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# Training packages for the use of child development tools in low/middle-income countries: a review

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## ABSTRACT

**Background** We are now moving beyond the focus of 'child survival' to an era which promotes children thriving and developing rather than simply 'surviving'. In doing so, we are becoming more aware of the large variation of child development screening tools available globally, but in particular, those in low/middle-income countries (LMICs).

**Methods** This narrative review identifies 24 child development tools used in LMICs. We aimed to identify information on training accessibility and training design, assessment methods and cost of training. For those tools with no training information identified or for any tools identified as providing online training, the tool author was contacted individually to obtain information on the features of the tool's training package.

**Results** Information on training features was identified for 18 tools. All of the tools are identified as screening tools with some also identified as surveillance or assessment tools. The training material for the majority of the tools was not readily accessible and most training packages were proprietary and only available with a face-to-face training design. Other training options included a user manual, training videos or training through an online platform.

**Conclusions** Training is a key factor when selecting a child development screening or surveillance tool particularly in a low-income or middle-income setting where funds may be limited. The accessibility of training can have a key impact on the implementation and utilisation of tools desperately needed for use in LMICs.

## INTRODUCTION

### Early childhood development

Sustainable Development Goal 4.2.1 places great emphasis on early childhood development and the need for countries to monitor that their youngest children are on track developmentally.<sup>1</sup> Factors such as poverty and nutrition put children at risk of not achieving their developmental potential, with approximately 250 million children affected in developing countries.<sup>2</sup> Furthermore, early identification of developmental delay improves child outcomes by providing access to services to those in need.<sup>3–5</sup> Developmental monitoring, surveillance and screening are critical components of promoting developmental progress but to do so, countries need valid, easy-to-use tools with clear training protocols to ensure correct application and high-quality data.

### Developmental screening, surveillance and monitoring

For this review, we used definitions from the literature and recent WHO reports.<sup>6</sup> 'Developmental

assessment' refers to 'an evaluation of a child's skills in multiple areas of function, including cognition, communication, motor skills, daily living skills, and social and behavioral skills' that can be used for diagnostic purposes.<sup>7</sup> Developmental screening involves 'the use of standardised tool to identify the risk' for developmental delay.<sup>8</sup> In contrast, 'developmental monitoring' refers to the tracking of a child's growth and development 'in collaboration with the family (asking about parental concerns, obtaining a developmental history, observing the child during the visit, identifying risk and protective factors [...])'.<sup>9</sup> Monitoring has no 'predetermined time frame' and takes into account risk factors within the child's environment.<sup>6</sup> Developmental 'surveillance' can be used interchangeably with 'monitoring' but as 'surveillance' might imply 'looking for something that has gone wrong or is about to go wrong',<sup>6</sup> many prefer the term 'monitoring'.

This review focuses on screening tools; however, some of the identified tools are also described as assessment or surveillance tools if they function as a screener. We have focused on tools described as screening tools as these tools are most often used at scale within national programmes. We realise that there is a debate regarding child developmental screening, and best practice recommends using tools as part of ongoing child surveillance or monitoring programmes.<sup>10</sup>

### Key features of developmental tools to consider

There are various important features that users may consider when deciding on their use of a developmental tool.<sup>11</sup> These include: the type of tool, developmental domains addressed, target age group, number of items (length and time for administration), cost involved, whether the tool is suitable for the local context and its adaptability to the cultural settings. This can be of particular importance when choosing a tool for resource-limited and culturally diverse settings where aspects, such as the applicability to the cultural context and the language in which the tool is provided, are key. Furthermore, the mode of administration is vital when assessing what training features may be required. For example, caregiver report involves a caregiver answering questions about the child, whereas direct observation requires the child to complete tasks provided through an assessor (the person applying the tool); or a mix of both. Through our review, we note requirements for assessors and the time needed to administer the tool. Child development screening or surveillance tools are often shorter and faster to administer with lower costs and expertise required in comparison with child development assessment



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tools, therefore often preferable in resource-limited settings. Furthermore, scoring and referral pathways are vital to consider, particularly when tools are used across settings with different support infrastructures for children identified with difficulties. Boggs *et al*<sup>12</sup> provide a useful overview of tools' validity and reliability, cultural adaptability and accessibility; these have not been directly assessed in this review as the main focus was training features.

