HECDI

education

early

childhood

USER MANUAL AND TECHNICAL GUIDE
for the Compact Holistic Early Childhood Development Index (HECDI)

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of Education

ECCE SERIES

Covering children from birth to 8 years old, Early Childhood Care and Education, also known as ECCE, "aims at the holistic development of a child's social, emotional, cognitive and physical needs in order to build a solid and broad foundation for lifelong learning and wellbeing" (UNESCO). It is not only at this stage of life that the development of individuals is the most crucial, but also that the environment around them is the most influential. It is therefore necessary to be able to guarantee each and every child a quality and equity access to education, care, health, nutrition and protection.

In line with target 4.2 of the Sustainable Development Goal 4 which stipulates that 'by 2030, ensure that all girls and boys have access to quality early childhood development, care and pre-primary education so that they are ready for primary education", IBE-UNESCO, mandated to support Member States in the curriculum development, has elaborated the "ECCE Series". These publications are an agile collection of tools, policies and good practices in ECCE as well as the result of IBE's activities in the field. Thus, the purpose of these series is to share practices as a way to contribute to a thriving environment for children's development while providing them with the necessary tools in becoming good and responsible citizens in the future.

The issues of this ECCE Series are to be considered as working instruments, alive, open, everchanging documents aimed at inspiring policy-makers and professionals of the Early Childhood community, in creating better and better curricula and enabler (tools, curricula, policy documents and training processes) with the final goal of giving children the better opportunities in their early years.

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Dubai **Cares**

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Introduction by IBE

It is during their early years that children are given the educational keys necessary to acquire the skills that will influence their future lives. This is why the development and education of the youngest are at the heart of IBE's concerns. The development of the Early Childhood Care and Education (ECCE) instruments, which present the overall ECCE system, reflects the IBE's values and mandate, such as respect for curriculum and overall development to ensure quality education for learners of all ages. The ECCE framework is translated into a series of documents including this User's Manual and Technical Guide for the Holistic Compact Early Childhood Development Index (HECDI). Developed in 2014, the original version of this indicator of young children's well-being has been revised and updated, particularly with regard to data collection sources and the inclusion of children with special needs in the indicators.

Thus, the User's Manual and Technical Guide for the Holistic Compact Early Childhood Development Index (HECDI) contains the quality criteria for being a curricular reference in the field of ECCE while meeting the pursuit of the Sustainable Development Goals, in particular SDG4 for quality education for all, especially target 4.2 on early childhood education and care.

I would like to wish all users a good use of this document.

Mr. **Yao Ydo**
Director of IBE

Introduction by Dubai Cares

Early Childhood Care and Education (ECCE) has been an integral part of Dubai Cares' mandate to ensure underserved children and youth have equitable access to quality education and learning opportunities. We strongly believe in the role that ECCE plays in fostering children's holistic social, emotional, physical, and cognitive development. Through our strong programmatic partnerships, support to research, advocacy, and global platforms, we aim to build resilient and sustainable education systems through evidence-based interventions focused on capacity building and systems strengthening.

We are pleased to see the strong and solid outputs produced through our partnership with UNESCO International Bureau of Education (IBE-UNESCO). The significant support that they have extended to the four countries under this partnership (Laos, Rwanda, Cameron and Eswatini) for over four years, has resulted in developing strong and replicable prototypes, guidelines, M&E tools, and delivery mechanisms for ECCE. Additionally, one of the key milestones of this initiative was the development of the Holistic Early Childhood Development Index (HECDI) framework, which provides indicators and targets for more comprehensive monitoring of the child's development, which can be implemented at both country and international levels.

We strongly believe that these series and the tools that were developed would greatly contribute to the existing body of knowledge for ECCE and better inform both practitioners and policy makers; not just in specific countries included in this partnership, but also for countries that are looking to strengthen its existing ECCE frameworks and modalities. We also hope that this initiative will create a space for much needed dialogue, complementarity and collaborations to take place both on the national and international levels and for more partners to converge and work together in ensuring that ECCE is appropriately positioned within policy and practice.

