

Appendix 1: Models and Tests

A. Model steps

For all models, sample longitudinal weights were applied and EM Laplace-6 estimates were requested.

Steps for the effects of concurrent poverty and previous-period poverty status were as follows:

- 1- Baseline model with no covariates.
- 2- Inclusion of binary indicators of survey round to assess time trend for the health indicator. The first time point was not included because it represents the baseline health status (i.e., the reference category).
- 3- Inclusion of the poverty measure:
 - a. poverty status at time “t” for concurrent poverty
 - b. poverty status at time “t-1” for previous-period poverty
 - c. poverty class membership for cumulative poverty.
- 4- Inclusion, one by one, of time-varying and time-invariant covariates which were significantly associated ($p \leq 0.05$) with both the poverty and the health indicator at baseline.
- 5- Full model including the time variables, concurrent / previous-period poverty, and all covariates which remained statistically significant or changed the poverty-coefficient by at least 10%.
- 6- Exclusion from the final model of non-significant covariates, if their exclusion did not substantially modify the coefficients of the remaining covariates.

B. Summary of variables tested, excluded, and included by health indicator, Quebec (QLSCD 1998-2001).

| | Number of mother-reported asthma-like attacks - previous 12 months | | Health perceived < very good – previous 12 months | |
|-------------------------------------|--|-------|---|-------|
| | Intercept | Slope | Intercept | Slope |
| Level 1 variables | | | | |
| <i>Time dummy variables</i> | | | | |
| 5 months | - | - | X (ref) | |
| 17 months | X (ref) | | | X |
| 29 months | | X | | X |
| 41 months | | X | | X |
| Concurrent poverty | Poverty at 17, 29, 41 months | | Poverty at 5, 17, 29, 41 months | |
| Use of daycare centre | ✓ | | Daycare at 5, 17, 29, 41 months | |
| Living in a single-parent household | Single parenthood at 17, 29, 41 months | | ✓ | |
| In-home tobacco smoke | ✓ | | ✓ | |
| Level 2 variables | | | | |
| Latent classes of poverty | X | X | X | X |
| Child's birth order | | | X | |
| Gender | X | | X | |
| Preterm birth | ✓ | | ✓ | |
| Malformation | ✓ | | ✓ | |
| Duration of breastfeeding | ✓ | | ✓ | |
| Mother's immigrant status | ✓ | | X | |
| Mother's education level | X | | X | |
| Mother's age at child's birth | X | | ✓ | |
| Having a pet at home at baseline | ✓ | | - | |

X : included ; - : Not tested or unmeasured; ✓: Tested and then excluded from the model

Appendix 2 Equations for baseline and final models

Note: i represents repeated measures whereas j represents persons

A-Concurrent poverty (Fit with HLM 6.0 software)

A.1-Number of mother-reported asthma-like attacks, previous 12-months

A.1.1: Baseline

Level-1 Model

$$\text{Log} [\text{Number of mother-reported asthma-like attacks}_{ij}] = \pi_{0j} + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \nu_{0j}$$

A.1.2: Final model

Level-1 Model

$$\text{Log} [\text{Number of mother-reported asthma-like attacks}_{ij}] = \pi_{0j} + \pi_{1j}*(\text{t29 months}) + \pi_{2j}*(\text{t41 months}) + \pi_{3j}*(\text{concurrent poverty}) + \pi_{4j}*(\text{single parent family}) + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \beta_{01}*(\text{birth rank}=2^{\text{nd}}) + \beta_{02}*(\text{birth rank}>=3^{\text{rd}}) + \beta_{03}*(\text{boy}) + \beta_{04}*(\text{mother's education=secondary}) + \beta_{05}*(\text{mother's education <secondary}) + \beta_{06}*(\text{mother} \leq 19 \text{ years old}) + \beta_{07}*(\text{mother} > 34 \text{ years old}) + \nu_{0j}$$

$$\pi_{1j} = \beta_{10}$$

$$\pi_{2j} = \beta_{20}$$

$$\pi_{3j} = \beta_{30}$$

$$\pi_{4j} = \beta_{40}$$

A.2-Child's health perceived by the mother as less than very good, previous 12-months

