Updated of
Japan Environment and Children's Study (JECS)

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United Kingdom

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Japan Environment and Children's Study (Jecs)

- Jecs is a **prospective birth cohort** study involving ~100,000 mother-child pairs
- Main Study with all the participants: **Biological sample collection** from mothers (and fathers if accessible) and children; **questionnaire administration** during pregnancy, at birth, 1 month, 6 month, and every 6 month after that until children reach 13 years of age; and medical record, registry and school **record transcription**
- **Substudy**: A sub-cohort (n ~ 5,000) will be formed within Main Study
  - Home visit—Indoor and outdoor air quality, noise, dwelling inspection…
  - Psychological development test (Kyoto Scale), physical examination, blood and urine collection
- **Case-cohort** and **nested case-control** studies for rare diseases
- **Adjunct Studies** conducted with extramural funding
- **Pilot Study** to evaluate the feasibility, acceptability and cost of the proposed procedures and processes to be used in the Main Study
- > Protocol paper: Kawamoto *et al*. BMC Public Health 2014, **14**:25

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National Institute for Environmental Studies

Exposure of interest

Exposures	Examples
Chemicals from environment/occupation	PCBs, PBDEs, PFCs, POPs, pesticides, EDCs, synthetic musk, phthalates, parabens, triclosan, benzophenone, PAHs, cotinine, caffeine, metals, particulate matters
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, aductomics

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Priority outcomes

Outcomes	Examples
Pregnancy/reproduction	Stillbirth, preterm delivery, low birth weight
Congenital anomalies	Cleft lip and palate, ventricular septal defect, hypospadias, cryptorchidism, Down syndrome
Neurodevelopmental disorders	Autism spectrum disorders, learning disability, ADHD
Immunological disorders	Asthma, atopic dermatitis, food allergy, Kawasaki disease
Metabolic disorders	Glucose metabolism disorder, obesity
Cancers	Leukaemia, lymphoma, brain tumours

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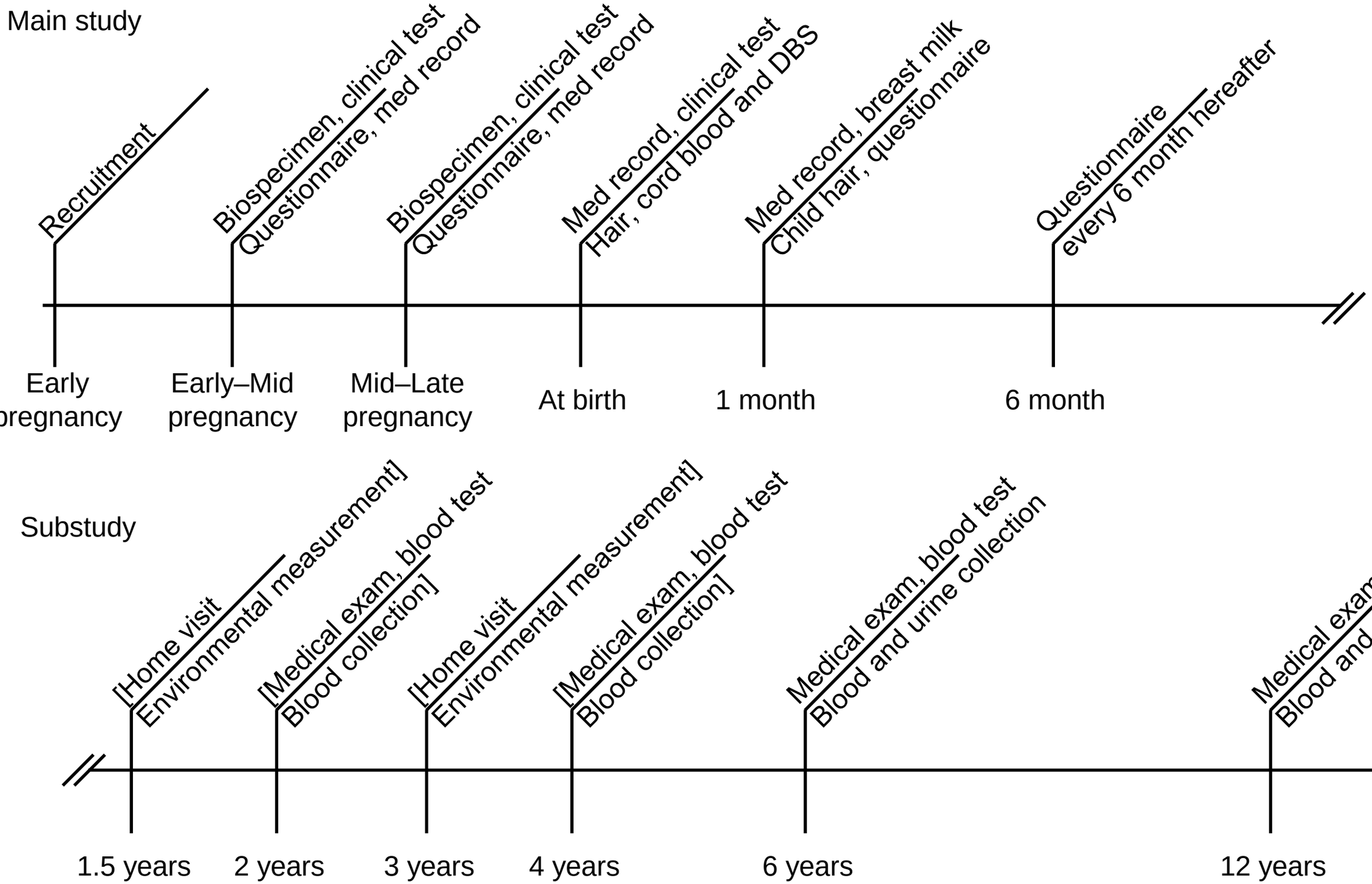
Road map



