

Childhood Disability Screening Tools: The South East Asian Perspective

A Review for the WHO Office of the
South East Asian Region

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Background

The survival of children in most Low and Middle income countries has improved, and the focus is now shifting to optimizing the development of children¹. There are an estimated 200 million children in the world who have a disability, and the bulk of these children live in low and middle income countries². Living in these countries places children at risk for disability due to poverty related health factors, such as anemia and malnutrition. It also leaves them with the additional burden of the stigma associated with disability¹. The countries included in the South East Asian Region all belong to the LAMI group as defined by the World Bank³. In the rest of this report, whenever the term LAMI countries are used, it's relevance to the SEAR needs to be kept in mind.

Over the last few years there has been a shift from looking at childhood disability as a medical diagnosis to a more bio psycho social model. We now recognize the impact of risk factors, such as those associated with poverty, on child development. Children at risk for disability and children with disability are being recognized as part of a continuum in LAMI countries². This approach also recognizes the need to target the milieu in which these children live for prevention and intervention efforts.

The importance of promoting early childhood development in LAMI countries is undisputed. However, given the paucity of resources, we need to target the most vulnerable group of children for early identification and intervention. The most vulnerable group of children in these settings is those with, or at high risk for, a disability⁴.

There is also sufficient data to suggest that the use of formal tools is far more likely to identify children with disability rather than informal assessment by care providers⁵. This is particularly true for LAMI countries due to poor awareness about disability amongst care providers⁶. This makes the use of tools for identifying childhood disability a priority for these countries. Although there have been a number of studies looking at tools for developmental screening or monitoring child development, most have been focused on establishing prevalence of disability or validation of tools. These studies as well as reviews of screening tools in LAMI countries¹ have not yet looked at crucial issues like building partnerships between caregivers and care providers, and linkage of identification of disability to services. These are issues which are particularly relevant to resource poor countries.

This review looks at studies that describe screening or monitoring instruments for the identification of disability in children in Low and Middle Income countries. The parameters used to analyze these studies comprise of both - those that need to be applied to all screening tools, as well as those which are especially relevant to Low and Middle income countries, like those in the South East Asia region.

Objective

This article looks at screening tools, for children under the age of 18 years that have been designed for use in LAMI countries, specifically in the South East Asian region. This review focuses on the following key issues:

- (1) Are there screening tools that have been specifically developed for, and are in use in the South East Asian region?
- (2) Is there a screening tool that identifies all disabilities?
- (3) Should there be developmental screening as a one time event at a particular age or should there be ongoing developmental surveillance/ monitoring by care providers?
- (4) In LAMI countries, is it possible to provide a detailed assessment for all screen positive children for an accurate diagnosis?
- (5) Which existing screening tools have intervention services linked to them?

Methods

- Electronic databases (Pubmed, Google Scholar, Embase, PsycInfo) were searched by using specific search terms related to developmental screening instruments and childhood disability in low and middle income countries. Whole texts of articles were scrutinized to obtain qualitative and quantitative information about screening tools, pertaining to their use for identification, making decisions about intervention, comparison of interventions and for epidemiological research.
- Eligibility for inclusion of LAMI countries in the South East Asian region was determined by referring to the World Bank List of Economies. The economies are divided into income groups according to 2011 gross national income (GNI) per capita (calculated using the World Bank Atlas method) ³. The groups are: low income, \$1005 or less; lower middle income, \$1006-3975; upper middle income, \$3,976–12,275; and high income, \$12,276 or more.
- **Google Scholar** produced a list of 41 articles when the search terms “Childhood Disabilities”, “Low and Middle Income Countries”, “Developmental Screening Tools” “Mental Retardation” “Intellectual Disability” were used. Out of the 41 articles produced in the search 24 were discarded based on inadequate relevance to search keywords, or if the article was from a high income country. Full text was not available for 5 articles from the LAMI countries. Out of the remaining articles, 11 were based on cross sectional studies and 1 was a case study.
- **PsycINFO**- “Childhood disability screening”, “low and middle income”, “developing countries” were the search words used. The number of articles obtained in response to combinations of keywords was as under. Childhood disability-319, when combined with disability and screening-43. All other combinations did not lead to any further references. A review of these revealed that none of the results for the above mentioned keywords were relevant.
- **Pubmed**- A Pubmed search for search terms Childhood disabilities Low and Middle Income countries resulted in a total of 32 articles. 8 were reports of

International Organizations. 7 were reviews, 1 a cohort study and 11 were cross sectional studies. 5 articles were discarded on account of an inadequate match between content and search criteria.

- A search in specific journals like the Journal of Developmental and Behavioral Pediatrics, Pediatrics, Indian Pediatrics, Indian Journal of Pediatrics was also conducted. Official websites of the World Health Organization, UNICEF, UNDP, World Bank were also searched for relevant literature.
- We also sent e mails to previously identified WHO SEARO experts in the field of disability to enquire about other screening instruments in use and in press.

Results

Our search strategy produced a total of 39 articles. The current review mainly focuses on tools used in the South East Asian region and the data about the use of the same screening instruments from countries outside of this region particularly from those in the low and middle income group, is used to make comparisons. Literature related to screening instruments are focused on piloting use of an instrument in a particular region, establishing prevalence rates with the help of a screening tool and validating them for use in LAMI countries. 2 articles described the development of a screening instrument and the process of validating it^{7,8}. Alternatives to use of screening tests to identify children with disabilities were also looked at in some studies^{9,10}. Screening tests used for comparing interventions have also been described¹¹. A study using a combination of assessment and advice materials has also been included¹².

Cross references from previously identified articles were used to obtain additional information. The relevant articles were accessed through the above mentioned search engines as well as in specific journals.

The screening instruments identified were analyzed using already established standards for assessing their psychometric properties. Additional criteria, based on literature in the area of Early Childhood Development and Childhood Disabilities have been used to assess their use in the context of LAMI countries. In the following section we outline details of screening standards and the overall criteria used in this review for assessing screening instruments.

Criteria for Screening Tests^{13,14,15}

Purpose of the Test – defining the purpose will determine the type of test to be used and the domains to be measured¹⁴. For instance, if the purpose is to determine which children require intervention, one of the things the test should measure is the domain which the intervention hopes to target.

Standards for a Screening Test^{5,13}

Standardization – while in the West this has been done using large nationally representative samples, in LAMI countries, given the prevalence of high risk factors, using ‘prescriptive samples’ such as those used by WHO for growth charts has been recommended⁵.

Reliability – refers to how consistently a measure produces similar results for a child or group of children with repeated measurements over time¹⁴. There should be information on internal consistency, inter rater reliability and test- retest reliability.

Validity refers to the degree to which a measure accurately samples or assesses behaviors or abilities that reflect the underlying concept being tested.

This should include concurrent validity (comparing the screening test to a diagnostic test). The criterion related validity is the “acid test” of a screening test and includes

Sensitivity – the percentage of children with disability who are correctly identified by the screening test. Ideally this should be at least 70 to 80%.

Specificity – the percentage of children without disability who are correctly identified by the screening test. This should ideally be 80% or more.

Positive Predictive value – the percentage of children who are identified as having a disability who do actually have a disability. Values of 30 to 50% are common in studies looking at screening tools for disability.

Negative Predictive value – the percentage of children who are identified as not having a disability who actually do not have a disability. This is not a commonly presented value in studies that look at tool validity.

In addition to these instrument specific criteria, the appropriateness of a screening tool for use in a particular region, in this case the LAMI countries of the South East Asian region needs to be assessed. The following section discusses the context of this region and then outlines criteria we have used to assess the tools appropriateness to the context.

Special Issues in Low and Middle Income Countries⁵

The value of caregiver reports about a child’s development has been well recognized in the Western world^{16,17}. Nonetheless, relying on the caregiver’s concerns alone may present some concerns in LAMI countries. Due to the high prevalence of developmental difficulties in high risk populations, families may not have an appropriate baseline of what typical development is. In addition, many families may not be willing to discuss their concerns. When families are asked questions from a very structured checklist, they may not express their concerns. This is due to a variety of reasons, including the stigma associated with disability. Families may not feel comfortable discussing a sensitive issue with a care provider who does not have an ongoing relationship with them. The low level of literacy presents an additional problem and does not allow the use of written forms or questionnaires that might offer more privacy or anonymity. Some of these issues are reflected in disability prevalence reported in low income countries like India¹⁸.

The issue of who will administer the test is vital in LAMI countries. In an unpublished review, for the WHO, Ertem (2011, in publication) found that in most LAMI countries health care providers do not routinely use screening instruments. If we want screening to be routinely implemented for all children, then we need to have instruments that are affordable and simple. Lay health workers who have access to young children at risk of and with disabilities, will then be able to use them.

Cultural issues impact the outcome of screening tests significantly. Child development and disability related concepts are understood differently in different contexts. This has been noted in studies in India, China, Thailand¹⁹ as well as in Malawi²⁰. Some studies have suggested using functional outcomes that cut across cultures rather than creating culture specific tools in each country^{1,5}.

Lastly a key issue when performing screening tests is to look at whether the screening process is linked to further assessment, and intervention. In LAMI countries, where resources are scant, the link between screening positive for disability and subsequent access to services is ethical and mandatory .

This report looks at the existing screening tools keeping the above issues in mind.

(1) **General Criteria**

- Target age group
- Type of the Screening tool
 - Direct Child Testing
 - Parent teacher report
 - Observational tools
 - Population level assessments
- Developmental domains assessed and description of how the tool is used (where available)
- Able to assess functional skills rather than non functional outcomes
- Psychometric properties
 - Reliability
 - Validity
 - Standardized for the local population

(2) **Context Specific Criteria**

- Cost of the tool
- Ease of administration
 - Training requirements, type and number of staff required
 - Is the tool simple enough to be used by lay health workers in a community setting?

- Instrument properties
 - Culture sensitivity
 - Understood by caregivers
 - Helps develop a relationship between health provider and caregiver and does not focus on testing the child
 - Is linked to further assessment and intervention and does not stigmatize the child
 - Results are understood by caregivers and health workers

The predominant focus in the subsequent section is on tools that have been developed for and are used in the South East Asian region.

ACCESS Portfolio

The disability group at the Center for International Child Health created the ACCESS portfolio keeping the unique identification and intervention needs of developing countries.

