



Child Growth and Development Path-to-Scale Research Initiative

September 2020

Executive Summary

Path-to-Scale Research at IPA

Innovations for Poverty Action's Path-to-Scale Research (PSR) Program works to accelerate the process of moving evidence-based interventions from proof-of-concept to scalable and adaptable programs and policies. In contrast to *innovation research* that explores brand new ideas for solving development problems, *path-to-scale research* begins with evidence-based approaches that have already shown promise in rigorous impact evaluations. PSR builds on these promising approaches by creating evidence on when, where, and why an approach is expected to work, and identifying ways to optimize program design and implementation at scale. PSR supports policy-maker efforts to identify and incorporate the most effective interventions into programs and policies, resulting in better health outcomes, improved livelihoods, and less poverty.

Child Growth and Development (Stunting) Initiative

Stunting¹, or being too short for one's age, is a warning signal that a child is at risk of failing to reach their full potential. Stunting predicts poor school achievement and progress, lower cognition, reduced earnings, and a higher probability of living in poverty. It also increases the risk of death from infectious diseases in childhood. Stunting is a standard measure of chronic malnutrition, but poor nutrition and feeding, inadequate care, and repeated infections can also cause growth faltering. Increases in poverty, disruptions to food and agricultural systems, and reduced access to health services, challenges predated but also exacerbated by the current COVID-19 pandemic, create conditions that make children vulnerable to stunting.^{2,3}

The PSR team reviewed evidence on stunting reduction interventions and held a workshop with academic and practitioner experts to identify promising evidence-based approaches (EBAs) and explore research questions to address evidence gaps. These prioritized EBAs include **small-quantity lipid-based nutrient supplements (SQ-LNS)** and **animal source foods** to complement infant diets, **cash transfers combined with behavior change communication (BCC)** programs, and **home-based growth monitoring**.

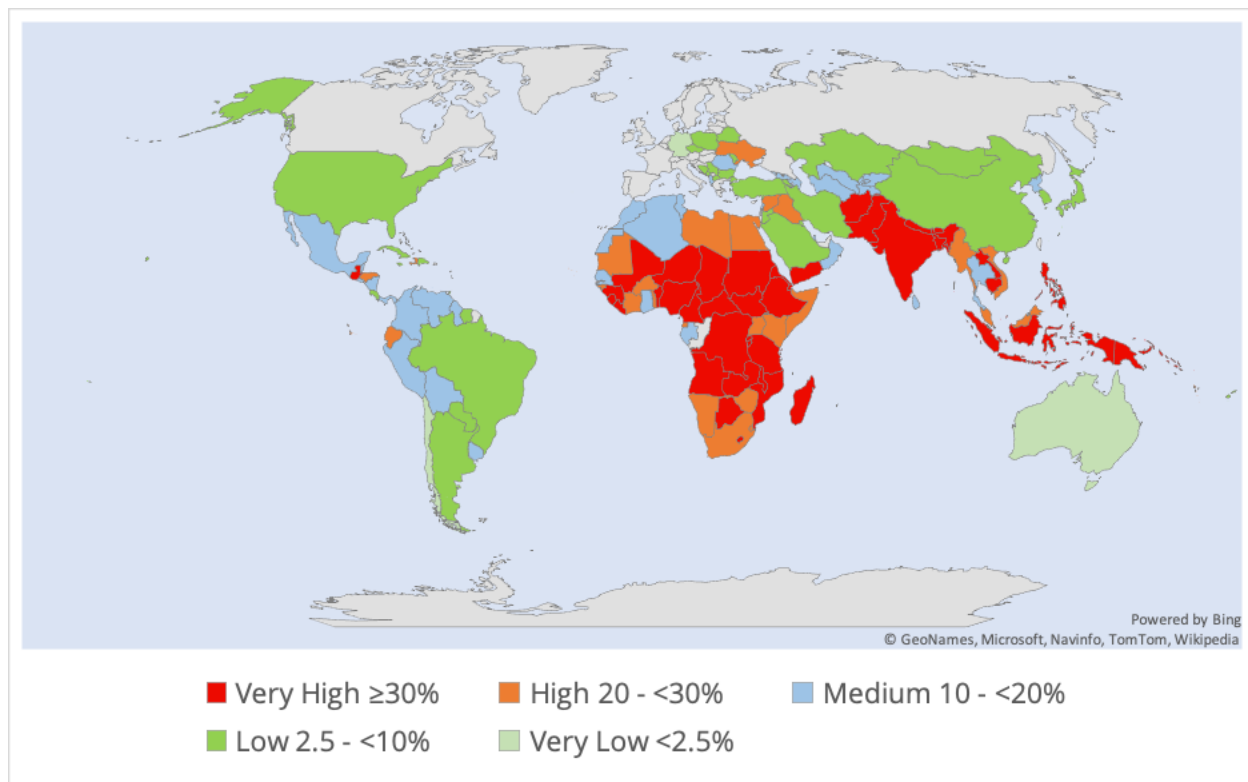
The PSR team has consolidated research agendas around these EBAs, working closely with stakeholders throughout the process, and is currently seeking implementation and research partnerships for SQ-LNS, cash transfers combined with BCC, and animal-source foods. The PSR team is targeting countries and sub-national regions with the most severe burdens of stunting to scale up research.⁴

