

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, articles from three special issues including *BMJ Global Health's* [supplement](#) on the measurement of reproductive, maternal, newborn and child health and nutrition, *Maternal & Child Nutrition's* [supplement](#) on the marketing and consumption of commercial foods fed to young children in low and middle-income countries, and the *Annals of the New York Academy of Sciences'* [special issue](#) on the risk of excessive intake of vitamins and minerals are featured in this issue. Here are some of the highlights:

- Using nationally representative repeated cross-sections from all available Demographic and Health Surveys from 72 countries, [Finaret and Masters](#) (2019) explained that even after accounting for random measurement error of birth dates that lead to spurious child heights, season of birth remains a determinant of height-for-age z-scores (HAZ) in many of the poorest countries.
- Using data from India's 2015–16 National Family Health Survey, [Kim and colleagues](#) (2019) examined the relative importance of 23 correlates of anthropometric failures and found strong association with maternal factors including stature, education, and body-mass index, and with household wealth and air quality.
- Linking nationally-representative anthropometric data from India's 2015–2016 Demographic and Health Survey with satellite-based PM_{2.5} exposure (concentration) data, [Spears and colleagues](#) (2019) found that exposure to PM_{2.5} in the last trimester and in the first few months of life are significantly associated with child height deficits.
- In the context of current global scenario of micronutrient (MN) inadequacy and excess, both of which are detrimental to health, [Engle-Stone and colleagues](#) (2019) proposed a framework for comparing risks of micronutrient deficiency and excess.
- In an editorial, [Rasmussen](#) (2019) raised the issue of lack of research on human milk composition and as a consequence lack of study of maternal nutritional status as it relates to composition of milk. In this context, he directed the readers to an important work by Daniels et al. (2019):
 - [Daniels and colleagues](#) (2019) evaluated the adequacy of micronutrient intakes of exclusively breastfed infants by measuring breast milk volume and its micronutrient concentrations and assessed maternal micronutrient intakes and its relationship with breast milk concentrations.
- In a systematic review, [Pries and colleagues](#) (2019) summarized literature on the contribution of snack food and sugar-sweetened beverages consumption to total energy intakes of children below 23 months of age in low- and middle-income countries (LMIC) and found that such foods contributed to a substantial proportion of total energy intake but there is limited evidence on how such foods affect overall dietary adequacy, and growth.

- Using data from 191 Demographic and Health Surveys (DHS) from 65 LMICs, [Bogler and colleagues](#) (2019) concluded that measles vaccination substantially reduces stunting and underweight among children in low- and middle-income countries.
- In a Cochrane Collaboration’s systematic review, [Goudet and colleagues](#) (2019) assessed the impact of nutritional interventions on nutrition outcomes (including stunting, wasting and underweight) and non-nutritional outcomes (socioeconomic, health and developmental) among children below five years living in urban slums in LMICs. The authors found no evidence of effect of the interventions among this population, which otherwise were found to be effective in outside of the slum contexts.
- In a special [supplement](#) on the measurement of reproductive, maternal, newborn and child health and nutrition:
 - Emphasizing on the need to advance the nutrition intervention coverage measurement agenda, [Gillespie and colleagues](#) (2019) identified 24 nutrition interventions that should be tracked by all countries, and determined if their coverage is currently measured by major household nutrition and health surveys and used three case studies to illustrate feasibility of innovations in data collection.
 - [Amouzou and colleagues](#) (2019) raised the issue of the gaps between crude coverage indicators, contact coverage indicators and those that measure effective coverage and proposed a framework for the measurement of effective coverage. In addition, the authors applied the framework in their systematic literature review and provided examples of how the framework can be operationalized for reproductive, maternal, newborn, and child health and nutrition (RMNCH+N).
- In a commentary on dietary guidance for children under 2 years of age, [Pérez-Escamilla and colleagues](#) (2019) argued the importance of responsive feeding in child care and development and highlighted the need for incorporating responsive feeding principles into dietary guidelines for infants and young children.
- Using existing literature, [Walls and colleagues](#) (2019) discussed three key pathways of the impact of trade and investment on nutrition and non-communicable diseases and asserted that trade openness could have contributed to shifts in dietary patterns, and foreign direct investment is most strongly associated with increases in obesity and NCDs.
- Based on data from India’s National Sample Survey Office’s surveys on healthcare, [Ghosh and Husain](#) (2019) evaluated the impact of the National Health Mission on improving utilization of maternal healthcare services in Bihar, which had very poor maternal and child health outcomes at the start of the mission.
- [Menon and colleagues](#) (2019) illustrated the concept of “effective convergence” i.e., the successful reach of nutrition-related programs from relevant sectors to address the key determinants of poor nutrition for the same household, same woman, and same child in the first 1,000 days and comment that convergence can only be deemed successful when all interventions reach all target households in the right timeframes.
- Analysing the role of self-targeting in reforming the Indian food subsidy program, [Kozicka and Vanneman](#) (2019) explained the under-purchase, or low take-up, from the Targeted Public Distribution System (TPDS), which is typically attributed to ‘leakage’, and provided an alternative solution based on self-targeting; while poorer households increase their consumption from the TPDS, wealthier households restrain from consuming subsidized commodities.

