**NUTRITIONAL INTERVENTIONS OR EXPOSURES IN INFANTS AND CHILDREN AGED UP TO THREE YEARS OF AGE AND THEIR EFFECTS ON SUBSEQUENT RISK OF OVERWEIGHT, OBESITY, AND BODY FAT: A SYSTEMATIC REVIEW OF SYSTEMATIC REVIEWS**

Bernadeta Patro-Gołąb1\*, MD, Bartłomiej M Zalewski1\*, MD, Maciej Kołodziej1, MD, Stefanie Kouwenhoven2, Bsc, Lucilla Poston3, PhD, Keith M Godfrey4, PhD, Berthold Koletzko5, Professor of Paediatrics, Johannes Bernard van Goudoever2,6, MD, Hania Szajewska1, MD

1 Department of Paediatrics, Medical University of Warsaw, Poland

2 VU University Medical Center Amsterdam, Department of Pediatrics, Amsterdam, The Netherlands

3 KCL Division of Women’s Health, Women’s Health Academic Centre, King’s College London and Kings Health Partners, UK

4 MRC Lifecourse Epidemiology Unit and NIHR Southampton Biomedical Research Centre, University of Southampton and University Hospital Southampton NHS Foundation Trust, UK

5 Ludwig-Maximilians-Universität München,Division of Metabolic and Nutritional Medicine, Dr. von Hauner Children’s Hospital, University of Munich Medical Centre, München, Germany

6 Department of Paediatrics, Emma Children’s Hospital, Amsterdam Medical Center, Amsterdam, The Netherlands

\*Both authors equally contributed to the manuscript.

Correspondence to:

Bernadeta-Patro Gołąb

Medical University of Warsaw,

Department of Paediatrics

Żwirki i Wigury 63A, 02-091 Warsaw, Poland

Email: abpatro@yahoo.com

**RESULTS**

**DESCRIPTION OF INCLUDED REVIEWS**

**Table S2** summarizes the characteristics of the 40 included reviews, including two Cochrane reviews. Most (n=29) were published between 2010 and 2015. Seven eligible reviews included RCTs only, and others included RCTs and non-RCTs. With respect to the interventions/exposures, included reviews were heterogeneous, encompassing nutritional interventions/exposures: breastfeeding; infant formula; complementary feeding; protein intake; fat intake (including long-chain polyunsaturated fatty acids [LCPUFA]); sugar and sugar-sweetened beverage intake; energy intake; dairy intake; fruit and vegetable intake. Outcome measures were also heterogeneous as was the age at outcome measurement.

**METHODOLOGICAL QUALITY OF INCLUDED REVIEWS**

**Table S3** provides a summary of the methodological quality of included reviews based on AMSTAR assessment, see**.** Only six (including both Cochrane reviews) were of high methodological quality. Methodological quality is detailed in specific subsections.

**RISK OF BIAS IN INCLUDED STUDIES**

The majority of reviews evaluated the risk of bias (also described as the methodological quality) of the included studies. The Cochrane reviews used the Cochrane Risk of Bias tool. Non-Cochrane reviews also used other tools to assess the risk of bias. More details are presented in **Table S2** andin topic subsections where relevant.

**Table S1**. **Search strategy (an example for Ovid MEDLINE) used to identify potentially eligible reviews.**

**Database: Ovid MEDLINE(R) 1946 to Present with Daily Update**

**Search Strategy:**

--------------------------------------------------------------------------------

1 exp Obesity/ (153557)

2 exp Overweight/ (155763)

3 adiposity/ (6638)

4 1 or 2 or 3 (162674)

5 (obese or obesity or overweight or over-weight or adiposity).ti,ab. (193664)

6 4 or 5 (231753)

7 exp child/ or exp infant/ (2100429)

8 (infant or infants or infancy or child or children or childhood or baby or babies or pediatric or paediatric).ti,ab. (1279299)

9 7 or 8 (2361365)

10 6 and 9 (41344)

11 exp Diet/ (207579)

12 exp Feeding Behavior/ (130574)

13 exp Vitamins/ (275130)

14 vitamin A/ or vitamin C/ or vitamin D/ or Vitamin B6/ (80725)

15 Dietary fats/ (43658)

16 Dietary proteins/ (33341)

17 Dietary carbohydrates/ (22690)

18 Dietary fiber/ (13559)

19 Dietary Iron/ (2335)

20 Dietary calcium/ (9277)

21 Fruit/ or Vegetables/ (39164)

22 carbonated beverages/ (2091)

23 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 or 19 or 20 or 21 or 22 (641411)

24 (diet$ or food or nutrition).ti,ab. (645817)

25 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 (iron or calcium or fibre or carbohydrates or protein$)).ti,ab. (115781)

26 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 vitamin$).ti,ab. (7128)

27 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 healthy eating).ti,ab. (633)

28 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 healthy diet).ti,ab. (236)

29 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 balanced diet).ti,ab. (60)

30 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 fruit$).ti,ab. (2921)

31 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 vegetable$).ti,ab. (1991)

32 ((increas$ or improv$ or encourag$ or promot$ or recommend$ or motivat$ or incentiv$ or market$ or advert$) adj3 (micronutrient$ or macronutrient$ or nutrient$)).ti,ab. (4512)

33 ((fizzy or sugary or sweetened or carbonated) adj2 (drink or beverage$)).ti,ab. (1722)

34 24 or 25 or 26 or 27 or 28 or 29 or 30 or 31 or 32 or 33 (757246)

35 23 or 34 (1156099)

36 10 and 35 (13983)

37 (systematic$ adj2 review$).ti,ab. (61703)

38 meta-analysis as topic/ (14731)

39 meta-analytic$.ti,ab. (3693)

40 meta-analysis.ti,ab,pt. (75100)

41 metanalysis.ti,ab. (126)

42 metaanalysis.ti,ab. (1076)

43 meta analysis.ti,ab. (56684)

