



EDITOR'S NOTE

The sixth edition of the Abstract Digest underscores a complex and evolving nutrition landscape in South Asia, characterized by the persisting "triple burden" of malnutrition – undernutrition, overweight and obesity, and anemia. The *2025 report of the Lancet Countdown to 2030* provides an overarching global and regional assessment of reproductive, maternal, child, and adolescent health and nutrition, with an emphasis on low- and middle-income countries (LMICs), especially in South Asia.

Broadly, the featured articles examine the importance of preconception care and interventions to improve maternal and child health, alongside analyses of antenatal care service utilization and its associated factors. Studies also examine the prevalence and determinants of various forms of malnutrition, and assess the effectiveness and cost-benefit of nutrition programs and interventions, focusing on India and Bangladesh. A few articles focus on adolescent nutrition, highlighting the rising rates of overweight and obesity among children and adolescents in countries like Nepal and Bangladesh, as well as opportunities to improve maternal, infant, young child, and adolescent nutrition service delivery in Bangladesh, India, and beyond. Several articles delve into the influence of food environments on dietary quality and health in Bangladesh, India, and Nepal, as well as the broader context of health systems and policy implementation in LMICs. Many of the studies in this edition call for future research on rigorous evaluations of scalable interventions in real-world settings.

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The 2025 report of the Lancet Countdown to 2030 for women's, children's, and adolescents' health: tracking progress on health and nutrition.

Amouzou, A., Barros, A. J. D., Requejo, J., Faye, C., Akseer, N., Bendavid, E., Blumenberg, C., Borghi, J., El Baz, S., Federspiel, F., Ferreira, L. Z., Hazel, E., Heft-Neal, S., Hellwig, F., Liu, L., Maïga, A., Munos, M., Pitt, C., Shawar, Y. R., Shiffman, J., ... Boerma, T. (2025). The 2025 report of the Lancet Countdown to 2030 for women's, children's, and adolescents' health: tracking progress on health and nutrition. *Lancet* (London, England), 405(10488), 1505–1554. [https://doi.org/10.1016/S0140-6736\(25\)00151-5](https://doi.org/10.1016/S0140-6736(25)00151-5)

COMMENT

Maintaining nutrition as a woman's right through the life course.

Desai, S., & Rashid, S. F. (2025). Maintaining nutrition as a woman's right through the life course. *The Lancet regional health. Southeast Asia*, 36, 100587. <https://doi.org/10.1016/j.lansea.2025.100587>

Optimizing pre-conception care in South Asia.

Bhutta, Z. A., Diamond-Smith, N., & Lamichhane, P. (2025). Optimizing pre-conception care in South Asia. *The Lancet regional health. Southeast Asia*, 36, 100586. <https://doi.org/10.1016/j.lansea.2025.100586>

Preconception malnutrition among women and girls in south Asia: prevalence, determinants, and association with pregnancy and birth outcomes.

Miller, F., Sethi, V., Schoenaker, D., Chowdhury, R., Verma, R. K., Hirst, J., Nair, M., Benedetto, C., Sriram, U., Murira, Z., & Saville, N. M. (2025). Preconception malnutrition among women and girls in south Asia: prevalence, determinants, and association with pregnancy and birth outcomes. *The Lancet regional health. Southeast Asia*, 36, 100573. <https://doi.org/10.1016/j.lansea.2025.100573>

Effects of preconception nutrition interventions on pregnancy and birth outcomes in South Asia: a systematic review.

Saville, N. M., Dulal, S., Miller, F., Schoenaker, D., Chowdhury, R., Hazra, A., Hirst, J., Murira, Z., & Sethi, V. (2025). Effects of preconception nutrition interventions on pregnancy and birth outcomes in South Asia: a systematic review. *The Lancet regional health. Southeast Asia*, 36, 100580. <https://doi.org/10.1016/j.lansea.2025.100580>

Enhanced quality of nutrition services during antenatal care through interventions to improve maternal nutrition in Bangladesh, Burkina Faso, Ethiopia, and India.

Nguyen PH, Tran LM, Kachwaha S, Sanghvi T, Mahmud Z, Zafimanjaka MG, Walissa T, Ghosh S, Kim SS. Enhanced quality of nutrition services during antenatal care through interventions to improve maternal nutrition in Bangladesh, Burkina Faso, Ethiopia, and India. *J Glob Health*. 2025 Mar 14;15:04054. doi: 10.7189/jogh.15.04054. PMID: 40080899; PMCID: PMC11906204.

Association of quality antenatal care and completion of eight or more antenatal care visits with skilled delivery care utilization among pregnant women in Bangladesh: A nationwide population-based study.

Rahman, M. O., Rauf, M. A., Ulfa, Y., Siddiqi, M. N. A., Islam, M. R., Inaoka, K., Miyahara, R., Yoneoka, D., & Ota, E. (2025). Association of quality antenatal care and completion of eight or more antenatal care visits with skilled delivery care utilization among pregnant women in Bangladesh: A nationwide population-based study. *PloS one*, 20(4), e0322725. <https://doi.org/10.1371/journal.pone.0322725>

More than just visits: Timing, frequency, and determinants of effective antenatal care in Bangladesh - BDHS 2007 to 2017-18.

Jitu, M. H. I., Afiaz, A., & Biswas, R. K. (2025). More than just visits: Timing, frequency, and determinants of effective antenatal care in Bangladesh - BDHS 2007 to 2017-18. *PloS one*, 20(5), e0321686. <https://doi.org/10.1371/journal.pone.0321686>

Inequalities in antenatal care service utilization in Nepal: evidence from nationally representative Nepal multiple indicator cluster surveys 2014 and 2019.

Sapkota, S., Gyawali, A., Thapa, B., & Hu, Y. (2025). Inequalities in antenatal care service utilization in Nepal: evidence from nationally representative Nepal multiple indicator cluster surveys 2014 and 2019. *BMC public health*, 25(1), 1727. <https://doi.org/10.1186/s12889-025-22897-9>

Associated factors for the utilization of institutional delivery services in Nepal: Findings from the Nepal Demographic Health Survey, 2022.

Thasineku, O. C., Pandit, S., Acharya, D., & Gurung, Y. B. (2025). Associated factors for the utilization of institutional delivery services in Nepal: Findings from the Nepal Demographic Health Survey, 2022. *PloS one*, 20(5), e0322309. <https://doi.org/10.1371/journal.pone.0322309>

Continuum of care for maternal and newborn health services in Nepal: An analysis from demographic and health survey 2022.

Pandey, A. R., Adhikari, B., Sangroula, R. K., Sapkota, P. M., Regmi, S., Sharma, S., Dulal, B., Lamichhane, B., Kc, S. P., Dhakal, P., & Baral, S. C. (2025). Continuum of care for maternal and newborn health services in Nepal: An analysis from demographic and health survey 2022. *PloS one*, 20(3), e0319033. <https://doi.org/10.1371/journal.pone.0319033>

Benefit-cost analysis of an integrated package of interventions during preconception, pregnancy and early childhood in India.

Choudhary, T. S., Mazumder, S., Taneja, S., Chowdhury, R., Upadhyay, R. P., Sharma, S., Dhabhai, N., Norheim, O. F., Bhandari, N., & Johansson, K. A. (2025). Benefit-cost analysis of an integrated package of interventions during preconception, pregnancy and early childhood in India. *BMJ global health*, 10(4), e013659. <https://doi.org/10.1136/bmjgh-2023-013659>

Cost-effectiveness analysis of two integrated early childhood development programs into Bangladeshi primary health-care services.

Hossain, S. J., Palmer, T., Uddin Tipu, S. M. M., Mehrin, S. F., Shiraji, S., Hasan, M. I., Alam Bhuiyan, M. S., Salveen, N. E., Tofail, F., Baker-Henningham, H., Haghparast-Bidgoli, H., & Hamadani, J. D. (2025). Cost-effectiveness analysis of two integrated early childhood development programs into Bangladeshi primary health-care services. *The Lancet regional health. Southeast Asia*, 35, 100564. <https://doi.org/10.1016/j.lansea.2025.100564>

A mobile messaging service for families on postnatal knowledge and practices: a cluster randomized trial, India.

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Effect of India's flagship conditional maternity benefit scheme on utilization of maternal and child health services: evidence from a statewide evaluation study.

Banerjee, R., Singh, B. S., Sahrawat, N., Mehrotra, A., Swain, S., Mishra, R. M., Antony, P., Aparna, U., Jain, B. K., & Neogi, S. B. (2025). Effect of India's flagship conditional maternity benefit scheme on utilization of maternal and child health services: evidence from a statewide evaluation study. *BMC pregnancy and childbirth*, 25(1), 294. <https://doi.org/10.1186/s12884-025-07416-3>

Global, regional, and national prevalence of adult overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021.

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Global, regional, and national prevalence of child and adolescent overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021.

GBD 2021 Adolescent BMI Collaborators (2025). Global, regional, and national prevalence of child and adolescent overweight and obesity, 1990–2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021. *Lancet (London, England)*, 405(10481), 785–812. [https://doi.org/10.1016/S0140-6736\(25\)00397-6](https://doi.org/10.1016/S0140-6736(25)00397-6)

Perspective: Can Growth Monitoring and Promotion Accurately Diagnose or Screen for Inadequate Growth of Individual Children? A Critical Review of the Epidemiologic Foundations.

Leroy, J. L., Brander, R. L., Frongillo, E. A., Larson, L. M., Ruel, M. T., & Avula, R. (2025). Perspective: Can Growth Monitoring and Promotion Accurately Diagnose or Screen for Inadequate Growth of Individual Children? A Critical Review of the Epidemiologic Foundations. *Advances in nutrition (Bethesda, Md.)*, 16(3), 100367. <https://doi.org/10.1016/j.advnut.2025.100367>

Interventions for Childhood Central Obesity: A Systematic Review and Meta-Analysis.

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Community-based interventions addressing multiple forms of malnutrition among adolescents in low- and middle-income countries: a scoping review.

Ranisavljev M, Kurniawan AL, Ferrero E, Shinde S, Zhao S, Partap U, Mkwanzani N, Dah NC, Agure E, Berhane HY, Neumann C, Alangea DO, Liu S, Ostojic SM, Fawzi WW, Walsh F, Bärnighausen T; ARISE-NUTRINT collaborators. Community-based interventions addressing multiple forms of malnutrition among adolescents in low- and middle-income countries: a scoping review. *Nutr J.* 2025 Apr 30;24(1):69. doi: 10.1186/s12937-025-01136-2. PMID: 40307813; PMCID: PMC12044920.

How do gender transformative interventions reduce adolescent pregnancy in low- and middle-income countries: a realist synthesis.

Shukla, S., Kharade, A., Böhret, I., Jumaniyazova, M., Meyer, S. R., Abejirinde, I. O., Shenderovich, Y., & Steinert, J. (2025). How do gender transformative interventions reduce adolescent pregnancy in low- and middle-income countries: a realist synthesis. *Journal of global health*, 15, 04102. <https://doi.org/10.7189/jogh.15.04102>

Prevalence of severe and moderate anthropometric failure among children in India, 1993-2021.

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Arora, P., Bhatia, M., & Dwivedi, L. K. (2025). Co-Occurrences of Forms of Child Undernutrition in India: Insights from the National Family Health Survey. *Nutrients*, 17(6), 977. <https://doi.org/10.3390/nu17060977>

Extreme heat exposure in the first 1000 days: Implications for childhood stunting in Bangladesh.

Raza, W. A., Misha, F., Hossain, S. S., Gulshan, J., Rashid, B., Sayem, S. M., Aranya, S. G., & Chaudhery, D. (2025). Extreme heat exposure in the first 1000 days: Implications for childhood stunting in Bangladesh. *Public health*, 241, 83-88. <https://doi.org/10.1016/j.puhe.2025.02.002>

Changing maternal, infant and young child nutrition practices through social and behaviour change interventions implemented at scale: Lessons learned from Alive & Thrive.

Flax VL, Bose S, Escobar-DeMarco J, Frongillo EA. Changing maternal, infant and young child nutrition practices through social and behaviour change interventions implemented at scale: Lessons learned from Alive & Thrive. *Matern Child Nutr.* 2025 Apr;21(2):e13559. doi: 10.1111/mcn.13559. Epub 2023 Sep 21. PMID: 37735818; PMCID: PMC11956063.

