

EDITOR'S NOTE

In this issue of Abstract Digest, we present to you a collection of articles on various outcomes, determinants and interventions related to maternal and child nutrition, from around the world and India, in particular. Additionally, we bring to you two salient reports, which have been released recently. UNICEF's [Children, Food and Nutrition: Growing well in a changing world](#) highlights the state of the world's children in 2019. India's [Comprehensive National Nutrition Survey](#) provides significant information on malnutrition, anemia and micronutrient deficiencies among children and adolescents in India. Here are some of the highlights of this issue:

- Using data from nationally-representative health, nutrition and demographic surveys from 12 countries in South Asia, [Harding and colleagues](#) (2019) found that overweight and obesity are transcending the wealth, education, and place of residence and are becoming more prevalent across South Asia in a context where undernutrition still persists. This calls for immediate attention to multi-duty policies and programmes.
- [India State-Level Disease Burden Initiative Malnutrition Collaborators](#) (2019) analysed the disease burden attributable to child and maternal malnutrition, and the trends in the malnutrition indicators from 1990 to 2017 in every state of India. They identified malnutrition to be the leading risk factor for death in children below 5 years of age, accounting for 68.2 percent of the total under-5 deaths.
- Using India's National Family and Health Survey data, [Young and colleagues](#) (2019) applied multiple regression and decomposition analysis to assess the determinants of underweight and overweight/obesity and found that factors including improvements in socioeconomic conditions, diet diversity, and urban residence were positively associated with declines in undernutrition as well as increase in overweight among adolescents and women.
- Using the Lives Saved Tool (LiST), [Alderman and colleagues](#) (2019) modelled the impact of scaling up health programs in India between 2006 and 2016 and compared estimates to observed changes and found that at the national level for India, the reductions in stunting and child mortality that LiST predicts, based on changes in coverage of services between 2006 and 2016, are similar to the actual outcomes as observed in 2016.
- In a systematic review and meta-analysis, [Prado and colleagues](#) (2019) assessed whether effects of early life nutrition interventions on linear growth are associated with effects on neurobehavioural developmental scores and found that the determinants of linear growth and neurodevelopment are only partly shared, concluding that interventions should specifically target determinants of neurodevelopment and not simply linear growth.
- In its first ever use of Women's Empowerment in Agriculture Index (WEAI) in association with explicit measurement of medical biomarkers for women's iron deficiency status, [Gupta and colleagues](#) (2019) found that in the state of Maharashtra, women's iron status improved with higher empowerment levels in agriculture, concluding that non-dietary pathways can potentially address micronutrient outcomes for women.
- Using data from India's latest round of National Family Health Survey (2015–16), [Paul and colleagues](#) (2019) conducted regression analysis and found that being married before 18 years of age was significantly associated with increased likelihood of stunting, underweight, and anemia among children.

- Using 2015–16 National Family Health Survey data, [Dhami and colleagues](#) (2019) investigated the regional prevalence and factors associated with complementary feeding practices in India and found wide differences in regional prevalence and factors associated with complementary feeding practices.
- In a systematic review of complementary feeding interventions in low-and-middle-income countries (LMICs) [Girard and colleagues](#) (2019) noted that behaviour change interventions use a limited set of techniques and depend heavily on education-focused techniques. They called for implementation research to identify, develop, and optimize behaviour change techniques for improving complementary feeding.
- [Lo and colleagues](#) (2019) used Demographic and Health Survey data from 77 countries to assess trends and equity across countries and found high variability in coverage within countries as compared to between countries and coverage was high among wealthier populations.
- In a systematic review of 180 studies, describing 39 trials involving 46 intervention arms, [Hennessy and colleagues](#) (2019) synthesized evidence for the effectiveness of obesity prevention interventions delivered by health professionals during the first 1000 days period and found that four interventions were effective on a primary (adiposity/weight) and secondary (behavioural) outcome measure.
- Using data from the National Sample Survey Office's surveys on healthcare, [Ghosh and Husain](#) (2019) critically evaluated the impact of India's National Health Mission on improving utilisation of maternal healthcare services in the state of Bihar, which had very poor maternal and child health outcomes at the start of the mission.
- [Murthy and colleagues](#) (2019) conducted a pseudo-randomized controlled trial among pregnant women from urban slums and low-income areas in Mumbai, India, to determine the impact of an mHealth voice message service (mMitra) on infant care knowledge, and practices among low-income women and concluded that tailored mobile voice messages can significantly improve infant care practices and maternal knowledge that can in turn positively impact infant child health.
- [Sadruddin and colleagues](#) (2019) conducted a global systematic review focusing on the way grandparents influence child health and development outcomes. They presented a conceptual framework to theorize pathways of care and emphasized the need for data particularly on caregiver contact, behavior, and support.
- Through a matched cohort study, [Reese and colleagues](#) (2019) assessed the effectiveness of a community-level combined household piped water and sanitation intervention in rural Odisha, in eastern India, at least 5 years after the completion of intervention, and found that the intervention was associated with a reduction in soil-transmitted helminth infection and improvements in height-for-age.
- In a non-randomised, controlled study with baseline and endline cross-sectional surveys, [Gope and colleagues](#) (2019) evaluated the effects of two community strategies to reduce undernutrition among children under three years in rural eastern India, and found reductions in prevalence of stunting, underweight, and wasting among children below three years in areas with crèches, Participatory Learning and Action meetings with women's groups, and home visits.
- Using cross-sectional data on women from five states in India, [Raghunathan and colleagues](#) (2019) found that participation in self-help group increases women's access to information and their participation in some agricultural decisions, but has limited impact on agricultural practices or outcomes.
- Based on the experience of adapting and using the Women's Empowerment in Agriculture Index (WEAI) to Indian context, [Gupta and colleagues](#) (2019) provided an example of how WEAI can be adapted to a context, generate empirical evidence on the level of women's empowerment across four locations in the country and test for intra-country variations, and

identify aspects of empowerment that are picked up to different degrees by WEAI_India and WEAI.

- A [National Consultative Group](#) (2019) constituted by the Nutrition Chapter of the Indian Academy of Pediatrics (IAP), consisting of various stakeholders, reviewed the literature and existing guidelines and policy regulations, and formulated recommendations for limiting consumption of these foods and beverages in Indian children and adolescents.

Enjoy reading!