44 meta-synthesis.ti,ab. (226)

45 metasynthesis.ti,ab. (129)

46 meta synthesis.ti,ab. (226)

47 meta-regression.ti,ab. (2579)

48 metaregression.ti,ab. (292)

49 meta regression.ti,ab. (2579)

50 (synthes$ adj3 literature).ti,ab. (1365)

51 (synthes$ adj3 evidence).ti,ab. (4111)

52 integrative review.ti,ab. (873)

53 data synthesis.ti,ab. (7315)

54 (research synthesis or narrative synthesis).ti,ab. (752)

55 (systematic study or systematic studies).ti,ab. (6668)

56 (systematic comparison$ or systematic overview$).ti,ab. (1814)

57 evidence based review.ti,ab. (1203)

58 comprehensive review.ti,ab. (6684)

59 critical review.ti,ab. (10427)

60 quantitative review.ti,ab. (458)

61 structured review.ti,ab. (469)

62 realist review.ti,ab. (52)

63 realist synthesis.ti,ab. (33)

64 pooled analysis.ti,ab. (4002)

65 or/37-64 (160154)

66 review.pt. (1982057)

67 medline.ab. (57449)

68 pubmed.ab. (32782)

69 cochrane.ab. (31403)

70 embase.ab. (30877)

71 cinahl.ab. (10334)

72 psyc?lit.ab. (862)

73 psyc?info.ab. (7363)

74 (literature adj3 search$).ab. (25868)

75 (database$ adj3 search$).ab. (24467)

76 (bibliographic adj3 search$).ab. (1254)

77 (electronic adj3 search$).ab. (8807)

78 (electronic adj3 database$).ab. (10699)

79 (computeri?ed adj3 search$).ab. (2578)

80 (internet adj3 search$).ab. (1689)

81 included studies.ab. (7229)

82 (inclusion adj3 studies).ab. (6532)

83 inclusion criteria.ab. (35733)

84 selection criteria.ab. (20136)

85 predefined criteria.ab. (1105)

86 predetermined criteria.ab. (737)

87 (assess$ adj3 (quality or validity)).ab. (40939)

88 (select$ adj3 (study or studies)).ab. (37444)

89 (data adj3 extract$).ab. (29234)

90 extracted data.ab. (7092)

91 (data adj2 abstracted).ab. (3326)

92 (data adj3 abstraction).ab. (836)

93 published intervention$.ab. (104)

94 ((study or studies) adj2 evaluat$).ab. (105926)

95 (intervention$ adj2 evaluat$).ab. (6045)

96 confidence interval$.ab. (231303)

97 heterogeneity.ab. (93722)

98 pooled.ab. (46178)

99 pooling.ab. (7657)

100 odds ratio$.ab. (153866)

101 (Jadad or coding).ab. (119740)

102 or/67-101 (810894)

103 66 and 102 (130400)

104 review.ti. (253482)

105 104 and 102 (48188)

106 (review$ adj4 (papers or trials or studies or evidence or intervention$ or evaluation$)).ti,ab. (101122)

107 65 or 103 or 105 or 106 (294154)

108 letter.pt. (913128)

109 editorial.pt. (369094)

110 comment.pt. (614714)

111 108 or 109 or 110 (1406204)

112 107 not 111 (286350)

113 exp animals/ not humans/ (4082574)

114 112 not 113 (276392)

115 36 and 114 (705)

