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National, longitudinal NASCITA birth cohort study: prevalence of overweight at 12 months of age in children born healthy

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ABSTRACT

Objective To estimate the prevalence of overweight at 12 months in an Italian birth cohort and to identify factors related to an increased likelihood of being overweight.

Methods The Italian NASCITA birth cohort was analysed. Infants were classified as underweight (<5th), normal weight (5–84th) and overweight (≥85th centile) at 12 months of age according to the WHO percentiles of body mass index (BMI) and the prevalence of overweight was estimated. To test the association between the chance of being overweight and parental and newborn characteristics, and infant feeding, healthy newborns (no preterm/low birth weight and with no malformations), with appropriate-for-gestational-age birth weight were selected, and univariate and multivariate analyses were performed.

Results The prevalence of overweight was 23.5% (95% CI 22.2% to 24.8%) in all cohort members with 12-month data (N=4270), and 23.1% in the appropriate-for-gestational age subsample (N=2835).

A big infant appetite (OR 3.92, 95% CI 2.40 to 6.40) and living in southern Italy (OR 1.58, 95% CI 1.29 to 1.94) were the main variables associated with a greater likelihood of being overweight. Breastfeeding practice did not influence the chance of being overweight, but was associated with an increase (exclusive breast feeding for at least 6 months) or a decrease (breast feeding for at least 12 months) in BMI z score at 12 months.

Conclusions The sociodemographic factors (eg, area of residence, maternal employment status) seem to be the most relevant determinants influencing the chance of being overweight at 12 months. Early interventions, with particular attention to vulnerable families, may be helpful in preventing childhood and adult obesity.

WHAT IS ALREADY KNOWN ON THIS TOPIC

⇒ Childhood overweight and obesity represents an increasing public health issue.
⇒ Italy is one of the European countries with the greatest proportion of overweight/obese children, with a greater prevalence in southern Italy.

WHAT THIS STUDY ADDS

⇒ Nearly one out of four infants were overweight at 12 months of age.
⇒ Living in southern Italy and having unemployed mother were the main factors associated with an increased likelihood of being overweight at 12 months of age.

HOW THIS STUDY MIGHT AFFECT RESEARCH, PRACTICE OR POLICY

⇒ To involve parents in educational interventions may be helpful in reducing the prevalence of overweight in childhood.
⇒ These interventions should take into account the geographical context and the characteristics of the family.

INTRODUCTION

Childhood overweight and obesity represent an increasing public health issue that threatens future health and quality of life.[1] Evidence suggests that there are early-life factors (eg, maternal body mass index (BMI), gestational weight gain, maternal smoking habits and infant feeding) associated with the development of obesity.[2 3] Nutrition, in particular, plays an important role in growth and development and breast feeding (BF) is considered by the WHO the best method of nourishment for infants for its positive health effects on children and mothers in the short and long term.[4]

For these reasons, the WHO recommends that children should be exclusively breastfed for the first 6 months of life; afterward, they should begin eating safe and adequate complementary foods while continuing BF for up to 2 years and beyond.[4]

Several studies found an association between BF and a reduced risk of being overweight, even if results are not conclusive.[5–7]

Italy is one of the European countries with the greatest prevalence of childhood overweight and obesity, with a rate in the 8-year-old children of 42% and 21%, respectively.[8 9] A North-South gradient was detected not only in Europe, but also within Italy.[10] In particular, school-aged children living in the South of Italy have a twofold greater risk of overweight compared with children living in the North.[10]

However, there is scant information concerning the proportion of overweight Italian children at an early age.

In this context, this study aimed to describe the growth of newborns participating in the Italian national NASCITA (NAscere e creSCere in ITAlia) cohort in their first year of life, to estimate the BMI status and the prevalence of overweight at 12 months, and to identify potential factors associated with a greater likelihood of being overweight.

METHODS

Data source

The NASCITA birth cohort was set up by the Laboratory for Mother and Child Health of the Istituto di Ricerche Farmacologiche Mario Negri IRCCS in Milan in collaboration with the national Paediatric Cultural Association (Associazione Culturale Pediatri, ACP).

