The Golden Opportunity

Examining the Effect of Hygiene Theory on Atopic Diseases in Newborns

THE HEBREW UNIVERSITY OF JERUSALEM

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Background and previous studies

Background: Atopy is a type of allergy. Two main causes are genetics and hygiene- lack of exposure to antigens in childhood. The pandemic created a special situation for investigation the second.

Previous studies: According to Israeli Ministry of Health, COVID19 caused decrease in respiratory infections following the restrictions. It may explain research findings of low incidence of respiratory infections in babies born early in the pandemic.

Research Objective

Examine the impact of a highly hygienic environment during, before and after COVID19 on Atopic diseases among babies.

Data and its collection

- Data was collected starting from November 2018.
- Experiment participants: Hebrew-speaking across all sectors, near the date of birth for babies who were born at week 36 or later with a normal birth weight and without any birth defects.
- At predetermined intervals, parents were sent questionnaires.
- Characteristics of the babies, their families and environment were collected.
- Development of atopic diseases among babies was examined.
- Atopic disease = food allergies, atopic dermatitis or hyperreactive airway.
- The babies were divided into 4 groups according to birth date and main landmarks during the pandemic

Group	Birth	Sample size	2Y Sickness percent
1	Up to March19	172	0.36
2	March19 to March20	650	0.43
3	March20 to Feb21	623	0.49
4	From Feb21	207	0.51

Statistical Models

- Standard Logistic Regression Model:

$$Logit\big(Prob(Atopic\ 2_{nd}\ year)\big) = \beta_0 + \beta_{1,\dots,21}\text{Background} + \beta_{22}1_{DOB_2} + \beta_{23}1_{DOB_3} + \beta_{24}1_{DOB_4}$$

- Generalized Additive Logistic Regression Model:

$$Logit\big(Prob(Atopic\ 2_{nd}\ year)\big) = \beta_0 + \beta_{1,\dots,21}\text{Background} + S(DOB)$$

Background – a vector of all background variables

S – a smooth function

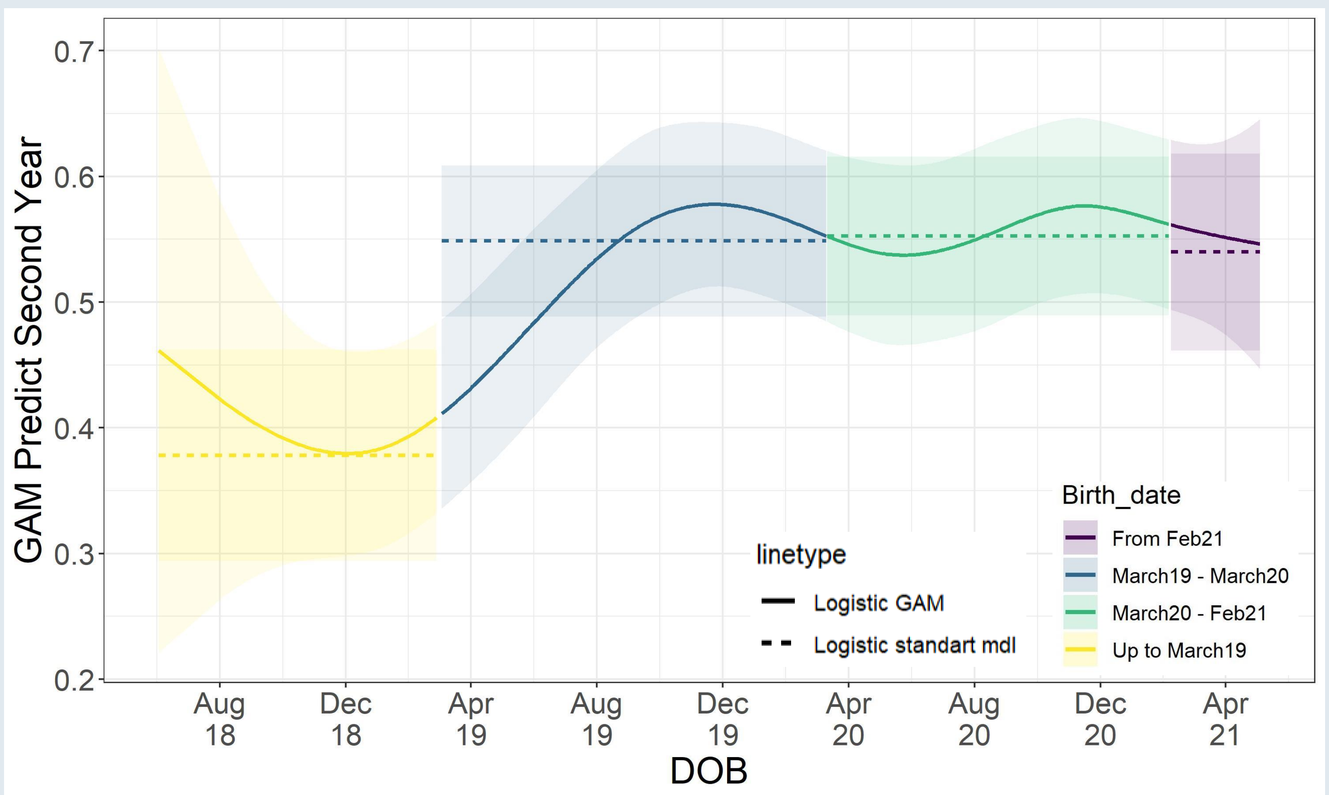
DOB refers to the Birth date group variable