The ACCESS portfolio has the identification and the advice section. The portfolio was field tested in Uganda and Sri Lanka ¹². The aims were to determine whether: community health workers (CHWs) could learn to use the materials in the portfolio easily; materials identified young children with disabilities; parents were satisfied with the process and advice given; healthcare workers could use the portfolio in addition to other health care duties.

(1) General Criteria

- **Target age group** – children under 3 years of age
- **Type of screening instrument-** Has the following components: Identification and Advice Sections (details of the Advice section, given in the section addressing the tools link to intervention services). Child testing and parent interview are methods used for screening
 - **Identification Section-**
 - ‘Messages for Mothers’ published by the CBR Training and Development Centre, Solo, Indonesia.
 - WHO Growth Charts (using local versions where they contain basic milestone information).
 - The 10 Question Screen
 - Jamaican adaptation of the Denver Developmental Screening Checklist, 3D Foundation, Kingston, Jamaica.
 - WHO Play Materials, WHO Geneva.
 - A short screen about vision (developed for the portfolio).
 - A short screen about hearing and communication (developed for the portfolio).

The identification Section requires a combination of child testing and parent report.

- **Domains assessed and description of how the tool is used-** The authors recognize that in some settings a screening tool with a medical bias (such as the Ten Questions) might be appropriate, in other settings basic advice to mothers of developmentally or chronologically very young children such as the Advice Tools from Solo (CBR Training and Development Centre, 1995) might be more appropriate. Therefore both these components have been included. The part of the ACCESS portfolio that has the DDST (adapted) version and the TQSI (Ten Questions) assesses domains that these individual screening tools target. (Discussed in the previous sections). They have a better sensitivity for identifying serious cognitive deficits and lower sensitivity for vision, hearing, milder cognitive deficits and the subset of children who are at risk for a disability. But as the portfolio has been supplemented with a vision, hearing and a communication screen, it is able to address these limitations of the TQSI and the DDST.
 - 'Messages for mothers' is a component of the identification section of the ACCESS portfolio. The Training and Development Center, Solo, Indonesia has been providing CBR training and implementation for 25 years with over 80 CBR projects now in place. Their training program includes a non formal participatory module to suit the needs of a rural population. This aims at building capacity in the community to identify and intervene in disabilities.
- **How the portfolio was used by the authors in their study-** In Sri Lanka 12 public health midwives (PHMs) were selected to use the portfolio for a trial period of 6 months. In Uganda, 11 primary health care nurses from 7 health centres and 2 hospitals assisted with field testing. 10% of children seen by the health workers were seen by a medical physician (Sri Lanka) and physiotherapist and occupational therapist (Uganda) and their assessments compared with screen results from the CHWs. CHWs collected data over 6 months on children age 3 or under 'who were causing their mothers concern'. Children were screened, advice given where appropriate, and referrals made to local doctor or paediatrician or local hospital where necessary. Health workers also completed questionnaires about ease of use of the portfolio and took part in focus group discussions about use of the materials and training. Parents also took part in focus groups.
- **Able to assess functional skills rather than non functional outcomes-**
 - The TQSI, DDST, hearing and vision screen provide the screening component of the tool. The 'messages for mothers' and the WHO play materials add the psychosocial component to make the ACCESS a functional tool. The inclusion of growth charts also helps the person who is screening place the above information in the context of the child's growth and nutritional status.
- **Psychometric properties**
 - Overall, 769 children were screened in Uganda and 580 in Sri Lanka. In Uganda, 44% of children seen failed the screen and in Sri Lanka 11% failed and were deemed to have a disability by the health workers. Developmental delay and difficulties with movement and self-care were the commonest forms of disability identified. Compared to expert assessments, accuracy was 82% in Uganda and 76% in Sri Lanka. However, this is based on the total number of screens found to be correct compared to expert assessment and figures are not presented for sensitivity and specificity.

- **Qualitative data** – There were many positive comments made about how the project helped both children with disabilities and their parents. CHWs were generally very positive about the training and use of the portfolio. There was consensus that the project had raised awareness of disability within the community and workers were pleased to have been involved in this. Parents found the advice and materials helpful.
- **Standardization for the population-** The Ten Questions has been used in LAMI countries in the South East Asian region. An adaptation of the Denver Developmental Screening Test was used. The authors do not comment if there were any specific differences in response to any of the items in these 2 countries (Srilanka and Uganda).

(2) Context Specific Criteria

- **Cost of the tool-** The authors do not state the cost of individual components like the ‘Messages for mothers’, and the hearing and vision screen devised by them. However, many of the components (e.g. TQSI) are free. Given the recommended use by community workers it is unlikely to be expensive.
- **Ease of administration**
 - **Training required and number and type of staff needed-** A training curriculum was prepared by the author to familiarize field workers with basic disability issues, and develop their competence and confidence in the use of the materials. A total of 23 health workers were trained from both sites using a common curriculum, with minor adjustments based on local cultures and customs, over 4/5 days. It included some formal teaching, but most of the learning activities were interactive and group based.
 - **Is the tool simple enough to be used by lay health workers in a community setting?** The individual components of the tool have been used with success by CHWs across different regions. In Srilanka and Uganda Public Health Midwives and Primary Health Care Nurses were selected to administer the ACCESS portfolio. The materials given to the caregivers were translated into the local languages.
- **Instrument properties**
 - **Culture sensitivity-** As stated in the previous sections, the individual components such as the TQSI have been found to be culture sensitive. Information about the culture sensitivity of the adapted version of the DDST and the details of ‘messages for mothers’ – The CBR component - has not been provided by the authors
 - **Understood by caregivers-** The CHWs used the ‘messages for mothers’ CBR material in the identification section. The advice material provided in the ACCESS portfolio has WHO play materials and materials from ‘Disabled Village Children’. All of these are meant to be used in the community setting and are easily understood by the caregivers.
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-** The format of the screening encourages a participatory approach between the caregiver and the care provider during the process of discussing identification and intervention. Results from focus

group discussions with health workers and parents, and questionnaires to health workers, demonstrate that both groups found the process clear and useful. Parents liked the process and found the advice materials helpful. Several health workers commented on their developing positive attitudes towards disability and improvements in their own self-confidence

- **Is linked to further assessment and intervention** - The identification and the advice section cater to the intervention and encourage participation from the caregivers in the process. Parents commented about how they found the care providers approachable and genuinely concerned about their child and also found the advice material useful.
- **Results are understood by caregivers**- The author does not specifically comment about whether the CHWs communicate the results of the screening to the caregiver. However, given that this tool encourages participatory interaction and rapport building, the caregivers are likely to feel comfortable enquiring about their child's development

Baroda Development Screening Test for Infants

In 1983 a UNICEF aided programme for the prevention, early detection and intervention of childhood disability in urban slums was launched in Baroda, India.

A screening test was developed from the Bayley Scales of Infant Development (BSID) as it has been standardized on Baroda infants (Baroda norms)⁸. Only those items which were simple and easy to administer and assess and not requiring any special training, experience or equipment were selected. A total of 54 items were selected.

(1) General Criteria

- Target age group-0-30 months
- **Type of screening tool**- Screens by testing the child and by parent interview.
- **The developmental domains assessed and description of how the tool is used**-The tool has a total of 54 items for the abovementioned age range. A child who fails items in his/her chronological age group as reported by the caregiver is screened out for detailed study.
- **Psychometric properties**
 - **Reliability**- Not available
 - **Validity**:-
 - **Sensitivity**- 65%-93%. This variability was found because of the method adopted to screen. The lowest sensitivity was obtained when parent interview technique was used. As the authors had access to records of children between the ages of 0-30months on whom the Bayley Scales of Infant Development (BSID) was administered. They compared scores of items (54 items) that are included in the BDST with the overall performance of the child on the BIRD (Baroda Norms). The method in the latter situation involves testing the child for the purpose of scoring.
 - **Specificity**-77.37%-94.44%

- **Positive Predictive Value**-6.67%-34.37%
- The authors express their concern over the low sensitivity and specificity when the screening is performed using the parent interview technique. To improve the sensitivity their recommendations include training the interviewer to observe the child during the interaction with the caregiver, repeat the screening process in a day or two , or have 2 interviewers do independent/joint screenings.
- The authors state that a sensitivity and specificity of 65% can be accepted as valid for reliable screening. Validity measures such as those stated above are likely to identify children with severe cognitive and motor deficits.
- Children with mild disability and those at risk are likely to go undetected. The authors suggest that a follow up screen by the same examiner, or screening by 2 independent staff may be required to increase its psychometric property⁸.
- **Standardized for the local population**- Items selected are from the Baroda norms established for the Indian adaptation of the Bayley Infant Scales of Development. However, the authors do acknowledge that the BDST has been used to a limited extent and propose that it be used for a regular survey of the 0-2 year population to facilitate its study.

(2) **Context Specific Criteria**

- **Cost of the tool**-Inexpensive
- **Ease of administration** –
 - **Training and the number and type of staff required**
 - The screening test was put to use in a field survey as well as in clinical practice (especially well baby clinics). No information is available on the time taken to administer/conduct the interview with the caregivers. Given the authors recommendations for improved sensitivity the process may take longer and may involve more than one care provider than the current recommendations for administration.
 - **Is the tool simple enough to be used by lay health workers in a community setting?** It is noted that it had been used for more than 3 years by Community Health Workers of Baroda. The authors have found that 5 or 6 one hour sessions are sufficient for training on screening.
- **Instrument properties**
 - **Culture sensitivity**- yes, as the items have been selected from the Baroda Norms of the BSID.
 - **Understood by caregivers**- There is no information on how the results of the screening would be communicated with caregivers. For caregivers of children who screen positive and negative, communication about results is important to help them understand the next step which could be referral or intervention. Given that the sensitivity and Positive Predictive Value of the screen is less than adequate, communication of results and its implications is vital. Also as stated previously, communication becomes an important step to engage the care providers in further dialogue about intervention

- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child**-The interview method does provide an opportunity for interaction with the caregiver and has a potential to build a relationship with them. However, the tool by itself provides this opportunity in the form of enquiring about specific milestones which could make the communication very closed ended.
- **Is linked to further assessment and intervention instead of stigmatizing the child** It is not linked with intervention services. In the absence of interventions, the end result in terms of 'passing' or 'failing' a screen could be a cause for stigmatization.
- **Results are understood by caregivers and care providers**-The care providers undergo training for using the screening tool and its interpretation. The issue of how caregivers interpret a 'pass' or 'fail' result is discussed above.

