

## EDITOR'S NOTE

The 48<sup>th</sup> issue of Abstract Digest features studies on anemia highlighting trends, inequities, and determinants of anemia among various population groups. Another study examined micronutrient deficiencies and their association with cognitive function among children and adolescents. This issue also includes the latest Lancet 2023 Breastfeeding Series editorial and three-papers that outline the multifaceted and highly effective strategies used by commercial formula manufacturers to target parents, health-care professionals, and policy-makers. Other studies included are on patterns in the prevalence of unvaccinated children, variations in measures of poverty, and an assessment of progress on the sustainable development goals. Another study examined the validity of maternal reports of receiving counseling on infant and young child feeding, and yet another one examined utilization of systematic review-based evidence in formulating guidelines for the National Health Programme.

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Happy reading!

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**Integrating an Algorithmic and Health Systems Thinking Approach to Improve the Uptake of Government Antenatal Nutrition Services in Vidisha, Madhya Pradesh (India), 2018 to 2021**

Sethi, V., A. Mishra, K.S. Ahirwar, A.P. Singh, S. Pawar, P. Awasthy, A. Tiwari, et al. 2023. "Integrating an Algorithmic and Health Systems Thinking Approach to Improve the Uptake of Government Antenatal Nutrition Services in Vidisha, Madhya Pradesh (India), 2018 to 2021." *Health Policy and Planning*, February. Doi: <https://doi.org/10.1093/heapol/czad011>

In 2018, the Government of Madhya Pradesh initiated the feasibility testing of integrating an algorithmic approach (assess, give, counsel, treat) to strengthen antenatal nutrition services in routine government-funded programmes coupled with a health system thinking approach to strengthen the health service delivery platform. Implementation phases included (1) an evidence review and stakeholder consultations (April 2018) and (2) a health systems strengthening preparedness phase (May–December 2018), including pilot testing in Vidisha district (January–December 2019) covering ~54 100 pregnant women with 237 antenatal contact points through 241 government auxiliary nurse midwives/staff nurses. During 2020–21, feasibility testing was expanded to an additional 7 districts. We used programme registers of the Auxiliary Nurse Midwives Registers (2019–21) and National Family Health Survey data for 2016 and 2021 to show changes in the Vidisha district and 7 expansion districts. We compare the performance of Vidisha district with Ashok Nagar district, where no such intervention occurred. Comparing 2016 and 2021 data, the Vidisha district showed improvements in receipt of antenatal care in the first trimester (29 to 85%) and in four antenatal visits (17 to 54%). Using the difference-in-difference approach, a 42% net increase in first-trimester antenatal check-ups in Vidisha as compared to Ashok Nagar is observed. There was also an improvement in the maternal nutrition budget of the state from USD 8.5 million to USD 17.8 million during this period. The Vidisha initiative offers several lessons in time-effective workflow to deliver all constituents of nutrition services at various antenatal contact points through and via routine government health systems. Continued execution of the algorithm for screening, with longitudinal data on the management of all nutrition risks, will be critical to show its long-term impact on maternal morbidities and birth outcomes.

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**Intergenerational persistence of health: Evidence from India**

Kumar, S., and B. Nahlen. 2023. "Intergenerational Persistence of Health: Evidence from India." *Economics Letters* 224 (March): 111023. Doi: <https://doi.org/10.1016/j.econlet.2023.111023>.

Using nationally representative data, we estimate intergenerational mobility in health in India. Results from the instrumental variable method show that children of anemic mothers are more likely to be anemic, with an intergenerational health correlation of 0.26. Results are robust to the inclusion of confounding factors including the mother's height. We find that the correlation between mothers' anemic status and children's anemic status differs by wealth quintile, indicating that economic status may play a role in the persistence of poor health across generations in developing countries.

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**Prevalence of anemia among reproductive women in different social group in India: Cross-sectional study using nationally representative data**

Sharif, N., B. Das, and A. Alam. 2023. "Prevalence of Anemia among Reproductive Women in Different Social Group in India: Cross-Sectional Study Using Nationally Representative Data." *PLOS ONE* 18 (2): e0281015. Doi: <https://doi.org/10.1371/journal.pone.0281015>.

