POSHAN
Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition in India
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EDITOR'S NOTE

The 49th issue of Abstract Digest features a set of studies on child growth, including patterns of child stunting in low- and middle-income countries, various forms of inequities in child growth, and the role of milk in child growth. It also includes studies on obesity in India and the double burden of malnutrition. Anemia is also highlighted in this issue, with one article presenting a framework on integrated action for anemia and the other exploring the timely diagnosis of anemia. This edition also presents various studies examining the factors associated with coverage of antenatal coverage, with maternal behavior change, with kangaroo mother care, and with breastfeeding practices. Two articles focus on frontline workers, and there is a systematic review that examines dietary diversity and undernutrition among school children. Moreover, this issue features authors' correspondence and responses in The Lancet on gender sensitivity in the National Family Health Surveys.

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Jejeebhoy 2023. *The Lancet 401 (10386): 1424–25*

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PEER-REVIEWED

Patterns in Child Stunting by Age: A Cross-sectional Study of 94 Low- and Middle-income Countries

Karlsson, O., R. Kim, G.M. Moloney, A. Hasman, and S. V. Subramanian. 2023. "Patterns in Child Stunting by Age: A Cross-sectional Study of 94 Low- and Middle-income Countries." *Maternal & Child Nutrition, June.* https://doi.org/10.1111/mcn.13537.

Child stunting prevalence is primarily used as an indicator of impeded physical growth due to undernutrition and infections, which also increases the risk of mortality, morbidity and cognitive problems, particularly when occurring during the 1000 days from conception to age 2 years. This paper estimated the relationship between stunting prevalence and age for children 0–59 months old in 94 low- and middle-income countries. The overall stunting prevalence was 32%. We found higher stunting prevalence among older children until around 28 months of age—presumably from longer exposure times and accumulation of adverse exposures to undernutrition and infections. In most countries, the stunting prevalence was lower for older children after around 28 months—presumably mostly due to further adverse exposures being less detrimental for older children, and catch-up growth. The age for which stunting prevalence was the highest was fairly consistent across countries. Stunting prevalence and gradient of the rise in stunting prevalence by age varied across world regions, countries, living standards and sex. Poorer countries and households had a higher prevalence at all ages and a sharper positive age gradient before age 2. Boys had higher stunting prevalence but had peak stunting prevalence at lower ages than girls. Stunting prevalence was similar for boys and girls after around age 45 months. These results suggest that programmes to prevent undernutrition and infections should focus on younger children to optimise impact in reducing stunting prevalence. Importantly, however, since some catch-up growth may be achieved after age 2, screening around this time can be beneficial.

When Social Identities Intersect: Understanding Inequities in Growth Outcomes by Religion- Caste and Religion-Tribe as Intersecting Strata of Social Hierarchy for Muslim and Hindu Children in India

Chatterjee, P., J. Chen, A. Yousafzai, I. Kawachi, and S. V. Subramanian. 2023. "When Social Identities Intersect: Understanding Inequities in Growth Outcomes by Religion- Caste and Religion-Tribe as Intersecting Strata of Social Hierarchy for Muslim and Hindu Children in India." *International Journal for Equity in Health 22 (1): 115*. https://doi.org/10.1186/s12939-023-01917-3.

Background: Minority social status determined by religion, caste and tribal group affiliations, are usually treated as independent dimensions of inequities in India. This masks relative privileges and disadvantages at the intersections of religion-caste and religion-tribal group affiliations, and their associations with population health disparities. **Methods:** Our analysis was motivated by applications of the intersectionality framework in public health, which underlines how different systems of social stratification mutually inform relative access to material resources and social privilege, that are associated with distributions of population health. Based on this framework and using nationally representative National Family Health Surveys of 1992–93, 1998–99, 2005–06, 2015–16 and 2019–21, we estimated joint disparities by religion-caste and religion-tribe, for prevalence of stunting, underweight and wasting in children between 0–5 years of age. As indicators of long- and short-term growth interruptions, these are key population health indicators capturing developmental potential of children. Our sample included Hindu and Muslim children of < = 5 years, who belonged to Other (forward) castes (the most privileged social group), Other Backward Classes (OBCs), Schedule Castes (SCs) and Schedule Tribe (STs). Hindu-Other (forward) caste, as the strata with the dual advantages of religion and social group was specified as the reference category. We specified Log Poisson models to estimate multiplicative interactions of religion- caste and religion-tribe identities on risk ratio scales. We specified variables that may be associated with caste, tribe, or

religion, as dimensions of social hierarchy, and/or with child growth as covariates, including fixed effects for states, survey years, child's age, sex, household urbanicity, wealth, maternal education, mother's height, and weight. We assessed patterns in growth outcomes by intersectional religion-caste and religion-tribe subgroups nationally, assessed their trends over the last 30 years, and across states. **Findings:** The sample comprised 6,594, 4,824, 8,595, 40,950 and 3,352 Muslim children, and 37,231, 24,551, 35,499, 1,87,573 and 171,055 Hindu children over NFHS 1, 2, 3, 4, and 5, respectively. As one example anthropometric outcome, predicted prevalence of stunting among different subgroups were as follows- Hindu Other: 34.7% (95%CI: 33.8, 35.7), Muslim Other: 39.2% (95% CI: 38, 40.5), Hindu OBC: 38.2 (95%CI: 37.1, 39.3), Muslim OBC: 39.6% (95%CI: 38.3, 41), Hindu SCs: 39.5% (95%CI: 38.2, 40.8), Muslims identifying as SCs: 38.5% (95%CI: 35.1, 42.3), Hindu STs: 40.6% (95% CI: 39.4, 41.9), Muslim STs: 39.7% (95%CI: 37.2, 42.4). Over the last three decades, Muslims always had higher prevalence of stunting than Hindus across caste groups. But this difference doubled for the most advantaged castes (Others) and reduced for OBCs (less privileged caste group). For SCs, who are the most disadvantaged caste group, the Muslim disadvantage reversed to an advantage. Among tribes (STs), Muslims always had an advantage, which reduced over time. Similar directions and effect sizes were estimated for prevalence of underweight. For prevalence of wasting, effect sizes were in the same range, but not statistically significant for two minority castes-OBCs and SCs. **Interpretation:** Hindu children had the highest advantages over Muslim children when they belonged to the most privileged castes. Muslim forward caste children were also disadvantaged compared to Hindu children from deprived castes (Hindu OBCs and Hindu SCs), in the case of stunting. Thus, disadvantages from a socially underprivileged religious identity, seemed to override relative social advantages of forward caste identity for Muslim children. Disadvantages born of caste identity seemed to take precedence over the social advantages of Hindu religious identity, for Hindu children of deprived castes and tribes. The doubly marginalized Muslim children from deprived castes were always behind their Hindu counter parts, although their differentials were less than that of Muslim-Hindu children of forward castes. For tribal children, Muslim identity seemed to play a protective role. Our findings indicate monitoring child development outcomes by subgroups capturing intersectional social experiences of relative privilege and access from intersecting religion and social group identities, could inform policies to target health disparities.