PEER-REVIEWED

Trends and Correlates of Overweight among Pre-School Age Children, Adolescent Girls, and Adult Women in South Asia: An Analysis of Data from Twelve National Surveys in Six Countries over Twenty Years

Harding, K.L., V.M. Aguayo, and P. Webb. 2019. "Trends and Correlates of Overweight among Pre-School Age Children, Adolescent Girls, and Adult Women in South Asia: An Analysis of Data from Twelve National Surveys in Six Countries over Twenty Years". *Nutrients* 11(8): 10.3390/nu11081899. <https://doi.org/10.3390/nu11081899>

Overweight has become a global pandemic and is associated with a rise in diet-related non-communicable diseases and associated co-morbidities. Most of the world's undernourished people live in South Asia, yet the number of overweight and obese individuals in this region is growing. This study explores trends and correlates of overweight among pre-school age children, adolescent girls, and adult women in South Asia. Using pooled data from 12 national surveys in six countries, generalized linear mixed models were run to analyze relationships. Overweight children had significantly higher odds than non-overweight children of having an overweight mother (Adjusted Odds Ratio: 1.34, $p < 0.01$). Overweight adolescent girls were more likely to come from a wealthier household (Adjusted Prevalence Ratio (APR): 2.46, $p < 0.01$) in an urban area (1.74, $p < 0.01$), and have formal education (1.22, $p < 0.01$), compared to non-overweight girls. Similar relationships were seen among overweight vs. non-overweight adult women. In Bangladesh, India, and Nepal, overweight among girls and women increased over time, while differentials associated with household wealth, urban residence, and formal education attenuated over time. Overweight and obesity are becoming more prevalent across South Asia in a context of persisting undernutrition. Once a condition of the wealthier, more educated and urban, rates of overweight are increasing among poorer, less educated, and rural women. This requires immediate attention to 'multi-use' policies and programmes.

The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017

India State-Level Disease Burden Initiative Malnutrition Collaborators. 2019. "The burden of child and maternal malnutrition and trends in its indicators in the states of India: the Global Burden of Disease Study 1990–2017". *The Lancet Child & Adolescent Health*. [https://doi.org/10.1016/S2352-4642\(19\)30273-1](https://doi.org/10.1016/S2352-4642(19)30273-1).

Background: Malnutrition is a major contributor to disease burden in India. To inform subnational action, we aimed to assess the disease burden due to malnutrition and the trends in its indicators in every state of India in relation to Indian and global nutrition targets. **Methods:** We analysed the disease burden attributable to child and maternal malnutrition, and the trends in the malnutrition indicators from 1990 to 2017 in every state of India using all accessible data from multiple sources,

as part of Global Burden of Diseases, Injuries, and Risk Factors Study (GBD) 2017. The states were categorised into three groups using their Socio-demographic Index (SDI) calculated by GBD on the basis of per capita income, mean education, and fertility rate in women younger than 25 years. We projected the prevalence of malnutrition indicators for the states of India up to 2030 on the basis of the 1990–2017 trends for comparison with India National Nutrition Mission (NNM) 2022 and WHO and UNICEF 2030 targets. **Findings:** Malnutrition was the predominant risk factor for death in children younger than 5 years of age in every state of India in 2017, accounting for 68.2% (95% UI 65.8–70.7) of the total under-5 deaths, and the leading risk factor for health loss for all ages, responsible for 17.3% (16.3–18.2) of the total disability-adjusted life years (DALYs). The malnutrition DALY rate was much higher in the low SDI than in the middle SDI and high SDI state groups. This rate varied 6.8 times between the states in 2017, and was highest in the states of Uttar Pradesh, Bihar, Assam, and Rajasthan. The prevalence of low birthweight in India in 2017 was 21.4% (20.8–21.9), child stunting 39.3% (38.7–40.1), child wasting 15.7% (15.6–15.9), child underweight 32.7% (32.3–33.1), anaemia in children 59.7% (56.2–63.8), anaemia in women 15–49 years of age 54.4% (53.7–55.2), exclusive breastfeeding 53.3% (51.5–54.9), and child overweight 11.5% (8.5–14.9). If the trends estimated up to 2017 for the indicators in the NNM 2022 continue in India, there would be 8.9% excess prevalence for low birthweight, 9.6% for stunting, 4.8% for underweight, 11.7% for anaemia in children, and 13.8% for anaemia in women relative to the 2022 targets. For the additional indicators in the WHO and UNICEF 2030 targets, the trends up to 2017 would lead to 10.4% excess prevalence for wasting, 14.5% excess prevalence for overweight, and 10.7% less exclusive breastfeeding in 2030. The prevalence of malnutrition indicators, their rates of improvement, and the gaps between projected prevalence and targets vary substantially between the states. **Interpretation:** Malnutrition continues to be the leading risk factor for disease burden in India. It is encouraging that India has set ambitious targets to reduce malnutrition through NNM. The trends up to 2017 indicate that substantially higher rates of improvement will be needed for all malnutrition indicators in most states to achieve the Indian 2022 and the global 2030 targets. The state-specific findings in this report indicate the effort needed in each state, which will be useful in tracking and motivating further progress. Similar subnational analyses might be useful for other low-income and middle-income countries.

A Doubled Edged Sword? Improvements in Economic Conditions Over a Decade in India Led to Declines in Undernutrition as Well as Increases in Overweight Among Adolescents and Women

Young, M. F., P. H. Nguyen, L. M. Tran, R. Avula, and P. Menon. 2019. "A Doubled Edged Sword? Improvements in Economic Conditions Over a Decade in India Led to Declines in Undernutrition as Well as Increases in Overweight Among Adolescents and Women". *The Journal of Nutrition* nxz251. <https://doi.org/10.1093/jn/nxz251>

Background: India is facing a dual burden of undernutrition and overweight/obesity, and there are gaps in our understanding of the driving factors over time. **Objective:** This study examined the national and state trends for BMI and identified the determinants of underweight and overweight/obesity among adolescent girls and women. **Methods:** We used India's National Family Health Surveys data collected in 2005–2006 (n = 110,887) and 2015–16 (n=645,193). We applied multiple regression and decomposition analysis to assess determinants of underweight (BMI z score < -1SD; <18.5 kg/m²) and overweight/obesity (BMI z score >1SD; ≥25 kg/m²). **Results:** Over the past decade, the prevalence of underweight decreased (43% to 38% and 33% to 19%) and the prevalence of overweight/obesity increased (3% to 5% and 15% to 24%), among adolescents and women, respectively, with high heterogeneity across states. Factors associated with a lower prevalence of underweight among women included higher socioeconomic status (SES) (OR: 0.35; 95% CI: 0.31, 0.41), urban residence (OR: 0.49; 95% CI: 0.45, 0.54), improved diet diversity (OR: 0.75; 95% CI: 0.69, 0.82), and latrine use (OR: 0.76; 95% CI: 0.70, 0.82). Higher education levels, decision-

making, and ownership of money were also associated with a lower prevalence of underweight. Factors positively associated with overweight/obesity among women included SES (OR: 3.24; 95% CI: 2.81, 3.73), urban residence (OR: 2.23; 95% CI: 2.05, 2.42), diet diversity (OR: 1.21; 95% CI: 1.10, 1.32), latrine use (OR: 1.31; 95% CI: 1.21, 1.43), and education (OR: 1.39; 95% CI: 1.24, 1.55). Adolescents shared similar determinants to women. Overall, SES was a key driver of changes in women's BMI, explaining 29% of the reduction in undernutrition and 46% of the increase in overweight/obesity. **Conclusions:** Despite overall declines, regional and age disparities remain in the overall burden of underweight and the increases in overweight/obesity are concerning. The identified divergent risk factors (SES, residence, diet, education) highlight that simply improving economic status will not ensure healthy BMI status for women and girls. Balanced multidisciplinary approaches are needed to address both undernutrition and overweight.