Results

Results of the Second-year - Logistic standard regression Vs. Logistic GAM:

Variable	Logistic standard model				Logistic GAM		
	Est	Std	Pval	Odds Ratio	Est	Std	Pval
Intercept	-1.71	0.56	0.00		-1.03	0.56	0.07
SES Groups 6-8	0.32	0.16	0.05		0.32	0.16	0.05
SES Groups 9-10	0.10	0.19	0.62		0.10	0.19	0.62
Gender – Female	-0.17	0.11	0.11		-0.17	0.11	0.10
Number of siblings 1-2	-0.11	0.13	0.36		-0.12	0.13	0.35
Number of siblings 3+	-0.44	0.21	0.04		-0.46	0.21	0.03
Delivery mode – Natural	0.12	0.18	0.49		0.14	0.18	0.45
Pregnancy type – Spontaneous	0.09	0.20	0.63		0.11	0.20	0.59
Feeding type - Breastfeeding+ CMF	0.05	0.12	0.70		0.03	0.12	0.80
Feeding type - CMF	-0.02	0.16	0.89		-0.03	0.16	0.84
Father with atopic disease	0.09	0.16	0.58		0.10	0.16	0.53
Mother with atopic disease	0.14	0.14	0.31		0.14	0.14	0.32
Mother year of birth	-0.02	0.01	0.08		-0.03	0.01	0.06
Mother education - Post graduate	0.00	0.23	0.99		0.01	0.23	0.95
Mother education - Academic	0.11	0.17	0.51		0.12	0.17	0.50
Vaccine 1st year	0.50	0.28	0.07		0.51	0.28	0.07
Nursing 1st year - Private nanny	-0.38	0.23	0.09		-0.37	0.23	0.11
Nursing 1st year - Day care	-0.08	0.12	0.53		-0.09	0.12	0.47
Atopic disease 1st year	0.84	0.11	0.00		0.85	0.11	0.00
Antibiotic treatment 1st year	0.76	0.12	0.00		0.75	0.12	0.00
Birth date - March19 to March20 - DOB_2	0.69	0.20	0.00	2.00			
Birth date - March20 to Feb21 - DOB_3	0.71	0.19	0.00	2.03			0.00
Birth date - From Feb21 - DOB_4	0.66	0.23	0.00	1.93			

Probability of a typical baby getting an Atopic disease (2nd Y) depending on birth date:



Conclusions

- In the Logistic model, birth date variables are significant. The smoothed estimator in Logistic GAM is significant as well.
- Reviewing the current data, it appears that babies born during Covid19 were more likely to develop an Atopic disease in their 2nd year. Since hygiene conditions increased during that period, it seems that they contribute to the chances of getting an Atopic disease.