Enjoy reading!

PEER-REVIEWED

Correcting for artifactual correlation between misreported month of birth and attained height-for-age reduces but does not eliminate measured vulnerability to season of birth in poorer countries

Finaret, A.B., and W.A. Masters. 2019. "Correcting for artifactual correlation between misreported month of birth and attained height-for-age reduces but does not eliminate measured vulnerability to season of birth in poorer countries". *The American Journal of Clinical Nutrition*. doi: nqz111. <https://doi.org/10.1093/ajcn/nqz111>

Background: Height-for-age z-scores (HAZ) are associated with month of birth (MOB) in many nutrition surveys, but that link could be an artifactual result of measurement error in child birthdates. **Objective:** We corrected estimates of the associations between HAZ and MOB for a common type of age misreporting, to measure the remaining seasonality in HAZ and identify country characteristics associated with vulnerability to seasonal changes in early life. **Design:** We used nationally representative repeated cross-sections from all available Demographic and Health Surveys (DHS), totaling 1,363,806 children from 218 surveys in 72 countries over 1986–2016, to estimate the seasonal patterns in HAZ by MOB within each survey. Then, we corrected these estimates for each survey's random errors in recorded birth month implied by differences in attained height between children reported as born in December of one year versus January of the next. Indicators of seasonal variation between other months were modeled as functions of national-level incomes using linear regression, and visualizations were constructed using nonparametric local polynomial smoothing regressions. **Results:** Over all surveys, misreporting MOB accounted for about one-eighth of the gap in attained height between the worst and best months to be born, which averaged 0.41 HAZ in the raw data and 0.34 HAZ after correction for age misreporting. A linear correction reduced apparent seasonality of HAZ by MOB in 49 of 72 countries, and the remaining nonartifactual differences by season of birth were larger in countries with lower average income per capita. **Conclusions:** Measurement error in child MOB helps to explain the association between attained height and seasonal variation in early life environments, but significant seasonality in HAZ by MOB remains in many poor countries. Higher national income is associated with smoother outcomes across birth months, and birth registration efforts would improve nutrition research.

Assessing associational strength of 23 correlates of child anthropometric failure: An econometric analysis of the 2015-2016 National Family Health Survey, India

Kim, R., S. Rajpal, W. Joe, D.J. Corsi, R. Sankar, A. Kumar, and S.V. Subramanian. 2019. "Assessing associational strength of 23 correlates of child anthropometric failure: An econometric analysis of the 2015-2016 National Family Health Survey, India". *Social Science & Medicine*. <https://doi.org/10.1016/j.socscimed.2019.112374>

Despite the broad consensus that investments in nutrition-sensitive programmes are required to reduce child undernutrition, in practice empirical studies and interventions tend to focus on few nutrition-specific risk factors in isolation. The 2015–16 National Family Health Survey provides the first opportunity in more than a decade to conduct an up-to-date comprehensive evaluation of the relative importance of various maternal and child health and nutrition (MCHN) factors in respect to child anthropometric failures in India. The primary analysis included 140,444 children aged 6–59 months with complete data on 20 MCHN factors, and the secondary analysis included a subset of 25,603 children with additional paternal data. Outcome variables were stunting, underweight and wasting. We conducted logistic regression models to first evaluate each correlate separately in age- and sex-adjusted models, and then jointly in a mutually adjusted model. For all anthropometric failures, indicators of past and present socioeconomic conditions showed the most robust associations. The strongest correlates for stunting were short maternal stature (OR: 4.39; 95%CI:

4.00, 4.81), lack of maternal education (OR: 1.74; 95%CI: 1.60, 1.89), low maternal BMI (OR: 1.64; 95%CI: 1.54, 1.75), poor household wealth (OR: 1.25; 95%CI: 1.15, 1.35) and poor household air quality (OR: 1.22; 95%CI: 1.16, 1.29). Weaker associations were found for other correlates, including dietary diversity, vitamin A supplementation and breastfeeding initiation. Paternal factors were also important predictors of anthropometric failures, but to a lesser degree than maternal factors. The results remained consistent when stratified by children's age (6–23 vs 24–59 months) and sex (girls vs boys), and when low birth weight was additionally considered. Our findings indicate the limitation of nutrition-specific interventions. Breaking multi-generational poverty and improving environmental factors are promising investments to prevent anthropometric failures in early childhood.

The association of early-life exposure to ambient PM_{2.5} and later-childhood height-for-age in India: an observational study

Spears, D., S. Dey, S. Chowdhury, N. Scovronick, S. Vyas, and J. Apte. 2019. "The association of early-life exposure to ambient PM_{2.5} and later-childhood height-for-age in India: an observational study." *Environmental Health* 18(62).

