

Association between maternal lifestyle during early pregnancy and onset phase of childhood overweight

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Background

- We previously clarified the association of maternal lifestyle during early pregnancy, including smoking and breakfast consumption, with childhood obesity and overweight at 5 years of age and 9–10years of age.
- To prevent childhood obesity, we considered that it was important to specify the risk factor about each onset phase.

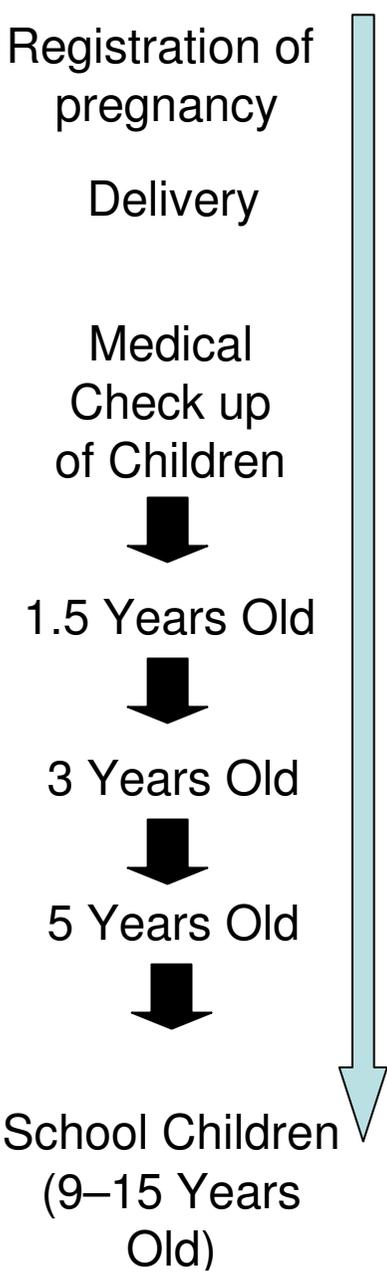
Objectives

- We aimed to clarify the association between maternal lifestyle during early pregnancy and being childhood overweight between birth and 5 years of age, and between 5 years of age and 9–10 years of age.

Participants and Study Design

- The study population comprised children born between April 1, 1991 and March 31, 1997, in Japan, and their mothers.
- These subjects are the participants of Project Koshu, a dynamic ongoing prospective cohort study of pregnant women and their children in a Japanese rural area that commenced in 1988.