Developmental Assessment Tool for Anganwadis (DATA)

Nair et al. (2009) developed the 12-item Developmental Assessment Tool for Anganwadis (DATA)²¹

(1) General Criteria-

- **Age group**- 2-3 years in an Anganwadi setting
- **Type of tool**- Uses combination of child testing and parent report
- **Developmental Domains assessed**- six domains of gross motor, fine motor, cognitive, personal-social, expressive language, and receptive language
- **Does it identify all developmental disabilities**- This tool places emphasis on being able to recognise children with milder disabilities and those who are at risk. They have also factored in the early period of lag (immediately after joining the Anganwadi), and the unfamiliarity of the AWW (Anganwadi worker) with the child. The authors have not used a prescriptive sample for standardizing the tool and acknowledge that they have noted an overall delay in the Anganwadi population while validating the tool against norms for children from high income countries. Therefore an interpretation of 'mild disability' or 'at risk' status may be somewhat misplaced, with the risk of missing the truly 'at risk group'.
- **Able to assess functional skills rather than non functional outcomes**-The items are representative of all the domains listed above. The authors do not comment about any other functional skill falling within the domains assessed that may have been more culturally relevant for the population assessed.
- **Psychometric properties**
 - **Reliability**- The internal consistency of the scale was high with a Cronbach's value of 0.86. The measure was administered by experienced developmental therapists, as against the intended utility by Anganwadi workers. The data available is from a prefield study and the authors propose to address this limitation during field trials by AWWs

- **Validity-** Items were selected from a list of milestones from the Denver Developmental Screening Test (DDST), the Developmental Assessment Scale for Indian Infants (DASII), the Receptive - Expressive Emergent Language Test (REEL) and the Vineland Adaptive Behavior Scale (VABS). Face validity was considered to be high as the items were taken from internationally used measures. Construct validity was analysed using exploratory factor analysis which yielded a 2 - factor model which explained 56% of the variance. There is also no data on sensitivity, specificity or PPV for DATA.
- **Standardized for the local population** - A total of 429 toddlers mean age 30.9 months from 36 randomly selected anganwadis were recruited for standardization. The norms established are not for a 'prescriptive population' and therefore this tool could possibly miss children who are truly 'at risk' given the authors concerns about 'overall delay in the population'

(2) Context Specific Criteria

- **Cost of the tool-** Tool is not available for general use.
- **Ease of administration**
 - **Training requirements, type and number of staff required-** The current version has been used by trained and experienced developmental therapists. It has not been administered by AWWs for whose use the tool is intended. The authors propose to address these limitations during field trials.
 - **Is the tool simple enough to be used by lay health workers in a community setting?** - The tool requires administering certain tasks and therefore equipment is required. Maintaining cleanliness and hygiene of these in a field setting could be a cause for concern. The pre field trial required computation of scores for individual domains to ascertain the child's developmental status. This will need to be simplified for use in a community setting.
- **Instrument properties**
 - **Culture sensitivity-** items chosen are culture sensitive, but would require the child to perform.
 - **Understood by caregivers-** No **specific** comments regarding this aspect by the authors.
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-**The tool primarily focuses on testing the child, and does not encourage communication **and** participation from the caregiver in its current form. Prior familiarity with the AWW may encourage the caregivers to engage with them in a dialogue related to their child's development.
 - **Is linked to further assessment and intervention** - The authors propose to design a participatory training program that sensitizes the AWWs to early childhood development and **developmental** disabilities. The program aims to train them in DATA. The authors do not mention any plans to incorporate an intervention module at this juncture. In many regions, intervention services are limited or absent, and identification alone may place the family and child at risk for stigma.

- **Results are understood by caregivers and health workers**-Not enough information available. The **author** does not mention the process of communicating the results with the caregivers in the study

Disability Screening Schedule

This tool was developed as a one-time screen for all major disabilities in children under 6 years of age²². 19 Anganwadi workers used the tool for screening 3560 children in 9 urban slums in Delhi

(1) General Criteria

- **Target age group-0-6 years**
- **Type of screening tool**- uses combination of child testing and parent report
- **Developmental domains assessed**-The DSS was developed as a one time screen for all major disabilities including motor, cognitive and sensory disabilities. The tool has 3 sections, including information from parents, the examiners observations and summary of observations.
- **Does it screen for all disabilities**- the authors have not provided us with information about specific disabilities that the tool can identify.
- **Able to assess functional skills rather than non functional outcomes**-The details of items in the DSS is unavailable. The study does not provide specific information in this regard.
- **Psychometric properties**
 - **Reliability:** Agreement between the **investigator** and the AWW on test results was good
 - **Validity: Cross validation results by an investigator are as follows**- Sensitivity and Specificity were **89%** and **98%** respectively
 - **Standardized for the local population**- No

(2) Context Specific Criteria:

- **Cost of the tool**- Information not available.
- **Ease of administration**
 - **Training requirements, type and number of staff required**-the AWW were trained over a period of 6 days. **Administration** time -5 minutes.
 - **Is the tool simple enough to be used by lay health workers in a community setting** - Yes, adjustments **were** made to make it simple and user friendly.
- **Instrument properties**
 - **Culture sensitivity**- the investigators have referred to other culture sensitive screening instruments developed for and in use in LAMI countries. Specific details about items included are not available which makes it difficult to comment on this aspect.

- **Understood by caregivers**- No **difficulties** reported.
- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child**- The questions were made closed ended to facilitate its usage by the AWWs. Concerns about such an interaction with regard to building relationships have been discussed earlier.
- **Is linked to further assessment and intervention** -No not linked to interventions.
- **Results are understood by caregivers and health workers**- no information available

Early Childhood Care and Development- ECCD, Philippines¹⁴

(1) General Criteria-

- **Target age group**-0-5 years
- **Type of instrument**- Direct child testing is the method used
- **Assesses all domains**-yes, includes fine and gross motor, receptive and expressive language, self-help, cognitive, and social-emotional skills
- **Does it screen for all disabilities**- Disability specific information not available
- **Assesses functional outcomes as opposed to non functional skills**- Information about the items in the tool not available.
- **Psychometric properties**-
 - **Reliability**- data not available
 - **Validity**- data not available
 - **Standardization**- yes, normed for the local population

(2) Context specific criteria-

- **Cost of the tool**- Not available
- **Ease of administration** :
 - **Training requirements, type and number of staff required**-training is required (details not available). Requires some experience with child development assessment. Time for administration –requires approximately 1.5 hours
 - **Is the tool simple enough to be used by lay health workers in a community setting?** May not be **feasible** for use by lay health workers as prior experience with child development assessment is required
- **Instrument properties**
 - **Culture sensitivity**- no details available
 - **Understood by caregivers**- details not available

- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child**- Not available, the drawbacks of a direct child testing measure in this regard have been discussed in previous sections
- **Is linked to further assessment and intervention** -No not linked to interventions.
- **Results are understood by caregivers and health workers**- no information available.

The Guide for Monitoring Child Development

This tool was developed in Turkey for use by health care providers in LAMI countries to monitor the development of children 0.0-3.5 years of age⁵. The GMCD model aims to bring early childhood development concepts into health care delivery systems in LMICs and has three components: developmental monitoring, developmental support, and management of developmental difficulties

(1) **General Criteria:**

- **Target age group**- 0-3.5 years
- **Type of screening tool**- Monitoring and intervention tool, Uses parent/caregiver report
- **Developmental domains assessed and description of how the tool is used**-

The GMCD comprises of the GMCD Developmental Monitoring Component, The Developmental Support Component and The GMCD Management Component. We describe the first component in this section.

The GMCD Developmental Monitoring Component- GMCD is a brief, open-ended, pre-coded interview with the primary caregiver. The first question asks about parental concerns. There are then 6 open-ended questions relating to developmental domains like expressive and receptive language, gross and fine motor skills, social skills, play skills and self help skills. For each of the 6 questions there are specific pre-coded milestones. The GMCD form is composed of two tables on each side of a single sheet. The questions are placed in rows and 8 age ranges in the columns with milestones in the cells. Milestones were chosen by pooling items from standardized instruments, selecting those that could be easily observed and reported by caregivers, and those which were universal (e.g. peek a boo) rather than culture specific (e.g., playing with a mirror).

It does not screen specifically for sensory impairments like visual and hearing impairment, but as the interview is open ended in its nature, the parents get an opportunity to talk about their concerns if any in these areas.

- **Able to assess functional skills rather than non functional outcomes**- The model used in this instrument views health and development within the framework of the WHO International Classification of Functioning (ICF)²³. The assessment therefore focuses on functional skills.
- **Psychometric properties**

- **Reliability**-To assess Inter rater reliability medical students previously trained on the GMCD were required to administer it. Within 48 hours an experienced child development specialist **administered** the GMCD to the same caregivers. Inter-rater reliabilities between the student pairs (kappa=0.85, $p<0.001$), and between the development specialist and the students were high (kappa= 0.83 and 0.88, $p<0.001$). Inter-rater reliabilities between the student pairs (kappa=0.85, $p<0.001$), and between the development specialist and the students were high (kappa= 0.83 and 0.88, $p<0.001$).
- **Validity**- The concurrent validity of the GMCD compared to a comprehensive developmental evaluation was examined in a cross-sectional study involving 79 infants aged 1-24 months, who were born with very low birth weight (VLBW) and received neonatal **intensive** care at Ankara University School of Medicine. A pediatrician with no specific training in child development but trained in the GMCD administered the GMCD before the health visit. An experienced developmental-behavioral pediatrician “blinded’ to the GMCD results, conducted a comprehensive developmental assessment within 48 hours. This evaluation included a developmental history, play observations, neurological examination, and the Bayley II. The development of the children were found to be “appropriate for age” in 69.6% with the GMCD, and 70.9% with the comprehensive evaluation. Percent agreement (91%), kappa (0.80), sensitivity (0.86), and specificity (0.93) were high ($p<0.001$). These levels of internal consistency are considered Good (.80-.89) to Excellent (.90-1.00).
- **Standardized for the local population** - The pilot study for the standardization of the milestones for **children** 0-24 months was conducted in a cross-sectional study. The authors followed WHO recommendations for developing standard references in developing countries in selecting the reference sample. The participants were 510 healthy children (based on predefined criteria) who from birth onwards had received preventive healthcare from two well-child care clinics. As in the standardization of other instruments, such as the Denver II, the ages at which >90% of the study sample attained each milestone were computed, and the milestone was placed in the corresponding column.