Progress in reducing child mortality and stunting in India: an application of the Lives Saved Tool

Alderman, H., P. H. Nguyen, and P. Menon. 2019. "Progress in reducing child mortality and stunting in India: an application of the Lives Saved Tool". *Health Policy and Planning* czz088. <https://doi.org/10.1093/heapol/czz088>

The Lives Saved Tool (LiST) has been used to estimate the impact of scaling up intervention coverage on undernutrition and mortality. Evidence for the model is largely based on efficacy trials, raising concerns of applicability to large-scale contexts. We modelled the impact of scaling up health programs in India between 2006 and 2016 and compared estimates to observed changes. Demographics, intervention coverage and nutritional status were obtained from National Family and Health Survey 2005–6 (NFHS-3) for the base year and NHFS-4 2015–16 for the endline. We used the LiST to estimate the impact of changes in coverage of interventions over this decade on child mortality and undernutrition at national and subnational levels and calculated the gap between estimated and observed changes in 2016. At the national level, the LiST estimates are close to the actual values of mortality for children <1 year and <5 years in 2016 (at 41 vs 42.6 and 50 vs 56.4, respectively, per 1000 live births). National estimates for stunting, wasting and anaemia are also close to the actual values of NFHS-4. At the state level, actual changes were higher than the changes from the LiST projections for both mortality and stunting. The predicted changes using the LiST ranged from 33% to 92% of the actual change. The LiST provided national projections close to, albeit slightly below, actual performance over a decade. Reasons for poorer performance of state-specific projections are unknown; further refinements to the LiST for subnational use would improve the usefulness of the tool.

Do effects of early life interventions on linear growth correspond to effects on neurobehavioural development? A systematic review and meta-analysis

Prado, E.L., L.M. Larson, K. Cox, K. Bettencourt, J.N. Kubes, and A.H. Shankar. 2019. "Do effects of early life interventions on linear growth correspond to effects on neurobehavioural development? A systematic review and meta-analysis" *The Lancet Global Health* 7(10): e1398-e1413. [https://doi.org/10.1016/S2214-109X\(19\)30361-4](https://doi.org/10.1016/S2214-109X(19)30361-4)

Background: Faltering in linear growth and neurobehavioural development during early childhood are often assumed to have common causes because of their consistent association. This notion has contributed to a global focus on the promotion of nutrition during pregnancy and childhood to improve both conditions. Our aim was to assess whether effects of interventions on linear growth are associated with effects on developmental scores and to quantify these associations. **Methods:** In this systematic review and meta-analysis, we included randomised trials done during pregnancy and in children aged 0–5 years that reported effects of any intervention on length-for-age or height-for-

age Z scores (LAZ or HAZ) and on any of the following outcomes: motor, cognitive or mental, language, and social-emotional or behavioural development. We searched MEDLINE (Ovid), CINAHL (EBSCO), and PsycINFO (EBSCO) from database inception to June 25, 2019. Study-level data were extracted and, when required, authors were contacted for missing information. We calculated weighted meta-regression coefficients of the association between standardised effect sizes of interventions on LAZ or HAZ and developmental outcome scores and calculated pooled effect sizes for different types of intervention. **Findings:** Of the 7207 studies identified, we included 75 studies with 122 comparisons between intervention and control groups and outcomes reported for 72 275 children. Across all interventions, effect sizes on LAZ or HAZ were significantly associated with effect sizes on social-emotional scores (β 0.23, 95% CI 0.05 to 0.41; $p=0.02$), but not on cognitive (0.18, –0.36 to 0.72; $p=0.51$), language (0.12, –0.07 to 0.31; $p=0.21$), or motor development scores (0.23, –0.05 to 0.50; $p=0.11$). In studies that provided nutritional supplements, we observed positive significant pooled effect sizes on all five outcomes of LAZ or HAZ (effect size 0.05, 95% CI 0.01–0.09; $p=0.01$; $n=50$), cognitive or mental (0.06, 0.03–0.10; $p<0.01$; $n=38$), language (0.08, 0.03–0.13; $p=0.01$; $n=21$), motor (0.08, 0.04–0.12; $p<0.01$; $n=41$), and social-emotional (0.07, 0.02–0.12; $p=0.01$; $n=20$) scores. The effect sizes of nutritional supplementation on LAZ or HAZ scores were significantly associated with effect sizes on cognitive (β 0.40, 95% CI 0.04–0.77; $p=0.049$) and motor (0.43, 0.11–0.75; $p=0.01$) scores. In the 14 interventions promoting responsive care and learning opportunities, the pooled effect size on LAZ or HAZ score was not significant (–0.01, 95% CI –0.07 to 0.05; $p=0.74$), but pooled effect sizes on cognitive, language, and motor scores were 4 to 5 times larger (range 0.38–0.48) than the pooled effect sizes of nutritional supplementation (0.05–0.08). **Interpretation:** In nutritional supplementation interventions, improvements in linear growth were associated with small improvements in child development, whereas nurturing and stimulation interventions had significant effects on child development but no effects on linear growth. The determinants of linear growth and neurodevelopment are only partly shared. To nurture thriving individuals and communities, interventions should specifically target determinants of neurodevelopment and not simply linear growth.

Women's empowerment and nutrition status: The case of iron deficiency in India

Gupta, S., P. Pingali, and P. Pinststrup-Andersenc. 2019. "Women's empowerment and nutrition status: The case of iron deficiency in India". *Food Policy*.

<https://doi.org/10.1016/j.foodpol.2019.101763>

In this paper we study the relationship between women's empowerment in agriculture and their iron deficiency status in Maharashtra, India. This is the first time the Women's Empowerment in Agriculture Index (WEAI) has been used in association with explicit measurement of medical biomarkers for women's iron deficiency status. Using primary data for 960 women we find that the log odds of a poor iron status in women decline as women's empowerment levels in agriculture improve. Further, this decline is seen in the presence of multiple dietary diversity measures (dietary diversity score, share of rice and wheat in the diet, total iron intake and iron intake from iron-rich food groups – all for 24-h and 30-day recalls) suggesting that in addition to dietary pathways women's empowerment can play a role in addressing micronutrient deficiencies like those of iron in a vulnerable sub-group of the population. It also reinforces the need to move away from the 'staple grain fundamentalism' that has characterized agricultural policy in India, towards more nutrition-sensitive food systems.