Path-to-Scale Research Initiative on Child Growth and Development

Stunting is characterized by poor linear growth and is identified as height-for-age that is two or more standard deviations below the mean of a healthy reference population. Stunting is a commonly-used measure of chronic malnutrition, but stunting can be caused by deficient health care, poor nutrition and feeding, inadequate water and sanitation, inadequate care, and repeated infections during the first 1,000 days of a child's life (from conception to the second birthday).⁵

Being short for one's age is a warning signal that a child is at risk of failing to reach their full potential. Stunting in children predicts poor school achievement, low cognition, reduced earnings, and a higher probability of living in poverty.⁶ It also increases the risk of death from infectious diseases in childhood and is an underlying cause of an estimated one million child deaths annually.⁷

Figure 1: Percentage of stunted children under 5, 2019



Source: UNICEF/WHO/World Bank Joint Child Malnutrition Estimates Expanded Database: Stunting, March 2019, New York

Nearly 150 million children under the age of five are stunted today, with 57.5 million (40%) in Africa and 78.2 million (54%) in Asia.⁸ These children, and those at risk of stunting, are unlikely to realize their full growth and development potential.

A large body of evidence exists about what works to reduce child stunting. Two recent *Lancet* series (2008, 2013) identified the critical role of early nutrition during the 1,000-day window, and days of life, and nearly a dozen evidence-based interventions that have the greatest impact on child health and development.^{9,10} While progress has been made in reducing stunting at a global level, a quarter of children under the age of 5 were stunted in 2019, signaling the need to ensure promising evidence-based approaches are refined and scaled to meet the needs of our world's most vulnerable at scale.¹¹

The Path-to-Scale Research Approach¹²

Innovations for Poverty Action's Path-to-Scale Research (PSR) Program works to accelerate the process of moving evidence-based interventions from proof-of-concept to scalable and adaptable programs and policies. In contrast to *innovation research* that explores brand new ideas for solving development problems, *path-to-scale research* begins with evidence-based approaches that have already shown promise in rigorous impact evaluations. Path-to-scale research builds on these promising approaches by creating evidence on when, where, and why an approach is expected to work, and identifying ways to optimize program design and implementation at scale. Path-to-scale research supports policy-maker efforts to identify and incorporate the most effective interventions into programs and policies, resulting in better health outcomes, improved livelihoods, and less poverty.

