**Supplemental Table 1: Ingredients of the treatment and control snacks at each stage of the trial**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | Treatment | | | |  | Control |
|  |  |  |  | Fruit bar |  |  |
|  | Jan 2006 to Oct 2006 | Oct 2006 to Jun 2007 | Jun 2007 to May 2012 | Jan 2010 to May 2012 |  | Jan 2006  to May 2012 |
| Ingredients |  |  |  |  |  |  |
| Dry GLV powder, g1 | 7.5 | 3.8 | 0 | 0 | 0 |
| Milk powder, g | 16 | 12 | 12 | 0 | 0 |
| Fruit powder, g | 4 | 4 | 0 | 0 | 0 |
| Fresh GLV, g | 0 | 29 | 30 | 0 | 0 |
| Dried fruit, g | 0 | 0 | 4 | 60 | 0 |
| Chickpeas, g | 0 | 0 | 0 | 2 | 0 |
| Sesame seeds, g | 0 | 0 | 0 | 3 | 0 |
| Low-micronutrient vegetables2 | 0 | 0 | 0 | 0 | 18 |
| Binding ingredients, g3 | 30 | 28 | 30 | 0 | 22 |
| Spices, g | 2 | 2 | 2 | 2 |  | 2 |

1 GLV: green leafy vegetable; GLVs included spinach, colocasia, amaranth, fenugreek, coriander, shepu, onion stalk and curry leaves. Dried GLVs were air-dried at room temperature and supplied as powders or flakes. Dried fruits included figs, dates, raisins, mango, apple, gooseberry and guava.

2 Low micronutrient vegetables included potato and onion.

3 Binding ingredients used were wheat flour, rice flour, chickpea flour or semolina. The treatment snacks changed during the course of the trial in order to improve the palatability of the snacks, hence the four columns for the treatment snacks in the table (18). The nutrient content remained similar (Supplemental Table 2).

**Supplemental Table 2: Mean nutrient composition and percentage contribution to nutrient requirements of the treatment and control snacks at each stage of the trial**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Treatment | | | | | | | | | |  | | Control | | |
|  |  | |  | |  | | Fruit bar | | All  treatment snacks  Jan 2006-Jun 20121 | |  | | All  control snacks  Jan 2006-Jun 20121 | | |
|  | Jan 2006 to  Oct 2006 | | Oct 2006 to  Jun 2007 | | Jun 2007 to  May 2012 | | Jan 2010 to  May 2012 | |  | |
|  |  | | | | | | | |  | | | | | | |
| Micronutrient content/ snack |  |  |  |  |  |  |  |  |  | |  |  | | | |
| ß-Carotene, RE | 114 + 26 | | 200 + 23 | | 141 + 85 | | 353 + 180 | | 159 + 55 | [21-595] |  | 2 + 1 | | [0-3] | |
| Riboflavin, mg | 0.20 + 0.01 | | 0.21 + 0.02 | | 0.15 + 0.03 | | 0.04 + 0.02 | | 0.16 + 0.04 | [0.00-0.22] |  | 0.01 + 0.01 | | [0.00-0.02] | |
| Folate, μg2 | 26.0 + 5.7 | | 50.8 + 19.5 | | 67.5 + 30.6 | | 40.2 + 35.9 | | 58.5 + 14.6 | [5.2-93.0] |  | 6.1 + 4.6 | | [2.7-12.1] | |
| Vitamin C, mg | <1 + 0.0 | | 0.5 + 0.6 | | 2.1 + 3.0 | | 8.7 + 12.7 | | 2.1 + 1.8 | [0.0-36.6] |  | 0.0 + 0.0 | | [0.0-0.6] | |
| Vitamin B-12, μg | 0.64 + 0.05 | | 0.58 + 0.16 | | 0.31 + 0.13 | | 0.14 + 0.15 | | 0.38 + 0.14 | [0.00-0.74] |  | 0.18 + 0.25 | | [0.00-0.60] | |
| Calcium, mg | 210 + 14 | | 275 + 66 | | 194 + 35 | | 76 + 16 | | 200 + 42 | [52-356] |  | 25 + 35 | | [8-87] | |
| Iron, mg | 6.85 + 1.07 | | 5.90 + 1.58 | | 3.93 + 1.26 | | 1.75 + 0.49 | | 4.42 + 1.27 | [1.22-7.59] |  | 0.90 + 0.26 | | [0.65-1.28] | |
| Macronutrient content/ snack3 | | | | | | | | | | | | | | | |
| Energy, MJ | 0.74 + 0.09 | | 0.70 + 0.06 | | 0.61 + 0.07 | | 0.92 + 0.04 | | 0.69 + 0.08 | [0.56-0.92] |  | 0.37 + 0.05 | | [0.27-0.66] | |
| Protein, g | 7.3 + 0.9 | | 6.9 + 0.7 | | 6.4 + 1.0 | | 2.7 + 0.3 | | 6.4 + 1.0 | [2.7-7.9] |  | 2.4 + 0.6 | | [1.0-3.3] | |
| % of RNI | | | | | | | | | | | | | | | |
| ß-Carotene, RE | 14 |  | 25 |  | 18 |  | 44 |  | 20 |  |  | | <1 | |  |
| Riboflavin, mg | 14 |  | 15 |  | 11 |  | 3 |  | 11 |  |  | | <1 | |  |
| Folate, μg | 4 |  | 8 |  | 11 |  | 7 |  | 10 |  |  | | 1 | |  |
| Vitamin C, mg | <1 |  | 1 |  | 4 |  | 16 |  | 4 |  |  | | <1 | |  |
| Vitamin B-12, μg | 25 |  | 22 |  | 12 |  | 5 |  | 15 |  |  | | 7 | |  |
| Calcium, mg | 18 |  | 23 |  | 16 |  | 6 |  | 17 |  |  | | 2 | |  |
| Iron, mg | 35 |  | 30 |  | 20 |  | 9 |  | 23 |  |  | | 5 | |  |

