

Evidence to Action: Highlights From Transform Nutrition Research (2012-2017)

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Abstract

Background: The *Transform Nutrition (Transform)* research consortium (2012-2017), led by the International Food Policy Research Institute, sought to generate evidence to inform and inspire action to address undernutrition in 4 high-burden countries (India, Bangladesh, Kenya, and Ethiopia) and globally.

Objective: Within the context of the literature, this synthesis article brings together core findings of *Transform*, highlighting priorities for future research.

Methods: This article uses a narrative approach to synthesize diverse study findings that collectively address *Transform*'s three primary research questions: (1) How can nutrition-specific interventions be appropriately designed, implemented, scaled, and sustained in different settings?; (2) How can the nutritional impact of social protection and agriculture be improved?; and (3) How can enabling environments be promoted so as to use existing political and economic resources more effectively?

Results: Highlights of *Transform* include (1) improved understanding of the relative effectiveness of different combinations of nutrition-specific interventions and the ways in which they can be scaled for maximal impact; (2) evidence that shows that social protection and agriculture need to be explicitly linked to nutrition in order to contribute to stunting reduction; (3) identification of key components of "enabling environments" for nutrition and how they can be cultivated/sustained; (4) research that examines ways in which leaders emerge and operate to change the political and policy landscape in different settings; and (5) "stories of change" that provide in-depth contextual knowledge of how transformative change has been driven in countries that have made inroads in reducing malnutrition. The conclusion highlights the contributions of the consortium and provides recommendations for future research.

Keywords

nutrition, agriculture, social protection, leadership, governance

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Introduction

The past decade has seen a marked growth in evidence of the enormous human and economic costs of undernutrition, along with signs that this evidence is strengthening the commitment to act. Undernutrition is responsible for the deaths of millions of young children every year and their failure to attain their potential as adults if they survive.¹ The rate of undernutrition reduction, however, remains slow and patchy across regions.² Knowledge of “what works” in terms of nutrition-specific interventions has grown,³ but scaling up is slow.⁴ The potential for leveraging agriculture, social protection, and health systems and sectors for nutrition has not been fully exploited,⁵ despite the recognized need for the bulk of improvements to come from outside the nutrition sector.¹ Finally, wider political and socio-economic structures and processes do not support nutrition as well as they could, if at all. Alan Berg’s assertion 30 years ago—that “better nutrition is in everyone’s interests, but is nobody’s responsibility” —remains apposite today.⁶

Against this backdrop, the *Transform Nutrition* Research Programme Consortium (*Transform*) — a partnership of 5 research organizations (note 1)—was launched in 2012. *Transform* sought to generate and use evidence to accelerate undernutrition reduction in the 2 highest burden regions of South Asia and sub-Saharan Africa (with a special focus on India, Bangladesh, Ethiopia, and Kenya).

Following in-depth consultations with partners and wider stakeholders in focal countries during its inception phase, a research agenda was developed to better understand undernutrition’s causes at the immediate, underlying, and basic levels to generate better evidence of what works at scale and to enhance the use of this evidence to improve nutrition.

Transform’s portfolio was structured according to the following 3 themes:

1. **Transforming delivery:** How can nutrition-specific interventions be appropriately designed, combined, implemented, scaled, and sustained in different settings?
2. **Transforming agriculture and social protection:** How to maximize the impacts of investments in agriculture and social protection on nutrition?
3. **Transforming leadership, commitment, and accountability:** How can enabling environments for nutrition be cultivated and sustained (with special focus on leadership, commitment, and accountability)?

Transform thus set out to address nutrition challenges in a new and integrated way to understand the barriers and opportunities, identify potential solutions, and actively engage with key stakeholders to translate and use this evidence to scale up effective actions. This synthesis article uses the same structure to highlight our main findings, before pulling them together in the concluding section, while highlighting priorities for future research.

Transforming Delivery of Nutrition-Specific Interventions

Nutrition-specific interventions target the immediate causes of undernutrition, namely, inadequate dietary intake and ill health.³ In 2013, the *Lancet Series on Maternal and Child Nutrition* recommended 10 best-bet nutrition-specific interventions (including micronutrient supplementation and fortification, community-based nutrition behavior change communication [BCC] interventions aimed at strengthening breast-feeding and complementary feeding practices, and community management of severe acute malnutrition) that, if scaled to 90% coverage, could reduce stunting by 20% for countries with high rates of undernutrition and dramatically reduce infant and child mortality.³ Research undertaken by *Transform Nutrition*⁷ for the Copenhagen Consensus has shown that every dollar invested in these interventions generates around 15 dollars in economic benefits. *Transform*’s first theme sought to address knowledge gaps regarding the delivery and scaling of these types of intervention, in its focal countries. We highlight some of the main activities and outputs of this theme here.

Scaling up impact on nutrition: A review. Despite a growing consensus on what needs to be done, much less is known about

how to operationalize the right mix of actions in different contexts, how to do so at a scale that matches the size of the problem, in an equitable manner, and how to do so in ways that link nutrition-specific and nutrition-sensitive interventions.⁴

This crucial gap was the rationale for a *Transform* evidence review that cast a wide net across different sectors to try to understand more about the key preconditions, drivers, and pathways of successful scale-up, in different contexts for different purposes. Drawing on this cross-sectoral evidence base, along with experiences in scaling

4 major nutrition programs, 9 essential elements were identified: (1) a clear vision or goal for impact; (2) clarity on intervention characteristics (what exactly is to be scaled up—a technology, a process, a project, an innovation, and/or a methodology?); (3) an enabling organizational context for scaling up; (4) drivers such as catalysts, champions, system-wide ownership, and incentives; (5) choice of contextually relevant strategies and pathways for scaling up, (6) operational and strategic capacities; (7) adequacy, stability, and flexibility of financing; (8) appropriate governance systems and processes; and (9) embedded mechanisms for monitoring, learning, and accountability.⁴ This framework was later used to structure a series of follow-up country case studies (see Box 1).

Box 1. *Transform's* Research Related to Gender and Women's Empowerment

Gender has become an important focus in research on food security and nutrition.^{8,9} Examining how gendered power dynamics and women's empowerment mediate nutrition outcomes was also important for *Transform's* research. One of *Transform's* first outputs was an evidence review on women's empowerment and nutrition. Following an examination of definitions and measures of empowerment, it reviewed evidence of impact of agricultural interventions, cash transfer programs, and microfinance initiatives on empowerment measures, health and nutrition behaviors and practices, and on final nutrition outcomes. It found limited evidence of mixed impacts of these types of interventions on empowerment measures and behaviors and practices, and limited impacts on final nutrition outcomes such as stunting. The review highlights the gap in research on *pathways* of impact, which could shed more light on why impacts on final outcomes are scarce. Other factors such as sampling methods, implementation modality, and quality of services can also play a key role.¹⁰

Transform also carried out several analyses of secondary data from large household surveys to examine the role of underlying drivers in nutrition outcomes. Headey et al¹¹ show that parental education and wealth accumulation were two key drivers of stunting reduction in Bangladesh between 1997 and 2011; Menon et al.¹² examine subnational trends in underweight prevalence of under-fives and find that improvements in social equity factors such as maternal education and household assets (among others) were important drivers of undernutrition reduction. In its assessment of state-level data on undernutrition determinants, the first ever India Health Report¹³ related indicators of women's social status (eg, education, age at marriage, exposure to violence, workforce participation, household decision-making) to differential progress among states in improving nutrition outcomes. Lastly, Smith and Haddad¹⁴ analyze data for 116 out of 132 developing countries between 1972 and 2012 to examine drivers of child undernutrition reduction and find that women's education and gender equity are key drivers in sub-Saharan Africa and South Asia.

(Continued)

Box I. (Continued)

Third, several studies in India examine frontline worker (FLW) power dynamics and incentives, as well as women's empowerment as drivers of changes in nutrition. The study by Kohli et al.,¹⁵ part of the *Stories of Change* initiative, finds that lack of progress in women's education, early age at marriage for girls, and women's participation in household decisions continues to pose challenges to undernutrition reduction in Odisha, India, despite progress in coverage of key nutrition-specific interventions and in developing an enabling policy environment. Two other studies examined FLW incentives and their influence on service delivery and nutrition outcomes in Bihar, including individual, programmatic, and community factors.^{16,17} A qualitative case study by Deshpande¹⁸ highlights the continuing caste dynamics among *anganwadi* workers in India that affects implementation of the Integrated Child Development Services Program.