A.2.1: Baseline

Level-1 Model

$$\text{Logit} [\pi_{\text{health} < \text{very good-ij}}] = \pi_{0j} + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \nu_{0j}$$

A.2.2: Final model

Level-1 Model

$$\text{Logit} [\pi_{\text{health} < \text{very good-ij}}] = \pi_{0j} + \pi_{1j}*(\text{t17 months}) + \pi_{2j}*(\text{t29 months}) + \pi_{3j}*(\text{t41 months}) + \pi_{4j}*(\text{concurrent poverty}) + \pi_{5j}*(\text{uses daycare}) + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \beta_{01}*(\text{birth rank}=2^{\text{nd}}) + \beta_{02}*(\text{birth rank}>=3^{\text{rd}}) + \beta_{03}*(\text{boy}) + \beta_{04}*(\text{mother immigrant}) + \beta_{05}*(\text{mother's education}=\text{secondary}) + \beta_{06}*(\text{mother's education} < \text{secondary}) + \upsilon_{0j}$$

$$\pi_{1j} = \beta_{10}$$

$$\pi_{2j} = \beta_{20}$$

$$\pi_{3j} = \beta_{30}$$

$$\pi_{4j} = \beta_{40}$$

$$\pi_{5j} = \beta_{50}$$

B-Poverty during previous round (Fit with HLM 6.0 software)

B.1-Number of mother-reported asthma-like attacks, previous 12-months

B.1.1: Baseline

Level-1 Model

$$\text{Log} [\text{Number of mother-reported asthma-like attacks}_{ij}] = \pi_{0j} + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \upsilon_{0j}$$

B.1.2: Final model

Level-1 Model

$$\text{Log} [\text{Number of attacks}_{ij}] = \pi_{0j} + \pi_{1j}*(\text{t29 months}) + \pi_{2j}*(\text{t41 months}) + \pi_{3j}*(\text{poverty}_{i-1}) + \pi_{4j}*(\text{concurrent poverty}_i) + \pi_{5j}*(\text{single parent family}) + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \beta_{01}*(\text{birth rank}=2^{\text{nd}}) + \beta_{02}*(\text{birth rank}>=3^{\text{rd}}) + \beta_{03}*(\text{boy}) + \beta_{04}*(\text{mother's education}=\text{secondary}) + \beta_{05}*(\text{mother's education} < \text{secondary}) + \beta_{06}*(\text{mother} \leq 19 \text{ years old}) + \beta_{07}*(\text{mother} > 34 \text{ years old}) + \upsilon_{0j}$$

$$\pi_{1j} = \beta_{10}$$

$$\pi_{2j} = \beta_{20}$$

$$\pi_{3j} = \beta_{30}$$

$$\pi_{4j} = \beta_{40}$$

$$\pi_{5j} = \beta_{50}$$

B.2-Child's health perceived by the mother as less than very good, previous 12-months

B.2.1: Baseline

Level-1 Model

$$\text{Logit} [\pi_{\text{health} < \text{very good-ij}}] = \pi_{0j} + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \upsilon_{0j}$$

B.2.2: Final model

Level-1 Model

$$\text{Logit} [\pi_{\text{health} < \text{very good-ij}}] = \pi_{0j} + \pi_{1j}^*(\text{t29 months}) + \pi_{2j}^*(\text{t41 months}) + \pi_{3j}^*(\text{poverty}_{i-1}) + \pi_{4i}^*(\text{poverty}_i) + \pi_{5i}^*(\text{uses daycare}_{ii}) + e_{ij}$$

Level-2 Model

$$\pi_{0i} = \beta_{00} + \beta_{01}^*(\text{birth rank}=2^{\text{nd}}) + \beta_{02}^*(\text{birth rank} \geq 3^{\text{rd}}) + \beta_{03}^*(\text{boy}) + \beta_{04}^*(\text{mother immigrant}) + \beta_{05}^*(\text{mother's education}=\text{secondary}) + \beta_{06}^*(\text{mother's education} < \text{secondary}) + \upsilon_{0i}$$

$$\pi_{1j} = \beta_{10}$$

$$\pi_{2j} = \beta_{20}$$

$$\pi_{3j} = \beta_{30}$$

$$\pi_{4j} = \beta_{40}$$

$$\pi_{5j} = \beta_{50}$$

C- Cumulative poverty (Poverty classes with Mplus 5.2; Growth curves with HLM 6.0)