Values are mean + SD; 1Values are weighted mean + SD [range] for the nutrient content of the snacks, given in the units shown, and represent the weighted average based on the number of days that the different snack recipes were distributed over the study period, and the lowest and highest nutrient content measured in a sample of an individual snack recipe; 2 Total folate; 3 Macronutrient content calculated from Indian Food Tables (19). RE=retinol equivalents; RNI= FAO/WHO recommended reference nutrient intake (RNI) during the first trimester of pregnancy, except calcium, for which only a third trimester value is available (20).

**Supplemental Table 3: Examples of treatment and control recipes.**

**Treatment Recipes Control Recipes**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Ingredient | Weight, g |  | Ingredient | Weight, g |
| RECIPE 1 |  |  | RECIPE 1 |  |
| Fresh spring onion stalk | 15 |  | Tapioca | 30 |
| Whole milk powder | 12 |  | Potato | 10 |
| Dried raisins and figs | 4 |  | Corn flour | 2.5 |
| Wheat flour | 7 |  | Wheat flour | 2.5 |
| Rice flour | 6 |  | Mixed spices | 1 |
| Sorghum flour | 0.5 |  |  |  |
| Pearl millet flour | 4 |  | RECIPE 2 |  |
| Mixed spices | 1 |  | Potato | 45 |
|  |  |  | Wheat flour | 5 |
| RECIPE 2 |  |  | Corn flour | 2 |
| Fresh onion stalk | 10 |  | Mixed spices | 1 |
| Fresh coriander | 10 |  |  |  |
| Whole milk powder | 12 |  | RECIPE 3 |  |
| Dried apricot | 4 |  | Potato | 25 |
| Wheat flour | 19 |  | Semolina | 5 |
| Pearl millet flour | 5 |  | Rice flour | 15 |
| Mixed spices | 1 |  | Mixed spices | 1 |
|  |  |  |  |  |
| RECIPE 3 (fruit bar) |  |  | RECIPE 4 (‘chikki’) |  |
| Mango | 30 |  | Puffed rice | 7 |
| Indian gooseberry | 17 |  | Jaggery | 2 |
| Raisins | 5 |  | Sugar | 4 |
| Chickpea | 10 |  |  |  |
| Sesame seed | 3 |  |  |  |

All treatment and control snacks except the fruit bar and chikki were cooked by deep-frying in sunflower oil.