Integration of nutrition within a national program. Transforming delivery of nutrition-specific interventions will usually require reform of government policy and practice. In 2011, the Government of Bangladesh, in an effort to optimize nation-wide nutritional outcomes, integrated key nutrition-specific interventions in their existing health system delivery platform—the National Nutrition Service (NNS). Two years after this rollout, *Transform* undertook an evaluation¹⁹ commissioned by the World Bank to identify what was being done right, but perhaps more importantly, where mainstreaming fell short. Somewhat overwhelmed by the myriad nutrition-specific interventions, NNS was hampered by frequent changes in leadership, weak coordination, and capacity gaps at all levels—national and subnational. The evaluation also found that the NNS started with too many interventions for its existing implementation capacity, and there were critical mismatches in choice of platforms to deliver the preventive interventions. The study did nonetheless highlight potential solutions to achieve sustained improvement in the quality of nutrition services. Carefully selecting outreach-based platforms for delivering core preventive services, particularly through collaborations with existing nongovernmental organizations, can increase coverage of preventive nutrition interventions through community platforms, optimize workload, and benefit from the years of experience in community engagement. Strategic investments to ensure

capacity development, nationally and at the frontline, transparency, and effective planning, monitoring, and accountability mechanisms are key to sustainability.

Supply- and demand-side constraints to delivering nutrition programs at community level. Among the factors identified in our scaling-up review,⁴ issues of barriers and capacity directly relate to the delivery and approaches to increasing coverage of nutrition-specific interventions. Translating upstream policies to downstream health and nutrition services effectively requires an understanding of how various grassroot-level factors might influence uptake at the population level.²⁰ Embedding core interventions into appropriate platforms, maintaining an uninterrupted supply of quality services, and promoting community demand for their use are critical.

The delivery and uptake of health and nutritional services, both product-oriented (eg, immunization) and information-based (eg, counseling), are influenced by several factors. At the community level, the success of health and nutrition programs can be affected by practical constraints relating to the performance of frontline health workers (FLWs) and/or the characteristics of beneficiary households. These influences are highly contextual, necessitating study at a fairly granular level.

In India, for example, despite specific program guidelines for FLWs, the coverage of information-based services has generally been

low in rural areas. Our study,¹⁶ conducted in 1 district of the state of Bihar, found that beneficiaries (eg, pregnant women) are more likely to receive counseling if the FLWs maintain a registry of recipients and have a lower work load in terms of the number of pregnant women in their catchment areas requiring a visit. Incentives for FLWs were important for service delivery, and product-oriented services such as immunization had a spillover effect on the delivery of information-based ones like general nutrition counseling. On the demand side, household education and socioeconomic status disproportionately influenced receipt of certain services that should be universal. We found that educated household heads were more likely to be aware of and receive immunization services than their less educated counterparts suggesting that, in the short term at least, outreach efforts should prioritize less educated households to raise awareness about the available services.

In Bangladesh, delivery of nutrition-specific interventions was mainstreamed into the health systems with the introduction of the third health sector program in 2011.²¹ Routine health system platforms including antenatal care (ANC), postnatal care, and management of childhood illnesses at health facilities were chosen as key contact opportunities for nutrition services. After more than 2 years, the quality of nutrition counseling during ANC services was better than that offered at health facilities during child illness, which tended to be brief with inadequate provision of counseling. Poor training of FLWs and a lack of systematic supervision and oversight, combined with weak accountability processes, impeded the delivery of quality nutrition services at the community level.

Public-private partnerships to improve nutrition: A review. Addressing the multisectorality of the nutrition problem necessitates different stakeholders working together, an example of which is a public-private partnership (PPP). While the Scaling up Nutrition (SUN) Movement, which seeks to provide space (“a big tent”) for such partnerships among others, has been growing in momentum, its 2015 Independent Comprehensive Evaluation suggested the process *has not solved the multiple COI [conflict of interest] challenges facing the*

move”ment (p62).²² There remains a lack of consensus on promising approaches for developing and implementing PPP arrangements.

Within this context, another *Transform* evidence review²³ sought to bring more rigor to the discussion of private sector engagement in nutrition, summarizing the evidence base and outlining potential ways forward. The review generated three main findings. First, there are not enough high-quality, independent evaluations of the impact of private-sector engagement in nutrition. Second, the pervasive environment of mistrust needs to be proactively addressed by both public and private sectors. This may take time (the review found no examples of successful PPPs that took less than 2 years to establish). Third, PPPs are most likely to succeed where the nutritional benefits are significant and where public-sector solutions are not readily available, effective, or sustainable. There is a considerable untapped potential for private sector-driven, pro-nutrition innovations and financing. Open and transparent bilateral discussions of objectives, roles, expectations, and potential conflicts of interest are needed, along with adequate monitoring and independent evaluations of the initiatives that emerge.

On-time data for action. Frontline service delivery requires timely and actionable data, and this is particularly evident with regard to severe acute malnutrition, which affects around 17 million children younger than 5 years and is responsible for 1 to 2 million preventable deaths every year. *Transform* supported Save the Children to evaluate the development and pilot of a mobile health (mHealth) application in 5 countries by World Vision, Dimagi, Save the Children, and International Medical Corps to help health workers follow treatment protocols for Community Management of Acute Malnutrition and generate accurate and timely data to respond to changes in caseloads. The experience documented by the project reveals some of the challenges faced in rolling out a mobile app in some of the most remote health facilities in the world—such as software bugs, time for FLWs to adopt and adapt the technology, and insufficient budget and staff time for piloting.²⁴

Transforming Agriculture and Social Protection

The limited impact of nutrition-specific interventions on stunting has catalyzed a growing interest in the potential for nutrition-sensitive interventions—complementary programs deriving from other sectors that address the underlying determinants of malnutrition.⁵ Against this backdrop, *Transform* explored the potential of two sectors—social protection and agriculture—in two countries (Bangladesh and Ethiopia) to reduce chronic undernutrition. The following main findings emerged from this work:

First, in and of itself, social protection has little effect on improving children's nutritional status.²⁵ In both Bangladesh and Ethiopia, although providing food and/or cash improved household food security, it had no effect on chronic child undernutrition. Our work in Bangladesh²⁶ highlights the importance of linking social protection to intensive nutrition BCC activities. These improved women's nutrition knowledge²⁷ and enhanced their status within their homes²⁸ and communities²⁹; combined with a cash transfer, they resulted in preschool children consuming a more diverse set of foods, including animal source foods.²⁶

Second, food is needed for children to grow; hence, agricultural interventions that increase food supply should improve children's nutritional status. *Transform's* work suggests that this simplistic narrative—still prominent in many policy circles—is misleading. Our work in Bangladesh³⁰ finds little evidence that rising rice yields reduced chronic undernutrition. Nor is simply providing nutrition BCC in rural communities sufficient. In Ethiopia, we find that even when mothers are knowledgeable about good child nutrition practices, this has little effect on the quality of children's diets when children live in households with poor market access.^{31,32} Looking beyond *Transform*, this suggests that agricultural development may drive improvements in children's nutritional status when it includes market-integration activities, such as enhanced value chains that generate a wider range of foods (especially animal source foods), when it links with

nutrition BCC activities, and efforts to promote sanitation and hygiene.

There are two common threads linking our social protection and agriculture work: (1) by themselves, each sector appears to have limited impacts on chronic child undernutrition; both need to be explicitly linked to the nutrition sector in order to be effective; and (2) the importance of animal source foods. In Bangladesh, children in households where mothers received both cash and intensive nutrition BCC were more likely to consume flesh foods, eggs, and dairy; these children were the only ones who saw their nutritional status improve.²⁶ In Ethiopia, we find that children with access to dairy products were less likely to be stunted.³³ These results are consistent with recent work in nutritional sciences that emphasize the importance of essential amino acids³⁴ and choline³⁵ found in animal source foods and eggs, respectively, for child growth.