The methods of the NASCITA cohort have been described elsewhere.[11,12] Briefly, all Italian children receive primary healthcare exclusively from a family paediatrician until they are at least 6 years old as part of universalistic health system organisation. Seven well-child visits are scheduled by the paediatrician in the first 6 years of a child's life to monitor growth and development and offer preventive care (figure 1).[11] Additional visits are guaranteed when needed. The newborn population consists of all infants born during the enrolment period (1 April 2019–31 July 2020) and seen by the paediatricians for the well-child visits of the first year of life, if parental consent was given.[11,12]

Some information was obtained for the NASCITA study in addition to the data routinely collected by the paediatricians during the well-child visits.[11,12]

During the first visit, paediatricians collected sociodemographic data regarding the parents, and information about their health status (eg, smoking habits, chronic diseases), the pregnancy and the delivery. Moreover, during the well child visits information concerning anthropometric measures of the newborns and feeding habits were collected, and during the third and fourth visits (scheduled at 6 and at 12 months of age, respectively) the paediatricians collected data on infant weaning (timing; traditional vs baby led), and on the parental perception of appetite and growth of the child.

Outcomes

Infants were classified as underweight (<5th centile), normal (5–84th centile) and overweight (≥85th centile) at visit 4 according to the WHO percentiles of BMI, estimated on the basis of the gender of the neonate and the age at the moment of the visit.[13]

The likelihood of being overweight at 12 months of age was the primary outcome measure.[14,15]

Moreover, age-specific and sex-specific 12 month BMI z-scores were calculated using WHO BMI reference data.[13]

Healthy appropriate-for-gestational age subsample

For the evaluation of factors associated with an increased BMI at 12 months, healthy newborns were selected (ie, with the exclusion of preterm and low birthweight newborns and of neonates with congenital malformations and/or admitted to intensive care unit). Moreover, the analyses were focused on neonates with appropriate-for-gestational age (AGA) birth weight, estimated using the Italian Neonatal Study charts,[16] in order to monitor a cohort with homogeneous characteristics and a similar baseline risk, consistently with most of the studies that evaluated infant growth (figure 2).[17]

The comparison of characteristics of included versus excluded families are reported in online supplemental table S1. Slight differences were observed between the two samples, concerning the distribution by area of residence, maternal educational level and employment status, and the type of delivery.The most relevant difference was observed for the latter variable, but the lower rate of caesarean section in the AGA subsample (27.7% vs 36.7% in the sample not included) is associated to the greater prevalence of caesarean delivery in preterm and/or low birthweight neonates.

Covariates

Variables associated with an increased risk of overweight in childhood in previous studies were selected as covariates.[2,3,10] The full list of covariates is reported in table 1; it includes:

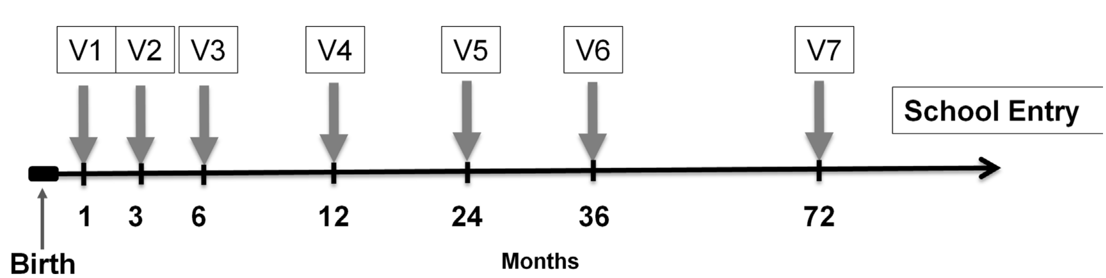

Figure 1 Timeline of well-child visits in the NASCITA (NAscere e creSCere in ITAlia) study.[11]