Impact of child marriage on nutritional status and anaemia of children under 5 years of age: empirical evidence from India

Paul, P., P. Chouhan, and A. Zaveri. 2019. "Impact of child marriage on nutritional status and anaemia of children under 5 years of age: empirical evidence from India". *Public Health*: 95-101. <https://doi.org/10.1016/j.puhe.2019.08.008>

Objective: Despite several international commitments and national policies to eliminate the practice of girl child marriage, it remains pervasive in India. In this study, we aimed to examine the association between child marriage and nutritional status and anaemia in children aged below 5 years. **Study design and methods:** We have used the data from the latest round of the Indian National Family Health Survey (NFHS), conducted in 2015–2016. For this study, the sample was limited to 80,539 living children aged below 5 years born to 60,003 ever-married women aged 15–24 years. We have considered children's stunting, wasting, underweight and anaemia as outcomes variables and child marriage (married below 18 years) as the exposure of variables of interest. Pearson's Chi-squared test and binary logistic regressions were applied to assess the associations. **Results:** About 58% of sample women were married before 18 years of age. The prevalence of children's stunting, wasting and underweight were 37%, 23% and 36%, respectively. More than half of the sample children (62%) were anaemic. Regression analysis revealed that child marriage (<18 years) was significantly associated with increased likelihood of stunting (adjusted odds ratio [AOR] = 1.06, 95% confidence interval [CI] = 1.02–1.10) and underweight (AOR = 1.04, 95% CI = 1.00–1.08) even after controlling for relevant confounding variables. Child marriage had no significant association with children being wasted and anaemic in crude analyses. However, it is found that child marriage significantly increases the risk of childhood anaemia in adjusted analyses (AOR = 1.08, 95% CI = 1.03–1.13). **Conclusions:** The findings of our study suggest that there is a need for effective policies and programmes to end the practice of child marriage and targeted intervention should be made to improve nutritional outcomes of children born to women married in childhood.

Prevalence and factors associated with complementary feeding practices among children aged 6–23 months in India: a regional analysis

Dhami, M.V., F.A. Ogbo, U.L. Osuagwu, and K.E. Agho. 2019. "Prevalence and factors associated with complementary feeding practices among children aged 6–23 months in India: a regional analysis". *BMC Public Health* 19: 1034. <https://doi.org/10.1186/s12889-019-7360-6>

Background: Inappropriate complementary feeding practices significantly contribute to undernutrition among children under 2 years of age in India. However, there is limited up-to-date evidence on the prevalence and factors associated with complementary feeding practices to guide policy actions at the subnational level in India. We investigated the regional prevalence and factors associated with complementary feeding practices in India. **Methods:** This study used a sample of 69,464 maternal responses from the 2015–16 National Family Health Survey in India. The prevalence of complementary feeding indicators was estimated using data for each administrative region, namely: North (n=8469), South (n=12,828), East (n=18,141), West (n=8940), North-East (n=2422) and Central (n=18,664). Factors associated with complementary feeding by region in India were investigated using logistic regression Generalized Linear Latent and Mixed Models (GLLAMM) with a logit link and binomial family that adjusted for clustering and sampling weights. **Results:** The study showed a wide variation in the prevalence of introduction of solid, semi-solid or soft foods (complementary foods) among infants aged 6–8 months in regional India; highest in the South (61%) and lowest in the Central and Northern regions (38%). Similarly, minimum dietary diversity (MDD) was highest in the South (33%) and lowest in the Central region (12%). Both minimum meal frequency (MMF) and minimum acceptable diet (MAD) varied substantially across the regions. The factors associated with complementary feeding practices also differed across Indian regions. Significant modifiable factors associated with complementary feeding practices included higher

household wealth index for the introduction of complementary foods in the North and Eastern India; higher maternal education for MMF and MDD in the North and Central regions; and frequent antenatal care visits (≥ 4 visits) for all indicators but for different regions. **Conclusion:** Our study indicates that there are wide differences in regional prevalence and factors associated with complementary feeding practices in India. The improvement of complementary feeding practices in India would require national and sub-national efforts that target vulnerable mothers, including those with no education and limited health service contacts.

A scoping review of social-behaviour change techniques applied in complementary feeding interventions

Girard, A.W., E. Waugh, S. Sawyer, L. Golding, and U. Ramakrishnan. 2019. "A scoping review of social-behaviour change techniques applied in complementary feeding interventions". *Maternal & Child Nutrition*.

<https://doi.org/10.1111/mcn.12882>

Education and other strategies to promote optimal complementary feeding can significantly improve practices, but little is known about the specific techniques successful interventions use to achieve behaviour change. We reviewed the literature for complementary feeding interventions in low-/middle-income countries (LMIC) published since 2000. We systematically applied a validated taxonomy mapping process to code specific behaviour change techniques (BCTs) used in each intervention; effectiveness ratios for each BCT were estimated. Sixty-four interventions met inclusion criteria, were abstracted, BCTs identified, and coded. Dietary diversity was the most commonly assessed component of complementary feeding, and interpersonal communication, either individually or in groups, was the most commonly used delivery platform. Of the 93 BCTs available for mapping, the 64 interventions included in this review applied a total of 28 BCTs. Interventions used a median of six techniques (max = 13; min = 2). All interventions used "instruction on how to perform the behaviour." Other commonly applied BCTs included "use of a credible source" (n = 46), "demonstration of the behaviour" (n = 35), and "providing information about health consequences" (n = 30). Forty-three interventions reported strategies to shift the physical or social environment. Among BCTs used in >20 interventions, five had effectiveness ratios >0.8: "provision of/enabling social support"; "providing information about health consequences"; "demonstration of the behaviour"; and "adding objects to the environment" namely, food, supplements, or agricultural inputs. The limited reporting of theory-based BCTs in complementary feeding interventions may impede efforts to improve and scale effective programs and reduce the global burden of malnutrition.

State of deworming coverage and equity in low-income and middle-income countries using household health surveys: a spatiotemporal cross-sectional study

Lo, N.C., S. Heft-Neal, J.T. Coulibaly, L. Leonard, E. Bendavid, and D.G. Addiss. 2019. "State of deworming coverage and equity in low-income and middle-income countries using household health surveys: a spatiotemporal cross-sectional study". *Lancet Global Health* 7: e1511–20.

