High-Frequency Nutrition Counseling & Growth Monitoring to Address Childhood Stunting

Evidence from Pakistan[1]

The study was conducted in Gulshan-e-Sikandarabad, a low-income neighborhood in Karachi, Pakistan.

Executive Summary

Stunting remains a major global health challenge, especially in Pakistan. This technical note describes the findings of a study assessing a nutrition-related intervention in a low-income community in Karachi, Pakistan. Under a program of monthly home visits, locally recruited community health workers implemented the intervention of nutrition counseling and growth monitoring over a six-month period. The results of the study are encouraging: child height increased and stunting decreased as a result of the program. The program is cost-effective and relatively simple to implement, and the program components can potentially be integrated into existing community health worker programs in Pakistan.

Context

Globally, 149 million children under five years of age are stunted with two out of five children living in low-income countries being stunted.[2] Pakistan's stunting rate of 38% is higher than the South Asian regional average of 32%.[3] Despite declining poverty over the last decade, stunting levels have stagnated in Pakistan. Stunting is included as a key indicator for the Human Capital Index[4] and it is closely linked to the Sustainable Development Goals

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(SDGs) 2.2.[5] Stunting has received significant global attention because of its long-term effects on children, as it impedes the physical growth of children; it is correlated with a high incidence of disease and infections and has a negative effect on their cognitive development and performance at school and subsequently at work.[6] Stunting also reduces the lifetime earnings of an individual and hampers growth of GDP.[7] However, the evidence-base for effective interventions to tackle childhood growth faltering is limited, especially in low resource settings. This study "High-Frequency Nutrition Counseling & Growth Monitoring to Address Childhood Stunting" was conducted in Gulshan-e-Sikandarabad, a low-income neighborhood in Karachi to evaluate the effects of in-home child growth monitoring supplemented with counselling for nutrition best practices on infant and young child feeding (IYCF).

Intervention and Implementation

SUMMARY: Locally recruited female community health workers (CHWs), who were trained to provide nutrition counselling and in-home growth monitoring, visited target households and interacted with the caregiver once a month for a period of six months. The intervention, described below, was composed of four different components. Combinations of these components were allocated to the three treatment arms of the study. These are described ahead in detail, but in brief: treatment-1 was provided counseling and monitoring; treatment-2 was provided counseling, monitoring and a growth monitoring chart called the Growth Monitoring Tool (GroMoTo); and treatment-3 was provided counseling, monitoring, GroMoTo and a cash transfer. Later in the study, a group of households that did not receive program services was added and statistically matched to the households in the treatment arms; this enabled comparison with a pure control group.

Design of the intervention

The four components of the intervention are described below:

COUNSELING: CHWs conducted monthly home visits to provide information to the caregivers about best practices on infant and young child feeding (IYCF) practices along with other childcare inputs such as optimal WASH practices. This manual builds on existing guidelines previously developed by the Government of Sindh. The manual that was designed for this study was concise with a focus on child health and nutrition keeping in mind the local community. The manual includes modules on exclusive breastfeeding for the first six-months after birth, complementary feeding for children in the age groups of 6 to 8 months, 9 to 11 months, and 12 to 24 months, a module on overall hygiene for the mother and child, and an additional module on severe acute malnutrition. The counseling delivered during each visit was

specific and concrete. For instance, a sample 24-hour meal-plan for a child aged between six and eight months was structured to include: breakfast — egg; morning snack — mashed banana/mango; lunch — softened roti with ghee; dinner — softened roti with yogurt/mashed potato.

MONITORING: Data on child anthropometrics was recorded by CHWs at each monthly visit. With active assistance from the caregiver, CHWs measured the child's weight and height. Prior to each visit, a training session was conducted by the field management team on the protocols that were to be followed for each measurement exercise. A set of standard operating procedures were shared with each team to ensure high quality of implementation that included procedures for daily calibration of equipment, cleaning of equipment before taking measurements, placing the child on the equipment and recording the measurements. Each team was assessed using technical error of measurement (TEM), and those who fell short of achieving the desired score were retrained.