**TABLE S2. Characteristics of included reviews**

**BREASTFEEDING**

| Reference [AMSTAR SCORE] | Search date  | No of studies \* /age 0-3 \*\*  | Participants age range †/‡ | Eligible type of studies | Intervention/Exposure | Primary outcomes (of our interest) | Main findings  | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Arenz et al. 2004; [6] | Dec 2003 | 9/9 | Not explicitly stated – breastfed infants  | Prospective cohort, retrospective cohort,cross-sectional, case–control studies | Any BF *vs* different patterns of BF/FFDuration of BF (any) | Obesity, overweight (defined as BMI-centile) | 1) Lower obesity risk in BF children Adj. OR 0.78, 95% CI 0.71, 0.85)2) Dose response effect reported in 4 studies; in remaining 4 studies – NS  | Not stated | Different patterns and duration of BF *vs* FF or BF |
| Gale et al. 2012; [6] | Mar 2011 | 15/15  | From birth up to 12 mo | Longitudinal, cross-sectional studies  | Exclusive or predominant BF *vs* FF | Body composition (fat mass, fat free mass) | Compared to BF, FF was associated with altered body composition in infancy:- in FF infants, fat-free mass higher at 3–4 mo [MD (95% CI): 0.13 kg (0.03, 0.23 kg)], 8–9 mo [0.29 kg (0.09, 0.49 kg)], and 12 mo [0.30 kg (0.13, 0.48 kg)], and fat mass lower at 3–4 mo [20.09 kg (20.18, 20.01 kg)] and 6 mo [20.18 kg (20.34, 20.01 kg)] than in BF infants. At 12 mo, fat mass higher in FF infants [0.29 kg (20.03, 0.61kg)] than in BF infants.  | - No study reported whether measurements performed by investigators blinded to the feeding group. - The feeding method prospectively defined in all studies except for 1 study- The definitions used for feeding groups varied - Information provided on weaning indicated that feeding at 6 mo was no longer predominantly breast-milk feeding even in those groups designated as BF groups. Therefore, for 6 mo, the BF group represented originally BF infants. - In 8 of the 15 studies, age-specific values used for hydration and density of fat-free mass | - |
| Harder et al. 2005; [4] | Dec 2003 | 17/17 | Not explicitly stated – breastfed infants | Cohort studies, Case-control studies  | Duration of BF (any) | Overweight, obesity | Dose-dependent association between longer duration ofBF and decrease in risk of overweight – 1 mo of BF associated with a 4% decrease in risk of overweight (OR 1⁄4 0.96/mo of BF, 95% CI: 0.94, 0.98). | Not stated | - |
| Hornell et al. 2013; [5] | Jan 2000 to June 2011 | 54/23(including 4 SR/MA) | Not explicitly stated – breastfed infants | Prospective cohorts, studies, meta-analyses, SRs | 1)Exclusive Breastfeeding (eBF)2)Duration of BF (any) | Overweight, obesity  | 1) Conflicting results: 3 prospective studies showed protective effect and 2 did not.2a) Protective dose/duration effect of BF2b) Protective Protective dose/duration effect of BF against overweight and obesity in childhood, adolescence and adulthood | -Longer duration of exclusive BF or any BF associated with a protective effect against overweight and obesity in childhood and adolescence – convincing evidence (grade 1) - Limited-suggestive evidence (grade 3) for a protective effect of BF for the association with overweight/obesityin adulthood. | - |
| Horta et al. 2015; [7] | Aug 2014 | 168/105 | Not explicitly stated – breastfed infants | Cohort, cross-sectional, case-control studies | BF (any) | Overweight , obesity | BF subjects less likely to be obese/overweight [pooled OR: 0.74 (95% (CI): 0.70, 0.78)] (n = 113). Among the 11 high-quality studies smaller association [pooled OR: 0.87 (95%CI: 0.76, 0.99)].  | Separate analysis for high quality studies (stable effect) | - |
| Ip et al. 2009;  | May 2006 | Not explicitly reported (32 primary studieson infant and 43 on maternalhealth outcomes, 28 SR/MA | Not explicitly stated – breastfed infants | SRs, RCTs, prospective cohorts, case-control studies  | BF | 19 different outcomes including obesity risk | BF associated with a reduction in the risk of obesity  | 3 SRs and MA of good and fair quality | - |
| Kramer et al. 2012; [10] | Jun 2011 | 23/1 | Infants  | RCT, cohort, observational studies | Duration of BF: exclusive BF for 6-7 mo *vs* eBF for 3-4 mo and mixed afterwards | Mean BMI | Higher mean BMI at 6.5 y in eBF (MD 0.20 [ 0.02, 0.38 ]) | Only 1 high quality study (PROBIT) | Only PROBIT study assessed impact of breastfeeding on BMI |
| Monasta et al. 2010;  | Medline from Jan 1966;Embase from 1980; Web of Science from 1970; Cinhal from 1982; PsycINFO from 1887; to April 2008 | 22/7 | Children under 5 y of age/ Not explicitly stated – breastfed infants | SRs | BF | Overweight, obesity  | No or short BF positively associated with later overweight and obesity | 6 SR of moderate quality, 1 SR of low quality  | - |
| Owen et al. 2005; [5] | Nov 2004 | 70/70 | Not explicitly stated – breastfed infants | Observational , longitudinal cohorts, cross-sectional studies | 1) BF (any) *vs* FF in infancy2) duration of eBF | Mean BMI | 1) Mean BMI lower in BF group: MD -0.04 (95%CI: -0.05, -0.02); Adj. MD -0.01 (95%CI -.05, .03) 2) Prolonged eBF duration ≥8 mo) – greater effect (based on 3 studies)  | According to the authors the difference between the groups likely to be strongly influenced bypublication bias and confounding factors | Protective effect of prolonged eBF duration on BMI after adjustment for confounding factors present only in 1 study  |
| Weng et al. 2012; [5] | 1990 to May 2011 | 30/10 assessing BF | Not explicitly stated – breastfed infants | Prospective observational cohorts studies | 1) Any BF in the first year of life *vs* no BF, 2) Duration of BF (any) | Overweight | 1) MA comparing BF with non-BF infants found a15% decrease (95% CI 0.74, 0.99; n=10) in the odds of childhood overweight. 2) 5 studies analysed the impact of BF duration on childhood overweight – 4 studies did not find significant associations; in 1 study significant decrease in the odds of overweight at 2 y of age for infants who were BF for > 6 mo compared to those BF for < 3 mo | Newcastle-Ottawa tool: selection score – moderate/low for 9/10 studies;comparability score – high for 7/10;ascertainment score – high for 5 studies, moderate/low for 5 studies | High heterogeneity in MA assessing the risk of overweight I2=73.3% |
| Yan et al. 2014; [5] | Aug 2014 | 25/25 | Not explicitly stated – breastfed infants | Prospective cohort, cross-sectional studies  | 1) Any BF (ever *vs* never),2) Duration of any BF(<3 mo *vs* 3–5 mo *vs* 5–7 vs mo *vs* ≥7 mo) | Obesity | 1) BF associated with a significantly reduced risk of obesity in children (adj. OR = 0.78; 95% CI: 0.74, 0.81). 2)Longer duration of BF – lower risk of childood obesity ≥7 mo adj.OR 0.79 (95% CI 0.70, 0.88) | Not stated | - |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; RCT, randomized controlled trial; BMI, body mass index; CI, confidence interval; MD, mean difference; BF, breastfeeding/breastfed; FF, formula feeding; MA, meta-analysis; SR, systematic review; (adj)OR, (adjusted) odds ratio; eBF, exclusive breastfeeding; NS, non-significant; mo, months; y, years.