Stunting Interventions Evidence Review

The PSR team conducted an evidence review to identify and assess evidence of stunting interventions on child growth and nutrition outcomes, while also accounting for the breadth and direction of the available evidence. The *Lancet*-identified interventions were used as the primary basis for the initial search.¹³ Nutrition-sensitive programs and emerging innovations reviewed by the *Lancet* were also included in the search.¹⁴ Additional interventions were included based on a detailed review of the studies.

Randomized controlled trials (RCTs), quasi-RCTs, and systematic reviews assessing these interventions on non-hospitalized, healthy¹⁵ infants and young children aged six to 23 months of age and pregnant and lactating women were included in the review. The primary outcomes of interest included linear growth, height or length-for-age z scores, and stunting (defined as height/length-for-age z score \leftarrow 2).

We searched Google Scholar, Cochrane, PubMed, Oxford Academia, Wiley Online Library for studies in November 2019. We also checked the reference lists of included studies and studies within systematic reviews.



An IPA research team led a randomized evaluation in Zambia to test the impact of two different methods to improve parents' awareness of their children's development.

Evidence Review of Interventions to Prevent and Improve Child Growth			
Intervention Category	Intervention Characteristics	Impact on Child Growth	Strength of Evidence
Complementary food provision with or without education	Animal-source foods (ASF)	Mixed	Promising
	Small-quantity lipid-based nutrient supplements (SQ-LNS)	Positive	Strong
	Multiple micronutrient powder	No effect	Moderate (No effect)
	Local food	Mixed	Promising
Nutrition education	Complementary feeding	Positive	Strong
	Home-based growth monitoring	Positive	Promising
Prenatal/ maternal dietary or micronutrient supplementation	SQ-LNS	Positive	Moderate
	Multiple micronutrient supplements	Mixed	Promising
Micronutrient	Zinc	Positive	Promising

supplementation in children	Vitamin A	Positive	Promising
Disease prevention	Malaria	No effect	Promising (No effect)
	Deworming	No effect	Promising (No effect)
Nutrition-sensitive interventions	Social safety nets: cash transfer	Mixed	Moderate
	Agriculture: Home gardening; Poultry rearing	Mixed	Moderate
	Maternal and child healthcare/ health strengthening	Mixed	Promising
	WASH	No effect	Strong (No effect)
Strength of Evidence Key: Promising = One to two studies showing promising results Moderate = Multiple studies pointing in the same direction Strong = Consensus on the effectiveness of an approach			

Evidence Workshop

The PSR team hosted a workshop on December 11, 2019, to discuss promising approaches and interventions to address child stunting with a small group of leading academics and practitioners.¹⁶ At the workshop, the PSR team presented findings from its evidence review on stunting reduction interventions, and four researchers presented approaches that have shown promise in rigorous impact evaluations. The group discussed promising EBAs to prioritize for PSR and explored initial research questions.

Focal Evidence-Based Approaches

Based on the feedback and discussion at the evidence workshop, the PSR team identified four evidence-based approaches to focus on initially through the Child Growth and Development PSR.

EBA 1: Small-quantity lipid-based nutrient supplements (SQ-LNS)

To support rapid growth and development, infants need complementary foods with high nutrient density. Unfortunately, infants in low- and middle-income settings are often fed diets that fall short in delivering the macro and micronutrients needed.¹⁷ SQ-LNS are nutrient-dense products for infants and toddlers that provide energy, protein, essential fatty acids, and a wide range of micronutrients. SQ-LNS are designed to complement infant diets without displacing breastmilk and local foods, thus the “small quantity,” which is roughly 20g/110-120 calories. Large-quantity LNS are better known as ready-to-use therapeutic foods (RUTF), which are used in the treatment of acute malnutrition.