His Excellency Dr. **Tariq Al Gurg**,
Chief Executive Officer at Dubai Cares
and Member of its Board of Directors

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Foreword

In 2010, following the World Conference on Early Childhood Care and Education, UNESCO began constructing a framework to develop a composite early child development index through interagency collaboration. This work resulted in the Holistic Early Childhood Development Index (HECDI) Framework and Technical Guide which was published in 2014. The publication summarised the resulting work of the HECDI Technical Committee and working groups along with significant consultation and inputs from relevant international agencies.

Since the completion of the original HECDI Technical Guide there was a call for further work and in particular the computation of a HECDI single value index. Specifically UNESCO sought to continue the HECDI development by producing a pragmatic and efficient single index and documenting a means to convert the basket of indicator values into that single index. This was to involve, among other tasks;

» identifying the relative priority of the current indicators (as they were described in UNESCO's 2014 HECDI Technical Guide) and potential new ones in Early Child Care and Education (ECCE), and

» converting those indicators and their priorities into a single, decomposable, numerical value that could be applied at multiple levels.

This document is a result of the further work on the HECDI and serves as both a technical guide on the process of formulating the Single Value Compact HECDI, and as a user manual for the excel spreadsheet file – which computes the index once data on indicator values are inputted[1].

The enhancements to the original HECDI have included:

» A specific definition for each of the individual indicators/sub-targets that make up the HECDI

» A modernisation of the HECDI updating the indicators on the basis of current scientific knowledge of early child development and including disability within the indicator framework

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1   The excel file can be asked to IBE-UNESCO via email, e.drure@unesco.org

» Identification of sources of data to compute the HECDI calculation

» A mathematical computation to calculate one overall HECDI score from the indicator basket. This overal score can now be used to compare towns, regions, countries and sub-population groupings. The mathamatical computation includes;

› A weighting to each indicator that make up the HECDI (i.e. a high mortality rate gains a higher weighting than the lack of a parental leave policy)

› An allowance for missing indicators within the overall computation of the HECDI.

Each of these enhancements have been explained in more detail within this Technical Guide.

As a result of these enhancements to the HECDI, it is now possible for anyone to easily calculate a HECDI score for their own community, region, country or any population group of interest, and this score can then be compared to others. The values for the individual indicators simply need to be entered into the spreadsheet and the HECDI score will be automatically calculated, with the appropriate weightings applied automatically. To help people utilise the calculator, real examples for five different countries have been provided. These countries exemplify data sources and how the calculator itself works (see Appendix 1).

The International Bureau of Education (IBE) is a UNESCO category one Institute mandated as the Centre of Excellence in curriculum and related matters including Early Childhood Care and Education (ECCE). The aim of IBE is to strengthen the capacities of member states to design, develop, and implement curricula that ensure the equity, quality, development-relevance and resource efficiency of education and learning systems. UNESCO's mandate strategically positions IBE to support member states' efforts to implement and monitor Sustainable Development Goal 4 (SDG 4) 'Quality Education for All' and indeed, other SDGs that depend for their success on effective education and learning systems.

In terms of early childhood, target SDG 4.2 states that 'by 2030 ensure that all girls and boys have access to quality early child development, care and pre-primary education so that they are ready for primary education'. However, early childhood development is not simply confined to the field of education only, and as such a globalising approach where the curriculum covers other fields is required. Indeed, education has an influence in other such areas including health, nutrition, child and social welfare to support a healthy learning environment where the wellbeing of children are at the core. Entirely consistent with this understanding, the HECDI is holistic, capturing a broad range of indicators that taken together encapsulate supports for early child development. As such, IBE proposes that the HECDI, as a pragmatic and holistic measurement index, could be used as an overarching index by member states to assess SDG 4.2.

This document is presented in three sections. The first details the process and results of evaluating, prioritising and refining the original HECDI Framework (2014). The second details the formulation of the single value HECDI, including the definition of component scores for each HECDI sub-target/basket indicator, the definition of an aggregation formula that converts the component scores into a single value index, and the weightings for each sub-target in the calculation of the overall index. The final section is concerned with the computation of the single value index and also details three statistical simulations for different baskets of indicator values. Finally, Appendix 1 details the HECDI for 5 countries, exemplifying the use and calculation of the index.