**FORMULA FEEDING**

| Reference [AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Eligible type of studies | Intervention/Exposure | Primary outcomes (of our interest) | Main findings  | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **PROTEIN CONTENT** |
| Abrams et al. 2015; [6] | From 1966 to Aug 2014 | 6/4 | Infants /infants | RCTs | IF with lower protein/energy content | BMI, body composition | - BMI z-score – 2 RCTs with conflicting results-BMI at 24 mo (2 RCTs) and at 6y (1 RCT) – significantly lower in lower protein groups- Adequate growth; fat mass index and fat-free mass index tended to be lower but not significant in the lower-protein group at 6 mo of age (1 RCT) | Selection bias: - unclear risk in 2 studies,- low in 1 RCT, - low for RSG and unclear for AC in 1 RCTPerformance bias: – low risk for all studies;Detection bias: – unclear risk for all studies;Attrition bias: - high risk for 1 study, medium for other 3 studies | Concentrations of energy and protein slightlybelow the traditional 20 kcal/oz and 1.4–1.5 g/dL used in the United States in infant formulas used in included studies  |
| Patro et al. 2016; [10] | From 1946 to Nov 2014 | 12/12 |  Infants and young children (aged 0-3 y) /infants | RCT, quasi-RCTs | Cow’s milk-based IF and/or follow-on formula with variations in protein quantity  *vs* lower-protein cow’s milk-based IF and follow-on formula | Obesity, overweight; BMI,fat mass, fat-free mass  | - Lower-protein concentration in infant formula may reduce mean and/or z-score BMI (from 12 mo of age) and the risk of obesity in children aged 6 y (based on 1 RCT).- Effects on body composition: unclear (paucity of data) | Methodological limitations included: small sample size in 7 RCTs, participants’ replacement (1 RCT), pseudorandom allocation (2 RCTs), a high loss to follow-up (3 RCTs), per protocol analysis (3 RCTs). - In many studies, due to poor reporting, the risk of bias described as ‘unclear’ | Conclusions with respect to the risk of overweight and obesity based solely on 1 large RCT  |
| **PROBIOTICS/PREBIOTICS** |
| Szajewska et al. 2013; [8] | Jun 2013 | 9/9 | Infants/from birth to 4 mo at enrollment | RCTs | IF supplemented with probiotics (*Bifidobacterium* *lactis* Bb12 or *Lactobacillus* GG)  *vs* unsupplemented IF | 1. BMI/mo2.Body composition - skinfold, DXA | 1.Formula with B. lactis - (3 RCTs) - no significant differences between the groups in BMI (MD 0.09 kg/m2/mo; 95% CI -0.05, 0.22); Formula with LGG- no studies2.None of the studies reported on any of these outcomes | In 2 out of 3 trials, very high dropout rate; In 1 study, random sequence generation unclear;Otherwise, the risk of bias described as low | - |
| Liber et al 2013; [8] | Dec 2012 | 19/3 | Birth to adulthood/ birth to 12mo | RCTs  | IF supplemented with inulin-type fructans |  BMI | No studies in 0-3 y old children that assessed BMI | No studies assessing the outcomes of interest in our target group | - |
| **LCPUFA** |
| Campoy et al. 2012; [6] | From 1966 to Apr 2011 | 15/0 | Infants and children up to 2 y/ birth to 4 mo | RCTs, quasi-RCTs  | IF supplemented with LCPUFAs | BMI | None of the included studies assessed BMI  | None of the included studies assessed BMI  | - |
| Rodriguez et al. 2012; [4] | Not reported | 13 /7 studies in children, but – only 2 RCTs in term infants and with respect to infant formula supplementation | Infants/birth to 4 mo | Observational, cohort, RCTs studies | LCPUFA- supplemented IF  | BMI, skinfold measurements, waist and head circumferences; body fat, lean mass;  | 1st RCT - no effect of supplementation of IF with DHA or with DHA and AA, compared to unsupplemented group, on body composition at the age of 12 mo.Second RCT -similar BMI and overweight risk in all study groups (LCPUFA supplemented, unsupplemented and BF group) at 9 y. | 1 RCT of quality moderate quality, second RCT of high risk of bias  | 4 out of 7 studies in children focused on preterm infants and only 2 (RCTs) on term infants and infant formula suppelmentation |
| **SOY-BASED FORMULA** |
| Mendez et al. 2002; [1] | Not reported | 6/1 | Not explicitly stated/ birth to 13 mo | RCTs, observational, cohort studies; | Soy-based IF *vs* cow’s milk– based formula  | BMI  | BMI assessed at 20–34 y - no difference between the groups assessed in 1 retrospective cohort study | Not assessed  | - |

 \* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; RCT, randomized controlled trial; BMI, body mass index; CI, confidence interval; MD, mean difference; RSG, random sequence generation; AC, allocation concealment; LCPUFA, long-chain polyunsaturated fatty acids;; IF, infant formula; mo, months; y, years.