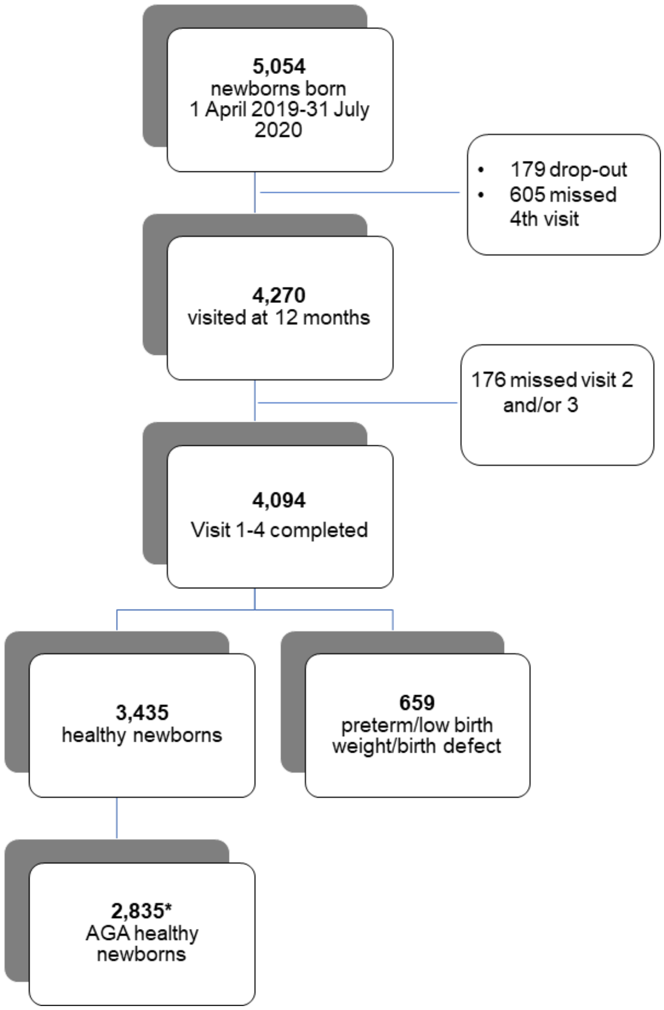

Figure 2 Flow chart of newborns enrolled in the NASCITA (NAscere e creSCere in ITAlia) birth cohort. *Healthy newborns with appropriate-for-gestational weight attending all the first four well-child visits. AGA, appropriate-for-gestational age.

Maternal characteristics

Geographical area of residence (North/Centre/South), age of the mother at delivery, maternal educational level (low: no schooling or primary school; high: secondary school or university), employment status, marital status, nation of birth (Italy yes/no) and parity (primiparous yes/no).

Data concerning pregnancy, delivery and newborn

Prepregnancy BMI, gestational weight gain, occurrence of gestational diabetes, type of delivery, gender of the neonate.

Mothers were grouped according to their prepregnancy BMI into three categories, underweight (≤18.5), normal (18.6–24.9) and overweight or obese (≥25.0). To evaluate gestational weight gain, the weight variations recommended by the Institute of Medicine criteria were applied after grouping the mothers according to the prepregnancy BMI.[18 19]

Table 1 Variables associated with overweight at the stepwise logistic regression analysis

Variable	Value	OR (95% CI)	P value
Geographical area of residence	North/centre	1	<0.001
	South	1.58 (1.29 to 1.94)	
Employment status	Employed	1	0.004
	Unemployed	1.36 (1.11 to 1.67)	
Pre-pregnancy BMI	Underweight	0.55 (0.36 to 0.86)	0.008
	Normal	1	
	Overweight	1.05 (0.85 to 1.32)	0.64
Baby-led weaning	Yes	1	0.009
	No	1.43 (1.12 to 1.83)	
Infant appetite*	Poor	0.27 (0.14 to 0.53)	0.0001
	Normal	1	–
	Big	3.92 (2.40 to 6.40)	<0.001

*Infant appetite as perceived by the parents.
BMI, body mass index.

Lifestyle habits

Smoking habits of the mother (mother smoked during pregnancy and or postpartum period), and mean number of daily hours spent outdoor by parents and infant (<1; 1–3; >3).

Infant nutrition

BF practice (exclusive BF ≥6 months, EBF; BF ≥12 months), timing of weaning according to the age of the infant in months (<5; 5; ≥6), type of weaning (traditional vs baby led, BLW), consumption of commercial baby food (yes/no), parental perception of general infant appetite (poor/normal/big) and parental concern about growth.

The perception of parents about their infant's appetite was investigated by the paediatricians by adapting the correspondent item in the Baby Eating Behaviour Questionnaire.[20]

Traditional weaning involved spoon feeding purees or semi-liquid foods then graduating to more textured foods and some finger foods before joining in with the family diet, while BLW included different approaches (eg, 'on demand approach/self weaning', low degree of spoon feeding or puree feeding).[21]

With the exception of the anthropometric measures, all the other data were collected by the family paediatricians through an interview with the parents. The details concerning data collection were reported in the study protocol.[11] Information on maternal characteristics, and on pregnancy, delivery and neonates were collected during visit 1, while those on lifestyle habits and infant nutrition during visits 1–4.