Incremental financial costs of strengthening large-scale child nutrition programs in Bangladesh, Ethiopia, and Vietnam: retrospective expenditure analysis.

Sanghvi, T. G., Homan, R., Nguyen, T., Mahmud, Z., Walissa, T., Nersesyan, M., Preware, P., Frongillo, E. A., & Matheson, R. (2025). Incremental financial costs of strengthening large-scale child nutrition programs in Bangladesh, Ethiopia, and Vietnam: retrospective expenditure analysis. *Globalization and health*, 21(1), 21. <https://doi.org/10.1186/s12992-025-01118-3>

Quality Assurance and Quality Improvement in Maternal, Infant, Young Child and Adolescent Nutrition Service Provision in Five Countries.

Sethuraman K, Bose S, Escobar-DeMarco J, Frongillo EA. Quality Assurance and Quality Improvement in Maternal, Infant, Young Child and Adolescent Nutrition Service Provision in Five Countries. *Matern Child Nutr.* 2025 Apr;21(2):e13772. doi: 10.1111/mcn.13772. Epub 2025 Mar 24. PMID: 40126934; PMCID: PMC11956046.

Equity and equality in diets and nutrition: Frameworks, evidence, and four country case studies

Harris, J., Battersby, J., Gordon, J. et al. Equity and equality in diets and nutrition: Frameworks, evidence, and four country case studies. *Food Sec.* (2025). <https://doi.org/10.1007/s12571-025-01537-5>

The rural food environment and its association with diet, nutrition status, and health outcomes in low-income and middle-income countries (LMICs): a systematic review.

Choudhury, S., Bi, A. Z., Medina-Lara, A., Morrish, N., & Veettil, P. C. (2025). The rural food environment and its association with diet, nutrition status, and health outcomes in low-income and middle-income countries (LMICs): a systematic review. *BMC public health*, 25(1), 994. <https://doi.org/10.1186/s12889-025-22098-4>

What Adults in Rural South Asia Eat and When They Eat It: Evidence From Bangladesh, India, and Nepal.

Scott, S., Patwardhan, S., Ruel, M., Chakrabarti, S., Neupane, S., Manohar, S., Moursi, M., & Menon, P. (2025). What Adults in Rural South Asia Eat and When They Eat It: Evidence From Bangladesh, India, and Nepal. *The Journal of nutrition*, 155(7), 2406–2415. <https://doi.org/10.1016/j.tjn.2025.05.014>

Caregiver Feeding Behaviours and Child Dietary Diversity and Growth in Rural Bangladesh.

Chowdhury, Z. T., Hurley, K. M., Shaikh, S., Mehra, S., Ali, H., Shamim, A. A., & Christian, P. (2025). Caregiver Feeding Behaviours and Child Dietary Diversity and Growth in Rural Bangladesh. *Maternal & child nutrition*, 21(2), e13781. <https://doi.org/10.1111/mcn.13781>

Association of food environment with diet quality and Body Mass Index (BMI) of school-going adolescents in Nepal.

Sharma, P., Limaye, N., Sah, R. K., & Shrestha, A. (2025). Association of food environment with diet quality and Body Mass Index (BMI) of school-going adolescents in Nepal. *PloS one*, 20(4), e0321524. <https://doi.org/10.1371/journal.pone.0321524>

Power dynamics and intersectoral collaboration for health in low- and middle-income countries: a realist review.

Aivalli, P., Dada, S., Gilmore, B., Srinivas, P. N., & De Brún, A. (2025). Power dynamics and intersectoral collaboration for health in low- and middle-income countries: a realist review. *Health policy and planning*, 40(6), 661–683. <https://doi.org/10.1093/heapol/czaf022>

Bridging the gaps: advancing preconception nutrition in South Asia through evidence, policy, and action.

Miller, F., Sethi, V., Hazra, A., Schoenaker, D., Chowdhury, R., Hirst, J., Murira, Z., & Saville, N. M. (2025). Bridging the gaps: advancing preconception nutrition in South Asia through evidence, policy, and action. *The Lancet regional health. Southeast Asia*, 36, 100585. <https://doi.org/10.1016/j.lansea.2025.100585>

Iron Deficiency in Adults: A Review.

Auerbach, M., DeLoughery, T. G., & Tirnauer, J. S. (2025). Iron Deficiency in Adults: A Review. *JAMA*, 333(20), 1813–1823. <https://doi.org/10.1001/jama.2025.0452>

Comparative effectiveness of daily therapeutic supplementation with multiple micronutrients and iron-folic acid versus iron-folic acid alone in children with mild-to-moderate anaemia in rural India: an open-label, randomised controlled trial.

Upadhyay, R. P., Chowdhury, R., Mundra, S., Taneja, S., Jacob, M., Kapil, U., Bavdekar, A., & Bhandari, N. (2025). Comparative effectiveness of daily therapeutic supplementation with multiple micronutrients and iron-folic acid versus iron-folic acid alone in children with mild-to-moderate anaemia in rural India: an open-label, randomised controlled trial. *The Lancet. Global health*, 13(3), e497–e507. [https://doi.org/10.1016/S2214-109X\(24\)00559-X](https://doi.org/10.1016/S2214-109X(24)00559-X)

Measuring feasibility: complex questions need complex tools.

de Boer, M., Kalbarczyk, A., Islam, M. N., Rodríguez, D. C., Sarker, M., Christian, P., & Lyman, A. T. (2025). Measuring feasibility: complex questions need complex tools. *BMJ global health*, 10(6), e017331. <https://doi.org/10.1136/bmjgh-2024-017331>

PEER REVIEWED

Amouzou et al. (2025). The 2025 report of the Lancet Countdown to 2030 for women's, children's, and adolescents' health: tracking progress on health and nutrition. *Lancet (London, England)*, 405(10488), 1505-1554. [https://doi.org/10.1016/S0140-6736\(25\)00151-5](https://doi.org/10.1016/S0140-6736(25)00151-5)

The Lancet Countdown 2030 Report, Tracking Progress in Reproductive, Maternal, Newborn, Child, and Adolescent Health and Nutrition, assesses whether the momentum needed to reach the Sustainable Development Goals (SDGs) has been sustained, accelerated, stagnated, or regressed in comparison with the Millennium Development Goal (MDG) period (2000-2015).

COMMENT

Desai, S., & Rashid, S. F. (2025). Maintaining nutrition as a woman's right through the life course. *The Lancet regional health. Southeast Asia*, 36, 100587. <https://doi.org/10.1016/j.lansea.2025.100587>

The Lancet Regional Health South-East Asia set of Reviews on preconception nutrition highlights the urgency of addressing malnutrition amongst women in South Asia. Malnutrition, particularly anaemia, is a persistent, pernicious burden linked to a range of poor health outcomes. The authors bring together reviews of evidence, national data, policies and a stakeholder consultation to argue for a “preconception” approach to accelerate progress. The analyses adopt a broad WHO definition of this phase to include women 15–49 years, irrespective of marital status, gravidity or pregnancy intention provided they are not currently pregnant or have not undergone sterilization.

Many of the papers’ highlighted gaps in policy, research and implementation aimed towards a preconception approach resonate with existing global health goals. For example, investing in longitudinal data collection, implementation research and evaluation to understand changing health needs and variation within populations is a critical component of ensuring high-quality health systems. Similarly, echoing the longstanding recognition of the social determinants of health, the articles amplify the generational benefits of access to clean water, sanitation and toilets. Community mobilisation features as a critical part of recommended intervention strategies, drawing from experience with participatory approaches in India and Bangladesh. Specific to South Asia, evidence on the burden of malnutrition underscores the importance of triple-pronged strategies that address underweight, over-weight and anaemic women.

[Read more here.](#)

Bhutta, Z. A., Diamond-Smith, N., & Lamichhane, P. (2025). Optimizing pre-conception care in South Asia. *The Lancet regional health. Southeast Asia*, 36, 100586. <https://doi.org/10.1016/j.lansea.2025.100586>

The World Health Organization defines preconception care as the provision of biomedical, behavioral, and social health interventions to women and couples before conception occurs, aiming to improve their health status and reduce factors contributing to poor maternal and child health outcomes. Others have suggested an even broader paradigm inclusive of societal needs. Although preconception care has been under the spotlight in Low- and Middle-Income countries (LMICs) for over a decade, corresponding progress in implementation and program development has been limited. Preconception nutrition issues such as undernutrition and concomitant overweight/obesity and micronutrient deficiencies, the so-called “triple-burden” of malnutrition, have received scant policy attention.

[Read more here.](#)

Miller, F., Sethi, V., Schoenaker, D., Chowdhury, R., Verma, R. K., Hirst, J., Nair, M., Benedetto, C., Sriram, U., Murira, Z., & Saville, N. M. (2025). Preconception malnutrition among women and girls in south Asia: prevalence, determinants, and association with pregnancy and birth outcomes. *The Lancet regional health. Southeast Asia*, 36, 100573. <https://doi.org/10.1016/j.lansea.2025.100573>

This review highlights the growing double burden of malnutrition among women of reproductive age in South Asia. Using nationally-representative survey data, we highlight that the prevalence of overweight now exceeds that of underweight, while anaemia remains persistently high despite intervention efforts. Underweight and anaemia are more common among unmarried women, whereas overweight is more prevalent among parous women, underscoring the need for life-stage-specific preconception nutrition programs. In our systematic review, micronutrient deficiencies vary widely between and within countries, reflecting regional disparities in nutritional status and inconsistencies in diagnostic methods. Associations of preconception underweight, overweight, anaemia and micronutrient deficiencies with health, nutrition, socio-demographic, and WASH indicators are mixed, emphasising the need for tailored, context-specific interventions. The lack of longitudinal studies limits our understanding of associations between preconception nutritional status and subsequent birth outcomes, underscoring the need for comprehensive, longitudinal studies across South Asia to inform and monitor targeted nutrition programs.

Saville, N. M., Dulal, S., Miller, F., Schoenaker, D., Chowdhury, R., Hazra, A., Hirst, J., Murira, Z., & Sethi, V. (2025). Effects of preconception nutrition interventions on pregnancy and birth outcomes in South Asia: a systematic review. *The Lancet regional health. Southeast Asia*, 36, 100580. <https://doi.org/10.1016/j.lansea.2025.100580>

Undernutrition amongst reproductive age women, low birth weight, small for gestational age and preterm birth present significant health burdens in South Asia which interventions in pregnancy alone have not resolved. Effectiveness of preconception nutrition interventions is not well-documented. This systematic review summarises evidence on the effect of preconception nutrition interventions on pregnancy and birth outcomes in South Asia. We found highly heterogeneous evidence across four micronutrient supplementation, two food supplementation, and three complex interventions trials. Preconception micronutrient supplementation alone did not affect birth size, but food supplementation was effective with and without multiple micronutrients, especially when initiated at least 90 days before conception. Combined health, nutrition, psychosocial care, and WaSH interventions addressing determinants at multiple levels were most effective. However intensive delivery by project employees poses problems for scale-up. More robust South Asian preconception intervention trials to identify scalable interventions that are effective in real-world delivery settings are needed. FUNDING: UNICEF Regional Office for South Asia contract number 43384734.

Nguyen PH, Tran LM, Kachwaha S, Sanghvi T, Mahmud Z, Zafimanjaka MG, Walissa T, Ghosh S, Kim SS. Enhanced quality of nutrition services during antenatal care through interventions to improve maternal nutrition in Bangladesh, Burkina Faso, Ethiopia, and India. *J Glob Health*. 2025 Mar 14;15:04054. doi: 10.7189/jogh.15.04054. PMID: 40080899; PMCID: PMC11906204.