EBA 2: Cash transfers plus behavior change communication (BCC) programs

Cash may provide the resources to invest in child health and development but to effectively use cash transfers to address financial and resource constraints to improved child growth and development, caregivers must understand what constitutes good feeding, care, health and hygiene practices. Evidence suggests that increasing knowledge and awareness of nutrition and health practices rarely leads to sustained behavior change.¹⁸ Behavior change communication (BCC) is a collection of communication approaches and tools used to change behaviors, such as those related to child health and development, by influencing knowledge, attitudes, and social norms.¹⁹

EBA 3: Home-Based Growth Monitoring

Caregivers may not recognize stunting in their children or be aware of the subsequent health and development implications. While caregivers want the best for their children, they may not have the necessary knowledge or access to information that would support improved feeding and nutrition practices. Growth monitoring, the process of tracking a child's growth against a standard with frequent anthropometric measurements, can be a tool for preventing and treating malnutrition when implemented correctly and paired with appropriate actions to correct growth faltering.²⁰

EBA 4: Animal Source Foods (ASF)

Animal-source foods, such as eggs, meat, fish, and dairy, are energy dense and contain multiple micronutrients and essential fatty acids with high bioavailability. Caregivers' may not be familiar with what constitutes proper nutrition or the importance of early nutrition and the role ASFs could play. There may also be context-specific ecological, cultural, and socioeconomic factors influencing the use of ASFs in infant and young child feeding practices.

Path-to-Scale Research Agendas for Evidence-Based Approaches

The Path-to-Scale Research team has developed a research agenda based on the four prioritized EBAs. The research agenda and questions for each EBA target on the state and strength of the evidence. An EBA that has only been tested in one or two studies will have a different research objective and research type needed than an EBA that has been tested multiple times across a variety of contexts. Research questions address objectives related to internal validity, robustness and scale, external validity and mechanisms, cost and optimization.

EBA 1: Small-quantity lipid-based nutrient supplements (SQ-LNS)

Evidence has shown SQ-LNS provided to infants can significantly improve children's height and/or length-for-age scores and may prevent undernutrition.²¹ A gap in the evidence centers on delivery and pricing. Unlike ready-to-use therapeutic foods (large-quantity LNS), which are exclusively distributed via public health channels to treat severe acute malnutrition, SQ-LNS will rely on caregiver demand. A market trial study in Burkina Faso found that household demand was very sensitive to price.²² LNS sales during a 60-week period only met the recommended dosage (one sachet per child per day) for around five percent of target-age children.²³ Local LNS production is

not likely to dramatically reduce costs²⁴, so exploration of how delivery platforms may affect costs, consumption patterns, and effective demand is an important step on the path to scale.

There is an evidence gap surrounding potential synergies between packages of interventions, including LNS. Two recent WASH efficacy studies in Bangladesh and Zimbabwe found that LNS alone provided significant child growth benefits, but LNS combined with WASH improved child development measures more than LNS alone. An important next step is to consider how to bring effective interventions to scale, both individually and combined, and to optimize effectiveness and cost-effectiveness.²⁵ Given robust evidence of the efficacy of SQ-LNS to improve growth outcomes, our path-to-scale research agenda focuses on **how to deliver SQ-LNS** to children at risk of growth faltering during the complementary feeding period. For example, are market, public sector, or hybrid delivery channels more effective for improving child growth and nutritional status?

Summary of Evidence: Small-quantity Lipid-based nutrient supplements (SQ-LNS)		
STUDY		IMPACT ON LINEAR GROWTH/STUNTING
Das et al. 2019	Meta-analysis (LMICs)	<ul style="list-style-type: none"> ✓ Moderate stunting reduced 7-11 percent²⁶ ✓ Severe stunting reduced 15 percent
Luby et al. 2018	Bangladesh	<ul style="list-style-type: none"> ✓ LAZ increased 0.25
Adu-Afarwuah et al. 2007	Ghana	<ul style="list-style-type: none"> ✓ LAZ increased 0.26 – 0.35²⁷
Hess et al. 2015	Burkina Faso	<ul style="list-style-type: none"> ✓ Stunting reduced 10 PPs ✓ LAZ increased 0.27
Humphrey et al. 2019	Zimbabwe	<ul style="list-style-type: none"> ✓ Stunting reduced 7.2 PPs ✓ LAZ increased 0.16
Galasso et al. 2019	Madagascar	<ul style="list-style-type: none"> ✓ Stunting reduced 8.2 – 9 PPs ✓ LAZ increased 0.210 – 0.216
Iannotti et al. 2013	Haiti	<ul style="list-style-type: none"> ✓ LAZ increased 0.13
Maleta et al. 2015	Malawi	<ul style="list-style-type: none"> ✗ No effect on LAZ

