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# Effects of dietary diversity and energy supplementation interventions during pregnancy on birth, child health and development outcomes: a systematic review

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*Submitted to the Coordinating Group of:*

Crime and Justice

Education

Disability

International Development

Nutrition

Social Welfare

Methods

Knowledge Translation and  
Implementation

Other:

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Plans to co-register:

No

Yes  Cochrane  Other

Maybe

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## **Title of the review**

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Effects of dietary diversity and energy supplementation interventions during pregnancy on birth, child health and development outcomes: a systematic review

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## **Background**

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Optimal maternal nutrition is essential for normal fetal growth and safe pregnancy outcomes. Maternal under- and over-nutrition are risk factors for adverse pregnancy outcomes including preterm birth, low birth weight, small-for-gestational-age, stillbirth, neonatal mortality and maternal mortality (Bhutta, 2013; Christian, 2015). Multiple maternal nutrition interventions have been studied in the past and previous reviews have synthesized the evidence related to these interventions (Ota 2015, Stevens 2015). Most of these reviews were published few years ago and recent updates are not available. Also, most of these reviews did not assess the long term developmental outcomes in children. Furthermore, there is lack of data synthesis related to programmatic evaluation of food supplementation programs for mothers. This review aims to update the evidence that exists from trials, as well as collate relevant data from evaluations of existing programmes, for dietary diversity and energy supplementation interventions during pregnancy. As such, we will provide an overall assessment of the effectiveness of dietary diversity and energy supplementation interventions during pregnancy for improving maternal, neonatal and child health outcomes. This evidence will be critical to inform policy and programmatic decision-making in low- and middle-income countries.

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## **Objectives**

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1. What is the effectiveness of dietary diversification strategies during pregnancy on birth, child health and development outcomes?
2. What is the effectiveness of balanced energy protein supplementation during pregnancy on birth, child health and development outcomes?
3. What is the effectiveness of food distribution programmes during pregnancy on birth, child health and development outcomes?

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## Existing reviews

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Ota E, Hori H, Mori R, Tobe-Gai R, Farrar D. Antenatal dietary education and supplementation to increase energy and protein intake. *Cochrane Database Syst Rev* 2015, Issue 6. Art. No: CD000032. doi:10.1002/14651858.CD000032.pub3.

Imdad A, Bhutta ZA. Maternal nutrition and birth outcomes: effect of balanced protein-energy supplementation. *Paediatr Perinat Epidemiol* 2012;26(1):178-90. doi:10.1111/j.1365-3016.2012.01308.x.

Stevens B, Buettner P, Watt K, Clough A, Brimblecombe J, Judd J. The effect of balanced protein energy supplementation in undernourished pregnant women and child physical growth in low- and middle-income countries: a systematic review and meta-analysis. *Matern Child Nutr* 2015;11:415-32. doi:10.1111/mcn.12183.

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## Intervention

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The following interventions targeting pregnant women will be included:

- Dietary diversification strategies
  - Balanced energy protein supplementation
  - Food distribution programmes
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## Population

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The target population is pregnant women, regardless of health status, living in low- and middle-income countries as defined by the World Bank.

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## Outcomes

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### Maternal outcomes

#### Primary outcome

Mortality:

- Maternal death (death while pregnant or within 42 days of pregnancy termination)

#### Secondary outcomes

Morbidity:

- Pre-eclampsia
- Gestational hypertension
- Antepartum haemorrhage
- Postpartum haemorrhage
- Premature rupture of membranes
- Placental abruption
- Infections during pregnancy
- Clinical malaria
- Bone mineral density

- Incidence of fracture
- Hypothyroidism
- Thyroid size
- Night blindness

**Biochemical status:**

- Anaemia
  - Haemoglobin concentration
- Iron deficiency anaemia
- Thyroglobulin concentration