Cultivating Enabling Environments for Nutrition

That enabling policy and political environments play a central role in transforming nutrition is a central proposition at the heart of the *Transform Nutrition* consortium. The consortium was able to^{36,37} systematically consider these broader policy and political processes underpinning basic and underlying determinants and actions in these fields. These reviews were joined by primary research considering the centrality of capacity, leadership in nutritional performance, and broader indicators of governance in predicting nutrition outcomes.^{17,38,39} The ways in which nutrition commitment can be built and measured at country and subnational levels were also a key area of methodological development and research, alongside other related fields such as real-time monitoring of nutrition outcomes via mobile phones and the role of social accountability in health and nutrition services.⁴⁰⁻⁴²

What is an enabling environment? Transform's research, which formed part of the second *Lancet Series on Maternal and Child Nutrition*, summarized the wider institutional, governance, and political factors behind successful nutrition-

relevant action. “Enabling environments for nutrition” were defined as *the wider political and policy processes which build and sustain momentum for the effective implementation of actions that reduce undernutrition* (p553).³⁶ Three core domains were found to underpin and shape such environments: (1) framing, knowledge, and evidence; (2) politics and governance; and (3) capacity and resources. All 3 of these domains, in turn, apply to two distinct stages—first, building political commitment to address malnutrition, and second, translating this commitment into specific actions that are implemented. A second article³⁷ widened such considerations to themes common in critical development studies including power, social accountability, and the role of political narrative. Complementary work at a country level⁴³ has shown how such factors operate in context at both national and community levels.^{11,20}

Demographic and Health Surveys were also used in another study¹⁴ in a unique way to consider how nutrition outcomes are driven by indicators of governance and government effectiveness. The research underlined the way in which past drivers of stunting reductions have been fundamentally multisectoral—including distributed income growth, food quality/quantity, women’s education and empowerment, and safe water and sanitation.

Building political commitment. Getting governments and others to step up to the nutrition challenge requires concerted efforts to build commitment, responsiveness, and accountability for progress. For the past 6 years, *Transform* has been at the forefront of research in this new frontier. The

program was catalytic in the development of the Hunger and Nutrition Commitment Index (HANCI), which measures commitment in terms of government expenditure, programs, and legal frameworks in areas directly targeting improved nutrition.^{40,44,45} Published as an annual global index and as a special African Index in 2016, the HANCI has usefully unpacked the notion of commitment and enabled countries to track their relative progress, regionally and over time, often triggering national debates on nutrition in the process. Accompanying research⁴⁵ has considered broader drivers of commitment in a 5-country comparison, which found by statistically comparing the results of the expert surveys in the 5 countries (note 2) that hunger and nutrition commitment does not necessarily go hand in hand. Undernutrition tends to be invisible until the need to act becomes a political necessity, but this often occurs too late to be effective for those most at risk.

Major progress has been made in recent years in terms of generating political attention and in many cases political and policy commitment to nutrition as a development issue. But for high-level promises and pledges to be progressively translated into changes in incentives, new decisions, and actions, we need new forms of commitment. In our “Stories of Change” work (Box 2), we found that countries are struggling to grapple with the challenges of turning high-level political attention into institutional and financial commitments and ultimately into large-scale implementation of effective actions.

Box 2. Stories of Change

After several years of growing political commitment, with more and more pledges and declarations and an increasing focus on data and evidence, the international nutrition community has come to recognize the power of narrative. Knowledge that is useful practically needs to encompass a lot more than data and evidence—it needs to include experience. To contribute to such *experiential* learning, *Transform* developed an innovative multi-method approach to documenting change, entitled “Stories of Change” (SoC). The goal was to systematically assess and analyze drivers of change in 6 high-burden countries—Bangladesh, India (Odisha), Ethiopia, Nepal, Senegal, and Zambia—where improvements in child nutrition had accelerated in recent years.⁴³

(Continued)

Box 2. (Continued)

The *Stories of Change* methodology combines quantitative analysis of drivers of change (using statistical decomposition of DHS datasets) with a mixed-methods approach to understand perceptions of change—as well as future challenges—on the part of national and subnational stakeholders and, crucially, community members themselves. In also placing a strong emphasis on cross-country sharing and *experiential* learning, the initiative has been welcomed by nutrition stakeholders, especially the SUN Movement, as a complement to other methods of understanding and facilitating change, and provides the basis for a future stream of work.

The devil is in the national- and subnational-level detail but overall, SoC shone a light on a core set of interlinked factors that underpin, enable, and drive change in nutrition. The main recommendations that emerged⁴³ are summarized here.

Build commitment

Catalyze and support multisectoral/multistakeholder engagement, and political leadership and commitment at all levels; disaggregate “government” with regard to commitment (commit to what, by whom); improve community commitment and awareness of nutrition problems, programs, rights and government promises to strengthen demand and accountability.

Strengthen cross-sectoral (horizontal) coherence

Develop cross-sectoral vision and shared nutrition goals, including civil society and private sector; integrate nutrition (as both an outcome and a contributor) into other sectoral policies; advocate for high-level institutionalization (eg, prime minister’s office) for better coordination and political clout.

Improve vertical coherence (national to grassroots), scale, and reach

Align national commitments with ground-level implementation realities; build nutritional literacy of local leaders; strengthen vertical (2-way) communication level from national to community; proactively identify and address challenges in implementation (eg, ownership, responsibility, accountability). Learn and apply lessons from successful scaling, within and outside nutrition.

Generate data and evidence

Catalyze a data revolution in nutrition; evaluate implementation of national plans and publish results; disaggregate data to surface disparities in outcomes and intervention coverage; build library of experience, for example, from other SoC case studies.

Strengthen leadership and capacity

Develop a network of connected nutrition leaders; enhance cross-sectoral/lateral leadership on nutrition; balance praise and blame in cultivating leadership.

Assess capacity strengths and gaps (individual, community, organizational, systemic); build on existing technical and systemic capacities; strengthen frontline worker capacity, power and incentives, including appropriate salaries, adequate worker numbers, and an exploration of innovative nonfinancial motivations.

Secure and sustain financing

Develop sustainable funding mechanisms/flows to ensure adequate worker remuneration; enhance flexibility of international donor funding; explore innovative financing for nutrition.

The findings of these 6 country case studies and an overview were published as a special issue in *Global Food Security* in June 2017, along with three other papers (quantitative analysis of drivers, community-level perceptions of change, and reflections on the SoC approach from global and national nutrition leaders).⁴³

Strengthening accountability. Within the challenging multisectoral arena of nutrition, accountability relates to clarity and cross-sectoral consensus on roles and responsibilities for different actions. It requires transparency and an understanding of whose job is under threat if they consistently fail to deliver on agreed targets. Global and national accountability is key, but accountability is relevant at all levels and ultimately should be channeled to the grassroots, where nutritionally vulnerable communities live.

Accountability needs data on trends in different forms of malnutrition and on the outcomes of actions and programs (from different sectors, at various levels). Data need to be timely, accessible, actionable, and acted upon. In addition to our work on mobile applications (in Kenya, see above), *Transform* has developed evidence reviews on nutrition surveillance systems^{46,47} and real-time monitoring.⁴¹ The effectiveness of nutrition surveillance depends on context and purpose—whether for early warning, for program decision-making, advocacy, monitoring and evaluation, or media awareness. Our India Health Report (IHR) was transformative in bringing together state-level, nutrition-relevant data in India for the first time.¹³

Social accountability initiatives have been trialed successfully in many public sectors including education and health, but there is still little evidence on their use directly benefiting nutrition. Research published by *Transform*⁴² in collaboration with the Making All Voices Count Programme has reviewed the evidence in South Asia and pointed to a number of innovative ways in which social accountability tools are now being applied to health, nutrition, and related sectors. *Transform* concluded that the nutrition sector now stands virtually alone, however, in lacking a rigorous evidence base on the application of social accountability approaches to improving community-level outcomes. We hypothesize that such approaches could be similarly transformative at a community level.

Identifying and supporting nutrition leadership. Although earlier studies have long highlighted the role of leadership in driving nutritional change,³⁶ there has been little empirical work

on the nature and role of such leadership. In one *Transform* study,³⁹ 89 individuals were identified via stakeholder mapping exercises across the 4 focus countries and subsequently interviewed. The results showed that there was no one type of individual associated with nutrition leadership or champions but a range of individuals with different backgrounds and motivations. What was important is that they were boundary spanners (between sectors and disciplines), strategic at adapting politically and ensuring that others followed in their stead, particularly as their knowledge and understanding of nutrition developed.

Accompanying this research, the consortium invested further in ways to identify, nurture, and support nutrition leaders. This included highlighting the work of nutrition champions⁴⁸ and running an annual training course focusing on the latest research and evidence. Many leaders reported substantial benefits of being involved in terms of their influence in policy and practice (note 3).