PSR Research Questions:

- Demand and consumption: How do pricing (subsidized vs. market), marketing, and delivery methods affect demand and consumption?
- Cost assessment: How cost-effective is SQ-LNS compared to other feeding and home fortification supplements?
- Market impacts: How does SQ-LNS availability affect childhood diets and obesity rates?

- Development: What are the anthropometric, developmental, and morbidity outcomes after the 1,000-day window?
- Feeding practices: How do you align SQ-LNS with local child nutrition practices for optimal child growth and development?
- Targeting: Which households should be targeted for SQ-LNS distributions?

Project Development Priorities: Conduct impact evaluations in multiple contexts with high rates of stunting to test methods of delivering small-quantity LNS to children between six and 24 months of age at high risk of growth faltering.

EBA 2: Cash transfers plus behavior change communication (BCC) programs

Overall, current evidence suggests that cash transfers may improve height and nutritional status, but the effects are modest and inconsistent across programs.²⁸ Recent evidence in Bangladesh, Myanmar, and Nigeria has found that combining BCC covering maternal health and nutrition, exclusive breastfeeding, complementary feeding, hygiene and sanitation practices, and health-seeking for child illness with cash transfers can improve linear growth and nutritional status. An RCT in Bangladesh comparing cash, food, cash plus food, and cash plus BCC found that all interventions improved household food intake, but only the addition of BCC led to significant improvements in child anthropometrics. All three studies used unique BCC packages, comprised of interpersonal communication, group-based, media, community and social mobilization, and advocacy activities with different dosages/exposures. An important next step is to understand which components of the BCC package worked and if they are context-specific, in addition to the synergies with the amount of the cash transfer. Our path-to-scale research agenda builds on this promising evidence to understand **how robust these findings are** at larger scales and in new contexts and **how to maximize the cost-effectiveness** of the approach.

Summary of Evidence: Cash transfers plus behavior change communication (BCC)		
STUDY		IMPACT ON LINEAR GROWTH/STUNTING
Ahmed et al. 2019	Bangladesh	<ul style="list-style-type: none"> ✓ Stunting reduced by 7.8 PPs ✓ LAZ increased 0.25
Maffioli et al. 2019	Myanmar	<ul style="list-style-type: none"> ✓ Stunting reduced 4.4 PPs
Carneiro et al. 2019	Nigeria	<ul style="list-style-type: none"> ✓ Stunting reduced 5.4 PPs ✓ HAZ increased 0.14

PSR Research Questions:

- Delivery: How do intensity (number and duration of activities) and delivery platforms (digital, community health worker) of the BCC package affect child growth outcomes?
- Co-Delivery: Which component of the intervention drives results—BCC, conditionality, or cash transfer?
- Cost assessment: How cost-effective are BCC and cash compared to other child growth interventions?
- Development: What are the anthropometric, developmental, and morbidity outcomes after the 1,000-day window?
- Behavior change: How does delivery of BCC to multiple audiences (i.e. mothers/caregivers, fathers, influencers such as mothers-in-law/grandmothers) affect child growth outcomes?
- Targeting: Which households should be targeted for participation in cash plus BCC programs?

Project Development Priorities: Conduct multi-arm RCTs of cash transfers combined with BCC programs of varying intensity and delivery methods on child growth and nutritional status.