Statistical analysis

χ^2 tests were performed with the aim to evaluate the association between the reported covariates and the BMI status (overweight vs normal), and a stepwise logistic regression analysis was performed. The a priori criteria of probability to enter the predictor in the model was set as less than or equal to 0.05 and for removing the predictor as greater than or equal to 0.10.

Multiple linear regression models were used to examine the associations between covariates and 12-month BMI z-score.

Statistical significance was evaluated using a two-tailed p<0.05. All data management and analyses were performed using SAS software, version 9.4 (SAS Institute, Inc., Cary, NC, USA).

RESULTS

The prevalence of overweight was 23.5% (95% CI 22.2% to 24.8%) in all cohort members with 12-month data (N=4270), and 23.1% (21.5%–24.6%) in the AGA subsample (N=2835).

The geographical area of residence, the age of the mother at delivery, her nationality, educational level and employment status, her prepregnancy BMI, the timing and type of weaning, the mean number of daily hours spent outdoors, the parental perception of infant appetite and growth, and the consumption of baby food were associated with different likelihoods of being overweight at 12 months of age at the univariate analyses (online supplemental table S2). More specifically, the variables more strongly associated, with the logistic regression analysis, with an increased likelihood of being overweight (table 1) were an excessive appetite (OR 3.92, 95% CI 2.40 to 6.40), living in southern Italy (OR 1.58, 95% CI 1.29 to 1.94), and traditional weaning (OR 1.43, 95% CI 1.12 to 1.83).

The same variables were associated with an increasing in BMI z score at 12 months, along with the early introduction of complementary food, the EBF and an excessive gestational weight gain, while BF for at least 12 months, the introduction of complementary food at ≥6 months of age and having an underweight mother in prepregnancy period reduced the BMI z score (table 2).

Table 2 Results of the multiple linear regression (dependent variable: BMI z score at visit 4)

Variable	Beta	SE	P value
Intercept	0.0424	0.0540	0.4322
Geographical area of residence=South	0.1830	0.0425	<0.0001
Mother unemployed	0.1333	0.0430	0.0020
Pre-pregnancy BMI=underweight	−0.1912	0.0736	0.0095
Gestational weight gain=over	0.1303	0.0441	0.0032
EBF=Yes	0.1657	0.0545	0.0024
BF=No	0.0998	0.0403	0.0134
Timing of weaning <5 months	0.1376	0.0623	0.0273
Timing of weaning ≥6 months	−0.1044	0.0499	0.0366
BLW=No	0.2166	0.0461	<0.0001
Infant appetite=Scarse*	−0.5184	0.0959	<0.0001
Infant appetite=Big*	0.7117	0.1134	<0.0001
Parental concern about growth	−0.2892	0.0839	0.0006

*Infant appetite as perceived by the parents.
BF, breast feeding; BLW, baby lead weaning; BMI, body mass index; EBF, exclusive BF.

DISCUSSION

Nearly one out of four infants resulted overweight at 1 year of age according to the WHO growth chart. This finding is the same observed in a cohort of Danish neonates,[21] despite the fact that data reported for school-aged children show a greater prevalence of overweight in the Mediterranean region compared with Northern European countries.[22]

The geographical area of residence emerged as the main factor associated with the risk of overweight, with a 10% difference in prevalence between the North and South of Italy. Moreover, living in the South was associated with an increase in BMI z score. These data are consistent with those of other studies, which detected a twofold greater risk of being obese in school-aged children living in the southern regions.[10 23] The fact that geographical differences already emerged at 12 months of age in newborns that had similar characteristics at birth strongly support the relevance of the early months of age in influencing the growth of the child.[24]

Italy's southern regions are characterised by a higher poverty rate, by inequalities in provision of social and educational services, and by a worse status in several health indexes,[25] and this, too, may have an impact on the likelihood of being overweight or obese. The risk of overweight in the South, however, remained significantly higher even after adjusting for several variables. It, therefore, seems that lower education and socioeconomic conditions existing in the South do not fully explain the greatest prevalence of overweight, and that cultural factors, dietary habits or genetic factors may play a role.