**Supplemental Table 4: Anthropometry and nutritional status in early and late pregnancy among women with and without gestational diabetes (WHO 1999 criteria (27))**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | GESTATIONAL DIABETES | | |  | NO GESTATIONAL DIABETES | | |  |  |
|  | *n* |  | |  | *n* |  | |  | *P* |
|  |  |  |  |  |  |  |  |  |  |
| At recruitment, pre-pregnancy |  |  |  |  |  |  |  |  |  |
| Age, years | 100 | 26.0 [24.0, 29.0] | |  | 908 | 24.0 [21.0, 27.0] | |  | <0.001 |
| Weight, kg | 100 | 48.8 [42.2, 55.6] | |  | 908 | 45.2 [39.9, 51.5] | |  | 0.001 |
| Height, cm1 | 100 | 151.1 + 5.0 | |  | 908 | 151.3 + 5.4 | |  | 0.73 |
| Body mass index, kg/m2 | 100 | 21.7 [18.4, 24.2] | |  | 908 | 19.7 [17.8, 22.4] | |  | <0.001 |
| Triceps skinfold, mm | 100 | 16.8 [12.2, 21.3] | |  | 908 | 13.4 [9.6, 18.5] | |  | <0.001 |
| Subscapular skinfold, mm | 100 | 25.1 [19.0, 34.8] | |  | 908 | 20.7 [14.9, 28.5] | |  | <0.001 |
| Parity2 0 | 100 | 20 (20.0) | |  | 908 | 284 (31.3) | |  | 0.07 |
| 1 |  | 58 (58.0) | |  |  | 455 (50.1) | |  |  |
| >1 |  | 22 (22.0) | |  |  | 169 (18.6) | |  |  |
| Standard of living index (score) | 100 | 26.0 [21.5, 29.5] | |  | 878 | 25.0 [21.0, 30.0] | |  | 0.26 |
| Education2 | 100 | 6 (6.0) | |  | 906 | 78 (8.6) | |  | 0.64 |
| Primary or less |  | 89 (89.0) | |  |  | 778 (85.9) | |  |  |
| Secondary |  | 5 (5.0) | |  |  | 50 (5.5) | |  |  |
| Graduate |  |  |  |  |  |  |  |  |  |
| Dietary intake, frequency/week2 |  |  |  |  |  |  |  |  |  |
| Milk <1 |  | 47 (47.0) | |  |  | 428 (47.1) | |  | 0.49 |
| 1-6 |  | 43 (43.0) | |  |  | 353 (38.9) | |  |  |
| ≥7 |  | 10 (10.0) | |  |  | 127 (14.0) | |  |  |
| Green leafy vegetables <1 |  | 20 (20.0) | |  |  | 216 (23.8) | |  | 0.68 |
| 1-6 |  | 77 (77.0) | |  |  | 669 (73.7) | |  |  |
| ≥7 |  | 3 (3.0) | |  |  | 23 (2.5) | |  |  |
| Fruit <1 |  | 14 (14.0) | |  |  | 147 (16.2) | |  | 0.38 |
| 1-6 |  | 66 (66.0) | |  |  | 626 (68.9) | |  |  |
| ≥7 |  | 20 (20.0) | |  |  | 135 (14.9) | |  |  |
| Meat and fish <1 |  | 29 (29.0) | |  |  | 224 (24.7) | |  | 0.02 |
| 1-6 |  | 54 (54.0) | |  |  | 600 (66.1) | |  |  |
| ≥7 |  | 17 (17.0) | |  |  | 84 (9.3) | |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Visit 1, median [IQR] gestation 10.1 [9.4, 12.0] weeks | | | |  |  |  |  |  |  |
|  | | | |  |  |  |  |  |  |
| Weight, kg | 92 | 50.3 [43.5, 56.9] | |  | 769 | 46.6 [41.0, 53.0] | |  | 0.004 |
| Triceps skinfold, mm | 94 | 15.6 [12.5, 19.4] | |  | 804 | 13.5 [9.4, 17.6] | |  | <0.001 |
| Subscapular skinfold, mm | 94 | 25.3 [18.6, 32.5] | |  | 804 | 21.4 [15.5, 28.3] | |  | 0.001 |
| Hemoglobin, g/dL | 88 | 11.4 [10,7, 12.1] | |  | 719 | 11.3 [10.6, 12.1] | |  | 0.84 |