Wealth Inequalities in Nutritional Status among the Tribal Under-5 Children in India: A Temporal Trend Analysis Using NFHS Data of Jharkhand and Odisha States - 2006-21

Rekha, S., P. Shirisha, V.R. Muraleedharan, G. Vaidyanathan, and U. Dash. 2023. "Wealth Inequalities in Nutritional Status among the Tribal Under-5 Children in India: A Temporal Trend Analysis Using NFHS Data of Jharkhand and Odisha States - 2006-21." *Dialogues in Health 2 (December): 100135.* https://doi.org/10.1016/j.dialog.2023.100135.

Background: Undernutrition remains a major public health concern in India, especially among children belonging to the Scheduled Tribes (ST). In this study, we analyse wealth inequalities in nutritional outcomes within ST communities in two tribal-dominated states of India, namely, Odisha and Jharkhand. The study also compares the trends in nutrition outcomes between ST and Non-ST children in these states. **Methods:** We have conducted a trend analysis of the prevalence and inequalities in the nutritional indicators among ST children under age five using unit-level data of the National Family Health Survey (NFHS) [NFHS-3(2005–06),4 (2015–16) and 5(2019–2021)]. Wealth-related inequalities were analysed using the Slope Index of Inequality (SII), which measures absolute inequality, and the relative Concentration Index (CIX), which measures relative inequality. We have also analysed the correlation between Antenatal Care (ANC) visits and nutritional indicators using the Pearson Correlation test. **Results**: The trend analysis shows that the prevalence of undernutrition remains higher among ST children in India as compared to Non-ST children between NFHS-3 (2005–

06) and NFHS-5 (2019–2020) in Jharkhand and Odisha. The SII and CIX values show that statistically significant inequalities in stunting and underweight exist among children belonging to various wealth quintiles within the ST category in both states. Wasting is found to be significantly prevalent across all wealth quintiles. Also, we found a negative association between ANC visits and all three nutritional indicators. **Interpretation**: Our study highlights the importance of monitoring both the absolute and relative wealth inequalities in nutritional outcomes. This is due to the fact that while inequalities across groups may reduce, the prevalence of poor nutritional outcomes may increase among certain groups. Such observations, therefore, will enable policymakers to focus further on those groups and devise appropriate interventions.

Growth in Milk Consumption and Reductions in Child Stunting: Historical Evidence from Cross-Country Panel Data

Haile, B., and D. Headey. 2023. "Growth in Milk Consumption and Reductions in Child Stunting: Historical Evidence from Cross-Country Panel Data." *Food Policy 118 (July): 102485.* https://doi.org/10.1016/j.foodpol.2023.102485

Agricultural and food policies are increasingly being tasked with doing more to improve the nutritional status of low-income populations, especially reductions in child stunting. Which specific food sectors warrant additional policy attention is less clear, although a growing body of research argues that increased animal-sourced food consumption in general, and increased dairy consumption specifically, can significantly reduce the risks of stunting, as well as deficiencies in micronutrients and high quality protein. However, experimental research on dairy's impacts on child growth in developing countries is very limited, and non-experimental evidence is confined to cross-sectional surveys. In this study we adopt a more macro lens by using a cross-country panel to show that increases in milk consumption over time are associated with large reductions in child stunting even after controlling for important confounding factors. Countries with high rates of stunting should therefore consider nutrition-sensitive strategies to increase dairy consumption among young children through both supply- and demand-side interventions.

Abdominal Obesity in India: Analysis of the National Family Health Survey-5 (2019–2021) Data

Chaudhary, M., and P. Sharma. 2023. "Abdominal Obesity in India: Analysis of the National Family Health Survey-5 (2019–2021) Data." *The Lancet Regional Health - Southeast Asia 14 (July): 100208.* https://doi.org/10.1016/j.lansea.2023.100208.

Background: The ever-growing trend of abdominal obesity worldwide has garnered global attention over the past three decades. In India, BMI has conventionally been used to measure obesity. National Family Health Survey (NFHS) is the largest demographic and health survey (DHS) in India. For the first time, the NFHS conducted the fifth round in 2019–21 which assessed abdominal obesity through waist circumference. The objective of the current study was to determine the prevalence of abdominal obesity and explore the associated socioeconomic factors. **Methods:** The prevalence of abdominal obesity in India was determined using the NFHS-5 dataset, where waist circumference was used as a measure. Multivariable binary logistic regression was then employed to examine the association of different socioeconomic factors with abdominal obesity. **Findings:** The prevalence of abdominal obesity in the country was found to be 40% in women and 12% in men. The findings show that 5–6 out of 10 women between the ages of 30–49 are abdominally obese. The association of abdominal obesity in women is stronger with older age groups, urban residents, wealthier sections, and non-vegetarians. For those practising the Sikh religion, the prevalence is higher in both men and women. Abdominal obesity is also on the rise in rural areas and is penetrating lower and middle socioeconomic sections of society. **Interpretation:** The findings of the current study highlight the need for the government and other stakeholders to proactively design targeted interventions for

abdominal obesity, especially for women in their thirties and forties in India. Further research is recommended to understand the driving factors of abdominal obesity, their inter-operability, and the disease risk associated with this type of obesity.

National Income and Macro-Economic Correlates of the Double Burden of Malnutrition: An Ecological Study of Adult Populations in 188 Countries over 42 Years

Seenivasan, S., D. Talukdar, and A. Nagpal. 2023. "National Income and Macro-Economic Correlates of the Double Burden of Malnutrition: An Ecological Study of Adult Populations in 188 Countries over 42 Years." https://doi.org/10.1016/S2542-5196(23)00078-5. *The Lancet Planetary Health 7 (6): e469–77.*

Background: The double burden of malnutrition (DBM) represents a growing global challenge with adverse health and economic consequences. We aimed to investigate the associative roles of national income (gross domestic product per capita [GDPPC]) and macro-environmental factors on the DBM trends among national adult populations. **Methods**: In this ecological study we assembled extensive historical data on GDPPC from the World Bank World Development Indicators database and population-level DBM data of adults (aged ≥18 years) from the WHO Global Health Observatory database in 188 countries over 42 years (1975–2016). In our analysis, a country was considered to have the DBM in a year when adult overweight (BMI ≥25·0 kg/m2) and underweight (BMI <18·5 kg/m2) prevalence was each 10% or more in that year. We used a Type 2 Tobit model to estimate the association of GDPPC and selected macro-environmental factors (globalisation index, adult literacy rate, female share in the labour force, share of agriculture in the national gross domestic product [GDP], prevalence of undernourishment, and percentage of principal display area mandated to be covered by health warnings on cigarette packaging) with DBM in 122 countries. **Findings:** We find a negative association between GDPPC and the likelihood of a country having the DBM. However, conditional on its presence, DBM level exhibits an inverted-U shaped association with GDPPC. We found an upward shift in DBM levels from 1975 to 2016 across countries at the same level of GDPPC. Among the macro-environmental variables, share of females in the labour force and share of agriculture in the national GDP are negatively associated with DBM presence in a country, whereas the prevalence of undernourishment in the population is positively associated. Further, globalisation index, adult literacy rate, share of females in the labour force, and health warnings on cigarette packaging are negatively associated with DBM levels in countries. **Interpretation:** DBM level in national adult populations rises with GDPPC until US$11 113 (in 2021 constant dollar terms) and then starts declining. Given their current GDPPC levels, most low-income and middle-income countries are thus unlikely to have a decline in the DBM levels in the near future, ceteris paribus. Those countries will also be expected to experience a higher DBM level at similar levels of national income than were historically experienced by the current high-income countries. Our findings point to a further intensification of the DBM challenge in the near future for the low-income and middle-income countries as they continue to have income growth.