Assessing and strengthening nutrition-relevant capacity. Alongside individual leadership, organizational and systemic capacities have been highlighted as critical aspects of health system change that are also relevant to nutrition. Reviews by *Transform* focused on India and South Asia^{49,50}—undertaking situation and curriculum analyses,¹⁵ policy analysis of Government of India programs⁵¹ as well as wider qualitative work drawing on the opinions of public health nutritionists. Constraints in educational capacity ranged from the lack of accreditation for future professionals to the lack of journals—with the potential role accreditation might play in building a future national cadre of nutritionists being particularly highlighted.

In addition to this research on capacity, *Transform* and partners Public Health Foundation of India, Centre for Chronic Disease Control (CCDC), and Partnerships and Opportunities to Strengthen and Harmonize Actions for Nutrition in India (POSHAN) have also contributed to building capacity in the region, adapting the annual *Transform Nutrition* short course, intended to build nutrition knowledge and capacity, to the Indian context and holding national-

and state-level courses in Delhi and Bihar in 2014 and 2015. Through our alumni, and subnational trainings in India and Ethiopia, we are realizing that the challenges for strengthening capacity and leadership at subnational level—to address the oft-cited “missing middle”—are different from those at national levels.

Conclusions

Over a period of 6 years, *Transform Nutrition* initiated a series of research studies linked to a range of communications and capacity strengthening activities, with a particular focus on eastern Africa and South Asia along with more globally relevant work. More than 90 peer-reviewed journal articles have been published and many more briefs, blogs, and newsletters targeted to relevant audiences. In the three Appendix A tables, corresponding to the three core themes discussed above, we provide more detail on the main findings emerging from a selection of the leading studies.

Highlights of *Transform* research include (1) enhanced understanding of the relative effectiveness of different combinations of nutrition-specific interventions and the ways in which they can be scaled for maximal impact; (2) evidence to show that, by themselves, the social protection and agriculture sectors have limited impacts on chronic undernutrition and that both need to be explicitly linked to the nutrition sector in order to be effective; (3) identification of key components of “enabling environments” for nutrition and how they can be cultivated and sustained; (4) groundbreaking research that shines a light on the ways in which leaders emerge and operate to change the political and policy landscape, in different settings; and (5) “stories of change” that provide in-depth contextual knowledge of how transformative change has been driven in countries that have made inroads in reducing malnutrition.

Main Policy and Program-Relevant Findings

With regard to the three core themes, we summarize here the key policy and program-relevant findings emerging from *Transform Nutrition* research.

Theme 1: Transforming delivery. The potential to reduce stunting significantly through nutrition-specific interventions alone is limited. In India, delivery of nutrition interventions via coordinated frontline implementation by workers from two ministries and stories of successful scale-up, such as Odisha, show that many of the big changes were driven by improvements across sectors. Combinations of nutrition-specific interventions with nutrition-sensitive actions are likely to be more effective in reducing stunting, and this also strengthens incentives for policy makers to act multisectorally.

For health services to work for nutrition, a good fit to platforms is needed, along with strong coordination, continuous service and demand mobilization, and role clarity, capacity, and incentives for frontline workers. Mobile technology has real potential to improve services.

Theme 2: Transforming agriculture and social protection. Combining BCC with cash transfers in Bangladesh provided a rapid reduction in stunting, while the Productive Safety Net (social protection) Programme in Ethiopia, without any nutrition intervention built-in, had no impact on stunting, wasting, or child diets even when overlaid with community nutrition actions.

In Bangladesh, it was noted that the cash transfers were effective through mothers being more likely to use them to provide animal source foods (milk and eggs) for their children.

Work on agriculture in Ethiopia and Bangladesh suggests that for child growth, what matters is access to certain food types (animal source foods) in environments which are hygienic. BCC can only be effective where the recommended food sources are available. Nutrition-sensitive agriculture interventions therefore need to focus on certain types of food, promote hygiene, and strengthen markets for these food types rather than concentrating on agricultural productivity more broadly.

Theme 3: Transforming leadership, commitment, and accountability. Evidence, governance, leadership, and capacity are critical dimensions of shaping policy processes into an enabling environment for

successful scale-up of nutrition-specific or nutrition-sensitive actions.

Building leadership capacity and recognizing and supporting champions are effective mechanisms for inspiring and catalyzing national and subnational nutrition commitment, accountability, and policy change.

The challenges for strengthening leadership capacity for collaboration across sectors at subnational level may be different from those at national levels.

Tools to support commitment through surveillance and monitoring need to be tailored to the purpose and level—impact on nutrition requires commitment to nutrition (not just food security); national-level metrics may encourage debate, but subnational data may be more effective in generating commitment that results in impact. Institutional and financial commitments need to flow from political attention for implementation to happen.

Research priorities. Several research priorities remain. With regard to delivery of nutrition-specific interventions, we need (1) to strengthen our understanding of the drivers for uptake of interventions (in addition to improving supply-side delivery factors) using context-specific studies; (2) more rigorous assessments of impacts of engagement by the commercial sector in nutrition; and (3) further development and improvement in data management systems to ensure timely, accurate actionable data. With regard to agriculture and nutrition, future work—both research and interventions—should focus both at the household/caregiver levels (eg, increasing incomes, improving knowledge of good nutrition practices) and on improving access to animal source foods through improvements in value chains. On social protection, more operational and evaluative research is needed to test approaches to integrating nutrition behavioral change and women's empowerment approaches within programs. And finally, on enabling environments, we need further research on (1) commitment (ie, how to build trust and generate consensus among government stakeholders, understanding why political commitment is still absent in many countries, and how to turn high-level political commitment into sustained

institutional commitment); (2) clarifying roles and responsibilities to enhance collaboration across sectors and administrative levels; (3) assessing and monitoring of commitment and accountability (eg, via better surveillance systems); (4) social accountability approaches to improve outcomes at community level; and (5) approaches to developing nutrition leadership.

Contributions to change. *Transform Nutrition* has catalyzed and supported evidence-informed action on nutrition in its focal countries as well as contributing at a global level. Some examples are highlighted here.

At a national level, *Transform* evidence was consulted in the redesign of Ethiopia's Productive Safety Net Programme (a social protection program benefitting 10 million people) to include specific nutrition elements. In Bangladesh, policy makers drew on *Transform* evidence to inform the nutrition section of the National Five-Year Plan. Following the NNS assessment, the Government of Bangladesh also implemented recommendations to strengthen frontline delivery through district nutrition officers, with support from UNICEF. *Transform*-funded analysis on the importance of BCC in improving child nutritional status of children (from the Transfer Modality Research Initiative) informed the 2016 National Nutrition Plan of Action for Bangladesh, and the Ministry of Women and Children Affairs adopted recommendations to incorporate BCC into the Vulnerable Group Development Program. In India, building on previous engagement with senior policy makers *Transform* hosted the launch event for the IHR and 2015 Global Nutrition Report, with the presence of senior ministers from both the Ministry of Women and Child Development and the Ministry of Health and Family Welfare. The IHR was cited in a draft "National Plan of Action for Children, 2016."

At the global level, evidence from *Transform* has been used by the SUN Movement to inform the framework of their 2016 to 2020 strategy, particularly the strategic objective to expand and sustain enabling political environments and for their implementation roadmap. *Transform* and SUN have collaborated most closely in initiatives to build capacity through evidence and training

on leadership, including the nutrition champions initiative and the codevelopment of a toolkit to guide nutrition stakeholders on how to identify, engage, and sustain nutrition champions as a key strategy for change, launched at the SUN Global Gathering in Abidjan in November 2017. Along with other sources, *Transform* research contributed to the inclusion of stunting reduction as a priority in the report of the High-Level Panel convened by UK Prime Minister David Cameron in 2013 to inform the development of the sustainable development goals. Evidence from *Transform*'s work on enabling environments, leadership, accountability, scaling up, PPPs, data, and mobile phones has featured in Global Nutrition Reports. Evidence from *Transform* research

(especially the \$1:16 cost to benefit ratio work) has contributed to the investment case for nutrition, which encouraged African heads of state and finance ministers to focus investment on nutrition, leading to the launch of the African Leaders for Nutrition Initiative. The Stories of Change initiative has generated significant traction in shining a light on critical “how” questions and given rise to a new generation of national and subnational case studies of change (in Vietnam, Tanzania, Rwanda, and several Indian states). Finally, the lessons learnt in managing a multi-partner initiative on nutrition are now being brought to bear in a new regional initiative—*Transform Nutrition West Africa*—with support from the Bill and Melinda Gates Foundation.

Appendix A

Key Studies Within the 3 Transform Nutrition Themes

Table A1. Theme A1: Transforming Delivery of Nutrition-Specific Interventions.