**Background:** The common cause of anemia in the general population is iron deficiency. Anemia is adversely affecting women of reproductive age and child health which in turn results in increased morbidity and maternal death, and also hamper social-economic growth. Reproductive women are more prone to anemia due to inadequate dietary intake and iron loss during menstruation and pregnancy. **Objectives:** This study examined the level and trend of anemia prevalence among the socially disadvantaged group (SC&ST, OBC) of women as compared to the other women (general) and identified the main responsible factors behind this. **Data and methods:** The data for this analysis has been taken from three rounds of National Family Health Survey (NFHS) conducted during 2005–2006 (NFHS 3), 2015–16 (NFHS 4) and 2019–21 (NFHS 5). Univariate and bivariate analyses were used to assess the level of anemia among reproductive age group women of different social groups. The regression model represents the relative risk of different confounding factors on the occurrence of anemia. GIS technique used for graphical representation of anemia prevalence rate among different social groups of women in different states of India. **Result:** In India more than 15 states belong to the high prevalence (>55%) of anemia among socially backward groups in 2019–21. The anemia prevalence was high (>55%) in all social groups (SC & ST, OBC, general) observed in 7 states in NFHS-3, 4 in NFHS-4 and 11 states in NFHS-5. The overall result reveals that the SC&ST women were more prone to any anemia than OBC and general women and the prevalence rate slightly increased from 2005–06 to 2019–21. Among all variables, economic status dominantly controls the anemia level in all social groups. Anemia prevalence of the poor and poorest group of general women were much worse than the women of richer and richest groups of SC&ST, OBC. The odds of women having anemia were lower among higher educated and urban women as compared to the non-educated and rural women, irrespective of social group. The prevalence of anemia decreases with increased age of women and increases with the number of childbearing. All differences were statistically significant. **Conclusions:** The problem of iron deficiency remains a major issue in India, where the majority of the states (eastern, north-eastern and central) suffer from high anemia prevalence rate and it increases over time. It is observed that multiple socio-demographic factors ranging from poor economic and educational status, rural residence to higher childbearing of women are responsible for predicting anemia levels among the social groups of women in India. To eradicate this problem India should improve women's overall nutrition status and their income. Meanwhile, GOI should be more focused on the existing policies related to anemia and on their actual implementation on grassroots level.

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#### **Predictors of Incidence and Remission of Anemia among Never-Married Adolescents Aged 10–19 Years: A Population-Based Prospective Longitudinal Study in India**

Rai, R.K., S. Shinde, J.-W. De Neve, and W.W. Fawzi. 2023. "Predictors of Incidence and Remission of Anemia among Never-Married Adolescents Aged 10–19 Years: A Population-Based Prospective Longitudinal Study in India." *Current Developments in Nutrition* 7 (3): 100031. Doi: <https://doi.org/10.1016/j.cdnut.2023.100031>

**Background:** Dynamics of the anemia burden among Indian adolescents are poorly understood because of a lack of population-based longitudinal data. **Objectives:** To examine the burden of anemia among never-married adolescents aged 10–19 y from the states of Bihar and Uttar Pradesh, India, and a wide range of predictors of its incidence and remission. **Methods:** A sample of 3279 adolescents (male: 1787 and female: 1492) aged 10–19 y were included from baseline (2015–2016) and follow-up (2018–2019) surveys of the UDAYA (Understanding the Lives of Adolescents and Young Adults) project in India. In 2018–2019, all new cases of anemia were considered as incidence, whereas a return to the nonanemic status from being anemic in 2015–2016 was considered remission. Univariate and multivariable modified Poisson regression models with robust error variance were deployed to attain the study objective. **Results:** The crude prevalence of anemia among males decreased from 33.9% (95% CI: 30.7%–37.3%) in 2015–2016 to 31.6% (95% CI: 28.6%–

34.7%) in 2018–2019 but increased among females from 57.7% (95% CI: 53.5%–61.7%) in 2015–2016 to 63.8% (95% CI: 59.9%–67.5%) in 2018–2019. Anemia incidence was estimated to be 33.7% (95% CI: 30.3%–37.2%), whereas nearly 38.5% (95% CI: 35.1%–42.1%) of adolescents experienced remission of anemia. Older adolescents (aged 15–19 y) were less likely to experience anemia incidence. Consumption of eggs daily or weekly was negatively associated with anemia incidence compared with occasional or never consumption. Females had a higher risk of experiencing an incidence of anemia and decreased risk of experiencing anemia remission. The likelihood of adolescents experiencing anemia increased with an increased patient health questionnaire score. Household size was also associated with an increased risk of anemia incidence. **Conclusions:** Interventions that are sensitive to socio-demographic factors and encouraging access to mental health services and nutritious food consumption could be helpful in further anemia mitigation.