1. Evaluating, prioritising and refining the original HECDI Indicators and Data sources

Targets and sub-targets

The HECDI Framework (2014) lays out 4 overall targets and 20 sub-targets for the monitoring of young children's development and wellbeing at the population level. The targets span health, nutrition, education, social protection, poverty and parental support, thus ensuring a holistic measure of whether a child is achieving their developmental potential.

The 4 overall targets are:

1   Children survive and demonstrate age-appropriate development and learning (6 sub-targets)

2   Children experience cognitively stimulating, emotionally supportive home environments with adequate resources (9 sub-targets)

3   Children and families have access to quality programmes and services addressing health care, good nutrition, education and social protection (4 sub-targets)

4   Children's rights are protected and upheld through the implementation of policies and programmes to support children and families (1 sub-target)

The **definitions sheet** of the spreadsheet file lists *sub-targets* along with *target* codes indicating to which overall target they belong (consistent with target codes from HECDI Framework (2014)). The *area of focus* column indicates whether the sub-target relates to health, nutrition, education, social protection, poverty or parental support.

Indicators and Data sources

The HECDI Framework (2014) outlines indicators and data sources for each sub-target. In order to move towards a workable and well-defined Single Value Indicator, a review was conducted which aided the prioritisation and combination of multiple indicators, highlighted limitations in some of the suggested indicators and data sources, and included more specific or relevant indicators and data sources.

The definitions sheet of the spreadsheet file details the number of indicators suggested in the HECDI Framework (2014) and provides notes on potential limitations of a given indicator, suggestions for prioritising or combining multiple indicators of it, and refines the definitions accordingly. Based on this evaluation, a single, well-defined indicator for each sub-target is provided in the definitions sheet. Data sources suggested in the HECDI Framework (2014) were also assessed, and were validated and prioritised, leading to a suggested primary source for each sub-target, along with detailed references to locations of available data. Potential Secondary Sources are also provided as possible alternatives to the primary suggested sources.

Four sub-targets are flagged (indicated in orange) where significant changes in definition have been made or where there are existing data availability issues and/or where there is a lack of internationally consistent approach. Target 1.3 – not suffering from frequent or chronic illness has been changed to not suffering from disability due to difficulty in defining a stable construct for the former. Further, the lack of inclusion of disability as an indicator within the original HECDI was an obvious oversight in the previous work. Targets 2.2, 2.3 and 3.1 are country-level indicators relating to policy or service delivery, for which there are no existing consistent approaches to defining them and as such no available data. It is suggested that either a set of specific and internationally comparable criteria for these sub-targets be created while considering the availability of relevant data sources, or that these be reconsidered as inclusions within the HECDI at this point in time. For the purposes of a comprehensive simulation, these four indicators are still included in the calculations, but they have been pragmatically reduced to determining if such a policy/service exists or not (rather than making any judgement as to the merit/quality of the policy/service). Noting that the spreadsheet contains all the specific details (including notes on the decision making behind the chosen indicators for each sub-target), this table below provides a brief summary of the final indicators for quick reference.

Table 1: Target and associated indicator

Target Code	Target Name	Indicator
1.1	Survive past age 5	Under-5 mortality rate
1.2	Born without low birthweight	% Low-birthweight babies (% of births)
1.3	Not suffering from disability	% children with severe disability
1.4	Demonstrate age-appropriate development/learning	% 36-59 month old children developmentally "on track"
1.5	Healthy weight (obesity)	% Overweight under age 5
1.6	Healthy weight (malnutrition)	% Stunted under age 5 (less than two standard deviations below median for the international reference population)
2.1	Access to improved drinking water and sanitation	**Average** of % Access to improved drinking water sources **AND** % use of improved sanitation facilities
2.2	Policies for paid parental leave	Is there any maternal leave policy? Is there any paternal leave policy?
2.3	Programs for parent support and education	Are programs to support/improve parenting available to parents?
2.4	Maternal Education	Mother average years of schooling (learning-adjusted)
2.5	Maternal Wellbeing and absence of depression	% of mothers happy
2.6	Emotionally supportive home - absence of domestic violence and violent discipline	% children aged 1-14 years who experience physical punishment and/or psychological aggression by caregivers past month
2.7	Experience frequent cognitive stimulation	% children age 24-59 months engaged in four or more activities to provide early stimulation and responsive care in the last 3 days
2.8	Experience adequate daily care	% children under 5 left alone of with a sibling under 10 for more than a week in last week

