)** | **1.07 (1.01–1.14)** | **0.02** |
| Adjusted odds ratio† | 1.00 | **1.07 (1.00–1.14)** | **1.10 (1.03–1.17)** | **1.09 (1.03–1.16)** | 1.05 (0.99–1.13) | 0.08 |
| Asthma | | | | | | |
| Cases, n | 914 | 977 | 919 | 915 | 942 | |
| Crude odds ratio | 1.00 | 1.05 (0.96–1.16) | 0.99 (0.90–1.09) | 0.99 (0.90–1.09) | 1.02 (0.93–1.13) | 0.89 |
| Adjusted odds ratio | 1.00 | 1.07 (0.97–1.17) | 1.02 (0.92–1.12) | 1.02 (0.92–1.12) | 1.04 (0.94–1.15) | 0.79 |
| Allergic rhinitis or pollinosis | | | | | | |
| Allergic rhinitis | 2412 | 2671 | 2765 | 2714 | 2578 | |
| | 1.00 | **1.12 (1.05–1.20)** | **1.20 (1.12–1.28)** | **1.17 (1.10–1.25)** | **1.08 (1.01–1.16)** | **0.008** |
| | 1.00 | **1.08 (1.01–1.16)** | **1.13 (1.06–1.21)** | **1.11 (1.03–1.18)** | 1.05 (0.98–1.12) | 0.14 |
| Allergic conjunctivitis | | | | | | |
| Cases, n | 353 | 361 | 420 | 373 | 368 | |
| Crude odds ratio | 1.00 | 1.00 (0.86–1.16) | **1.18 (1.03–1.37)** | 1.05 (0.90–1.22) | 1.03 (0.89–1.20) | 0.51 |
| Adjusted odds ratio | 1.00 | 0.97 (0.84–1.13) | 1.13 (0.98–1.31) | 1.00 (0.86–1.17) | 1.01 (0.86–1.18) | 0.80 |
| Atopic dermatitis | | | | | | |
| Atopic dermatitis | 886 | 993 | 985 | 1,008 | 994 | |
| | 1.00 | **1.11 (1.01–1.22)** | **1.11 (1.01–1.22)** | **1.15 (1.04–1.26)** | **1.13 (1.02–1.24)** | **0.02** |
| | 1.00 | **1.11 (1.01–1.23)** | **1.12 (1.02–1.24)** | **1.16 (1.05–1.27)** | **1.15 (1.04–1.28)** | **0.006** |

ω3PUFA intake

| | Quintile for ω-3 PUFA intake | | | | | |
|---|---|---|---|---|---|---|
| | 1 (low) | 2 | 3 | 4 | 5 (high) | $P_{trend}$ |
| Median intake of ω-3 PUFA*, g/d | 0.89 | 1.40 | 1.83 | 2.36 | 3.48 | |
| All subjects, n | 8541 | 8557 | 8578 | 8554 | 8601 | |
| Any of four allergies | | | | | | |
| Cases, n | 3342 | 3638 | 3670 | 3719 | 3628 | |
| Crude odds ratio | 1.00 | **1.15 (1.08–1.22)** | **1.16 (1.09–1.24)** | **1.20 (1.13–1.27)** | **1.13 (1.07–1.21)** | **<0.0001** |
| Adjusted odds ratio | 1.00 | **1.12 (1.05–1.19)** | **1.13 (1.06–1.21)** | **1.18 (1.10–1.25)** | **1.14 (1.06–1.23)** | **<0.0001** |
| Asthma | | | | | | |
| Cases, n | 896 | 942 | 923 | 925 | 981 | |
| Crude odds ratio | 1.00 | 1.06 (0.96–1.16) | 1.03 (0.93–1.13) | 1.03 (0.94–1.14) | 1.10 (1.00–1.21) | 0.12 |
| Adjusted odds ratio | 1.00 | 1.06 (0.96–1.17) | 1.03 (0.94–1.14) | 1.04 (0.94–1.15) | 1.09 (0.97–1.22) | 0.26 |
| Allergic rhinitis or pollinosis | | | | | | |
| Allergic rhinitis | 6134 | 5917 | 5858 | 5813 | 5969 | |
| | 1.00 | **1.14 (1.06–1.21)** | **1.18 (1.11–1.26)** | **1.20 (1.13–1.28)** | **1.12 (1.05–1.20)** | **0.0001** |
| | 1.00 | **1.10 (1.03–1.18)** | **1.15 (1.07–1.23)** | **1.18 (1.10–1.26)** | **1.14 (1.06–1.24)** | **0.0001** |
| Allergic conjunctivitis | | | | | | |
| Cases, n | 332 | 374 | 385 | 407 | 377 | |
| Crude odds ratio | 1.00 | 1.13 (0.97–1.31) | **1.16 (1.00–1.35)** | **1.24 (1.07–1.43)** | 1.13 (0.97–1.32) | **0.049** |
| Adjusted odds ratio | 1.00 | 1.10 (0.94–1.28) | 1.12 (0.96–1.31) | **1.21 (1.03–1.41)** | 1.14 (0.95–1.36) | 0.07 |
| Atopic dermatitis | | | | | | |
| Atopic dermatitis | 845 | 981 | 1,019 | 1,034 | 987 | |
| | 1.00 | **1.18 (1.07–1.30)** | **1.23 (1.11–1.35)** | **1.25 (1.14–1.38)** | **1.18 (1.07–1.30)** | **0.0005** |
| | 1.00 | **1.17 (1.06–1.29)** | **1.21 (1.10–1.34)** | **1.24 (1.12–1.38)** | **1.18 (1.05–1.32)** | **0.002** |