During each monthly visit, each team of CHWs carried an infantometer, a stadiometer, a digital weighing scale, two calibration rods (small and large), a three-kilogram calibration weight, spirit level, dignity sheets, hand sanitizers, disinfecting wipes, and a set of batteries.[8] Teams were instructed to calibrate the equipment every day and send the calibration data to the research team through a separate electronic data-entry form. One CHW measured the child with the caregiver's help and the other CHW recorded the measurements in the electronic data entry form.

GROMOTO: CHWs recorded height measurement on a growth monitoring chart called the Growth Monitoring Tool (GroMoTo) that was installed at the first visit, and helped caregivers understand where their child was compared to healthy growth norms. The chart and record-keeping are like growth-charts found in clinics, except it was placed in the caregiver's home. The aim was to make it visual and intuitive. To this end, the chart area had two colored zones: red and green. The red-zone of the chart marked height-for-age considered stunted (height-for-age and stunting are described in detail ahead). The green-zone of the chart had height-for-age scores above the stunting threshold. CHWs recorded child's height on the chart and placed a sticker on top of the image of a stunted child (if the child was measured to be stunted i.e., marker was in the red zone) or healthy child (if the child was measured to be healthy i.e., marker was in the green zone) according to the height measurements taken.

LABELED CASH TRANSFER: At each monthly visit, the CHW gave a fixed amount of cash of Rs. 400 or $11.91 (PPP) to the caregiver, with a suggestion on using it to buy nutritious food for their child (hence, labeled cash transfer since the suggestion is not

enforceable in this context). The amount is approximately 5% of monthly consumption expenditure for a household of seven living on less than $2 a day which can at least buy 1-month's supply of eggs along with half a month's supply of milk for one under-five child.

Steps taken to prepare for six monthly home visits

1 A manual for CHW-based nutrition counseling was developed by the research team in consultation with nutrition experts. The contents of the manual have been described above (see "Counseling" in the section titled "Design of the interventon").

2 Next, the manual was incorporated into an intervention instrument software (developed on Kobo) that was loaded onto electronic tablets. These tablets were distributed to 12 CHWs and their supervisor who used them to implement home visits. The software displayed modules from the nutrition counseling manual according to the child's age and anthropometric data that was entered on any particular monthly scheduled visit. For example, if at the fourth visit the child was 12-months old then the complementary feeding module for 12 to 24 months was displayed, or, if the anthropometric measurements indicated a severely low weight-for-age (auto-calculated in the survey) then the additional module on severe acute malnutrition was displayed.

3 Equipment to measure child weight and height was procured, along with bags to carry it. The equipment included infantometers (infant length), stadiometers (child height), digital weighing scales, calibration rods (small and large), three-kilogram calibration weights, spirit levels, dignity sheets, hand sanitizers, wet wipes, and a set of batteries.

A picture from the nutrition counselling manual advising the caregiver to give different types of food throughout the day.

Community health workers were trained to accurately measure child height and weight using high quality equipment. The interventional materials and procedures were tested extensively before they were fielded.

NOTE: The picture depicts a scene from the training and is not meant as a guide for how to correctly measure infant length.