[https://doi.org/10.1016/S2214-109X\(19\)30413-9](https://doi.org/10.1016/S2214-109X(19)30413-9)

Background: Mass deworming against soil-transmitted helminthiasis, which affects 1 billion of the poorest people globally, is one of the largest public health programmes for neglected tropical diseases, and is intended to be equitable. However, the extent to which treatment programmes for deworming achieve equitable coverage across wealth class and sex is unclear and the public health metric of national deworming coverage does not include representation of equity. This study aims to measure both coverage and equity in global, national, and subnational deworming to guide future

programmatic evaluation, investment, and metric design. **Methods:** We used nationally representative, geospatial, household data from Demographic and Health Surveys that measured mother-reported deworming in children of preschool age (12–59 months). Deworming was defined as children having received drugs for intestinal parasites in the previous 6 months before the survey. We estimated deworming coverage disaggregated by geography, wealth quintile, and sex, and computed an equity index. We examined trends in coverage and equity index across countries, within countries, and over time. We used a regression model to compute the household correlates of deworming and ecological correlates of equitable deworming. **Findings:** Our study included 820 883 children living in 50 countries from Africa, the Americas, Asia, and Europe that are endemic for soil-transmitted helminthiasis using 77 Demographic and Health Surveys from December, 2003, to October, 2017. In these countries, the mean deworming coverage in preschool children was estimated at 33·0% (95% CI 32·9–33·1). The subnational coverage ranged from 0·5% to 87·5%, and within-country variation was greater than between-country variation. Of the 31 countries reporting that they reached the WHO goal of more than 75% national coverage, 30 had inequity in deworming, with treatment concentrated in wealthier populations. We did not detect systematic differences in deworming equity by sex. **Interpretation:** Substantial inequities in mass deworming programmes are common as wealthier populations have consistently higher coverage than that of the poor, including in countries reporting to have reached the WHO goal of more than 75% national coverage. These inequities seem to be geographically heterogeneous, modestly improving over time, with no evidence of sex differences in inequity. Future reporting of deworming coverage should consider disaggregation by geography, wealth, and sex with incorporation of an equity index to complement the conventional public health metric of national deworming coverage.

The effectiveness of health professional-delivered interventions during the first 1000 days to prevent overweight/obesity in children: A systematic review

Hennessy, M., C. Heary, R. Laws, L. van Rhoon, E. Toomey, H. Wolstenholme, and M. Byrne. 2019. "The effectiveness of health professional-delivered interventions during the first 1000 days to prevent overweight/obesity in children: A systematic review". *Obesity Reviews*. <https://doi.org/10.1111/obr.12924>

Childhood obesity is a global public health challenge. Early prevention, particularly during the first 1000 days, is advocated. Health professionals have a role to play in obesity prevention efforts, in part due to the multiple routine contacts they have with parents. We synthesized the evidence for the effectiveness of obesity prevention interventions delivered by health professionals during this time period, as reviews to date have not examined effectiveness by intervention provider. We also explored what behaviour change theories and/or techniques were associated with more effective intervention outcomes. Eleven electronic databases and three trial registers were searched from inception to 04 April 2019. A total of 180 studies, describing 39 trials involving 46 intervention arms, were included. While the number of interventions has grown considerably, we found some evidence for the effectiveness of health professional-delivered interventions during the first 1000 days. Only four interventions were effective on a primary (adiposity/weight) and secondary (behavioural) outcome measure. Twenty-two were effective on a behavioural outcome only. Several methodological limitations were noted, impacting on efforts to establish the active ingredients of interventions. Future work should focus on the conduct and reporting of interventions.

Has the National Health Mission Improved Utilisation of Maternal Healthcare Services in Bihar?

Ghosh, S., and Z. Husain. 2019. "Has the National Health Mission Improved Utilisation of Maternal Healthcare Services in Bihar?". *Economic & Political Weekly* 54(31).

<https://www.epw.in/journal/2019/31/special-articles/has-national-health-mission-improved-utilisation.html>

Based on data from the National Sample Survey Office's surveys on healthcare, this study critically evaluates the impact of the National Health Mission on improving utilisation of maternal healthcare services in Bihar, which had very poor maternal and child health outcomes at the start of the mission. In particular, it investigates factors affecting the utilisation of maternal care services and choice of facilities between the pre- and post-NHM periods; assesses the success of the Janani Suraksha Yojana in enhancing institutional delivery, particularly in public facilities; and estimates the out-of-pocket expenditure on maternal care in the pre- and post-NHM periods and identifies factors affecting such expenditure levels.

The Impact of an mHealth Voice Message Service (mMitra) on Infant Care Knowledge, and Practices Among Low-Income Women in India: Findings from a Pseudo-Randomized Controlled Trial

Murthy, N., S. Chandrasekharan, M.P. Prakash, N. N. Kaonga, J. Peter, A. Ganju, and P.N. Mechael. 2019. "Effects of participatory learning and action with women's groups, counselling through home visits and crèches on undernutrition among children under three years in eastern India: a quasi-experimental study". *Maternal and Child Health Journal*.

<https://doi.org/10.1007/s10995-019-02805-5>

Objectives: mHealth interventions for MNCH have been shown to improve uptake of antenatal and neonatal services in low- and middle-income countries (LMICs). However, little systematic analysis is available about their impact on infant health outcomes, such as reducing low birth weight or malnutrition among children under the age of five. The objective of this study is to determine if an age- and stage-based mobile phone voice messaging initiative for women, during pregnancy and up to 1 year after delivery, can reduce low birth weight and child malnutrition and improve women's infant care knowledge and practices. **Methods:** We conducted a pseudo-randomized controlled trial among pregnant women from urban slums and low-income areas in Mumbai, India. Pregnant women, 18 years and older, speaking Hindi or Marathi were enrolled and assigned to receive mMitra messages (intervention group N = 1516) or not (Control group N = 500). Women in the intervention group received mMitra voice messages two times per week throughout their pregnancy and until their infant turned 1 year of age. Infant's birth weight, anthropometric data at 1 year of age, and status of immunization were obtained from Maternal Child Health (MCH) cards to assess impact on primary infant health outcomes. Women's infant health care practices and knowledge were assessed through interviews administered immediately after women enrolled in the study (Time 1), after they delivered their babies (Time 2), and after their babies turned 1 year old (Time 3). 15 infant care practices self-reported by women (Time 3) and knowledge on ten infant care topics (Time 2) were also compared between intervention and control arms. **Results:** We observed a trend for increased odds of a baby being born at or above the ideal birth weight of 2.5 kg in the intervention group compared to controls (odds ratio (OR) 1.334, 95% confidence interval (CI) 0.983–1.839, p = 0.064). The intervention group performed significantly better on two infant care practice indicators: giving the infant supplementary feeding at 6 months of age (OR 1.4, 95% CI 1.08–1.82, p = 0.009) and fully immunizing the infant as prescribed under the Government of India's child immunization program (OR 1.531, 95% CI 1.141–2.055, p = 0.005). Women in the intervention group had increased odds of knowing that the baby should be given solid food by 6 months (OR 1.89, 95% CI 1.371–2.605, p < 0.01), that the baby needs to be given vaccines (OR 1.567, 95% CI 1.047–2.345, p = 0.028), and that the ideal birth weight is > 2.5 kg (OR 2.279, 95% CI 1.617–3.213, p < 0.01). **Conclusions for Practice:** This study provides robust evidence that tailored mobile voice messages can significantly improve infant care practices and maternal knowledge that can positively impact infant child health.