(2) **Context Specific Criteria**

- **Cost of the tool**- Currently being standardized and validated in other populations.
- **Ease of administration**
 - **Training required and number and type of staff required**- The GMCD training program developed by the authors consists of written materials, slides, and demonstration videos and has been adopted by the Turkish Ministry of Health and UNICEF-Turkey to be used in a nationwide training program child development for primary health care providers. The training involves 1 day for each of the 3 GMCD components. The training includes interpreting the result of the GMCD together **with** all of the other existing clinical information, giving feedback starting with the child’s specific strengths and using the following components to develop a plan with the caregiver to

support the child's development and to manage developmental difficulties if they are detected. Time taken for administration-7-10 minutes

- **Is the tool simple enough to be used by lay health workers in a community setting?** The tool has **been** used by medical students trained in the GMCD. Although the study has not used lay community workers, community health workers in India (Belgaum and in Mumbai as part of a training program) have been trained successfully to use the GMCD (unpublished)

➤ **Instrument properties**

- **Culture sensitivity-** The open ended nature of the questions encourages a description of the child's development by caregivers. There are specific pre coded milestones. Caregiver's spontaneous responses to the open-ended questions are applied to the milestones whenever possible. Additional questions are used when necessary to prompt responses to specific milestones.
- **Understood by caregivers-**98% of the caregivers in the authors study responded by saying that the **GMCD** questions were easy to understand. Most caregivers (64%) had less than 5 years of education in this case.
- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-**Training in the GMCD includes interpreting the result of the **GMCD** with the caregiver together with all of the other existing clinical information. The care provider gives feedback starting with the child's specific strengths and uses the support component to develop a plan with the caregiver to support the child's development. The same approach is used to manage developmental difficulties if they are detected.
- **Is linked to further assessment and intervention** -yes, the second component of the GMCD is the support component.
- **The GMCD developmental support component** is an expanded version of the WHO Care for Development Intervention and provides clinicians with techniques to counsel caregivers on what they can do in their daily lives to support their child's development. Information is obtained about caregivers' efforts related to enhancing their child's development, positive efforts are praised, and suggestions are provided for age-appropriate activities to enhance child development. These details are provided on the GMCD Developmental Support Card.
- The authors suggest that the GMCD advances the field conceptually by introducing a new **and** practical method of using an open-ended interviewing technique to get information on child development. It is proposed as an alternative to tools such as DSS, TQS and ACCESS Portfolio which they note are designed to question caregivers about severe disability.

Indonesian Adaptation of the Vineland Adaptive Behavior Scales (IVABS)

Tombokan et al investigated whether a translated and culturally adapted VABS (henceforth called the *Indonesian Adaptation VABS* or IVABS), has the same psychometric properties when used in Indonesia as the original VABS has when used in the United States²⁴. The IVABS is a 245 item adaptation of a Western measure of adaptive behaviour (the Vineland Adaptive Behaviour Scales Survey Form) developed for use in Indonesia

(1) General criteria

- **Target age group-0-18 years**
- **Type of tool-** parent/ teacher report is used
- **Developmental Domains assessed and method of administration-** The domains assessed includes Communication, Daily Living Skills, Socialization, and Maladaptive Behaviour. In a semi structured interview, the “examiner” interviews an “informant,” usually either a parent or a teacher. During the interview, rules are employed for rating adaptive behaviours on a scale of 0 to 2 for identifying the floor and ceiling points for a child, and obtaining a score for each domain. A composite score is obtained by summing the scores on all domains except Maladaptive Behaviour.
- **Able to assess functional skills rather than non functional outcomes-**The Vineland Adaptive Behavior Scales are designed to measure adaptive skills and functional outcomes. The authors have carefully addressed the issue of functionality in a different context, by scrutinizing individual items for their cultural relevance.
- **Psychometric properties**
 - **Reliability-**The author **states** concerns about generalizability and reliability. The author proposes to repeat the study across a larger sample size for national standardization.
 - **Validity-** the pattern of correlations for the two groups of Indonesian children assessed in the study corresponds to patterns of correlation found in American children.
 - **Standardized for the local population-** The 43 children were matched to 43 children with normal intelligence. We agree with the authors concerns about the sample size of the study and second the need for standardization across a larger sample for use across the country.

(2) Context Specific Criteria

- **Cost of the tool-** not available
- **Ease of administration**
 - **Training requirements, type and number of staff required-**As trained professionals were part of this study, there is no additional information about the training requirements for IVABS

- **Is the tool simple enough to be used by lay health workers in a community setting-** Since in this study the author has conducted all the interviews, it's use by other professionals and lay workers has not been explored

➤ **Instrument properties**

- **Is it culture sensitive and understood by parents-** items in the IVABS were assessed to **determine** applicability to Indonesian culture, (including whether children of the appropriate age have the opportunity to perform the behaviour described in an item); familiarity of the wording to parents and teachers; and offensiveness of an item's phrasing to parents and teachers from various cultural subgroups within Indonesia. As necessary, items were eliminated, translated, modified, or replaced with new items.
- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-** The **framework** of a parent/teacher interview gives caregivers an opportunity to talk about the child's development.
- **Is linked to further assessment and intervention -** the author does state the role of the IVABS in developing **intervention** programs focusing on varying areas of development. However, the nature of the IVABS (the length of the instrument) and the kind of intervention services being discussed in the article may not be feasible in a resource poor community setting for widespread use.
- **Results are understood by caregivers and health workers-** Information about caregiver feedback about the **interview** experience is not available.

Parents Evaluation of Developmental Status (PEDS; Indian Validation)

The Indian validation of PEDS was undertaken on a small sample (79 parent child dyads). Developmental status was assessed by the Developmental Profile II which gives an IQ equivalent score. They also administered the Indian Adaptation of the Vineland Social Maturity Scale. Sensitivity was 62% and specificity 65%, both of which were lower than values found for North American children (75% and 74% respectively). Singhi et al stated that the PEDS may be used as a pre screening method in a busy outpatient setting instead of a standardized screening tool pending studies in a larger population

The original authors and developers of PEDS²⁵ expressed concerns about the scoring method and the concurrent test used to assess the accuracy (The Developmental Profile II) of PEDS in the Indian study.

Psychosocial Developmental Screening Test

This screening test was developed by the Indian Council of Medical Research ²⁶. The test contains 66 milestone items which form a simple, culturally appropriate screen for psychosocial development that can be administered by CHWs.

(1) General Criteria

- **Target age group-0-6 years**
- **Type of tool-** uses child testing as a **method**.
- **Assesses all developmental domains-** A **list** of 66 items spanning across gross motor, fine motor and vision, self help skills or personal skills, social skills and hearing and concept development domains were selected.
- **Able to assess functional skills rather than non functional outcomes-** The authors used cost and cultural relevance as criteria for items to be included in the screening tool.
- **Psychometric properties**
 - **Reliability-** 95-98% between **supervising** psychologists and the Community Health Workers.
 - **Validity-** not **available**.
 - **Standardized for the local population-** The tool was standardized in a population of 13000 children who belonged to the urban, rural and tribal areas of 3 regions in India.

(2) Context Specific Criteria

- **Cost of the tool-** The authors have **ensured** that the tool remains inexpensive by including low cost items that can be easily incorporated into a Primary Health Care set up.
- **Ease of administration**
 - **Training requirements, type and number of staff required-** The authors have spent 2 weeks in training each set of Community Health Workers. The training session included theory sessions on child development and demonstration of how the tool is used. The trainees were also supervised while they administered the tool themselves.
 - **Is the tool simple enough to be used by lay health workers in a community setting-** The authors have taken care in ensuring that items selected were easy to administer and score with a clear 'pass' or a 'fail' result, low in cost and culturally relevant
- **Instrument properties**
 - **Culture sensitivity-** The authors **have** ensured that the final 66 items selected were culturally relevant and assessed functional outcomes in a child.
 - **Understood by caregivers-** The tool is based on child testing methods. It is unclear if the CHWs are **expected** and trained to communicate with the family about the purpose of the exercise while administering the tool.
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-** the tool relies on 'pass' or 'fail' outcomes while screening the child and does not appear to require the caregivers to participate. A CHW from the same area may have a rapport

with the caregiver which could encourage communication regarding the development of the child. The tool does not have this component built in.

- **Is linked to further assessment and intervention** - The sites chosen by the authors are resource poor (rural and tribal areas). The author proposes different ways of using the instrument- as an **abbreviated** screening tool by selecting a smaller number of items, or as a tool to compare and monitor efficacy of interventions (non formal education component of the ICDS). The tool is not linked to interventions. Given the context of the area a screening tool by itself will not serve the purpose of addressing the needs of the children who are identified as having a developmental concern.
- **Results are understood by caregivers and health workers**- The health workers from different regions including **rural** and tribal regions were successfully trained to use the tool. There is not enough information about if and how the results were communicated to the caregiver.

Rapid Pre-screening Denver Questionnaire-(R-PDQ)

Awasthi et al designed a study to validate The Rapid Prescreening Denver Questionnaire in a preschool population living in the urban slums covered by the Integrated Child Development Scheme.²⁷

(1) General Criteria

- **Target Age group-0-6 years**, but in this study children between the ages of 2-4 years were included.
- **Type of screening tool-Parent questionnaire.**
- **Developmental domains assessed**- There are four R-PDQ questionnaires, one each for the following age groups: 0 to 9 months, 9 to 24 months, 2 to 4 years and 4 to 6 years. Each questionnaire tests 4 specific **domains** of development: gross motor (GM), fine motor activity (FMA), personal-social (PS) and language (L). The person keeps answering the questions till there are three negative responses. Questionnaire for age 2 to 4 years was translated into Hindi, and pilot tested for how well it is understood.
- **Does it screen for all disabilities**- the authors **have** not provided us with information about specific disabilities that the tool can identify.
- **Able to assess functional skills rather than non functional outcomes**- The authors had concerns about the culture sensitivity of some of the items in the tool. Some of the items on the tool therefore may have had little functional relevance for the caregivers in the population chosen.
- **Psychometric properties**
 - Comparison of this tool with another screening tool the DDST was performed. This is a deviation from the usual process of assessing validity against a gold standard tool. Concerns **regarding** the use of the DDST as a gold standard have been discussed in the section on the Trivandrum Developmental Screening Test.