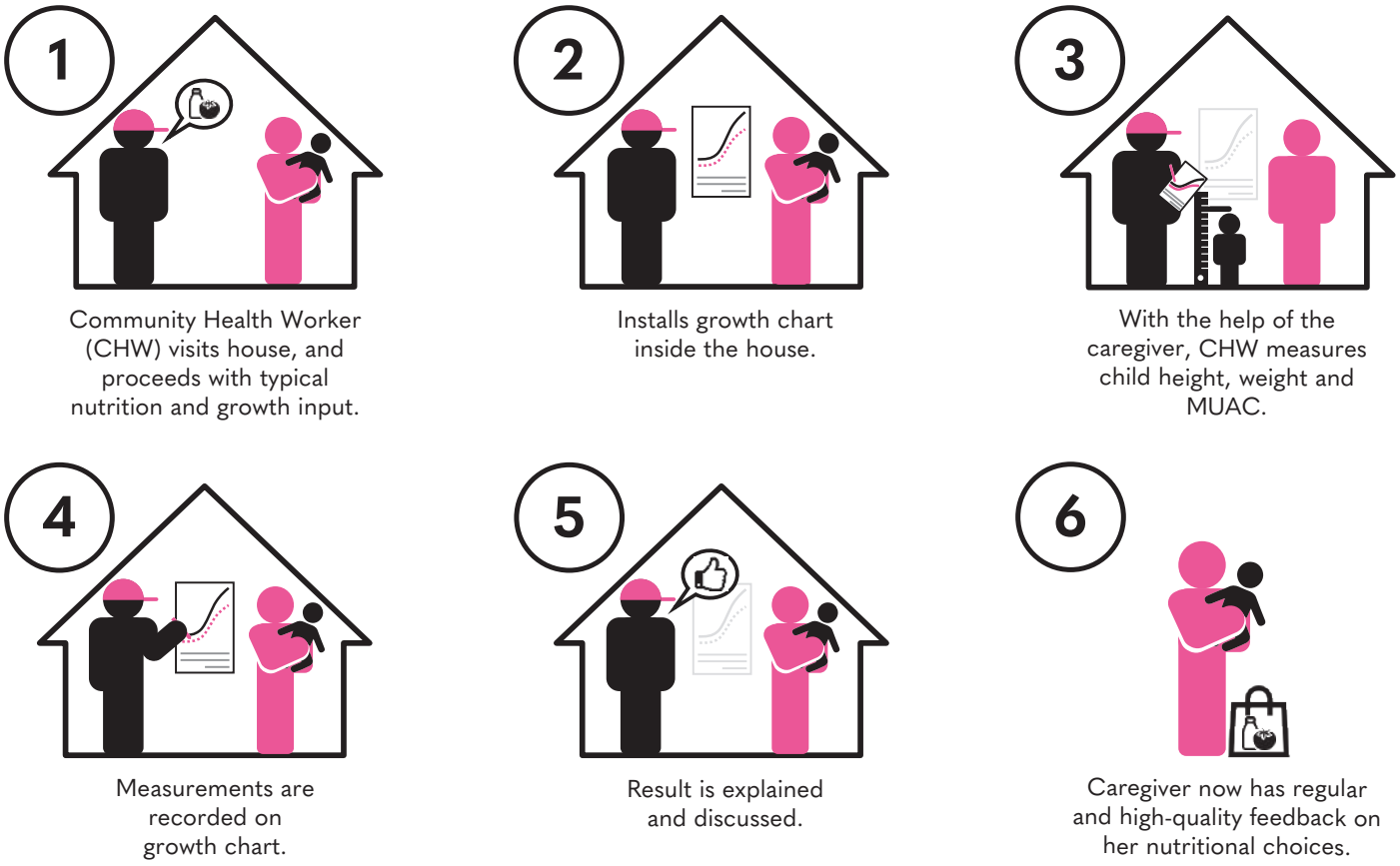
4 Finally, women from the local community with a high-school degree were recruited and trained by the research team as CHWs. This group of women was trained over a four-day period to execute two main activities:

- Firstly, they were trained to deliver nutrition counseling to caregivers of young children. CHWs were familiarized with the components of the nutrition counseling manual and were given sample spoons and cups for measurement with which they could demonstrate quantities to caregivers during household visits. CHWs were trained to use the tablet and software to deliver nutrition counseling and advice.
- Secondly, the CHWs were extensively trained to accurately and reliably measure child weight and height using standard procedures and equipment. CHWs were also trained to correctly use the electronic tablet to record the measurements they made. Since all data collection was digital, the research team was able to closely monitor the quality of all measurements on a daily basis. Each CHW was assessed using technical error of measurement, and those who fell short of achieving the desired score were retrained.