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### **Determinants and transition of anaemia among under-five children from different social groups in India from 2005–06 to 2015-16**

Ghosh, P. 2023. “Determinants and Transition of Anaemia among Under-Five Children from Different Social Groups in India from 2005–06 to 2015-16.” *Social Science & Medicine* 320 (March): 115702. Doi: <https://doi.org/10.1016/j.socscimed.2023.115702>

Anaemia among under-five children is a global health problem and a major cause of child morbidity and mortality, especially in Lower-Middle-Income countries including India. Despite a significant decrease over the last decade, nearly 58% of children in India suffered from anaemia in 2015-16. This national average hides the inequality in the prevalence of anaemia among indigenous people and other social groups. Therefore, the study focuses on identifying time-dependent significant determinants of the prevalence of anaemia from 2005–06 to 2015-16 among children belonging to Scheduled Tribe (ST), Scheduled Caste (SC), Other Backward Class (OBC) and Other or General social groups. Besides, it also identified social group-wise transition of anaemia among under-five children belonging to different socio-demographic, economic, residential and regional backgrounds in India. Time-dependent and independent logistic regression models were used to identify significant determinants of child anaemia and the mean probability of anaemia across different categories of explanatory backgrounds. Though the probability of anaemia has decreased more among marginalized children during the last decade, it remains relatively higher among them. The study has outlined the significant effects of child age, birth order, maternal anaemia, education level and geographic regions on the prevalence of anaemia among ST, SC, OBC and General social groups in India over the past decade. The effect of economic status on the prevalence of anaemia among ST and SC children was insignificant. Four subpopulations demonstrated a relatively greater magnitude of decadal anaemia risk reduction among children of early age groups, living with teenage, non-anaemic, less educated mothers and living in northeast India. The study suggests the arrangement of region-specific, social-group based strategies for reducing the prevalence of anaemia among under-five children in India. In this way, the nation can achieve “health and well-being for all” (SDG 03) by eliminating the geographical, and social inequality in the prevalence of child anaemia within the country (SDG 10).

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### **Micronutrients and cognitive functions among urban school-going children and adolescents: A cross-sectional multicentric study from India**

Singh, S., S. Awasthi, D. Kumar, S.R. Sarraf, A.K. Pandey, G.G. Agarwal, A. Awasthi, et al. 2023. “Micronutrients and Cognitive Functions among Urban School-Going Children and Adolescents: A Cross-Sectional Multicentric Study from India.” *PLOS ONE* 18 (2): e0281247. Doi: <https://doi.org/10.1371/journal.pone.0281247>

**Background:** Micronutrient deficiency (MD) is associated with deficits in cognitive functioning of children. However, no comprehensive multicentric study has been conducted in India to explore the role of multiple MD in cognition of children and adolescents. The present study aimed to explore association of MD with level of general intelligence and specific cognitive functions, in urban school-going children and adolescents across ten cities of India. **Method:** Cross-sectional multicentric study, enrolled participants aged 6–16 years. Blood samples were collected for biochemical analysis of calcium, iron, zinc, selenium, folate, vitamin A, D and B12. Colored Progressive Matrices / Standard Progressive Matrices (CPM/SPM), Coding, Digit Span and Arithmetic tests were used for the assessment of cognitive functions of participants. Height and weight measures were collected along with socio-economic status. **Results:** From April-2019 to February-2020, 2428 participants were recruited from 60 schools. No MD was found in 7.0% (134/1918), any one MD in 23.8% (457/1918) and  $\geq 2$  MD in 69.2% (1327/1918) participants. In presence of  $\geq 2$  MD, adjusted odds ratio (OR) for borderline or dull normal in CPM/SPM was 1.63, (95% CI: 1.05–2.52), coding was 1.66 (95% CI: 1.02–2.71), digit span was 1.55 (95% CI: 1.06–2.25) and arithmetic was 1.72 (95% CI: 1.17–2.53), controlling for gender, socioeconomic status and anthropometric indicators. **Conclusion:** Since  $\geq 2$  MD were found in more than 2/3rd of participants and was associated with impairment in cognitive function, attempts must be made to ameliorate them on priority in school going children in India.

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#### Child dietary patterns in Homo sapiens evolution: A systematic review

Iannotti, L.L., E.A. Gyimah, M. Reid, M. Chapnick, M.K. Cartmill, C.K. Lutter, C. Hilton, T.E. Gildner, and E.A. Quinn. 2022. "Child Dietary Patterns in Homo Sapiens Evolution." *Evolution, Medicine, and Public Health* 10 (1): 371–90. Doi: <https://doi.org/10.1093/emph/eoac027>.

Dietary patterns spanning millennia could inform contemporary public health nutrition. Children are largely absent from evidence describing diets throughout human evolution, despite prevalent malnutrition today signaling a potential genome-environment divergence. This systematic review aimed to identify dietary patterns of children ages 6 months to 10 years consumed before the widespread adoption of agriculture. Metrics of mention frequency (counts of food types reported) and food groups (globally standardized categories) were applied to: compare diets across subsistence modes [gatherer–hunter–fisher (GHF), early agriculture (EA) groups]; examine diet quality and diversity; and characterize differences by life course phase and environmental context defined using Köppen–Geiger climate zones. The review yielded child diet information from 95 cultural groups (52 from GHF; 43 from EA/mixed subsistence groups). Animal foods (terrestrial and aquatic) were the most frequently mentioned food groups in dietary patterns across subsistence modes, though at higher frequencies in GHF than in EA. A broad range of fruits, vegetables, roots and tubers were more common in GHF, while children from EA groups consumed more cereals than GHF, associated with poor health consequences as reported in some studies. Forty-eight studies compared diets across life course phases: 28 showed differences and 20 demonstrated similarities in child versus adult diets. Climate zone was a driver of food patterns provisioned from local ecosystems. Evidence from Homo sapiens evolution points to the need for nutrient-dense foods with high quality proteins and greater variety within and across food groups. Public health solutions could integrate these findings into food-based dietary guidelines for children.