<https://doi.org/10.1186/s12940-019-0501-7>

Background: Children in India are exposed to high levels of ambient fine particulate matter (PM_{2.5}). However, population-level evidence of associations with adverse health outcomes from within the country is limited. The aim of our study is to estimate the association of early-life exposure to ambient PM_{2.5} with child health outcomes (height-for-age) in India. **Methods:** We linked nationally-representative anthropometric data from India's 2015–2016 Demographic and Health Survey (n = 218,152 children under five across 640 districts of India) with satellite-based PM_{2.5} exposure (concentration) data. We then applied fixed effects regression to assess the association between early-life ambient PM_{2.5} and subsequent height-for-age, analyzing whether deviations in air pollution from the seasonal average for a particular place are associated with deviations in child height from the average for that season in that place, controlling for trends over time, temperature, and birth, mother, and household characteristics. We also explored the timing of exposure and potential non-linearities in the concentration-response relationship. **Results:** Children in the sample were exposed to an average of 55 µg/m³ of PM_{2.5} in their birth month. After controlling for potential confounders, a 100 µg/m³ increase in PM_{2.5} in the month of birth was associated with a 0.05 [0.01–0.09] standard deviation reduction in child height. For an average 5 year old girl, this represents a height deficit of 0.24 [0.05–0.43] cm. We also found that exposure to PM_{2.5} in the last trimester in utero and in the first few months of life are significantly (p < 0.05) associated with child height deficits. We did not observe a decreasing marginal risk at high levels of exposure. **Conclusions:** India experiences some of the worst air pollution in the world. To our knowledge, this is the first study to estimate the association of early-life exposure to ambient PM_{2.5} on child height-for-age at the range of ambient pollution exposures observed in India. Because average exposure to ambient PM_{2.5} is high in India, where child height-for-age is a critical challenge in human development, our results highlight ambient air pollution as a public health policy priority.

Special Issue

Special Issue: Risk of Excessive Intake of Vitamins and Minerals

Annals of the New York Academy of Sciences 1446(1): 1–172.

<https://nyaspubs.onlinelibrary.wiley.com/toc/17496632/2019/1446/1>

Weighing the risks of high intakes of selected micronutrients compared with the risks of deficiencies

Engle-Stone, R., S.A. Vosti, H. Luo, J. Kagin, A. Tarini, K.P. Adams, C. French, and K.H. Brown. 2019. "Weighing the risks of high intakes of selected micronutrients compared with the risks of deficiencies". *Annals of the New York Academy of Sciences* 1446: 81-101. doi:10.1111/nyas.14128. <https://doi.org/10.1111/nyas.14128>

Several intervention strategies are available to reduce micronutrient deficiencies, but uncoordinated implementation of multiple interventions may result in excessive intakes. We reviewed relevant data collection instruments and available information on excessive intakes for selected micronutrients and considered possible approaches for weighing competing risks of intake above tolerable upper intake levels (ULs) versus insufficient intakes at the population level. In general, population-based surveys in low- and middle-income countries suggest that dietary intakes greater than the UL are uncommon, but simulations indicate that fortification and supplementation programs could lead to high intakes under certain scenarios. The risk of excessive intakes can be reduced by considering baseline information on dietary intakes and voluntary supplement use and continuously monitoring program coverage. We describe a framework for comparing risks of micronutrient deficiency and excess, recognizing that critical information for judging these risks is often unavailable. We recommend (1) assessing total dietary intakes and nutritional status; (2) incorporating rapid screening tools for routine monitoring and surveillance; (3) addressing critical research needs, including evaluations of the current ULs, improving biomarkers of excess, and developing methods for predicting and comparing risks and benefits; and (4) ensuring that relevant information is used in decision-making processes.

Editorial

At long last: new information on the association between maternal dietary intake, the composition of human milk, and its nutrient adequacy for infants

Rasmussen, K.M. 2019. "At long last: new information on the association between maternal dietary intake, the composition of human milk, and its nutrient adequacy for infants", *The American Journal of Clinical Nutrition*, nqz079. <https://doi.org/10.1093/ajcn/nqz079>

In recent decades, researchers have discovered that human milk contains cytokines, a wide variety of human milk oligosaccharides, as well as bacteria, viruses, immune cells, and even stem cells. However, the nutritional composition of human milk has received much less attention, which was discussed at a recent conference convened by the National Institutes of Health titled "Workshop on Human Milk Composition—Biological, Environmental, Nutritional, and Methodological Considerations." In fact, there have been few new entries to the US Department of Agriculture's National Nutrient Database for Standard Reference on the composition of human milk since 1990, and these studies were limited in size and generalizability. This disappointing situation has resulted from a lack of support for the study of the nutritional composition of human milk. As a corollary, the study of how maternal nutritional status relates to milk composition has also languished. This is unfortunate because of the changes that have occurred in the composition of women's diets and in the proportion of women who are too heavy at conception and who are at risk of dying during pregnancy in recent decades. As a result, we lack the data needed to update the Dietary Reference Intakes for formula-fed infants, which are based on the composition of human milk. Other policies that are based on the Dietary Reference Intakes, such as the 2020 Dietary Guidelines for Americans, which will include infants for the first time, will also lack up-to-date information on this fundamental subject. In this context, the article by Daniels et al. in this issue of the Journal is an important contribution to the literature. The authors report on maternal micronutrient intake as well as the

volume and nutritional composition of human milk consumed by infants in a sample of 113 mother–infant dyads who resided in West Java, Indonesia.

