

The Global Scales for Early Development (GSED) project

October 2021

GSED team



Why is ECD measurement important

ECD monitoring at population level

- GAP to be filled: indicators for measuring child development up to 24 months of age at population level

ECD measurement for programmatic evaluations

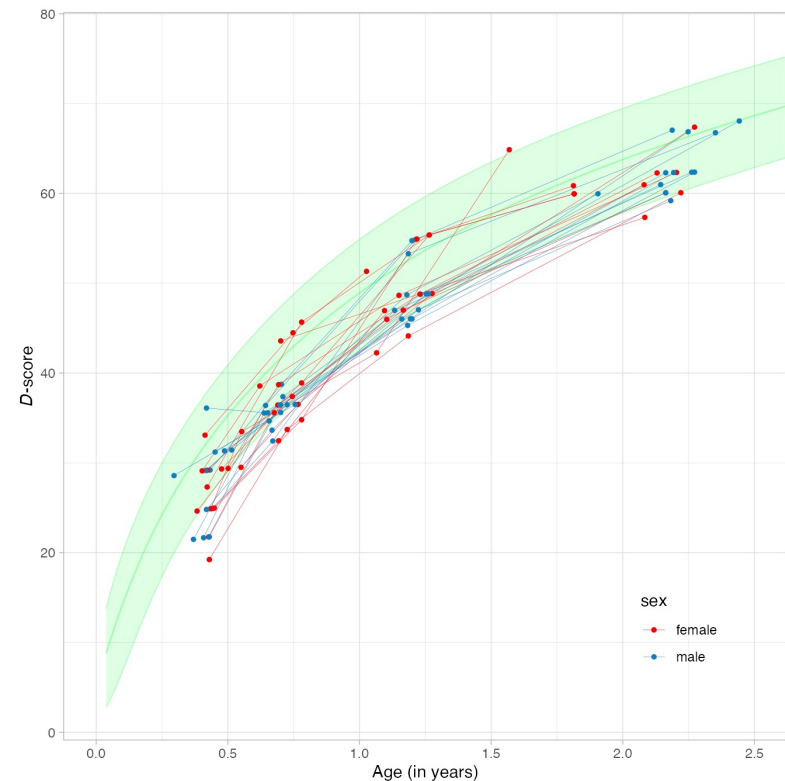
- Limited availability of appropriate measures for birth to 3 years
 - **GAP to be filled: indicators that reliable and valid globally, easy to administer and interpretable, free and open-access**

No data/No problem/No action (Alfredo Solari)

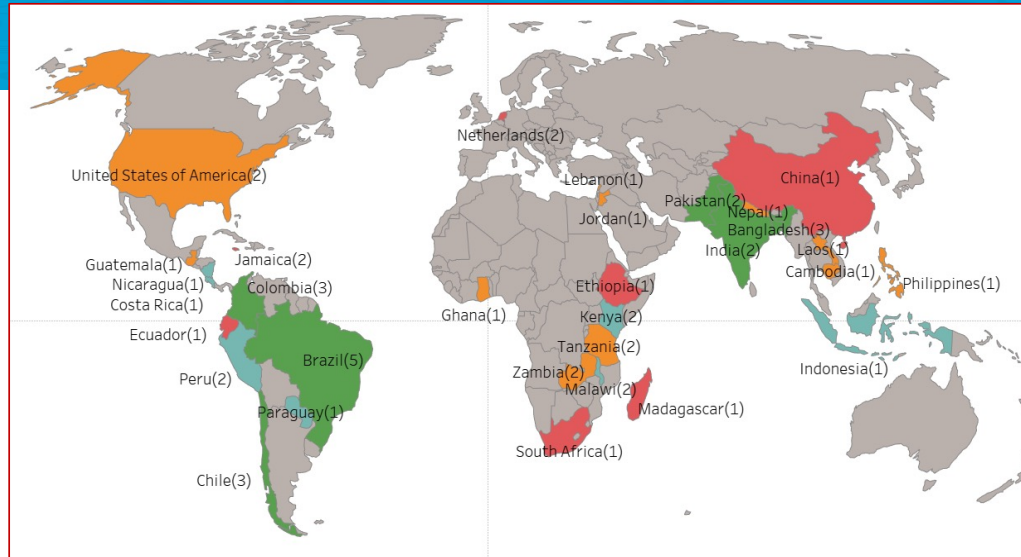


The Development score (D-score)

- The **D-score** is an interval scale with a common numerical unit for all ages, the D-score.
- The **DAZ** is the age-standardized D-Score, which allows to compare developmental levels by age, as does height-for-age for height.
- It will be possible to construct cut-off points to identify children reaching their development potential vs. children with developmental delay—this is, on-/off-track children, or in other words, the **equivalent of chronic malnutrition**.