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#### Accelerating action to reduce anemia: Review of causes and risk factors and related data needs

Hess, S.Y., A. Owais, M.E.D. Jefferds, M.F. Young, A. Cahill, and L.M. Rogers. 2023. "Accelerating Action to Reduce Anemia: Review of Causes and Risk Factors and Related Data Needs." *Annals of the New York Academy of Sciences*, March. Doi: <https://doi.org/10.1111/nyas.14985>.

Anemia is a major public health concern. Young children, menstruating adolescent girls and women, and pregnant women are among the most vulnerable. Anemia is the consequence of a wide range of

causes, including biological, socioeconomic, and ecological risk factors. Primary causes include: iron deficiency; inherited red blood cell disorders; infections, such as soil-transmitted helminthiasis, schistosomiasis, and malaria; gynecological and obstetric conditions; and other chronic diseases that lead to blood loss, decreased erythropoiesis, or destruction of erythrocytes. The most vulnerable population groups in low- and middle-income countries are often at the greatest risk to suffer from several of these causes simultaneously as low socioeconomic status is linked with an increased risk of anemia through multiple pathways. Targeted and effective action is needed to prevent anemia. Understanding the causes and risk factors of anemia for different population subgroups within a country guides the design and implementation of effective strategies to prevent and treat anemia. A coordinated approach across various expert groups and programs could make the best use of existing data or could help to determine when newer and more relevant data may need to be collected, especially in countries with a high anemia burden and limited information on the etiology of anemia.

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### Lancet 2023 Breast feeding series: Editorial

#### Unveiling the predatory tactics of the formula milk industry

The Lancet. 2023. "Unveiling the Predatory Tactics of the Formula Milk Industry." *The Lancet* 401 (10375): 409. Doi: [https://doi.org/10.1016/S0140-6736\(23\)00118-6](https://doi.org/10.1016/S0140-6736(23)00118-6)

For decades, the commercial milk formula (CMF) industry has used underhand marketing strategies, designed to prey on parents' fears and concerns at a vulnerable time, to turn the feeding of young children into a multibillion-dollar business. The immense economic power accrued by CMF manufacturers is deployed politically to ensure the industry is under-regulated and services supporting breastfeeding are under-resourced. These are the stark findings of the 2023 Breastfeeding Series, published in *The Lancet* today.

The three-paper Series outlines how typical infant behaviours such as crying, fussiness, and poor night-time sleep are portrayed by the CMF industry as pathological and framed as reasons to introduce formula, when in fact these behaviours are common and developmentally appropriate. However, manufacturers claim their products can alleviate discomfort or improve night-time sleep, and also infer that formula can enhance brain development and improve intelligence—all of which are unsubstantiated. Infant feeding is further commodified by cross-promotion of infant, follow-on, toddler, and growing-up milks using the same branding and numbered progression, which aims to build brand loyalty and is a blatant attempt to circumvent legislation that prohibits advertising of infant formula.

Breastfeeding has proven health benefits across high-income and low-income settings alike: it reduces childhood infectious diseases, mortality, and malnutrition, and the risk of later obesity; mothers who breastfeed have decreased risk of breast and ovarian cancers, type 2 diabetes, and cardiovascular disease. However, less than 50% of babies worldwide are breastfed according to WHO recommendations, resulting in economic losses of nearly US\$350 billion each year. Meanwhile, the CMF industry generates revenues of about \$55 billion annually, with about \$3 billion spent on marketing activities every year.

The industry's dubious marketing practices are compounded by lobbying, often covertly via trade associations and front groups, against strengthening breastfeeding protection laws and challenging food standard regulations. In 1981, the World Health Assembly adopted the International Code of Marketing of Breast-milk Substitutes, a set of standards to prevent inappropriate marketing of formula. It includes prohibition of advertising of CMF to the public or promotion within health-care

systems; banning provision of free samples to mothers, health-care workers, and health facilities; no promotion of formula within health services; and no sponsorship of health professionals or scientific meetings by the CMF industry. However, despite repeated calls for governments to incorporate the Code's recommendations into legislation, only 32 countries have legal measures that substantially align with the Code. A further 41 countries have legislation that moderately aligns with the Code and 50 have no legal measures at all. As a result, the Code is regularly flouted without penalty.