Steps taken to execute six monthly home visits

5 A complete workplan was developed. CHWs were put in pairs to improve safety. Information about eligible households from the local community was available from a baseline survey conducted by the Center for Economic Research in Pakistan (CERP). This information was used to generate a workplan for all CHWs pairs. Each CHW pair was given a daily target set of households and a field manager ensured adherence to the plan.

6 Before setting out for their daily target households, the CHW teams cleaned and calibrated their equipment. Teams were instructed to calibrate the equipment daily and send the calibration data to the research team through a separate electronic data-entry form. Furthermore, CHW teams discussed their plans



Growth monitoring home visit process.

with the field manager before they set out. Teams approached all households on their daily list and any household visit that was unsuccessful was rescheduled.

7 During the household visit, CHWs performed the following steps:

- Introduced themselves to the caregiver and ensured that there was sufficient time to demonstrate the procedures (20-minutes).
- CHWs then discussed nutritional information with the caregiver, using their electronic tablet to show images and ensure a comprehensive discussion.
- Next, CHWs measured child height and weight using the measurement equipment they carried. CHWs involved the caregiver in this process. While one CHW and the caregiver made measurements, the other CHW recorded the measurements.
- Finally, the results of the measurements were conveyed to the caregiver and any questions or concerns of the caregiver were addressed by the CHWs.
- In addition:
  - If the household was allocated to have the growth monitoring chart installed, the CHW marked the

measured height of the child on the chart and discussed it with the caregiver.

- If the household was allocated to receive cash, the CHW handed over cash and created a record of this.

8 All work was checked. The goal was to deliver and implement the counselling material as intended. In order to do this, there were regular back checks, feedback was taken from mothers, and frequent retraining of procedures to ensure that implementations was done in the desired manner by field management staff.

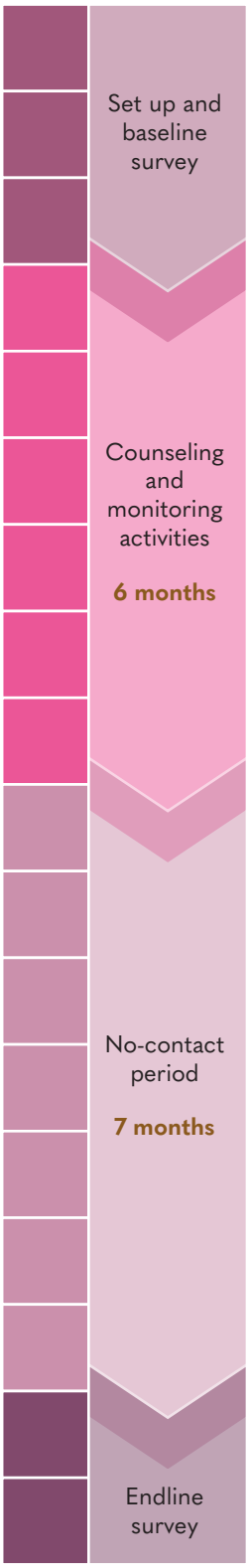
9 Upon completing their daily targets, CHWs would reconvene at the field office and debrief with the field manager. The data was reviewed and any inconsistent or incorrect data was marked so that CHWs could revisit households to make corrections.

Methodology

The study used a combination of methods to assess the impact of the intervention described above — a randomized controlled trial along with matching.