BACKGROUND: Quality antenatal care (ANC) services are critical for maternal health and nutrition. Information on the quality of nutrition interventions during ANC is scarce in low- and middle-income countries. We examined the effects of intensified maternal nutrition interventions during ANC on service readiness, provision of care, and experience of care and assessed the inter-relationships between the dimensions of quality. **METHODS:** We used data from impact evaluations of maternal nutrition interventions in Bangladesh, Burkina Faso, Ethiopia, and India. We calculated the quality of nutrition services during ANC using information from health facility assessments, health care provider interviews, ANC observations, and client exit interviews. We used structural equation models to examine relationships between the dimensions of quality. **RESULTS:** Health facilities in all four countries had a high service readiness component in terms of basic amenities, equipment and supplies, medicines and commodities, and guidelines (mean (\bar{x}) = 8-10 in Bangladesh and Burkina Faso, \bar{x} = 7-9 in Ethiopia, and \bar{x} = 6-8 in India). Scores for provision of care were low across the countries but higher in intervention compared to control areas in Bangladesh (5.2 vs. 2.9) and Burkina Faso (5.6 vs. 4.8), but not significantly different in Ethiopia (range = 4.7-5.0) and India (range = 2.6-3.5). For experience of care, client satisfaction scores were high and similar between intervention and control areas in all countries (range = 8.3-9.7), but client experience scores were lower with statistically significant differences observed only in Bangladesh (\bar{x} = 8.2 in intervention vs. \bar{x} = 7.1 in control areas).

The interventions had significant direct effects on service readiness in Bangladesh (beta = 0.07), Burkina Faso (beta = 1.20), and Ethiopia (beta = 1.0), on the provision of care in Bangladesh (beta = 2.27), Burkina Faso (beta = 1.27), and India (beta = 0.96), and experience of care in Bangladesh (beta = 0.21).

Rahman, M. O., Rauf, M. A., Ulfa, Y., Siddiqi, M. N. A., Islam, M. R., Inaoka, K., Miyahara, R., Yoneoka, D., & Ota, E. (2025). Association of quality antenatal care and completion of eight or more antenatal care visits with skilled delivery care utilization among pregnant women in Bangladesh: A nationwide population-based study. *PLoS one*, 20(4), e0322725. <https://doi.org/10.1371/journal.pone.0322725>

INTRODUCTION: Provision of quality antenatal care (QANC) services and delivery care by skilled health professionals can effectively reduce and manage complications throughout pregnancy and childbirth, leading to better maternal and neonatal health outcomes. The WHO recently updated its recommendation to at least eight antenatal care (ANC) visits. However, little is known about how QANC services and completion of eight or more ANC visits interact with skilled delivery care utilization. **METHODS:** This study utilized data from Bangladesh Demographic and Health Survey 2017-18, including 4,457 pregnant women aged 15-49 years who had given birth three years preceding the survey. Descriptive statistics were employed to analyze the study population's characteristics and the proportion of skilled birth attendance (SBA) and facility delivery (FD) in Bangladesh. Multilevel mixed-effects logistic regression analyses were used to determine the strength of association of QANC services and completion of eight or more ANC visits with skilled delivery care utilization. **RESULTS:** Only one in five women received good QANC services, and one in eight completed eight or more ANC visits. The overall proportions of SBA and FD were 56.74% [95% CI: 55.27-58.20] and 53.85% [52.37-55.32] respectively. Women with eight or more ANC visits had significantly higher odds of utilizing SBA (OR: 2.11 [1.60-2.77]) and FD (OR: 2.19 [1.68-2.85]) compared to those with only 1-3 ANC visits. Likewise, good QANC services were associated with higher odds of SBA (OR: 1.72 [1.38-2.15]) and FD (OR: 1.56 [1.26-1.93]). **CONCLUSION:** This study highlights the significant positive association of QANC services and adherence to the WHO-recommended eight or more ANC visits with increased skilled delivery care utilization in Bangladesh. Strengthening policies and programs to enhance the quality and frequency of ANC services can promote skilled delivery care, ensuring safe motherhood and childbirth.

Jitu, M. H. I., Afiaz, A., & Biswas, R. K. (2025). More than just visits: Timing, frequency, and determinants of effective antenatal care in Bangladesh - BDHS 2007 to 2017-18. *PLoS one*, 20(5), e0321686. <https://doi.org/10.1371/journal.pone.0321686>

BACKGROUND: Timely initiation and adequate number of antenatal care (ANC) visits are crucial for ensuring the health and well-being of both pregnant women and their unborn children. Despite recent progress, Bangladesh continues to face challenges in achieving sustainable development goal (SDG-3) related to maternal and neonatal health. This study examines the factors contributing to delayed initiation and a low number of ANC visits, while also evaluating the association between the timing and overall number of ANC visits. **DATA:** Nationally representative data from the Bangladesh Demographic and Health Surveys (BDHS) conducted in 2007 (n = 3050) and 2017-18 (n = 4544) on women aged 15-49 years. **METHODS:** We investigated two binary outcome variables: late ANC, defined as the initiation of ANC visits after 12 weeks of gestation, and low ANC, defined as having less than four ANC visits. Geospatial mapping was employed to visualize spatial patterns, followed by survey-weighted logistic regression to identify risk factors associated with late initiation of ANC and low ANC visit frequency. Additionally, classification tree analysis was utilized to explore interactions between predictors and outcomes. **RESULTS:** Logistic regression modeling revealed that late ANC was associated with a more than fourfold increase in the odds of having fewer than four ANC visits (AOR: 4.60 [95% CI: 3.69-5.73] in 2007 and AOR: 4.68 [95% CI: 4.00-5.48] in 2017-18). Classification tree analysis further confirmed that late ANC initiation was the most critical predictor of total number of ANC attendance, underscoring the necessity of early ANC initiation to ensure sufficient coverage. **CONCLUSION:** Early initiation of ANC is essential for achieving an adequate number of ANC visits. Notably, the same set of sociodemographic factors remained statistically significant predictors in both 2007 and 2017, highlighting the persistent nature of these disparities and underscoring the urgent need for targeted policies and health interventions.

Sapkota, S., Gyawali, A., Thapa, B., & Hu, Y. (2025). Inequalities in antenatal care service utilization in Nepal: evidence from nationally representative Nepal multiple indicator cluster surveys 2014 and 2019. *BMC public health*, 25(1), 1727. <https://doi.org/10.1186/s12889-025-22897-9>

INTRODUCTION: Antenatal care (ANC) is essential for improving maternal and neonatal health outcomes, and its utilization is influenced by socioeconomic factors. This study aims to assess disparities in ANC service utilization by wealth, caste/ethnicity, and province among Nepalese women, using data from the nationally representative Nepal Multiple Indicator Cluster Surveys (MICS) 2014 and 2019. **METHODS:** We assessed the association of ANC service utilization with the household wealth index quintiles, caste/ethnicity and province using multivariable logistic and negative binomial regression models. We also measured wealth-related inequality using concentration curves and concentration indices.

RESULTS: The proportion of women who received four or more ANC visits increased from 60.6% in 2014 to 77.8% in 2019. However, in both 2014 and 2019, women in the highest wealth quintile were over five times more likely to receive recommended ANC visits than those in the lowest quintiles. Similarly, the expected number of ANC visits was 70% higher in 2014 and 35% higher in 2019 for women in the highest wealth quintile compared to the lowest quintile. Concentration curves showed a decrease in pro-rich inequality in ANC utilization by 2019 relative to 2014, though notable inequality remained. Geographic disparities were evident: Karnali and Madhesh provinces had significantly lower utilization of recommended ANC visits and fewer ANC visits than Koshi Province. Ethnic disparities were also prominent, with women from Dalit, Disadvantaged Janajati, and Other Madheshi caste groups being significantly less likely to complete recommended ANC visits. **CONCLUSION:** Our findings reveal persistent wealth-related inequality in ANC service utilization in Nepal, with women from wealthier households, advantaged caste/ethnic groups and better-off provinces having higher odds of receiving recommended ANC visits and a higher number of ANC visits. Concerted efforts are needed to address these equity gaps in ANC service utilization, particularly for women from low-income households, disadvantaged caste/ethnic groups, and underserved provinces.

Thasineku, O. C., Pandit, S., Acharya, D., & Gurung, Y. B. (2025). Associated factors for the utilization of institutional delivery services in Nepal: Findings from the Nepal Demographic Health Survey, 2022. PloS one, 20(5), e0322309. <https://doi.org/10.1371/journal.pone.0322309>

INTRODUCTION: Institutional delivery provides skilled obstetric health care, postnatal care, and essential medical timely intervention to enhance the health of mothers and children. In Nepal, the proportion of institutional deliveries has increased from 8 percent in 1996-79 percent in 2022, although it is not satisfactory. This study investigates disparities in the utilization of institutional delivery service across associated factors related to residential factors, socio-economic factors, health service-related factors, and bio-demographic factors. **METHODS:** We used secondary data from the Demographic and Health Survey (DHS) 2022 of Nepal. It involves a sample of 1977 eligible women aged 15-49 who had given birth within two-year preceding the survey. We considered institutional delivery as an outcome variable, while residential, socio-economic, bio-demographic, and health service-related factors as independent variables. Descriptive analysis and binary logistic regression analysis for crude and adjusted odds ratios (AOR) along with 95% confidence interval (CI) were utilized. **RESULTS:** Of the total 1977 women, 1569 (79.4%) opted for institutional delivery. Women belonging to the Muslim ethnic group had lower odds (AOR:0.500, 95% CI: 0.259-0.966, $p < 0.050$) compared to their reference group. Similarly, the likelihood of opting for institutional delivery was significantly lower among women who required more than 30 minutes time to reach a health facility (AOR:0.626, 95% CI: 0.491-0.800, $p < 0.001$) and those having 6 + parity (AOR:0.080, 95% CI: 0.032-0.205, $p < 0.001$) compared to their reference group. In the contrary, women from Terai region (AOR:2.428, 95% CI: 1.194-4.937, $p < 0.050$), Bagmati Province (AOR:2.327, 95% CI: 1.179-4.593, $p < 0.050$), secondary and higher education level (AOR:3.161, 95% CI: 2.141-4.668, $p < 0.001$), richest wealth group (AOR:13.451, 95% CI: 5.231-34.589, $p < 0.001$), and antenatal care (ANC) visits 4 and more times (AOR:5.084, 95% CI: 2.7963-9.242, $p < 0.001$), were noticed more likely to choose for institutional delivery compared to their reference group, respectively. **CONCLUSION:** The result shows the ecological region, province, ethnic group, distance to reach health facility, parity, respondents' education level, wealth index and ANC visits, and mother's age in 5-year groups are the associated factors for the utilization of institutional delivery service in Nepal. It highlights the need for targeted interventions to enhance the utilization of institutional delivery services. Addressing socio-economic and geographical disparities, economic barriers, advancing education, promoting antenatal care visits, and ensuring nearer healthcare accessibility are crucial to achieving the equitable maternal and neonatal health care through institutional delivery in Nepal. It is concluded that more attention needs to be paid to areas where the severity persists by professionals and policymakers as well.

Pandey, A. R., Adhikari, B., Sangroula, R. K., Sapkota, P. M., Regmi, S., Sharma, S., Dulal, B., Lamichhane, B., Kc, S. P., Dhakal, P., & Baral, S. C. (2025). Continuum of care for maternal and newborn health services in Nepal: An analysis from demographic and health survey 2022. PloS one, 20(3), e0319033. <https://doi.org/10.1371/journal.pone.0319033>

INTRODUCTION: With high burden of maternal mortality and stagnant neonatal mortality, maternal and newborn health services have remained a priority program for Nepal. This study aims to assess the determinants of four or more antenatal care (≥ 4 ANC) visits, institutional delivery (ID), postnatal care (PNC) visit for mother and newborn within the first two days of delivery and the continuum of care. **METHODS:** We performed weighted analysis of Nepal Demographic and Health Survey (NDHS) 2022 data accounting for complex survey design. The NDHS is a nationally representative cross-sectional survey that employs a two-stage stratified sampling technique to select participants. We analyzed data from 1,891 women who had live births within two years prior to the survey. Distribution of variables are described using frequency, percentage, and 95% confidence intervals (CI). We performed bivariate and multivariable logistic regression and the results are presented in crude odds ratio (COR), adjusted odds ratio (AOR) and 95% CI. **RESULTS:** In the study, 80.62% (95% CI: 77.95, 83.03) of participants had ≥ 4 ANC visits, 79.37% (95% CI: 76.68, 81.82) had ID, and 62.56% (95% CI: 56.67, 65.36) received PNC for mother and newborn within two days of delivery. Likewise, 67.59% (95% CI: 64.59, 70.45) had both ≥ 4 ANC visits and ID, while 51.01% (95% CI: 48.08, 53.93) had all three components of the continuum of care: ≥ 4 ANC visits, ID, and PNC visit within two days of delivery.