Reference and Aim	Methods	Findings and Recommendations
<p>Gillespie S, Menon P, Kennedy A. Scaling up impact on nutrition: what will it take? <i>Adv Nutr</i>. 2015;6:440-451.</p> <p>Aim: Synthesize what is known about scaling up, from nutrition and other disciplines, and identify elements of success in “scaling up” nutrition-relevant actions.</p>	<p>A literature search (1990 onward) was carried out (January 2014) using key search term combinations in PubMed and Google Scholar, as well as an ExpandNet and Brookings Institution bibliography. Additional sector-specific gray literature was identified through snowballing. A total of 55 papers were included, based on which, a list of 9 critical factors was generated.</p>	<p>There is a need for more clarity and consistency on “scaling up,” in terms of scope, purpose, and processes. Authors outline 9 critical elements to guide action for scaling-up impact on nutrition:</p> <ol style="list-style-type: none"> 1. Articulate a clear and shared vision/goal for scaled-up impact. 2. Align characteristics of interventions with context to permit adaptation over time. 3. Focus on enabling environments for scale-up, at different levels. 4. Identify drivers and address barriers to scale-up. 5. Understand and contextualize scaling-up strategies and pathways. 6. Ensure operational and strategic capacities to ensure sustainable scale-up. 7. Secure stable, adequate, and flexible financing. 8. Ensure adequate governance of scale-up processes. 9. Include monitoring, evaluation, and learning in scaling strategies and linking these to governance systems to improve accountability.
<p>Avula R, Kosec K, Holtemeyer B, et al. 2014. Education and work incentives for frontline workers and household socioeconomic status influence delivery of health and nutrition interventions in Bihar, India. <i>FASEB J</i>. 28 (1 suppl):624-5.</p> <p>Aim: Examine how frontline worker (FLW) incentives and household socioeconomic status (SES) influence health and nutrition service delivery in Bihar, India.</p>	<p>Multivariate regression analysis was carried out to examine demand- and supply-side determinants of household receipt of immunization, food supplements (FS), pregnancy care information (PCI), or nutrition information (NI). Based on a 2012 cross-sectional survey of 790 FLWs and 6002 households from 400 villages in 1 district in Bihar.</p>	<ul style="list-style-type: none"> - Supply-side determinants varied by outcome: (1) FLW incentives were marginally positively associated with immunization ($P < .1$); (2) FLW education ($P < .05$), the use of pregnancy registers ($P < .05$), and incentives ($P < .05$) were positively associated with PCI; (3) FLWs living outside their service areas was negatively associated with FS to households ($P < .1$). - Demand-side determinants also varied by outcome: (1) a more educated household head was associated with greater immunization, (2) lower SES households were more likely to get FS ($P < .05$), but higher SES households ($P < .05$) and households who had visited nutrition centers ($P < .05$) were more likely to get NI. <p>In sum, FLW proximity to service area, FLW education, and incentives affect service delivery outcomes, although household factors are also important. Service delivery outcomes could be improved by recruiting more educated FLWs, investing in incentives, and improving household contacts with nutrition centers through demand creation.</p>

(continued)

Table A I. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>Kosec K, Avula R, Menon P, et al. Predictors of Essential health and nutrition service delivery in Bihar, India: results from household and frontline worker surveys. <i>Global Health: Sci Pract</i> J. May 2015.</p> <p>Aim: Examine predictors of use of immunization information and services, food supplements (FS), pregnancy care information (PCI), and general nutrition information (NI).</p>	<p>For each service delivery outcome, a logistic regression model was defined using a combination of variables hypothesized to be demand- and supply-side drivers of service utilization. Based on a 2012 cross-sectional survey of 6002 households in 400 randomly selected villages in 1 district in Bihar, and an integrated survey of 377 Anganwadi workers (AWWs) and accredited social health activists (ASHAs) from these villages.</p>	<ul style="list-style-type: none"> - Approximately 35% of households reported receiving any of the 4 services. - Financial immunization incentives for AWWs and above-median household head education were statistically significant predictors of households' receipt of immunization services. - Higher household SES was associated with significantly lower chances of receiving FS. - ASHAs receiving incentives for institutional delivery was marginally associated with higher chances of receiving PCI, and ASHAs who maintained records of pregnant women was significantly associated with households receiving this information. - AWWs who received immunization incentives were associated with significantly higher chances of households receiving general NI, suggesting a large spill-over effect of incentives from product to information-oriented services.
<p>Kuntal S, Billah M, Menon P, El Arifeen S, Mbuya NVN. <i>Bangladesh National Nutrition Services. Assessment of Implementation Status.</i> Washington, DC: International Bank for Reconstruction and Development/The World Bank; 2015.</p> <p>Aim: Assess implementation effectiveness of Bangladesh's National Nutrition Services Program (NNS) to identify achievements and bottlenecks, assess quality and coverage of interventions, and make recommendations to strengthen implementation.</p>	<p>Progress in NNS Program implementation was evaluated in five domains: management and support services, training and capacity development, service delivery, M&E, and exposure to interventions. A mixed-methods approach involved document review, stakeholder interviews at different administrative levels, and focus group discussions with providers and beneficiaries at community level. Survey data were collected in 6 districts through a facility survey, a health-care provider survey, observation of ANC service delivery, management of children younger than 5 years, and exit interviews.</p>	<p>Overall, findings show that product-oriented incentives directly affect delivery of product- and information-oriented services, but that household factors (eg, SES, education of household head) are also important. Authors find that existing government programs can mitigate demand- and supply-side constraints to receipt of essential interventions by optimizing existing incentives for FLWs in national programs. This can help FLWs better organize their work and raise awareness among groups less likely to access services.</p> <ul style="list-style-type: none"> - The NNS is an ambitious but valuable approach to supporting nutrition actions through an existing health system with diverse platforms. - Ensuring stable and strong NNS leadership is critical for ensuring well-coordinated service delivery for Line Directorate; current arrangements are unable to ensure effective NNS coordination and implementation. - Focusing on leadership and coordination challenges and embedding a set of interventions into well-matched health system delivery platforms will likely help achieve scale and impact. - Engagement with technical partners for monitoring and implementation support, high-coverage outreach platforms, and ensuring transparency will likely also help achieve scale and impact. - Development partners committed to nutrition must coordinate their efforts and provide support for nutrition in Bangladesh.

(continued)

Table A I. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>Billah SM, Saha KK, Khan ANS, et al. Quality of nutrition services in primary health care facilities: implications for integrating nutrition into the health system in Bangladesh. <i>PLoS One</i>. 2017;12(5): e0178121.</p> <p>Aim: Examine nutrition services quality provided during antenatal care (ANC) and management of sick children younger than 5 years.</p>	<p>Quality-of-service delivery was assessed according to indicators for structural readiness (presence of equipment, guidelines, registering/reporting forms in ANC rooms and consulting areas for sick children at 37 primary health-care facilities in 12 subdistricts; nutrition service delivery-related training and knowledge of 95 health-care providers determined), nutrition service delivery process (381 ANC visit observations; 826 sick children consultations); and outcome (satisfaction with services among 541 mothers/caregivers).</p>	<ul style="list-style-type: none"> - Structural readiness to provide nutrition services was higher for ANC compared to management of sick children; ~73% of ANC rooms had >5 of the 13 essential items, but only 13% of designated areas for management of sick children had this. - One in 5 (19%) health-care providers had received nutrition training through NNS. - Nutrition service delivery was poor: <30% of women received all 4 key antenatal nutrition services, 25% of sick children had their weight checked against a growth chart, and <1% had their height measured. - However, most mothers/caregivers rated above average satisfaction with the service. <p>Increasing training coverage and improving equipment provision is key for improving nutrition services. Barriers to implementing nutrition services (eg, high caseloads) need to be considered to identify alternative service delivery platforms prior to national-level scale-up.</p>
<p>Hoddinott J, Gillespie S, Yosef S. Public-private partnerships and undernutrition: examples and future prospects. In: Biesalki H, Black R, eds. <i>Hidden Hunger. Malnutrition and the First 1,000 Days of Life: Causes, Consequences and Solutions</i>. Basel: Karger; 2016.</p> <p>Aim: Clarify what public-private partnerships (PPPs) are, give examples of successful and less successful PPPs, and outline lessons.</p>	<p>Searched for PPP case studies using key search terms in Google Scholar and university academic catalogs. Also searched gray literature and searched for original references used in these.</p>	<ul style="list-style-type: none"> - Authors distinguish between 2 types of PPPs: noncontractual and contractual. - Study finds 24 case studies of nutrition-relevant PPPs, but evidence on actual impact of PPPs is weak. - There is scope for PPPs to reduce undernutrition, with several caveats: (1) independent rigorous assessments of commercial sector engagement impact on nutrition are few, so caution should be exercised when assessing acclamations/critiques of PPPs in nutrition; (2) private sector should recognize that actions by some firms have led to mistrust; the public sector should accept that sustainable PPPs allow private firms to generate profit; (3) PPPs that involve multiple firms can be problematic because they force competitors to work together or because they create potential for involved companies to lock out nonmembers. - There is scope for private-sector involvement in driving innovations to reduce undernutrition, as well as to act as a financier of investments that help improve children's nutritional status. For PPPs to be successful, there needs to be open discussions of objectives, roles, and expectations of all parties including potential conflicts of interest.