The prioritisation of trade interests over health was brought to the forefront in 2018, when US officials threatened to enforce trade sanctions and withdraw military aid to Ecuador unless it dropped a proposed resolution at the World Health Assembly to protect and promote breastfeeding. Some CMF lobby groups have cautioned against improved parental leave. Duration of paid maternity leave is correlated with breastfeeding prevalence and duration, and absence of, or inadequate, paid leave forces many mothers to return to work soon after childbirth. Lack of safe spaces for breastfeeding or expressing milk in workplaces, or facilities to store breastmilk, mean that breastfeeding is not a viable option for many women.

Some women choose not to breastfeed, or are unable to. Perceived pressure, or inability, to breastfeed—especially if it is at odds with a mother's wishes—can have a detrimental effect on mental health, and systems should be in place to fully support all mothers in their choices. Women and families make decisions about infant feeding based on the information they receive, and a criticism of the CMF industry's predatory marketing practices should not be interpreted as a criticism of women. All information that families receive on infant feeding must be accurate and independent of industry influence to ensure informed decision making. Marketing by the CMF industry is an interconnected, multifaceted, powerful system that knowingly exploits parents' aspirations. Under the Convention of the Rights of the Child, governments have a duty to tackle misinformation—and governments need to embrace the breastfeeding Code without further delay to ensure that manufacturers making misleading claims about their products are held to account.

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### **Breastfeeding: crucially important, but increasingly challenged in a market-driven world**

Pérez-Escamilla, R., C. Tomori, S. Hernández-Cordero, P. Baker, A.J.D. Barros, F. Bégin, D.J. Chapman, et al. 2023. "Breastfeeding: Crucially Important, but Increasingly Challenged in a Market-Driven World." *The Lancet* 401 (10375): 472–85. Doi: [https://doi.org/10.1016/S0140-6736\(22\)01932-8](https://doi.org/10.1016/S0140-6736(22)01932-8)

In this Series paper, we examine how mother and baby attributes at the individual level interact with breastfeeding determinants at other levels, how these interactions drive breastfeeding outcomes, and what policies and interventions are necessary to achieve optimal breastfeeding. About one in three neonates in low-income and middle-income countries receive prelacteal feeds, and only one in two neonates are put to the breast within the first hour of life. Prelacteal feeds are strongly associated with delayed initiation of breastfeeding. Self-reported insufficient milk continues to be one of the most common reasons for introducing commercial milk formula (CMF) and stopping breastfeeding. Parents and health professionals frequently misinterpret typical, unsettled baby behaviours as signs of milk insufficiency or inadequacy. In our market-driven world and in violation of the WHO International Code for Marketing of Breast-milk Substitutes, the CMF industry exploits concerns of parents about these behaviours with unfounded product claims and advertising messages. A synthesis of reviews between 2016 and 2021 and country-based case studies indicate that breastfeeding practices at a population level can be improved rapidly through multilevel and multicomponent interventions across the socioecological model and settings. Breastfeeding is not the sole responsibility of women and requires collective societal approaches that take gender inequities into consideration.

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### **The political economy of infant and young child feeding: confronting corporate power, overcoming structural barriers, and accelerating progress**

Baker, P., J.P. Smith, A. Garde, L.M. Grummer-Strawn, B. Wood, G. Sen, G. Hastings, et al. 2023. "The Political Economy of Infant and Young Child Feeding: Confronting Corporate Power, Overcoming Structural Barriers, and Accelerating Progress." *The Lancet* 401 (10375): 503–24. Doi: [https://doi.org/10.1016/S0140-6736\(22\)01933-X](https://doi.org/10.1016/S0140-6736(22)01933-X)

Despite increasing evidence about the value and importance of breastfeeding, less than half of the world's infants and young children (aged 0–36 months) are breastfed as recommended. This Series paper examines the social, political, and economic reasons for this problem. First, this paper highlights the power of the commercial milk formula (CMF) industry to commodify the feeding of infants and young children; influence policy at both national and international levels in ways that grow and sustain CMF markets; and externalise the social, environmental, and economic costs of CMF. Second, this paper examines how breastfeeding is undermined by economic policies and systems that ignore the value of care work by women, including breastfeeding, and by the inadequacy of maternity rights protection across the world, especially for poorer women. Third, this paper presents three reasons why health systems often do not provide adequate breastfeeding protection, promotion, and support. These reasons are the gendered and biomedical power systems that deny women-centred and culturally appropriate care; the economic and ideological factors that accept, and even encourage, commercial influence and conflicts of interest; and the fiscal and economic policies that leave governments with insufficient funds to adequately protect, promote, and support breastfeeding. We outline six sets of wide-ranging social, political, and economic reforms required to overcome these deeply embedded commercial and structural barriers to breastfeeding.

