

## IMPACT OF THE MOTHER'S AGE AT CHILDBIRTH ON THE HEALTH OF NEW-BORN CHILDREN

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### **Extended Abstract**

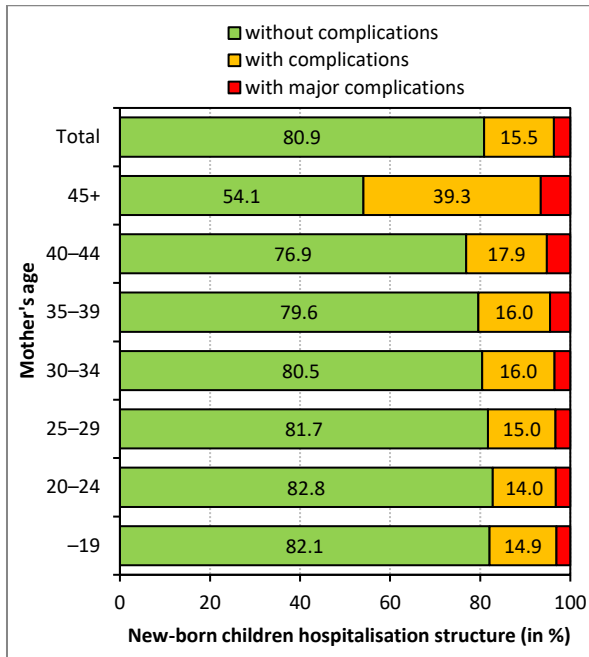
The paper focused on evaluating the influence of the increasing age of mothers at childbirth on the incidence of post-birth complications in new-born children and on the assessment of the potential impact on the length and frequency of hospitalisation of such children. Unique data was employed in the analysis, i.e. anonymised individual data obtained from the General Health Insurance Company of the Czech Republic (GHIC CR) which allowed for the monitoring of the incidence of complications in new-born children and the length and frequency of their hospitalisation, as well as the estimation of which children were most likely conceived naturally and those that were conceived following IVF treatment. Thus, we were able to control the explanatory variable, i.e. IVF, which has been widely discussed in recent years in connection with the increasing age of mothers and the possible impacts on the course and outcome of the pregnancy.

**Tab. 1 – New-born children monitored by type of conception, frequency of birth, by weight at birth and mother's age at childbirth, 2014**

	Mother's Age at Childbirth							Total
	-19	20-24	25-29	30-34	35-39	40-44	45+	
<b>Number of new-born children monitored</b>								
<b>Total</b>	<b>1,248</b>	<b>6,126</b>	<b>15,243</b>	<b>17,884</b>	<b>8,551</b>	<b>1,288</b>	<b>61</b>	<b>50,401</b>
of which probably conceived following IVF	..	20	226	564	412	71	..	1 293
– proportion of new-born children following IVF (in %)	..	0.3	1.5	3.2	4.8	5.5	..	2.6
from single births	1,234	5,998	14,890	17,310	8,247	1,225	53	48,957
from double births	14	126	350	565	298	63	8	1,424
from triple births	..	2	3	9	6	..	..	20
–proportion of multiple births (in %)	1.1	2.1	2.3	3.2	3.6	4.9	13.1	2.9
<b>Structure of new-born children birth weight category according to the DRG code (in %)</b>								
–749 g	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
750–999 g	0.2	0.1	0.1	0.1	0.1	0.2	1.6	0.1
1000–1499 g	0.7	0.7	0.6	0.6	0.6	0.9	1.6	0.6
1500–1999 g	2.6	1.7	1.5	1.6	1.5	2.6	4.9	1.6
2000–2499 g	9.0	5.6	4.6	3.9	4.2	4.8	4.9	4.5
2500+ g	87.6	91.8	93.1	93.8	93.6	91.5	86.9	93.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