Table A2. Theme 2: Transforming Agriculture and Social Protection.

Reference and Aim	Methods	Findings and Recommendations
Berhane G, Hoddinott JF, Kumar N. <i>The Impact of Ethiopia's Productive Safety Net Programme on the Nutritional Status of Children: 2008–2012</i> . IFPRI Discussion Paper 1604. Washington, DC: International Food Policy Research Institute (IFPRI); 2017. Aim: Examine the impact of Ethiopia's Productive Safety Net Program (PSNP) on children's nutritional status (2008–2012).	Inverse-probability-weighted regression-adjustment estimators are used to assess impact. Sixty-eight wordas were randomly sampled from the original list included in PSNP, proportional to size and stratified by regions. In each, sample enumeration areas (EAs) were randomly selected from a list of EAs with PSNP activity. In each EA, a list of households was developed, from which 15 PSNP beneficiary and 10 nonbeneficiary households were randomly sampled. Sample sizes were based on power calculations demonstrating how large the sample needed to be to identify an effect size equivalent to a 10-percentage point increase in food security. There were 4 rounds of data collection in 2006 to 2012.	<ul style="list-style-type: none"> - No evidence is found that PSNP reduced chronic or acute undernutrition between 2008 and 2012. The reason is not necessarily clear, although authors note child diet quality is poor. - Authors find no evidence that the PSNP improves consumption of pulses, oils, fruits, vegetables, dairy products, or animal-source proteins. Most mothers had not had contact with health extension workers; they did not receive information about optimal feeding practices. Water practices were poor. <p>These findings informed revisions of the PSNP. Future research will examine whether these led to improvements in anthropometry and diets of preschool children in Ethiopia.</p>
Ahmed AU, Hoddinott JF, Roy S, et al. <i>Which Kinds Of Social Safety Net Transfers Work Best For The Ultra Poor In Bangladesh? Operation and Impacts of the Transfer Modality Research Initiative</i> . Dhaka: IFPRI/WFP Bangladesh; 2016. Aim: Generate evidence for streamlining the social safety net system in Bangladesh, improve food and nutrition security and livelihoods of the ultra-poor in a cost-effective manner.	The Transfer Modality Research Initiative (TMRI) was tested in northwest and southern Bangladesh. Three transfer modalities were tested: (1) cash only, (2) food only, and (3) cash and food. In the northwest, a cash transfer conditional on attending nutrition BCC training was also tested; in the south, a food ration conditional on attending nutrition BCC training was tested. In each region, 5 upazilas were randomly selected to receive the 4 transfer modalities. From the list of villages in these upazilas, 250 were randomly assigned to a treatment and control group. A village census of these was used to randomly select 10 households from each cluster for a total of 5000 households that fulfilled criteria related to poverty level, child age, and whether they were receiving benefits from other interventions. 4000 women and 21 600 family members received a monthly transfer. Baseline (March to April 2012), midline (June 2013), and endline (April 2014) household surveys were used, as well as qualitative research (November 2012)	<ul style="list-style-type: none"> - All modalities improved measures of household consumption. Modalities combined with BCC had the most substantial impact on household consumption in both regions; magnitudes of impact from a given modality were larger in the north. - TMRI modalities with BCC components had large significant impacts on maternal knowledge regarding nutrition and care practices, and in both regions mothers acted on this improved knowledge. Child diets improved in both regions, but in areas with BCC, they substantially contributed to an increase in consumption of nonstaples (whereas in non-BCC arms, impacts were due to an increase in legumes which were included in the food basket). BCC trainings led to increased use of micronutrient powders. - The cash + BCC modality improved child nutrition (7.3-percentage point reduction in stunting). No modality had an impact on acute child undernutrition.

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Table A2. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>Hirvonen K, Hoddinott J, Minten B, Stifel D, 2017. Children's diets, nutrition knowledge, and access to markets. <i>World Dev.</i> 2007;95:303-315.</p> <p>Aim: Examine the impact of caregivers' nutrition knowledge and its complementarity with market access on feeding practices in Ethiopia.</p>	<p>to examine participants' views on TMRI. The impact estimation strategy was based on the randomized controlled trial design. Analysis of covariance (ANCOVA) regression is used to estimate treatment effect.</p>	<ul style="list-style-type: none"> - Policy implications: Cash and food transfers can be effective in improving diets of poor households, but transfers alone are not sufficient to improve child nutrition. Linking transfers (especially cash) with BCC to improve chronic undernutrition among children is important. Finally, cash transfer impacts on consumption and child nutrition are the same or better than those from food transfers.
<p>Economometric analysis using instrumental variables estimators to examine the impact of maternal knowledge of good nutrition practices on child diets when access to food markets is variable. Survey data come from a woreda (district) in Amhara region, Ethiopia, characterized by large variations in transportation costs over relatively short distances. Data from 2 rounds of household panel surveys carried out in 2011 (850 households) and 2014 (775 households) in Alefa woreda in northwestern Ethiopia, along 7 subdistricts (sub-kebeles) along a route going westward from Atsedemariam (170 households in each of the 5 distance brackets, defined by travel time by donkey to Atsedemariam, yielding 850 households).</p>	<p>Building on economic theory, econometric analysis of the impact of dairy cow ownership on preschool children's milk consumption and anthropometric outcomes. Extensive attention paid to robustness of results. Data are drawn from a household survey intended to be the baseline for the government's Agricultural Growth Program's (AGP) baseline evaluation. Total sample of 7930 households in 61 AGPS woredas and 32 non-AGPS woredas.</p>	<ul style="list-style-type: none"> - Better nutrition knowledge leads to considerable improvements in children's dietary diversity but only in areas in relatively good market access. - It is important that policymakers and program implementers ensure that efforts to improve nutrition knowledge are complemented by efforts to improve access to food.
<p>Hoddinott J, Headey D, Dereje M. Cows, missing milk markets and nutrition in rural Ethiopia, <i>J Dev Stud.</i> 2015;51(8):958-975.</p> <p>Aim: Test whether farm assets have direct dietary impacts on nutrition, and indirect effects via income.</p>	<p>Building on economic theory, econometric analysis of the impact of dairy cow ownership on preschool children's milk consumption and anthropometric outcomes. Extensive attention paid to robustness of results. Data are drawn from a household survey intended to be the baseline for the government's Agricultural Growth Program's (AGP) baseline evaluation. Total sample of 7930 households in 61 AGPS woredas and 32 non-AGPS woredas.</p>	<ul style="list-style-type: none"> - Cow ownership increases children's milk consumption and children's linear growth and reduces stunting. - Household cow ownership is less important when there is sufficient access to local markets, suggesting that the development of markets could function as a substitute for household cow ownership. - Research recommendations: The nonexperimental part of the analysis can be improved by experimental approaches; standard health and nutrition surveys should include more detailed agricultural models that capture nutrition determinants such as cow ownership.