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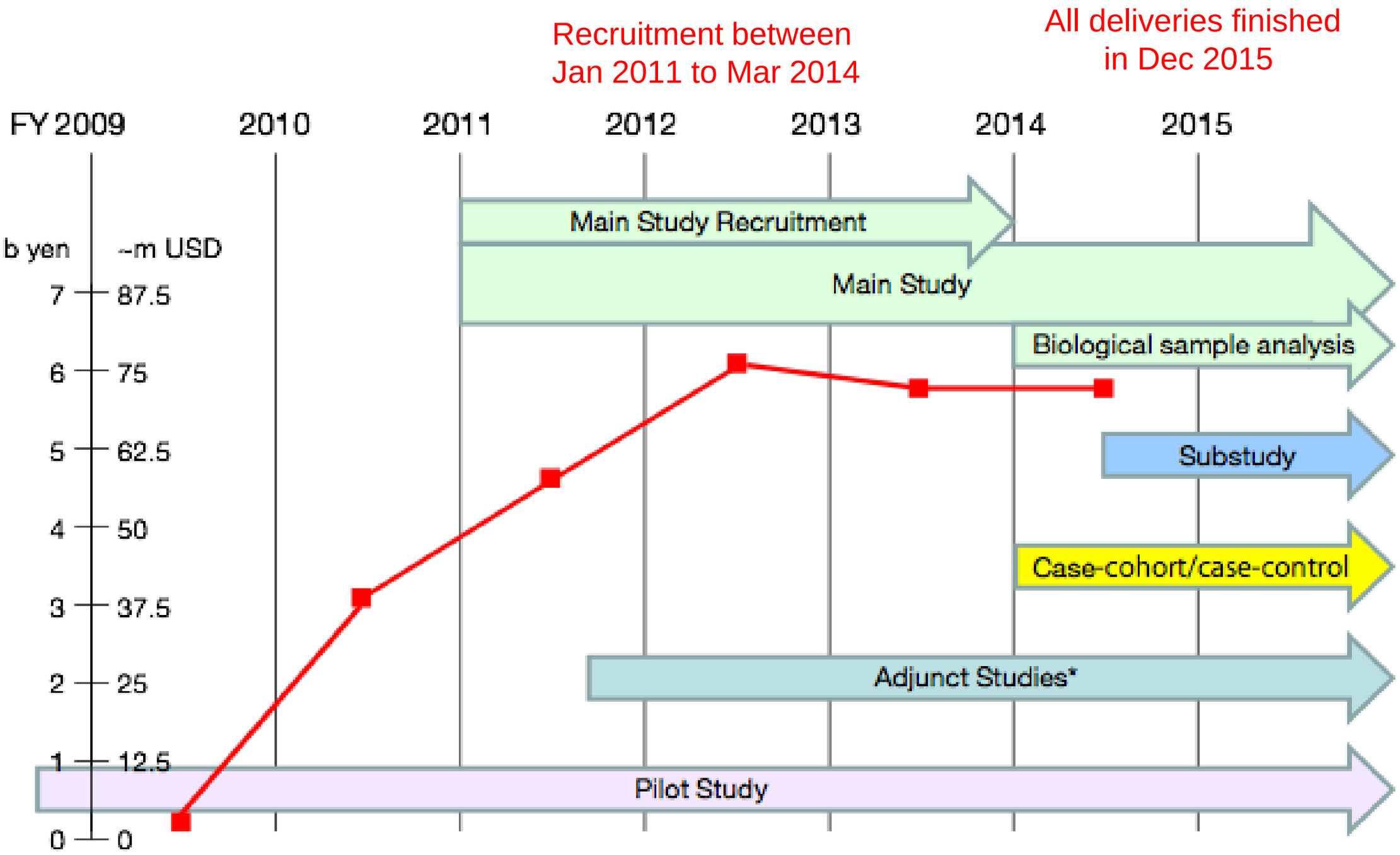