The richest wealth quintile participants had three folds higher odds (AOR: 2.98, 95% CI: 1.83, 4.83) of completing continuum of care, while the odds were two folds (AOR: 2.04, 95% CI: 1.41, 2.94) higher for richer wealth quintile participants. Participants with birth order three or more had lower odds (AOR: 0.50, 95% CI: 0.36, 0.69) of completing all three continuum of care components. Among other variables associated with continuum of care were province, distance to facility and internet use. **CONCLUSION:** Significant disparities exist in continuum of care or its components based on wealth quintile, province, and place of residence. Tackling economic gaps, provincial disparities, and leveraging technology are crucial for ensuring fair access to essential maternal health services. Nepal's transition to a federal structure with 7 provinces and 753 local governments with decision making authority presents an opportunity to test and scale up innovative strategies for improving continuum of care coverage.

Choudhary, T. S., Mazumder, S., Taneja, S., Chowdhury, R., Upadhyay, R. P., Sharma, S., Dhabhai, N., Norheim, O. F., Bhandari, N., & Johansson, K. A. (2025). Benefit-cost analysis of an integrated package of interventions during preconception, pregnancy and early childhood in India. *BMJ global health*, 10(4), e013659. <https://doi.org/10.1136/bmjgh-2023-013659>

Background: We have previously shown that an integrated intervention package delivered during preconception, pregnancy and early childhood substantially reduces low birth weight and stunting at 24 months of age compared with routine care. Now we conduct a benefit-cost analysis to estimate the return on investment of this integrated approach in India. This increases the policy relevance of trial results, given the low investment in healthcare in India. **Methods:** We used data from 13 500 participants in the Women and Infant Integrated Interventions for Growth Study (WINGS). Integrated delivery of healthcare, nutrition, water, sanitation and hygiene (WaSH), and psychosocial care interventions during preconception period, or pregnancy and early childhood, or both (full package), was compared with routine care. We converted reduction in mortality, morbidity and increase in productivity to monetary values and calculated the benefit-cost ratio. We used primary and secondary trial health outcomes from the WINGS trial to calculate benefits, and we collected costs prospectively during the trial. Uncertainty was explored in a one-way sensitivity analysis. We applied a discount rate of 3% per annum to both costs and benefits, considering the purchasing power parity (PPP) of US dollars in 2021. **Results:** Every dollar invested returned 6.1\$ PPP for interventions during preconception, 9.9\$ PPP for pregnancy and early childhood interventions and 3.7\$ PPP for the full package of interventions compared with routine care in the base case scenario. The return to investment was positive (>4.6\$ PPP per 1\$ PPP invested) for pregnancy and early childhood interventions in all scenarios of the sensitivity analysis. The net monetary benefits of the interventions ranged between 7364 and 25 917\$ PPP. **Conclusion:** Our results suggest that integrated and concurrent delivery of healthcare, nutrition, WaSH and psychosocial care interventions during pregnancy and early childhood yield positive economic returns.

Hossain, S. J., Palmer, T., Uddin Tipu, S. M. M., Mehrin, S. F., Shiraji, S., Hasan, M. I., Alam Bhuiyan, M. S., Salveen, N. E., Tofail, F., Baker-Henningham, H., Haghparast-Bidgoli, H., & Hamadani, J. D. (2025). Cost-effectiveness analysis of two integrated early childhood development programs into Bangladeshi primary health-care services. *The Lancet regional health. Southeast Asia*, 35, 100564. <https://doi.org/10.1016/j.lanse.2025.100564>

BACKGROUND: We have previously shown that an integrated intervention package delivered during preconception, pregnancy and early childhood substantially reduces low birth weight and stunting at 24 months of age compared with routine care. Now we conduct a benefit-cost analysis to estimate the return on investment of this integrated approach in India. This increases the policy relevance of trial results, given the low investment in healthcare in India. **METHODS:** We used data from 13 500 participants in the Women and Infant Integrated Interventions for Growth Study (WINGS). Integrated delivery of healthcare, nutrition, water, sanitation and hygiene (WaSH), and psychosocial care interventions during preconception period, or pregnancy and early childhood, or both (full package), was compared with routine care. We converted reduction in mortality, morbidity and increase in productivity to monetary values and calculated the benefit-cost ratio. We used primary and secondary trial health outcomes from the WINGS trial to calculate benefits, and we collected costs prospectively during the trial. Uncertainty was explored in a one-way sensitivity analysis. We applied a discount rate of 3% per annum to both costs and benefits, considering the purchasing power parity (PPP) of US dollars in 2021. **RESULTS:** Every dollar invested returned 6.1\$ PPP for interventions during preconception, 9.9\$ PPP for pregnancy and early childhood interventions and 3.7\$ PPP for the full package of interventions compared with routine care in the base case scenario. The return to investment was positive (>4.6\$ PPP per 1\$ PPP invested) for pregnancy and early childhood interventions in all scenarios of the sensitivity analysis. The net monetary benefits of the interventions ranged between 7364 and 25 917\$ PPP. **CONCLUSION:** Our results suggest that integrated and concurrent delivery of healthcare, nutrition, WaSH and psychosocial care interventions during pregnancy and early childhood yield positive economic returns.

Johnston, J. S., Suri, P., Yan, S., Chandrasekar, A., Singla, S., Ward, V. C., & Murthy, S. (2025). A mobile messaging service for families on postnatal knowledge and practices: a cluster randomized trial, India. *Bulletin of the World Health Organization*, 103(4), 255-265. <https://doi.org/10.2471/BLT.24.292145>

OBJECTIVE: To evaluate the impact of a mobile messaging service that delivers World Health Organization recommendations on postnatal care to families from birth through six weeks postpartum via a messaging platform. **METHODS:** We randomized tertiary hospitals in four Indian states into two groups. In the treatment group, 15 hospitals promoted the messaging service to families in maternity wards before discharge following a recent birth. Nine control hospitals provided standard in-hospital information. From mid-March 2021 to mid-January 2022, we recruited mothers to participate in the study. Consenting mothers completed a face-to-face baseline survey before hospital discharge after birth and a follow-up phone survey roughly 6 weeks postpartum. Using logistic regression controlling for state-fixed effects and baseline covariates, we examine intent-to-treat estimates and report risk differences. **FINDINGS:** A total of 21 937 participants met the inclusion criteria. We observed significant positive impacts in 7 out of 11 neonatal and maternal care practices examined (P -values < 0.05). Breastfeeding increased by 3.1 percentage points, recommended cord care practices by 4.1 percentage points, skin-to-skin care with mothers by 9.2 percentage points, and skin-to-skin care by fathers by 2.2 percentage points. For recommended maternal dietary practices, we observed significant increases in adherence to guidelines advising no reduction of food intake (7.1 percentage points), no reduction of water intake (7.9 percentage points) and no restrictions on food items (10.8 percentage point; P -values < 0.01). **CONCLUSION:** This study demonstrates that concise yet comprehensive digital messaging delivered to families during the postpartum period can effectively encourage recommended postnatal care practices.

Banerjee, R., Singh, B. S., Sahrawat, N., Mehrotra, A., Swain, S., Mishra, R. M., Antony, P., Aparna, U., Jain, B. K., & Neogi, S. B. (2025). Effect of India's flagship conditional maternity benefit scheme on utilization of maternal and child health services: evidence from a statewide evaluation study. *BMC pregnancy and childbirth*, 25(1), 294. <https://doi.org/10.1186/s12884-025-07416-3>

BACKGROUND: The Pradhan Mantri Matru Vandana Yojana (PMMVY) is India's flagship Maternity Benefit Programme to improve maternal nutrition and child health. This study evaluates the functional status of the scheme, knowledge regarding the scheme and its effect on pattern of service utilization in a north Indian state. **METHODS:** A three-pronged mixed-methods evaluation including household survey of beneficiary and non-beneficiary women, in-depth interviews of key stakeholders (district and state level program managers, program implementers and frontline workers) and review of secondary data from the PMMVY Common Application Software and state PMMVY dashboard was done. Household survey covered 1290 women, and 70 in-depth interviews were held with eligible women, and PMMVY managerial and implementation staff. Quantitative data was analysed using SPSS version 22.0, qualitative data was analysed thematically and triangulated with quantitative results for effective analysis and conclusion. The study received ethical approval from the Institutional Review Board of IIHMR Delhi. **RESULTS:** A strong political commitment with requisite systems and resources across all levels was observed. Coverage of PMMVY was less in urban areas (53.1% as compared to overall coverage of 95.9%). Knowledge of the scheme was high among both beneficiary and non-beneficiary women (97.8% beneficiary women and 94.2% non-beneficiary women). Utilization of Maternal and Child Health (MCH) services were significantly poorer among non-beneficiary women for four antenatal check-ups (OR 0.74, 95% CI 0.55-0.99, $p = 0.04$), childbirth registration (OR 0.28, 95% CI 0.18-0.45, $p < 0.001$) and child immunization (OR 0.43, 95% CI 0.33-0.55, $p < 0.001$). However, certain operational challenges were found related to beneficiary enrolment and use of PMMVY software, and a gap in intended and actual use of PMMVY incentive was observed (26.2% beneficiary women had spent the cash incentive on needs not related to nutrition or health). **CONCLUSION:** Despite operational challenges, PMMVY has been effective in improving the utilization of health services like antenatal check-ups, childbirth registration and child immunization. The benefits of the scheme may be maximized by addressing those limitations in its delivery.

GBD 2021 Adult BMI Collaborators (2025). Global, regional, and national prevalence of adult overweight and obesity, 1990-2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021. *Lancet (London, England)*, 405(10481), 813-838. [https://doi.org/10.1016/S0140-6736\(25\)00355-1](https://doi.org/10.1016/S0140-6736(25)00355-1)

BACKGROUND: Overweight and obesity is a global epidemic. Forecasting future trajectories of the epidemic is crucial for providing an evidence base for policy change. In this study, we examine the historical trends of the global, regional, and national prevalence of adult overweight and obesity from 1990 to 2021 and forecast the future trajectories to 2050. **METHODS:** Leveraging established methodology from the Global Burden of Diseases, Injuries, and Risk Factors Study, we estimated the prevalence of overweight and obesity among individuals aged 25 years and older by age and sex for 204 countries and territories from 1990 to 2050. Retrospective and current prevalence trends were derived based on both self-reported and measured anthropometric data extracted from 1350 unique sources, which include survey microdata and reports, as well as published literature.

Specific adjustment was applied to correct for self-report bias. Spatiotemporal Gaussian process regression models were used to synthesise data, leveraging both spatial and temporal correlation in epidemiological trends, to optimise the comparability of results across time and geographies. To generate forecast estimates, we used forecasts of the Socio-demographic Index and temporal correlation patterns presented as annualised rate of change to inform future trajectories. We considered a reference scenario assuming the continuation of historical trends. **FINDINGS:** Rates of overweight and obesity increased at the global and regional levels, and in all nations, between 1990 and 2021. In 2021, an estimated 1.00 billion (95% uncertainty interval [UI] 0.989-1.01) adult males and 1.11 billion (1.10-1.12) adult females had overweight and obesity. China had the largest population of adults with overweight and obesity (402 million [397-407] individuals), followed by India (180 million [167-194]) and the USA (172 million [169-174]). The highest age-standardised prevalence of overweight and obesity was observed in countries in Oceania and north Africa and the Middle East, with many of these countries reporting prevalence of more than 80% in adults. Compared with 1990, the global prevalence of obesity had increased by 155.1% (149.8-160.3) in males and 104.9% (95% UI 100.9-108.8) in females. The most rapid rise in obesity prevalence was observed in the north Africa and the Middle East super-region, where age-standardised prevalence rates in males more than tripled and in females more than doubled. Assuming the continuation of historical trends, by 2050, we forecast that the total number of adults living with overweight and obesity will reach 3.80 billion (95% UI 3.39-4.04), over half of the likely global adult population at that time. While China, India, and the USA will continue to constitute a large proportion of the global population with overweight and obesity, the number in the sub-Saharan Africa super-region is forecasted to increase by 254.8% (234.4-269.5). In Nigeria specifically, the number of adults with overweight and obesity is forecasted to rise to 141 million (121-162) by 2050, making it the country with the fourth-largest population with overweight and obesity. **INTERPRETATION:** No country to date has successfully curbed the rising rates of adult overweight and obesity. Without immediate and effective intervention, overweight and obesity will continue to increase globally. Particularly in Asia and Africa, driven by growing populations, the number of individuals with overweight and obesity is forecasted to rise substantially. These regions will face a considerable increase in obesity-related disease burden. Merely acknowledging obesity as a global health issue would be negligent on the part of global health and public health practitioners; more aggressive and targeted measures are required to address this crisis, as obesity is one of the foremost avertible risks to health now and in the future and poses an unparalleled threat of premature disease and death at local, national, and global levels. **FUNDING:** Bill & Melinda Gates Foundation.