The GSED development process



- **Unique children:** 73,222 – ages 0 to <48 month
- **Visits** (unique child/age combinations): 109,079
- **Items:** 2,275
- **Scores:** 4,740,866
- **Countries:** 31 (cohorts 51)

1 Data harmonization with several countries and instruments: experts review

- Item mapping
- Categorization in developmental areas
- Reliability analysis

2 Statistical methodology harmonization:

- 2PL vs IPL (Rasch model)
- Multidimensional vs unidimensional scores
- Run model

3 Develop GSED measures

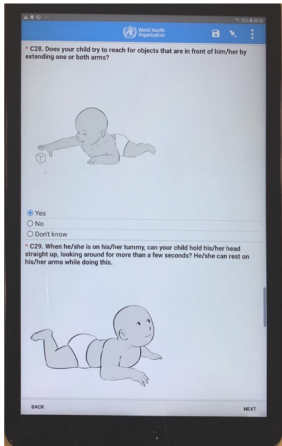
- Item selection and adaptation

4 Develop implementation package

HARMONIZATION

PROTOTYPES

The Global Scales for Early Development (GSED): A single package for measurement



GSED Short Form

Population-Level Monitoring, Caregiver reported

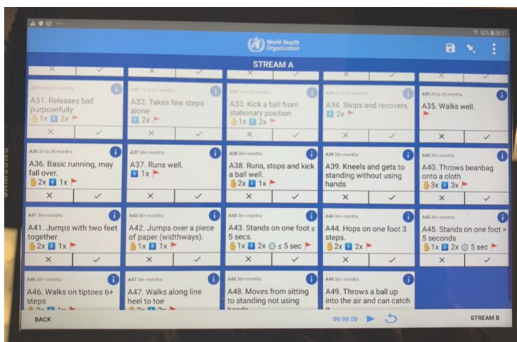
One unidimensional score

Complementary Materials: media package
(audio, visual and short videoclips)