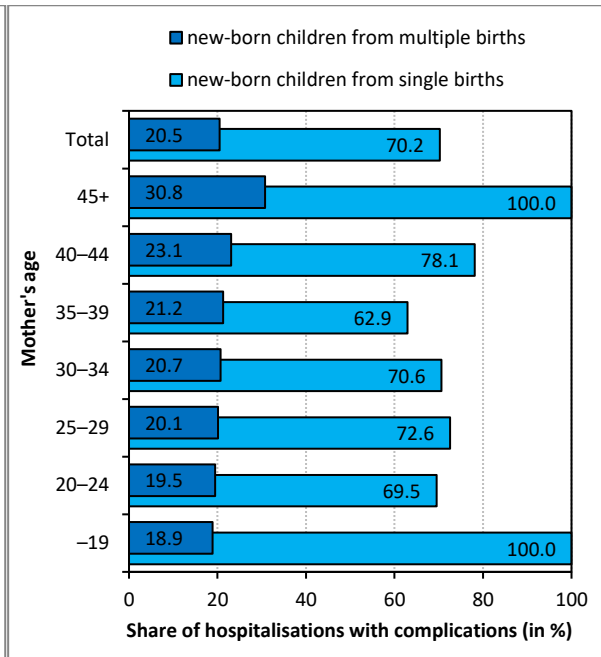
Source: GHIC CR, 2017; author's calculations

**Fig. 1 – Structure of the hospitalisation of new-born children according to the extent of complications during hospitalisation and mother's age, 2014**



Source: GHIC CR, 2017; author's calculations

**Fig. 2 – Proportion of hospitalisations of new-born children with complications according to the frequency of delivery and mother's age, 2014**



Source: GHIC CR, 2017; author's calculations

The results (Table 2) revealed that with the advancing age of the mother at childbirth, the chances of complications in the new-born child increase while controlling for other variables (birth weight, multiple birth, gender of the child, IVF). Children born to mothers under the age of 25 have an 11% – 16% lower chance of experiencing complications than do the children of mothers aged 25 to 29. Moreover, while the chance of the occurrence of complications increases after the age of 30, a significant increase is evident at age 40 and above. The children of mothers aged over 40 years of age were found to have a 1.35 times higher chance of the incidence of complications than children born to mothers aged 25 to 29. These results also applied with concern to the analysis of a subgroup of new-born children with birth weights of over 2500 grams, i.e. such children born to mothers over 40 years of age have a 1.31 times higher chance of post-birth complications than do children born to mothers aged 25 to 29.

The increase in the mother's age at childbirth is accompanied by the extension of the duration of the hospitalisation of children following the birth and an increase in the number and length of subsequent hospitalisation periods in the first two years of their lives (Table 3). The average length of the hospitalisation period of children following childbirth is U-shaped dependent on the age of the mother; the lowest values are attained with concern to mothers aged 30 to 34, who currently make up the most numerous age group of mothers in Czechia, and the length of the duration of hospitalisation increases in the directions towards both the lower and higher ages of women at childbirth. At the same time, the hospitalisation period is longer for children born as one of a multiple birth, those whose hospitalisation is classified as "complicated", those born following IVF (high probability) and those with low birth weights.

**Tab. 2 – Odds ratios of binary logistic models analysing the chances that a new-born child will suffer complications during post-birth hospitalisation, all new born children (Model 1) and new-born children with a birth weight of over 2500 grams (Model 2)**

Category	Exp( $\beta$ )	sign.	95% confidence interval Exp( $\beta$ )
<b>MODEL 1 – all new born children</b>			
<b>Mother's Age at Childbirth</b>			
do 19	0.84	*	0.72–0.99
20–24	0.89	**	0.82–0.97
25–29	1		
30–34	1.11	***	1.05–1.17
35–39	1.16	***	1.08–1.24
40+	1.35	***	1.18–1.55
<b>Birth weight</b>			
–999 g	32.83	***	16.82–64.06
1000–1499 g	44.22	***	30.43–64.24
1500–1999 g	14.65	***	12.41–17.31
2000–2499 g	5.19	***	4.74–5.68
2500 g a více	1		
<b>Multiple birth</b>			
no	1		
yes	1.36	***	1.19–1.56
<b>IVF</b>			
no	1		
yes	1.34	***	1.17–1.53
<b>New-born child gender</b>			
male	1		
female	0.86	***	0.82–0.90
Konstanta / Constant	0.19	***	
N	50,401		
Negelkerke R <sup>2</sup>	0.114		
% of successful cases	82.6		
<b>MODEL 2 – new-born children with a birth weight of over 2500 grams</b>			
<b>Mother's Age at Childbirth</b>			
do 19	0.91		0.76–1.09
20–24	0.91	*	0.83–0.99
25–29	1		
30–34	1.10	**	1.04–1.17
35–39	1.16	***	1.08–1.25
40+	1.31	***	1.13–1.52
<b>Multiple birth</b>			
no	1		
yes	1.83	***	1.52–2.20
<b>IVF</b>			
no	1		
yes	1.34	***	1.16–1.56
<b>New-born child gender</b>			
male	1		
female	0.89	***	0.85–0.94
Konstanta / Constant	0.19	***	
N	46,918		
Negelkerke R <sup>2</sup>	0.005		
% of successful cases	84.0		