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### **Marketing of commercial milk formula: a system to capture parents, communities, science, and policy**

Rollins, N., E. Piwoz, P. Baker, G. Kingston, K.M. Mabaso, D. McCoy, P.A. Ribeiro Neves, et al. 2023. "Marketing of Commercial Milk Formula: A System to Capture Parents, Communities, Science, and Policy." *The Lancet* 401 (10375): 486–502. Doi: [https://doi.org/10.1016/S0140-6736\(22\)01931-6](https://doi.org/10.1016/S0140-6736(22)01931-6).

Despite proven benefits, less than half of infants and young children globally are breastfed in accordance with the recommendations of WHO. In comparison, commercial milk formula (CMF) sales have increased to about US\$55 billion annually, with more infants and young children receiving formula products than ever. This Series paper describes the CMF marketing playbook and its influence on families, health professionals, science, and policy processes, drawing on national survey data, company reports, case studies, methodical scoping reviews, and two multicountry research studies. We report how CMF sales are driven by multifaceted, well-resourced marketing strategies that portray CMF products, with little or no supporting evidence, as solutions to common infant health and developmental challenges in ways that systematically undermine breastfeeding. Digital platforms substantially extend the reach and influence of marketing while circumventing the International Code of Marketing of Breast-milk Substitutes. Creating an enabling policy environment for breastfeeding that is free from commercial influence requires greater political commitment, financial investment, CMF industry transparency, and sustained advocacy. A framework convention on the commercial marketing of food products for infants and children is needed to end CMF marketing.

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### **Patterns in the Prevalence of Unvaccinated Children Across 36 States and Union Territories in India, 1993-2021**

Rajpal, S., A. Kumar, M. Johri, R. Kim, and S. V. Subramanian. 2023. "Patterns in the Prevalence of Unvaccinated Children Across 36 States and Union Territories in India, 1993-2021." *JAMA Network Open* 6 (2): e2254919. Doi: <https://doi.org/10.1001/jamanetworkopen.2022.54919>

**Importance:** Children who do not receive any routine vaccinations (ie, who have 0-dose status) are at elevated risk of death, morbidity, and socioeconomic vulnerabilities that limit their development over the life course. India has the world's highest number of children with 0-dose status; analysis of national and subnational patterns is the first important step to addressing this problem. **Objectives:** To examine the patterns among children with 0-dose immunization status across all 36 states and union territories (UTs) in India over 29 years, from 1993 to 2021, and to elucidate the relative share of multiple geographic regions in the total geographic variation in 0-dose immunization. **Design, Setting, and Participants:** This repeated cross-sectional study analyzed all 5 rounds of India's National Family Health Survey (1992-1993, 1998-1999, 2005-2006, 2015-2016, and 2019-2021) to compare the prevalence of children with 0-dose status across time-space and geographic regions. The Integrated Public Use of Microdata Series was used to construct comparable geographic boundaries for states and UTs across surveys. The study included a total of 125 619 live children aged 12 to 23 months who were born to participating women. **Main Outcomes and Measures:** The outcome was a binary indicator of children's 0-dose vaccination status, coded as children aged 12 to 23 months at the time of the survey who had not received the first dose of the diphtheria-tetanus-pertussis-containing vaccine. The significance of each geographic unit was computed using the variance partition coefficient (VPC). **Results:** Among 125 619 children, the national prevalence of those with 0-dose status in India decreased from 33.4% (95% CI, 32.5%-34.2%) in 1993 to 6.6% (95% CI, 6.4%-6.8%) in 2021. A substantial reduction in the IQR of 0-dose prevalence across states from 30.1% in 1993 to 3.1% in 2021 suggested a convergence in state disparities. The prevalence in the northeastern states of Meghalaya (17.0%), Nagaland (16.1%), Mizoram (14.3%), and Arunachal Pradesh (12.6%) remained relatively high in 2021. Prevalence increased between 2016 and 2021 in 10 states, including several traditionally high-performing states and UTs, such as Telangana (1.16 percentage points) and Sikkim (0.92 percentage points). In 2021, 53.0% of children with 0-dose status resided in the populous states of Uttar Pradesh, Bihar, and Maharashtra. A multilevel analysis comparing the share of variation at the state, district, and cluster (primary sampling unit) levels revealed that clusters accounted for the highest share of the total variation in 2016 (44.7%; VPC [SE], 1.04 [0.32]) and 2021 (64.3%; VPC [SE], 0.38 [0.12]). **Conclusions and Relevance:** In this cross-sectional study, findings from approximately 3 decades of analysis suggest the need for sustained efforts to target populous states like Uttar Pradesh and Bihar and northeastern parts of India. The resurgence of 0-dose prevalence in 10 states highlights the importance of programs like Intensified Mission Indradhanush 4.0, a major national initiative to improve immunization coverage. Prioritizing small administrative units will be important to strengthening India's efforts to bring every child into the immunization regime.