GSED Psychosocial Form

Caregiver reported

Being further developed/
tested



GSED Long Form

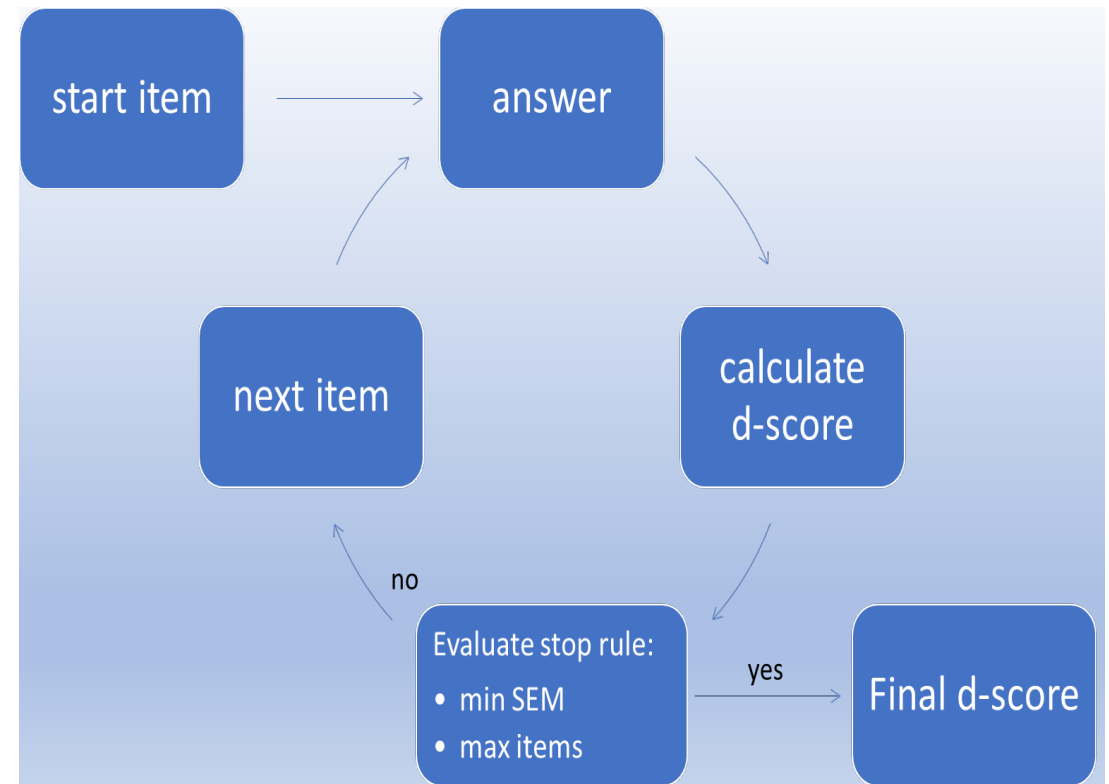
Program Evaluation, Direct assessment

One unidimensional score (by developmental domain being explored)

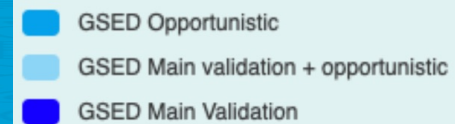
Complementary Materials: locally made toolkit and interactive media
package (audio, visual and short videoclips)

Using innovation and technology: *The adaptive testing approach*

- GSED is validating an adaptive testing approach (3 countries) to reduce the number of items asked to each respondent:
- Adaptive testing relies on a probability model for 'passing' one item based on the difficulty (determined by existing data available) of the item and the age of the child
- Depending on each 'pass' or 'fail' (the ability of the child) the model presents the subsequent item.