Article

Micronutrient intakes of lactating mothers and their association with breast milk concentrations and micronutrient adequacy of exclusively breastfed Indonesian infants

Daniels, L., R.S. Gibson, A. Diana, J.J. Haszard, S. Rahmanna, D.E. Luftimas, D. Hampel, S. Shahab-Ferdows, M. Reid, L. Melo, Y. Lamers, L.H. Allen, and L.A. Houghton. 2019.

“Micronutrient intakes of lactating mothers and their association with breast milk concentrations and micronutrient adequacy of exclusively breastfed Indonesian infants”, *The American Journal of Clinical Nutrition*, nqz047.

<https://doi.org/10.1093/ajcn/nqz047>

Background: Breast milk is the sole source of nutrition for exclusively breastfed infants in the first 6 mo of life, yet few studies have measured micronutrient concentrations in breast milk in light of maternal diet and subsequent infant micronutrient intakes. **Objectives:** We evaluated the adequacy of micronutrient intakes of exclusively breastfed Indonesian infants by measuring milk volume and micronutrient concentrations and assessed maternal micronutrient intakes and their relationship with milk concentrations. **Methods:** Mother–infant (2–5.3 mo) dyads ($n = 113$) were recruited for this cross-sectional study. Volume of breast-milk intake via the deuterium dose-to-mother technique over 14 d and analyzed micronutrient concentrations were used to calculate micronutrient intakes of exclusively breastfed infants. Maternal 3-d weighed food records were collected to assess median (IQR) micronutrient intakes. Multivariate regression analyses examined the association of usual maternal micronutrient intakes with milk micronutrient concentrations after adjustment for confounding variables. **Results:** Mean \pm SD intake of breast-milk volume was 787 ± 148 mL/d. Median daily infant intakes of iron, zinc, selenium, magnesium, sodium, and B-vitamins (thiamin, riboflavin, niacin, pantothenic acid, B-6, and B-12) were below their respective Adequate Intakes. Inadequacies in maternal intakes (as % < estimated average requirements) were >40% for calcium, niacin, and vitamins A, B-6, and B-12. Significant positive associations existed between maternal usual intakes of vitamin A, niacin and riboflavin and milk retinol, nicotinamide, and free riboflavin concentrations in both unadjusted and adjusted (for infant age, milk volume, and parity) analyses (all $P < 0.05$). **Conclusions:** The majority of micronutrient intakes for these exclusively breastfed infants and their mothers fell below recommendations, with associations between maternal intakes and breast-milk concentrations for 3 nutrients. Data on nutrient requirements of exclusively breastfed infants are limited, and a better understanding of the influence of maternal nutritional status on milk nutrient concentrations and its impact on the breastfed infant is needed.

Special Supplement

Marketing and Consumption of Commercial Foods Fed to Young Children in Low and Middle-income Countries

Maternal & Child Nutrition 15(S4).

<https://onlinelibrary.wiley.com/toc/17408709/2019/15/S4>

Analysis

Snack food and beverage consumption and young child nutrition in low- and middle-income countries: A systematic review

Pries, A.M., S. Filteau, and E.L. Ferguson. 2019. "Snack food and beverage consumption and young child nutrition in low- and middle-income countries: A systematic review". *Maternal & Child Nutrition* 15(S4): e12729.

<https://doi.org/10.1111/mcn.12729>.

Although snacks can provide important nutrients for young children during the complementary feeding period, the increasing availability of snack foods and sugar-sweetened beverages (SSB), often energy-dense and nutrient-poor, in low- and middle-income countries (LMIC) is a concern. Such foods may displace consumption of nutritious foods in contexts where diets are often nutritionally inadequate and the burden of childhood malnutrition is high. This systematic review summarizes literature on the contribution of snack food/SSB consumption to total energy intakes (TEI) of children below 23 months of age in LMIC and associations between this consumption and nutritional outcomes. It also identifies areas where further research is needed. A systematic search of Embase, Global Health, and MEDLINE for literature published in January 1990–July 2018 was conducted. This search yielded 8,299 studies, 13 of which met inclusion criteria: Nine studies assessed % TEI from snack foods/SSB, and four studies assessed associations between snack food/SSB consumption and nutritional outcomes. Average % TEI from snack foods/SSB ranged from 13% to 38%. Findings regarding associations with growth were inconclusive, and no studies assessed associations with nutrient intakes. Variation in measurement of consumption and definitions of snack foods and SSB limited study comparisons. Further research is needed to understand how consumption of energy-dense, nutrient-poor snack foods and SSB influences undernutrition and overnutrition among young children during the complementary feeding period in settings that are experiencing dietary transitions and the double burden of malnutrition.