GBD 2021 Adolescent BMI Collaborators (2025). Global, regional, and national prevalence of child and adolescent overweight and obesity, 1990-2021, with forecasts to 2050: a forecasting study for the Global Burden of Disease Study 2021. *Lancet (London, England)*, 405(10481), 785-812.
[https://doi.org/10.1016/S0140-6736\(25\)00397-6](https://doi.org/10.1016/S0140-6736(25)00397-6)

BACKGROUND: Despite the well documented consequences of obesity during childhood and adolescence and future risks of excess body mass on non-communicable diseases in adulthood, coordinated global action on excess body mass in early life is still insufficient. Inconsistent measurement and reporting are a barrier to specific targets, resource allocation, and interventions. In this Article we report current estimates of overweight and obesity across childhood and adolescence, progress over time, and forecasts to inform specific actions. **METHODS:** Using established methodology from the Global Burden of Diseases, Injuries, and Risk Factors Study 2021, we modelled overweight and obesity across childhood and adolescence from 1990 to 2021, and then forecasted to 2050. Primary data for our models included 1321 unique measured and self-reported anthropometric data sources from 180 countries and territories from survey microdata, reports, and published literature. These data were used to estimate age-standardised global, regional, and national overweight prevalence and obesity prevalence (separately) for children and young adolescents (aged 5-14 years, typically in school and cared for by child health services) and older adolescents (aged 15-24 years, increasingly out of school and cared for by adult services) by sex for 204 countries and territories from 1990 to 2021. Prevalence estimates from 1990 to 2021 were generated using spatiotemporal Gaussian process regression models, which leveraged temporal and spatial correlation in epidemiological trends to ensure comparability of results across time and geography. Prevalence forecasts from 2022 to 2050 were generated using a generalised ensemble modelling approach assuming continuation of current trends. For every age-sex-location population across time (1990-2050), we estimated obesity (vs overweight) predominance using the log ratio of obesity percentage to overweight percentage. **FINDINGS:** Between 1990 and 2021, the combined prevalence of overweight and obesity in children and adolescents doubled, and that of obesity alone tripled. By 2021, 93.1 million (95% uncertainty interval 89.6-96.6) individuals aged 5-14 years and 80.6 million (78.2-83.3) aged 15-24 years had obesity. At the super-region level in 2021, the prevalence of overweight and of obesity was highest in north Africa and the Middle East (eg, United Arab Emirates and Kuwait), and the greatest increase from 1990 to 2021 was seen in southeast Asia, east Asia, and Oceania (eg, Taiwan [province of China], Maldives, and China). By 2021, for females in both age groups, many countries in Australasia (eg, Australia) and in high-income North America (eg, Canada) had already transitioned to obesity predominance, as had males and females in a number of countries in north Africa and the Middle East (eg, United Arab Emirates and Qatar) and Oceania (eg, Cook Islands and American Samoa). From 2022 to 2050, global increases in overweight (not obesity) prevalence are forecasted to stabilise, yet the increase in the absolute proportion of the global population with obesity is forecasted to be greater than between 1990 and 2021, with substantial increases forecast between 2022 and 2030, which continue between 2031 and 2050.

By 2050, super-region obesity prevalence is forecasted to remain highest in north Africa and the Middle East (eg, United Arab Emirates and Kuwait), and forecasted increases in obesity are still expected to be largest across southeast Asia, east Asia, and Oceania (eg, Timor-Leste and North Korea), but also in south Asia (eg, Nepal and Bangladesh). Compared with those aged 15-24 years, in most super-regions (except Latin America and the Caribbean and the high-income super-region) a greater proportion of those aged 5-14 years are forecasted to have obesity than overweight by 2050. Globally, 15.6% (12.7-17.2) of those aged 5-14 years are forecasted to have obesity by 2050 (186 million [141-221]), compared with 14.2% (11.4-15.7) of those aged 15-24 years (175 million [136-203]). We forecasted that by 2050, there will be more young males (aged 5-14 years) living with obesity (16.5% [13.3-18.3]) than overweight (12.9% [12.2-13.6]); while for females (aged 5-24 years) and older males (aged 15-24 years), overweight will remain more prevalent than obesity. At a regional level, the following populations are forecast to have transitioned to obesity (vs overweight) predominance before 2041-50: children and adolescents (males and females aged 5-24 years) in north Africa and the Middle East and Tropical Latin America; males aged 5-14 years in east Asia, central and southern sub-Saharan Africa, and central Latin America; females aged 5-14 years in Australasia; females aged 15-24 years in Australasia, high-income North America, and southern sub-Saharan Africa; and males aged 15-24 years in high-income North America. INTERPRETATION: Both overweight and obesity increased substantially in every world region between 1990 and 2021, suggesting that current approaches to curbing increases in overweight and obesity have failed a generation of children and adolescents. Beyond 2021, overweight during childhood and adolescence is forecast to stabilise due to further increases in the population who have obesity. Increases in obesity are expected to continue for all populations in all world regions. Because substantial change is forecasted to occur between 2022 and 2030, immediate actions are needed to address this public health crisis. FUNDING: Bill & Melinda Gates Foundation and Australian National Health and Medical Research Council.

Leroy, J. L., Brander, R. L., Frongillo, E. A., Larson, L. M., Ruel, M. T., & Avula, R. (2025). Perspective: Can Growth Monitoring and Promotion Accurately Diagnose or Screen for Inadequate Growth of Individual Children? A Critical Review of the Epidemiologic Foundations. *Advances in nutrition (Bethesda, Md.)*, 16(3), 100367. <https://doi.org/10.1016/j.advnut.2025.100367>

Growth monitoring and promotion (GMP), the process of periodic anthropometric measurements to assess the adequacy of individual child growth, is implemented across low-income and middle-income countries. The epidemiologic foundations of GMP (i.e., that GMP can accurately diagnose or screen for inadequate growth) have never been critically reviewed. We first assessed growth patterns of individual healthy children. Using longitudinal data from low-income, middle-income, and high-income countries, we evaluated whether commonly used GMP criteria can be used for diagnosis and screening; i.e., whether they accurately identify current, or predict subsequent, inadequate growth in individual children. The growth of individual healthy children does not track along a specific growth curve, which challenges the notion that growth measurements alone can be used to distinguish between healthy and inadequate growth. We demonstrated that GMP criteria do not provide meaningful diagnostic information and that GMP is not a meaningful screening activity: commonly used GMP criteria are inaccurate predictors of (inadequate) growth later in childhood, and collecting individual children's weight and height does not help to identify who needs support or who will benefit. Our results do not undermine the importance of dedicated programs to diagnose wasting in individual children nor do they challenge the need for well-child care to support parents and to ensure children's optimal nutrition, health, and development. Our findings, however, highlight the need to carefully reconsider the current design of GMP in low-income and middle-income countries.

Aychiluhm, S. B., Mondal, U. K., Isaac, V., Ross, A. G., & Ahmed, K. Y. (2025). Interventions for Childhood Central Obesity: A Systematic Review and Meta-Analysis. *JAMA network open*, 8(4), e254331. <https://doi.org/10.1001/jamanetworkopen.2025.4331>

IMPORTANCE: The rapid rise in childhood central obesity and its cardiometabolic complications in adulthood highlight the urgent need for targeted global interventions. OBJECTIVE: To examine the association of lifestyle, behavioral, and pharmacological interventions with childhood central obesity. DATA SOURCES: MEDLINE, Embase, CINHAL, PsycINFO, PubMed, Academic Search Database, and ProQuest from inception to September 25, 2024. STUDY SELECTION: Inclusion criteria included (1) randomized clinical trials (RCTs) focusing on children aged 5 to 18 years with overweight or obesity at baseline and (2) measured central obesity as a primary or secondary outcome. DATA EXTRACTION AND SYNTHESIS: The Preferred Reporting Items for Systematic Reviews and Meta-Analyses reporting guideline was followed. Two authors independently extracted data. Risk of bias was assessed using the revised Cochrane risk-of-bias tool (RoB 2.0). A random-effects meta-analysis was conducted to pool standardized mean differences (SMD) from individual studies. Sensitivity analysis, meta-regression, and subgroup analyses were also conducted.

MAIN OUTCOMES AND MEASURES: The main outcome was childhood central obesity measured using waist circumference (WC), waist-to-height ratio, waist-to-hip ratio, and WC z score. **RESULTS:** This review included 34 RCTs, involving 8183 children aged 5 to 18 years. Twelve studies had a low risk of bias, whereas 8 were deemed to have a higher risk of bias. The meta-analysis of 2 RCTs examining low-fat lunchboxes and a Mediterranean diet along with physical activity (lasting up to 150 minutes per week over 6 to 9 months) showed a significant association with WC (standard mean difference [SMD], -0.38 [95% CI, -0.58 to -0.19]). Five additional RCTs involved behavioral interventions on dietary education to reduce unhealthy snacks, increase fruit and vegetable intake, promote daily physical activity, and limit screen time, supported by online resources also showed a significant association with WC (SMD, -0.54 [95% CI, -1.06 to -0.03]). However, standalone dietary, physical activity, pharmacotherapy, dietary supplements, motivational interviewing, and combined dietary, physical activity, and behavioral methods did not show a significant association with WC. **CONCLUSIONS AND RELEVANCE:** In this meta-analysis of RCTs, combining dietary changes with physical activity, as well as using behavioral strategies alone, were associated with reduced central obesity in children from high- and middle-income countries. Findings from this study have policy implications for Sustainable Development Goals of ending all forms of malnutrition and reducing premature mortality from noncommunicable diseases.

Ranisavljev M, Kurniawan AL, Ferrero E, Shinde S, Zhao S, Partap U, Mkwanzani N, Dah NC, Agure E, Berhane HY, Neumann C, Alangea DO, Liu S, Ostojic SM, Fawzi WW, Walsh F, Bärnighausen T; ARISE-NUTRINT collaborators. Community-based interventions addressing multiple forms of malnutrition among adolescents in low- and middle-income countries: a scoping review. *Nutr J.* 2025 Apr 30;24(1):69. doi: 10.1186/s12937-025-01136-2. PMID: 40307813; PMCID: PMC12044920.

BACKGROUND: Community-based interventions hold promise for addressing adolescent malnutrition, but there is limited knowledge of their nature and impact on adolescent nutrition outcomes in low- and middle-income countries (LMICs). This scoping review aimed to characterize community-based adolescent nutrition interventions in LMICs and summarize their effects on adolescent nutrition outcomes. **METHODS:** We systematically searched MEDLINE via PubMed, Embase, and CENTRAL through the Cochrane Library for studies published between 2000 and 2023. The review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews guidelines. Eligible studies included randomized controlled trials and quasi-experimental studies addressing adolescent malnutrition in LMIC community settings, involving adolescents aged 10-19 years. A narrative synthesis was employed to analyze and describe the evidence. **RESULTS:** Our review included 37 records from 36 studies conducted in 27 countries. Interventions included micronutrient supplementation, nutrition education, food supplementation and fortification, physical activity education, and multicomponent approaches. The intervention duration ranged from 3 weeks to 2 years, with limited studies grounded in theoretical frameworks. Fifty-seven percent of interventions (n = 21) targeted adolescent girls, indicating a gap in programs for boys and other vulnerable groups, such as out-of-school adolescents and migrants. The intervention delivery agents included research staff and healthcare professionals. The majority of interventions were delivered in person; few utilized social media strategies. Among the studies reviewed, nine out of ten evaluating micronutrient supplementation, six out of seven assessing nutrition education, and seven out of eight examining multicomponent interventions reported improvement in at least one nutrition or diet-related outcome. **CONCLUSIONS:** Community-based interventions hold promise for improving adolescent nutritional status in LMICs. However, our review highlights gaps in the evidence base, marked by significant variability in intervention design, delivery, and implementation platforms. This underscores the need for integrated approaches and rigorous evaluations of their implementation outcomes, including acceptability, relevance, feasibility, effectiveness, and sustainability, in addressing adolescent nutrition challenges. **REGISTRATION:** The review protocol was registered prospectively with the Open Science Framework on 19 July 2023 (<https://osf.io/t2d78>).

