CHILD LENGTH MAT
A Community Tool to Prevent Stunting

Stunting: A Maker and Marker of Poverty

Adequate linear growth in the first two years is a sign of overall child well-being and development. Low length- or height-for-age, or stunting, indicates a failure to achieve one's own genetic potential for healthy growth. Stunting is caused by persistent, cumulative inadequate dietary intake and poor utilization of nutrients due to infections and illnesses. Stunting has immediate and life-long consequences. In addition to the physical manifestations, stunting indicates delayed neurological development leading to permanent cognitive impairment; a weakened immune system, and susceptibility to chronic diseases such as obesity and heart disease in adulthood[i]; and higher risk of lower birthweight and mortality of infants born to women who have been stunted as children.[ii]

Globally, one in four children under the age of 5 is stunted. The majority (70%) of the world's 165 million stunted children lives in low and middle-income countries. Stunting costs countries up to 11% of their gross domestic product (GDP) due to lower wages and lost productivity.[iii]

Why a "Child Length Mat"?

Stunting reduction is a centerpiece of global multi-sectoral nutrition and development agendas. Specifically, the country-led Scaling-Up Nutrition (SUN) Movement, the First 1,000 Days Partnership and USAID's Multi-Sectoral Nutrition Strategy, 2014-2025, aims to prevent at least 20 million children from becoming stunted.

Effective interventions to prevent stunting are needed during the first 1,000 days from the start of a woman's pregnancy until the child's second birthday. However, to the people who need to take action: families and community leaders, stunting is often invisible because so many children are stunted or it is simply normalized as a genetic issue. Even health workers do not give chronic malnutrition measured by linear growth the same attention as acute malnutrition as few routinely measure height, especially in community programs.[iv]

There are few tools for community programs. The Child Length Mat fills this gap as an easy-to-use community tool. With the visual cue of the Child Length Mat, families and community workers can see and understand to what extent a child is on target for normal height /length-for-age and then address behaviors and structures in time to promote optimal child growth.

Photo Credit: Jeunsafy Sen

THE MANOFF GROUP

Early Prototype

In **Bolivia**, in response the government's focus in 2006 on linear child growth, professionals from The Manoff Group (TMG), developed a portable length mat for community programs of the Bolivian NGO network, PROCOSI , and those supported under a Government/World Bank project. Both boys' and girls' measurements appeared side- by-side on the durable plastic mat. Markings on each side denoted the cut-off lengths for children 6, 12 and 18 months of age to indicate if a child was stunted, defined as <-2SD of the current WHO standard.[v] The six-month interval between cut-offs allowed enough time for child's length to be affected by his or her diet and environment. The pre-identified cut-off demarcation omitted the need for the worker to look up each child's measurements on a growth table.

Validation Process

Projects in Cambodia and Guatemala **recently adapted the early prototype to local needs and** assessed the mats' relative performance compared to the standard height board, the "gold" standard.

In **Cambodia** in 2016, the USAID-funded NOURISH Project adapted and tested local prototypes. The tests compared the measurements of 84 children (equally split between girls and boys by age category) with a standard height board and the Child Length Mat in 23 villages in two provinces. In each site, the test was set up with three stations. First, the caregiver gave consent and the date of birth to the supervisor. Next, an anthropometrist conducted the height board measurement. The caregiver returned the results to the supervisor, and then proceeded to the length mat. A trained provider used the length mat. The first measure was kept separate to avoid influencing the second measure. The persons measuring each child indicated the result as well as their own level of confidence in the result (high, medium, low).

Cambodia Child Length Mat Prototype Validation Round 1

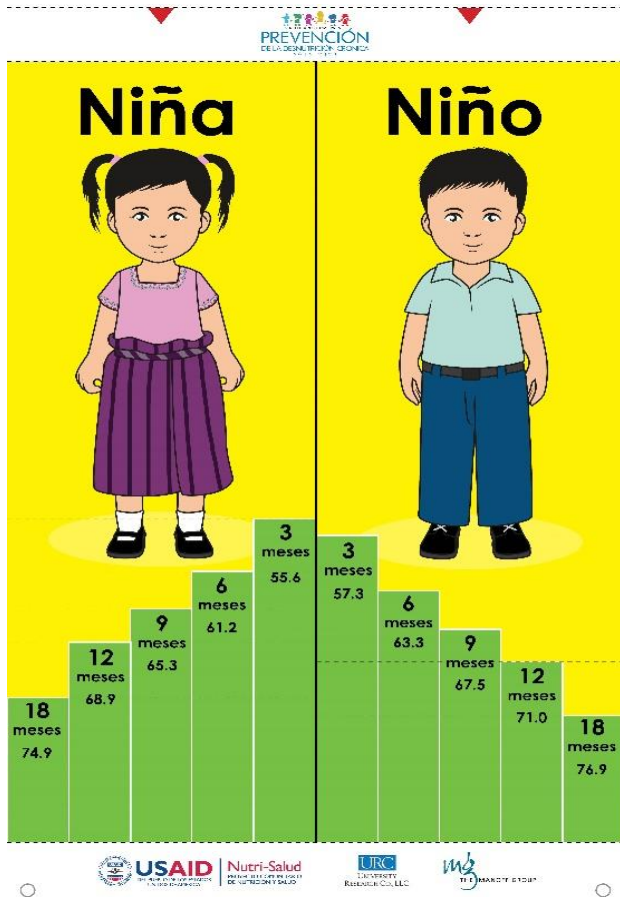| SENSITIVITY .57	SPECIFICITY .94
If the child is stunted, how often the length mat will show that the child is stunted	*If the child is not stunted, how often will length mat will show that the child is not stunted*
Positive Predictive Value (PV+) .67	**Negative Predictive Value (PV-) .92**
If the length mat shows the child is stunted, the probability that the child is actually stunted	*If the length mat shows the child is not stunted, the probability that the child is not stunted*