EBA 3: Home-Based Growth Monitoring

Home-based growth monitoring is a new intervention that shows promising evidence for improving child growth outcomes. IPA research in Zambia found that providing caregivers a home-based growth chart significantly improved growth among malnourished children.

The evidence for traditional growth monitoring was found to have little or no effect on children’s nutritional status.²⁹ Growth monitoring, traditionally through primary healthcare or community-based services, is meant to be a diagnostic tool for assessing the status of a child’s growth and to instigate appropriate action in response to the growth status, thus preventing and reducing child malnutrition and mortality. Furthermore, growth monitoring is meant to make growth faltering visible to caregivers so that they can adopt improved childcare behaviors.³⁰ In practice, growth monitoring is often implemented poorly, in isolation from key interventions such as nutrition counseling, by inadequately trained and supported health workers.³¹ Additionally, understanding of child growth status and related practices by caregivers is a major issue.³² Our path-to-scale research agenda seeks to test **how robust the Zambia findings are** and if the approach can work **at a larger scale and in other contexts** with similarly high rates of stunting.

Summary of Evidence: Home-Based Growth Monitoring		
STUDY		IMPACT ON LINEAR GROWTH/STUNTING
Fink et al. 2017	Zambia	✓ Stunting reduced by 22 PPs ³³

PSR Research Questions:

- Co-Delivery: How does the addition of caregiving/early child development messages and tools on the poster impact child cognition (ECD measures) while maximizing effects on child growth and nutritional status?
- Cost assessment: How cost effective are growth charts compared to other child growth interventions?
- Development: What are the anthropometric, developmental and morbidity outcomes after the 1,000-day window?
- Feeding practices: How do the charts affect child growth and nutritional status of future children and siblings after the 1,000 day window?
- Targeting: Which households should be targeted for home-based growth monitoring?
- Replication: Does the initial Zambia RCT replicate on a larger scale and in other contexts?

EBA 4: Animal Source Foods (ASF)

Limited evidence suggests ASF can improve height, but very few studies have directly tested the effect of ASF on child growth during the complementary-feeding window, and effects appear highly context-dependent.³⁴ As such, ASF strategies that account for ecological, cultural, and socioeconomic factors, along with dietary patterns, could effectively address nutritional deficiencies in infant and young child diets.

Summary of Evidence: Animal Source Foods (ASF)		
STUDY		IMPACT ON LINEAR GROWTH/STUNTING
Ianotti et al. 2017	Ecuador	<ul style="list-style-type: none"> ✓ LAZ increased 0.63 ✓ Stunting reduced by 47%
Marquis et al. 2018	Ghana	<ul style="list-style-type: none"> ✓ LAZ increased 0.22 ✗ No treatment effect for stunting
Eaton et al. 2019	Meta-analysis (LMICs)	<ul style="list-style-type: none"> ✓ Suggestive evidence
Stewart et al. 2019	Malawi	<ul style="list-style-type: none"> ✗ No treatment effect for LAZ or stunting

In Ecuador, eggs are available and more affordable than other ASF but not fed to children before the age of one due to the belief of allergic reactions. The Ianotti et al., 2017 study provided children with one egg per day for six months beginning at ages six to nine months, which resulted in significant declines in stunting in the short term, though the effect washed out two years after the end of the intervention. The intervention was replicated in Malawi with a larger sample size but found to have no effect, likely due to the existing high intake of ASF in Malawi whereas the diet is low in ASF in Ecuador.³⁵

Potentially more sustainably, a study in Ghana provided resources and training for egg production and home gardens, along with nutrition education.³⁶ Participants increased home production and income from selling eggs, while nutrition education may have supported improved dietary diversity and increased women's knowledge and skills in their income-generation activities and caregiving behaviors.

Other interventions, including cash transfers and nutrition education, that have shown positive effects on stunting have also had positive effects on ASF consumption, hypothesizing it may be a critical channel for the impact on growth.^{37, 38, 39} Our path-to-scale research agenda seeks to **understand the contextual factors** that determine when and where ASF interventions can be effective at improving child growth and nutritional status.