C.1-Number of mother-reported asthma-like attacks, previous 12-months

C.1.1: Baseline

Level-1 Model

$$\text{Log} [\text{Number of mother-reported asthma-like attacks}_{ij}] = \pi_{0j} + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \upsilon_{0j}$$

C.1.2: Final model

Level-1 Model

$$\text{Log} [\text{Number of mother-reported asthma-like attacks}_{ij}] = \pi_{0j} + \pi_{1j}^*(\text{t29 months}) + \pi_{2j}^*(\text{t41 months}) + \pi_{3j}^*(\text{single parent family}) + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \beta_{01}^*(\text{birth rank}=2^{\text{nd}}) + \beta_{02}^*(\text{birth rank} \geq 3^{\text{rd}}) + \beta_{03}^*(\text{boy}) + \beta_{04}^*(\text{mother's education}=\text{secondary}) + \beta_{05}^*(\text{mother's education} < \text{secondary}) + \beta_{06}^*(\text{mother} \leq 19 \text{ years old}) + \beta_{07}^*(\text{mother} > 34 \text{ years old}) + \beta_{08}^*(\text{transient poverty}) + \beta_{09}^*(\text{chronic poverty}) + \upsilon_{0j}$$

$$\pi_{1j} = \beta_{10} + \beta_{11}^*(\text{transient poverty}) + \beta_{12}^*(\text{chronic poverty})$$

$$\pi_{2j} = \beta_{20} + \beta_{21}^*(\text{transient poverty}) + \beta_{22}^*(\text{chronic poverty})$$

$$\pi_{3j} = \beta_{30}$$

C.2-Child's health perceived by the mother as less than very good, previous 12-months

C.2.1: Baseline

Level-1 Model

$$\text{Logit} [\pi_{\text{health} < \text{very good-ij}}] = \pi_{0j} + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \upsilon_{0j}$$

C.2.2: Final model

Level-1 Model

$$\text{Logit} [\pi_{\text{health} < \text{very good-ij}}] = \pi_{0j} + \pi_{1j}^*(\text{t17 months}) + \pi_{2j}^*(\text{t29 months}) + \pi_{3j}^*(\text{t41 months}) + \pi_{4j}^*(\text{uses daycare}) + e_{ij}$$

Level-2 Model

$$\pi_{0j} = \beta_{00} + \beta_{01}^*(\text{birth rank}=2^{\text{nd}}) + \beta_{02}^*(\text{birth rank}\geq 3^{\text{rd}}) + \beta_{03}^*(\text{boy}) + \beta_{04}^*(\text{mother immigrant}) + \beta_{05}^*(\text{mother's education}=\text{secondary}) + \beta_{06}^*(\text{mother's education} < \text{secondary}) + \beta_{07}^*(\text{transient poverty}) + \beta_{08}^*(\text{chronic poverty}) + u_{0j}$$

$$\pi_{1j} = \beta_{10}^*(\text{transient poverty}) + \beta_{12}^*(\text{chronic poverty})$$

$$\pi_{2j} = \beta_{20}^*(\text{transient poverty}) + \beta_{12}^*(\text{chronic poverty})$$

$$\pi_{3j} = \beta_{30}^*(\text{transient poverty}) + \beta_{12}^*(\text{chronic poverty})$$

$$\pi_{4j} = \beta_{30}$$

Appendix 3: Fixed effects and level 2 variances from multilevel Poisson (number of mother-reported asthma-like attacks) and logistic regressions (maternal perception of health as less than very good)

Table A1: Fixed effects of concurrent poverty on number of mother-reported asthma-like attacks, multilevel Poisson regressions, Quebec (QLSCD, 1998-2001).