Hamazaki K et.al. Nutrition 2019:61:194-201

Ann Allergy Asthma Immunol 116 (2016) 425–430

Contents lists available at ScienceDirect

# From Adjunct Study

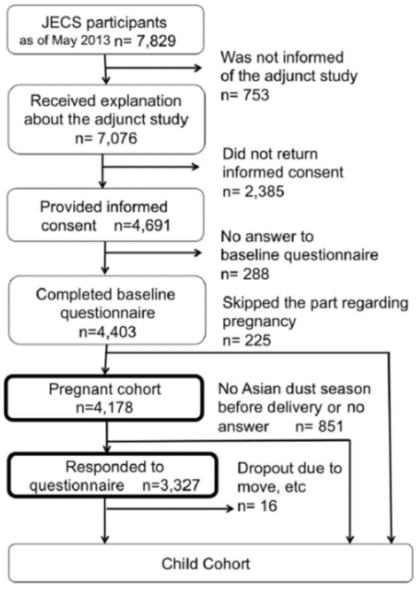
(Kyoto, Toyama, Tottori)

## Effect of desert dust exposure on allergic symptoms

### A natural experiment in Japan

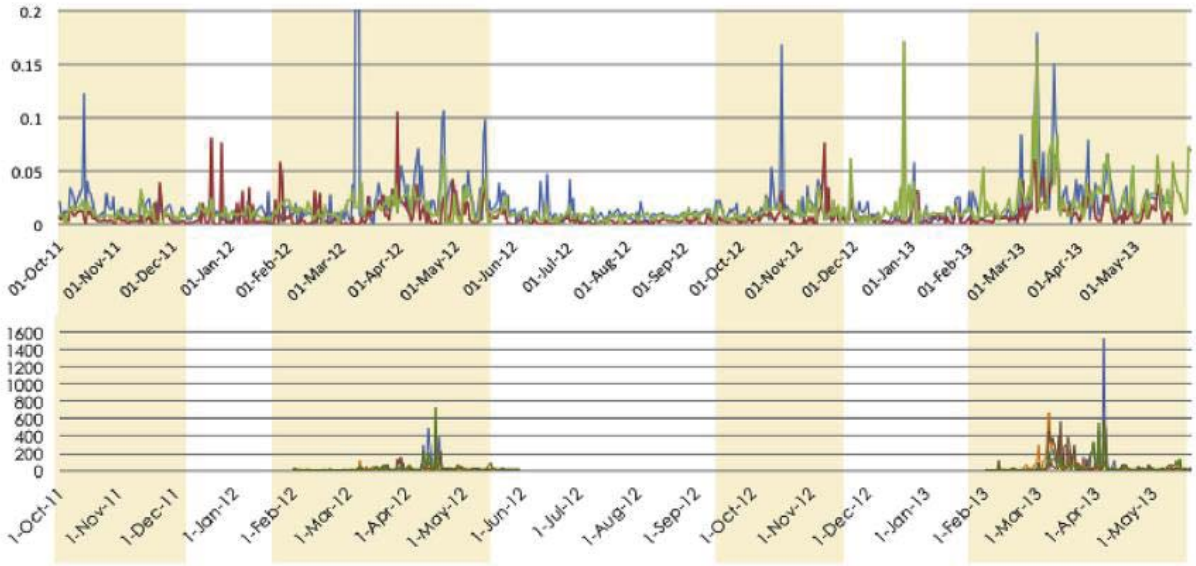
Kumiko T. Kanatani, MD, MAS*; Kei Hamazaki, MD, PhD†; Hidekuni
Nobuo Sugimoto, PhD‡; Atsushi Shimizu, PhD§; Hisashi Noma, PhD
Yoshimitsu Takahashi, PhD*,**; Toshiko Itazawa, MD, PhD††; Miho Eg
Keiko Sato, PhD§§,||||; Tohshin Go, MD, PhD||||; Isao Ito, MD, PhD¶¶; Y
Ikuo Konishi, MD, PhD##; Yuichi Adachi, MD, PhD††; Takeo Nakayam
Environment & Children's Study Group