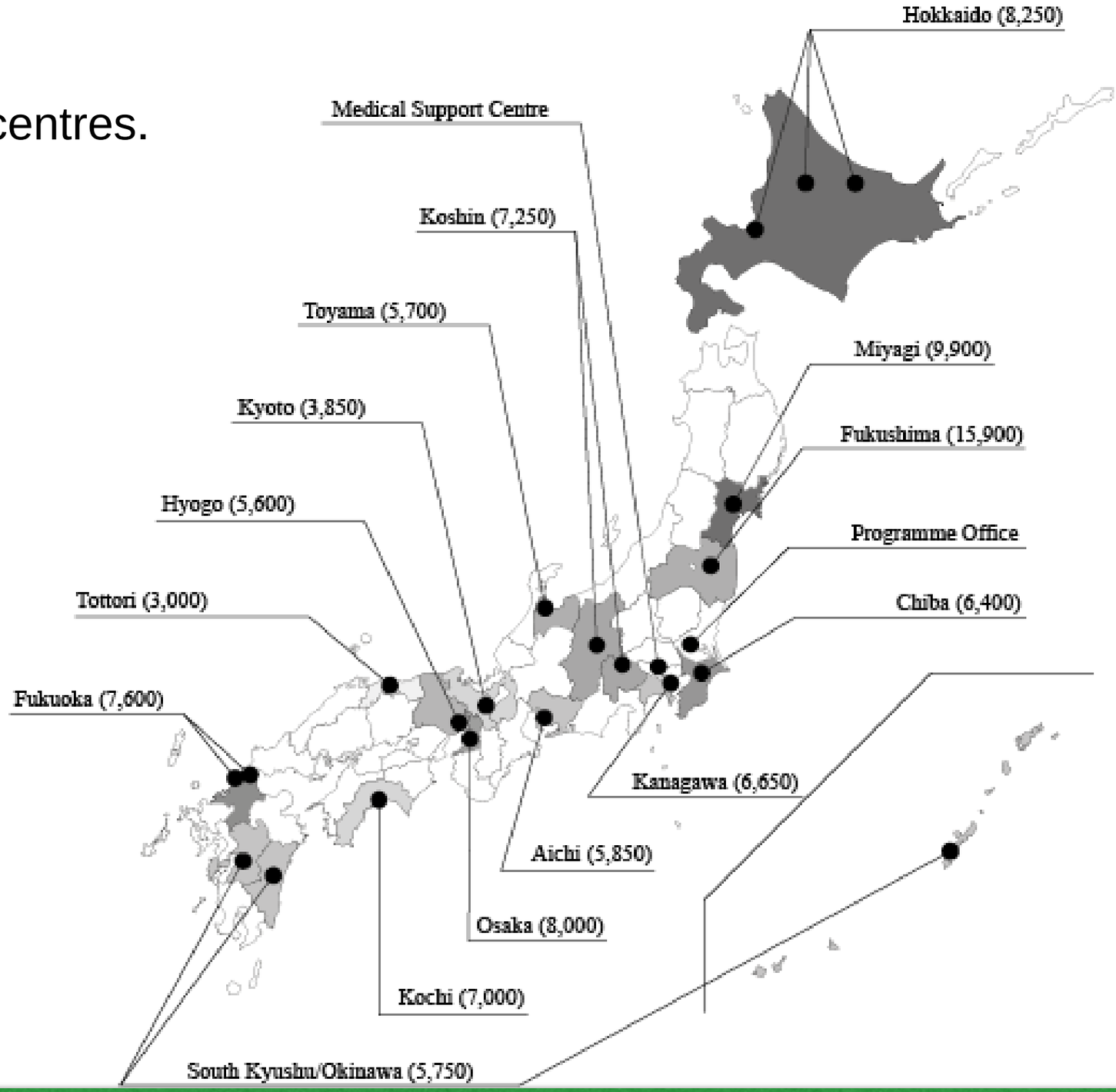
Budget and study structure