Trends in Prevalence and Determinants of Severe and Moderate Anaemia among Women of Reproductive Age during the Last 15 Years in India

Sappani, M., T. Mani, E.S. Asirvatham, M. Joy, M. Babu, and L. Jeyaseelan. 2023. "Trends in Prevalence and Determinants of Severe and Moderate Anaemia among Women of Reproductive Age during the Last 15 Years in India." *PLOS ONE 18 (6): e0286464.* https://doi.org/10.1371/journal.pone.0286464.

Background: Anaemia is a serious global public health problem that disproportionally affects children, adolescent girls, and women of reproductive age, especially pregnant women. Women of

reproductive age are more vulnerable to anaemia, particularly severe and moderate anaemia leads to adverse outcomes among pregnant women. Despite continuous Government efforts, anaemia burden still poses a serious challenge in India. The objective of this study is to assess the trends in prevalence and determinants of severe and moderate anaemia among women of reproductive age between 15 and 49 years. **Method:** We used three rounds of the large-scale National Family Health Survey (NFHS) India, conducted on a representative sample of households using a cross-sectional design across the country in 2005–06, 2015–16 and 2019–2021. We included all the women aged 15 to 49 years in our analysis. We used the same haemoglobin (Hb) cut-off values for all the three rounds of surveys to ensure comparability. Generalized linear regression analyses with log link were done. Survey weights were incorporated in the analysis. **Results:** The prevalence of severe or moderate Anaemia (SMA) in non-pregnant women was 14.20%, 12.43% and 13.98%; it was 31.11%, 25.98% and 26.66% for pregnant women in 2006, 2016 and 2021 respectively. The decline in SMA prevalence was 1.54% in non-pregnant women, whereas it was 14.30% in pregnant women in 15 years. Women who were poor, and without any formal education had a higher risk for severe and moderate Anaemia**. Conclusion:** Despite the intensive anaemia control program in India, SMA has not declined appreciably in non-pregnant women during the last two decades. Despite the decline, the prevalence of SMA was about 26% in pregnant women which calls for a comprehensive review of the existing anaemia control programmes and there must be targeted programmes for the most vulnerable and high-risk women such as rural, poor and illiterate women of reproductive age to reduce the burden of anaemia among them.

Comprehensive Framework for Integrated Action on the Prevention, Diagnosis, and Management of Anemia: An Introduction

Wilson, S.E., L.M. Rogers, M.N. Garcia-Casal, M. Barreix, A. Bosman, J. Cunningham, A. Goga, A. Montresor, and Ö. Tunçalp. 2023. "Comprehensive Framework for Integrated Action on the Prevention, Diagnosis, and Management of Anemia: An Introduction." *Annals of the New York Academy of Sciences 1524 (1): 5–9*. https://doi.org/10.1111/nyas.14999.

The World Health Organization (WHO) announced in 2021 a commitment to develop a comprehensive framework for integrated action on the prevention, diagnosis, and management of anemia and to establish an Anaemia Action Alliance to support the implementation of the framework. WHO commissioned four background papers to provide reflections about the most pressing issues to be addressed for accelerating reductions in the prevalence of anemia. Here, we provide a complete vision of the framework.

Diagnosing Anemia: Challenges Selecting Methods, Addressing Underlying Causes, and Implementing Actions at the Public Health Level

Garcia-Casal, M.N., O. Dary, M.E. Jefferds, and S. Pasricha. 2023. "Diagnosing Anemia: Challenges Selecting Methods, Addressing Underlying Causes, and Implementing Actions at the Public Health Level." *Annals of the New York Academy of Sciences 1524 (1): 37–50.* https://doi.org/10.1111/nyas.14996.

Accurate and affordable tools for diagnosing anemia and its main determinants are essential for understanding the magnitude and distribution of the problem and the appropriate interventions needed for its timely prevention and treatment. The objective of this review is to address methods, equipment, and sample-related and quality control aspects of hemoglobin measurement for anemia diagnosis. Also, other iron-, infectious-, and genetic-related causes of anemia are addressed in individuals and populations. The best practice for hemoglobin determination is the use of venous

blood, analyzed on automated hematology analyzers, with high-quality control measures in place. The importance of a correct anemia diagnosis is highlighted by the cost of a misdiagnosis. A false-negative diagnosis may result in missing out and not treating anemia, its causes, and its adverse effects. On the other hand, a false-positive diagnosis may result in the provision of unneeded treatment or referral for expensive laboratory tests to determine a cause of anemia, wasting valuable resources and risking causing harm. At the individual level, clinicians must understand the causes of absolute and functional anemia to diagnose and treat anemia at the clinical level. Actions toward anemia diagnosis and control at public health levels require global, regional, and country actions that should cover general and context-specific characteristics.

Factors Associated with Underutilization of Antenatal Care in India: Results from 2019–2021 National Family Health Survey

Thakkar, N., P. Alam, and D. Saxena. 2023a. "Factors Associated with Underutilization of Antenatal Care in India: Results from 2019–2021 National Family Health Survey." *PLOS ONE 18 (5): e0285454.* https://doi.org/10.1371/journal.pone.0285454.

Introduction: Despite progress in recent years, full antenatal care utilization in India continues to be relatively low and inequitable, particularly between states and districts. In 2015–2016, for example, only 51% of women aged 15–49 in India attended antenatal care at least four times during pregnancy. Using data from the fifth iteration of India's National Family Health Survey, our study aims to explore factors related to the underutilization of antenatal care in India. **Materials and methods:** Data from the most recent live birth in the past five years among women aged 15–49 years were included in our analysis (n = 172,702). Our outcome variable was "adequate antenatal care visits", defined as four or more antenatal visits. Utilizing Andersen's behavioral model, 14 factors were identified as possible explanatory variables. We used univariate and multivariate binary logistic regression models to analyze the association between explanatory variables and adequate visits. Associations were considered statistically significant if $p<0.05$. **Results:** Of the 172,702 women in our sample, 40.75% (95% CI: 40.31–41.18%) had an inadequate number of antenatal care visits. In multivariate analysis, women with less formal education, from poorer households and more rural areas had higher odds of inadequate visits. Regionally, women from Northeastern and Central states had higher odds of inadequate antenatal care utilization compared to those from Southern states. Caste, birth order, and pregnancy intention were also among the variables associated with utilization of antenatal care. **Discussion**: Despite improvements in antenatal care utilization, there is cause for concern. Notably, the percentage of Indian women receiving adequate antenatal care visits is still below the global average. Our analysis also reveals a continuity in the groups of women at highest risk for inadequate visits, which may be due to structural drivers of inequality in healthcare access. To improve maternal health and access to antenatal care services, interventions aimed at poverty alleviation, infrastructure development, and education should be pursued.

Assessing the Coverage of Full Antenatal Care among Adolescent Mothers from Scheduled Tribe and Scheduled Caste Communities in India

Singh, A., V. Kumar, H. Singh, S. Chowdhury, and S. Sharma. 2023. "Assessing the Coverage of Full Antenatal Care among Adolescent Mothers from Scheduled Tribe and Scheduled Caste Communities in India." *BMC Public Health 23 (1): 798.* https://doi.org/10.1186/s12889-023-15656-1.