PSR Research Questions:

- Demand and consumption: How does delivery (e.g., raising garden chickens vs. egg provision/purchase) affect outcomes?
- Cost assessment: How cost-effective are ASFs compared to other feeding and home fortification supplements?
- Development: What are the anthropometric, developmental, and morbidity outcomes outside of the 1,000-day window?
- Feeding practices: What are the contextual factors (cultural preferences and practices)/selection criteria for choosing ASF versus another type of intervention to improve child growth?
- Replication: Does ASF impact on child growth replicate in other contexts?
- Targeting: Which households should be targeted for encouraging ASF to complement infant diets?

Project Development Priorities: Conduct a multi-arm RCT to compare two different types of ASF with non-ASF nutrient supplements in a context where ASFs are accessible but not commonly fed to children between the ages of six and 24 months.

Pursuing Child Growth and Development Path-to-Scale Research

The PSR team has created research agendas around the prioritized EBAs, working closely with stakeholders throughout the process, and is seeking new implementation and research partnerships for LNS, cash transfers combined with BCC and animal-source foods.

The next step in the PSR approach is to create research projects to pursue the research agendas. This includes building research and implementation partnerships, designing rigorous evaluations to answer PSR agenda questions, and securing funding to conduct research projects.

IPA has country programs in Bangladesh, Liberia, Malawi, Mali, Nigeria, Philippines, Rwanda, Sierra Leone, Tanzania, and Zambia, all of which have very high burdens of stunting.⁴⁰ As such, these countries will be priorities for the PSR agendas. While these are the countries with the highest national burden of stunting, other countries with high sub-national burdens would also be informative research sites to analyze these interventions.

Pursuing PSR Agendas Case Study: Home-based Growth Charts (Box 1)

IPA research in Zambia found that providing caregivers a home-based growth chart for assessing children's growth trajectories had a significant impact (22 percentage point reduction) on stunting among children malnourished at baseline.⁴¹ A qualitative follow-up study found that most caregivers showed considerable knowledge on health, nutrition, and child growth and were able to demonstrate how to use the growth charts for their children. Yet some participants felt they did not have the power to change the stature of their children as it is due to genetics and/or God. Significantly, men have a critical role in food purchase decision-making, but few men knew how to use the growth charts.

A larger RCT in Zambia is in planning stages to explore effectiveness at scale. In this study, we want to understand if the results hold at a larger scale across a wider geography in-country and if the intervention could be effectively implemented through existing channels with the potential to scale nationally.

An RCT in Indonesia is underway to test if the growth charts intervention works outside of Zambia in a context with similar rates of stunting, and how the intervention can be effectively adapted to this new context.

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- ¹¹ Joint child malnutrition estimates.
- ¹² A second approach to the evidence reviews, implemented by IPA's SME Program, was to ask for nominations from the program's network for nominations of studies showing the most promise to be developed into scalable solutions to spur growth of small and medium firms in low- and middle-income countries.
- ¹³ The Lancet-identified interventions include complementary feeding promotion in children six to 24 months of age with or without nutrition education, nutrition education alone, micronutrient supplementation in children, supplementation in pregnancy and disease prevention.
- ¹⁴ The Lancet series also reviewed nutrition-sensitive programs in agriculture, social safety nets, early child development, and water, sanitation and hygiene (WASH) but evidence of their impact on nutrition-related outcomes (e.g. stunting) was scarce.
- ¹⁵ The PSR team did not include studies specifically undertaken with undernourished populations, such as children suffering from wasting.
- ¹⁶ Attendee organizations included Boston University, Cornell University, FHI 360, Global Alliance for Improved Nutrition (GAIN), Hospital for Sick Children (SickKids), Johns Hopkins University, Save the Children, USAID Advancing Nutrition, University of California Davis (UC Davis)
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