Furthermore, this is the first prospective study of a voice-based mHealth intervention to demonstrate a positive impact on infant birth weight, a health outcome of public health importance in many LMICs.

How do grandparents influence child health and development? A systematic review

Sadrudin, A.F.A., L.A. Ponguta, A.L. Zonderman, K.S. Wiley, A. Grimshaw, and C. Panter-Brick. 2019. "How do grandparents influence child health and development? A systematic review". *Social Science & Medicine* 239. doi: 112476.

<https://doi.org/10.1016/j.socscimed.2019.112476>

Grandparents are often a key source of care provision for their grandchildren, yet they are sidelined in caregiving research and policy decisions. We conducted a global, systematic review of the literature to examine the scope and quality of studies to date (PROSPERO database CRD42019133894). We screened 12,699 abstracts across 7 databases, and identified 206 studies that examined how grandparents influence child health and development. Indicators of grandparent involvement were contact, caregiving behaviors, and financial support. Our review focused on two research questions: how do grandparents influence child health and development outcomes, and what range of child outcomes is reported globally? We examined study design, sample characteristics, key findings, and outcomes pertaining to grandchildren's physical health, socio-emotional and behavioral health, and cognitive and educational development. Our search captured studies featuring grandparent custodial care (n = 35), multigenerational care (n = 154), and both types of care (n = 17). We found substantial heterogeneity in the data provided on co-residence, caregiving roles, resources invested, outcomes, and mechanisms through which "grandparent effects" are manifested. We identified two important issues, related to operationalizing indicators of grandparent involvement and conceptualizing potential mechanisms, leading to gaps in the evidence base. Currently, our understanding of the pathways through which grandparents exert their influence is constrained by limited data on what grandparents actually do and insufficient attention given to interpersonal and structural contexts. We present a conceptual framework to explicitly measure and theorize pathways of care, with a view to inform research design and policy implementation. We underscore the need for more robust data on three indicators of caregiver involvement—contact, behavior, and support—and for careful description of structural and interpersonal contexts in caregiving research.

Assessing longer-term effectiveness of a combined household-level piped water and sanitation intervention on child diarrhoea, acute respiratory infection, soil-transmitted helminth infection and nutritional status: a matched cohort study in rural Odisha, India

Reese, H., P. Routray, B. Torondel, S.S. Sinharoy, S. Mishra, M.C. Freeman, H.H. Chang, and T. Clasen. 2019. "Assessing longer-term effectiveness of a combined household-level piped water and sanitation intervention on child diarrhoea, acute respiratory infection, soil-transmitted helminth infection and nutritional status: a matched cohort study in rural Odisha, India". *International Journal of Epidemiology*. doi: dyz157. <https://doi.org/10.1093/ije/dyz157>

Background: Open defecation is widespread in rural India, and few households have piped water connections. While government and other efforts have increased toilet coverage in India, and evaluations found limited immediate impacts on health, longer-term effects have not been rigorously assessed. **Methods:** We conducted a matched cohort study to assess the longer-term effectiveness of a combined household-level piped water and sanitation intervention implemented by Gram Vikas (an Indian NGO) in rural Odisha, India. Forty-five intervention villages were randomly selected from a list of those where implementation was previously completed at least 5 years before,

and matched to 45 control villages. We conducted surveys and collected stool samples between June 2015 and October 2016 in households with a child <5 years of age (n=2398). Health surveillance included diarrhoea (primary outcome), acute respiratory infection (ARI), soil-transmitted helminth infection, and anthropometry. **Results:** Intervention villages had higher improved toilet coverage (85% vs 18%), and increased toilet use by adults (74% vs 13%) and child faeces disposal (35% vs 6%) compared with control villages. There was no intervention association with diarrhoea [adjusted OR (aOR): 0.94, 95% confidence interval (CI): 0.74–1.20] or ARI. Compared with controls, children in intervention villages had lower helminth infection (aOR: 0.44, 95% CI: 0.18, 1.00) and improved height-for-age z scores (HAZ) ($p=0.17$, 95% CI: 0.03–0.31). **Conclusions:** This combined intervention, where household water connections were contingent on community-wide household toilet construction, was associated with improved HAZ, and reduced soil-transmitted helminth (STH) infection, though not reduced diarrhoea or ARI. Further research should explore the mechanism through which these heterogeneous effects on health may occur.

Effects of participatory learning and action with women's groups, counselling through home visits and crèches on undernutrition among children under three years in eastern India: a quasi-experimental study

Gope, R.K., P. Tripathy, V. Prasad, H. Pradhan, R.K. Sinha, R. Panda, J. Chowdhury, G. Murugan, S. Roy, M. De, S.K. Ghosh, S.S. Roy, and A. Prost. 2019. "Effects of participatory learning and action with women's groups, counselling through home visits and crèches on undernutrition among children under three years in eastern India: a quasi-experimental study". *BMC Public Health* 19. <https://doi.org/10.1186/s12889-019-7274-3>

Background: India faces a high burden of child undernutrition. We evaluated the effects of two community strategies to reduce undernutrition among children under 3 years in rural Jharkhand and Odisha, eastern India: (1) monthly Participatory Learning and Action (PLA) meetings with women's groups followed by home visits; (2) crèches for children aged 6 months to 3 years combined with monthly PLA meetings and home visits. **Methods:** We tested these strategies in a non-randomised, controlled study with baseline and endline cross-sectional surveys. We purposively selected five blocks of Jharkhand and Odisha, and divided each block into three areas. Area 1 served as control. In Area 2, trained local female workers facilitated PLA meetings and offered counselling to mothers of children under three at home. In Area 3, workers facilitated PLA meetings, did home visits, and crèches with food and growth monitoring were opened for children aged 6 months to 3 years. We did a census across all study areas and randomly sampled 4668 children under three and their mothers for interview and anthropometry at baseline and endline. The evaluation's primary outcome was wasting among children under three in areas 2 and 3 compared with area 1, adjusted for baseline differences between areas. Other outcomes included underweight, stunting, preventive and care-seeking practices for children. **Results:** We interviewed 83% (3868/4668) of mothers of children under three sampled at baseline, and 76% (3563/4668) at endline. In area 2 (PLA and home visits), wasting among children under three was reduced by 34% (adjusted Odds Ratio [aOR]: 0.66, 95%: 0.51–0.88) and underweight by 25% (aOR: 0.75, 95% CI: 0.59–0.95), with no change in stunting (aOR: 1.23, 95% CI: 0.96–1.57). In area 3, (PLA, home visits, crèches), wasting was reduced by 27% (aOR: 0.73, 95% CI: 0.55–0.97), underweight by 40% (aOR: 0.60, 95% CI: 0.47–0.75), and stunting by 27% (aOR: 0.73, 95% CI: 0.57–0.93). **Conclusions:** Crèches, PLA meetings and home visits reduced undernutrition among children under three in rural eastern India. These interventions could be scaled up through government plans to strengthen home visits and community mobilisation with Accredited Social Health Activists, and through efforts to promote crèches.