- **Reliability**- Not available
- **Validity**- as the tool was being validated against another screening tool and not a gold standard tool, **co** positivity and co negativity were terms used instead of sensitivity and specificity. When 1 or more delays on the RPDQ was used as the cutoff, the authors found a higher sensitivity (co positivity) 100% with respect to the DDST and a very low specificity (co negativity) of 7.8%. when the cut off was shifted to 2 or more delays it increased the sensitivity to 53.9% but specificity still remained low making it even less suitable for screening purposes.
- **Standardized for the local population**- no

(2) **Context Specific Criteria**

- **Cost of the tool**- Not available.
- **Ease of administration**
 - **Training requirements, type and number of staff required**-Not described.
 - **Is the tool simple enough to be able to be used by lay health workers in a community setting**- The tool has only been administered by trained research assistants. Given their difficulties in administering some of the items, it's wider use in the current form, does not seem feasible for an Anganwadi setting.
- **Instrument properties**
 - **Culture sensitivity**- many items were not culturally appropriate.
 - **Understood by caregivers**- no, this was a concern for the authors.
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child**- No. The tool is a questionnaire with closed ended questions. Many items were not culture sensitive which made it difficult for care givers to understand the questions asked.
 - Is linked to further assessment and intervention - No, it is not linked to interventions.
 - **Results are understood by caregivers and health workers**- The research assistants appear to have had considerable difficulty in administering the tool. There is no information about the results being communicated to the caregivers

Shoklo Developmental Test (Thailand) ¹⁴ - Tests neurodevelopmental status of infants in Thailand.

(1) **General Criteria**

- **Target age group**-3-12 months
- **Type of screening instrument**-child **observation** and parental report required, Infants perform various activities using an assortment of toys and are scored on a pass/fail basis

- **Developmental domains assessed-** motor, **cognitive**, social-emotional behaviours and speech
 - **Does it screen for all disabilities-** the authors **have** not provided us with information about specific disabilities that the tool can identify.
 - **Assesses functional outcomes and not non functional skills-** Details of items in the test not available to comment
 - **Psychometric properties-**
 - **Reliability-** not available.
 - **Validity-** validated against the Griffith Mental Development Scales.
 - **Standardization-** not done.
- (2) **Context specific criteria**
- **Cost of the tool-** Not available
 - **Ease of administration :**
 - Training requirements, type and number of staff required-training is required (details not available).
 - Administration time 20 minutes and scoring time 5 minutes
 - **Is the tool simple enough to be used by lay health workers in a community setting?** - community workers without a background in child development have been able to use the tool.
 - **Instrument properties**
 - **Culture sensitivity-** no details available.
 - **Understood by caregivers-** details not available.
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-** The familiarity of the health care worker with the family will determine the extent to which the above is possible. The tool does not appear to provide specific opportunities for this.
 - Is linked to further assessment and intervention -No not linked to interventions.
 - Results are understood by caregivers and health workers- no information available.

Shoklo Neurological Test for Children (Thailand) ¹⁴

- (1) **General Criteria-**
- **Target age group-**9-36 months
 - **Type of tool-** Observe infants while they perform various activities using an assortment of toys and are scored on a pass/fail basis.

- **Developmental Domains assessed-** assessment of coordination, tone, and behaviour to evaluate abrupt neurological disturbances in children between 9-36 months of age
 - **Does it assess all disabilities:** disability specific information not available
 - **Does it assess functional outcomes as opposed to non functional skills-** Focuses on neurological assessment
 - **Psychometric properties-**Tested on 300 infants in Thai camp. No clear age-based norms established. In order to validate the tests it was applied to a cohort of London infants. The Griffiths Developmental Scales were applied in the same infants and both the Shoklo Neurological and the Shoklo Developmental Tests showed good correlation with this standardized neurodevelopmental assessment.
- (2) **Context specific criteria**
- **Cost of the tool-** Information Not available
 - **Culture sensitivity-**As details of items included not available, difficult to comment
 - **Ease of administration-**
 - **Training required and number and type of staff required-**
 - **Training.** Can be performed by a health care worker, but no experience related to child development required. Test takes 15 minutes. Scoring takes 5 minutes.
 - Is the tool simple enough to be used by lay health workers in a community setting?- yes
 - **Instrument properties**
- As described for Shoklo Neurodevelopmental test**

Ten Questions Screening Instrument

In their systematic review, Maulik and Darmstadt (2007)¹ noted that the most commonly used tool to assess disability in large populations in LAMI countries was the Ten Questions Screening Instrument (TQSI), which is referred to as TQSI hereafter. The TQSI was developed in 1984, for use in resource poor countries²⁸

(1) General Criteria

- **Target age group-** The tool screens children between the ages of 2-9 years; The TQSI has been modified to screen children under the age of 2 years²⁹. For screening children between 9-18 years of age supplemental tools are required.
- **Type of the Screening tool-** Uses Parent report as a method. The instrument is used as a screening tool to make decisions about appropriate referrals and interventions and is also a tool that has been widely used in epidemiological studies to look at prevalence rates of disability, specifically intellectual disability in different countries.

- **Developmental domains assessed and description of how the tool is used-** It has ten questions which focus on questions about general functional abilities and milestones. Of the ten questions 4 are associated with the child's vision, hearing, movement and seizures, and 6 concern the child's cognitive competence. A child is considered screen positive if his or her parents respond yes to one or more of the 10 questions. An additional question has been included in a recent version (Ten Q Screening Instrument Plus) which enquires about behavioral problems in children.
- **Does it screen for all disabilities?**-It has good sensitivity to pick up serious cognitive, motor and seizure deficits. Lower sensitivity for vision and hearing deficits warrant inclusion of separate hearing and vision screens ^{30,31}.
- **Able to assess functional skills rather than non functional outcomes-**Yes, the tool enquires about the skills of the child in comparison to other children in the community. The caregiver will look at functional outcomes relevant to all children within that setting while responding to the question.
- **Psychometric properties-**
- **Reliability-**Test retest reliability of the tool are good (coefficients 0.6-0.8) which is comparable to other instruments like the Vineland Adaptive Behavior Scales
- **Validity:-**
 - **Sensitivity**->80% sensitivity for serious cognitive, motor and seizure deficits (in populations in Jamaica, Pakistan and Bangladesh. **A relatively lower sensitivity was found for vision and hearing deficits**^{30,31}. Given that the tool aims to screen children in the 2-9 years age range (without modification for age), a window of opportunity for the recommended early identification of visual and hearing impairment may be lost by only relying on the TQSI.
 - **Specificity**-specificity of TQS as a screen for serious disability was high in all populations: 92% Bangladesh, 85% Jamaica; and 86% Pakistan.
 - **Positive Predictive Value-** The studies in all three countries (Bangladesh, Jamaica, and Pakistan) have also shown that the screen has limited positive predictive value for serious disability (<25%), meaning that most (>75%) children who screen positive do not have a serious disability. The screen is not disability specific. The interpretation of the TQ is made globally, with an affirmative response to any question indicating screen positive status. There is no requirement for there to be a correlation between the TQ question that was answered as a 'yes' and the actual disability diagnosed.
 - Validation of the tool has been performed across different countries in 2 phase studies. Validity studies have been carried out in Pakistan, Jamaica, Bangladesh ^{28,30,32} In all three populations sensitivity for severe cognitive disability was found to be 1.00. However, overall sensitivity to cognitive disability was found to be variable (84% in Pakistan, 82% in Bangladesh and 53% in Jamaica). Singhi et al found the TQSI to have a sensitivity of 100 % for significant disabilities in the 2-9 year age group; however, the Positive Predictive Value was 50% with an interesting difference between the genders (61% in boys and 31% in girls) in a validity study conducted in Northern India³³. The author attributes this to a cultural preference among families for

the male gender and hypothesizes that this could have led to the participants in the study to express a greater concern for the male children in their family.

- **Mung'ala Odera et al** carried out a two phase study to look at the sensitivity and specificity and Positive Predictive Value of the TQSI to look at neurological impairments in 6-9 year olds in rural Kenya³⁴. TQSI's sensitivity ranged from 70% (cognitive impairment) to 100% (epilepsy). Specificity ranged from 71% (cognitive impairment) to 98% (for both motor and visual impairment). Positive predictive values ranged from 11% to 33% (0.24 for cognitive impairment). Negative predictive values ranged from 97% to 100% (0.95 for cognitive impairment).
- The TQSI has a higher sensitivity for more severe disabilities specifically cognitive, motor and seizure deficits in older children³³ which could be because these conditions are more readily recognized by caregivers. **Singhi et al**³³ found that 23% of children screening false positive (low PPR-50%) have milder delays secondary to conditions like malnutrition. Therefore, the over referrals secondary to the TQSI screening may not necessarily result in inefficient use of resources as these will be used up in reaching a subset of children who are also likely to benefit from intervention.
- **Bashir et al.**³⁵ Used the TQSI to screen children in the 6-10 year population for Mild Mental Retardation. The TQSI had additional probes and screen positive children were assessed using Weschler Intelligence Scale (translated in Urdu), Griffith Mental Development Scales, Goodenough Draw a Man and adaptive function scales to identify the subset of children whose IQ was between 50-69. Children who screened negative on the TQSI were not included in the second phase of the study. As the aim of the study was to only look at children falling within the Mild Mental Retardation range, there was no information on children whose IQ scores may have been lower or higher than the said scores. An extrapolation about sensitivity, specificity and PPR is difficult from the available data, but this study underscores the value of supplementing the TQSI with other measures to identify less severe types of cognitive disabilities, sensory impairments, language and learning related disabilities.
- **Pongprapai et al** conducted a 3 phase study in rural Thailand to look at prevalence of disability³⁶. The first phase included using a modified TQ, to screen children under the age of 15 years. The second phase included assessments on TQ screen positive children using the revised WHO Training of the Disabled in the Community manual and the third phase included assessment by a trained rehabilitation specialist. This study raised concerns about the specific item related to "fits" which resulted in false positives in the first phase especially among a group of children who had febrile seizures. The screen negative children were not assessed further so factors contributing to false negatives were not discussed. A modification addressing the seizure related question was recommended by the authors
- Standardized for the population-Not applicable
- **Appropriate for use in different LAMI countries-** To assess test retest reliability repeat screenings were carried out in Jamaica, Bangladesh and Pakistan conclude that the TQS is a reliable questionnaire and indicators of

reliability are comparable across populations that differ in culture and level of socioeconomic development.³¹

(2) **Criteria especially relevant to LAMI countries**

➤ **Cost- Free**

➤ **Ease of administration –**

– **Training requirements, type and number of staff required-**

– The TQSI has been administered by community workers in all of the above mentioned studies. However, the training required for the same is not clearly mentioned or defined.