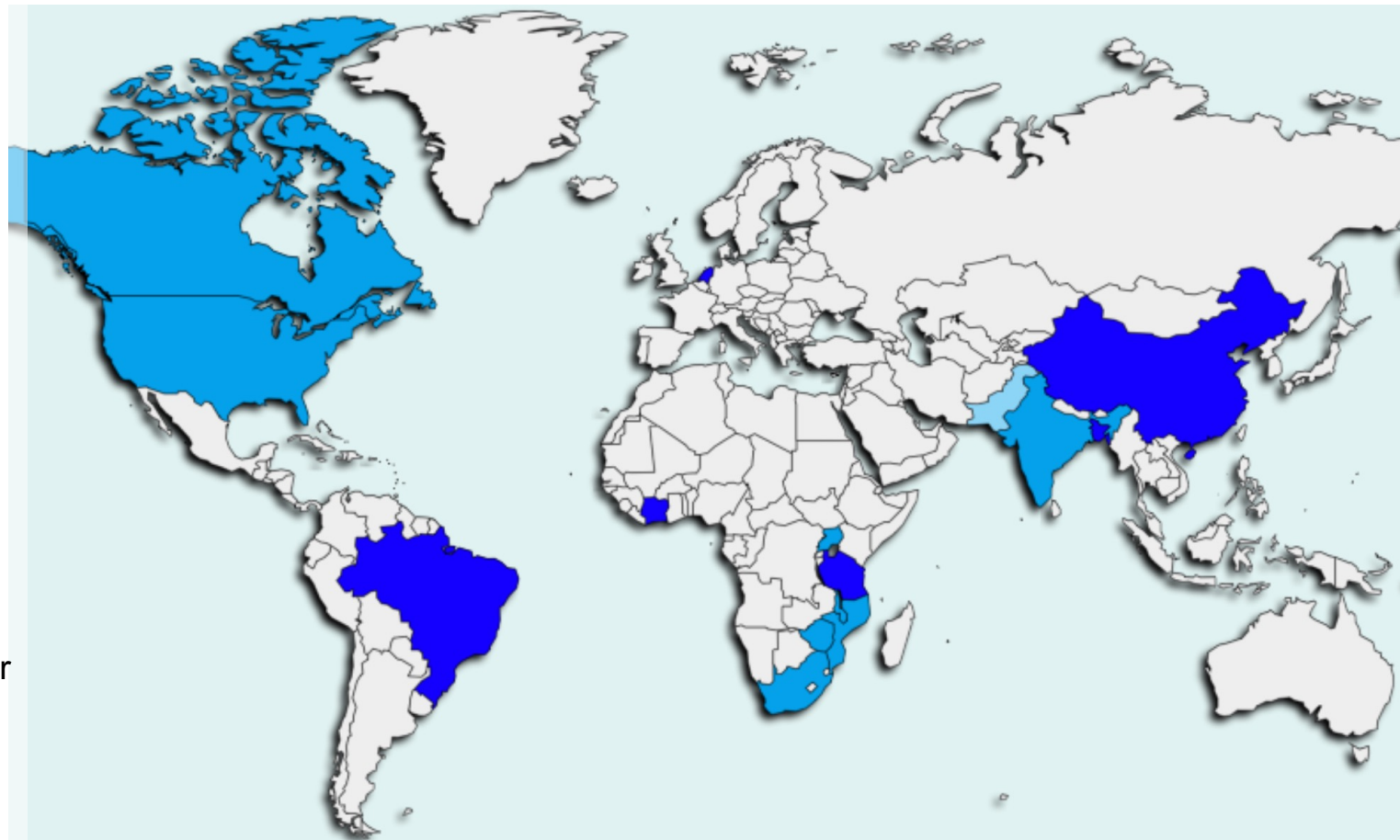


The GSED project sites



MAIN VALIDATION

- **Brazil:** Butantã-Jaguará (São Paulo) [University of São Paulo Medical School]
- **Bangladesh:** Projahnmo [Projahnmo Study Group; Johns Hopkins University]
- **Côte d'Ivoire:** Yopougon (Abidjan), [Innovations for Poverty Action]
- **The Netherlands:** Leiden [Netherlands Organization for Applied Scientific Research]
- **Pakistan:** Karachi [Aga Khan University]
- **Republic of China:** Shanghai, Hainan, Hebei and Yunnan [National Children's Medical Center / Shanghai Children's Medical Center]
- **Zanzibar-Tanzania:** Pemba, [Center for Public Health Kinetics]



Main validation objectives

- Out-of-Sample Fit
 - Content validity
 - Criterion validity
- Construct/Concurrent validity
 - Predictive validity
 - Reliability
 - Fairness

(Additional) Opportunistic testing objectives

- For **generalizability, differential item functioning & cultural comparability of the items** in a diverse range of samples than those included in current validation efforts (including different geographic regions, country income levels and cultural contexts)
- In census-level **household surveys** (GSED SF)
- For **programmatic evaluation** to test sensitivity to several types of interventions

Methods: Feasibility phase (pilot)

Objectives

- Developing and refining the procedures for data collection at each study site
 - Testing the feasibility and acceptability of the proposed data collection methods at each country site
 - Testing the adaptations and translations of study measures
 - Collecting data from a small sample of children at each study site to trial the methods and sampling scheme
 - Conducting preliminary descriptive analyses to determine any obvious problems with the measures such as levels of missingness, range of category responses in contextual variables, etc.
-

Methods

Sample (~1-42 months of age)

Sample size per study site = 32 children

Finalization of forms

Translation and adaptation

Finalization of GSED App

Definition of data management systems

Training

Quantitative and qualitative data collection

Data analyses

Completed: Bangladesh, Pakistan, Tanzania
In progress: Brazil, China, Cote D'Ivoire, The Netherlands

Methods: Main Validation Phase

Methods

Sample (~1-42 months of age)

- Sample size per study site = 1248 children,
 - Sample Size for reliability = 140
 - Sample size for concurrent validity = 150
 - Sample size for benchmark development = 522
 - Sample size for short-term (6 months) predictive validity = 502

Ongoing: Bangladesh, Pakistan, Tanzania
Planned: Brazil, China, Cote D'Ivoire, The Netherlands