Estimating the effect of measles vaccination on child growth using 191 DHS from 65 low- and middle-income countries

Bogler, L., N. Jantos, T. Bärnighausen, and S. Vollmera. 2019. "Estimating the effect of measles vaccination on child growth using 191 DHS from 65 low- and middle-income countries". *Vaccine* 37(35): 5073-5088.

<https://doi.org/10.1016/j.vaccine.2019.06.054>

Background: Childhood vaccinations reduce morbidity and mortality and are highly cost-effective. They may also protect children from malnutrition and lead to improved child growth. Stunting, wasting and underweight are targets used to monitor progress towards the achievement of the sustainable development goals (SDGs). **Methods:** We use data from Demographic and Health Surveys (DHS) covering the period from 1990 to 2017 to estimate the effect of measles vaccination at 12 months of age on stunting, wasting, and underweight. For causal estimation, we use household- and mother-fixed effects, which allows us to compare outcomes across siblings while controlling for all observed and unobserved confounders that are shared by the siblings, such as household social characteristics and home location. In addition, we control for a wide range of sibling-varying confounders, including sex, age, birth order and mother's age at birth, as well as vaccination with diphtheria-tetanus-polio (DPT), as a broad indicator of general likelihood to receive vaccinations. **Results:** Our samples include 347,808 individuals in 132 surveys from 59 countries (for stunting), 430,963 individuals in 190 surveys from 65 countries (for wasting), and 353,520 individuals in 130 surveys from 59 countries (for underweight). Measles vaccination is associated with significantly reduced odds of stunting (odds ratio 0.90 [95% CI 0.86–0.94], $p < 0.001$) and underweight (odds ratio 0.90 [95% CI 0.86–0.95], $p < 0.001$). The association with wasting is weaker and not statistically significant (odds ratio 0.95 [95% CI 0.89–1.02], $p = 0.143$). Our results remain

robust across several alternative specifications of our regression models. **Conclusions:** Measles vaccination substantially reduces stunting and underweight among children in low- and middle-income countries. Increasing measles coverage from the current low to near-universal levels would provide a large boost to child growth and the attainment of the SDGs.

Nutritional interventions for preventing stunting in children (birth to 59 months) living in urban slums in low- and middle-income countries (LMIC)

Goudet, S.M., B.A. Bogin, N.J. Madise, and P.L. Griffiths. 2019. "Nutritional interventions for preventing stunting in children (birth to 59 months) living in urban slums in low- and middle-income countries (LMIC)". *Cochrane Database of Systematic Reviews* 2019(6). doi: 10.1002/14651858.CD011695.pub2.

<https://doi.org/10.1002/14651858.CD011695.pub2>

Background: Nutritional interventions to prevent stunting of infants and young children are most often applied in rural areas in low- and middle-income countries (LMIC). Few interventions are focused on urban slums. The literature needs a systematic assessment, as infants and children living in slums are at high risk of stunting. Urban slums are complex environments in terms of biological, social, and political variables and the outcomes of nutritional interventions need to be assessed in relation to these variables. For the purposes of this review, we followed the UN-Habitat 2004 definitions for low-income informal settlements or slums as lacking one or more indicators of basic services or infrastructure. **Objectives:** To assess the impact of nutritional interventions to reduce stunting in infants and children under five years old in urban slums from LMIC and the effect of nutritional interventions on other nutritional (wasting and underweight) and non-nutritional outcomes (socioeconomic, health and developmental) in addition to stunting. **Data collection and analysis:** We screened and then retrieved titles and abstracts as full text if potentially eligible for inclusion. Working independently, one review author screened all titles and abstracts and extracted data on the selected population, intervention, comparison, and outcome parameters and two other authors assessed half each. We calculated mean selection difference (MD) and 95% confidence intervals (CI). We performed intervention-level meta-analyses to estimate pooled measures of effect, or narrative synthesis when meta-analyses were not possible. We used P less than 0.05 to assess statistical significance and intervention outcomes were also considered for their biological/health importance. Where effect sizes were small and statistically insignificant, we concluded there was 'unclear effect'. **Main results:** The systematic review included 15 studies, of which 14 were randomised controlled trials (RCTs). The interventions took place in recognised slums or poor urban or periurban areas. The study locations were mainly Bangladesh, India, and Peru. The participants included 9261 infants and children and 3664 pregnant women. There were no dietary intervention studies. All the studies identified were nutrient supplementation and educational interventions. The interventions included zinc supplementation in pregnant women (three studies), micronutrient or macronutrient supplementation in children (eight studies), nutrition education for pregnant women (two studies), and nutrition systems strengthening targeting children (two studies) intervention. Six interventions were adapted to the urban context and seven targeted household, community, or 'service delivery' via systems strengthening. The primary review outcomes were available from seven studies for LFA/HFA, four for LBW, and nine for length. The studies had overall high risk of bias for 11 studies and only four RCTs had moderate risk of bias. Overall, the evidence was complex to report, with a wide range of outcome measures reported. Consequently, only eight study findings were reported in meta-analyses and seven in a narrative form. The certainty of evidence was very low to moderate overall. None of the studies reported differential impacts of interventions relevant to equity issues. **Zinc supplementation of pregnant women on LBW or length (versus supplementation without zinc or placebo) (three RCTs):** There was no evidence of an effect on LBW (MD -36.13 g, 95% CI -83.61 to 11.35), with moderate-certainty evidence, or no evidence of

