**Table S1: Relevant questions of the NIH (National Institute of Health) Quality Assessment Tool for Observational and Cross-Sectional Studies for evaluating study quality for inclusion in the IPD Meta-analysis**

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| --- |
| Q1: research question - Was the research question or objective in this paper clearly stated? |
| Q2: study population - Was the study population clearly specified and defined? |
| Q3: participation rate - Was the participation rate of eligible persons at least 50%? |
| Q4: recruitment - Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants? |
| Q6: exposure measured prior to the outcome - For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured? |
| Q11: outcome measured or reported - Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants? |
| Q12: blinding - Were the outcome assessors blinded to the exposure status of participants? |
| Q13: loss to follow-up <40% - Was loss to follow-up after baseline 40% or less? |

**Table S2: Study quality based on NIH (National Institute of Health) Quality Assessment Tool for Observational and Cross-Sectional Studies**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Study** | **Q1: research question** | **Q2: study population** | **Q3: participation rate** | **Q4: recruitment** | **Q6: exposure measured prior to the outcome** | **Q11: outcome measured or reported** | **Q12: blinding** | **Q13: loss to follow-up <40%** | **Overall quality rating** |
| **Møller,****2014**Denmark  | yes | yes | yes | yes | yes | reported | yes | yes  | fair – outcome reported |
| **Bettiol,****2010**Brazil  | yes | yes | yes | yes | yes | measured | yes | yes | good |
| **Da Silva,****2010**Brazil  | yes | yes | yes | yes | yes | measured | yes | yes | good |
| **Gilman,****2008**United States  | yes | NRa | NRa | yes | yes | measured | yes | yes | good  |
| **Grzeskowiak,****2015**Australia  | yes | yes | NAb | yes | yes | measured | yes | yes (NAc) | good  |
| **Howe,****2012**United Kingdom  | yes | yes | NRd | yes | yes | measured | yes | yes | good  |
| **Boerschmann,****2010**Germany  | yes | yes, very special population | NR | NR | yes  | measured | yes | NR | fair, because of limited external validity - special population: offspring of GDM mothers + offspring of diabetes type 1 mothers + controls → might bias our results as offspring of GDM mothers has increased risk for overweight/obesity  |
| **Jones,****1999**Australia  | yes | yes, very special population | yes | yes | yes | measured | yes | no | fair, because of limited external validity - special population: tasmanic SIDS study – inhabitants of Tasmania, who are a high risk group for SIDS are; low follow-up rate for weight measurement  |
| **Koshy,****2010**United Kingdom  | yes | yes | yes | yes | no | measured | yes | no (NAe) | fair - exposure not from documentation prior to outcome measure |
| **Oken,** **2005**United States  | yes | yes | yes | yes | yes | measured | yes | yes | good |
| **Syme,****2010**Canada  | yes | yes | yes  | yes | no (NAb) | measured | yes | no (NAe) | good – retrospective cohort study of prenatal exposure to maternal cigarette smoking (in a sizable subset, exposure validated in medical records);  |
| **Sharma,****2008**United States  | yes | yes | NAf | yes | yes | measured | yes | no (NAf) | good - special population: low-income children |
| **Thiering,****2011**Germany  | yes | yes | NRa | yes | yes | measured | yes | yes | good - special population: children with asthma and control group; participation rate a bit unclear |
| **Prabhu,****2010**United Kingdom | yes  | yes | yes | yes | yes | measured | yes | NR | good - publication of this data concerning fetal growth and asthma; no publication of 5 year and 10 year follow-up data. |
| **Widerøe,****2003**Norway  | yes | yes | yes (random sample) | yes | yes | measured | yes | yes | good |
| **Von Kries,****2002**Germany | yes | yes | yes | yes | no | measured | yes | yes (NAe) | fair - exposure not from documentation prior to outcome measure |

NA=not applicable; NR=not reported; a not reported in this paper, but okay see e.g. (Nelson and Ellenberg 1986); b retrospective prospective study; c linking of data at age seven only possible for small part of the sample, which should be effect neutral; d Proportion of invited and participating children not reported, however should not be a problem; GDM=gestational diabetes mellitus; SIDS=sudden infant death syndrome; e cross-sectional survey; f linking data from two different programs (pregnancy nutrition surveillance system and pediatric nutrition surveillance system)

**Table S3: Study characteristics and dose-response results for the number of cigarettes smoked during pregnancy or overall results for the association between smoking in pregnancy and offspring anthropometric outcome in studies not providing data for the IPD meta-analysis**

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| --- | --- | --- | --- | --- | --- |
| **Study, Year**  | **Study,** **study type** | **N cases include in the study** | **Children’s age in years****(mean ± SD)** | **Study quality (assessed with NIH toola** | **Dose response results [method/model used]** |
| **Durmus 2011**34 | Generation R Study, prospective study | 907 | Ca. 2 | Good | * Outcome: High and weight and Subcutaneous fat mass at ages of 24 months
* Doses analyzed: None, <5 cig, >5 cig per day
* >5 cigs./day:
	+ Lower high and weight with higher number of cigarettes (trend test p<0.10)
	+ Higher subcutaneous fat mass with higher number of cigarettes (trend test p<0.05)

[models adjusted or child’s age, sex, maternal education, maternal height and weight, breastfeeding, current height and observer of the skinfold measurement] |
| **Gorog 2011**35 | CESAR study, retrospective study | 8926 | 9-12  | Fair – exposure not measured prior to the outcome | * Outcome: Overweight in children aged 9-12 years:
* Overall association for smoking (yes/no) OR=1.26, 95%-CI=[1.03-1.55]
* Dose-response: An average of 0.1, 95%-CI=[-0.04 - 0.25] extra cigarette per day smoked in pregnancy by mothers of overweight children (stratified for household density: significant dose effect in children of less-crowded household)