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Table A2. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>Hirvonen K, Hoddinott J. Agricultural production and children's diets: evidence from rural Ethiopia. <i>Agr Econ</i>. 2016;48(4):469-480.</p> <p>Aim: Examine the relationship between preschool children's food consumption and household agricultural production.</p>	<p>Econometric analysis focuses on the relationship between children's diets and diversity of household food production—controlling for chill age and sex, household education, income and wealth, food prices, and access to markets. Authors use cross-sectional survey data collected in 5 regions in Ethiopia in 2013 as part of a baseline survey for Feed the Future. Total sample includes 7011 households.</p>	<ul style="list-style-type: none"> - Policy recommendations: Potential classes of intervention could be experimented with (1) interventions that increase dairy productivity and (2) interventions that develop or improve dairy market value chains. - Increased household production diversity leads to significant improvements in children's dietary diversity. - However, nonseparability of consumption and production does not hold for households that have access to food markets. - Findings point to nutrition-sensitive agricultural interventions pushing for market integration being more effective in reducing undernutrition than those promoting production diversity.
<p>Headley D, Hoddinott J. Agriculture, nutrition and the green revolution in Bangladesh. <i>Agr Syst</i>. 2016;149:122-131.</p> <p>Aim: Assess linkages between agriculture and nutrition over the past few decades in Bangladesh.</p>	<p>Authors develop a conceptual model to identify different impacts of productivity growth in staples for child nutrition outcomes to assess Bangladesh's food system evolution. A multiround district-level panel is developed linking changes in nutrition survey data with agricultural sample survey data (1996-2011). This is used to run regressions to test for associations between yield growth and anthropometric and child feeding indicators.</p>	<ul style="list-style-type: none"> - Bangladesh's food system evolution saw rapid growth in yields and calorie availability, but less progress in diversification of food production and consumption. - Rice yields predict earlier introduction of complementary foods to young children (mostly rice) and increases their weight-for-height. It does not predict improvements in dietary diversity of children or height-for-age. - Further impacts on nutrition require diversifying the food basket through demand- and supply-side interventions.
<p>van den Bold M, Quisumbing AR, Gillespie S. <i>Women's Empowerment and Nutrition: An Evidence Review</i>. IFPRI Discussion Paper 01294. Washington, DC: International Food Policy Research Institute; 2013.</p> <p>Aim: Review evidence of impact of agricultural interventions, conditional cash transfer programs (CCTs) and unconditional cash</p>	<p>Electronic databases were searched using key terms including Google Scholar, 3ie, EconLit, ELDIS, IDEAS, and Research for Development, as well as IFPRI, World Bank, FAO, and IDS websites, to examine women's empowerment definitions and measures. Further studies collected through contacts and snowballing. Over 4000 references screened (titles and abstracts) and nearly 200 sources included.</p>	<ul style="list-style-type: none"> - Evidence from CCTs shows positive impacts on women's empowerment; quantitative findings are more mixed. There are heterogeneous impacts on long-term nutritional status and limited impact on micronutrient status. Evidence from UCTs shows mixed impacts on women's empowerment and positive impacts on nutrition outcomes. - Reviews find little difference in terms of impact on stunting between CCTs and UCTs; conditionality is less important than, for example, access to health

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Table A2. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>transfer programs (UCTs), and microfinance programs on women's empowerment measures and nutrition outcomes.</p>		<p>care, child age, and child sex. Evidence of impact is mixed depending on gender of the transfer recipient or on the conditionality; CCTs with nonhealth conditionalities had negative impacts on nutritional status. Impacts of transfer programs based on gender of transfer recipient have mixed results, but there is hardly experimental evidence of testing gender-differentiated impacts of a single program.</p> <ul style="list-style-type: none"> - Agricultural interventions (primarily home gardening and dairy) demonstrate mixed impacts on empowerment measures and show little evidence of impact on nutrition outcomes. Implementation modalities determine different impacts in terms of empowerment and nutrition. - Evidence of impact of microfinance on women's empowerment is mixed, though more recent reviews do not find evidence of impact. - For all 3 types of programs, very little evidence exists on pathways of impact, and evidence is often bias toward a region.
<p>Headley D, Hoddinott J, Ali D, Tesfaye R, Dereje M. The Other Asian Enigma: explaining the rapid reduction of malnutrition in Bangladesh. <i>World Dev.</i> February 2015;66:749-761.</p> <p>Aim: Assess drivers of changes in child growth outcomes between 1997 and 2011 in Bangladesh.</p>	<p>Regression and decomposition analysis to assess key drivers of child undernutrition change, using 1997, 2000, 2004, 2007, and 2011 DHS rounds. Paper analyzes 3 key indicators: height for age (HAZ) z-scores, stunting prevalence (HAZ < -2), and severe stunting prevalence (HAZ < -3).</p>	<ul style="list-style-type: none"> - Rapid wealth accumulation and significant gains in parental education are the 2 main drivers of child undernutrition reductions. Health, sanitation, and demographic factors also play important roles.

Table A3. Theme 3: Transforming Leadership, Commitment, and Accountability.

Reference and Aim	Methods	Findings and Recommendations
Gillespie S, Haddad L, Mannar V, Menon P, Nisbett N. The politics of reducing malnutrition: building commitment and accelerating progress. <i>Lancet</i> . 2013;382(9891):552-569. Aim: Examine how enabling environments for nutrition can be cultivated, sustained, and translated into impact.	Literature review of nutrition-relevant processes. Medline, Web of Science, and Econlit were searched on November 12-16, 2012 using key search terms. Gray literature was identified through ELDIS and Google Scholar. Assessment of the SUN movement was based on monitoring data from 30 countries and a closed online discussion with Eldis Communities web platform, with 75 participants from 6 countries (November 27 to December 4, 2012).	<ul style="list-style-type: none"> - Country experiences show that, with deliberate action, undernutrition reduction can be accelerated. - Policymakers should prioritize investment in scaling up nutrition-specific interventions and maximize nutrition sensitivity of national development initiatives. - Three core factors shape enabling environments: knowledge and evidence, politics and governance, and capacity and resources. - Political commitment can be built. - Nutrition leadership at all levels is critical for maintaining political momentum and translating into impact. - National and global support is needed to accelerate progress in undernutrition reduction. - The private sector has huge potential to contribute to accelerating nutrition improvements, but more evidence and trust are needed. - Operational research on delivery, implementation and scaling up of interventions, and contextual analyses are needed.
Nisbett N, Gillespie S, Haddad L, Harris J. Why worry about the politics of child nutrition? <i>World Dev</i> . 2014;64:420-433. Aim: Review existing literature on nutrition politics and policy and identify gaps in understanding.	Paper reviews literature on nutrition policy/politics based on searches of Medline, Web of Science, and Econlit with key terms, with further checks in ELDIS and Google Scholar for gray literature. Focused on nutrition and politics literature emerging from (1) nutrition policy, programming, and implementation; and (2) political science, policy sciences, and health systems research literature. Uses UNICEF 1990 and <i>Lancet</i> 2013 nutrition frameworks used as key conceptual frameworks.	<ul style="list-style-type: none"> - Political economies lie at the basis of the black box of basic determinants of undernutrition. - Three themes emerge from the literature review: (1) the importance of narratives, framings, and communication of evidence and knowledge related to causes, consequences, prevention, and treatment of undernutrition; (2) “the political economy of different stakeholders, ideas, and interests which both shape the narratives and available knowledge and enable and constrain the processes by which this knowledge is turned into action”; and (3) strategic and technical capacity and resources that are available for successful implementation of nutrition-specific or -sensitive programs and public service delivery” (p. 425). - Authors identify new directions in development thinking with regard to (1) power and the state and (2) nutrition back to its roots—toward new innovations in nutrition accountability and participation. <p>Research gaps:</p> <p>Framing, generation, and communication of knowledge and evidence</p> <ul style="list-style-type: none"> - Political economy and governance of stakeholders, ideas, and interests - Capacity (individual, organizational, systematic) and financial resources