Can women's self-help groups improve access to information, decision-making, and agricultural practices? The Indian case

Raghunathan, K., S. Kannan, and A. R. Quisumbing. 2019. "Can women's self-help groups improve access to information, decision-making, and agricultural practices? The Indian case". *Agricultural Economics*.

<https://doi.org/10.1111/agec.12510>

Effective agricultural extension is key to improving productivity, increasing farmers' access to information, and promoting more diverse sets of crops and improved methods of cultivation. In India, however, the coverage of agricultural extension workers and the relevance of extension advice is poor. We investigate whether a women's self-help group (SHG) platform could be an effective way of improving access to information, women's empowerment in agriculture, agricultural practices, and production diversity. We use cross-sectional data on close to 1,000 women from five states in India and employ nearest-neighbor matching models to match SHG and non-SHG women along a range of observed characteristics. We find that participation in an SHG increases women's access to information and their participation in some agricultural decisions, but has limited impact on agricultural practices or outcomes, possibly due to financial constraints, social norms, and women's domestic responsibilities. SHGs need to go beyond provision of information to changing the dynamics around women's participation in agriculture to effectively translate knowledge into practice.

Adapting the Women's empowerment in agriculture index to specific country context: Insights and critiques from fieldwork in India

Gupta, S., V. Vemireddy, D. Singh, and P. Pingali. 2019. "Adapting the Women's empowerment in agriculture index to specific country context: Insights and critiques from fieldwork in India". *Global Food Security* 23.

<https://doi.org/10.1016/j.gfs.2019.09.002>

The Women's Empowerment in Agriculture Index (WEAI) is a direct, multi-dimensional measure of women's access to resources and decision-making in various domains of agriculture. However, several challenges characterize its use: adaptation of questionnaires to local agricultural contexts, modifications to index construction once underlying activities and adequacy thresholds are modified, and sensitivity analysis. In this paper, we address such challenges based on our experience of adapting and using the WEAI across 3600 households in India. In doing so we contribute to the methodological and technical base underlying the index, expand the WEAI evidence base for South Asia, and highlight the importance of tailoring the index to specific agricultural contexts in order to impact public policies in a meaningful way.

Indian Academy of Pediatrics Guidelines on the Fast and Junk Foods, Sugar Sweetened Beverages, and Energy Drinks

Gupta, P., D. Shah, P. Kumar, N. Bedi, H.G. Mittal, K. Mishra, S. Khalil, K.E. Elizabeth, R. Dalal, R. Harish, U. Kinjawadekar, K. Indumathi, S.S. Gandhi, J.P. Dadhich, N. Mohanty, A. Gaur, A.K. Rawat, S. Basu, R. Singh, R.R. Kumar, B.J. Parekh, S.T. Soans, D. Shastri, H.P.S. Sachdev, Pediatric And Adolescent Nutrition Society (Nutrition Chapter) Of Indian Academy Of Pediatrics, and Participants of The Consensus Meeting. 2019. "Indian Academy of Pediatrics Guidelines on the Fast and Junk Foods, Sugar Sweetened Beverages, and Energy Drinks". *Indian Pediatrics*. doi: S097475591600133.

<https://www.ncbi.nlm.nih.gov/pubmed/31441436>

Justification: In view of easy availability and increasing trend of consumption of fast foods and sugar sweetened beverages (fruit juices and drinks, carbonated drinks, energy drinks) in Indian children, and their association with increasing obesity and related non-communicable diseases, there is a need to develop guidelines related to consumption of foods and drinks that have the potential to increase this problem in children and adolescents. **Objectives:** To review the evidence and formulate consensus statements related to terminology, magnitude of problem and possible ill effects of junk foods, fast foods, sugar-sweetened beverages and carbonated drinks; and to formulate recommendations for limiting consumption of these foods and beverages in Indian children and adolescents. **Process:** A National Consultative group constituted by the Nutrition Chapter of the Indian Academy of Pediatrics (IAP), consisting of various stakeholders in private and public sector, reviewed the literature and existing guidelines and policy regulations. Detailed review of literature was circulated to the members, and the Group met on 11th March 2019 at New Delhi for a day-long deliberation on framing the guidelines. The consensus statements and recommendations formulated by the Group were circulated to the participants and a consensus document was finalized. **Conclusions:** The Group suggests a new acronym 'JUNCS' foods, to cover a wide variety of concepts related to unhealthy foods (Junk foods, Ultra-processed foods, Nutritionally inappropriate foods, Caffeinated/colored/carbonated foods/beverages, and Sugar-sweetened beverages). The Group concludes that consumption of these foods and beverages is associated with higher free sugar and energy intake; and is associated with higher body mass index (and possibly with adverse cardiometabolic consequences) in children and adolescents. Intake of caffeinated drinks may be associated with cardiac and sleep disturbances. The Group recommends avoiding consumption of the JUNCS by all children and adolescents as far as possible and limit their consumption to not more than one serving per week. The Group recommends intake of regional and seasonal whole fruits over fruit juices in children and adolescents, and advises no fruit juices/drinks to infants and young children (age <2 y), whereas for children aged 2-5 y and >5-18 y, their intake should be limited to 125 mL/day and 250 mL/day, respectively. The Group recommends that caffeinated energy drinks should not be consumed by children and adolescents. The Group supports recommendations of ban on sale of JUNCS foods in school canteens and in near vicinity, and suggests efforts to ensure availability and affordability of healthy snacks and foods. The Group supports traffic light coding of food available in school canteens and recommends legal ban of screen/print/digital advertisements of all the JUNCS foods for channels/magazines/websites/social media catering to children and adolescents. The Group further suggests communication, marketing and policy/taxation strategies to promote consumption of healthy foods, and limit availability and consumption of the JUNCS foods.

NON-PEER REVIEWED

The State of the World's Children 2019 (Children, food and nutrition: Growing well in a changing world)

UNICEF (2019). *The State of the World's Children 2019. Children, Food and Nutrition: Growing well in a changing world*. UNICEF, New York.