| Anemia2 | 88 | 29 + 33.0 | |  | 719 | 260 + 36.2 | |  | 0.55 |
| Vitamin B-12, pmol/L | 82 | 216.0 [180.0, 282.0] | |  | 602 | 223.0 [171.0, 290.0] | |  | 0.92 |
| Vitamin B-12 deficiency2 | 82 | 9 + 11.0 | |  | 602 | 106 + 17.6 | |  | 0.13 |
| Plasma folate, nmol/L | 82 | 33.5 [17.6, 67.6] | |  | 603 | 30.2 [17.5, 64.2] | |  | 0.69 |
| Folate deficiency2 | 82 | 2 + 2.4 | |  | 603 | 8 + 1.3 | |  | 0.34 |
|  | | | |  |  |  |  |  |  |
| Visit 3, median [IQR] gestation 29.7 [29.3, 30.7] weeks | | | |  |  |  |  |  |  |
|  | | | |  |  |  |  |  |  |
| Weight, kg | 92 | 56.0 [50.3, 63.0] | |  | 865 | 52.4 [47.4, 58.8] | |  | 0.004 |
| Weight gain from registration, kg1 | 92 | 6.6 + 3.8 | |  | 865 | 7.2 + 3.9 | |  | 0.16 |
| Triceps skinfold, mm | 98 | 17.5 [12.5, 21.2] | |  | 893 | 14.3 [10.5, 19.0] | |  | <0.001 |
| Triceps gain from registration, mm1 | 98 | 0.1 + 5.0 | |  | 893 | 0.5 + 4.6 | |  | 0.38 |
| Triceps gain from visit 1, mm1 | 92 | 0.7 + 4.1 | |  | 793 | 1.0 + 3.5 | |  | 0.37 |
| Subscapular skinfold, mm | 98 | 26.6 [19.7, 34.3] | |  | 893 | 23.1 [17.6, 28.6] | |  | 0.003 |
| Subscapular skinfold gain from registration, mm1 | 98 | -0.2 + 7.3 | |  | 893 | 1.3 + 7.5 | |  | 0.05 |
| Subscapular gain from visit 1, mm1 | 92 | 1.0 + 5.6 | |  | 793 | 1.6 + 5.6 | |  | 0.35 |
| Hemoglobin, g/dL | 99 | 10.9 [10.2, 11.7] | |  | 886 | 10.7 [9.8, 11.5] | |  | 0.04 |
| Anemia2 | 99 | 54 (54.5) | |  | 886 | 518 (58.5) | |  | 0.45 |
|  |  |  |  |  |  |  |  |  |  |
| Birth outcomes |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |
| Birth weight, g1 | 86 | 2606.0 + 351.8 | |  | 729 | 2620.5 + 381.2 | |  | 0.74 |
| Low birth weight2 | 86 | 32 (37.2) | |  | 729 | 246 (33.7) | |  | 0.52 |
| Small for gestational age, Oken2 | 86 | 53 (61.6) | |  | 720 | 511 (71.0) | |  | 0.07 |
| Small for gestational age, within cohort2 | 84 | 3 (3.6) | |  | 716 | 67 (9.4) | |  | 0.10 |
| Large for gestational age, Oken2 | 86 | 0 (0.0) | |  | 720 | 2 (0.3) | |  | 1.00 |
| Large for gestational age, within cohort2 | 84 | 9 (10.7) | |  | 716 | 61 (8.5) | |  | 0.50 |
| Gestation, weeks | 100 | 39.0 [37.2, 39.7] | |  | 892 | 39.1 [38.1, 40.0] | |  | 0.04 |
| Pre-term2 | 100 | 20 (20.0) | |  | 892 | 87 (9.8) | |  | 0.002 |
| Major congenital anomalies2 | 100 | 2 (2.0) | |  | 908 | 4 (0.4) | |  | 0.11 |
| Elective cesarean section birth2 | 87 | 8 (9.2) | |  | 734 | 69 (9.4) | |  | 0.95 |
| Emergency cesarean section birth2 | 87 | 15 (17.2) | |  | 734 | 83 (11.3) | |  | 0.11 |
| Forceps/Ventouse delivery2 | 87 | 1 (1.1) | |  | 734 | 6 (0.8) | |  | 0.55 |
| Perinatal death2 | 98 | 3 (3.1) | |  | 897 | 14 (1.6) | |  | 0.41 |