### Training features

Training is a key consideration when choosing and implementing a screening tool<sup>13</sup> with a number of areas important to consider prior to making decisions about which tool to use. First, the length of training and certification process for the assessor, whether it is a direct training or a training of trainers (those training the assessors) format. Second, the source and availability of training materials, including features such as an open website, published literature, manual, and whether a request needs to be made to the tool's author or publisher. Third, the training approach—including whether it is done in person, online, and whether it is interactive (eg, reviewing items, role-play, simulations) or less interactive (using manuals). Feasibility features such as cost and language(s) can also greatly affect a tool's suitability for a specific context. Finally, the certification method (process by which an assessor is deemed competent to apply the tool unsupervised) can also vary ranging from direct supervision by a trainer to reaching a minimum inter-rater agreement ('the extent to which two or more raters agree'<sup>14</sup>). In some cases, formal certificates are provided on completion of training. These features are used to evaluate our review of tools shown in later sections.

With the recent COVID-19 pandemic, we particularly concentrate on the importance of online open-resource materials which will enable access to training through alternative methods to face-to-face training.

### Study aim

There are no reviews in the literature which examine characteristics of training provision for child development screening tools. This is an essential component of tool choice, often overlooked. We aim to clearly present the important features of training to consider with child development screening tools. Our objectives are:

1. To describe training approaches for child development screening tools.
2. To identify exemplar training approaches/packages.

## METHODS

### Selection criteria

Two large-scale systematic reviews,<sup>12 15</sup> the American Association of Pediatrics website on screening tools<sup>16</sup> and the World Bank report on measuring child development in low/middle-income countries (LMICs),<sup>17</sup> were used to generate a list of developmental screening tools using the criteria shown in [figure 1](#).

We label this review as a narrative review as in addition to the systematic reviews used, we conducted a specific but not systematic search to identify any additional tools not included in the systematic reviews. Two expert researchers reviewed the list and suggested more tools fitting the criteria. A total of 24 tools were identified of which 18 had retrievable information on training provision.

### Data extraction and analysis

For each tool, we extracted data on: the name, type of tool, country of use (and origin), target age, number of items, time

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> <li>○ Tool recognised as an individual-level developmental screening tool (as defined by the developers or publishers).</li> <li>○ Tool applicable for children from birth to 17 years old</li> <li>○ Tool examines multiple (&gt;1) developmental domains</li> <li>○ Tool used in at least one LMIC</li> </ul>	<ul style="list-style-type: none"> <li>○ Tool recognised as a population-level tool and/or as a more in-depth developmental assessment or diagnostic tool.</li> <li>○ Tool applicable for adults &gt;17 years old</li> <li>○ Tool examines only one or no specific developmental domains</li> <li>○ Tool used only in high-income countries</li> </ul>

**Figure 1** An outline of the inclusion and exclusion criteria. LMIC, low/middle-income country.

taken for administration, developmental domains, mode of administration, assessors' qualifications and availability of training package. We then extracted information on: training of trainers availability, length of training, training methods, certification process, training cost and training language(s).

We conducted our literature search on PubMed, MedEd-Publish and the Cochrane Library online databases identifying papers referring to each screening tool. A web search was also performed to check for the presence of a designated webpage for each tool. The researcher contacted tool developers via email to collect any missing information for nine tools. In eight cases, additional information was identified.

## RESULTS

[Figure 2](#) outlines the review of sources and tools fulfilling the inclusion/exclusion criteria. Although 24 tools were identified, training information was only available for 18 tools; this section focuses on those. Of the six tools without information on training, five were developed in non-English-speaking countries.