* Department of Health Informatics, Kyoto University School of Public Health, Kyoto, Japan
† Department of Public Health, University of Toyama, Toyama, Japan
‡ Center for Environmental Measurement and Analysis, National Institute for Environmental Studies, Tsukuba, Ibaragi,
§ Center for Regional Environmental Research, National Institute for Environmental Studies, Tsukuba, Ibaragi, Japan
|| Department of Data Science, The Institute of Statistical Mathematics, Tokyo, Japan
¶ Department of Biostatistics, Kyoto University School of Public Health, Kyoto, Japan
# Department of Social Medicine, Faculty of Medicine, Tottori University, Yonago, Japan
** Department of Social and Behavioral Sciences, Harvard School of Public Health, Boston, Massachusetts
†† Department of Pediatrics, Faculty of Medicine, University of Toyama, Toyama, Japan
‡‡ Department of Gynecology and Obstetrics, Kyoto University Graduate School of Medicine, Kyoto, Japan
§§ Institute for Advancement of Clinical and Translational Science, Kyoto University Hospital, Kyoto, Japan
|||| Kyoto Unit Centre for Japan Environment & Children's Study, Graduate School of Medicine, Kyoto University, Kyoto,
¶¶ Department of Respiratory Medicine, Kyoto University Hospital, Kyoto, Japan



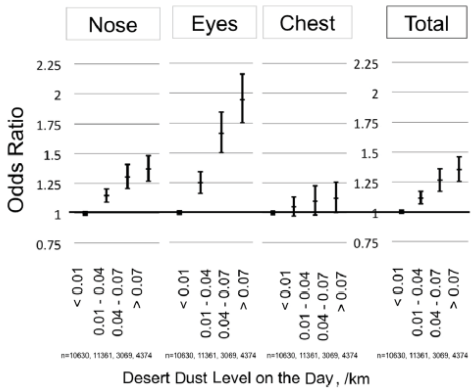

Kanatani KT et.al. Ann Allergy Asthma Immunol 2016:116:425-30

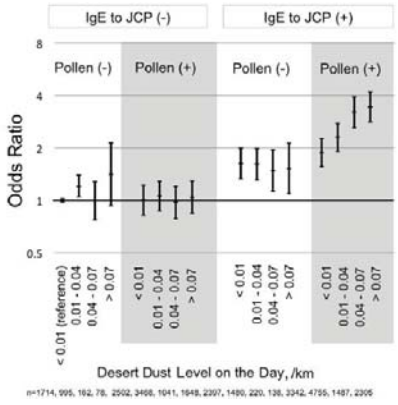
Time course of daily dust level in kilometers (upper) and pollen counts in cubic meters (lower) during the study period (shaded).