Values are median [IQR]; 1 Values are mean + SD; 2 Values are *n* (%). Small for gestational age (Oken) and large for gestational age (Oken) were defined using reference 31. Small for gestational age (within cohort) were defined as <10th percentile and >90th percentile respectively, based on sex-specific gestation-adjusted birth weights among all live singleton newborns without major congenital anomalies. IQR=interquartile range.

**Supplemental Figure 1: CONSORT diagram showing participant flow in the trial**

**PREGNANCIES**

***n* = 1106**

**PREGNANCIES**

***n* = 1185**

**STARTED SUPPLEMENT >90 DAYS BEFORE**

**LMP DATE**

***n*=857**

**STARTED SUPPLEMENT <90 DAYS BEFORE**

**LMP DATE**

***n*=249**

**STARTED SUPPLEMENT >90 DAYS BEFORE**

**LMP DATE**

***n*=969**

**STARTED**

**SUPPLEMENT <90**

**DAYS BEFORE**

**LMP DATE**

***n*=216**

**PREGNANCY REACHED AT LEAST 28 WEEKS GESTATION**

***n*=765**

**PREGNANCY REACHED AT LEAST 28 WEEKS GESTATION**

***n*=224**

**PREGNANCY REACHED AT LEAST 28 WEEKS GESTATION**

***n*=854**

**PREGNANCY REACHED AT LEAST 28 WEEKS**

**GESTATION**

***n*=185**

Natural abortion 17

Termination 11 Unknown outcome 3

**ATTENDED CLINIC FOR GTT**

***n*=375 (49%)**

**ATTENDED CLINIC FOR GTT**

***n*=117 (52%)**

**ATTENDED CLINIC FOR GTT**

***n*=420 (49%)**

**ATTENDED CLINIC FOR GTT**

***n*=96 (52%)**

Natural abortion 60

Termination 47

Unknown outcome 8

Natural abortion 48

Termination 39

Unknown outcome 5

Natural abortion 9

Termination 10

Unknown outcome 6

**TOTAL WOMEN**

**RECRUITED**

***n*=6513**

**RANDOMIZED TO TREATMENT GROUP**

***n* = 3205**

**RANDOMIZED TO**

**CONTROL**

**GROUP**

***n* = 3308**

**STAYED IN THE STUDY BUT NEVER**

**BECAME PREGNANT**  755

**DROPPED OUT OF THE STUDY BEFORE BECOMING PREGNANT**

Moved away 500

Declined further follow-up 481

Centre closed 48

Became sterilized 54

Separated from husband 4

Died 10

Husband died 11

**BECAME PREGNANT TOO EARLY**

**EXCLUDED AND NOT FOLLOWED FURTHER**

Started supplementation <90 days

Before LMP (up to Dec 2008) 156

Started supplementation after LMP

(after Dec 2008) 104

**STAYED IN THE STUDY BUT NEVER**

**BECAME PREGNANT** 692

**DROPPED OUT OF THE STUDY BEFORE**

**BECOMING PREGNANT**

Moved away 476

Declined further follow-up 547

Centre closed 40

Became sterilized 53

Separated from husband 6

Died 7

Husband died 6

**BECAME PREGNANT TOO EARLY**

**EXCLUDED AND NOT FOLLOWED FURTHER**

Started supplementation <90 days

before LMP (up to Dec 2008) 171

Started supplementation after LMP

(after Dec 2008) 101