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### Small area variations in four measures of poverty among Indian households: Econometric analysis of National Family Health Survey 2019–2021

Jain, A., S. Rajpal, M.J. Rana, R. Kim, and S. V. Subramanian. 2023. "Small Area Variations in Four Measures of Poverty among Indian Households: Econometric Analysis of National Family Health Survey 2019–2021." *Humanities and Social Sciences Communications* 10 (1): 18. Doi: <https://doi.org/10.1057/s41599-023-01509-0>

India has seen enormous reductions in poverty in the past few decades. However, much of this progress has been unequal throughout the country. This paper examined the 2019–2021 National Family Health Survey to examine small area variations in four measures of household poverty. Overall, the results show that clusters and states were the largest sources of variation for the four measures of poverty. These findings also show persistent within-district inequality when examining

the bottom 10th wealth percentile, bottom 20th wealth percentile, and multidimensional poverty. Thus, these findings pinpoint the precise districts where between-cluster inequality in poverty is most prevalent. This can help guide policy makers in terms of targeting policies aimed at reducing poverty.

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### Progress on Sustainable Development Goal indicators in 707 districts of India: a quantitative mid-line assessment using the National Family Health Surveys, 2016 and 2021

Subramanian, S.V., M. Ambade, A. Kumar, H. Chi, W. Joe, S. Rajpal, and R. Kim. 2023. "Progress on Sustainable Development Goal Indicators in 707 Districts of India: A Quantitative Mid-Line Assessment Using the National Family Health Surveys, 2016 and 2021." *The Lancet Regional Health - Southeast Asia*, February, 100155. Doi: <https://doi.org/10.1016/j.lansea.2023.100155>

**Background:** India has committed itself to accomplishing the Sustainable Development Goals (SDGs) by 2030. Meeting these goals would require prioritizing and targeting specific areas within India. We provide a mid-line assessment of the progress across 707 districts of India for 33 SDG indicators related to health and social determinants of health. **Methods:** We used data collected on children and adults from two rounds of the National Family Health Survey (NFHS) conducted in 2016 and 2021. We identified 33 indicators that cover 9 of the 17 official SDGs. We used the goals and targets outlined by the Global Indicator Framework, Government of India and World Health Organization (WHO) to determine SDG targets to be met by 2030. Using precision-weighted multilevel models, we estimated district mean for 2016 and 2021, and using these values, computed the Annual Absolute Change (AAC) for each indicator. Using the AAC and targets, we classified India and each district as: Achieved-I, Achieved-II, On-Target and Off-Target. Further, when a district was Off-Target on a given indicator, we further identified the calendar year in which the target will be met post-2030.

**Findings:** India is not On-Target for 19 of the 33 SDGs indicators. The critical Off-Target indicators include Access to Basic Services, Wasting and Overweight Children, Anaemia, Child Marriage, Partner Violence, Tobacco Use, and Modern Contraceptive Use. For these indicators, more than 75% of the districts were Off-Target. Because of a worsening trend observed between 2016 and 2021, and assuming no course correction occurs, many districts will never meet the targets on the SDGs even well after 2030. These Off-Target districts are concentrated in the states of Madhya Pradesh, Chhattisgarh, Jharkhand, Bihar, and Odisha. Finally, it does not appear that Aspirational Districts, on average, are performing better in meeting the SDG targets than other districts on majority of the indicators. **Interpretation:** A mid-line assessment of districts' progress on SDGs suggests an urgent need to increase the pace and momentum on four SDG goals: No Poverty (SDG 1), Zero Hunger (SDG 2), Good Health and Well-Being (SDG 3) and Gender Equality (SDG 5). Developing a strategic roadmap at this time will help India ensure success with regards to meeting the SDGs. India's emergence and sustenance as a leading economic power depends on meeting some of the more basic health and social determinants of health-related SDGs in an immediate and equitable manner.

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### The utilisation of systematic review evidence in formulating India's National Health Programme guidelines between 2007 to 2021

Rajwar, E., P. Pundir, S.S. Parsekar, A. D S, S.R.B. D'Souza, B.S. Nayak, J.A. Noronha, P. D'Souza, and S. Oliver. 2023. "The Utilization of Systematic Review Evidence in Formulating India's National Health Programme Guidelines between 2007 and 2021." *Health Policy and Planning*, January. Doi: <https://doi.org/10.1093/heapol/czad008>