Shukla, S., Kharade, A., Böhret, I., Jumaniyazova, M., Meyer, S. R., Abejirinde, I. O., Shenderovich, Y., & Steinert, J. (2025). How do gender transformative interventions reduce adolescent pregnancy in low- and middle-income countries: a realist synthesis. *Journal of global health, 15, 04102.* <https://doi.org/10.7189/jogh.15.04102>

BACKGROUND: Adolescent pregnancy poses a significant health challenge for girls aged 15-19 in low- and middle-income countries. While gender transformative interventions (GTIs) aim to address this issue, a substantial research gap exists concerning the underlying mechanisms contributing to their success. This study employs a realist synthesis approach to systematically investigate how, why, for whom, and in what contexts GTIs effectively reduce adolescent pregnancy. **METHODS:** A five-step realist review examined literature from four databases and five organisational repositories, including published and grey literature. The review focused on GTIs for adolescents aged 10-19 in low- or middle-income countries. Narrative synthesis and realist analysis were used to develop context-mechanism-outcome configurations. **RESULTS:** The review analysed 28 documents covering 14 interventions and proposing eight programme theories across three settings.

In the school, creating a supportive environment to foster positive social norms and providing a safe space was emphasised. Comprehensive sexual health education to promote critical thinking, knowledge retention, and goal setting was one of the key strategies. Empowering boys to adopt positive gender norms for behaviour change was also identified. In the health facility, providing a safe, supportive, and confidential environment for accessing services, as well as using digital health apps to empower adolescents in sexual reproductive health, were key. In the community, empowering girls through life skills and economic support and involving community members to foster stronger interpersonal bonds and a gender-positive environment were highlighted. These interventions led to increased contraceptive use, delayed marriage, and reduced adolescent pregnancy. **CONCLUSION:** This realist synthesis proposes eight nuanced programme theories of successful GTIs, providing essential insights for developing, implementing, and improving future programmes. These findings offer a foundation for effective strategies to mitigate adolescent pregnancy in diverse socio-cultural contexts. **REGISTRATION:** PROSPERO: CRD42023398293.

Narayanan, M., Karlsson, O., Kumar, A., Pullum, T. W., Kim, R., & Subramanian, S. V. (2025). Prevalence of severe and moderate anthropometric failure among children in India, 1993-2021. *Maternal & child nutrition*, 21(2), e13751. <https://doi.org/10.1111/mcn.13751>

Though child anthropometric failure (CAF) is a persistent problem in India, previous studies have often neglected state-level variance and aggregated moderate and severe CAF categories. This study addresses this gap by examining moderate and severe malnutrition across India's states and union territories (UTs) from 1993 to 2021. Data of children under 2 years old from five waves of National Family Health Surveys, a representative cross-sectional survey of Indian households, were analysed. Outcomes included prevalence of moderate and severe stunting, underweight and wasting, as per the 2006 World Health Organization growth standards. Percentage prevalence and standardized absolute change (SAC) were calculated nationally and by region for each wave. From 1993 to 2021, there was a notable reduction in the nationwide prevalence of moderate stunting, underweight and wasting, with rates dropping from 20% to 16%, 23% to 18%, and 15% to 12%, respectively. Severe stunting and underweight declined considerably from 23% to 16% and 18% to 11%, respectively; severe wasting marginally increased from 8% to 9%. From 2016 to 2021 moderate underweight was noted to have the highest SAC across all regions, although 15 regions saw an increase in the prevalence of moderate underweight. In the 2016-2021 period, severe wasting has increased in 13 of the 36 regions. While there has been a nationwide reduction in most indicators of CAF since 1993, the rate and direction of change vary widely among states and UTs and between moderate and severe categories within each of the states and UTs. Understanding these patterns of change can direct context-specific interventions for improving child nutrition and health. A greater focus on reducing severe wasting, which has increased since 1993, is also crucial.

Arora, P., Bhatia, M., & Dwivedi, L. K. (2025). Co-Occurrences of Forms of Child Undernutrition in India: Insights from the National Family Health Survey. *Nutrients*, 17(6), 977. <https://doi.org/10.3390/nu17060977>

Background: The composite index of anthropometric failure (CIAF) studies co-occurrences of three forms of child undernutrition: stunting (S), wasting (W), and underweight (U). This study attempts to modify it through the inclusion of a fourth form of undernutrition, that is, anaemia (A), serving as a proxy for micronutrient deficiencies among under-five children in India. **Methods:** Spatial and multivariate analyses were employed to analyse the co-occurrences of child undernutrition with reference to the child's and mother's characteristics using National Family Health Survey (NFHS) data. **Results:** The modified index of "CIAF + Anaemia" identified thirteen manifestations of child undernutrition in India, the most prevalent co-occurrence being "only anaemia" (30%), followed by a triple burden or co-occurrence of stunting, underweight, and anaemia (SUA) (12%). The prevalence of the quadruple burden of child undernutrition (SWUA) was found to be highest in the states of Jharkhand and Gujarat (7%). A higher likelihood of the co-occurrence of "SUA" was observed among underweight mothers (16%), whereas that of "only anaemia" was observed more among overweight mothers (35%) compared to their counterparts. The co-occurrences "SUA" and "SWUA" were found to be moderately clustered among the districts of India. **Conclusions:** Overall, the study reinforces the need for early identification and specialised treatment approaches for children burdened with multiple forms of undernutrition to prevent its scarring effect.

Raza, W. A., Misha, F., Hossain, S. S., Gulshan, J., Rashid, B., Sayem, S. M., Aranya, S. G., & Chaudhery, D. (2025). Extreme heat exposure in the first 1000 days: Implications for childhood stunting in Bangladesh. *Public health*, 241, 83-88. <https://doi.org/10.1016/j.puhe.2025.02.002>

OBJECTIVES: Stunting is a critical public health issue in Bangladesh, a country highly vulnerable to climate change and increased extreme heat exposure. Limited research has examined the relationship between extreme heat during the first 1000 days of life and stunting. This study provides the first evidence from Bangladesh on the likelihood of stunting among children aged 24-59 months following exposure to extreme heat during this crucial developmental period.

STUDY DESIGN: The study utilized district-level panel data from the 2012 and 2019 Multiple Indicator Cluster Surveys, comprising of 24,035 children aged 24-59 months, paired with daily temperature records reflecting conditions from the child's first 1000 days. **METHODS:** A multilevel logistic regression model with district-level random effects assessed the relationship between extreme heat exposure and stunting. **RESULTS:** A 1 % increase in extreme heat days during the first 1000 days of life was associated with higher odds of stunting (adjusted odds ratio [AOR] 1.56, 95 % confidence interval [CI] 1.25-1.95, $p < 0.0001$) at 24-59 months of age. Post-birth exposure to extreme heat showed a stronger association with stunting (AOR 1.67, 95 % CI 1.37-2.03, $p = 0.063$) than in utero exposure (AOR 1.28, 95 % CI 1.14-1.44, $p < 0.0001$). **CONCLUSION:** Escalating extreme heat threatens decades of progress in reducing stunting in Bangladesh. Mitigation efforts targeting the first 1000 days of life are critical, alongside further research to disentangle the specific effects of extreme heat on child growth within the broader context of climate change.

Alive & Thrive (A&T) is an initiative designed to advance the implementation of maternal, infant and young child nutrition (MIYCN) social and behaviour change (SBC) at a large scale. The aims of this research were to: (1) describe A&T's SBC implementation processes and their impact based on a review of programme documents and peer-reviewed publications and (2) gather lessons learned from key informant interviews (N = 23) with A&T staff and stakeholders in Bangladesh, Burkina Faso, Ethiopia, India, Nigeria and Vietnam. A&T's SBC approach used interpersonal communication, community mobilization and mass media to address knowledge gaps, strengthen self-efficacy and shift social norms. The initiative used data for design and evaluation and facilitated scale and sustainability through close collaboration with governments and other stakeholders. A&T's approach increased exclusive breastfeeding, minimum meal frequency of children and use of iron and folic acid tablets by pregnant women, but had mixed impacts on early initiation of breastfeeding and maternal and child dietary diversity. Multiple SBC channels and frequent contacts strengthened the impact of SBC on MIYCN practices. Lessons learned included: using existing large-scale platforms for interpersonal communication, improving counselling skills of health workers, delivering timely tailored messages, engaging key influencers to take specific actions, using research to address underlying behavioural concerns and maximize mass media reach and frequency, using simple memorable messages and employing additional channels to reach low media coverage areas. A&T developed and implemented at-scale MIYCN SBC in multiple countries, providing lessons learned about intervention strategies, engagement of influencers and mass media campaign development, which governments and other implementers can adapt and replicate.

Sanghvi, T. G., Homan, R., Nguyen, T., Mahmud, Z., Walissa, T., Nersesyan, M., Preware, P., Frongillo, E. A., & Matheson, R. (2025). Incremental financial costs of strengthening large-scale child nutrition programs in Bangladesh, Ethiopia, and Vietnam: retrospective expenditure analysis. *Globalization and health*, 21(1), 21. <https://doi.org/10.1186/s12992-025-01118-3>

BACKGROUND: Inattention to young child growth and development in a transitioning global environment can undermine the foundation of human capital and future progress. Diets that provide adequate energy and nutrients are critical for children's physical and cognitive development from 6 to 23.9 months of age and beyond. Still, over 70% of young children do not receive foods with sufficient nutrition particularly in low-and-middle income countries. Program evaluations have documented the effectiveness of large-scale behavior change interventions to improve children's diets, but the budgetary implications of programs are not known. This paper provides the incremental financial costs of strengthening three large-scale programs based on expenditure records from Bangladesh, Ethiopia, and Vietnam. **RESULTS:** The programs reached between one and 2.5 million mothers and children annually per country at unit costs of between \$0.9 to \$1.6 per mother and child reached. An additional 0.7 to 1.6 million people who were influential in supporting mothers and achieving scale were also engaged. The largest cost component was counselling of mothers. Rigorous external impact evaluations showed that over 434,500 children benefited annually from consuming a minimum acceptable diet in all countries combined, at an annual cost per country of \$6.3 to \$34.7 per child benefited. **CONCLUSIONS:** Large scale programs to improve young children's nutrition can be affordable for low- and middle-income countries. The study provides the incremental costs of selectively strengthening key program components in diverse settings with lessons for future budgeting. The costs of treating a malnourished child are several-fold higher than prevention through improved improving young children's dietary practices. Differences across countries in program models, coverage, costs, and outcomes suggest that countries need a minimum investment of resources for strengthening high-reach service delivery and communication channels and engaging relevant behavioral levers and community support for mothers to achieve impact at scale.

Sethuraman K, Bose S, Escobar-DeMarco J, Frongillo EA. Quality Assurance and Quality Improvement in Maternal, Infant, Young Child and Adolescent Nutrition Service Provision in Five Countries. *Matern Child Nutr.* 2025 Apr;21(2):e13772. doi: 10.1111/mcn.13772. Epub 2025 Mar 24. PMID: 40126934; PMCID: PMC11956046.