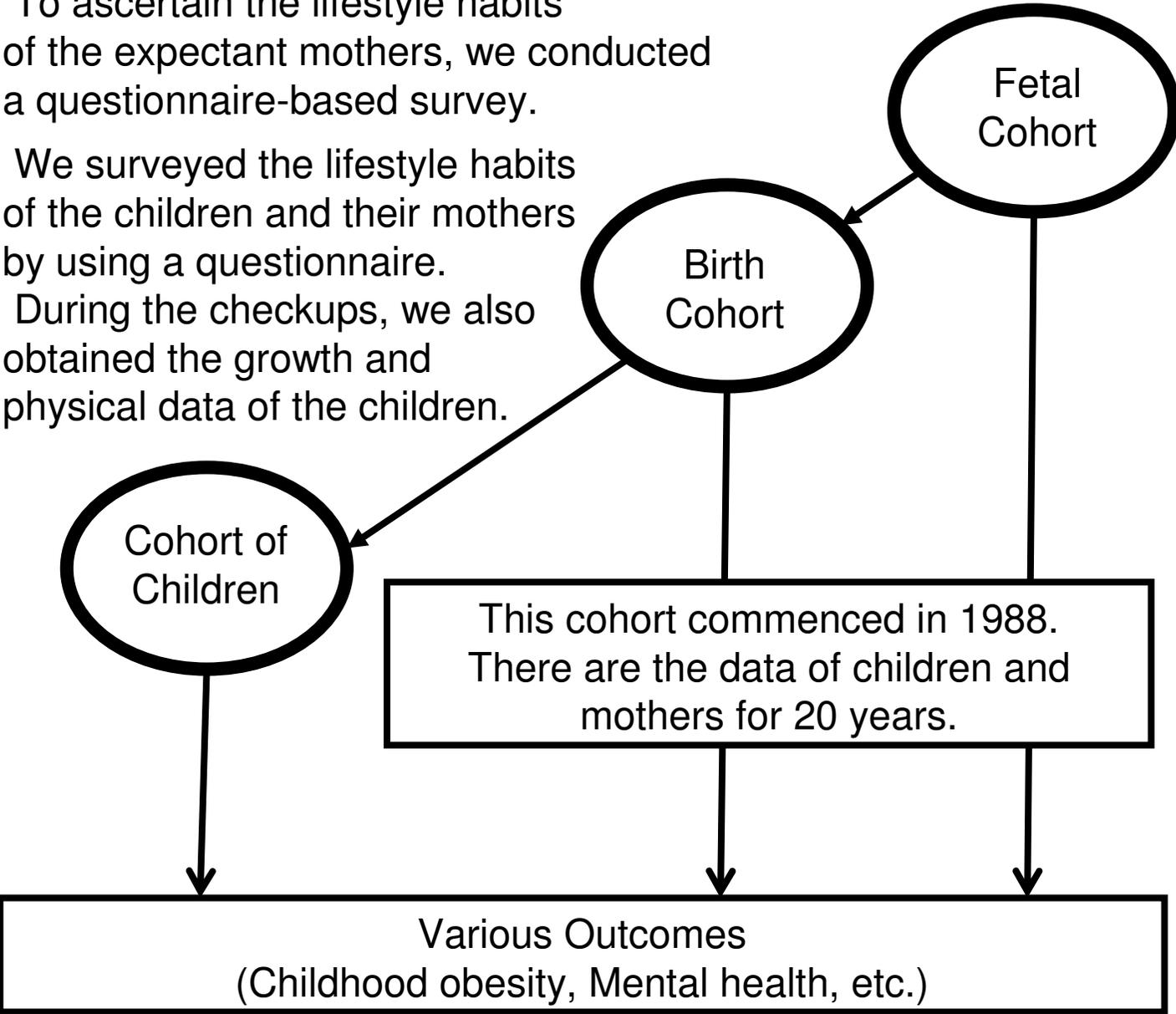
Project Koshu: A dynamic prospective cohort study



To ascertain the lifestyle habits of the expectant mothers, we conducted a questionnaire-based survey.

We surveyed the lifestyle habits of the children and their mothers by using a questionnaire.

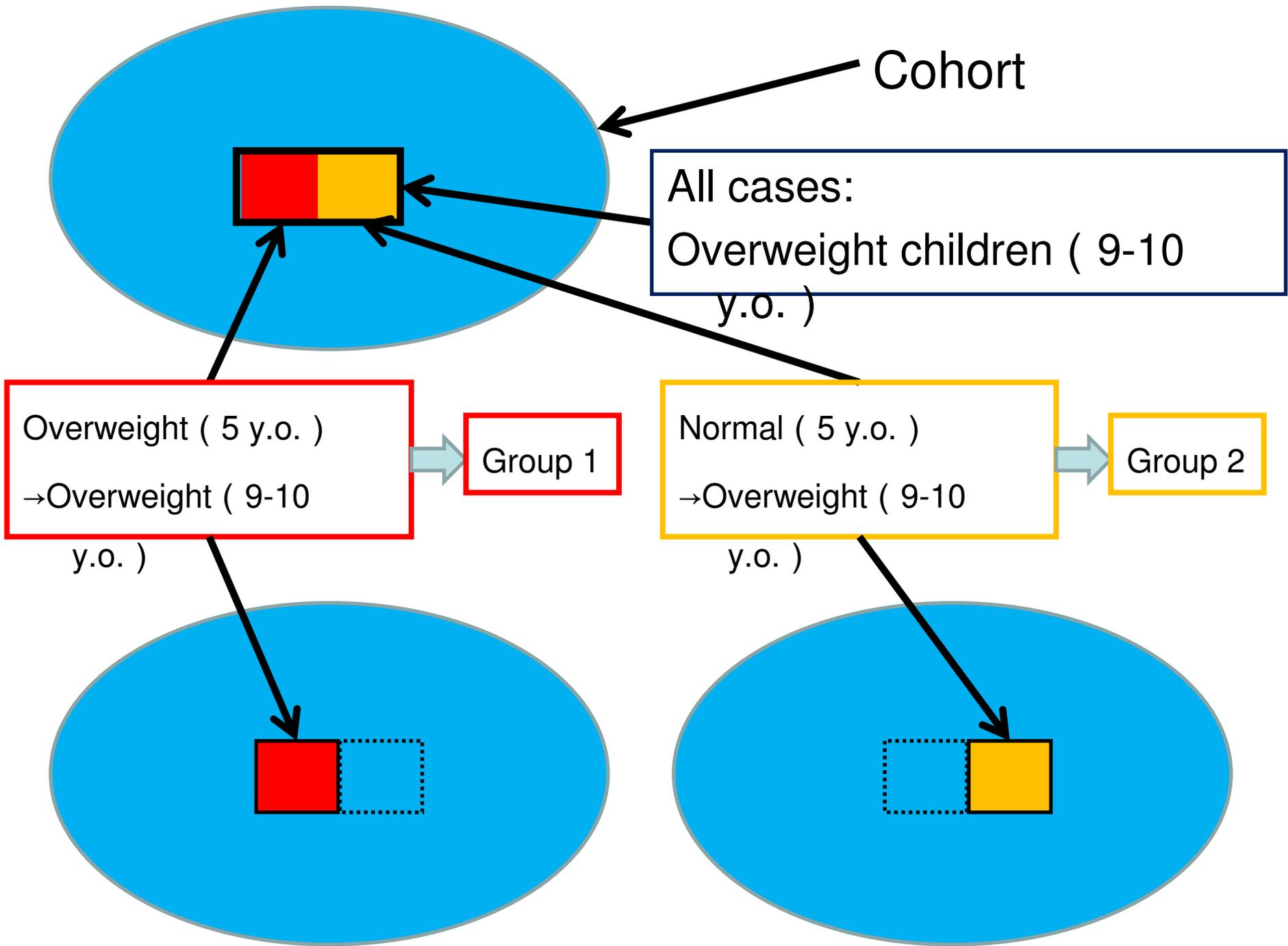
During the checkups, we also obtained the growth and physical data of the children.