This intervention was trialed in the neighborhood of Gulshan-e-Sikandarabad, a low-income informal settlement in Karachi. Households with at least one child between the age of three and 21 months at the time of the baseline survey were recruited to receive treatment. In the case that there was more than one child in this age range, the youngest one was deemed eligible. A total of 1,188 households were recruited and were randomly allocated to one of three arms:

1. ***TREATMENT-1 (T1) — COUNSELING + MONITORING (396 HOUSEHOLDS)*** in which CHWs conduct monthly home visits to provide information to caregivers on infant and young child feeding (IYCF) practices and engaged the caregiver in measuring the child's height and weight.
2. ***TREATMENT-2 (T2) — COUNSELING + MONITORING + GROMOTO (396 HOUSEHOLDS)*** in which along with activities in T1, the CHW plotted growth on the installed growth chart.



Simplified project timeline.

3. ***TREATMENT-3 (T3) — COUNSELING + MONITORING + GROMOTO + CASH TRANSFER (396 HOUSEHOLDS)*** in which along with activities in T2, at each monthly visit, the CHW gave Rs. 400 to the caregiver, with the suggestion to use it to buy nutritious food for their child.

CHWs conducted monthly home visits for a period of six months from August 2019 to February 2020. An endline survey was conducted six months later, in October 2020 i.e., a year after the start of intervention activities, and after a no-contact period of 6 months. The delay in conducting the endline survey was deliberate and allowed the research team to understand the persistence of gains in child health. The endline survey collected information on key child health indicators such as height and weight, along with child feeding practices.

At the time of the endline survey, an additional 451 households were interviewed to enable a comparison with a pure control that had not received any interventions. This sample was selected by retrospectively applying the same criteria used to recruit the original baseline sample i.e., the only criterion used at the time of recruiting the original sample was child's age. When these additional households were approached, the age of their children was calculated as it would have been at the time of the baseline and if they met the criterion (child between the age of three and 21 months at the time of the originally conducted baseline survey) they were included (this was the same criteria used at baseline i.e., child age was the only criteria).

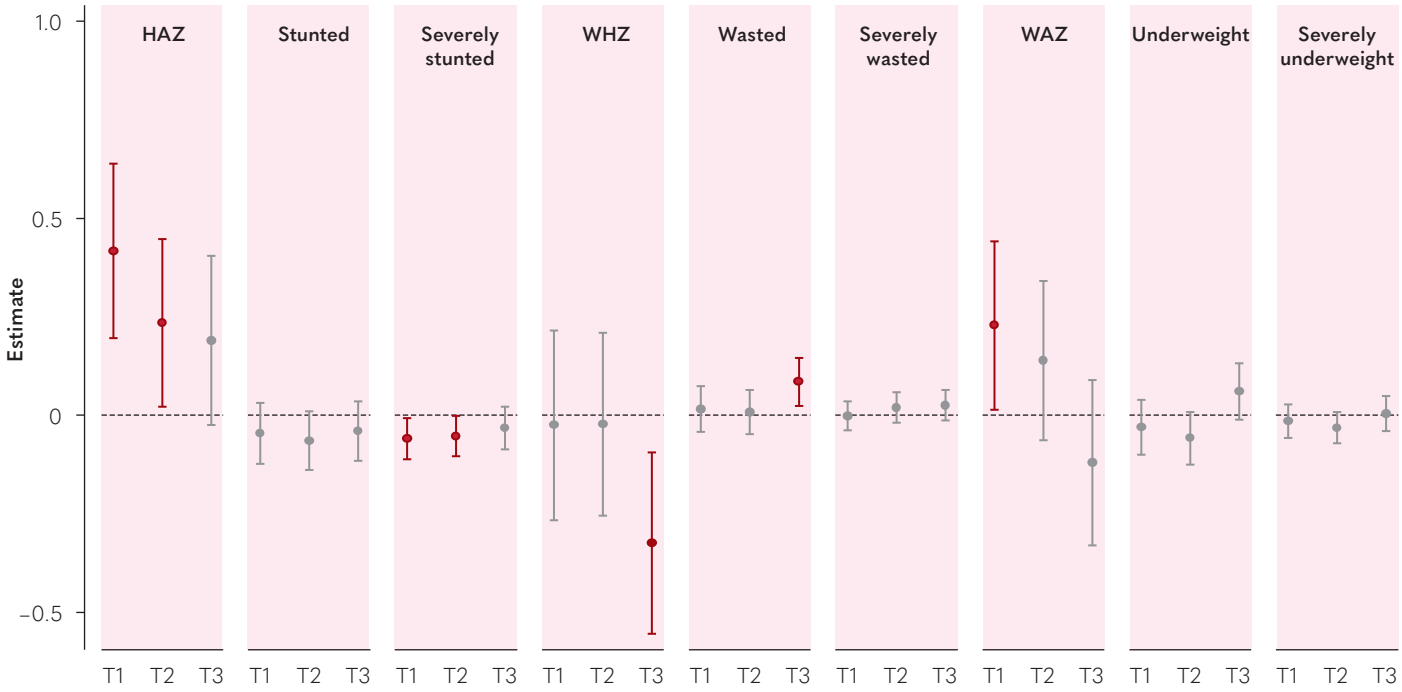
Next, coarsened exact matching (CEM) was used to prune the full sample to a matched subsample i.e., to match households from the original sample recruited at baseline (N=1,118) with the additional sample recruited at endline (N=451).[9] Matching was done using household characteristics that are relatively stable over time or that could be reliably known for the household at the time of baseline: household size, child's age at baseline, father's education, mother's education, neighborhood, and ethnicity.