The association between appetite-related traits and overweight in early childhood has already been documented.[26–28]

Maternal unemployment was also associated with an increased risk of infant overweight. This is not consistent with other studies, which indicate that full-time employment of the mother increases the chance in children of being overweight.[29–32] It should, however, be considered that most of the studies investigating the association between child weight and maternal employment status involved preschool or school-aged children, while the first year of life is a peculiar situation, since employed mothers are usually on maternity leave for 3 or more months.

Prepregnancy overweight and an excessive gestational weight gain have previously been associated with a greater BMI in infancy and childhood.[33–36] This association was not observed in our study, but it is likely that this is due to the choice to include only AGA newborns, while the impact of maternal BMI starts at birth, leading to an increased chance of delivering a large-for-gestational age neonate.[37]

Despite the fact that evidence is not conclusive, available data suggest that BLW may be associated with a lower BMI.[38 39] It has been hypothesised that BLW may improve the infant's appetite control and lead to higher levels of satiety-responsiveness.[39] This hypothesis is supported also by our findings, with an increase in BMI z score and a 43% greater likelihood of overweight in children who underwent traditional weaning.

No clear association was detected in the available studies between the timing of the introduction of complementary foods and childhood overweight[40]; in our analysis this association was detected when evaluating the influence on BMI z score, with an association between early weaning and an increase in BMI.

We did not find an association between BF (EBF) and overweight. Even with conflicting results, BF is associated with a reduced risk of being overweight.[5–7] Most studies, however, evaluate the risk of overweight at 2 or 3 years of age, and there are few data concerning infants aged 12 months.[14] In our sample, conflicting results were observed when analysing the impact on BMI z score, with an increase associated with EBF and a decrease associated with BF.

The sample was representative of the national population for distribution by geographical area of residence and environment (rural/urban), and demographic characteristics of the families.[11 12] The anthropometric measures were collected by the paediatricians during the visits and, from this point of view, may be more accurate than when recorded by parents.

Our study has some limitations. First of all, there is a debate on the reliability of BMI estimate in infancy, and more in general on the validity of BMI as a predictor of adiposity and in the body composition assessment.[41 42] Values of BMI at 6 or 12 months of age exceeding the 85th percentile resulted predictive of severe obesity in children,[43] therefore, despite the limitations in the BMI utility we decided to use this measure, consistently with studies previously performed by other researchers.[15 44] With the continuation of the NASCITA study we will evaluate which is the growth trajectories of children being overweight at 12 months.

The family paediatricians participated on a voluntary basis and most of them were educated to the best practices for supporting early child development. It is possible that they are not fully representative of Italian paediatricians, and in particular, they may be more sensitive to infant feeding and nutrition.

There were difficulties in data collection due to the COVID-19 pandemic. In particular, well-child visits were in some cases postponed and nearly 10% of infants missed one or more visits due to the parents' fear of contagion. The characteristics of children included in this analysis were not significantly different from those of the baseline cohort, with the exception of few variables (online supplemental table S1). Moreover, BMI was estimated on the basis of the actual age at the moment of the visit, so a delay of a few weeks had a negligible impact on the data collection.

We were not able to collect information concerning the children's dietary intake and the quality of their diets. Our definition of baby-led weaning was broad and included different attitudes. We did not, for example, have data concerning the percentage of children receiving spoon feeding or puree feeding. Finally, in the evaluation of factors associated with a greater likelihood of overweight we choose, consistently with other studies, to include only healthy newborns with an appropriate-for-gestational-age birth weight with the aim to monitor a cohort with the same baseline risk, and our results may apply only to these neonates (the majority). In any case, when considering all newborns independently of their weight-for-gestational-age, the prevalence of overweight at 12 months was very similar to that observed in AGA (23.5% vs 23.1%).

In conclusion, nearly one out of four infants in Italy are overweight. Living in the South and having unemployed mother are the main factors associated with the greatest likelihood of being overweight. Baby-led weaning resulted associated with a decreased likelihood of being overweight while, in our cohort, there were conflicting findings concerning the role of BF practice.