an effect or unclear effect on length with low- to moderate-certainty evidence. **Micronutrient or macronutrient supplementation in children (versus no intervention or placebo) (eight RCTs):** There was no evidence of an effect or unclear effect of nutrient supplementation of children on HFA for studies in the meta-analysis with low-certainty evidence (MD -0.02 , 95% CI -0.06 to 0.02), and inconclusive effect on length for studies reported in a narrative form with very low- to moderate-certainty evidence. **Nutrition education for pregnant women (versus standard care or no intervention) (two RCTs):** There was a positive impact on LBW of education interventions in pregnant women, with low-certainty evidence (MD $478.44g$, 95% CI 423.55 to 533.32). **Nutrition systems strengthening interventions targeting children (compared with no intervention, standard care) (one RCT and one controlled before-and-after study):** There were inconclusive results on HFA, with very low- to low-certainty evidence, and a positive influence on length at 18 months, with low-certainty evidence. **Authors' conclusions:** All the nutritional interventions reviewed had the potential to decrease stunting, based on evidence from outside of slum contexts; however, there was no evidence of an effect of the interventions included in this review (very low- to moderate-certainty evidence). Challenges linked to urban slum programming (high mobility, lack of social services, and high loss of follow-up) should be taken into account when nutrition-specific interventions are proposed to address LBW and stunting in such environments. More evidence is needed of the effects of multi-sectorial interventions, combining nutrition-specific and sensitive methods and programmes, as well as the effects of 'up-stream' practices and policies of governmental, non-governmental organisations, and the business sector on nutrition-related outcomes such as stunting.

Special Supplement

Measurement of reproductive, maternal, newborn and child health and nutrition

BMJ Global Health 4(Suppl4).

https://gh.bmj.com/content/4/Suppl_4

Analysis

Measuring the coverage of nutrition interventions along the continuum of care: time to act at scale

Gillespie, S., P. Menon, R. Heidkamp, E. Piwoz, R. Rawat, M. Munos, R. Black, C. Hayashi, K.K. Saha, and J. Requejo. 2019. "Measuring the coverage of nutrition interventions along the continuum of care: time to act at scale". *BMJ Global Health* 4(Suppl4): e001290.

<http://dx.doi.org/10.1136/bmjgh-2018-001290>

The global community is committed to addressing malnutrition. And yet, coverage data for high-impact interventions along the continuum of care remain scarce due to several measurement and data collection challenges. In this analysis paper, we identify 24 nutrition interventions that should be tracked by all countries, and determine if their coverage is currently measured by major household nutrition and health surveys. We then present three case studies, using published literature and empirical data from large-scale initiatives, to illustrate the kind of data collection innovations that are feasible. We find that data are not routinely collected in a standardised way across countries for most of the core set of interventions. Case studies—of growth monitoring and screening for acute malnutrition, infant and young child feeding counselling, and nutrition monitoring in India—highlight both challenges and potential solutions. Advancing the nutrition intervention coverage measurement agenda is essential for sustained progress in driving down rates of malnutrition. It will require (1) global consensus on a core set of validated coverage indicators on proven, high-impact nutrition-specific interventions; (2) the inclusion of coverage measurement and indicator guidance in WHO intervention recommendations; (3)

the incorporation of these indicators into data collection mechanisms and relevant intervention delivery platforms; and (4) an agenda for continuous measurement improvement.

Analysis

Advances in the measurement of coverage for RMNCH and nutrition: from contact to effective coverage

Amouzou, A., H.H. Leslie, M. Ram, M. Fox, S.S. Jiwani, J. Requejo, T. Marchant, M.K. Munos, L.M.E. Vaz, W. Weiss, C. Hayashi, and T. Boerma on behalf of the Countdown Coverage Technical Working Group. 2019. "Advances in the measurement of coverage for RMNCH and nutrition: from contact to effective coverage". *BMJ Global Health* 4(Suppl4): e001297. <http://dx.doi.org/10.1136/bmjgh-2018-001297>

Current methods for measuring intervention coverage for reproductive, maternal, newborn, and child health and nutrition (RMNCH+N) do not adequately capture the quality of services delivered. Without information on the quality of care, it is difficult to assess whether services provided will result in expected health improvements. We propose a six-step coverage framework, starting from a target population to (1) service contact, (2) likelihood of services, (3) crude coverage, (4) quality-adjusted coverage, (5) user-adherence-adjusted coverage and (6) outcome-adjusted coverage. We support our framework with a comprehensive review of published literature on effective coverage for RMNCH+N interventions since 2000. We screened 8103 articles and selected 36 from which we summarised current methods for measuring effective coverage and computed the gaps between 'crude' coverage measures and quality-adjusted measures. Our review showed considerable variability in data sources, indicator definitions and analytical approaches for effective coverage measurement. Large gaps between crude coverage and quality-adjusted coverage levels were evident, ranging from an average of 10 to 38 percentage points across the RMNCH+N interventions assessed. We define effective coverage as the proportion of individuals experiencing health gains from a service among those who need the service, and distinguish this from other indicators along a coverage cascade that make quality adjustments. We propose a systematic approach for analysis along six steps in the cascade. Research to date shows substantial drops in effective delivery of care across these steps, but variation in methods limits comparability of the results. Advancement in coverage measurement will require standardisation of effective coverage terminology and improvements in data collection and methodological approaches.