Background: The persistently high rates of maternal mortality and morbidity among historically marginalised social groups, such as adolescent Scheduled Castes (SCs) and Scheduled Tribes (STs) in India, can be attributed, in part, to the low utilisation of full antenatal healthcare services. Despite efforts by the Indian government, full antenatal care (ANC) usage remains low among this

population. To address this issue, it is crucial to determine the factors that influence the utilisation of ANC services among adolescent SC/ST mothers. However, to date, no national-level comprehensive study in India has specifically examined this issue for this population. Our study aims to address this research gap and contribute to the understanding of how to improve the utilisation of ANC services among adolescent SC/ST mothers in India. **Data and methods**: Data from the fourth round of the National Family Health Survey 2015–16 (NFHS-4) was used. The outcome variable was full antenatal care (ANC). A pregnant mother was considered to have 'full ANC' only when she had at least four ANC visits, at least two tetanus toxoid (TT) injections, and consumed 100 or more iron-folic acid (IFA) tablets/syrup during her pregnancy. Bivariate analysis was used to examine the disparity in the coverage of full ANC. In addition, binary logistic regression was used to understand the net effect of predictor variables on the coverage of full ANC. **Results:** The utilisation of full antenatal care (ANC) among adolescent SC/ST mothers was inadequate, with only 18% receiving full ANC. Although 83% of Indian adolescent SC/ST mothers received two or more TT injections, the utilisation of the other two vital components of full ANC was low, with only 46% making four or more ANC visits and 28% consuming the recommended number of IFA tablets or equivalent amount of IFA syrup. There were statistically significant differences in the utilisation of full ANC based on the background characteristics of the participants. The statistical analysis showed that there was a significant association between the receipt of full ANC and factors such as religion (OR = 0.143, CI = 0.044–0.459), household wealth (OR = 5.505, CI = 1.804–16.800), interaction with frontline health workers (OR = 1.821, CI = 1.241–2.670), and region of residence in the Southern region (OR = 3.575, CI = 1.917–6.664). **Conclusion:** In conclusion, the study highlights the low utilisation of full antenatal care services among Indian adolescent SC/ST mothers, with only a minority receiving the recommended number of ANC visits and consuming the required amount of IFA tablets/syrup. Addressing social determinants of health and recognising the role of frontline workers can be crucial in improving full ANC coverage among this vulnerable population. Furthermore, targeted interventions tailored to the unique needs of different subgroups of adolescent SC/ST mothers are necessary to achieve optimal maternal and child health outcomes.

Opportunities and Barriers for Maternal Nutrition Behavior Change: An In-Depth Qualitative Analysis of Pregnant Women and Their Families in Uttar Pradesh, India

Jhaveri, N.R., N.E. Poveda, S. Kachwaha, D.L. Comeau, P.H. Nguyen, and M.F. Young. 2023. "Opportunities and Barriers for Maternal Nutrition Behavior Change: An in-Depth Qualitative Analysis of Pregnant Women and Their Families in Uttar Pradesh, India." *Frontiers in Nutrition 10 (July).* https://doi.org/10.3389/fnut.2023.1185696

Background: Maternal undernutrition during pregnancy remains a critical public health issue in India. While evidence-based interventions exist, poor program implementation and limited uptake of behavior change interventions make addressing undernutrition complex. To address this challenge, Alive & Thrive implemented interventions to strengthen interpersonal counseling, micronutrient supplement provision, and community mobilization through the government antenatal care (ANC) platform in Uttar Pradesh, India. **Objective:** This qualitative study aimed to: (1) examine pregnant women's experiences of key nutrition-related behaviors (ANC attendance, consuming a diverse diet, supplement intake, weight gain monitoring, and breastfeeding intentions); (2) examine the influence of family members on these behaviors; and (3) identify key facilitators and barriers that affect behavioral adoption. **Methods:** We conducted a qualitative study with in-depth interviews with 24 pregnant women, 13 husbands, and 15 mothers-in-law (MIL). We analyzed data through a thematic approach using the Capability-Opportunity-Motivation-Behavior (COM-B) framework. **Results:** For ANC checkups and maternal weight gain monitoring, key facilitators were frontline worker home visits, convenient transportation, and family support, while the primary barrier was low motivation and lack understanding of the importance of ANC checkups. For dietary

diversity, there was high reported capability (knowledge related to the key behavior) and most family members were aware of key recommendations; however, structural opportunity barriers (financial strain, lack of food availability and accessibility) prevented behavioral change. Opportunity ranked high for iron and folic acid supplement (IFA) intake, but was not consistently consumed due to side effects. Conversely, lack of supply was the largest barrier for calcium supplement intake. For breastfeeding, there was low overall capability and several participants described receiving inaccurate counseling messages. **Conclusion:** Key drivers of maternal nutrition behavior adoption were indicator specific and varied across the capability-opportunity-motivation behavior change spectrum. Findings from this study can help to strengthen future program effectiveness by identifying specific areas of program improvement.

To What Extent Classic Socio-Economic Determinants Explain Trends of Anaemia in Tribal and Non-Tribal Women of Reproductive Age in India? Findings from Four National Family Heath Surveys (1998–2021)

Ghosal, J., M. Bal, M. Ranjit, A. Das, M.R. Behera, S.K. Satpathy, A. Dutta, and S. Pati. 2023. "To What Extent Classic Socio-Economic Determinants Explain Trends of Anaemia in Tribal and Non-Tribal Women of Reproductive Age in India? Findings from Four National Family Heath Surveys (1998–2021)." BMC Public Health 23 (1): 856. https://doi.org/10.1186/s12889-023-15838-x.

Background: Despite unprecedented socio-economic growth experienced by Indians in the past few decades, and a long history of anti-anaemia public health measures, prevalence of anaemia in Indian non-pregnant women of reproductive age group (NPWRA) has not declined. This warrants a firm understanding of what explains the anaemia situation over time, preferably by sub-populations. Therefore, we aimed to examine the trends of anaemia in tribal NPWRA (least privileged) and compare with the trends in the NPWRA of general caste (most privileged) between 1998 to 2021. Additionally, the study also explored explanation of any decline and tribal/general narrowing of these trends**. Methods**: We studied four rounds of National Family Health Survey (1998–99, 2005–06, 2015–16, 2019–21). We examined the trend of anaemia (haemoglobin < 12 g/dl) and its possible determinants in tribal and general NPWRA and estimated the portion of "decline" and "narrowing" that could be explained by the underlying and intermediate determinants (wealth, education, residence, parity and food security) using multiple logistic regression. **Results:** The distribution of determinants improved over 23 years in both the groups but more in tribals. But anaemia either remained unchanged or increased in both except 7.1 points decline in tribals between 2006–2016, leading also to 7 points narrowing of tribal/general gap. The modest attenuation of beta coefficients representing the change of anaemia prevalence (log of odds) in tribals from -0.314(-0.377, -0.251) to -0.242(-0.308, -0.176) after adjustment with determinants could explain only 23% of the decline. Similarly, only 7% of the narrowing of the tribal/general anaemia gap could be explained. **Conclusions:** The structural determinants wealth, education, food security, parity and urban amenities improved immensely in India but anaemia did not decline in this 23-year period. This implies that the "usual suspects" – the structural determinants are not the main drivers of anaemia in the country. The main driver may be absolute and/or functional deficiency status of micronutrients including iron attributable to inadequate uptake and absorption of these elements from Indian diets; and therefore, their effects are noticeable in every socio-economic stratum of India. Future research for aetiologies and new interventions for anaemia alleviation in India may focus on these factors.