Outcomes of this study

- We classified the cases of the childhood overweight at 9–10 years of age to two groups below.
- Group 1: Being overweight between birth and 5 years of age
- Group 2: Being overweight between 5 years of age and 9–10 years of age
- Childhood overweight at 5 years of age and 9–10 years of age were defined as international cutoff value.

(Cole TJ, Bellizzi MC, Flegal KM, Dietz WH. Establishing a standard definition for child overweight and obesity worldwide: international survey. *BMJ* 2000;320:1240-1243.)



Cohort

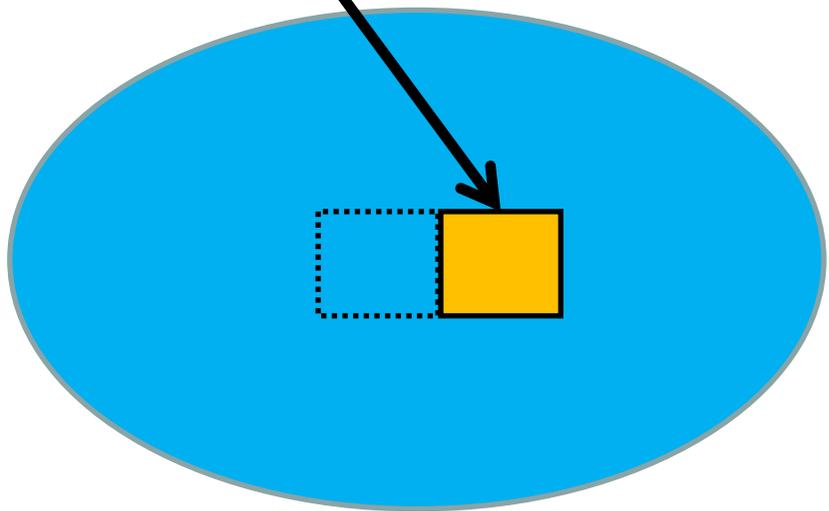
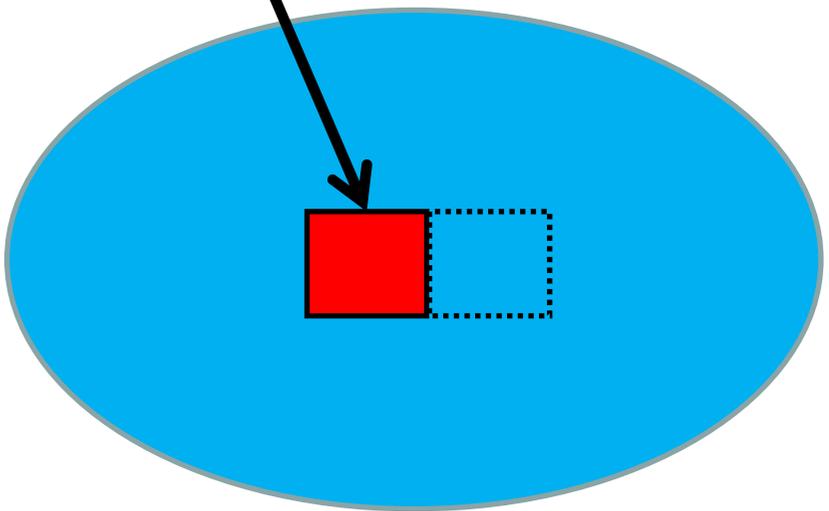
All cases:
Overweight children (9-10
y.o.)