The involvement of parents in educational interventions, starting from the pregnancy period, may be helpful in reducing the prevalence of childhood overweight. These interventions should take into account the geographical context (ie, South of Italy) and the maternal characteristics.[45]

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Contributors AC and EM conceptualised and designed the study, and drafted the initial manuscript. MC and RC participated in the conceptualisation and design of the study, and carried out the statistical analyses. CLP participated in the conceptualisation and design of the study, and reviewed and provided input in data analysis. MB conceptualised and designed the study, supervised data analysis, and critically reviewed the manuscript for important intellectual content. AC and MB are jointly responsible for the overall content as guarantors, and accept full responsibility for the finished work and/or the conduct of the study, had access to the data, and controlled the decision to publish. All authors reviewed and revised the manuscript, and approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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Competing interests None.

Patient and public involvement Patients and/or the public were involved in the design, or conduct, or reporting, or dissemination plans of this research. Refer to the Methods section for further details.

Patient consent for publication Not applicable.

Ethics approval The study was approved by the Fondazione IRCCS Istituto Neurologico 'Carlo Besta' ethics committee (Verbale n 59, 6 February 2019) and informed consent was obtained from the newborns' parents.

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Supplementary table 1 (S1) - Comparison of the characteristics of included (healthy AGA subsample) versus excluded newborns

Variable		**Included (2,835)**	**Excluded (2,219)**	**Total 5,054)**	**p**
Geographical area of residence	*North*	1.372 (48.4)	968 (43.6)	2.340 (46.3)	0.003
	Centre	538 (19.0)	442 (19.9)	980 (19.4)	
	South	925 (32.6)	809 (36.5)	1.734 (34.3)	
Setting	*Urban*	1.090 (38.5)	905 (40.8)	1.995 (39.5)	0.09
	Rural	1.744 (61.5)	1.312 (59.2)	3.056 (60.5)	
Maternal age at delivery	*Median (q1-q3)*	33.0 (30.0 – 36.0)	33.0 (30.0 - 37.0)	33.0 (30.0 - 37.0)	0.71
	mean (SD)	33.0 (5.3)	33.1 (5.4)	33.0 (5.4)	
Educational level*	*Low*	396 (14.1)	395 (18.1)	791 (15.8)	0.0001
	High	2.412 (85.9)	1.793 (81.9)	4.205 (84.2)	
Employment status	*Employed*	2.010 (71.4)	1.486 (67.5)	3.496 (69.7)	0.004
	Unemployed	807 (28.6)	714 (32.5)	1.521 (30.3)	
Mother born in Italy	*Yes*	2.486 (87.9)	1.871 (84.8)	4.357 (86.6)	0.001
	No	342 (12.1)	335 (15.2)	677 (13.4)	
Marital status	*With partner*	2.702 (96.4)	2.070 (94.8)	4.772 (95.7)	0.005
	Single	100 (3.6)	113 (5.2)	213 (4.3)	
Primiparous	*Yes*	1.549 (54.9)	1.243 (56.2)	2.792 (55.4)	0.36
	No	1.274 (45.1)	970 (43.8)	2.244 (44.6)	
Type of delivery	*Spontaneous*	2.048 (72.3)	1.405 (63.3)	3.453 (68.3)	
	Caesarean	786 (27.7)	814 (36.7)	1.600 (31.7)	<0.0001

Newborn gender	*Female*	1.413 (49.8)	1.061 (47.8)	2.474 (49.0)	0.15
	Male	1.422 (50.2)	1.158 (52.2)	2.580 (51.0)	

* Educational level: low: no schooling or primary versus high: secondary school or university

Supplementary table 2 (S2) – Association between maternal and neonatal characteristics and BMI at 12 months (overweight versus normal).

Variable	***Value***	**BMI at 12 months**		**OR (95%CI)**	**p-value**
		Normal (N=2031)	Overweight (N=654)		
Geographical area of residence	*North*	1037 (79.2)	272 (20.8)	1	<0.001
	Centre	398 (78.0)	112 (22.0)	1.07 (0.84-1.38)	
	South	596 (68.8)	270 (31.2)	1.73 (1.42-2.10)	
Setting	*Urban*	775 (75.8)	247 (24.2)	1	0.86
	Rural	1256 (75.5)	407 (24.5)	1.02 (0.85-1.22)	
Maternal age at delivery	*Median (Interquartile range)*	33.0 (30.0-36.0)	32.0 (28.0-36.0)	Not applicable	0.0005
	Mean (SD)	33.1 (5.2)	32.3 (5.5)		
Educational level**	*High*	1751 (76.7)	532 (23.3)	1	0.008
	Low	262 (69.7)	114 (30.3)	1.43 (1.13-1.82)	
Employment status	*Employed*	1489 (78.3)	411 (21.7)	1	<0.001
	Unemployed	528 (69.0)	239 (31.0)	1.64 (1.36-1.98)	
Mother born in Italy	*Yes*	1797 (76.4)	556 (23.6)	1	0.03
	No	231 (70.9)	94 (28.9)	1.32 (1.02-	