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Table A3. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>Smith L, Haddad L. Reducing child undernutrition: past drivers and priorities for the post-MDG era. <i>World Dev.</i> 2015;68:180-204.</p> <p>Aim: Investigate factors that contributed to reductions in child undernutrition (1970-2012) and identify future priorities.</p>	<p>Regression analysis is used to analyze data for 116/132 developing countries (1970-2012) from WHO, DHS, and World Bank. For child undernutrition, stunting (HAZ < -2 for children younger than 5 years) is used as the main indicator. For underlying determinants, study uses specific indicators that fall under household food security, quality of care for mothers and children, gender equality and women's empowerment, and health environment quality. For basic determinants, authors focus on national income, 5 dimensions of governance, urbanization, and age structure of populations.</p>	<ul style="list-style-type: none"> - Safe water and sanitation, gender equity, women's education, and quantity and quality of food were key drivers of stunting reductions in the past, with income growth and governance playing key facilitating roles. In addition to nutrition-specific and nutrition-sensitive programs and policies, investment in these key areas will be needed to ensure undernutrition reduction in the future. <p>Region-specific findings:</p> <ul style="list-style-type: none"> - South Asia: Access to sanitation, gender equality, and nutritional quality of food available is important, as well as improvements in women's education and food availability - Sub-Saharan Africa (SSA): Sanitation, gender equality, and women's empowerment are priority areas - Improved income growth in both regions is critical for reducing stunting. - Improving governance is very important, with a focus on political stability in South Asia and restraint of corruption and better bureaucratic effectiveness in SSA.
<p>Nisbett N, Haddad L, El-Arifeen S, Wach E. What drives and constrains effective leadership in tackling child undernutrition? findings from Bangladesh, Ethiopia, India and Kenya. <i>Food Policy.</i> 2015;53:33-45.</p> <p>Aim: Identify incentives and constraints to effective leadership and provide recommendations for leadership in nutrition.</p>	<p>Interviews with 89 individuals identified as national-level leaders on nutrition in India, Bangladesh, Kenya, and Ethiopia. Primary questions: (1) What motivates people to become leaders in nutrition? (2) What enables leaders to operate effectively in the nutrition policy sphere? (3) What are external barriers and challenges to effective operation? (4) What do leaders assess as knowledge gaps and how to they employ their existing knowledge? (5) How can the international policy community better support emerging leaders?</p>	<ul style="list-style-type: none"> - Leadership is important for advocating and directing change. - Leaders operate within fluid boundaries set by political economies of nutrition. - Successful leaders can cross boundaries and translate between sectors/ disciplines. - Leadership attributes in individuals and their networks can be developed by several supportive actions. <p>Recommendations:</p> <ul style="list-style-type: none"> - Support leader to leader networks and mentoring. - Storytelling around nutrition success stories and lessons. - Building community leadership, accountability, and activism; championing those who give communities voice. - Target efforts to expose or convince leaders to champion nutrition. - Improve curricula to include nutrition knowledge and adult development and leadership capacity. - Building better competency, rewards, and incentives frameworks for parts of the nutrition workforce.

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Table A3. (continued)

Reference and Aim	Methods	Findings and Recommendations
Khandelwal S, Paul T, Haddad L, et al. Postgraduate education in nutrition in South Asia: a huge mismatch between investments and needs. <i>BMC Med Educ.</i> 2014;14:3. Aim: Conduct a regional situational analysis of master's level academic programs in nutrition, focusing on Public Health Nutrition (PHN).	Systematic online search conducted to carry out a situational analysis of masters in nutrition in India, Pakistan, Bangladesh, Sri Lanka, Afghanistan, Maldives, Nepal, and Bhutan; complemented by institute website visits and library visits.	<ul style="list-style-type: none"> - 131 master's degree programs identified, 1 of which was in PHN and another 15 had modules in PHN. Most of these were in India with a few in Bangladesh and Sri Lanka. In other countries, neither nutrition nor PHN masters were found. - Indian and Sri Lankan programs were most inclusive in terms of eligibility; other countries restricted eligibility to those with health qualifications. - No country had modules on nutrition policy or nutrition's linkages to other sectors such as agriculture, social protection, WASH, or women's empowerment. <p>Overall, the master's level courses focus too little on strategies highlighted in the <i>Lancet</i> series. The possibility to scale up nutrition capacity and improve nutrition outcomes faces challenges.</p>
te Lintelo DJH, Lakshman R. Equate and conflate: political commitment to hunger and undernutrition reduction in five high-burden countries. <i>World Dev.</i> 2015;76:280-292. Aim: Test hypothesis that commitment to hunger reduction is empirically different from commitment to reducing undernutrition.	Building on literature on political commitment, political commitment indicators are synthesized, a survey is constructed, and primary data were collected through expert perception surveys (July to October 2013) with experts in 5 high-burden countries: Malawi, Tanzania, Zambia, Bangladesh, and Nepal to determine whether government commitment to hunger is the same as commitment to nutrition (using paired-sample <i>t</i> tests).	<ul style="list-style-type: none"> - Authors identify nine components of political commitment: publicness, voluntary ownership, explicitness, whether government actions are irrevocable, whether governments actively mobilize support, analytical rigor, continuity and capacity, implementation, and whether bureaucracies provide credible incentives for delivering policy initiatives. - Political commitment is measured to reducing (1) hunger and (2) undernutrition. - Commitment to hunger reduction is different from commitment to undernutrition reduction. Results show that commitment to hunger reduction is higher than to nutrition commitment in Malawi, Bangladesh, Zambia, and Tanzania, but vice versa in Nepal. - In each country, there is uneven performance on the 9 indicators; the survey instrument developed is hence sensitive enough to record this and has diagnostic value for different actors (eg, donors, CSOs, nutrition champions) to assess what areas of commitment need strengthening. - Sensitive commitment metrics are required to guide donor and government policies and programs. Without these, subpar prioritization of nonfood aspects of malnutrition might continue to risk inhibiting global nutrition targets.

(continued)

Table A3. (continued)

Reference and Aim	Methods	Findings and Recommendations
<p>Barnett I, Gallegos JV. <i>Using Mobile Phones for Nutrition Surveillance: A Review of Evidence</i>. IDS Evidence Report 01. Brighton: Institute of Development Studies; 2013.</p> <p>Aim: Review the evidence based on the impact of mobile phone technology for nutrition (and other) surveillance, specifically (1) whether mobile phones have the potential to improve surveillance effectiveness, and(2) whether their use can influence the empowering effect of nutrition and other surveillance.</p>	<p>Review's scope covered surveillance, mobile phone application, and low- and middle-income countries. Using keywords, authors searched electronic databases, reports by relevant organizations and governmental and nongovernmental documentation, mobile companies' websites, and interest organizations. Ultimately, 9 studies that assessed impact of mobile phone use for surveillance were included.</p>	<ul style="list-style-type: none"> - There is a lack of evidence on the impact of mobile phone use for (nutrition) surveillance. - Mobile phones may make nutrition surveillance timelier. - Mobile phones may improve data quality in nutrition surveillance. - There is a lack of evaluations of cost-effectiveness of use of mobile phones for surveillance. - There is a need for more analysis, visualization, and reporting of surveillance data. - There is a lack of evidence on the empowering effect of using mobile phones in surveillance.- - Surveillance using mobile phones faces financial, technical, and ethical challenges. - A functioning health-care system, strategic partnerships with the private sector, and government support are needed to ensure mobile phone-based surveillance is sustainable and scalable. <p>Overall, despite the limited evidence available, evidence that does exist suggests mobile phones can play an important role in nutrition surveillance by reducing time needed to collect data and improving data quality. It also has potential to improve analysis, presentation, and communication of data to stakeholders, but more needs to be understood about the barriers and facilitators to this technology.</p>
<p>Veronica Tuffrey. A perspective on the development and sustainability of nutrition surveillance in low-income countries. <i>BMC Nutr</i>. doi:10.1186/s40795-016-0054-x, March 2016</p> <p>Aim: Examine why nutrition surveillance in low-income countries is difficult to sustain; identify factors in those systems that have been maintained.</p>	<p>Reviews development of nutrition surveillance in low-income countries over the past 40 years. Uses case studies from Bangladesh, Ethiopia, and Malawi.</p>	<ul style="list-style-type: none"> - Despite 40 years since the start of nutrition surveillance initiatives, there exists little consensus on the best methods to undertake surveillance; many systems have been short-lived though there are not many evaluations to understand why. - Nutrition surveillance can not only be useful for acute crises but also in longer term development. Nutrition surveillance data increasingly provide important ways to hold governments to account and allow tracking of progress on targets. - Sustainability of nutrition surveillance systems depends on cost, development of capacity, and location of the institutional base, product demand, and participation. Also, sustainability of these systems depends on harnessing developments in electronic technology, overnutrition surveillance, the interface between national and international nutrition systems, and multisectoral activities in nutrition.

Authors' Note

Stuart Gillespie conceptualized the article, wrote the introduction and conclusions, wrote Box 2, and coauthored the “Cultivating enabling environments for nutrition” section with Nicholas Nisbett. John Hoddinott wrote the section “Transforming agriculture and social protection,” and Shams El Arifeen wrote “Transforming delivery of nutrition-specific interventions.” Mara van den Bold wrote Box 1, supported Stuart Gillespie in writing the introduction, and coordinated revisions (including summarizing study findings in Appendix A).

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Notes

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2. Using a paired-sample *t* test.
3. <https://medium.com/transform-nutrition/transforming-leadership-in-nutrition-10f41dceb805>

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