– **Understood by caregivers-**

The TQSI as mentioned above has a format that is easily understood by the person administering it and the caregiver. It can be done rapidly and does not require the use of equipments.

– **Is the tool simple enough to be used by lay health workers in a community setting?**

Yes

➤ **Instrument properties**

– **Culture sensitive and understood by caregivers-** Three features of the questionnaire design are intended to enhance its appropriateness and measurement qualities under diverse cultural and socioeconomic conditions: the questions are simple with a yes-no response format; they focus on universal abilities that children in all cultures normally acquire rather than culturally specific behaviours; and they ask the parent to compare the child to others of the same age and cultural setting³¹. The studies described above do not mention if attempts were made to communicate screening results.

– **Helps develop a relationship between health provider and caregiver and does not focus on testing the child**

– The period of contact is short. The context of testing is to determine which children 'pass' or 'fail' the test. Therefore the screening tool may not be supporting this important aspect of the process, which may be crucial to build in the intervention component.

– **Is linked to further assessment and intervention -** The TQSI by itself is not linked to intervention services. Pongprapai et al discuss concerns related to barriers in accessing interventions for the population assessed. A large part of South East Asian region faces similar challenges. Linking community based intervention services to screening instruments like the TQSI and training health workers in both could be considered.

– **TQSI as a part of the ACCESS portfolio-** Wirz et al¹² conducted a study in Srilanka and Uganda involving Child Health Workers who participated in screening and intervention. To address both the above needs, a portfolio comprising of identification and advice sections was created. TQSI and the DDST along with vision and hearing screens was part of the identification section of the portfolio. There was consensus that the project had raised

awareness of disability within the community and workers were pleased to have been involved in this. Parents found the advice and materials helpful.

- **Stigma-** Caregivers reluctance to share concerns, discuss their child's disability is often secondary to the stigma associated with the disability. A brief period of contact for screening purposes limits scope for further communication.
- **Results are understood by caregivers-** The studies using the TQSI alone do not discuss this aspect. However, when the TQSI was used as a part of the ACCESS portfolio, there were other components in the portfolio that encouraged communication with regard to the screening and intervention.

The Trivandaram Developmental Screening Chart

The TDSC was developed in 1991 in Child Development Center, Kerala, India by Nair et al.⁷

(1) General Criteria

- **Target age group-** 0-2 years, needs to be supplemented by other tools to identify older children with or at risk for disabilities.
- **Type of screening tool-** Uses child testing as a method for screening.
- **Developmental Domains covered and description of how the tool is used-** Seventeen test items were chosen to include mental and motor developmental milestones over the first 2 years of age. The range for each test items was taken from the norms given in the Bayley Scales of Infant Development (Baroda norms)⁸. A vertical line is drawn, or a pencil kept vertically, at the level of the chronological age of the child being tested. If the child fails to achieve any item on the left side of the line they are considered to have developmental delay.
- **Does it screen for all disabilities-** No
- **Able to assess functional skills rather than non functional outcomes -** yes
- **Psychometric properties**
 - Sensitivity-66.8%
 - Specificity-78.8%
 - Standardized for the local population- yes as items included in the tool have been taken from the Baroda norms for the Bayley
 - Validity- against the Denver Developmental Screening Test in a two stage study.
 - While discussing the psychometric properties the authors acknowledge the need for a screening tool to have a higher sensitivity than that of the TDSC. However, they state their preference for a screening tool that focuses on a relatively higher specificity like that of the TDSC. The lower rates of identification of children with milder degrees of disability or those at risk were not considered drawbacks. The stated rationale, behind this argument

being that intervention services are unavailable/ inadequate to address the needs of children perceived to have a mild or a 'borderline' disability.

- We agree with the authors' concerns about the sensitivity of the tool, The TDSC appears to be an instrument that is likely to identify the more severely affected children, and less likely to identify the group that has mild to moderate degrees of disability or is at risk for a disability. The TDSC's ability to identify sensory impairments and disabilities other than severe cognitive and motor deficits is also unclear. These concerns are similar to those expressed about the DDST, which in this case has been used for validation purposes. The DDST, like the TDSC is most useful in identifying children with moderate to severe motor or cognitive deficit. However its usefulness is limited in detecting more subtle delays³⁷. The DDST and the TDSC are similar in their psychometric properties of sensitivity and specificity.

(2) **Criteria especially relevant to LAMI countries**

➤ **Cost- Inexpensive**

➤ **Ease of administration –**

- **Training requirements, type and number of staff required-**Can be used by lay community workers and takes 5 minutes to administer. Training required-simple tool requiring a brief training process.
- **Is the tool simple enough to be used by lay health workers in a community setting?** The TDSC has been used by medical interns in the study conducted for validation. The authors state that the screening chart was being field tested for use by Anganwadi Workers in a major community study but it has not been possible to locate further substantive articles in relation to this.

➤ **Instrument properties**

- **Culture sensitive-** yes, based on local norms (Baroda norms) developed from an instrument used in the western population.
- **Understood by caregivers-** Administration and 'pass' 'fail' interpretation is fairly simple for care providers to understand. The nature of the instrument lends itself to be used along with growth charts and road to health charts, and like them be a visual medium for discussion about the child's development. However, as the number of items is small and is not linked to advice/recommendations for supporting child development, communication limited to conveying of results alone, may be a cause for concern. No information is given about the ease of communication of results to parents by the authors or in studies using the TDSC as a screening tool.
- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-** The period of contact is short. The context of testing is to determine which children 'pass' or 'fail' the test. Therefore the screening tool may not be supporting this important aspect of the process, which may be crucial to build in the intervention component.
- **Is linked to further assessment and intervention -**The tool in its current form is not linked to intervention services. Caregivers' reluctance to share concerns, discuss about their child's disability is often secondary to the stigma

associated with the disability. A brief period of contact for screening purposes limits scope for further communication and discussion regarding results of the screening and further intervention.

- Results understood by caregivers- no information is available

Woodside Screening Technique

Gupta et al reported the use of the Woodside Screening Technique by trained Paramedical workers to screen 619 children in an urban slum setting in India (Gupta,1991)³⁸

(1) General Criteria

- **Target Age group** -6 weeks -2 years
- **Type of tool**- combination of child testing and parent interview used
- **Developmental domains assessed**- Motor, language, **adaptive** and personal social domains assessed.
- **Able to assess functional skills rather than non functional outcomes**- the authors and the paramedical workers faced significant difficulties in attempting tasks that seemed functionally less relevant for the given context.
- **Psychometric properties**
 - **Reliability**-97% (between the author and the paramedical workers)
 - **Validity**-
 - **Sensitivity**- 83%
 - **Specificity**- 88%
 - **Over referral rates** (False positives)-10-28%
 - The presence of exclusion factors for screening (excluding children with identified disabilities) meant that the possibility of an artificial increase in sensitivity was prevented.
 - The Woodside Screening technique is validated against the Gesells Development Scales. The high rate of false positives was attributed to a number of items being culturally less relevant. The above sensitivity and specificity has been compared with that of the DDST. The limitations of DDST have already been discussed in the previous section in relation to its limited sensitivity for disabilities other than severe cognitive, motor disabilities.
 - **Standardized for the local population**-no

(2) Context Specific Criteria

- **Cost of the tool**- Information not available.
- **Ease of administration**-
 - **Training requirements, type and number of staff required**-The training required is reported as being 'intense' by the author. The authors have

trained paramedical health workers in the study. The intensity of the training required may be a constraint in resource poor settings for using such a tool.

- Is the tool simple enough to be used by lay health workers in a community setting? - discussed above.

➤ **Instrument properties**

- **Culture sensitivity**- the author reports the presence of some items in the tool that were not culturally appropriate. They made modifications in the some items of the tool to make it more culture sensitive.
- **Understood by caregivers**- difficulties were encountered in helping caregivers and children understand and comply with some of the items.
- **Helps develop a relationship between health provider and caregiver and does not focus on testing the child**- the focus is largely on testing the child and this coupled with the difficulties encountered in testing is likely to create a less than conducive situation for building a relationship with the caregiver.
- Is linked to further assessment and intervention - not linked to intervention.
- **Results are understood by caregivers and health workers**- information regarding communication about results to caregivers not given in the study. The health workers were able to understand the results of the screening test.