				1.70)	
Marital status	*With partner*	1931 (75.4)	629 (24.6)	1	0.29
	Single	73 (79.3)	19 (20.7)	0.80 (0.48-1.33)	
Primiparous	*Yes*	1115 (76.7)	338 (23.3)	0.88 (0.74-1.05)	0.15
	No	907 (74.3)	313 (25.7)	1	
Pre-pregnancy BMI	*Underweight*	159 (84.1)	30 (15.9)	0.59 (0.39-0.89)	0.005 *(0.003)**
	Normal	1334 (75.8)	429 (24.2)	1	
	Overweight	471 (72.6)	178 (27.4)	1.18 (0.97-1.45)	
Gestational weight gain	*Below*	614 (76.8)	186 (23.2)	1.00 (0.80-1.23)	0.12 *(0.08)**
	Normal	881 (76.7)	268 (23.3)	1	
	Over	463 (72.7)	174 (27.3)	1.24 (1.00-1.54)	
Gestational diabetes	*Yes*	101 (78.9)	27 (21.1)	0.82 (0.53-1.27)	0.38
	No	1930 (75.5)	627 (24.5)	1	
Type of delivery	*Spontaneous*	1487 (76.6)	454 (23.4)	1	0.07
	Caesarean	544 (73.2)	199 (26.8)	1.20 (0.99-1.45)	
Newborn	*Male*	997 (74.5)	341 (25.5)	1	0.17

gender	*Female*	1034 (76.8)	313 (23.2)	0.89 (0.74-1.06)	
Mother current smoker	*Yes*	185 (71.4)	74 (28.6)	1.27 (0.96-1.69)	0.10
	No	1846 (76.1)	580 (23.9)	1	
Exclusive breastfeeding ≥ 6 months	*Yes*	523 (75.3)	174 (25.0)	1	0.68
	No	1501 (75.8)	479 (24.2)	0.96 (0.79-1.17)	
Breastfeeding at 12 months	*Yes*	938 (78.0)	264 (22.0)	1	0.01
	No	1062 (73.7)	379 (26.3)	1.27 (1.06-1.52)	
Timing of complementary food introduction (months)	*<5*	158 (66.4)	80 (33.6)	1.65 (1.22-2.22)	0.002 *(0.02)**
	5	859 (76.7)	261 (23.3)	0.99 (0.82-1.19)	
	≥6	993 (76.5)	305 (23.5)	1	
Baby-led weaning	*Yes*	882 (78.6)	240 (21.4)	1	0.002
	No	1116 (73.2)	408 (26.8)	1.34 (1.12-1.61)	
Child care attendance	*Yes*	351 (76.0)	111 (24.0)	1	0.81
	No	1652 (75.5)	535 (24.5)	1.02 (0.81-1.29)	
Time spent outdoors (hrs/day)	*<1*	608 (71.9)	240 (28.3)	1.62 (1.22-2.17)	0.001 *(0.0008)**
	1-3	1062 (76.7)	322 (23.3)	1.25 (0.95-	

				1.64)	
	>3	325 (80.3)	79 (19.6)	1	
Infant appetite***	*Poor*	128 (90.1)	14 (9.9)	0.34 (0.20-0.60)	<0.001
	Normal	1857 (75.8)	593 (24.2)	1	
	Big	34 (44.7)	42 (55.3)	3.87 (2.44-6.14)	
Parents concerned about infant growth	*Yes*	156 (84.3)	29 (15.7)	0.56 (0.38-0.85)	0.0053
	No	1843 (75.2)	607 (24.8)	1	
Baby food consumption	*Yes*	138 (68.0)	65 (32.0)	1.52 (1.12-2.07)	0.007
	No	1881 (76.4)	582 (23.6)	1	

* *p-value of chi-square for trend test.* **Educational level: low: no schooling or primary versus high: secondary school or university. ***Infant appetite as perceived by the parents