Factors Associated with Delayed Initiation and Non-Exclusive Breastfeeding among Children in India: Evidence from National Family Health Survey 2019-21

Sharma, M., A. Anand, I. Goswami, and M.R. Pradhan. 2023. "Factors Associated with Delayed Initiation and Non-Exclusive Breastfeeding among Children in India: Evidence from National Family Health Survey 2019-21." *International Breastfeeding Journal 18 (1): 28.* https://doi.org/10.1186/s13006-023-00566-0.

Background: In India, more than half of the newborns experience delayed breastfeeding, and non-exclusive breastfeeding is practiced in 63% of babies below the age of six months. The goal of this study is to investigate the extent to which external environment, demographic and socioeconomic, pregnancy and birthing characteristics, as well as utilization of maternal care services, are associated with delayed initiation and non-exclusive breastfeeding among children in India. **Methods**: Data was gathered from the fifth round of the National Family Health Survey (NFHS), which was conducted in 2019-21. This study used information on 85,037 singleton infants aged 0–23 months and 22,750 singleton infants aged 0–5 months. Delayed initiation of breastfeeding and non-exclusive breastfeeding was used as outcome variables in this study. Unadjusted and adjusted multivariable binary logistic regression was performed to analyse the association of delayed breastfeeding and non-exclusive breastfeeding with selected background characteristics. **Results**: Factors significantly associated with increased risks of delayed initiation of breastfeeding included infants from in the central region (OR 2.19; 95% CI 2.09, 2.29), mothers in the 20 to 29 years age group at the time of childbirth (OR 1.02; 95% CI 0.98, 1.05), caesarean deliveries (OR 1.97; 95% CI 1.90, 2.05). The likelihoods for non-exclusive breastfeeding significantly increased among children belonging to the richest household status (OR 1.30; 95% CI 1.17, 1.45), mothers who had less than nine months of pregnancy period (OR 1.15; 95% CI 1.06, 1.25), and mothers who gave birth in non-health facility (OR 1.17; 95% CI 1.05, 1.31). **Conclusions**: The connections between several different categories of factors and non-exclusive breastfeeding and delayed breastfeeding initiation show the need for comprehensive public health programmes using a multi-sectoral approach to promote breastfeeding behaviours in India.

Determinants of Kangaroo Mother Care Uptake for Small Babies Along the Health Facility to Community Continuum in Karnataka, India

Washington, M., L. Macaden, A. Smith, S. Selvam, and P.K. Mony. 2023. "Determinants of Kangaroo Mother Care Uptake for Small Babies Along the Health Facility to Community Continuum in Karnataka, India." *Global Health: Science and Practice 11 (3): e2200457.* https://doi.org/10.9745/GHSP-D-22-00457.

Introduction: Kangaroo mother care (KMC) scale-up is a proposed strategy to accelerate reduction in neonatal mortality rates. We aimed to identify determinants of KMC uptake for small babies (less than 2,000 g birth weight) along the health facility to community continuum in Karnataka, India. **Methods:** From June 2017 to March 2020, data on characteristics of health facilities and health care workers (HCWs) from 8 purposively selected health facilities were assessed. Knowledge, attitude, and support the mothers received for KMC uptake were assessed once between 4 weeks and 8 weeks unadjusted age of the cohort of babies. Secondary data on KMC were obtained from the district-wide implementation research project database. Bivariate analysis was used to assess the association of characteristics of health facilities, HCWs, mothers, and small babies with the day of KMC initiation and its duration. Log-binomial regression analysis was then computed to identify determinants of KMC. **Results:** We recruited 227 (91.5%) of 248 babies eligible to participate with a mean unadjusted age of 35.6 days (±7.5) and 1,693.9 g (±263.1 g) birth weight. KMC was initiated for 95.2% of 227 babies at the health facility; initiated at 3 days or earlier of life for 59.6% of 226 babies; and babies continued to receive KMC for more than 4 weeks (30.2 days [±8.4]) at home.

Determinants of KMC initiation were HCWs' attitudes, initiation support at the health facility, and place of hospitalization. Determinants of KMC maintenance at the health facility were HCWs' skills and support the mother received at the facility after initiating KMC. Place of hospitalization and HCWs' knowledge determined KMC duration at home 1 week after discharge. **Conclusion:** These findings emphasize the importance of competent HCWs and support for mothers at the health facility for initiation and maintenance of KMC within the health facility and 1 week after discharge.

Role of Mitanin Community Health Workers in Improving Complementary Feeding Practices under Scaled-up Home-Based Care of Young Children in a Rural Region of India

Garg, S., M. Dewangan, K. Patel, C. Krishnendhu, and P. Nanda. 2023. "Role of Mitanin Community Health Workers in Improving Complementary Feeding Practices under Scaled-up Home-Based Care of Young Children in a Rural Region of India." *BMC Pediatrics 23 (1): 171.* https://doi.org/10.1186/s12887-023-03993-4.

Background: A large proportion of young children in developing countries receive inadequate feeding and face frequent infections. Global research has established the need for improving feeding practices and management of child illnesses. Interventions involving home visits by community health workers (CHWs) for caregiver education have been attempted in many countries. Indian government rolled out an intervention called home-based care of young children (HBYC) in 2018 but no studies exist of its scaled-up implementation. The current study was aimed at assessing the coverage of HBYC in Chhattisgarh state where it has been implemented through 67,000 rural CHWs known as Mitanins. **Methods:** This cross-sectional study was based on a primary household survey. Households with children in 7–36 months age were eligible for survey. A multi-stage sample of 2646 households was covered. Descriptive analyses were performed and key indicators were reported with 95% confidence intervals. To find out the association between caregiver practices and receiving advice from the CHWs, multivariate regression models were applied. **Results:** Overall, 85.1% children in 7–36 months age received at least one home visit from a CHW within the preceding three months. Complementary feeding had been initiated for 67% of children at six months age and the rate was 87% at eight months age. Around one-third of the children were fed less than three times a day. Around 41% households added oil in child's food the preceding day. CHWs were contacted in 73%, 69% and 61% cases of diarrhea, fever and respiratory infections respectively in children. Among those contacting a CHW for diarrhea, 88% received oral rehydration. The adjusted models showed that receiving advice from CHWs was significantly associated with timely initiation of complementary feeding, increasing the frequency of feeding, increasing diet diversity, addition of oil, weighing and consumption of food received from government's supplementary nutrition programme. **Conclusions:** Along with improving food security of households, covering a large share of young children population with quality home visits under scaled-up CHW programmes can be the key to achieving improvements in complementary feeding and child care practices in developing countries.