### Tools' main features

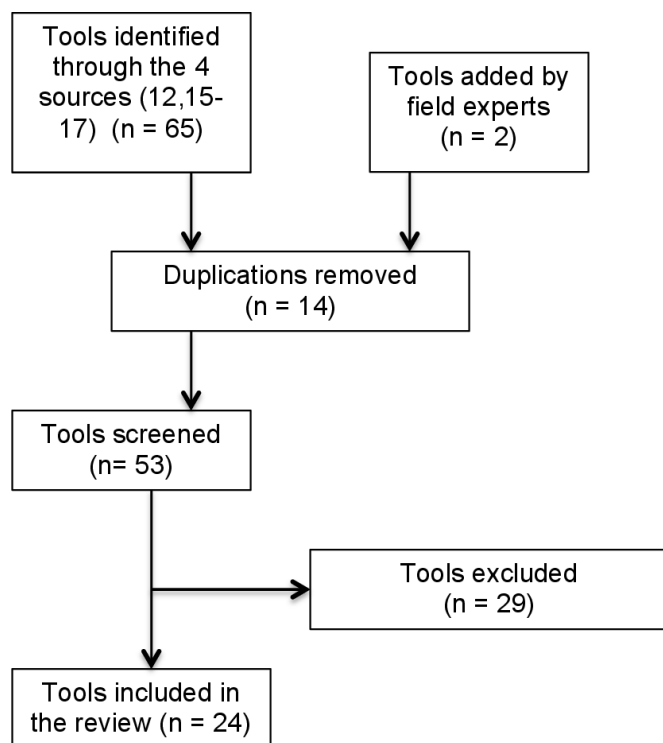
An overview of all 18 tools is provided in online supplemental table 1.

All 18 tools were described by their developers or publishers as developmental screening tools; however, three of these tools have also been classified as surveillance tools<sup>18 19</sup> and two as assessment tools.<sup>20 21</sup> Six tools were developed in the USA<sup>18 22–26</sup>; with others developed in India,<sup>27 28</sup> Bangladesh,<sup>20 29</sup> Cambodia,<sup>30</sup> Malawi,<sup>21</sup> Mexico<sup>31</sup> and Mongolia.<sup>32</sup> The tools cover a range of ages up to 8 years, with the exception of the Washington Group Question Sets targeting up to 17 years.<sup>33</sup> The number of items per tool varied from 8 (Parents' Evaluation of Developmental Status, also known as PEDS<sup>18</sup>) to 161 items (Mongolian Rapid Baby Scale<sup>32</sup>). The developmental domains mainly addressed were: gross and fine motor, language, cognition, behavioural, social-emotional, vision and hearing.

Ten tools (~55%) were solely caregiver reported, two used both caregiver report and child observation, and the remaining six used direct observation. Assessors' qualifications ranged from a minimum requirement of high school education<sup>21</sup> to a graduate degree and background working with children.<sup>20</sup> Most tools required the assessor to be a healthcare professional, psychologist, social worker or health visitor. Most tools required 30min to administer, apart from the Rapid Neurodevelopmental Assessment (RNDA)<sup>20</sup> (45 min) due to its complexity and use as an assessment tool.

### Training features

An overview of all 18 tools' training features is provided in online supplemental table 2.



**Figure 2** A flow chart of the search procedure.

### Training features overview

The existence of a separate assessor's manual was found for five tools. Around 44% of tools had their own dedicated website, which included a variety of resources (manuals, training information). Seven (39%) tools offered training of trainers. Training length for assessors varied from a few minutes through online videos for the Infant Neurological International Battery (INFANIB)<sup>34</sup> to 2 weeks, for the Indian Council of Medical Research (ICMR) Psychosocial Development Screening Test.<sup>35</sup> The INFANIB training videos are available via the Physiopedia website and include demonstrations of how to administer items but not the whole assessment. The RNDA tool was the tool found to have a clear training agenda available online.<sup>20</sup> For most tools, there was a need to contact the authors or publishers for training information.