Overweight (5 y.o.)
→ Overweight (9-10
y.o.)

Group 1

Normal (5 y.o.)
→ Overweight (9-10
y.o.)

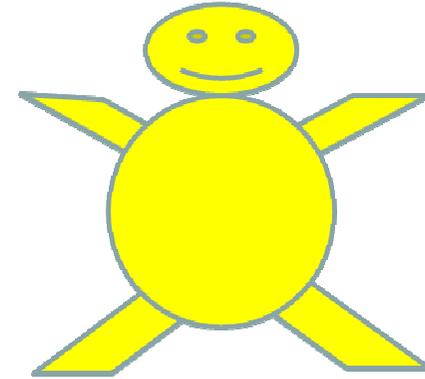
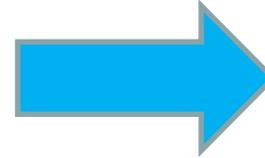
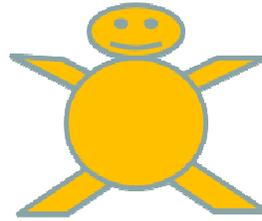
Group 2



5 years of age

9–10 years of age

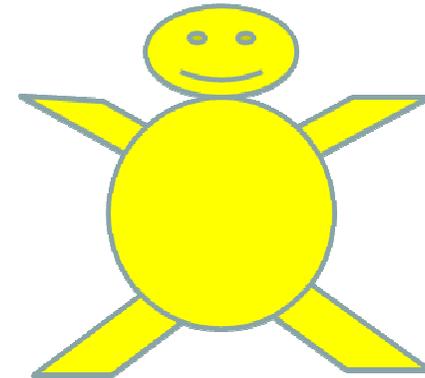
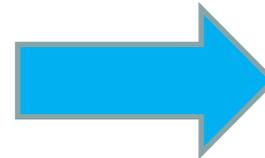
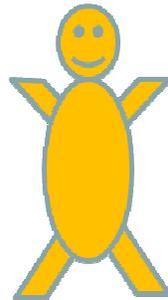
Group 1



Overweight

Overweight

Group 2



Normal weight

Overweight

Statistical analysis

- Dependent variables: Group 1 or Group 2
- Independent variables:
 - Smoking habits during early pregnancy
 - Breakfast habits just before pregnancy
- We used a multiple logistic regression analysis to adjust the variables and the confounding factors, namely maternal age at delivery and maternal BMI at non-pregnancy.