Target Code	Target Name	Indicator
2.9	Children not living in poverty	% of children under age 18 live on less than US$1.90 per day
3.1	Country/community monitors and responds to growth/nutritional status	The existence of a system approach to monitoring child growth
3.2	Access to comprehensive preventative/medical care, including well-baby checks, immunizations and responses to emergency need	**Average** % women receiving post-natal health check **AND** % 24-35 month year olds have full immunization coverage
3.3	Mothers have access to pregnancy/birth services	**Average** % mothers with skilled birth attendant **AND** % pregnancies with >=4 antenatal visits
3.4	Access to quality ECCE from birth to school entry	% children age 36-59 months who are attending an early childhood education programme
4.1	Country/state provides legal guarantee of rights	% children registered at birth

It is recognised that some of the indicators are not an ideal match for the sub-target. Much of the decision making around the indicators had to be pragmatic, and thus based on ready availability of data across countries. It is recommended that in future iterations of the HECDI, indicator sources be reviewed, and as countries build wider measurement systems, there may be more ideal indicators for some of the targets.

The following Table 2 provides the candidate source data for each of the indicators as listed in Table 1 above.

Table 2: Data sources for each of the indicators

Target Code	Indicator	Suggested Primary Source	Potential Secondary Sources
1.1	Under-5 mortality rate	UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at childmortality.org.	
1.2	% Low-birthweight babies (% of births)	No single source	UNICEF, State of the World's Children, Childinfo, and Demographic and Health Surveys, MICS,facility reporting system, national household surveys, data from routine surveys
1.3	% children with severe disability	Washington Group Indicator for disability (use the recommended category 3 (severe) as the definition). www. washingtongroup-disability.com	

Target Code	Indicator	Suggested Primary Source	Potential Secondary Sources
1.4	% 36-59 month old children developmentally "on track"	MICS Early Child Development Index (ECDI), UNICEF - Ref: MICS6 -TC.53. **OR** Early Human Capability Index **OR** Early Development Index **OR** MELQO MODEL **OR** IDELA **OR** other local measure of holistic ECD	
1.5	% Overweight under age 5	MICS (TC.47)	UNICEF, WHO, World Bank: Joint child Malnutrition Estimates (JME) harmonised dataset. National or subnational household survey, nutritional surveys and national nutrition surveillance systems.
1.6	% Stunted under age 5 (less than two standard deviations below median for the international reference population)	MICS (TC.45) / UNICEF, WHO, and the World Bank harmonized dataset	DHS, MICS, national or subnational household surveys nutritional surveys and national nutrition surveillance systems
2.1	**Average** of % Access to improved drinking water sources **AND** % use of improved sanitation facilities	MICS (WS1, WS8), DHS	
2.2	Is there any maternal leave policy? Is there any paternal leave policy?	No international source	Audit of local policies

Target Code	Indicator	Suggested Primary Source	Potential Secondary Sources
2.3	Are programs to support/improve parenting available to parents?	Potentially SABER ECD Q89 could help to provide information.	Audit of local programs available
2.4	Mother average years of schooling (learning-adjusted)	Learning-Adjusted Years of School - Human Capital Index (World Bank)	Maternal Education (MICS)
2.5	% of mothers happy	MICS (EQ 10a)	Maternal Happiness
2.6	% children aged 1-14 years who experience physical punishment and/or psychological aggression by caregivers past month	MICS (PR 2)	
2.7	% children age 24-59 months engaged in four or more activities to provide early stimulation and responsive care in the last 3 days	MICS (TC.49)	
2.8	% children under 5 left alone of with a sibling under 10 for more than a week in last week	MICS (TC.52)	
2.9	% of children under age 18 live on less than US$1.90 per day	World Bank and Global Micro Database (Newhouse et al. 2016)	
3.1	The existence of a system approach to monitoring child growth	No international standard source. Potentially SABER ECD Q89 could help	Audit of local programs available