Results of the first round with the cut-off lines at -2SD (2006 WHO standards) found moderate sensitivity and high specificity (ideal value is 1), meaning that not all children who are stunted would be identified but that few children who are not stunted would be (falsely) identified as stunted.

To increase the sensitivity, TMG prepared a second prototype with bars calibrated to -1.8SD (2006 WHO Standards) to account for the slight overestimation of the heel measurement.

Cambodia Child Length Mat Prototype Validation Round 2

SENSITIVITY 1	SPECIFICITY 1
If the child is stunted, how often the length mat will show that the child is stunted	*If the child is not stunted, how often will length mat will show that the child is not stunted*
Positive Predictive Value (PV+) 1	**Negative Predictive Value (PV-) 1**
If the length mat shows the child is stunted, the probability that the child is actually stunted	*If the length mat shows the child is not stunted, the probability that the child is not stunted*

Figure 1 Guatemala Child Length Mat

Results of the second round showed that sensitivity and specificity were very high, meaning that children who are stunted would be caught by the length mat and few children who are not stunted would be (falsely) identified as stunted. The users of the Child Length Mat found it to be easy to use and were significantly more confident in the result than those using the height board.

In **Guatemala**, the USAID-supported Nutri-Salud Project adapted and tested a prototype. The prototype in Guatemala used bars equivalent to -2SD length-for-age at three-month intervals: 3, 6, 9, 12, 15 and 18 months. The length mat bars begin at three months of age due to the high prevalence of stunting from birth among children in Guatemala.

Results showed high sensitivity (.94), meaning that nearly all children who are stunted would be caught by the length mat. Moderately high specificity (.78) means that few children who are not stunted would be (falsely) identified as such. For the design of the final mat, even though three-month-old children were more likely tobe falsely identified as stunted compared to other age groups, this bar was maintained, in addition to bars at 6, 9, 12 and 18 months to maintain a focus on the younger ages. As health facilities tend to measure heights of children at two years, 24 months was not included on the Guatemala mat.

Application

In Cambodia, 70 communities in Pursat Province are piloting the Child Length Mat as part of on-going, community growth promotion sessions. Trained community health workers, called Village Health Support Groups (VHSG), weigh every child under two years old every month and assess a child's length at 6, 12, 18 and 24 months. A process review in July 2017 consulted with 150 mothers and grandmothers of children under two years, 10 VHSG volunteers and 10 health workers. Health workers, VHSG and caregivers of children in these communities could understand and explain the length mat, and the importance of tracking their children's linear growth.

"The length mat is square with a yellow background and green stair for measuring the height of the child. Each green stair measures a different age of 6, 12, 18 and 24 months. There are two sides – one for a girl and one for a boy. When the heels reach the green stair, the height is normal. When the heels do not reach the green stair, the child is stunted." Mother, Pursat Province

"My child's growth is getting better. The length mat helped us to follow up her length."
Mother, Pursat Province

VHSG volunteers say that the length mat is an easy-to-use visual tool that prompts attention to height or length growth, in addition to on-going support on weight gain each month.

The Child Length Mat is portable and easy to use and carry as it is a plastic, compact tool that can be folded up just like a flipchart." VHSG, Pursat Province

"We used to tell caregivers whether a child's weight is good or bad but did not inform them about stunting. With the length mat, we can tell them when the child's length growth has not reached a good point and share more about complementary foods and small fish powder." VHSG, Pursat Province

Photo Credit: Jeunsafy Sen

Adaptation for Different Country Contexts

TMG adapts the Child Length Mat to fit local contexts. In addition to determining and validating age segments based on the stunting profile, we also offer best practice in tailoring design elements such as colors modified to reflect preferred colors the country context. For example, in Cambodia, bright green represents life and growth as the color of young rice growing in the fields. We can adapt other design elements as well using participatory design approaches to ensure understanding, identification and appeal for community members and families.

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[i] Victoria CG, et al. Maternal and child undernutrition: consequences for adult health and human capital. *Lancet* 2008 Jan 26; 271(9609):340-57.
[ii] Association with maternal stature with offspring mortality, underweight and stunting in low- to middle-income countries. JAMA 2010 Apr 21; 303(15):1507-16.
[iii] Horton and Steckel. Global Economic losses attributable to malnutrition 1900-2000 and projections to 2050. In: The Economics of Human Challenges (ed. B. Lomborg). Cambridge University Press: Cambridge, U.K.
[iv] Kathryn Dewey and Khadija Begum. Why stunting matters: Alive and Thrive Technical Brief. Issue 2, Sept 2010.
[v] Lucy Bassett and Julie Ruel-Bergeron. Promoting Healthy Child Growth and Development: Advances and Opportunities for Community-based Nutrition Programs in Central America. The World Bank, 2012.