Fetal outcomes

Primary outcome

**Mortality:**

- Miscarriage (loss of pregnancy before 28 weeks gestation)
- Stillbirth (death at or beyond 28 weeks gestation)
- Perinatal mortality (stillbirths and deaths  $\leq 7$  days)

Secondary outcomes

**Morbidity:**

- Congenital anomalies

Newborn outcomes

Primary outcome

**Mortality:**

- Neonatal mortality (deaths between 0 and 28 days)

Secondary outcomes

**Morbidity:**

- Low birth weight (<2500 g)
- Preterm birth (<37 weeks gestation)
- Small-for-gestational age (defined by study authors)
- Macrosomia (birthweight >4000 g)

**Anthropometry:**

- Birth weight (g)
- Birth length (cm)
- Head circumference (cm)

Child outcomes

Primary outcome

**Mortality:**

- Infant mortality (deaths between 0 and 12 months)
- Under-five mortality (deaths between 0 and 59 months)

## Secondary outcomes

### Morbidity:

- Stunting (-2 z-score or lower)
- Wasting (-2 z-score or lower)
- Underweight (-2 z-score or lower)
- Bone mineral density
- Fracture
- Rickets
- Hypothyroidism or elevated thyroid stimulating hormone (TSH)
- Development outcomes (as defined by study authors)
- Infection
- Respiratory disease
- Allergic disease

### Anaemia

- Haemoglobin concentration
- Iron deficiency anaemia

### Developmental Outcomes:

- Neurodevelopmental outcomes measured by scales such as Bayley Scales of Infant Development and McCarthy Scales of Children's Ability (MSCA)

## Other outcomes

- Mode of delivery (vaginal, instrumental vaginal, caesarean)
- Adverse outcomes: any reported throughout intervention period (e.g. urinary tract infections, kidney stones, hyperthyroidism, allergic reactions, etc.)

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## **Study designs**

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We will include primary studies, including large-scale programme evaluations that assess the efficacy and/or effectiveness of interventions using experimental and quasi-experimental study designs that allow for causal inference:

1. Studies where participants were randomly assigned, individually or in clusters, to intervention and comparison groups.
2. Studies where non-random assignment to intervention and comparison groups is based on other known allocation rules, including a threshold on a continuous variable (regression discontinuity designs) or exogenous geographical variation in the treatment allocation (natural experiments).
3. Controlled before-after studies in which allocation to intervention and control groups was not made by study investigators, and outcomes were measured in both intervention and control groups at baseline, and appropriate methods were used to control for selection bias and confounding, such as statistical matching (e.g., propensity score matching, or covariate matching) or regression adjustment (e.g., difference-in-differences, instrumental variables).

4. Interrupted time series studies in which outcomes were measured in the intervention group at least three time points before the intervention was implemented and at least three time points after.

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## References

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Bhutta, Z. A., Das, J. K., Rizvi, A., Gaffey, M. F., Walker, N., Horton, S., . . . Maternal and Child Nutrition Study Group. (2013). Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? *Lancet*, 382(9890):452-477. doi:10.1016/S0140-6736(13)60996-4.

Christian, P., Mullany, L. C., Hurley, K. M., Katz, J., & Black, R. E. (2015). Nutrition and maternal, neonatal, and child health. *Seminars in Perinatology*, 39(5):361-372. doi:10.1053/j.semperi.2015.06.009.

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## Review authors

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**Lead review author:** The lead author is the person who develops and co-ordinates the review team, discusses and assigns roles for individual members of the review team, liaises with the editorial base and takes responsibility for the on-going updates of the review.

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### **Roles and responsibilities**

Zulfiqar Bhutta has content expertise. Aamer Imdad and Rehana Salam have methodological, statistical, and information retrieval expertise. All additional team members (to be determined) will receive training in systematic review methods.

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### **Potential conflicts of interest**

The authors are not aware of any conflicts of interest arising from financial or researcher interests.

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### **Preliminary timeframe**

- Date you plan to submit a draft protocol: 15 February 2018
- Date you plan to submit a draft review: 30 June 2018