**COMPLEMENTARY FEEDING**

| Reference[AMSTAR SCORE] | Search strategy timeframe | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Eligible type of studies | Intervention/Exposure | Primary outcomes (of our interest) | Main findings | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lanigan et al. 2001; [4] | From 1982 to 1998 | 25/3 | Infants/infants | RCT, Observational-prospective,longitudinal, observational-cross-sectional, cohort studies | Timing of CF introduction | BMI, body composition | 1 prospective observational study: a subgroup in which CF after 5 mo was associated with increased adiposity at 6 y of age.Fat mass (2 studies): increased fat mass at follow-up at 6 y(solid feeding before 15 weeks) and 7-y- old children (CF introduced after 5 mo). | None of the studies met all the methodological criteria developed by the authors. Only 8 studies met 8 out of 9 criteria, 9studies met 7 and 6 studies met 6. 10 studies met5 or fewer criteria | - |
| Moorcroft et al. 2011; [6] | June 2010 | 24/24 | Infants/Not explicitly stated | RCTs, cohorts, case-control studies | Timing of CF introduction | Obesity (based on BMI or body composition) in 3 age groups:* ≤12 mo
* 1-18 y
* 12-18 y
 | No clear association between the age of introduction of solid foods and obesity found.BMI1) at 12 mo: in 1 study no difference in BMI; in 1 study lower BMI-z score when solids introduced before 4-5 mo (vs after 4-5 mo)2) 1-18 y: mixed results3) 12-18y: 2 studies – neither found an association between timing of the introduction and being obese/ overweight Body composition 1) <12 moFat mass: (1 study): no difference at 3,6,12 mo;Skinfold thickness (2 studies): mixed results2) 1y-18 y: mixed results | The studies were rated based upon the SIGN grading recommendations in evidence-based guidelines (SIGN 2001). Poor-quality studies were excluded by the authors. | No clear definition of overweight/ obesity.  |
| Pearce et al. 2013;[5] | Sep 2012 | 23/21 | Infants/ Not explicitly stated | Cohorts, cross sectional, case control studies | Timing of CF introduction | 1) BMI2) body composition (DXA, skinfold thickness, BIA) | No clear association of timing of CF with childhood obesity.1) 16/21 studies – no association (after adj.) 4 studies – CF ≤3 or ≤4 *vs* 4-6 or ≥6 mo associated with higher risk of childhood obesity1 study – 1% reduction of being overweight with every 1 mo of delay in CF introduction2) 7 studies: -DXA (2 studies) –no association. with fat mass.-Skinfold thickness (4/5 studies) – no association-BIA (1 study): introduction <15 weeks – higher %body fat  | The quality assessed using Newcastle-Ottawa.The quality assessed using adapted Newcastle-Ottawa scale:Cohort studies:-Selection of the study population: 6 of the cohort studies awarded max. of 3 stars, -Comparability:Varied from 0 to 4 stars; 7 studies max. of 4 points;-Assessment of outcome: all studies at least 2 stars; and 14 studies max 3 stars.1 case-control study: -Selection: 4 stars;-Comparability: 1 stars;-Assessment of outcome: 3 stars. | - |
| Pearce, Langley-Evans et al. 2013; [5] | June 2012 | 10/10 | Infants/Not explicitly stated  | Cohort, cross sectional studies | Types of foods introduced during CF | Obesity, BMI, body composition | Food type group (4 studies): In general no impact of the introduction of particular food type/group on childhood obesity.Macronutrient/energy intake and BMI or percentage body fat (4 studies):For protein, dairy, and energy intake see corresponding table section.  | The quality assessed using Newcastle-Ottawa. -Selection: 8 studies max. 3 stars;-Comparability:2 studies max. 4 stars; -Assessment of outcome: 4 studies max. 3 stars. | The authors highlighted the need for more studies that look at lean and fat mass instead of, or in addition to, BMI. |
| Qasem et. al 2015; [7] | May 2014 | 5/1 | Infants 4 to 6 mo | RCTs, observational studies | Timing introduciton of complementary foods (4 mo *vs* 6 mo) | BMI z-scoreFat mass (kg) | No significant differences between groups (based on single RCT) | Single RCT: with low risk of bias (Adequate sequence generation; Allocation concealment; Blinding; Incomplete outcome data; Free of selective reporting; Free of other bias)  | - |
| Weng et al. 2012; [5] | From 1990 to May 2011 | 30/4 assessing CF | Not explicitly stated | Prospective observational cohorts studies | 1) Any BF in the 1st year of life *vs* no BF 2) Duration of BF (any)3) Timing of introduction of solid foods | Overweight | 1) Overweight(adj.OR 0.85, 95% CI 0.74,0.99;)2) 4 studies negative effect and 1 positive effect3) 3/4 studies found that early introduction (<4 mo) as a risk factor of child obesity; in1 study – no association. | Newcastle-Ottawa tool: selection score – moderate/low for 9/10 studies;comparability score – high for 7/10;ascertainment score – high for 5 studies, moderate/low for 5 studies3) 4/4 studies: low/moderate quality for selection and ascertainment, and for comparability; 3/4 studies were of high quality. | High heterogeneity in a MA evaluating overweight risk I2=73.3% |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; RCT, randomized controlled trial; BMI, body mass index; CI, confidence interval; DXA, dual dual-energy X-ray absorptiometry; CF-complementary feeding; BF, breastfeeding/breastfed; OR, odds ratio; MA, meta-analysis; (adj)OR, (adjusted) odds ratio;

**PROTEIN INTAKE**

| Reference [AMSTAR SCORE] | Search date  | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings  | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hornell et al. 2013; [7] | Jun 2011complementary search in Feb2012 | 34/11 | 0-18y | RCTs, observational , cohort, cross-sectional studies | Protein intake in infancy and later childhood | BMI, body composition assessed at different age  | Higher protein intake in infancy and early childhood associated with increased growth and higher BMI in childhood. The protein intake between 15 E% and 20 E% inearly childhood associated with an increased risk of being overweight later in life.Inconclusive evidence for the association between higher protein intake in early childhood and later body fat increases | - Convincing evidence (grade 1) that higher protein intake in infancy and early childhood is associated with increasedgrowth and/or higher BMI in childhood.-Limited-inconclusive evidence (grade 4) for the association between higher protein intake in early childhood and later body fat increases (due to the 2 A-graded studies not being independent and studies from different groups finding opposing associations). | - |
| Pearce &Langley-Evans et al. 2013; [5] | June 2012 | 10/4 | Infants  | Cohort, cross sectional; cohort studies only with respect to protein intake  | Protein intake (% of energy) or types of protein (1 study) assessed at different ages in infancy | BMI, body composition | High total protein intake at 6,9,12 mo: NS effect in adj. analysis on BMI at school age or %body fat (2 studies) Different types of protein (total, animal, dairy, meat or cereal protein) at 12 mo of age (1 study): - Higher %body fat in infants in the highest tertiles of animal protein intake - Higher BMI z-score in infants in the highest tertiles of total, animal or dairy protein Protein intake (as % total energy intake) consumed at 2,4,9,12 mo (1 study):in boys positivelyassociated with BMI at the age of 6 y. | The quality assessed using Newcastle-Ottawa scale. Selection: 4 studies with 3 stars (max. score);Comparability:2 studies with 2 stars and 2 with 3 stars (max. score of 4 stars); Assessment of outcome: 3 studies with 2 stars , 1 with 3 stars (max. score 3 stars). | - |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; RCT, randomized controlled trial; BMI, body mass index; NS, non-significant; mo, months; y, years.