Greater efforts are needed to better integrate nutrition services focused on the first 1000 days into health systems. Key constraints to large-scale impact include the scale of coverage, intensity and quality of nutrition services. But there is little understanding to date on what quality comprises in the context of maternal, infant, young child and adolescent nutrition (MIYCAN) services. This qualitative assessment presents findings from five countries (Bangladesh, Burkina Faso, Cambodia, Ethiopia, and India) where Alive and Thrive (A&T) addressed the quality of MIYCAN services to understand the quality frameworks used, components addressed and factors that can improve the quality of MIYCAN services. The methodology consisted of reviewing programme documents and conducting purposive key informant interviews (n = 30) with A&T country staff and stakeholders involved with MIYCAN service provision supported by A&T technical assistance (TA). Countries used either health-system-level quality assurance (QA), largely systems strengthening, or facility-level continuous quality improvement (QI) that used an iterative process to improve service quality. Joint pilot interventions supported by A&T and respective country governments demonstrated that implementing QA/QI to improve MIYCAN services was feasible. Common QA/QI activities included improving nutrition standards of care, harmonising training materials, changing how services were delivered, altering counselling from didactic to dialogue-oriented and promoting the strategic use of data to address service provision challenges and identify solutions. Factors that facilitated QA/QI included working jointly with the government. The findings suggest that there are common principles that can guide the development of future MIYCAN programmes with similar objectives.

Harris, J., Battersby, J., Gordon, J. et al. Equity and equality in diets and nutrition: Frameworks, evidence, and four country case studies. *Food Sec.* (2025). <https://doi.org/10.1007/s12571-025-01537-5>

Who is malnourished, why some people have access to diverse and healthy diets while others do not, and the lifelong and intergenerational consequences of these situations are questions that are central to why we care about food and nutrition equity – but these questions are often overlooked in research and practice. The purpose of this paper is to review recent work on equity and equality in the field of food, diets and nutrition, and to provide empirical case-studies demonstrating issues and solutions in practice, in order to move the field forward coherently. The Nutrition Equity Framework illustrates how unfairness, injustice and exclusion condition deep drivers of inequity that lead to unequal diet and nutrition outcomes. We use the framework to structure four case-studies from Brazil, South Africa, Vietnam and the UK on how researchers and activists are involved in the struggle for fair and just diets that are healthier and more sustainable. Comparison across the four case-studies provides a useful illustration of how diet and nutrition equity dynamics can play out in diverse ways depending on national historical and contemporary contexts; but at the same time, we see some parallel trends and characteristics suggesting common drivers of unhealthy and inequitable diets. In terms of action, equity can be operationalized in the positive as the need for recognition, representation and redistribution with relation to marginalized population groups, and the paper ends with suggestions from the literature on how to take this forward in research and action.

Choudhury, S., Bi, A. Z., Medina-Lara, A., Morrish, N., & Veettil, P. C. (2025). The rural food environment and its association with diet, nutrition status, and health outcomes in low-income and middle-income countries (LMICs): a systematic review. *BMC public health*, 25(1), 994. <https://doi.org/10.1186/s12889-025-22098-4>

BACKGROUND: The food environment consists of external and personal domains that shape food purchasing decisions. While research on food environments has grown rapidly within high-income countries (HICs) in response to increasing rates of overweight, obesity, and non-communicable diseases (NCDs), critical research gaps remain. The role of food environment on diet, health and nutrition has been understudied in LMICs. To date, there has not been a systematic review specifically focusing on rural LMICs. This systematic review aims to synthesize findings from studies examining the association between rural food environment domains and diet, nutrition and health in LMICs or effects of food environment interventions on these outcomes. **METHODS:** Searches were conducted from 9 databases: Medline (PubMed), Embase (Ovid), Global Health (Ovid), PsycINFO (Ovid), EconLit (EBSCOhost), Web of Science (Social Science Citation Index), Scopus, CINAHL (EBSCOhost), and Applied Social Sciences Index and Abstracts (ProQuest) to identify studies published between 2000 and 2023 that reported associations between this/these dimensions with diets, nutrition or health outcomes. Both quantitative and qualitative studies that were published in English were included. Data extraction and quality appraisal was conducted independently by two authors, before the study findings were collated and summarized through a narrative data synthesis.

RESULTS: Nineteen eligible studies were identified from 9 databases covering 11 LMICs. The included studies employed quantitative (n = 12), mixed method (n = 6) and qualitative (n = 1) designs in the neighbourhood food environment. In this review, availability dimension of the external food environment featured most prominently, followed by accessibility, affordability, desirability, and convenience dimensions of the personal food environment. Food availability was positively associated with diet (n = 10), nutrition (n = 7) and health (n = 1). There was good evidence regarding associations between food accessibility, diet (n = 7) and nutrition (n = 3). We identified some evidence that food price and affordability (n = 8) were considered key barriers to achieving healthy diets. Desirability (n = 4) and convenience (n = 2) dimensions were also associated with dietary outcomes, although we found only a few studies. Only one South African qualitative study was identified which highlighted limited availability and accessibility to local supermarkets and surrounding informal fruit and vegetable vendors to be a barrier to expensive, healthy foods consumption. Finally, evidence regarding health outcomes, sustainability dimension, impacts of food environment interventions on relevant outcomes and interactions between food environment dimensions was missing. Overall, seven out of nineteen studies were rated as good quality, six were rated as fair and six were rated as poor.

CONCLUSIONS: Future interventions should consider improving availability and accessibility of nutritious foods to improve public health nutrition in rural LMICs. Evidence from studies assessing the workplace, home, and school food environments, food environment interventions, sustainability dimension and other key dimensions of the external food environment such as prices, vendor and product properties and marketing and regulation is needed to identify effective interventions to address malnutrition in all its forms characterized by the coexistence of undernutrition, overnutrition, undernutrition and diet-related non-communicable diseases (NCDs).

Scott, S., Patwardhan, S., Ruel, M., Chakrabarti, S., Neupane, S., Manohar, S., Moursi, M., & Menon, P. (2025). What Adults in Rural South Asia Eat and When They Eat It: Evidence From Bangladesh, India, and Nepal. *The Journal of nutrition*, 155(7), 2406-2415. <https://doi.org/10.1016/j.tjnut.2025.05.014>

BACKGROUND: Poor diets are associated with all forms of malnutrition and diet-related noncommunicable diseases (NCDs). Data on dietary patterns are scarce in South Asia. **OBJECTIVES:** We sought to describe overall diet quality and intake of foods and food groups at different eating occasions among adults in rural South Asia. **METHODS:** We collected cross-sectional data from 5 districts across Bangladesh (n = 2802 individuals), India (n = 1672), and Nepal (n = 1451). The Global Diet Quality Score (GDQS) application was used to measure food intake on the previous day, with each food tagged to an eating occasion. Diet quality and risk of dietary inadequacy and diet-related NCDs were assessed using GDQS total (0-49 points), GDQS positive (0-32), and GDQS negative (0-17) metrics for overall, healthy, and unhealthy food group intake, respectively. **RESULTS:** Diet quality was low, with similar scores across countries for GDQS total (17-19), GDQS positive (7-8), and GDQS negative (10-12). Over 90% of adults had levels of GDQS scores associated with moderate/high risk of nutrient inadequacy and diet-related NCDs, with the proportion at high risk in Bangladesh being 2-3x higher than that in other countries. One-third of adults skipped breakfast in Nepal, and snacking was twice as common in males (63%) vs females (33%) in Bangladesh. Lower GDQS total scores (worse diets) were associated with female gender and lower household wealth but not with household production of crops or livestock. **CONCLUSIONS:** These findings may help inform interventions to improve diets in South Asia, focusing on increasing intake of healthy fresh foods, while limiting intake of processed foods high in sugar, salt, and saturated fat.

Chowdhury, Z. T., Hurley, K. M., Shaikh, S., Mehra, S., Ali, H., Shamim, A. A., & Christian, P. (2025). Caregiver Feeding Behaviours and Child Dietary Diversity and Growth in Rural Bangladesh. *Maternal & child nutrition*, 21(2), e13781. <https://doi.org/10.1111/mcn.13781>

This study examined relations between caregiver feeding behaviours, child dietary diversity and anthropometry at 24 months of age in rural Bangladesh. Twenty-four hours dietary recall, weight and length data were collected on 4733 children. Factor analysis was applied to an 11-item caregiver feeding behaviours scale administered at 24 months, revealing two constructs: responsive/involved (five items) and forceful (six items); each dichotomised to reflect low and high use. Stunting (length-for-age Z-score < -2), wasting (weight-for-length Z-score < -2) and underweight (weight-for-age Z-score < -2) were defined using international growth reference standards. Associations between feeding behaviours, dietary diversity score (DDS, food groups consumed; range 0-7) and anthropometric indicators were examined using multivariable linear or logistic regression models, adjusting for study design, confounders and intervention arm. Mean (SD) age of children in the study was 24.1 (0.3) months. Mean (SD) DDS was 3.7 (1.4), with 55% of children meeting minimum dietary diversity (MDD, DDS \geq 4). Stunting, wasting and underweight were 40%, 19% and 42%, respectively. Use of high responsive/involved feeding behaviours (reported in 71% of mothers) was associated with higher DDS (0.09, 95% confidence interval [CI]: 0.001, 0.17) and higher odds of achieving MDD (OR: 1.17; 95% CI: 1.02, 1.33) but not with anthropometric outcomes. Use of high forceful feeding behaviours (reported in 34% of mothers) was associated with lower DDS (-0.12, 95% CI: -0.21 to 0.04), lower odds of achieving MDD (OR: 0.82, 95% CI: 0.72, 0.93), and higher odds of underweight (OR: 1.38, 95% CI: 1.22, 1.56) and wasting (OR: 1.55, 95% CI: 1.33, 1.81). In Bangladesh, responsive/involved feeding was associated with higher child dietary diversity whereas forceful feeding was associated with lower dietary diversity and undernutrition. Future research is needed to understand causality and test the effect of responsive feeding interventions on the promotion of child growth.

Sharma, P., Limaye, N., Sah, R. K., & Shrestha, A. (2025). Association of food environment with diet quality and Body Mass Index (BMI) of school-going adolescents in Nepal. *PloS one*, 20(4), e0321524. <https://doi.org/10.1371/journal.pone.0321524>

BACKGROUND: Adolescents are being more vulnerable to non-communicable diseases (NCDs). A healthy food environment is crucial in maintaining a healthy diet and achieving better health outcomes. This study aimed to determine how certain features of home food environment affect diet quality and Body Mass Index (BMI) of school-going adolescents. **METHODS:** We conducted a cross-sectional analytical study among 678 school-going adolescents aged 15-19 years in Budanilkantha municipality of Kathmandu, Nepal. We assessed home availability of food items in the past day, walking time needed to reach nearest shops from home, parental modeling, and parenting style. Furthermore, we assessed diet quality using a Diet Quality Questionnaire as Global Dietary Recommendations (GDR) Score and measured height and weight of participants to calculate BMI. We used multiple regression models to analyze data, all statistical analyses were performed using STATA-14. **RESULTS:** Of 678 participants, 51.92% were males, and mean age was 15.56 years. Those who had to walk > 20 minutes to reach nearest vegetable shop had an average 1.44 point lower GDR Score (95% CI: -2.08, -0.19) than those with vegetable shops at their home. Those who had processed meat at home in the past day had 1.61 points lower GDR Score (95% CI: -1.95, -1.28), those with fruits and vegetables had 0.74 points lower GDR Score (95% CI: 0.48, 1.00) as compared to those who didn't have. Participants who had starchy staple available had a BMI score lower by 5.59 kg/m² on average (95% CI: - 10.78, - 0.40), and when two participants whose parental modeling scores differed by a unit were compared, the one with a higher score had on an average 0.19 kg/m² greater BMI (95% CI: 0.01, 0.37). **CONCLUSION:** This study highlights impact of home food environment on diet quality and BMI among adolescents in urban Nepal. Availability of healthy foods positively affects diet quality, while unhealthy items negatively influences it. Future research should explore wider food environmental factors and intervention strategies to improve adolescents' diet quality.