| Fixed Effect | Coefficient | (Standard Error) | p-value |
|-------------------------------------|-------------|------------------|---------|
| <i>Intercept (t-17 months)</i> | -5.375 | (0.281) | 0.000 |
| Level 1 predictors | | | |
| Time | | | |
| t-29 months | -0.049 | (0.032) | 0.129 |
| t-41 months | -0.465 | (0.040) | 0.000 |
| Concurrent poverty | | | |
| Sufficient income (ref) | | | |
| Insufficient income | 0.328 | (0.122) | 0.007 |
| Type of family | | | |
| Two-parent family (ref) | | | |
| Single-parent family | 0.463 | (0.088) | 0.000 |
| Level 2 predictors | | | |
| Birth rank | | | |
| 1 st born (ref) | | | |
| 2 nd born | 1.408 | (0.289) | 0.000 |
| >= 3 rd born | 1.899 | (0.396) | 0.000 |
| Gender | | | |
| Girl (ref) | | | |
| Boy | 1.256 | (0.267) | 0.000 |
| Mother's education | | | |
| College or University studies (ref) | | | |
| High school diploma | 0.086 | (0.340) | 0.801 |
| No high school diploma | -0.032 | (0.378) | 0.933 |
| Mother's age | | | |
| <34 years (ref) | | | |
| >=35 years | -1.170 | (0.412) | 0.005 |

Table A2: Fixed effects of concurrent poverty on health perceived as less than very good, multilevel logistic regressions, Quebec (QLSCD, 1998-2001).

| Fixed Effect | Coefficient | (Standard Error) | p-value |
|--|-------------|------------------|---------|
| <i>Intercept (ref: t-5months)</i> | -4.555 | (0.195) | 0.000 |
| Level 1 predictors | | | |
| Time | | | |
| t-17 months | 0.438 | (0.137) | 0.002 |
| t-29 months | 0.276 | (0.137) | 0.044 |
| t-41 months | 0.297 | (0.139) | 0.032 |
| Concurrent poverty | | | |
| Sufficient income (ref) | | | |
| Insufficient income | 0.409 | (0.142) | 0.004 |
| Use of daycare centre | | | |
| Does not use (ref) | | | |
| Uses | 0.527 | (0.146) | 0.001 |
| Level 2 predictors | | | |
| Birth rank | | | |
| 1 st born (ref) | | | |
| 2 nd born | 0.787 | (0.168) | 0.000 |
| >= 3 rd born | 0.576 | (0.219) | 0.009 |
| Gender | | | |
| Girl (ref) | | | |
| Boy | 0.276 | (0.153) | 0.071 |
| Mother's immigrant status | | | |
| Non-immigrant or immigrant from European country (ref) | | | |
| Immigrant from non-European country | 0.674 | (0.271) | 0.013 |
| Mother's education | | | |
| College or University studies (ref) | | | |
| High school diploma | 0.421 | (0.191) | 0.028 |
| No high school diploma | 0.634 | (0.208) | 0.003 |

Table B1: Fixed effects of previous round poverty on number of mother-reported asthma-like attacks, multilevel Poisson regressions, Quebec (QLSCD, 1998-2001).

| Fixed Effect | Coefficient | (Standard Error) | P-value |
|-------------------------------------|-------------|------------------|---------|
| <i>Intercept (ref: t-17months)</i> | -5.476 | 0.287 | 0.000 |
| Level 1 predictors | | | |
| Time | | | |
| t-29 months | -0.033 | 0.033 | 0.313 |
| t-41months | -0.457 | 0.040 | 0.000 |
| Concurrent poverty | | | |
| Sufficient income (ref) | | | |
| Insufficient income | 0.257 | 0.121 | 0.033 |
| Previous period-poverty | | | |
| Sufficient income (ref) | | | |
| Insufficient income | 0.223 | 0.085 | 0.009 |
| Type of family | | | |
| Two-parent family (ref) | | | |
| Single-parent family | 0.497 | 0.089 | 0.000 |
| Level 2 predictors | | | |
| Birth rank | | | |
| 1 st born (ref) | | | |
| 2 nd born | 1.454 | 0.294 | 0.000 |
| >= 3 rd born | 1.941 | 0.399 | 0.000 |
| Gender | | | |
| Girl (ref) | | | |
| Boy | 1.303 | 0.271 | 0.000 |
| Mother's education | | | |
| College or University studies (ref) | | | |
| High school diploma | 0.080 | 0.342 | 0.814 |
| No high school diploma | -0.166 | 0.386 | 0.667 |
| Mother's age | | | |
| <34 years (ref) | | | |
| >=35 years | -1.162 | 0.415 | 0.006 |