Adaptive testing

Bangladesh, Pakistan, Tanzania

Reduces administration time by enabling assessors to administer a subset of items dependent on individual children's performance on each item

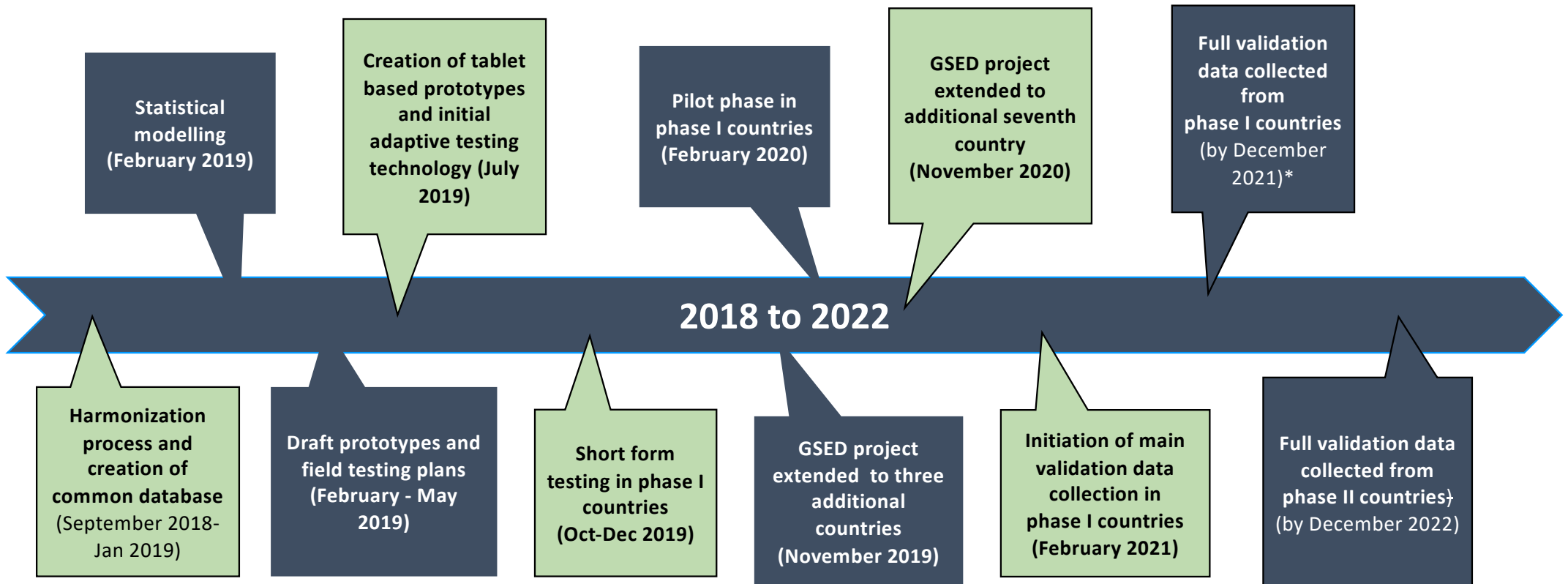
Relies on a probability model for 'passing' one item based on the difficulty (determined by existing data available) of the item and the age of the child

Depending on each 'pass' or 'fail' (the ability of the child) the model presents the subsequent item.

Objective: evaluate the feasibility and validity of developing an adaptive testing algorithm using the item bank generated through the project

Sample size: 504

Overall GSED Project timeline



*Short-term predictive validity data collected by March 2022

GSED project next steps

- Completion of validation data collection (including predictive validity and adaptive testing approach)
- **Availability of GSED package:**
 - Early 2022: Launch of GSED package version 1
 - December 2022: Launch of final GSED package
- **Future work:**
 - Creation of global norms and standards
 - Uptake and scale up of GSED use
 - Determination of predictive validity of GSED
 - Adaptation of GSED for individual-level
 - Correlation of D-score with neuroimaging findings
 - Extension of D-score methodology beyond 3 years including harmonization of GSED and ECDI2030 (UNICEF) and collaboration with World Bank
 - Further development and validation of GSED PF



Acknowledgements (alphabetical order)

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GSED opportunistic sites

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