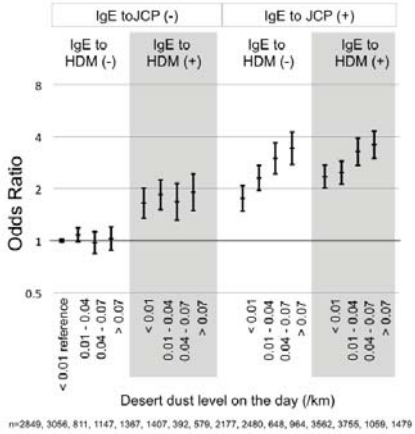


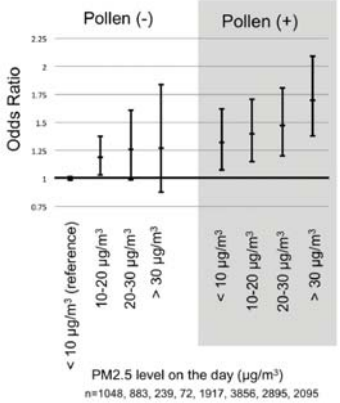

For dust levels, blue indicates Kyoto (Higashi-Osaka); red, Toyama; and green, Tottori (Matsue). For pollen counts, blue indicates Kyoto (Kyoto City area); purple, Kyoto (Nagahama area); green, Kyoto (Kizugawa area); red, Toyama; and orange, Tottori.

Kanatani KT et.al. Ann Allergy Asthma Immunol 2016:116:425-30




Pregnant women had an increased risk of allergic symptoms on high desert-dust days.
The increased OR was mostly driven by those who showed positive IgE to Japanese cedar pollen when pollen simultaneously dispersed
No clear risk increase was observed in the absence of pollen or for participants with negative IgE to Japanese cedar pollen.
The risk elevation was observed from low levels of desert dust in a dose-dependent manner even on control days.

Kanatani KT et.al. Ann Allergy Asthma Immunol 2016:116:425-30

# From Adjunct Study(Kyoto, Toyama, Tottori)

PLOS ONE

RESEARCH ARTICLE

## Association between vitamin D deficiency and allergic symptom in pregnant women

**Kumiko T. Kanatani[1,2]*, Yuichi Adachi[3], Kei Hamazaki[4], Kazunari Onishi[5], Tohshin Go[2], Kyoko Hirabayashi[2], Motonobu Watanabe[6], Keiko Sato[2,7], Youichi Kurozawa[5], Hidekuni Inadera[4], Hiroshi Oyama[8], Takeo Nakayama[1], for the Japan Environment and Children's Study Group¶**

**1** Department of Health Informatics, Kyoto University School of Public Health, Kyoto, Japan, **2** Kyoto Unit Centre for Japan Environment and Children's Study, Graduate School of Medicine, Kyoto University, Kyoto, Japan, **3** Department of Pediatrics, Faculty of Medicine, University of Toyama, Toyama, Japan, **4** Department of Public Health, University of Toyama, Toyama, Japan, **5** Department of Public Health, Tottori University, Yonago, Tottori, Japan, **6** Doshisha University Center for Baby Science, Kizugawa, Kyoto, Japan, **7** Institute for Advancement of Clinical and Translational Science, Kyoto University Hospital, Kyoto, Japan, **8** Department of Clinical Information Engineering, Health Services Sciences, School of Public Health, Graduate School of Medicine, the University of Tokyo, Tokyo, Japan

¶ Membership of the Japan Environment and Children's Study Group is provided in the Acknowledgments.
* kanatanik@mac.com

Check for updates

Kanatani KT, et al. PLoS ONE 2019:14(4): e0214797.