Results - Participants

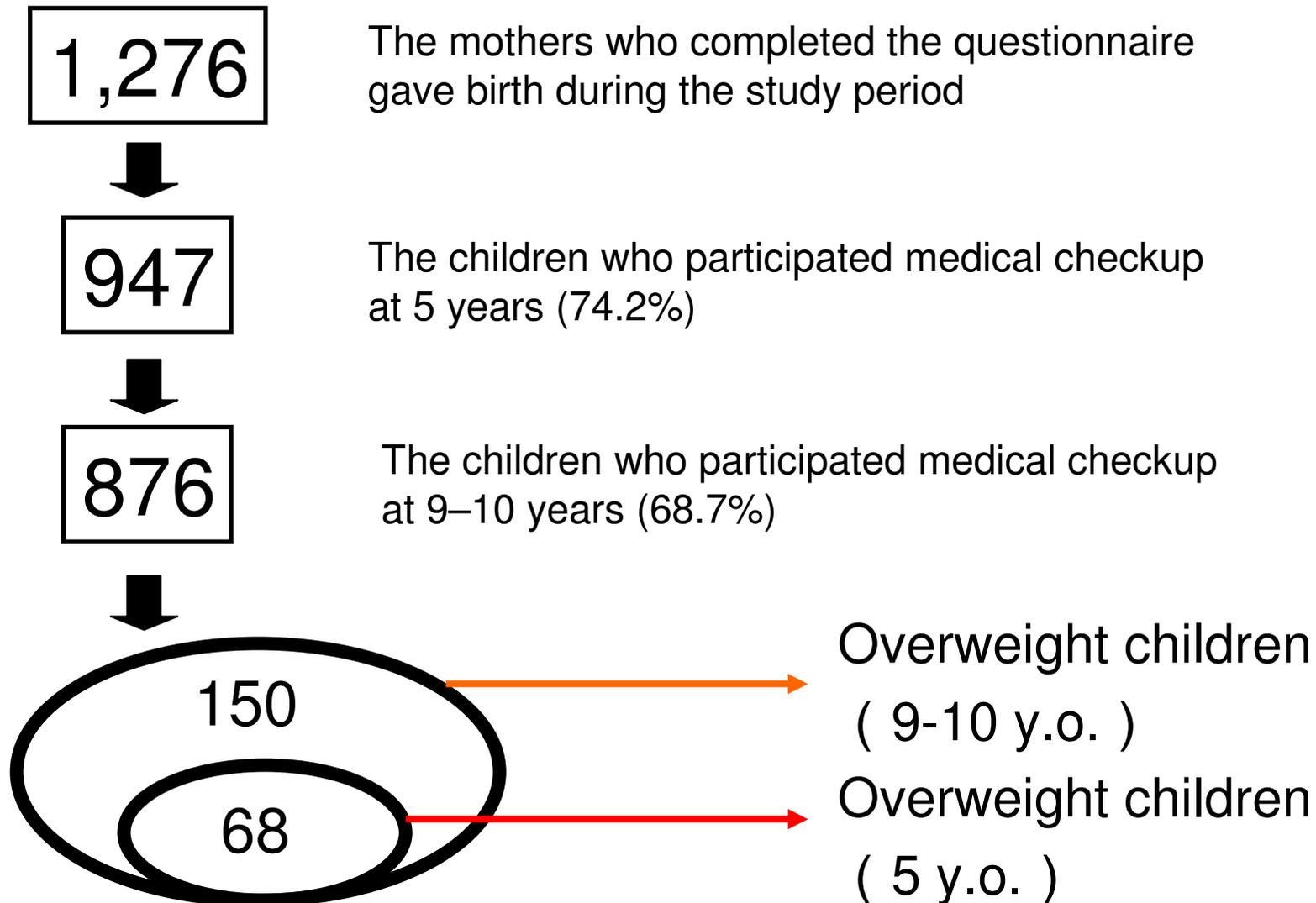


Table 1: Adjusted odds ratio (OR) and 95% confidence interval (CI) for maternal lifestyle factors that affected childhood overweight (Group1)

Lifestyle	Crude		Adjusted ^a	
	OR	95% CI	OR	95% CI
Smoking during early pregnancy				
Current smoker	4.15	(1.93 – 8.93)	3.56	(1.41 – 8.97)
Ex-smoker and Non-smoker				
Sleep duration				
Less than 8 h/d	1.78	(1.02 – 3.11)	1.52	(0.80 – 2.88)
More than 8 h/d				
Breakfast consumption				
I occasionally skip	2.18	(1.21 – 3.90)	2.51	(1.23 – 5.12)
I do not skip				
Maternal age at delivery			1.06	(0.99 – 1.15)
Maternal body mass index at non-pregnancy			1.21	(1.12 – 1.32)

a: Adjusted by maternal age, maternal body mass index, smoking status, sleep duration, and breakfast

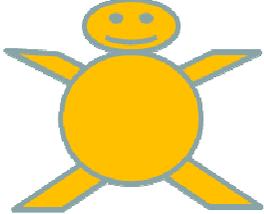
Table 2: Adjusted odds ratio (OR) and 95% confidence interval (CI) for maternal lifestyle factors that affected childhood overweight (Group 2)