**FAT INTAKE**

| Reference[AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Hooper et al. 2015; [9] | Nov 2014 | 57/4 | 2 y to adulthood | RCTs, cohorts studies | 1)Fat reduction 1st usual fat2)Total fat intake  | 1) Body fatness in children (based on RCTs)2) Body fatness later in life (based on cohort studies) | 1) No studies in 0-3 y old children2) No clearrelationship:- 1 cohort (2 analyses): positive relationship on %body fat, BMI, change BMI;- 2 cohorts: no clear relationship between fat intake and fatness (BMI, change BMI, percentile BMI, skinfolds, %BF);- 1 study: greater total fat intake at 2 y was related to lower percentage of subscapular skinfold and fat mass (but, not to BMI or % of triceps skinfold). | Generally high risk of bias in cohort studies - high proportion of participants lost to follow-up or lack of adjustment for potential confounders | Body fatness included body weight, body mass index, waist circumference, skinfold thickness or percentage fat. |
| Voortman et al. 2015; [5] | Apr 2014 | 45/8 | Birth to 5 y/Birth to 2 y  | Cross-sectional, longitudinal, cohort, interventional studies | n-3 fatty acids or mixed PUFA intake or blood levels  | Childhood obesity (BMI; BMI-for-age; ponderal index; fat mass; %BF; skinfold thicknesses) | No clear detrimental or beneficial effect on obesity. | Various quality between the studies.  | Different exposure measures (in majority of the studies dietary intake; in 3 of included studies– blood plasma measurements) |
| Koletzko et al. 2014; [1] | From Sep 2008 to Sep 2013 | 20 SR, 44 studies/2 studies | Not explicitly stated/ infants >3 mo | SRs, RCTs observational studies | LCPUFA supplementation  | Body composition  | One study: higher skinfold thickness at 12th mo of age in supplemented infants (aged 3-9 mo).  .Second study: lower skinfold ratio in intervention group (infants aged 9-18 mo supplemented for 12 mo ) | Not assessed | - |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; RCT, randomized controlled trial; BMI, body mass index; LCPUFA, long-chain polyunsaturated fatty acids; SR, systematic review; mo, months; y, years.

**SUGARS & SUGAR-SWEETENED BEVERAGES (SSB)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Reference [AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings  | Evidence quality | Comments |
| Clabaugh et al. 2011; [4] | From 2001 to 2009 | 9/0 | Children | RCTs, cross- sectional , cohorts,Longitudinal studies | SSB intake | BMI of children, obesity rate  | No studies identified in age group 0-3 y |  | - |
| Gibson 2008; [4] | July 2008 | 44/1 | Children/ 2y | Intervention studies, cross- sectional, longitudinal studies |  Sugar-containing drinks’ intake | BMI, overweight, obesity in children | 2 cross-sectional studies: conflicting results (1 study: positive association; 1 study: no association) 1 longitudinal study: positive association with BMI at 1 year of follow up, but only in overweight and obese children at baseline. | Study quality not formally assessed | - |
| Kaiser at al. 2013; [9] | Oct 2012 | 15/0 | Humans | RCTs | Nutritively sweetened beverage consumption | BMI change at 2 yBMI Z-score at 6, 12 and 18 mo | No studies identified in the age group 0-3 y. |  | - |
| Keller et al. 2015;  | From 1990 toAug 2013 | 13SR/12SR | 6 mo-19 y/not applicable  | SRs and/or meta-analyses | SSB consumption | Overweight, obesity | The majority of reviews concluded that there was a direct association between SSB consumption and overweight and obesity in children and adolescents;2 SR /MA with the highest quality scores (=9) had discrepant results. | Low to moderate quality of included reviews based on the AMSTAR score.High quality of 2 MA(different scoring system than for SRs)  | - |
| Olsen et al. 2009; [3] | Not given | 19/1 | Humans/ 2-3 y | Prospective and experimental studies | Intake of calorically sweetenedbeverages | BMI, BMI z-score | 1 study in children aged 0-3 y: positive association with BMI at 1 year of follow up, but only in overweight/ obese children at baseline. | Not assessed | - |
| Osei-Assibey et al. 2012; [3] | Aug 2011 | 26/2 | Birth-8 y/ birth – 2y  | RCTs, longitudinal studies | 1. Sugar -sweetened soft drinks intake2. Promotion of sweet drinks intake reduction | 1.Overweight (at 3-4 y);2. BMI-Z score (at 2 y) | 1:1 study in children 0-3 y: Positive association with BMI at 1 y of follow up, but only in overweight/obese children at baseline.2: Significantly less increase in BMI-z score in intervention group at 2 y of follow up (based on 1 RCT)  | ‘Moderately strong evidence’Not exhaustively specified by the authors how the evidence was assessed. | - |
| Perez-Morales et al. 2013;[4] | From 2001 to 2011 | 7/3 | 6m to 7 y/0,5-3 y | Prospective cohorts studies | SSB intake before 6 y | Childhood BMI  | According to the authors ‘a trend showing that high consumption of SSB is associated to higher BMI, waist circumference, and overweight later in childhood’ | Not assessed  | - |
| Te-Morenga et al. 2012; [9] | Dec 2011 | 21/6 | Children and adults | RCTs, prospective cohorts studies | 1. Effects of reducing dietary sugars intake2.Effects of increasing dietary sugars intake (mostly SSB in children) | Body fatness (childhood) | 1. No studies in 0-3 y group2. Increased risk of being overweight associated with higher intakes of dietary sugars - OR 1.55, 95%CI: 1.32, 1.82 – based on MA of 5 studies, but only 2 of them in children aged 0-3 y |  2. GRADE assessment of the evidence evaluating effects of increasing dietary sugars intake in children: Quality LOW (observational studies), however no serious risk of bias, inconsistency, indirectness, imprecision reported | - |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; SSB, sugar-sweetened beverages; RCT, randomized controlled trial; BMI, body mass index; CI, confidence interval; MD, mean difference; OR, odds ratio; MA, meta-analysis; SR, systematic review; mo, months; y, years.