Aivalli, P., Dada, S., Gilmore, B., Srinivas, P. N., & De Brún, A. (2025). Power dynamics and intersectoral collaboration for health in low- and middle-income countries: a realist review. *Health policy and planning*, 40(6), 661-683. <https://doi.org/10.1093/heapol/czaf022>

Intersectoral collaboration (ISC) is a critical strategy in global health for addressing complex challenges requiring multi-sectoral engagement. Although studies examined ISC in low- and middle-income countries (LMICs), gaps remain in understanding how power dynamics between stakeholders influence the effectiveness of ISC in these settings. This realist synthesis examines how, why, for whom, under what context, and to what extent power dynamics shape ISC in LMIC health programmes and policies, offering insights crucial for improving health policy implementation. Five initial programme theories were developed through a scoping review, document analysis, and qualitative study. A systematic search of Medline, Embase, CINAHL, Web of Science, and grey literature (2012-23) yielded 2850 records, with 23 included after screening. This period was chosen to capture contemporary shifts in ISC, following the 2012 UN Political Declaration on NCDs and the WHO's 2013 Health in All Policies (HiAP) framework, which strengthened multi-sectoral governance in LMICs. It also builds on prior reviews, ensuring an up-to-date synthesis of power dynamics in ISC. Data were synthesized using the context-mechanism-outcome framework, generating demi-regularities to refine programme theories (PTs). Findings reveal that power imbalances frequently manifest through hierarchical governance structures, resource disparities, and historical inequities, shaping ISC outcomes. Six refined PTs highlight: (i) inclusive policy development processes mitigate power asymmetries but require intentional facilitation to prevent marginalization of less dominant sectors. (ii) Leadership commitment and shared goal alignment enhance collaboration, yet competing institutional priorities often reinforce power struggles. (iii) Equitable resource allocation acts as both a catalyst for trust and a source of conflict, with donor influence exacerbating dependency dynamics. (iv) Hierarchical communication norms in LMICs undermine transparency, though informal interpersonal networks can circumvent bureaucratic barriers. (v) Ambiguity in roles and mandates amplifies power vacuums, enabling dominant actors to disproportionately influence agendas. Additionally, a sixth PT emerged: (vi) sustained interpersonal relationships counterbalance structural power imbalances, fostering accountability and adaptive problem-solving. These findings demonstrate that power dynamics in ISC within LMICs are mediated by both structural factors (e.g. funding models and institutional hierarchies) and relational mechanisms (e.g. trust and negotiation). Successful collaboration hinges on recognizing and addressing these dual dimensions of power. This synthesis advances the theoretical and practical understanding of ISC, offering policymakers actionable insights to navigate power-related challenges in intersectoral health initiatives.

Miller, F., Sethi, V., Hazra, A., Schoenaker, D., Chowdhury, R., Hirst, J., Murira, Z., & Saville, N. M. (2025). Bridging the gaps: advancing preconception nutrition in South Asia through evidence, policy, and action. *The Lancet regional health. Southeast Asia*, 36, 100585. <https://doi.org/10.1016/j.lansea.2025.100585>

This paper summarises the research, policy, and program gaps impeding the advancement of preconception nutrition in South Asia.

In line with our evidence reviews, qualitative semi-structured interviews with researchers and programme implementers identified gaps in our understanding of the prevalence and burden of preconception malnutrition due to limited survey and programme data, poor coverage of recommended interventions, and gaps in programme knowledge on effective intervention mechanism. Key barriers identified were the lack of evidence linking preconception care with long-term maternal and child health and nutrition outcomes and how to integrate preconception nutrition interventions into national health systems. We highlight the need for evidence-based, context-specific interventions which utilise effective delivery platforms and engage appropriate actors to reach diverse groups of women and men during the preconception period. We, as part of the South Asia Preconception Nutrition Collective, present actionable recommendations to address these gaps. FUNDING: UNICEF Regional Office for South Asia contract number 43384734.

Auerbach, M., DeLoughery, T. G., & Tirnauer, J. S. (2025). Iron Deficiency in Adults: A Review. JAMA, 333(20), 1813-1823. <https://doi.org/10.1001/jama.2025.0452>

IMPORTANCE: Absolute iron deficiency, defined as low iron stores with or without anemia, affects approximately 2 billion people worldwide and 14% of adults in the US. Iron-deficiency anemia, defined as low hemoglobin due to low iron stores, affects approximately 1.2 billion people worldwide, including 10 million in the US. **OBSERVATIONS:** Absolute iron deficiency progresses from low iron stores to iron-deficiency anemia. Individuals with nonanemic iron deficiency or iron-deficiency anemia may be asymptomatic or experience fatigue, irritability, depression, difficulty concentrating, restless legs syndrome (32%-40%), pica (40%-50%), dyspnea, lightheadedness, exercise intolerance, and worsening heart failure (HF). Symptom prevalences vary depending on age, comorbidities (eg, chronic kidney disease [CKD], HF), and severity and rate of development of iron deficiency. The most common causes of iron deficiency are bleeding (menstrual, gastrointestinal), impaired iron absorption (atrophic gastritis, celiac disease, bariatric surgical procedures), inadequate dietary iron intake, and pregnancy. In high-income countries, approximately 38% of nonpregnant, reproductive-age women have iron deficiency without anemia and about 13% have iron-deficiency anemia. During the third trimester of pregnancy, iron deficiency affects up to 84% of pregnant women, based on data from high-income countries. Additional risk factors include use of nonsteroidal anti-inflammatory drugs, inflammatory bowel disease (IBD [13%-90%]), and other chronic inflammatory conditions, such as CKD (24%-85%), HF (37%-61%), and cancer (18%-82%). Testing for iron deficiency is indicated for patients with anemia and/or symptoms of iron deficiency (fatigue, pica, or restless legs syndrome) and should be considered for those with risk factors such as heavy menstrual bleeding, pregnancy, or IBD. Iron deficiency is diagnosed by low serum ferritin (typically <30 ng/mL) in individuals without inflammatory conditions or by transferrin saturation (iron/total iron binding capacity x 100) less than 20%. Causes of iron deficiency should be identified and treated. Oral iron (ferrous sulfate 325 mg/d or on alternate days) is typically first-line therapy. Intravenous iron is indicated for patients with oral iron intolerance, poor absorption (celiac disease, post-bariatric surgical procedure), chronic inflammatory conditions (CKD, HF, IBD, cancer), ongoing blood loss, and during the second and third trimesters of pregnancy. **CONCLUSIONS AND RELEVANCE:** Iron deficiency and iron-deficiency anemia are common conditions that may cause symptoms such as fatigue, exercise intolerance, and difficulty concentrating. Ferritin and/or transferrin saturation are required for diagnosis and screening. Oral iron is first-line therapy for most patients. Intravenous iron is used for individuals who do not tolerate or have impaired absorption of oral iron, those with ongoing blood loss, certain chronic inflammatory conditions (IBD, CKD, HF, cancer), and during the second and third trimesters of pregnancy.

Upadhyay, R. P., Chowdhury, R., Mundra, S., Taneja, S., Jacob, M., Kapil, U., Bavdekar, A., & Bhandari, N. (2025). Comparative effectiveness of daily therapeutic supplementation with multiple micronutrients and iron-folic acid versus iron-folic acid alone in children with mild-to-moderate anaemia in rural India: an open-label, randomised controlled trial. The Lancet. Global health, 13(3), e497-e507. [https://doi.org/10.1016/S2214-109X\(24\)00559-X](https://doi.org/10.1016/S2214-109X(24)00559-X)

BACKGROUND: Anaemia is a major public health problem among children younger than 5 years and supplementation with iron-folic acid alone has not been found to result in desired improvements in haemoglobin concentrations. We aimed to compare the effect of supplementation with iron-folic acid plus multiple micronutrients versus iron-folic acid supplementation alone on haemoglobin concentration and cure rates in children with mild-to-moderate anaemia. **METHODS:** In this individually randomised controlled trial conducted in rural Haryana, India, children (aged 6-59 months) with mild-to-moderate anaemia (haemoglobin ≥ 7 to <11 g/dL) were randomly assigned (1:1) to receive either daily iron-folic acid plus multiple micronutrients or iron-folic acid alone for 90 days. The primary outcomes were mean haemoglobin concentration and the proportion of children cured of anaemia (haemoglobin ≥ 11 g/dL) at 90 days, assessed in the intention-to-treat population, which included all randomly assigned participants for whom primary outcome assessments were done. Safety was assessed in all randomly assigned participants. The trial was registered with the Clinical Trial Registry-India, CTRI/2020/10/028298.

FINDINGS: Between March 1, 2021, and March 7, 2022, 1300 children were randomly assigned to the iron-folic acid plus multiple micronutrients group (n=648) or the iron-folic acid alone group (n=652). At baseline, 93 (20%) of 472 children had vitamin B(12) deficiency (≤ 203 pg/mL), 16 (3%) of 475 children had serum folate deficiency (< 4 ng/mL), and 44 (9%) of 468 children had zinc deficiency (< 66 μ g/dL). 611 children in the iron-folic acid plus micronutrients group and 626 children in the iron-folic acid alone group had a blood sample collected at the end of the 90-day supplementation period and were included in the primary outcome assessment. At 90 days, no differences in mean haemoglobin concentration were identified between the treatment groups (mean difference 0.06 [95% CI -0.05 to 0.16]). 489 (80%) of 611 children in the iron-folic acid plus micronutrients group and 492 (79%) of 626 children in the iron-folic acid alone group were cured of anaemia (risk ratio 1.02 [95% CI 0.90 to 1.16]). Compliance rates in both groups exceeded 75%. Black stools were the most common side-effect observed in both groups (640 [99%] of 648 children in iron-folic acid plus micronutrients group and 643 [99%] of 652 children in the iron-folic acid alone group).

INTERPRETATION: In children with mild-to-moderate anaemia, supplementation with multiple micronutrients and iron-folic acid did not result in significant benefits compared with iron-folic acid alone. Efforts that focus on ensuring high compliance with iron-folic acid supplementation alone might achieve satisfactory rates of anaemia recovery.

FUNDING: Indian Council of Medical Research and the Government of India.

de Boer, M., Kalbarczyk, A., Islam, M. N., Rodríguez, D. C., Sarker, M., Christian, P., & Lyman, A. T. (2025). Measuring feasibility: complex questions need complex tools. *BMJ global health*, 10(6), e017331. <https://doi.org/10.1136/bmjgh-2024-017331>

We sought to assess the feasibility of mainstreaming balanced energy protein supplementation, a maternal nutrition intervention, into Bangladesh's routine antenatal care system in tandem with an ongoing effectiveness trial in northwestern Bangladesh. Feasibility is an implementation science outcome defined as the extent to which a new intervention can be implemented successfully in a given context. We found feasibility difficult to measure using existing Anglophone quantitative tools translated into Bangla and identified particular challenges with using Likert scales. We also found it challenging to measure feasibility early in implementation, as recommended in the implementation science literature, due to potential respondents' unfamiliarity with the intervention and what implementation would look like. To address these issues, we explored alternative assessment methods, such as focus groups and workshops. These formats presented additional difficulties, including identifying the correct participants and moderating participant power dynamics. In conclusion, we question whether existing feasibility assessment tools, developed in English, are suitable for use in non-Anglophone contexts as well as whether Likert scales are appropriate for use in low-income and middle-income countries more broadly. We also question current recommendations on the timing of feasibility assessments. We feel that-particularly with new, difficult-to-conceptualise interventions-feasibility must be assessed later in implementation or only after providing detailed explanations of the intervention to respondents.

UPCOMING EVENT

Delivering for Nutrition (D4N) in South Asia 2025

Delivering for Nutrition (D4N) is an annual conference dedicated to showcasing evidence-based strategies for improving nutrition across South Asia. With a strong emphasis on implementation research, D4N has emerged as a regional platform over the past few years bringing together policymakers, implementers, and researchers from across the region.

Organized by IFPRI, CGIAR, and a consortium of regional and global co-hosts, this year's conference – *Towards Impact at Scale* – will spotlight real-world solutions that have been implemented at scale – or show strong potential to scale – for improving nutrition across South Asia.

Conference Dates: December 2-4, 2025

[Click here to learn more](#)

International Congress of Nutrition (ICN) 2025

The International Congress of Nutrition (ICN) 2025 will take place from August 24-29 in Paris, France, under the theme "Sustainable Food for Global Health." Organized by the International Union of Nutritional Sciences (IUNS), this landmark event will bring together researchers, policymakers, practitioners, and industry leaders from around the world to share the latest evidence and innovations in nutrition science. With sessions spanning clinical nutrition, epidemiology, food systems, sustainability, and global health policy, ICN 2025 will serve as a vital platform for shaping the future of nutrition and advancing solutions to promote healthier populations and a more sustainable planet.

Conference Dates: August 24-29, 2025

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