Study locations

- Selected through past findings and competition

Jecs has 15 regional centres.



Current status

- Recruitment completed in March 2014
  - Mother: 103,086 (~80% consent rate)
  - Father: 51,943
  - Child: 100,169 live births (under data cleaning)
- Questionnaire (under data cleaning)
  - Through pregnancy to 4 years old (every 6 months)
- Medical record transcription (under data cleaning)
  - Mother: Through pregnancy to 1 month old
  - Child: If suspected disease, referring to the medical record
- Collection of biospecimens until 1 month old completed in January 2015
  - Details share the next slide
- Substudy started in November 2014 (recruitment phase)
  - Home visit (1.5 y/o): >2000 samples
  - Psycodevelopmental test, physician's exam, blood collection (2 y/o): >1000 exams

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Collection of biospecimens

Sample type	Participant		Number
Blood	Mother	1st trimester	91,935
		2nd trimester	97,979
		3rd trimester	98,818
	Father (during pregnacy)		49,796
	Umbilical cord blood		87,802
	Child (at birth, blood spot)		94,841
Breast milk	Mother (at 1m)		89,364
Hair	Mother (at birth)		78,719
	Child (at 1m)		94,990

And Jecs collected mother’s urine during pregnancy

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Analysis of biospecimens and environment exposures

- We started analysis of biospecimens in 2014.

- Main study
  - Mother’s blood: 20,000 samples were analyzed for heavy metals (Pb, Cd, Hg, Mg, Se) in 2014.
  - Mother’s urine: 15,000 samples were analyzed for cotinine in 2014.
  - DNA extraction & Genomics: under planning

- Substudy
  - Environmental exposures: more than 2,000 samples analyzed for VOCs, aldehyde etc. in Sep 2015

Cancer case ascertainment

- Process of ascertainment
  - Asking questions every year (1 y/o, 2 y/o ...) in child questionnaire.
  - If found suspected cancer cases, each regional centres request the detailed questionnaire to their physician.
  - Issued by physician
- Characteristics of the detailed questionnaire
  - The detailed questionnaire was made based on WHO cancer classification
  - Collecting ALL, AML, lymphoma, CNS and all malignant tumors.
  - Also collecting suspected benign tumors (ex. **Juvenile Xanthogranuloma)**
- Current status
  - This system started cancer ascertainment in Nov 2014.
  - We have not linked to public cancer registration yet.
  - suspected cancer cases were more than 60 cases
  - Among them, cancer ascertainment was completed more than 25.
  - Four hundreds and more suspected tumor cases found, if including any type of tumor.
  - data collection and cleaning phase

First 9,819 participants characteristics

- Participants: initially 9,838 pregnant women participated, 19 removed because of missing data on maternal age and gestational age at delivery.
- Entry period: January 2011 to 31st December 2011
- Recruitment rate: more than 50%

		Total	Age at delivery, years			
			<25	25–29	30–34	≥35
Number of mothers		9819	1049	2762	3456	2552
Age at delivery, years, mean		31(5)	10.7	28.1	35.2	26
Educational background, years	<10	5.2	20.4	5.2	2.5	2.6
	10–12	31.7	54	34.8	25.2	28.2
	≥13	63.2	25.6	60.1	72.4	69.1
Household income, million JPN Yen	<2	6.1	18.2	7.1	3.7	3.9
	2 to <4	35.2	51.8	42.7	32.4	24.7
	4 to <6	33	20.7	30.8	36.2	35.5
	6 to <8	15.1	4.9	12.1	16.6	20.2
	8 to <10	6.4	1.8	4.3	7.3	9
	≥10	4.2	2.6	2.9	3.9	6.7

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First 9,819 participants characteristics (cont.)