### Training approach

For most tools, training has been provided face-to-face through a combination of presentations, written materials such as manuals (eg, Guide for Monitoring Child Development (GMCD)<sup>36</sup>) and 'hands-on practice' using role-play and case studies (eg, Ages and Stages Questionnaires (ASQ)<sup>22</sup>) or demonstrations (Cambodian Development Milestone Assessment Tool (cDMAT)<sup>30</sup>). Videos for demonstration were found both from unofficial sources (eg, for the INFANIB<sup>34</sup>) or from official sources (eg, for the RNDA<sup>20</sup>). Three tools provided the option of training DVDs.

At the time of the review, only four tools offered online training packages: Child Development Evaluation (CDE) tool, Malawi Developmental Assessment Tool (MDAT), Mongolian Rapid Baby Scale and PEDS; however, the delivery of the training varied. The CDE tool,<sup>31</sup> developed in Mexico, offered asynchronous online interactive training. Trainees are given access to an online platform that includes all training content which they can complete at their own pace. They then complete assessments to test mastery of the content and write a reflection

on what they have learnt. Furthermore, regional master trainers provide face-to-face support and supervision. The MDAT<sup>21</sup> tool provides a synchronous approach whereby four to five online sessions, running 2–3 hours each, are organised over the course of 1–2 weeks. Sessions are run by senior trainers using presentations, videos, scenarios, Google quizzes and discussion around prerecorded videos.

### Certification process

The process for certification was mentioned for 10 tools. Most tools describe the use of inter-rater reliability measurements prior to their use and mainly for research studies with little information available on the official evaluation standards of competence for assessors. Examples of certification processes used for tools within research context included: a minimum of at least one 'direct observation of the candidate by a certified assessor' for the Lucknow Developmental Screening tool,<sup>27</sup> 'achievement of 95% inter-rater agreement between four assessors on 25 consecutive administrations' for the GMCD,<sup>36</sup> '90% inter-rater reliability on five consecutive tests' with 17 examiners using the Denver Developmental Screening Test<sup>25</sup> or 'inter-rater agreement between a fully trained doctor and the trainee' on 20 cases using the Shoklo Neurological and Developmental Tests.<sup>19</sup> These examples are hugely variable and will require different statistical procedures depending on whether it is between a certified assessor and trainee or between several trainees at once. Furthermore, most do not consider ongoing supervision or quality monitoring. One tool which did was the Shoklo Neurological and Developmental Test which provides guidance in its standard operating procedure<sup>37</sup> for each tester who should administer the test at least four times per month with regular monitoring and supervision twice a year at the Shoklo Malaria Research Unit.

For online training, different methods might be used for trainee certification. For the CDE, training participants are asked to identify errors in video clips of the administration of individual items or select the correct administration video; they must score  $\geq 95\%$ . For other tools (RNDA, MDAT),<sup>20,21</sup> a video of the trainee administering the tool in a real-life scenario has to be submitted to the tool's training team for review.

### Cost, language and accessibility

Cost of training ranged from 'no cost' to a maximum of US\$4025.<sup>22</sup> No information on training costs could be found for six tools. Additionally, there may be costs associated with purchasing of materials used for the tool and/or copyright, which have not been included in this review. English was the most common language for training; six tools had no information on training language. Training for some tools was provided in other languages such as Hindi,<sup>27</sup> Mongolian<sup>32</sup> and Spanish.<sup>31</sup> Seven tools had their own website: ASQ,<sup>22</sup> PEDS,<sup>18</sup> MDAT,<sup>38</sup> RNDA,<sup>20</sup> cDMAT,<sup>39</sup> Washington Group Question Sets,<sup>33</sup> Survey of Wellbeing of Young Children.<sup>24</sup> Availability and accessibility to training was often more direct in those cases. We did not identify any information on how training has been adapted in accordance to COVID-19 safety regulations.

## DISCUSSION

The information provided in this review highlights some challenges surrounding training provision and accessibility for screening tools in low-resource countries. We have identified a few key points emerging from our review: the need for better accessibility, adaptability (including use of language) and online training.