'All My Co-Workers Are Good People, But…': Collaboration Dynamics between Frontline Workers in Rural Uttar Pradesh, India

Glandon, D., M.Z. Hasan, M. Mann, S. Gupta, J. Marsteller, L. Paina, and S. Bennett. 2023. "'All My Co-Workers Are Good People, But…': Collaboration Dynamics between Frontline Workers in Rural Uttar Pradesh, India." *Health Policy and Planning 38 (6): 655.* https://doi.org/10.1093/heapol/czad025.

Multisectoral collaboration has been identified as a critical component in a wide variety of health and development initiatives. For India's Integrated Child Development Services (ICDS) scheme, which

serves >100 million people annually across more than one million villages, a key point of multisectoral collaboration—or 'convergence', as it is often called in India—is between the three frontline worker cadres jointly responsible for delivering essential maternal and child health and nutritional services throughout the country: the Accredited Social Health Activist (ASHA), Anganwadi worker (AWW) and auxiliary nurse midwife (ANM) or 'AAA' workers. Despite the long-recognized importance of collaboration within this triad, there has been relatively little documentation of what this looks like in practice and what is needed in order to improve it. Informed by a conceptual framework of collaborative governance, this study applies inductive thematic analysis of in-depth interviews with 18 AAA workers and 6 medical officers from 6 villages across three administrative blocks in Hardoi district of Uttar Pradesh state to identify the key elements of collaboration. These are grouped into three broad categories: 'organizational' (including interdependence, role clarity, guidance/support and resource availability); 'relational' (interpersonal and conflict resolution) and 'personal' (flexibility, diligence and locus of control). These findings underscore the importance of 'personal' and 'relational' collaboration features, which are underemphasized in India's ICDS, the largest of its kind globally, and in the multisectoral collaboration literature more broadly—both of which place greater emphasis on 'organizational' aspects of collaboration. These findings are largely consistent with prior studies but are notably different in that they highlight the importance of flexibility, locus of control and conflict resolution in collaborative relationships, all of which relate to one's ability to adapt to unexpected obstacles and find mutually workable solutions with colleagues. From a policy perspective, supporting these key elements of collaboration may involve giving frontline workers more autonomy in how they get the work done, which may in some cases be impeded by additional training to reinforce worker role delineation, closer monitoring or other top-down efforts to push greater convergence. Given the essential role that frontline workers play in multisectoral initiatives in India and around the world, there is a clear need for policymakers and managers to understand the elements affecting collaboration between these workers when designing and implementing programmes.

A Systematic Review and Meta-Analysis of the Association of Dietary Diversity with Undernutrition in School-Aged Children

Zeinalabedini, M., B. Zamani, E. Nasli-Esfahani, and L. Azadbakht. 2023. "A Systematic Review and Meta-Analysis of the Association of Dietary Diversity with Undernutrition in School-Aged Children." *BMC Pediatrics 23 (1): 269*. https://doi.org/10.1186/s12887-023-04032-y.

Background: Malnutrition in childhood has lasting consequences; its effects not only last a lifetime but are also passed down from generation to generation such as short stature, school-aged children are the most vulnerable section of the population and require special attention, including nutrition. **Method:** We searched Medline through PubMed, Scopus, and Web of Science to identify all observational studies published before Jun 2022. Observational studies with a pediatric population aged 5–18 years that evaluated risk estimate with 95% confidence intervals the relationship between dietary diversity and undernutrition (wasting, stunting, and thinness) were included. The Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) were followed. **Results:** This is a first systematic review and meta-analysis with a total of 20 studies were eligible (n = 18 388). Fourteen data evaluated stunting resulting in a pooled effect size estimated odds ratio of 1.43 (95% CI: 1.08–1.89; p = 0.013). Ten data evaluated Thinness resulting in a pooled effect size estimated odds ratio of 1.10 (95% CI: 0.81–1.49; P = 0.542). Two studies were revealed wasting with a odds ratio of 2.18 (95% CI: 1.41–3.36; p-value < 0.001). **Conclusion:** According to the conclusions of this meta-analysis of cross-sectional studies, inadequate dietary diversity increases the risk of undernutrition in growth linear but not in thinness in school-aged children. The findings of this analysis suggest that initiatives that support improvements to the diversity of children's diets to reduce the risk of undernutrition may be warranted in LMICs.

A Mixed Methods Systematic Review Exploring Infant Feeding Experiences and Support in Women with Severe Mental Illness

Baker, N., D. Bick, L. Bamber, C.A. Wilson, L.M. Howard, I. Bakolis, T. Soukup, and Y. Chang. 2023. "A Mixed Methods Systematic Review Exploring Infant Feeding Experiences and Support in Women with Severe Mental Illness." *Maternal & Child Nutrition, June.* https://doi.org/10.1111/mcn.13538

There are many benefits of breastfeeding to women and their infants but meeting the recommended 6 months of exclusive breastfeeding is likely to be more challenging for women with severe mental illness (SMI). This is the first systematic review that aims to examine evidence of (a) infant feeding outcomes in women with SMI and the factors associated with this, (b) the experiences of infant feeding and infant feeding support for women with SMI, (c) interventions for supporting infant feeding among these women and (d) health care professionals' attitudes toward supporting infant feeding in women with SMI. Mixed methods systematic review was carried out using the principles of Joanna Briggs Institute's (JBI) 'convergent integrated' methodology. CINAHL, PsycINFO, Medline and MIDIRS were used to search literature between 1994 and 2022. The quality of selected articles was assessed using JBI critical appraisal tools and thematic synthesis was undertaken to obtain findings. Eighteen papers were included in the final review. Women with SMI were less likely to initiate and continue breastfeeding than women without SMI. Several challenges with breastfeeding were highlighted, and while these were often linked to women's mental health difficulties, inconsistent advice from health care professionals and poor support with breastfeeding further compounded these challenges. This review highlights that policy and practice need to take into account the individual challenges women with SMI face when planning, initiating and maintaining breastfeeding. Education and training for health care professionals are needed to enable them to provide tailored infant feeding support to women with SMI, which reflects their individual needs.

LANCET CORRESPONDENCE ON GENDER INCLUSIVITY IN NATIONAL FAMILY HEALTH SURVEYS

How to Make India's National Family Health Survey More Gender-Sensitive

Joseph, V., and N. V Madhuri. 2022. "How to Make India's National Family Health Survey More Gender-Sensitive." *The Lancet 400 (10362): 1511.* https://doi.org/10.1016/S0140-6736(22)01798-6.

India's five rounds of the National Family Health Survey (NFHS) have provided large datasets with which to monitor progress on household sanitation, health and nutrition of women and children, and even the empowerment status of women. Whether these data accurately represent the condition and position of women in India is questionable.

The NFHS records data about couples and specifically on women's household decision making, mobility, use of a bank account and mobile phone, home or land ownership, and barriers to medical treatment, all of which are considered empowerment indicators for women. Each couple receives one survey. In a stereotypical patriarchal society where the man is usually head of the household, most respondents are men. A couple's record therefore often misses the women's point of view. The latest survey, NFHS-5,1 misses to a large extent woman's outcomes, and this might reflect women's voices in society generally.