**ENERGY**

| Reference[AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pearce &Langley-Evans et al. 2013; [5] | June 2012 | 10/ only 1 cohort study focused on energy intake | Infants | Cohort, cross sectional studies | Total energy intake during CF period (at 4 mo) | BMI  | Association between dietary energy intake and BMI at the age of 5 y:- BF infants, NS;- FF/mixed-fed infants, each 420 kj per day increase in energy led to an increased risk of BMI >85th percentile,(OR 1.25; 95% CI, 1.00, 1.55); higher BMI observed also at 1, 2 and 3 y | The quality assessed using Newcastle-Ottawa scale. Selection: 3 stars (max. score);Comparability: 3 stars (max. score of 4 stars); Assessment of outcome: 3 stars (max score 3 stars). | Conclusions based on only 1 cohort study that focused on energy intake  |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; BMI, body mass index; CI, confidence interval; CF, complementary feeding; OR, odds ratio; NS, nonsignificant; BF , breast feeding; FF, formula feeding; mo, months; y, years.

**DAIRY**

| Reference[AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pearce &Langley-Evans et al. 2013; [5] | June 2012 | 10/ only 1 cohort study evaluated on dairy protein intake | Infants | Cohort, cross sectional studies  | Protein intake, including diary protein intake, during CF period (at 6, 12, 18-24 mo of age) | BMI z-score at 3-4 and 7 y  | Infants in the highest tertiles of dairy protein at the age of 12 months had a higher BMI z-score | The quality assessed using Newcastle-Ottawa scale. Selection: 3 stars (max. score of 3 stars);Comparability: 3 stars (max. score of 4 stars); Assessment of outcome: 2 stars (max score 3 stars). | Conclusions based on only 1 cohort study that focused on dairy protein intake  |
| Dror et al. 2014; [5] | Aug 2013 | 36/1 | 2-19 y/2-3 y | Cross-sectional,prospective cohort studies | Diary consumption | BMI, z-scores or percentiles, fat mass, risk of obesity and overweight | NS association between total dairy or total milk intake at the age of 2 with BMI z-score or incident overweight at 3 y in a single study with participants from our age group (2-3 y)  | Quality score (max. score 16) of 14.5 in 1 study in our age group, otherwise quality varied between the studies | Only 1 cohort study in our age group  |
| Louie et al. 2011; [5] | From 1980 to Apr 2010 | 19 (10 among children)/ 1 | Humans/ 2-3 y | Prospective cohort studies | Dairy consumption | BMI, fat mass, risk of obesity and overweight. | NS association between total dairy or total milk intake at the age of 2 with BMI z-score or incident overweight at 3 y in a single study with participants from our age group (2-3 y) | Not assessed | Only 1 cohort study in our age groupcohort study in children 0-3 y (2-3 y) |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; BMI, body mass index; NS, non-significant, CF, complementary feeding; mo, months; y, years.

**FRUITS and VEGETABLE INTAKE**

| Reference[AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Kaiser at al. 2014; [9] |  June 2013 | 2 studies in primary analysis; 7 studies in secondary analysis/ 0 | Children and adults | RCTs | Fruits and vegetables consumption or education to increase fruits and veggies consumption for ≥ 8 weeks | Body composition, BMI | No studies in children  | No studies in children | - |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; RCT, randomized controlled trial; BMI, body mass index;

**ADHERENCE TO DIETARY GUIDELINES**

| Reference[AMSTAR SCORE] | Search date | No of studies \* /age 0-3 \*\* | Participants age range †/‡ | Type of studies | Intervention/Exposure | Primary outcomes | Main findings | Evidence quality | Comments |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Pearce &Langley-Evans et al. 2013; [5] | June 2012 | 10/1 | Infants | Cohort, cross sectional studies  | Adherence to dietary guidelines during thecomplementary feeding period | BMI, body composition (by DXA)  | No association of IGS (based on dietary patterns) and BMI, fat mass or fat-mass index at the age of 4 y. Positive association between increasing IGS and both lean mass and lean mass index in 4 y old children. | The quality assessed using Newcastle-Ottawa scale. Selection: 3 stars (max. score);Comparability: 3 stars (max. score of 4 stars); Assessment of outcome: 2 stars (max score 3 stars). | Conclusions based on only 1cohort study that focused on adherence to dietary guidelines |

\* total number of studies included in review assessing all outcomes; \*\* number of included studies that recruited participants aged 0-3y and that assessed our outcome of interest with respect to specific intervention/exposure; † eligibility criteria regarding the age of participants; ‡ participants age rage in studies of interest; BMI, body mass index; DXA, dual dual-energy; IGS - Infant Guideline Score

**Table S3.** **QUALITY ASSESSMENT OF THE REVIEWS**

The methodological quality of each included review using the ‘Assessment of Multiple Systematic Reviews’ (AMSTAR) tool.[[1]](#footnote-1) The tool contains the following 11 questions with regard to the quality of the review:

(1) Was a priori design provided?

(2) Was there duplicate study selection and data extraction?

(3) Was a comprehensive literature search performed?

(4) Was the status of publication (i.e., grey literature) used as an inclusion criterion?

(5) Was a list of studies (included and excluded) provided?

(6) Were the characteristics of the included studies provided?

(7) Was the scientific quality of the included studies assessed and documented?

(8) Was the scientific quality of the included studies used appropriately in formulating conclusions?

(9) Were the methods used to combine the findings of studies appropriate?

(10) Was the likelihood of publication bias assessed?

(11) Was the conflict of interest included?

* Yes; No; Can’t answer; Not applicable

For the purposes of this document, subjectively, we assumed that scores of 0–4 indicate a low-quality review, 5–8, a moderate-quality review, and, 9–11, a high-quality review, where a point is awarded only for ‘Yes’ answer.