**Note:** \*p<0.05; \*\* p<0.01; \*\*\* p<0.001; Model 1 – for all new born children, Model 2 – only for new-born children with a birth weight of over 2500 grams. The quality of the models was tested via the application of a number of tests. The chi-square significance levels demonstrated that the included variables contribute significantly to the overall model. The Wald test and p-values for each variable category reveal which categories of explanatory variables contribute significantly to the models. While the proportion of the explained variability measured via Nagelkerke R<sup>2</sup> was just 11.4% for Model 1 and 0.5% for Model 2, both models achieved a high proportion of correctly classified cases in the classification table (82.6% and 84%, respectively) thus demonstrating the good discriminatory power of both models.

The dependent variable 'Health complications with the new-born child during post-birth hospitalisation'- no (0), yes (1).

**Source:** GHIC CR, 2017; author's calculations

**Tab. 3 – Average duration of post-birth hospitalisation of new-born children according to GHIC CR data (in days) by mother's age**

Indicator	Mother's Age at Childbirth							Celkem / Total
	-19	20-24	25-29	30-34	35-39	40-44	45+	
Total	7.3	6.8	6.6	6.4	6.5	7.1	10.0	6.6
– male	7.4	7.0	6.7	6.5	6.7	7.2	12.1	6.7
– female	7.1	6.6	6.5	6.3	6.4	6.9	8.9	6.4
– from single births	7.2	6.6	6.3	6.1	6.3	6.7	8.5	6.3
– from multiple births	17.1	15.9	17.6	14.5	12.6	14.9	20.3	15.0
– with hospitalisation without complications	6.3	5.8	5.7	5.5	5.6	5.8	6.3	5.7
– with hospitalisation with complications	8.6	8.7	8.1	7.9	8.1	8.4	12.7	8.1
– with hospitalisation with major complications	28.0	23.7	20.9	19.1	17.4	20.5	24.8	20.0
– conceived naturally	7.3	6.8	6.5	6.3	6.4	7.0	10.0	6.5
– conceived probably following IVF	..	9.6	9.3	8.7	8.3	7.9	..	8.6
– with birth weight								
–749 g	..	64.3	62.0	56.2	63.0	..	..	60.4
750–999 g	38.5	44.6	58.2	58.1	50.3	86.0	21.0	55.4
1000–1499 g	45.7	39.9	39.6	39.0	41.6	41.0	36.0	40.0
1500–1999 g	23.5	25.8	25.0	23.9	23.4	20.9	23.3	24.2
2000–2499 g	10.2	10.7	11.8	11.3	12.0	10.4	13.7	11.4
2500+ g	6.1	5.9	5.7	5.6	5.7	6.0	8.4	5.7

Source: GHIC CR, 2017; author's calculations

Subsequent hospitalisation in the first two years of the child's life is most frequent with respect to children of mothers with lower ages at childbirth (an average of 1.8 hospitalisations for children of mothers aged 15 to 19 years versus 1.5 hospitalisations for those of mothers aged 25-44 years). However, the duration of subsequent hospitalisation is longest for children born to mothers over 40 years of age (average of 11.4 days for children of mothers aged 40 to 44 years and 15.4 days for those of mothers aged 45 years and over against 7.3 days for children born to mothers aged 25 to 29).