Disability Specific Screening Instruments

Sensory disabilities-

Screening test for low vision in developing countries³⁹

Simple but effective tests have been produced for screening subjects with low vision in developing countries

(1) **General Criteria-**

- **Target age group**- above 5years-90 years,
- **Type of screening tool**- uses child/person testing as a method
- **Domains assessed and description of how it is used**-Vision, The kit for assessment of low vision in developing countries contains a visual acuity test-card, a pinhole mask to detect refractive errors, and two manuals with instructions for visual acuity testing the assessment of functional vision, and background information concerning the effects of low vision
- **Does it screen for all disabilities**- No, is specific for visual impairment. Children less than 4 years of age with visual impairment are likely to be missed. Does not provide details of whether children with multiple disabilities- visual and hearing impairment and or intellectual disability can be tested.
- **Assesses functional outcomes as opposed to non functional skills**-yes
- **Psychometric properties**-
 - **Reliability**- not available

- **Validity:-**
- **Simplified Distance vision screen against the Snellen's test**
Sensitivity-85%
Specificity-96%
- **Simplified Near vision screen against the Near vision test for children(NVTC)**
Sensitivity-100%
Specificity-84%
- **Standardized for the local population- No**

(2) **Context specific criteria-**

- **Cost of the tool-** not available
- **Ease of Administration-**
 - **Training required and number and type of staff required-** previously untrained users are reported to have used the kit in the setting of a developing country. But the duration and type of training given, if any is not discussed in the study.
 - **Is it simple enough to be used by lay health workers in a community setting: yes** Qualitative feedback from users of the test card in developing countries has indicated that the format and content employed are suited to local needs. The acuity test card is appropriate, easy to learn, and simple to use in a variety of settings.
- **Instrument properties**
 - **Culture sensitive-yes**
 - **Understood by caregivers and the child being tested-yes**
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child- No**
 - **Is linked to further assessment and intervention -No**
 - **Results understood by caregivers and health workers-yes**

LV Prasad-Functional Vision Questionnaire⁴⁰

LV Prasad-Functional Vision Questionnaire, (LVP-FVQ) was developed to assess self-reported functional vision problems of visually impaired school children in India.

(1) **General criteria**

- **Target age group-**8-18 years
- **Type of instrument-** self report questionnaire used for monitoring vision status
- **Domains assessed-** Visual function

- **Description of the tool-** LVP-FVQ has 19 items (questions) designed to cover four domains: distance vision (six questions), near vision (six questions), color vision (two questions), and visual field (five questions). These 19 items are related to difficulties in performing a variety of tasks. An additional item (question 20) was related to the global self-assessment of a subject's vision in comparison to his or her normal sighted friends.
 - Screens for all disabilities- functional difficulties in visually impaired children
 - **Does it assess functional outcomes as opposed to non functional skills-yes**
 - **Psychometric properties-** reliability-0.93
 - Sensitivity and specificity- Not available
 - Standardized for the local population-no
- (2) **Context specific criteria-**
- **Cost of the tool-** Not available
 - **Ease of administration-**
 - **Training required, number and kind of staff required-** Since it is a self report tool, we need to look at the staff and the child's (who is to answer) skill levels. The author does see the tool being used in a community setting, but only talks about it's use by optometrist and paraoptometrists in this paper. The inclusion criteria and the nature of the questionnaire require that the respondent (child) has a certain level of language skills. Children with other co morbidities such as hearing impairment and intellectual disabilities were excluded from the study. This shows that this tool cannot be used for children who have multiple disabilities.
 - **Tool must be simple and be able to be used by lay health workers in a community setting-** Given the requirements stated, widespread use may not be feasible.
 - **Instrument properties**
 - **Culture sensitivity-** The questionnaire is targeted towards children who are going to school and many items are related to literacy and classroom settings. It may not be universally applicable to all children with visual impairments- (especially those who are younger and older children who are not literate/going to school)
 - **Understood by caregivers-** respondents in the study were able to understand the questions.
 - **Helps develop a relationship between health provider and caregiver and does not focus on testing the child-** It has the potential to especially if the responses lead to planned interventions
 - **Is linked to further assessment and intervention instead of stigmatizing the child-** According to the authors the questionnaire can be used in the following ways:
 - (i) Optometrists and Para optometrists using the tool can decide and plan referrals and interventions

- (ii) The questionnaire provides eye care professionals with a structured format for recording vision problems of children with visual impairment
- (iii) It guides them in planning appropriate interventions
- **Results are understood by caregivers and health workers- yes**

Hearing Impairment

The limitations of conducting widespread screening exercises in LAMI countries for hearing impairment is constrained because of limitations in manpower, equipments needed and uniform policy on monitoring. ⁴¹ authors have questioned the rationale of screening when intervention services are unavailable or inadequate. All six SEA countries have a national ear and hearing care policy in some form or other. Most of these countries already have legislation/law for environment noise control, education of the deaf and occupational possibilities for the deaf⁴². Although all countries have developed national programmes for prevention of deafness, the problem is how to evaluate and to measure the implementation activities in the field. Screening and intervention services, though an area of specific focus of such programs is likely to suffer from same limitations-inequitable access and quality.

Alternate Approaches to Identify Disabilities

In the South East Asian region the process of screening the children in the population for early identification of disabilities is challenging because of various reasons discussed in this review. Authors like Kuruvilla et al ¹⁰ have looked at the community survey method with rapid rural appraisal (RRA) in identifying disability in all age groups in a rural population in India. RRA used social mapping, semi-structured interviews and direct observation to identify people with disabilities. The drawback of this technique was that no child under the age of two was identified using either method and children under the age of 5 were only identified if they had a severe disability. The authors recommend the use of a simple screening tool such as the TDSC for all children under 2 years of age. The authors state that the RRA can facilitate community awareness of disability and participation in rehabilitation.

Elsewhere in the developing countries, other alternative screening methods have been described. The key informant and community survey methods for identifying children with disability in Jamaica⁹ and the Participatory Rural Appraisal (PRA) in rural Kenya described by Gona et al⁴³ are two such approaches. The latter is described as a research approach which involves local communities as active analysts of their own situation so that they can set their own priorities on how to change their situations. The cost involved in such screenings is lower and approaches like the PRA work towards increasing awareness and local participation.

Research Work in Progress in the Region

Two large scale research studies are underway in India. Both the studies are working towards development of a disability identification tool (a screening tool in the INCLIN study and a developmental monitoring tool in the NIH study). The tool being researched in the latter study has been described in the section which describes individual instruments.

Neuro Developmental Studies in Children in India- An INCLEN Study

A 2 phase INCLEN study is currently underway in India.

The Study aims of the 2 phase INCLEN study-

- (1) To develop a Neuro Developmental Screening Test (NDST) a community based screening tool for 10 neurodevelopmental disorders in children between the ages of 2-9 years.
- (2) To develop consensus clinical criteria (CCC) for diagnosis of neurodevelopmental disorders
- (3) To validate the NDST using these criteria
- (4) The second phase will include usage of the NDST and the CCC in the community to establish prevalence of disabilities
- (5) To characterize clinical spectrum of neuro developmental disorders (including the Autism Spectrum Disorders)

Expected Outcomes of the Study

- (1) A culturally sensitive and valid Neuro-developmental Disability Screening Tool (NDST) and “Consensus Clinical Criteria” for classifying each Neuro-developmental Disability will be developed. This is expected to have wide applicability in India and other low and middle income countries.
- (2) Estimation of Prevalence of neuro-developmental disabilities in children ages 2-9 in India and comparisons with services available to address them.
- (3) Data on modifiable risk factors will be used to design comprehensive community-based sustainable intervention programs for prevention and rehabilitation of children with NDDs.

(Source: Courtesy INCLEN website – www.inclen.org)

Development of an International Guide for Monitoring Child Development⁵

Study underway in 4 LAMI countries- India, South Africa, Argentina and Turkey. The study aims to

- (1) Standardize the Guide for Monitoring Child Development (GMCD) in four Low and Middle Income Countries that have very different demographic, cultural and linguistic characteristics so as to make it appropriate for universal use.
- (2) Establish valid scoring criteria for the GMCD that enables accurate detection of developmental difficulties when used in different cultures and languages.
- (3) Conduct a pilot study in the four countries to identify approaches to implementing and sustaining ongoing developmental monitoring using the GMCD in community health

clinics and assess to what extent identification of developmental difficulties using the GMCD results in access to services and appropriate management of developmental disabilities.

Expected Outcomes

- (1) The proposed study will develop the GMCD further to make it appropriate for use in diverse LMICs, establish its validity, and identify approaches to implementing and sustaining its use in clinical settings.
- (2) At the end of the proposed five-year project a standardized method for developmental monitoring that has proven validity in four countries with different cultures and multiple languages will have been developed
- (3) By the end of this study, pilot evidence on what kind of intervention model is needed for developmental monitoring to be feasible and sustainable for the detection and management of DDs within multiple health care systems. This model will have the potential to be directly applied in the entire country as well as in other LMIC.

Discussion

The review of studies presented above allows us to discuss in detail the questions that were raised as part of the objectives of this study. Two other issues relevant to the review are discussed – the use of screening v/s developmental surveillance, and the option of using techniques other than community survey for identifying children with disabilities.

- (1) **Are there Screening tools that have been specifically developed for and are in use in the South East Asian region?**

There is a paucity of research on childhood disability in the SEA region, and LAMI countries in general. Of the existing research, the bulk focuses on screening and establishing prevalence¹. The studies are fraught with difficulty in establishing a common definition of disability. Many of the studies do not describe psychometric properties of the tool completely. Some have been validated against the earlier versions of the DDST, which has been questioned in terms of its accuracy in screening for children with disability⁴⁴

The TQSI is a tool designed for use in LAMI and SEAR countries, and has been extensively studied. The TQSI has the advantage of being brief, easy to administer (though it is not clear how much training is required to administer it) and is low cost. It uses parent report to identify disability and uses functional outcomes that are not culture specific. However, it has many drawbacks including those stated in the section on 'Special issues in LAMI countries'. It relies on parent report in countries where parents may have inadequate knowledge about child development. It also uses an interview method where parents are asked to respond in yes/ no answers to sensitive questions. This leaves no room for building a relationship between a caregiver and care provider. Parents are unlikely to report issues that are associated with stigma for their family or child in this setting. It has also been found to have poor sensitivity for mild to moderate disabilities as well as sensory disabilities. Since the screen does not identify specific disabilities, a second level of assessment would be required to establish the

specific disability and appropriate intervention. This may not be feasible in many resource poor settings.

(2) **Is there a screening tool that identifies all disabilities?**

There is no one tool that identifies all disabilities. Most of the screening tools discussed above look at development across all domains. Disability specific psychometric properties have not been described for most tools. For instance, we do not know the sensitivity and specificity of these tools in identifying a specific disability like autism. The AAP Council on Children with Disabilities recommends screening for specific disabilities in the context of routine developmental surveillance⁴⁵. Also, there is some concern about community health workers in LAMI countries not being able to identify disability in children less than 2 years of age¹². This means that particularly for disabilities where identification and intervention is time critical with respect to outcome (e.g. hearing impairment) screening for that specific disability may need to happen independent of, and in addition to, the use of a global screening instrument⁴. This may require coordination across sectors (e.g. in conjunction with maternal and neonatal health programs).