In reality, data collected by the survey generate evidence for policy making only from men's perspectives. Hilary Graham argues that the survey method treats all individuals as being equal, and the subjectivity involved in framing questions for a survey might not fit a woman's answer to the question.2 Gender perspective should be considered early in the survey system, from composing questions and designing survey tools to sensitising the administrators and data entry operators to analyse data about women. Creating an encouraging environment for women to respond to the

survey is the prerequisite for women's participation in the survey. The complete set of NFHS questionnaires needs to be evaluated from a gender perspective.

Identifying gender-specific or differentiated data from the available data sources is difficult because of the limited policy space, poor coordination, and restricted resources, all of which are barriers to the development of additional gender data. Monitoring progress towards the Sustainable Development Goals will be difficult without gender-segregated differential data. Timely and accurate information about the status of women and girls is crucial for determining whether they are gaining from the activities designed to realise the 2030 agenda, particularly those activities that directly target gender equality.

Gender Inclusivity in India's National Family Health Survey

Jejeebhoy, S.J. 2023. "Gender Inclusivity in India's National Family Health Survey." *The Lancet 401 (10386): 1424–25.* https://doi.org/10.1016/S0140-6736(23)00338-0.

India's National Family Health Surveys (NFHSs), the most recent of which was done in 2019–21 (NFHS-5), have provided rich insights into women's wellbeing and agency and the progress made in enabling women to claim their rights. The NFHSs have allowed policy makers, programme implementers, and researchers to track over time women's nutritional status, access to institutional delivery services, educational status, and agency—namely, participation in household decision making, freedom of movement, control over resources, freedom from spousal violence, and other indicators reflecting voice and choice.

Yet, in their Correspondence, Vanishree Joseph and N V Madhuri state that the NFHS-5 "misses to a large extent woman's outcomes, and this might reflect women's voices in society generally". The authors explain that this limitation is due to the fact that each couple responds to a single questionnaire and, because of the patriarchal family system, the man usually supplies responses relating to women's agency. This interpretation is a gross misrepresentation of the NFHSs. The NFHSs, which are part of the Demographic and Health Surveys Program, are scientifically designed surveys offering findings that are representative of the country, and they can be compared with identical questions posed to men and women in other settings across the globe. The NFHS-5, like the other NFHSs, offers three separate questionnaires in each selected household. The first one is a household questionnaire, which is to be answered by the head of the household (typically a man) or any other responsible adult. However, questions are largely demographic, encompassing a roster of all household members (their age, sex, relationship to the head of the household, educational attainment level, etc). A second questionnaire is for women only; from each selected household, all women aged 15–49 years are selected for interview irrespective of marital status. The third questionnaire is directed to men aged 15–54 years from fewer, randomly selected households. Respondents to the female and male questionnaires are once again asked about their demographic characteristics, on the assumption that individuals provide more reliable information about themselves than does the head of the household (of course the head of the household could also be a respondent of the female or male questionnaire). Hence, women's perspectives are clearly not buried—each woman has the opportunity to report on her own agency, and even about the physical and sexual violence that her husband might have perpetrated.

Another misperception implied by Joseph and Madhuri is that the environment in which women respond to the questions might not be encouraging. In reality, people who are recruited to do interviews undergo an extensive training of 4 weeks, during which time they are trained not only in the content of each question but also about ethical issues, privacy and confidentiality, and the importance of making the respondent comfortable. Women are interviewed by female interviewers and men by male interviewers. Ensuring privacy means ensuring that women are interviewed in as

much privacy as the home allows, and, if other household members or visitors are present, that the respondent is comfortable in their presence or that the conversation takes place in low tones to avoid being overheard. All people recruited to do interviews have undergone mock sessions and field practice sessions, and trainers have vouched for their skills and empathy.

Joseph and Madhuri have no cause to worry that men are responding about women's empowerment or that the interview environment is threatening to women. However, researchers like me who are working on gender issues wish that the NFHSs would probe in greater depth about women's agency. Questions relating to work and use of time would help researchers to better understand women's limited participation in the labour force. More probing questions on marriage and reproductive choices—relating to premarital sexual relations, or choices related to contraception and abortion—would better elucidate power imbalances in intimate spheres. Social norms and the extent of adherence to traditional patriarchal norms are other areas that provide further information on gender roles, but they are poorly studied in the NFHSs. Finally, the NFHSs need to pay more attention to ensure that each domain of women's agency is adequately captured by the questions of the survey.

In 2019–21, only 71% of women in India made basic household decisions (with 89–91% of men making decisions on health or household purchases), 51% had access to money they could use, 79% owned a bank account, 42% had freedom of movement, and 29% continued to experience sexual or physical marital violence.1 Unlike the suggestions by Joseph and Madhuri,2 the NFHS-5, like the other NFHSs, tells us, in women's own voices, that women's agency remains hugely compromised.

Gender Inclusivity in India's National Family Health Survey

Arnold, F., and S. Kishor. 2023. "Gender Inclusivity in India's National Family Health Survey." *The Lancet 401 (10386): 1425–26.* https://doi.org/10.1016/S0140-6736(23)00339-2.

The Correspondence by Vanishree Joseph and N V Madhuri is misinformed. The authors state that data from India's latest National Family Health Survey (NFHS-5) generate evidence for policy making only from men's perspectives and that each couple receives only one survey. Both statements are not true. The survey includes separate questionnaires for women and men. The questionnaire for women is designed specifically to provide gender-relevant information on topics such as women's access to and control of household resources, empowerment, experience of domestic violence, fertility, family planning, nutrition, and maternal and child health. The questionnaire for men focuses on a smaller number of topics related to men's lives. Women are interviewed only by female interviewers and men are interviewed only by male interviewers. The interviews are done in privacy to the extent possible to ensure that responses are not affected by other household members. It is simply not true that the NFHS-5 misses to a large extent women's perspectives and outcomes, as the authors state.

The NFHS-5 questionnaires were based on the standard questionnaires of the Demographic and Health Surveys Program in 2018, but they were extensively revised by the survey's Technical Advisory Committee in India, which includes relevant Indian Government ministries, universities, international development partners, and other key stakeholders. In the NFHS-5, 724 155 women aged 15–49 years and 101 839 men aged 15–54 years were interviewed.2 Indian women's voices and lived experiences form the majority of the information provided by all NFHS surveys, including the NFHS-5.

Gender Inclusivity in India's National Family Health Survey – Authors' Reply

2023. "Gender Inclusivity in India's National Family Health Survey – Authors' Reply." *The Lancet 401 (10386): 1426.* https://doi.org/10.1016/S0140-6736(23)00334-3.

In our Correspondence, we did not question why women are excluded from the inquiry of the National Family Health Survey (NFHS); rather, we questioned why women are denied their epistemic authority and whose interests are served when interviewing women as part of the NFHS. The whole process of production, processing, and presentation of data needs to be looked at from women's perspectives. The questions posed to women in the survey tend to serve men's interests and gendered hierarchies. For instance, domestic violence against women is conceptualised as a harmful and unjustified act. The survey did not give scope to women to share their experiences and voice their concerns. The survey has viewed women only as wives subjected to domestic abuse as a consequence of their presumed misconduct. The claim of knowledge generated through the NFHS data on domestic violence needs to be justified. Although the NFHS provides insights into the nature of social reality, it should not depict the society in relation to masculine interests, attitudes, or values.