Dietary guidelines for children under 2 years of age in the context of nurturing care

Pérez-Escamilla, R., S. Segura-Pérez, and V. Hall Moran. 2019. "Dietary guidelines for children under 2 years of age in the context of nurturing care". *Maternal & Child Nutrition* 15: e12855. <https://doi.org/10.1111/mcn.12855>

Dietary guidelines provide advice on what to eat to different subsets of the population but often do not take into account the "how" to eat. Responsive feeding is a key dimension of responsive parenting involving reciprocity between the child and caregiver during the feeding process and is characterized by caregiver guidance and recognition of the child's cues of hunger and satiety. Evidence indicates that providing responsive feeding guidance to mothers on how to recognize and respond appropriately to children's hunger and satiety cues can lead to improved feeding practices and weight status and developmental outcomes among infants and young children. In addition, early and nurturing exposures to foods with different tastes and textures and positive role modelling help children to learn to eat healthy foods. The importance of improving caregiver's responsive feeding

behaviours to ensure the adequate introduction of complementary foods is becoming increasingly recognized, but responsive feeding principles have not been taken into account in a comprehensive way in the development of dietary guidelines. The incorporation of all responsive feeding principles into dietary guidelines has a strong potential to enhance their impact on early childhood development outcomes for infants and young children but will require adaptation to the different contexts across countries to ensure that they are culturally sensitive and grounded in a deep understanding of the types of foods and other resources available to diverse communities.

International trade and investment: still the foundation for tackling nutrition related non-communicable diseases in the era of Trump?

Walls, H., R. Smith, S. Cuevas, and J. Hanefeld. 2019. "International trade and investment: still the foundation for tackling nutrition related non-communicable diseases in the era of Trump?" *British Medical Journal* 365: l2217.

<https://doi.org/10.1136/bmj.l2217>

Trade and investment policy strongly influence diet, nutrition, and risk of non-communicable disease—but what does this mean in the context of recent global political developments?

Key messages:

- The 2030 Agenda for Sustainable Development identified international trade as a structural driver of sustainable development, including identification of the risk posed by international trade to the prevalence of non-communicable disease (NCD)
 - Poor diet and nutrition are risk factors for NCDs, accounting for 40% of annual deaths from NCDs
 - Trade and investment policy impact diet and nutrition through the food system and by affecting domestic policy and regulatory space relating to nutrition
 - We outline key pathways of this trade-nutrition impact on nutrition related NCD risk and consider their implications in the context of an evolving global trade regime.
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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.

Rethinking Effective Nutrition Convergence: An Analysis of Intervention Co-coverage Data

Menon, P., R. Avula, S. Pandey, S. Scott, and A. Kumar. 2019. "Rethinking Effective Nutrition Convergence: An Analysis of Intervention Co-coverage Data". *Economic & Political Weekly* 54(24).

<https://www.epw.in/journal/2019/24/commentary/rethinking-effective-nutrition-convergence.html>

The National Nutrition Mission has explicitly recognised the multisectoral nature of the challenge of malnutrition and has made “convergence” one of its key pillars. However, it does not yet have sharp operational clarity on how stakeholders can ensure that multiple programmes reach the same mother–child dyad in the first 1,000-day period. The article illustrates how data on co-coverage of interventions can be used to plan for and assess the success of efforts to strengthen convergence.

Cash vs. in-kind transfers: the role of self-targeting in reforming the Indian food subsidy program

Kozicka, M., R. Weber, and M. Kalkuhl. 2019. “Cash vs. in-kind transfers: the role of self-targeting in reforming the Indian food subsidy program”. *Food Security*.

<https://doi.org/10.1007/s12571-019-00942-x>

Historically, India has relied on subsidizing staple food as a major instrument in improving food security. Recently, however, cash transfers have entered the debate as an alternative, as they are associated with lower market distortions, leakages and fiscal costs. This study contributes to this debate by analyzing India’s Targeted Public Distribution System (TPDS). Our main objective was to explain the under-purchase, or low take-up, from the TPDS, which is typically attributed to ‘leakage’, i.e. the diversion of food grains from eligible consumers. We provide an alternative solution based on self-targeting; while poorer households increase their consumption from the TPDS, wealthier households restrain from consuming subsidized commodities. Using a large household dataset, we estimated that such a voluntary opt-out system, based on income, would save a minimum of 6.5% of grains released through the TPDS. Besides these demand-driven aspects, our analysis indicates that poor regions perform better at lowering the diversion of grains and that large targeting errors exist among female-led households. Finally, we find substantial regional price differences that would benefit the poor and rural population under a uniform cash-transfer system that does not correct for regional price levels.