A. BREASTFEEDING

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References** | **Was a priori design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Arenz 2004 | Yes | Can’t answer | Yes | No | Yes | Yes | No | No | Yes | Yes | No |
| Gale 2012 | Yes | No | No  | No | Yes | Yes | Yes | No | Yes | Yes | No |
| Harder 2005 | No | No | Yes | No | No | Yes | No | No | Yes | Yes | No |
| Hornell 2013 | No | No | No | No | Yes | Yes | Yes | Yes | Yes | No | No |
| Horta 2015 | No | Yes | Yes | No | No | Yes | Yes | Yes | Yes | Yes | No |
| Kramer 2012 | Yes  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| Owen 2005  | No | No | Yes | Yes | No | Yes | No | No | Yes | Yes | No |
| Weng 2012 | No | No | Yes | No | No | Yes | Yes | No | Yes | Yes | No |
| Yan 2014 | No | Yes | Yes | No | No | Yes | No | No | Yes | Yes | No |

**B. FORMULA FEEDING**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References** | **Was a priori design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Abrams 2015 | No | Can’t answer | Yes | Yes | Yes | Yes | Yes | No | No | No | Yes  |
| Campoy 2012 | No | Yes | Yes | No | No | Yes | Yes | Yes | Yes | No | No |
| Liber 2013 | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No |
| Mendez 2002 | No | No | No | No | No | Yes | No | No | No | No | No |
| Patro-Gołąb 2016  | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes  | Yes |
| Rodríguez 2012 | No | No | Yes | No | No | Yes | Yes | No | Yes | No | No |
| Szajewska 2013 | No | No | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| Voortman 2015 | No | No | Yes | No | No | Yes | Yes | Yes | Yes | No | No |

C. COMPLEMENTARY FEEDING

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References** | **Was a priori design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Lanigan 2001 | No | No | No | No | No | Yes | Yes | Yes | Yes | No | No |
| Moorcroft 2011 | No | Yes | No | No | Yes | Yes | Yes | Yes | Yes | No | No |
| Pearce 2013  | No | Yes | Yes | No | No | Yes | Yes | No | Yes | No | No |
| Pearce & Langley-Evans 2013 | No | Yes | Yes | No | No | Yes | Yes | No | Yes | No | No |
| Qasem 2015 | No | Can’t answer  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No | No |
| Weng 2012 | No | No | Yes | No | No | Yes | Yes | No | Yes | Yes | No |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  **References** | **Was a priori design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Hornell 2013 | No | No | Yes  | No | Yes | Yes | Yes | Yes  | Yes | No | Yes  |
| Pearce & Langley-Evans 2013 | No | Yes | Yes | No | No | Yes | Yes | No | Yes | No | No |

**D. PROTEIN INTAKE**

E. FAT

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References** | **Was a priori design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Hooper 2015 | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | No |
| Voortman 2015 | No | No | Yes | No | No | Yes | Yes | Yes | Yes | No | No |
| Koletzko 2014 | No | No | No | No | No | Yes | No | No | No | No | No |

**F. SUGARS AND SUGAR-SWEETENED BEVERAGES**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References** | **Was a priori design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Clabaugh 2011  | No | No | Yes | No | No | Yes | Yes | Yes | No | No | No |
| Gibson 2008 | No | No | Yes | Yes | Yes | Yes | No | No | No | No | No |
| Kaiser 2013 | No | Yes  | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | No |
| Olsen 2009 | No | No | Yes | No | No | Yes | No | No | No | No | Yes |
| Osei-Assibey 2012 | No | No | Yes | No | No | Yes | No  | No | Yes | No | No |
| Perez-Moralez 2013 | No | Yes | Yes | No | Yes | Yes | No | No | No | No | No |
| Te Morenga 2012 | Yes | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | Yes | No |

G. ENERGY

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References**  | **Was an 'a priori' design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Pierce 2013 | No | Yes | Yes | No | No | Yes | Yes | No | Yes | No | No |

**H. DAIRY INTAKE**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References**  | **Was an 'a priori' design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Dror 2014  | No | No | Yes | No | No | Yes | Yes | Yes | Yes | No | No |
| Louie 2011 | No | Yes | Yes | Yes | No | Yes | No | No | Yes | No | No |
| Pierce 2013 | No | Yes | Yes | No | No | Yes | Yes | No | Yes | No | No |

**I. FRUITS AND VEGETABLE INTAKE**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References**  | **Was an 'a priori' design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Kaiser 2014 | Yes | No | Yes | Yes | No | Yes | Yes | Yes | Yes | Yes | No |

**J. ADHERENCE TO DIETARY GUIDELINES**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **References**  | **Was an 'a priori' design provided?** | **Was there duplicate study selection and data extraction?** | **Was a comprehensive literature search performed?** | **Was the status of publication (i.e. grey literature) used as an inclusion criterion?** | **Was a list of studies (included and excluded) provided?** | **Were the characteristics of the included studies provided?** | **Was the scientific quality of the included studies assessed and documented?** | **Was the scientific quality of the included studies used appropriately in formulating conclusions?** | **Were the methods used to combine the findings of studies appropriate?** | **Was the likelihood of publication bias assessed?** | **Was the conflict of interest included?** |
| Pearce & Langley-Evans 2013 | No | Yes | Yes | No | No | Yes | Yes | No | Yes | No | No |

1. Shea BJ, Hamel C, Wells GA, Bouter LM, Kristjansson E, Grimshaw J, Henry DA, Boers M. AMSTAR is a reliable and valid measurement tool to assess the methodological quality of systematic reviews. [J Clin Epidemiol.](http://www.ncbi.nlm.nih.gov/pubmed/19230606) 2009 Oct; 62(10):1013-20. PMID: 19230606 [↑](#footnote-ref-1)