Table B2: Fixed effects of previous round poverty on health perceived as less than very good, multilevel logistic regressions, Quebec (QLSCD, 1998-2001).

| Fixed Effect | Coefficient | (Standard Error) | p-value |
|--|-------------|------------------|---------|
| <i>Intercept (ref: t-5months)</i> | -4.330 | 0.221 | 0.000 |
| Level 1 predictors | | | |
| Time | | | |
| t-29 months | -0.176 | 0.136 | 0.198 |
| t-41 months | -0.162 | 0.130 | 0.212 |
| Concurrent poverty | | | |
| Sufficient income (ref) | | | |
| Insufficient income | 0.122 | 0.198 | 0.537 |
| Previous period poverty | | | |
| Sufficient income (ref) | | | |
| Insufficient income | 0.193 | 0.197 | 0.329 |
| Use of daycare centre | | | |
| Does not use (ref) | | | |
| Uses | 0.598 | 0.166 | 0.001 |
| Level 2 predictors | | | |
| Birth rank | | | |
| 1 st born (ref) | | | |
| 2 nd born | 0.758 | 0.213 | 0.001 |
| >= 3 rd born | 0.555 | 0.285 | 0.051 |
| Gender | | | |
| Girl | | | |
| Boy | 0.289 | 0.197 | 0.141 |
| Mother's immigrant status | | | |
| Non-immigrant or immigrant from European country (ref) | | | |
| Immigrant from non-European country | 0.781 | 0.346 | 0.024 |
| Mother's education | | | |
| College or University studies (ref) | | | |
| High school diploma | 0.439 | 0.250 | 0.078 |
| No high school diploma | 0.731 | 0.268 | 0.007 |

Table C1: Fixed effects poverty class membership on number of mother-reported asthma-like attacks, multilevel Poisson regressions, Quebec (QLSCD, 1998-2001).

| | Latent classes of poverty experience | | | | | | | | |
|------------------------------------|--------------------------------------|------------------|---------|------------------|------------------|---------|-----------------|------------------|---------|
| | Non-poor | | | Tansient poverty | | | Chronic poverty | | |
| | Coefficient | (Standard Error) | p-value | Coefficient | (Standard Error) | p-value | Coefficient | (Standard Error) | p-value |
| <i>Intercept (ref: t-17months)</i> | -5.338 | (0.302) | 0.000 | -0.034 | (0.425) | 0.937 | 0.892 | (0.417) | 0.032 |
| Level-1 predictors | | | | | | | | | |
| Time | | | | | | | | | |
| t-29 months | -0.200 | (0.052) | 0.000 | 0.147 | (0.161) | 0.363 | 0.277 | (0.070) | 0.000 |
| t-41months | -0.380 | (0.058) | 0.000 | -0.070 | (0.145) | 0.630 | -0.149 | (0.082) | 0.069 |
| Type of family | | | | | | | | | |
| Two-parents family(ref) | | | | | | | | | |
| Single-parents family | 0.407 | (0.095) | 0.000 | | | | | | |
| Level-2 predictors | | | | | | | | | |
| Birth rank | | | | | | | | | |
| 1 st born (ref) | | | | | | | | | |
| 2 nd born | 1.475 | (0.298) | 0.000 | | | | | | |
| >= 3rd born | 2.014 | (0.420) | 0.000 | | | | | | |
| Gender | | | | | | | | | |
| Girl (ref) | | | | | | | | | |
| Boy | 1.232 | (0.280) | 0.000 | | | | | | |
| Mother's education | | | | | | | | | |
| University (ref) | | | | | | | | | |
| Secondary | -0.101 | (0.364) | 0.782 | | | | | | |
| No secondary diploma | -0.448 | (0.451) | 0.321 | | | | | | |
| Mother's age | | | | | | | | | |
| <34 years (ref) | | | | | | | | | |
| >=35 years | -1.145 | (0.402) | 0.005 | | | | | | |