<https://www.unicef.org/reports/state-of-worlds-children-2019>

This 2019 edition of The State of the World's Children (SOWC) examines the issue of children, food and nutrition, providing a fresh perspective on a rapidly evolving challenge. Despite progress in the past two decades, one third of children under age 5 are malnourished – stunted, wasted or overweight – while two thirds are at risk of malnutrition and hidden hunger because of the poor quality of their diets. At the center of this challenge is a broken food system that fails to provide children with the diets they need to grow healthy. This report also provides new data and analyses of malnutrition in the 21st century and outlines recommendations to put children's rights at the heart of food systems.

Comprehensive National Nutrition Survey, 2016-18 (CNNS Birth to Adolescence)

Ministry of Health and Family Welfare (MoHFW), Government of India, UNICEF and Population Council. 2019. *Comprehensive National Nutrition Survey (CNNS) National Report*. New Delhi. <https://www.nutritionindia.info/>

The Comprehensive National Nutrition Survey (CNNS) is the first ever national nutrition survey covering over 110,000 pre-schoolers, school-age children and adolescents in rural and urban areas across 30 states of India. The CNNS provides national and state level representative estimates from biological samples (blood, urine and stool) for micronutrient deficiencies and non-communicable diseases (NCDs) using best practices in training and field and gold standard laboratory methods.

Essential nutrition actions: mainstreaming nutrition through the life-course

Essential nutrition actions: mainstreaming nutrition through the life-course. Geneva: World Health Organization; 2019. <https://www.who.int/nutrition/publications/essential-nutrition-actions-2019/en/>

This publication's primary purpose is to provide a compilation of actions to address malnutrition in all its forms, in a concise and user-friendly format to help in decision-making processes for integration of nutrition interventions in national health policies, strategies, and plans based on country-specific needs and global priorities.

Rural transformation and the double burden of malnutrition among rural youth in low- and middle-income countries

Kadiyala, S., E. Aurino, C. Cirillo, C. Srinivasan, and G. Zanella. 2019. *Rural transformation and the double burden of malnutrition among rural youth in low- and middle-income countries*. International Fund for Agricultural Development. <https://data.unicef.org/resources/data-collection-analysis-reporting-on-anthropometric-indicators-in-children-under-5/>

Adolescence and early adulthood are periods of major biological, economic and social transitions for rural youth. They provide a critical window of opportunity for addressing chronic nutritional deficits from childhood, for “catch-up” growth, for providing a solid foundation for a healthy productive and reproductive life, and for arresting the intergenerational transmission of malnutrition. In this study we show that rural transformation processes are associated with improvements in rural youth nutrition—malnutrition and underweight—in nearly all regions, although the pace of change varies considerably across countries. Most low- and middle-income countries (LMICs) are faced with the double burden of malnutrition and overweight/obesity, and in some countries this double burden is increasing, with the prevalence of underweight and overweight/obesity rising concurrently. The effect of rural transformation processes on rural youth nutrition is mediated by its effects on the external and personal domains of the “food environment”. Transformation of agri-food systems are bringing about large changes in the diets of rural youth in LMICs, and particularly of the younger age groups, who appear to be witnessing rapid dietary transitions. The Young Lives dataset suggest that certain near-universal changes in patterns of dietary and nutrient intake patterns can be discerned in LMICs, although the pace of change varies. Dietary transitions are also driven by “globalisation influences”—especially dissemination of information through digital/social media and food industry advertising and marketing strategies—even in countries with low/slow rural transformation. Our results show that rural transformation processes can have both positive and negative effects on

rural youth nutrition in LMICs. Despite the globalisation influences of international trade and agri-food systems, dietary changes in individual LMICs are still influenced by national policies and production patterns. Understanding the pathways to impact of rural transformation on rural youth nutrition is crucial for designing “nutrition-sensitive” rural transformation policies.

UPCOMING EVENTS & DEADLINES

21st International Congress on Nutrition & Health

Theme: To enhance the nutritional growth for healthy living

Description: It is one of the leading community based events of its kind bringing together professionals in the field of Nutrition & Health sciences from around the globe representing all branches of the Nutrition & Health sciences—researches, developments, technology, equipment—all converging with the intention to inspire and transform collective knowledge into innovative solutions to help evaluate our planet’s health & sustainability with best nutrition.

When: November 14-15, 2019

Where: Zagreb, Croatia

For more information: <https://health.nutritionalconference.com/registration.php>

Call for Papers: GlobalFood Symposium 2020

Theme: Transformation of Global Agri-Food Systems

Description: The Fourth Global Food Symposium will be held on 24-25 April 2020 in Göttingen. The two-day conference will feature plenary sessions with invited speakers, contributed paper sessions, and posters.

Submission deadline: 15 November 2019

For more information: <http://www.uni-goettingen.de/de/191858.html>

ABOUT POSHAN

Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition in India (POSHAN) is a multi-year initiative that aims to build evidence on effective actions for nutrition and support the use of evidence in decision-making. It is supported by the Bill & Melinda Gates Foundation and led by IFPRI in India.

ABOUT ABSTRACT DIGEST

In each issue, the POSHAN Abstract Digest brings you some of the new and noteworthy studies on maternal and child nutrition. It focuses on India-specific studies and also brings to you other relevant global or regional literature with broader implications for maternal and child nutrition. The Abstract Digest is based on literature searches to identify selected studies that we think are most relevant to nutrition issues in India and to Indian programs and policies. We share with you a collection of abstracts from articles published in peer-reviewed journals, as well as selected non-peer-reviewed articles by researchers in reputed academic and/or research institutions and which demonstrated rigor in their research objectives, methodology, and analysis. The abstracts in this document are reproduced in their original form from their source, and without editorial commentary about specific articles.

CONTACT US

Email us at IFPRI-POSHAN@cgiar.org

IFPRI-NEW DELHI

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

NASC Complex, CG Block, Dev Prakash Shastri Road, Pusa, New Delhi 110012, India

T +91.11.66166565

F +91.11.66781699

<http://poshan.ifpri.info/>

IFPRI-HEADQUARTERS

INTERNATIONAL FOOD POLICY RESEARCH INSTITUTE

2033 K Street, NW, Washington, DC 20006-1002 USA

T. +1.202.862.5600 F. +1.202.467.4439

Skype: IFPRIhomeoffice

ifpri@cgiar.org

www.ifpri.org

This publication has been prepared by POSHAN with research assistance from Pratima Mathews, IFPRI, and has not been peer reviewed. Any opinions stated herein are those of the author(s) and do not necessarily reflect the policies of the International Food Policy Research Institute. Please contact [Dr. Rasmi Avula](mailto:Dr.Rasmi.Avula) for any questions. Copyright © 2019 International Food Policy Research Institute. All rights reserved. For permission to republish, contact ifpri-copyright@cgiar.org.