[Logistic regression model adjusted for person per room, breastfeeding, winter fruit consumption, exercise, mother’s education, high birth weight, summer fruit consumption, mothers occupations, study area (six countries in central/eastern Europe)] |
| **Harris 2013**17 | Nurses’ Health Study II, retrospective study | 35794 | 18 | Fair – outcome reported, no blinding | * Outcome: Overweight and obesity at age 18
* Overweight: (reference non-smoking)
	+ 1-14 cig. OR=1.13, 95%-CI=[1.18-1.50]
	+ 15-24 cig. OR=1.40, 95%-CI=[1.20-1.64]
	+ >25 cig. OR=1.15, 95%-CI=[0.97-1.69]
* Obesity: (reference non-smoking)
	+ 1-14 cig. OR=1.41, 95%-CI=[1.14-1.75]
	+ 15-24 cig. OR=1.69, 95%-CI=[1.31-2.18]
	+ >25 cig. OR=2.36, 95%-CI=[1.44-3.86]

[Logistic regression models with adjustment for socioeconomic and behavioral variables] |
| **Hill 2005**29 | Cognitive ad Personality Factors in Reatives of Alcoholics and the Biological Risk Factors in Relatives of Alcoholic Women Study, prospective study | 288 | 8-18 | Fair – no blinding | * Outcome: BMI in different age groups
* Dose-response (none, ½ pack, > ½ pack per day): only chi-square and p values reported
	+ 8-11 year old children: p=0.002
	+ 12-15 year old children: p=0.001
	+ 16-18 year old children: p=0.03
 |
| **Power 2002**32 | 1958 Britishbirth cohort, prospective study | 11405 | 33 | Good | * Outcome: Obesity at age 33
* Overall association for smoking (yes/no):
	+ male OR=1.55, 95%-CI=[1.19-2.00]
	+ female OR=1.45, 95%-CI=[1.13-1.87]
* For dose effects only prevalence reported:
	+ none 10.3%
	+ light (1-9 cig) 13.4%
	+ medium (10-19 cig.) 15.0%
	+ heavy (>20 cig.)16%
	+ significant linear dose trend

 [Sex and age stratified unadjusted logistic model; adjustment for prenatal BMI, maternal age, infant feeding, parity, social class, TV watching] |
| **Iliadou 2010**18 | Cohort study through linkage of national registers  | 259751 | Ca. 18 | Good | * Outcome: Obesity/overweight at age 18 in sons
* Dose effects: (compared to non-smoking)
	+ 1-9 cig OR=1.41, 95%-CI=[1.34-1.49]
	+ >10 cig OR=1.56, 95%-CI=[1.46-1.66]

[Generalized estimating equation models with adjustment for birth characteristics and other parental and adult characteristics] |
| **Kuhle 2010**59 | Childrens Lifestyle and School Performance Study, prospective | 3351 | 5th grade students | Good | * Outcome: Overweight
* Dose effects: (reference non-smoking)
	+ ½ pack: OR=1.39, 95%-CI=[1.14-1.70]
	+ > ½ pack: OR=1.41, 95%-CI=[ [1.07-1.86]

[Logistic regression model with random effects for school adjusted for pre-preg weight, parity, pa, sedentary activity, SGA/AGA/LGA] |
| **Fried 1999**74 | Ottawa Prenatal Prospective, prospective study | 135 | 9-12 | Fair – several aspects unclear | * Outcome: Weight z-scores (SD) at age 9-12 years
* Dose effects stratified by sex:
	+ boys:
* None: 0.33 (1.0)
* 1-16 cig. 0.76 (1.1)
* >16 cig. 0.99 (1.2)
	+ girls:
		- None: 0.16 (0.9)
		- 1-16 cig. 0.24 (0.8)
		- >16 cig. 0.67 (0.9)
 |
| **Cavlek 2010**60 | Croatian retrospective study  | 1003 | 6  | Fair – several aspects unclear | * Outcome: Low weight at age 6
* Dose effects: (reference non-smoking)
	+ 1-9 cig.: OR=1.32 ,95%-CI=[0,52 – 3,33]
	+ 10-19 cig.: OR=1.80 ,95%-CI=[1,08 – 3,01]
	+ >20 cig.: OR=0.85 ,95%-CI=[0,56 – 1,30]
 |
| **Dior 2014**33 | The Jerusalem Perinatal Study, prospective study | 11530 | 17 | Good | * Outcome: BMI at age 17
* Overall: BMI difference between offspring of smoking mothers and non-smoking mothers: 0.43 (SD=0.08) p<0.001
* Dose response for each 10 cigarettes smokes additionally: BMI-difference=0.287 (SD=0.045) p=0.005

[Models adjusted for gender and ethnicity, age of parents, socioeconomic status, parent’s years of education, birth weight, maternal pre-pregnancy BMI and maternal health conditions] |
| **Huang 2014**36 | 1979 National Longitudinal Survey of Youth | 5156 | 14-21 | Fair – several aspects unclear | * Outcome: Obesity (classified using CDC percentiles percentile>95%) in 10-18 year old adolescents
* Dose effects: (compared to non-smoking)
	+ ≤one pack: OR 1.40 (p<0.01 – no CI reported)
	+ >one pack: OR=1.43 (p<0.01– no CI reported)

 [hierarchical generalized linear modeling (HGLM) adjusting for prenatal factors as well as childhood familial experiences] |

a Detailed quality assessment in online supplement Table S1