Table C2: Fixed effects poverty class membership on health perceived as less than very good, multilevel logistic regressions, Quebec (QLSCD, 1998-2001).

| | Latent classes of poverty experience | | | | | | | | |
|--|--------------------------------------|------------------|---------|-------------------|------------------|---------|-----------------|------------------|---------|
| | Non-poor | | | Transient poverty | | | Chronic poverty | | |
| | Coefficient | (Standard Error) | p-value | Coefficient | (Standard Error) | p-value | Coefficient | (Standard Error) | p-value |
| <i>Intercept (ref:t-5months)</i> | -4.655 | (0.217) | 0.000 | 0.427 | (0.355) | 0.229 | 1.284 | (0.312) | 0.000 |
| Level-1 predictors | | | | | | | | | |
| Time | | | | | | | | | |
| t-17 months | 0.704 | (0.172) | 0.000 | -0.956 | (0.441) | 0.030 | -0.735 | (0.358) | 0.040 |
| t-29 months | 0.392 | (0.179) | 0.028 | -0.058 | (0.366) | 0.875 | -0.532 | (0.344) | 0.121 |
| t-41months | 0.357 | (0.179) | 0.045 | 0.167 | (0.367) | 0.648 | -0.584 | (0.321) | 0.068 |
| Use of daycare | | | | | | | | | |
| Does not use (ref) | | | | | | | | | |
| Using | 0.518 | (0.151) | 0.001 | | | | | | |
| Level-2 predictors | | | | | | | | | |
| Birth rank | | | | | | | | | |
| 1 st born (ref) | | | | | | | | | |
| 2 nd born | 0.723 | (0.173) | 0.000 | | | | | | |
| >= 3rd born | 0.578 | (0.226) | 0.011 | | | | | | |
| Gender | | | | | | | | | |
| Girl (ref) | | | | | | | | | |
| Boy | 0.276 | (0.156) | 0.077 | | | | | | |
| Mother's immigration status | | | | | | | | | |
| Non-immigrant or immigrant from European country (ref) | | | | | | | | | |
| Immigrant from non-European country | 0.600 | (0.288) | 0.037 | | | | | | |
| Mother's education | | | | | | | | | |
| University (ref) | | | | | | | | | |
| Secondary | 0.398 | (0.195) | 0.041 | | | | | | |
| No secondary diploma | 0.446 | (0.220) | 0.043 | | | | | | |

D-Between children variability: Level 2 variances

| | Level 2 (between children) Variances | |
|-----------------------------------|---|------------------------------|
| | Number of mother-reported asthma-like attacks | Health perceived < very good |
| Concurrent poverty | | |
| <i>From unit-specific model</i> | | |
| Null | 3.190 | 1.430 |
| Time variables | 3.182 | 1.440 |
| Time + poverty | 3.163 | 1.386 |
| Full model for concurrent poverty | 3.071 | 1.353 |
| <i>From Laplace</i> | | |
| Null | 6.739 | 3.057 |
| Time variables | 6.729 | 3.083 |
| Time + concurrent poverty | 6.687 | 2.924 |
| Full model for concurrent poverty | 6.532 | 2.804 |
| Previous period poverty | | |
| <i>From unit-specific model</i> | | |
| Null | 3.189 | 1.409 |
| Time variables | 3.171 | 1.410 |
| Time + poverty | 3.138 | 1.379 |
| Full model for concurrent poverty | 3.056 | 1.364 |
| <i>From Laplace</i> | | |
| Null | 6.740 | 3.333 |
| Time variables | 6.636 | 3.337 |
| Time + concurrent poverty | 6.556 | 3.211 |
| Full model for concurrent poverty | 6.435 | 3.111 |