### Accessibility of training

Less than 50% of tools reviewed are hosted on a website that includes training information. Information on training for remaining tools was collected through a literature search, expert recommendation or contact with tool developers. This is a time-consuming procedure that is impractical for professionals looking to use child development screening tools.

### Adaptability of the training

It is important that the training is adaptable to the needs of LMICs as well as culturally diverse settings, especially when several of the measures were developed in high-income, Western countries and often in English. Training should be culturally and linguistically appropriate, ensuring training materials are well translated prior to use and incorporating relevant local referral guidelines. Otherwise, there is the risk that the tools will not be administered appropriately to identify children needing further support or assessment. It is vital therefore that there is guidance as to how to consider this in local contexts; having local training of trainers who take on a role of supervising these issues may effectively address this.

### Online training

The majority of tools mentioned relied on in-person training which often entails travel to the local site, cost of holding the training, long sessions and certification processes that needs to be completed before the training ends. Tools incorporating online elements provide more flexibility, especially relevant during the COVID-19 pandemic. One good example was the CDE tool, which provides a robust online training package, allowing remote training and supervision through an online training platform.

### Quality monitoring

It has been difficult to extract detailed certification criteria for each tool, and often, it was not clear if inter-rater reliability was used as part of training certification process or tool validation. Some certification criteria were very intensive and may not be scalable when using tools at a national or international level where training occurs across countries and areas. It is obvious, however, that clear certification processes would improve quality of training and consequently of the tool administration and data collected. Continued monitoring and supervision may be important to prevent drift but this needs to be considered in context as it may include checking standards and following guidelines for referral and provision of advice. The development of a guidance document and checklist to support training planning would be of a great benefit. A relevant example are the standards developed by IntraHealth to guide the development and evaluation of training programmes.<sup>40</sup>

### Implications

We have provided a review of all accessible training packages for developmental screening tools used over the past 30 years in LMICs. Recent focus on child development has been highlighted globally through the Nurturing Care Framework with a focus particularly on child development.<sup>41</sup> Without appropriate and accessible training programmes, the use of developmental screening will be minimal and/or of poor quality. Some tools incur high training costs, are available in only one language with both trainers and assessors travelling to provide face-to-face training. Besides the identified challenges, our review has also highlighted features of effective training packages (figure 3).

#### Recommendations on what should a training package include:

- Easy access to the tool and training details, for example through a website
- Flexible training packages that can adapt to learner's experience and qualifications
- Availability of remote training such as through an online platform
- Availability of training in more than one language
- Clear and rigorous assessment process, especially when performed online, for example video- assessed, quiz with set pass mark
- Availability of Training of Trainers approach to build local capacity and facilitate supervision
- Training to be provided at an affordable cost

Figure 3 Suggestive features of an effective training package.

### Study limitations

The tools in this review have been collated from previous reviews looking at neurodevelopment screening tools in LMICs. The involvement of experienced academics and researchers in this study reduces the possibility of omitting important neurodevelopment tools. Although every effort has been made to include all relevant tools, we cannot guarantee that all have been included. In addition, the definitions for screening/surveillance/assessment tools can vary; hence, some tools may be classified differently depending on the definitions their developers have used. A major limitation has been identifying all information on training. Information provided on training is often restricted and we were not always able to access all training packages as learning materials in some cases, were proprietary and were only available to training participants. In addition, we cannot be certain that country-specific, locally developed tools are not omitted, as these may not have been as visible in online resources or publications. Finally, future research could identify and specifically focus on the more widely used tools (rather than any available tools) to make more effective comparisons for policymakers and researchers.

### CONCLUSION

In order for countries to meet targets relating to the Sustainable Development Goal 4.2.1, and to improve the developmental trajectories of children globally, feasible, accessible and low-cost tools must be available.<sup>1</sup> These tools must come with training packages that are accessible and easily implementable. Scalability of use of the tools can be improved by training through online platforms, available in more than one language and at low costs. The manuals and training methods should also be clearly outlined. By improving accessibility of training for child development screening tools, there will be better utilisation of resources globally, enabling a target for 4.2.1 to be reached.

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