			Age at delivery, years			
		total	<25	25–29	30–34	≥35
Smoking habits	Never smoked	56.5	47.4	54.3	58.9	59.2
	Quit before pregnancy	24.2	17.8	22.8	25.7	26.4
	During early pregnancy	19.3	34.8	22.9	15.5	14.4
Passive smoking	Rarely	47.3	24.3	41.3	53.4	54.8
	Daily	19.9	37.3	22	16.2	15.9
Parity	0	40.9	62.4	49.7	35.7	29.8
	1	38.2	30.3	36.5	41.9	38.4
	≥2	20.8	7.4	13.8	22.4	31.9
Type of delivery	Vaginal	80.3	86.8	84	79.8	74.2
	Cesarean	19.7	13.2	16	20.2	25.8
Gestational age at birth	Preterm births	6.9	6.5	7.4	5.6	8.2
	Term births	92.9	93.4	92.4	94.1	91.7
Baby characteristics	Male	51	52.3	51.7	50.1	51.1
	Birth weight total	2987(477)	2981(425)	2979(441)	2997(441)	2985(471)
	Signleton births Total	3002(433)	2992(413)	2997(424)	3012(427)	2997(459)
	Male	3046(431)	3050(421)	3041(410)	3052(437)	3044(449)
	Female	2956(430)	2929(396)	2952(433)	2973(412)	2948(464)
	.ow birth weight(<2500g)	9.1	9.8	8.5	9.1	9.4

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Selected maternal and infant characteristics of JECS and Japanese national surveys

	JECS	National survey	
	(%)	(%)	
Maternal characteristics			
Age at delivery, years			Vital Statistics, 2011[12]
20–29	37.8	38.5	
30–39	57.1	56.6	
Parity			
0	40.9	[a]	
Infant characteristics			
Live births			Birth Statistics, 2010[13]
Singleton births	98.2	98.0	
Gestational age at birth, weeks			Birth Statistics, 2010[13]
Term births (37–41)[b]	93.9	94.9	
Sex[c]			Vital Statistics, 2011[12]
Male	51.1	51.2	
Female	48.9	48.8	
Type of delivery			Surveys of Medical
Cesarean	19.7	19.2	Institutions, 2011[14]
Birth weight[b]			Birth Statistics, 2010[13]
Total, mean kg	3.00	3.02	
Low birth weight (<2500 g)	9.1	8.3	

[a]In Vital Statistics,[12] birth order has been reported. The proportion of first child among the number of the total births was 47.1% in 2011.
[b]Singleton births only.
[c]Excluding missing data.

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GIS data and special interest area in I4C

- Geographic information system (GIS) data
  - Collecting every participants' address at the entry
  - If families moved with no contact, we could find the move by questionnaire returning. We contact the families using transfer service and ask them to inform of the new address.
  - Ministry of the environment collected air pollutant data more than 1,500 locations every year.
  - We plan creating the spatial model.
  - Additionally, we collected indoor/outdoor air pollution in substudy
- Special interest area
  - Epigenetics, metabolomics, infectomics (microbiome)
    - But need more budget if do
  - Our most interested area is chemicals in environment
  - Also interested in chemicals in food
    - Based on food frequency questionnaire

The availability of data and biospecimens

- The current Jecs policy does not allow the biospecimens be shared outside the study group to protect the participants privacy

- Jecs is willing to participate in joint studies with the I4C group by analysing samples by Jecs labs

- Quality control exercises must be staged

Publication

Kawamoto *et al. BMC Public Health* 2014, **14**:25
http://www.biomedcentral.com/1471-2458/14/25

BMC Public Health

STUDY PROTOCOL Open Access

Rationale and study design of the Japan environment and children's study (JECS)

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Statistical Data

The Japan Environment and Children's Study (JECS): A Preliminary Report on Selected Characteristics of Approximately 10 000 Pregnant Women Recruited During the First Year of the Study

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For more information:
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