Evidence-informed policymaking integrates the best available evidence on programme outcomes to guide decisions at all stages of the policy process and its importance becomes more pronounced in resource-constrained settings. In this paper, we have reviewed the use of systematic review evidence in framing National Health Programme (NHP) guidelines in India. We searched official websites of the different NHPs, linked to the main website of the Ministry of Health and Family Welfare (MoHFW), in December 2020 and January 2021. NHP guideline documents with systematic review evidence were identified and information on the use of this evidence was extracted. We classified the identified systematic review evidence according to its use in the guideline documents and analysed the data to provide information on the different factors and patterns linked to the use of systematic review evidence in these documents. Systematic reviews were mostly visible in guideline documents addressing maternal and newborn health, communicable diseases and immunization. These systematic reviews were cited in the guidelines to justify the need for action, to justify recommendations for action and opportunities for local adaptation, and to highlight implementation challenges and justify implementation strategies. Guideline documents addressing implementation cited systematic reviews about the problems and policy options more often than citing systematic reviews about implementation. Systematic reviews were linked directly to support statements in few guideline documents, and sometimes the reviews were not appropriately cited. Most of the systematic reviews providing information on the nature and scale of the policy problem included Indian data. It was seen that since 2014, India has been increasingly using systematic review evidence for public health policymaking, particularly for some of its high-priority NHPs. This complements the increasing investment in research synthesis centres and procedures to support evidence-informed decision making, demonstrating the continued evolution of India's evidence policy system.

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### **Moderate accuracy of survey responses about infant and young child feeding counseling reported by mothers with children less than one year of age in India**

Kim, S.S., S. Ashok, R. Avula, T. Mahapatra, P. Gokhale, S. Walton, R.A. Heidkamp, and M.K. Munos. 2023. "Moderate Accuracy of Survey Responses about Infant and Young Child Feeding Counseling Reported by Mothers with Children Less than 1 Year of Age in India." *The Journal of Nutrition*, February. Doi: <https://doi.org/10.1016/j.tjn.2023.02.010>

**Background:** Counseling on infant and young child feeding (IYCF) to support optimal breastfeeding and complementary feeding practices is an essential intervention, and accurate coverage data is needed to identify gaps and monitor progress. However, coverage information captured during household surveys has not yet been validated. **Objectives:** We examined the validity of maternal reports of IYCF counseling received during community-based contacts and factors associated with reporting accuracy. **Methods:** Direct observations of home visits conducted by community workers in 40 villages in Bihar, India served as the "gold standard" to maternal reports of IYCF counseling received during 2-wk follow-up surveys (n = 444 mothers with children less than 1 y of age, interviews matched to direct observations). Individual-level validity was assessed by calculating sensitivity, specificity, and AUC. Population-level bias was measured using the inflation factor (IF). Multivariable regression models were used to examine factors associated with response accuracy. **Results:** Prevalence of IYCF counseling during home visits was very high (90.1%). Maternal report of any IYCF counseling received in the past 2 wk was moderate (AUC: 0.60; 95% CI: 0.52, 0.67), and population bias was low (IF = 0.90). However, the recall of specific counseling messages varied. Maternal report of any breastfeeding, exclusive breastfeeding, and dietary diversity messages had moderate validity (AUC > 0.60), but other child feeding messages had low individual validity. Child age, maternal age, maternal education, mental stress, and social desirability were associated with reporting accuracy of multiple indicators. **Conclusions:** Validity of IYCF counseling coverage was moderate for several key indicators. IYCF counseling is an information-based intervention that may be received from various sources, and it may be challenging to achieve higher reporting accuracy

over a longer recall period. We consider the modest validity results as positive and suggest that these coverage indicators may be useful for measuring coverage and tracking progress over time.

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## UPCOMING EVENTS & DEADLINES

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### 8th Annual Agriculture, Nutrition and Health (ANH) Academy Week

The 8th annual Agriculture, Nutrition & Health Academy Week will take place from 19 to 30 June 2023, online and in Lilongwe, Malawi. The programme will feature online Learning Labs followed by a full hybrid conference in Lilongwe. We invite the global community of researchers and research users to participate in this event. Speakers and participants will have the choice of joining in a number of ways.

**When:** June 19–30, 2023

**Where:** Online and Malawi

**For more information:** <https://www.anh-academy.org/academy-week/2023>

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### Nutrition 2023

NUTRITION 2023 is ASN's annual flagship meeting which will be held July 22 – 25, 2023, in Boston, MA. This 3 ½ day event will offer new, unpublished science presentations, featured sessions, award lectures and recognition, professional development, and networking/Groups Engaging Members (GEM) functions.

**When:** July 22-25, 2023

**Where:** Boston

**For more information:** <https://nutrition.org/n23/>

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### Micronutrient Forum 6th Global Conference

The Micronutrient Forum's 6th Global Conference (#MNF2023) will take place online and at the World Forum in The Hague, Netherlands, 16-20 October 2023 with a thematic focus on Nutrition for Resilience (N4R). Following the success of the 2020 Connected Conference with over 3,500 global participants, our 6th Global Conference will be delivered as a hybrid event, allowing delegates the opportunity to attend either in-person or virtually.

**When:** October 16-20, 2023

**Where:** The Hague, the Netherlands & Online

**For more information:** <https://mnforum2023.org/welcome-letter/>

## 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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