Using this matching procedure, the final sample available for analysis was 1,045 households (201 in treatment-1, 223 in treatment-2, 218 in treatment-3 and 403 in the matched control).

Results and Findings

Using simple difference estimates from regression analysis suggests that high-frequency nutrition counseling and anthropometric monitoring can be an effective solution to reduce stunting and improve child health outcomes.

- ***HEIGHT-FOR-AGE Z-SCORES*** (**HAZ**). Gains in this measure are recorded in standard deviations (SD). A child



Treatment impacts by arm compared to the matched control. Dots show point estimates from an OLS regression, while bars indicate standard errors. Dots and bars in red indicate statistically significant differences. All comparisons are with the matched control, represented by the horizontal line labelled zero. Thus, for instance, the average child in Treatment-1 saw a 0.41 gain in HAZ.

is stunted if they are more than two standard deviations below the median and severely stunted if they are more than three standard deviations below the median. The HAZ of children in the control arm was compared to the HAZ of children in each of the treatment arms. The results suggest that simply providing regular nutrition counseling and growth monitoring can help reduce stunting. The figure below shows the impact of each treatment arm (compared to the matched control) for a range of child anthropometric outcomes based on height and weight. As shown in the figure below, the three treatments substantially increased HAZ and decreased stunting and severe stunting. In particular, Treatment-1 — the arm with just nutrition counseling and monitoring — has a consistently "better" performance compared with other two treatments, with higher HAZ (0.42 SDs, $p<.01$) and lower severe stunting (6 percentage points, $p<.1$). Treatment-2 — the arm with the growth chart added along with counseling and monitoring — shows slightly lower impact on HAZ (0.23 SDs, $p<.1$) and a similar decrease in the incidence of severe stunting (5 percentage points, $p<.1$). This suggests that the marginal value of adding the growth chart is low. Finally, Treatment-3 — the arm with the added labelled cash transfer —

is statistically indistinguishable from the control. Somehow, adding a cash transfer resulted in no real gains in HAZ for children. To put the result for Treatment-1 in perspective, a range of comparable studies find increases in HAZ that do not exceed 0.25 standard deviations with time horizons ranging from a few months to two-years.[10]

- *WEIGHT-FOR-AGE Z-SCORES* (**WAZ**). Gains in this are recorded in standard deviations. A child is underweight if they are more than two standard deviations below the median and severely underweight if they are more than three standard deviations below the median. The results for WAZ are less precise. While children in Treatment-1 had a WAZ that was 0.23 SDs ($p<.1$) higher than that of the children in the control group, children in the other two treatment arms do no demonstrate higher WAZ. Additionally, the proportion of underweight and severely underweight children did not decrease.