NON-PEER REVIEWED

BUDGET BRIEFS - Integrated Child Development Services (ICDS) GoI, 2019-20

Kapur, A., and R. Shukla. 2019. “Integrated Child Development Services (ICDS) GoI, 2019-20”. *Budget Briefs* 11(2). Accountability Initiatives.

<https://accountabilityindia.in/publication/integrated-child-development-services-icds-2/>

The Integrated Child Development Services is the Government of India’s (GoI) flagship programme aimed at providing basic education, health, and nutrition services for early childhood development. This brief uses government data to analyse ICDS performance along the following parameters: ■ Allocations, releases, and expenditures, ■ Component-wise trends, ■ Human and physical resources, ■ Coverage, and ■ Outcomes.

BUDGET BRIEFS - National Health Mission (NHM) GoI, 2019-20

Shah, S., R. Junnarkar, and A. Kapur. 2019. “National Health Mission (NHM) GoI, 2019-20”. *Budget Briefs* 11(4). Accountability Initiatives.

<https://accountabilityindia.in/publication/national-health-mission-nhm-2/>

The National Health Mission (NHM) is Government of India's (GoI) largest public health programme. It consists of two sub-missions: ■ National Rural Health Mission (NRHM), and ■ National Urban Health Mission (NUHM). Using government data, this brief reports on: ■ Allocations and expenditures, ■ NHM approvals as per programmatic components and constituent activities, and ■ Physical and human resources.

Recommendations for data collection, analysis and reporting on anthropometric indicators in children under 5 years of age

Recommendations for data collection, analysis and reporting on anthropometric indicators in children under 5 years old. Geneva: World Health Organization and the United Nations Children's Fund (UNICEF), 2019. Licence: CC BY-NC-SA 3.0 IGO.

<https://data.unicef.org/resources/data-collection-analysis-reporting-on-anthropometric-indicators-in-children-under-5/>

This report was developed by a working group (WG) established by the WHO-UNICEF Technical Expert Advisory Group on Nutrition Monitoring (TEAM) and details standardized methods for generating representative malnutrition estimates based on anthropometric data relating to weight, length/height and age in children under 5 years of age. The guidance includes recommended steps for planning, collecting, analyzing and reporting on child malnutrition estimates. Some steps and recommendations included in the report are evidence-based while others were based on practical experience and expert advice of the working group members. Further research is required to provide a wider range of evidence-based recommendations.

Healthy States, Progressive India: Report on the Ranks of States and Union Territories

Healthy States, Progressive India: Report on the Ranks of States and Union Territories. New Delhi: NITI Aayog, The World Bank, Ministry of Health & Family Welfare, 2019.

https://niti.gov.in/writereaddata/files/document_publication/NITI-WB%20Health%20Index%20Report%20%28Web%20Ver%29_11-06-19.pdf

NITI Aayog in collaboration with the World Bank and the Ministry of Health and Family Welfare (MoHFW) embarked on a journey in 2017 to develop the first comprehensive State Health Index and published the first edition of "Healthy States, Progressive India - Report on the Ranks of States and Union Territories" to bring about a transformational change in the health of the people in India. The second edition of this exercise was conducted over a period of eight months in 2018-19. It involved extensive engagement with the States in the process of data collection; mentoring of States in the data submission process on an online portal hosted by NITI Aayog and an independent validation of data submitted. The timely completion of the second round of the State Health Index could not have been possible without the support and cooperation of all the partners.

Food Systems for Children and Adolescents: Working Together to Secure Nutritious Diets

UNICEF, GAIN. *Food systems for children and adolescents. Working together to secure nutritious diets.* New York: UNICEF; 2019.

https://www.unicef.org/nutrition/files/UNICEF_GAIN_Food_Systems_Children_Adolescents.pdf

Key messages:

- Improving children and adolescents' diets remains a major challenge in the 21st century. In many parts of the world, children and adolescents do not receive the diets they need – in quantity, frequency, and quality – to survive, grow, and develop to their full potential.
- Children and adolescents' physiological and psychosocial characteristics and their experiences with their interpersonal and socio-ecological environments change as they get older. With increasing independence, children and adolescents become principal actors in securing their diets.

- Broader food system issues need to be addressed to improve the diets of children and adolescents. Food systems are essential to delivering nutritious, safe, affordable, and sustainable diets, but the nutritional needs of children and adolescents (both of present and future generations) are often not prioritized.
- To better align food systems and the diets of children and adolescents, the Innocenti Framework on food systems for children and adolescents was developed. The framework comprises a set of drivers, plus four determinants (food supply chains, external food environments, personal food environments, and behaviours of caregivers, children and adolescents), which together influence the diets of children and adolescents.

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: Global Food Symposium 2020

Theme: Transformation of Global Agri-Food Systems

Description: The Fourth GlobalFood 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.

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