## Serum concentration of vitamin D varies throughout the year

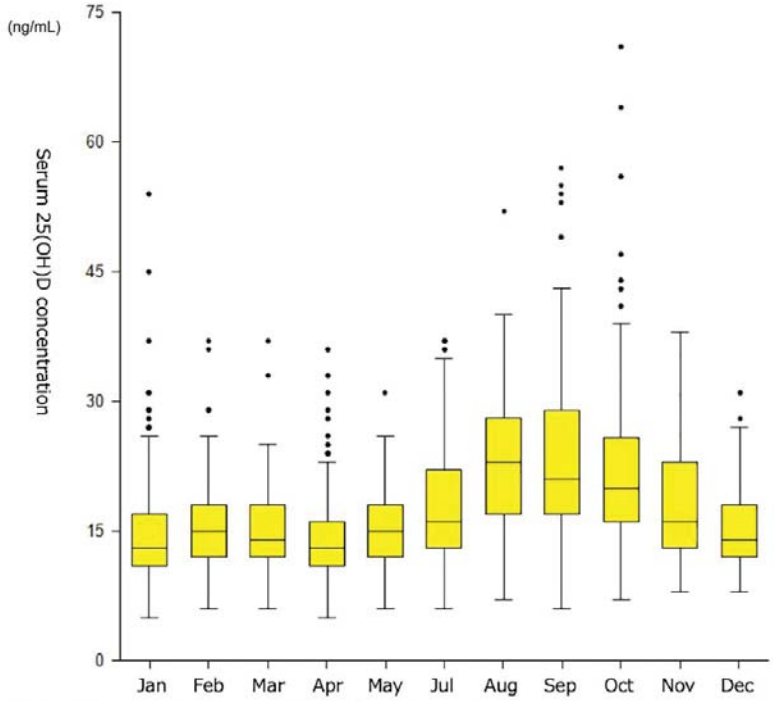



**Fig 3. Serum 25(OH)D levels in relation to sampled months.** Serum 25(OH)D was less than 20ng/mL in 1,233 of 1,745 samples (70.7%). There was a clear seasonal change with a peak at the end of summer and a trough in early spring. The median level of serum 25(OH)D in each season was 15, 14, 19, and 20 ng/mL in winter (Dec-Feb), spring (Mar-May), summer (Jul-Aug) and autumn (Sep-Nov).

Kanatani KT, et al. PLoS ONE 2019:14(4): e0214797.

Serum 25(OH)D was less than 20ng/mL in 1,233 of 1,745 samples (70.7%). The adjusted odds ratio (aOR) for occurrence of any allergic symptom in deficient cases compared with non-deficient cases was 1.33 (95% CI: 1.07–1.64, p = 0.01). Further, vitamin D deficiency significantly enhanced the risk increase at desert dust events and at pollen exposure (p-values for interaction<0.1).

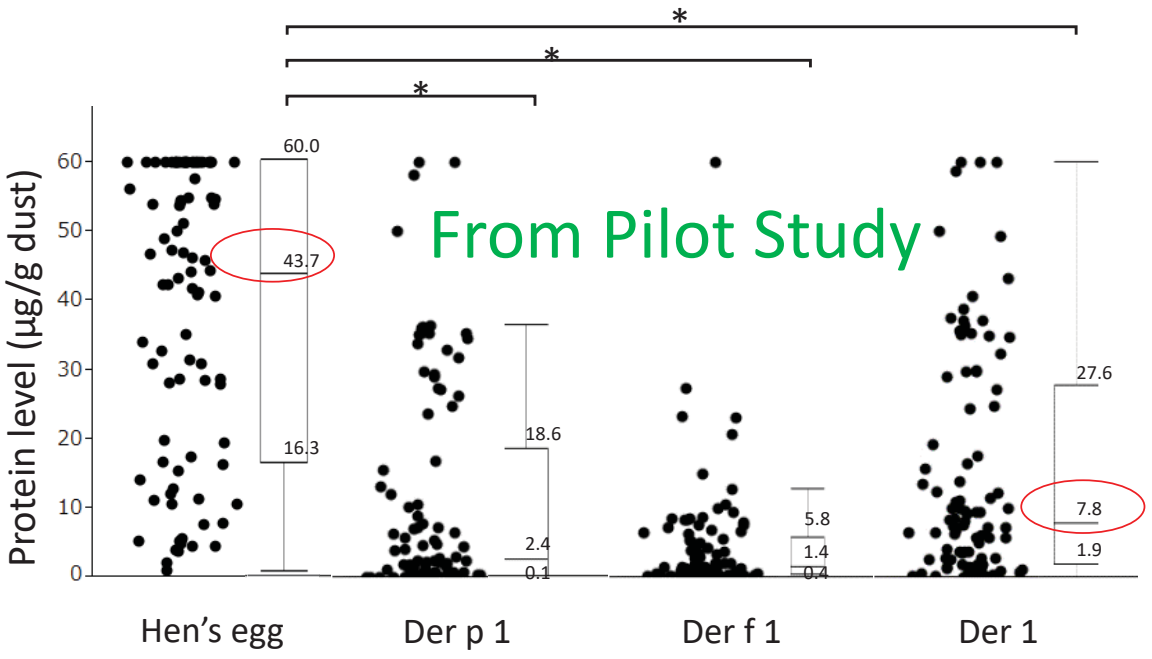
**Table 2. Odds ratio (OR) and its 95% Confidence Interval (95%CI) for allergic symptom development.**

| | OR | 95% CI | | | P value |
|---|---|---|---|---|---|
| Vitamin D deficiency [a] | 1.33 | 1.07 | – | 1.64 | .009 |
| IgE to cedar pollen (per class increase) | 1.28 | 1.21 | – | 1.35 | < .001 |
| IgE to house dust mite (per class increase) | 1.10 | 1.03 | – | 1.18 | .008 |