To summarize, the treatment improved height and weight measures for children. Treatment-1 in particular saw the greatest gains for children i.e., simply providing regular nutrition counseling and growth monitoring seems to generate substantial gains in child health and nutrition.

Policy and Program Implications

The "In-home Child Growth Monitoring" study provides evidence for ongoing programs that can help address stunting. Together with regular nutritional counselling this growth monitoring tool empowers women caregivers in a low-income setting to reduce stunting. This suggests that this simple but effective procedure could be better integrated into the government and NGO CHW programs at a relatively low cost together with other Infection Prevention and Control interventions.

Empowerment of Women Caregivers

The procedure developed interacts directly with women through nutrition counselling and active participation in the monitoring of child anthropometric growth. It is therefore likely that the procedures developed impacted the caregivers, and, that modifying some key childcare and nutrition choices resulted in the nutrition gains documented. In South Asia, women caregivers are often dependent on family members such as the mother and mother-in-law for guidance on matters pertaining to maternal and child health and nutrition. Hence, providing them regular feedback on their nutritional choices and guiding them on child growth monitoring provides an additional source of valuable information to help improve choices for their child's growth and development.

Scalability

The intervention protocol can be integrated into existing government and non-government CHW programs. Health workers in these existing programs already visit households to educate women about family planning, maternal and child health. Thus, the procedures used in this study can be integrated into the CHW manuals. Moreover, the study demonstrated that, even in a low-capacity setting, locally hired workers can be trained to execute the program at high quality level of implementation (confirmed through feedback from mothers and supervisor reports). The findings illustrate that integrating regular child growth monitoring and nutrition counseling into the existing programs could lead to improvements in children's health and nutrition.

Cost-effectiveness

This intervention (the program components of counseling, monitoring, GroMoTo and cash transfer delivered to T1, T2 and T3) proved to be very cost-effective as compared to similar interventions undertaken in Pakistan and elsewhere. The total monthly cost per child was $18, while the cost per stunting case averted by the intervention was $360.[11] The monthly costs that were included in the above calculation are salaries of community health workers, salary of quality assurance workers, the salary of field manager and field supervisor, field office rentals, and miscellaneous running expenditures such as printing. Other fixed and one-time costs include training, tablets used and the of anthropometric equipment used. To put these figures in perspective, a similar intervention in Pakistan involving responsive stimulation and nutrition interventions that reported a monthly cost of $21 per child visited,[12] and an experiment for reducing stunting and wasting undertaken in Dadu, Pakistan, the minimum cost per case of stunting averted was estimated at $1,107.[13] Similar nutritional interventions in Latin America[14] and Africa[15] show a cost per case of stunting averted ranging from $202 to $536.

Limitations

While these preliminary findings are encouraging, the study has limitations. The effects of embedding the intervention in existing GoS programs would need further assessment, potentially through pilot projects to determine feasibility, cost effectiveness, further challenges, and opportunities. Similarly, the study was conducted in an urban population in Pakistan's Sindh Province, in a setting of relatively easier access to nutritional products for caregivers. The effects on rural populations, and a comparison with other existing interventions, would need further assessment in a broader study.

Endnotes

1 Research Team contracted by World Bank and funded by the Strategic Impact Evaluation Fund (SIEF): Agha Ali Akram, Lahore University of Management Sciences, Pakistan; Abu S Shonchoy, Florida International University, USA; Akib Khan, Uppsala University, Sweden; Hina Khalid, Information Technology University, Pakistan; Takashi Kurosaki, Hitotsubashi University, Japan; Sidra Mazhar, Center for Economic Research in Pakistan, Pakistan; Mahrukh Khan, Center for Economic Research in Pakistan, Pakistan.

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