(3) **Should there be developmental screening as a one time event at a particular age or should there be ongoing developmental surveillance/monitoring by care providers?**

The dialogue between a caregiver and care provider regarding child development needs to be an ongoing process. In the West there is increasing recognition of the fact that viewing developmental screening as a one time cross sectional event for a community may not be as effective as incorporating developmental surveillance into well child care by care providers⁴⁶. The recent Lancet series on child development interventions also points out that the quality of the relationship between the care provider and caregiver is positively correlated with effectiveness. Developmental surveillance or monitoring can create an opportunity for such positive relationships leading to effective interventions⁵

(4) **In LAMI countries, is it possible to provide a detailed assessment for all screen positive children for an accurate diagnosis?**

The purpose of the screening instruments in most of the studies discussed above has been to provide prevalence estimates or to establish the psychometric properties of the tool. Estimation of prevalence is important for every country to understand local patterns, and to establish childhood disability as a priority for national policy. However, it is important to move beyond this goal, and look at what needs to be done next after children screen positive. Even the TQSI³⁰ is effective in identifying a specific disability only if a second level screen by a skilled person is available. In order to establish validity, there has been a skilled person administering a 'gold standard' tool in many of these studies. However, it is important to consider whether this is feasible in a non – research setting. The paucity of skilled professionals in LAMI countries has been noted previously, and the felt need even by pediatricians to include more in their training about childhood disability has been noted^{6,47}

(5) **Which Existing screening tools have intervention services linked to them?**

Most of the screening tools discussed in the previous section do not discuss interventions linked to screening positive. When screening tools are used in the community for the purposes of providing further interventions, it becomes ethically

important to ensure that effective interventions are available⁴⁸. Some of the studies have looked at using screening tools in conjunction with a simple parent education based intervention to promote child development such as the ACCESS study¹². Mathur et al¹¹ looked at the role of AWWs in detecting disability. As part of the study, a skilled team of professionals assessed children who screened positive, and nutritional support and immunization were provided as intervention. In the study by Pongprapai et al from Thailand³⁶ the physician who assessed screen positive children provided counseling for the families. However there are not enough studies from LAMI countries that demonstrate linkage between screening and intervention.

The GMCD (Guide for Monitoring Child Development,⁵) offers three components, one of which addresses the need for including intervention as part of the package offered by care providers. The intervention package is an expanded version of the Care for Development Intervention developed by WHO and UNICEF, which has been documented as an effective intervention in several LAMI countries². The process of standardizing the instrument for use in four LAMI countries is underway and it offers a promising option for monitoring child development while linking it to intervention.

(6) **Using methods other than community based surveys**

School based developmental screening instruments have been used to help teachers assess the percentage of children in a group who exhibit school readiness e.g. the Early Development Inventory⁴⁸. This is a population-based approach that is meant to drive policy rather than provide interventions for an individual child.

Other ways of identifying individuals with disability have been considered by some researchers, in particular, Participatory Rural Appraisal and the Key Informant approach⁴³. While there are concerns about these approaches with respect to sensitivity, particularly for childhood disability,⁹ it appears to be a low cost approach which can be effective in identifying local perceptions of disability.

Conclusion

- The identification of children with or at risk for disability is an issue of key importance for countries in South East Asia, and all Low and Middle Income countries. Identifying these children will help allocate scarce resources effectively.
- Screening instruments developed and used so far have had limitations in terms of key issues relevant to LAMI countries. There needs to be a tool that will promote relationships between care providers and caregivers at the community level. This will drive the process of identification as well as link it to interventions.
- Developmental monitoring or surveillance as part of routine health care (or other ways of interacting with young children e.g. preschools) appears to be preferable to a single large screening process and subsequent referral to specialists.
- A second level of detailed assessment by skilled professionals following a positive screen may not be feasible in actual practice in resource poor settings. It therefore becomes ethically important to link the monitoring or screening to interventions at the community level.
- There are some monitoring / screening tools that are currently in the process of being standardized for LAMI countries. Until such time that an ideal tool is

available that meets the needs of LAMI countries, existing instruments need to be combined with an intervention package (such as Care for Development developed by WHO and UNICEF) in a manner that is appropriate for that community.

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Name of the tool	General Criteria						
	age group	Type of the Screening tool	Developmental domains assessed	Assess functional skills	Psychometric properties		
					Reliability	Validity	Standardized for the local population
ACCESS Portfolio	0-3 years	Combination of child testing and parent interview	fine motor-adaptive, gross motor, personal-social, and language skills and areas covered by TQSI	yes	Information not available	Information not available	some components like DDST standardised
Baroda Development Screening Test for Infants	0-30 months	Combination of child testing and parent interview	Mental and motor milestones assessed	Yes	Information not available	Sensitivity-65-93% Specificity-77.37%-94.44%	No
Developmental Assessment Tool for Anganwadis (DATA)	2-3 years	Combination of child testing and parent interview	fine motor-adaptive, gross motor, personal-social, and language skills and areas covered by TQSI	Information not available	High	Data not available	No
Disability Screening Schedule	0-6 years	Combination of child testing and parent interview	motor, cognitive and sensory domain.	Information not available	good	Sensitivity-89% Specificity-98%	No
Early Childhood Care and Development-ECCD, Philippines	0-5 years	child testing	fine and gross motor, receptive and expressive language, self-help, cognitive, and social-emotional	Information not available	Information not available	Information not available	
The Guide for Monitoring Child Development	0-3.5 years	Parent report	expressive and receptive language, gross and fine motor , social , play and self help skills	yes	High	Sensitivity-86% Specificity-93%	Yes, in Turkey. Standardization in 4 LAMI countries underway
Indonesian adaptation of Vineland Adaptive Behavior Scales	0-18 years	Parent/teacher report	Communication, Daily Living Skills, Socialization, and Maladaptive Behavior.	yes	No	Not done	No
Psychosocial Developmental Screening Test	0-6 years	Child Testing	gross motor, fine motor and vision, self help skills or personal skills, social skills and hearing and concept development	yes	High	Information not available	Yes
Rapid Pre-screening Denver Questionnaire -(R-PDQ)	0-6 years	Parent questionnaire	gross motor, fine motor activity, personal-social and language	No	Information not available	sensitivity-100% specificity-7.8%	No

Name of the tool	General Criteria						
	age group	Type of the Screening tool	Developmental domains assessed	Assess functional skills	Psychometric properties		
					Reliability	Validity	Standardized for the local population
Shoklo Developmental Test (Thailand)	3-12 months	Combination of child testing and parent interview	motor, cognitive, social-emotional behaviours and speech	Information not available	Information not available	Validated against the Griffith Mental Development Scales	No
Shoklo Neurological test for children (Thailand)	9-36 months	child testing	assesses coordination, tone and behaviour	Not applicable	Information not available	specific information not available	No
Ten Questions Screening Instrument	2-9 years, modified TQSI for 0-2 years	Parent report	Cognition, movement and seizures, vision, hearing, behaviours	yes	good	Sensitivity and specificity >80% for serious disabilities	Not applicable
The Trivandrum Developmental Screening Chart	0-2 years	Child Testing	Mental and motor milestones assessed	yes	Information not available	Sensitivity-66.8% Specificity-78.8%	No
Woodside Screening Technique	6 weeks to 2 years	Child Testing and parent interview	Motor, language, adaptive and personal social skills	No	High	sensitivity-83% specificity-88%	No
LV Prasad-Functional Vision Questionnaire	8-18 years	self report questionnaire for monitoring vision	vision	yes	High	Information not available	No
Screening test for low vision in developing countries	5 yrs-90 yrs	testing the child/adult	vision	No	Not available	sensitivity-100% specificity-84%	No

Name of the tool	Context Specific Criteria							
	Cost of the tool	Ease of administration		Instrument properties				
		Training requirements, type and number of staff	simple enough to be used by lay CHWs	Culture sensitivity	Understood by caregivers	Helps develop a relationship with caregivers	Is linked to further intervention	Results understood by caregivers
ACCESS Portfolio	Information not available	4-5 days	yes	yes	yes	yes	yes	yes
Baroda Development Screening Test for Infants	Inexpensive	5-6 hrs of training required	Yes	yes	Yes	No	No	Information not available
Developmental Assessment Tool for Anganwadis (DATA)	not available for use	Information not available	not clear at this stage	yes	information not available	No	No	Information not available
Disability Screening Schedule	Information not available	Training for 6 days	yes	yes	No	No	No	No
Early Childhood Care and Development- ECCD, Philippines	Information not available	Information not available	No	Information not available	information not available	Information not available	No	
The Guide for Monitoring Child Development		1 day for each of the three components	yes	yes	yes	yes	yes	yes
Indonesian adaptation of Vineland Adaptive Behavior Scales	not available	Information not available	not clear at this stage	yes	yes	Information not available	may not be for community use	Information not available
Psychosocial Developmental Screening Test	Inexpensive	2 weeks	yes	yes	yes	No	No	Information not available
Rapid Pre-screening Denver Questionnaire- (R-PDQ)	Information not available	Information not available	not clear at this stage	No	No	No	No	No
Shoklo Developmental Test (Thailand)	Information not available	Information not available	yes	Information not available	information not available	No	No	Information not available
Shoklo Neurological test for children (Thailand)	Information not available	Information not available	yes	Information not available	information not available	No	No	Information not available

Name of the tool	Context Specific Criteria							
	Cost of the tool	Ease of administration		Instrument properties				
		Training requirements, type and number of staff	simple enough to be used by lay CHWs	Culture sensitivity	Understood by caregivers	Helps develop a relationship with caregivers	Is linked to further intervention	Results understood by caregivers
Ten Questions Screening Instrument	Free	Information not available	yes	yes	yes	No	No	Information not available
The Trivandrum Developmental Screening Chart	Inexpensive	described as brief	yes	yes	Yes	No	No	Information not available
Woodside Screening Technique	Information not available	Intense	No	No	No	No	No	Information not available
LV Prasad-Functional Vision Questionnaire	Information not available	Information not available	Self report form- requires language, literacy skills	Context in which tool can be used limited	yes	yes	yes	yes
Screening test for low vision in developing countries	Information not available	Information not available	yes	yes	yes	No	No	yes