Another narrowly conceptualised aspect is the empowerment of women. The survey looked at empowerment in terms of what women are allowed to do. This conception of power is implicitly masculinist—it explains only domination and control but not what women can do and how they transform their own lives and others.

Additionally, details on children's immunisation status is recorded only from mothers' recalls. Vaccinating children is often perceived as the mothers' duty. Reaching out to mothers is a matter of convenience as they are viewed as a gateway to improved children's health. If the survey could recognise, reduce, and realign such gendered roles and responsibilities, the road towards an egalitarian society will be smoother. Otherwise, unquestioned belief will become a reality, especially while glorifying motherhood.

There is no iota of doubt regarding the training of the interviewers of this survey. However, the issue of reflexivity often occurs in the process of objective inquiry. Sometimes the emotional embodiment in the survey process can affect the results of the survey. Interviewers' consciousness might be constrained by their knowledge, experience, empathy, and their understanding on interviewees' silences, exclusions, and hesitation to answer specific questions. Checking one's own beliefs, judgements, and practices during the survey process is also very important.

The survey has indeed added resources in the form of data and generated evidence for policy making. Nevertheless, its use to transform society needs representation of data from women's perspectives and a shift away from androcentric patterns into questions. We believe that the NFHS has the potential to move from "telling it like it is" to "telling it as it may become", which are very different aspects, the first one indicating deconstruction and critique, and the second one indicating reimagination and reconstruction.

NON-PEER REVIEWED

Cultural and Contextual Drivers of Triple Burden of Malnutrition among Children in India

Singh, S.K, A. Chauhan; S.K. Sharma, P. Puri, S. Pedgaonkar, L.K. Dwivedi, and T.L. Smith. 2023. "Cultural and Contextual Drivers of Triple Burden of Malnutrition Among Children in India." *Preprints.org 2023, 2023060350.* https://doi.org/10.20944/preprints202306.0350.v1

The study examines malnutrition's triple burden, including anaemia, overweight, and stunting, among children aged 6-59 months. Using data from the National Family Health Survey-5 (2019-21), the study identifies risk factors and assesses the contribution at different levels to existing malnutrition burden. A random intercept multilevel logistic regression model and spatial analysis are

employed to identify child, maternal, and household level risk factors for stunting, overweight, and anaemia. The study finds that 34% of children were stunted, 4% overweight, and 66% anaemic. Stunting and anaemia prevalence were higher in central and eastern regions, while overweight was more prevalent in the north-eastern and northern regions. At macro-level, the coexistence of stunting, overweight, and anaemia circumstantiates the triple burden of childhood malnutrition with substantial spatial variation (Moran's I: stunting-0.53, overweight-0.41 and anaemia-0.53). Multilevel analysis reveals that child, maternal, and household variables play a substantial role in determining malnutrition burden in India. The nutritional health is significantly influenced by a wide range of determinants, necessitating multilevel treatments targeting households to address this diverse group of coexisting factors. Given the intra-country spatial heterogeneity, the treatment also needs to be tailor-made for various disaggregated levels.

A digital messaging intervention and remote data collection to support ECD & nutrition: Telangana, India

Roy, R., K. Tiwari, G. Lall, K. S. Chandrika, D. Jangra, N. R. Gaddamanugu, and G. Divan. 2023. " A digital messaging intervention and remote data collection to support ECD & nutrition: Telangana, India." *Field Exchange 69, May*. www.ennonline.net/fex/69/digital-counselling-intervention-remote-data-collection-early-child-development-nutrition-india

This article explores the development of a digital messaging intervention and methodologies used to collect data remotely during the COVID-19 pandemic – in Telangana, India – which targeted message recall, early child development and infant and young child feeding practices. The digital messaging intervention leveraged an existing opportunity in Telangana, one of the states with the highest penetration of mobile phones and internet usage, including ownership of phones among women, which ensured that messages delivered through the intervention achieved significant reach among beneficiaries. While digital messaging is a promising model to reach women with messages, it cannot replace the critical interpersonal communication offered by frontline workers. Both models are therefore complementary.

Prevalence of Vitamin B12 and Folate Deficiencies in Indian Children and Adolescents

Shalini, T.; R. Pullakhandam, S. Ghosh, B. Kulkarni, H. Rajkumar, H.S. Sachdev, A.V. Kurpad, and G.B. Reddy. 2023. "Prevalence of Vitamin B12 and Folate Deficiencies in Indian Children and Adolescents." *Nutrients 2023, 15, 3026.* doi: 10.20944/preprints202305.1011.v1

Deficiencies of vitamin B12 (B12) and folate (FA) are of particular interest due to their pleiotropic role in 1-carbon metabolism. In addition to adverse birth outcomes, deficiencies of B12 and FA, or an imbalance in FA/B12 status, are linked to metabolic disorders. Indian diets that are predominantly plant food-based could be deficient in these vitamins, but there are no national estimates of the prevalence of B12 and FA deficiency in Indian children and adolescents, nor of their associations with age, sex, and growth indicators. The recent Comprehensive National Nutrition Survey (CNNS-2016-18) provided estimates of the prevalence of B12 and FA deficiency at the national and state level among preschool (1-4y: 9,976 and 11,004 children respectively), school-age children (5-9y: 12,156 and 14,125) and adolescents (10-19y: 11,748 and 13,621). Serum B12 and erythrocyte FA were measured by the direct chemiluminescence method and their deficiency was defined using WHO cut-offs. The prevalence of B12 and FA deficiency was high among adolescents (31.0%, CI: 28.7-33.5 and 35.6%, CI: 33.1-8.2), compared to school-age (17.3%, CI: 15.4-19.3 and 27.6%, CI: 25.5-29.9) and preschool children (13.8%, CI: 11.7-16.2 and 22.8%, CI: 20.5-25.2, respectively). The prevalence of both B12 and FA deficiency was significantly higher by 8 and 5% points respectively, in

adolescent boys compared to girls. The prevalence of B12 deficiency was higher in moderately stunted school children (by 18.9% points) than in normal children, but no such difference was observed for FA deficiency. There was wide regional variation in the prevalence of B12 and FA deficiency, but no rural-urban differences were observed across all age groups. The national prevalence of B12 deficiency among preschool or school-age children was <20% (the cut-off that indicates a public health problem). However, FA deficiency in these age groups and both FA and B12 deficiencies in adolescents were >20%, which warrants further investigation.

Reducing inequalities for food security and nutrition

https://www.fao.org/3/cc6536en/cc6536en.pdf

The report "Reducing inequalities for food security and nutrition" has been developed by the High Level Panel of Experts on Food Security and Nutrition (HLPE-FSN) following the request by the United Nations Committee on World Food Security (CFS) as included in its Programme of Work (MYPoW 2020-2023). In particular, the CFS requested the HLPE-FSN to develop a report to: (i) analyse evidence relating to how inequalities in access to assets (particularly land, other natural resources and finance) and in incomes within food systems impede opportunities for many actors to overcome food insecurity and malnutrition; (ii) analyse the drivers of inequalities and provide recommendations on entry points to address these; and (iii) identify areas requiring further research and data collection. This report will inform the ensuing CFS thematic workstream on inequalities, aiming at addressing the root causes of food insecurity with a focus on those "most affected by hunger and malnutrition".

UPCOMING EVENTS & DEADLINES

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/

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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