Lifestyle	Crude		Adjusted ^a	
	OR	95% CI	OR	95% CI
Smoking during early pregnancy				
Current smoker	1.01	(0.35 – 2.90)	0.76	(0.22 – 2.67)
Ex-smoker and Non-smoker				
Sleep duration				
Less than 8 h/d	0.93	(0.58 – 1.50)	0.80	(0.47 – 1.34)
More than 8 h/d				
Breakfast consumption				
I occasionally skip	1.10	(0.58 – 2.07)	1.04	(0.50 – 2.19)
I do not skip				
Maternal age at delivery			1.03	(0.96 – 1.10)
Maternal body mass index at non-pregnancy			1.14	(1.05 – 1.23)

a: Adjusted by maternal age, maternal body mass index, smoking status, sleep duration, and

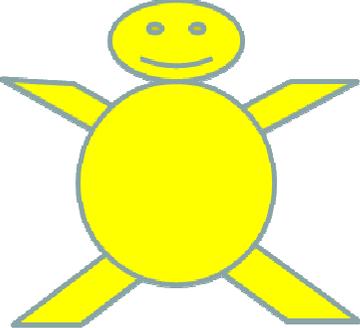
Maternal lifestyle during pregnancy

5 years



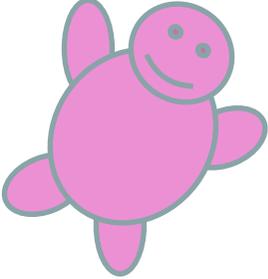
Overweight

9–10 years

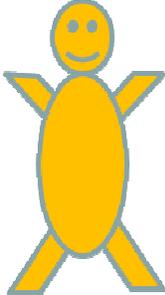


Overweight

Birth

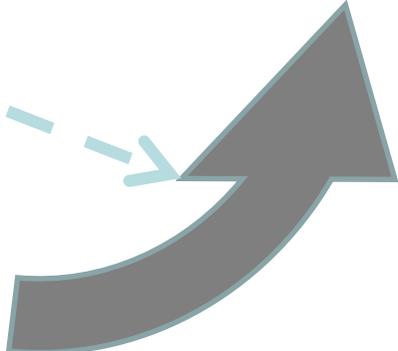
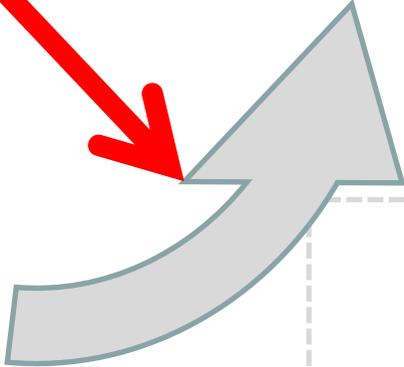
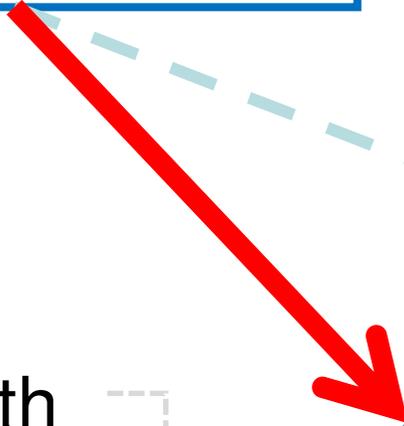


Early onset



Normal weight

Late onset



The concept of Fetal Programming (Barker hypothesis)

Maternal under nutrition



Birth weight ↓



Weight gain during
early childhood ↑



Childhood and adult
overweight and obesity ↑



Type 2 diabetes,
hypertension, and CHD ↑

=

?

Maternal smoking

Maternal skipping
breakfast

Our data may represent
this relationship.



Moreover...

- These results suggested that late onset of childhood overweight was associated with other risk factors that were not considered in this study, such as childhood lifestyle including diet and exercise.
- For the prevention of childhood overweight, it may be important to carry out the continuous prevention program of mother and child which starts from pre-pregnancy.

Conclusion

- These results suggested that there were some differences of risk factor about each onset phase of childhood overweight.
- Especially, we believe that maternal lifestyle during and just before pregnancy is an important contributor to the prevention of being childhood overweight of early infant.

Acknowledgement

- Koshu project was conducted with the cooperation of the Koshu City administration office.
- We thank the public health nurses working at Koshu City for collaboratively implementing this study.