Vit.D deficiency increased the risk of allergic symptom when exposed to desert dust events and IgE positive to JCP and HDM was also risk factors.

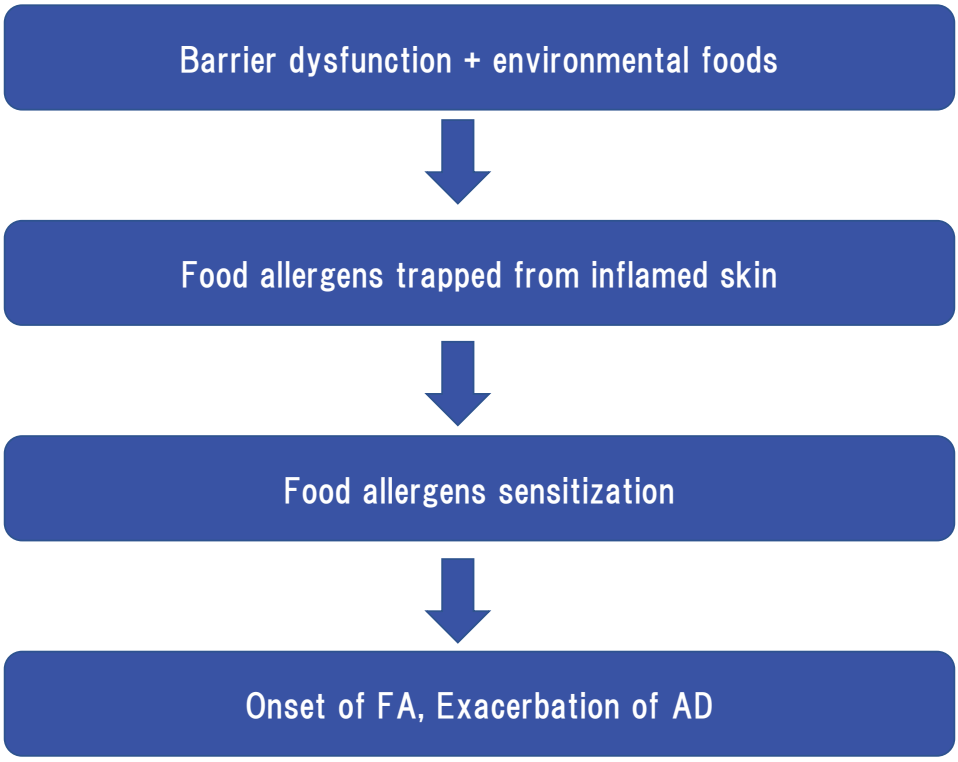
Kanatani KT, et al. PLoS ONE 2019:14(4): e0214797.

# Egg protein was detected from house dust collected From bed sheets in all participants' houses




Wilcoxon rank-sum test * $p < 0.001$

Kitazawa H et.al. Allergology International 2019




# Summary

- The primary aim of JECS is to examine environmental influence on children's health
- Half of pregnant mothers have history of allergic diseases and ¾ of mothers have been sensitized with any allergens
- Hg influences allergen sensitization in different manner due to the kinds of allergens.
- Adjunct studies revealed the influence of desert dust on allergy and a pilot study showed house dust of all participants' house contained egg proteins.
- Important exposure variables including environmental chemicals that might influence the onset of allergic diseases are to be analyzed

# Acknowledgement


Hokkaido

Miyagi

Fukushima

Toyama

Chiba

Koushin

Tottori

Aichi

Kanagawa

Kyoto

Core Center
National Institute for
Environmental study

Hyogo

Osaka

Medical Support Center
National Center for Child Health
and Development

Kochi

Fukuoka

South Kyushu
& Okinawa