Target Code	Indicator	Suggested Primary Source	Potential Secondary Sources
3.2	**Average** % women receiving post-natal health check **AND** % 24-35 month year olds have full immunization coverage	MICS (TM13 & TC11)	
3.3	**Average** % mothers with skilled birth attendant **AND** % pregnancies with >=4 antenatal visits	MICS (TM9 & TM5)	
3.4	% children age 36-59 months who are attending an early childhood education programme	MICS (LN1)	
4.1	% children registered at birth	MICS (PR 1)	

Notes: MICS refers to UNICEF's Multiple Indicator Cluster Survey and the codes in brackets refer to the question number within the survey (mics.unicef.org). SABER refers to the World Bank's System's Approach for Better Education Results and similarly the code in brackets refers to the survey question number (saber.worldbank.org).

2. Formulating a Single Value Index

With well-defined indicators and identified data sources established for each of the 20 sub-targets, the process of combining them into a single value index (SVI) that describes the status of young children may begin. The single value index is designed to lie between 0 and 1, with 1 indicating the best possible outcome and 0 indicating the worst possible outcome for a given population of young children.

In order to create such an index, the sub-targets must be converted into component scores that also range between 0 and 1, a weighting of the contribution of each sub-target to the single-value index must be specified, and a formula for aggregating the component scores into a single value must be created.

Defining Component Scores

For each sub-target, a component score ranging from 0 (worst possible outcome) to 1 (best possible outcome) must be defined based on the relevant indicator and data source. This is to ensure that the components of the final SVI all 'load' in the same direction in a consistent manner.

The **definitions sheet** of the spreadsheet file defines a *numerator*, *denominator* and *component score formula* for each sub-target. Most indicators are defined as proportions of young children or their families meeting or failing to meet a certain criteria (e.g. low birthweight, severe disability, developmentally on track) or having or not having access to a certain service (child growth monitoring, access to improved water and sanitation, paid parental leave). As such, most component scores are defined as the proportion of the population meeting the desirable ideal. If the indicators are defined in a positive manner (e.g. Target 1.4 – child is developmentally on track), then the component score is simply the proportion of children in the

population meeting that standard (e.g. 67% of children in Country A are developmentally on track). If the conventional indicator is defined in a negative manner (e.g. Child is living in poverty), then the component score is defined as the inverse probability (e.g. 33% of children in District B are living in poverty becomes 67% of children are not living in poverty) such that a component score of 1 represents the ideal. Maternal education is not defined as a percentage but as a proportion of years of schooling out of an ideal of a maximum 14 years of schooling.

In this way, all component scores are defined in such that they range from score 0 (worst possible outcome) to 1 (best possible outcome). That is, 1 represents the 'ideal' for each component score, such that they may be aggregated into a single value in a logical manner.

An example of a component score calculation for a fictitious population (country A) is provided below for Target 1.1 of the HECDI to demonstrate the need to use inverse probability when conventional indicators are defined in a negative manner. Here the sub-target is children survive past age 5, and the associated conventional indicator with available data is defined as %children that die before age 5.

Example 1: Target 1.1 – Children Survive past age 5

$$Component\ Score = 1 - \frac{\%\ children\ that\ die\ before\ age\ 5}{100\%}$$

Interpretation of component score:

* 0 = all children in population die before age 5

* 1 = no children in population die before age 5

As such, if in Country A 25% of children die before age 5, then the component score for target 1.1 would be 0.75 – indicating that 75% of children survive to age 5.

In the **computations sheet** of the spreadsheet file, the component score definitions are provided for each sub-target. Population data may be entered into the *numerator* column for each sub-target, which corresponds to the numerator definitions provided on the **definitions sheet**. This will result in the generation of a *computed component score* in the **computations sheet** for the corresponding sub-target.

Aggregating Component Scores into a Single Value Index

With component scores defined, we know consider the process of aggregating each of them into a single value index. This requires a methodology of aggregating scores that has well-defined and well-behaved mathematical psychometric properties. Additionally this requires a prioritisation (or not) of certain sub-targets over others in the formulation of the final measure of early childhood wellbeing.

The most common approach to combining such scores is a linear aggregation method, for example summing or averaging components. A key limitation of these approaches is that components are assumed to be interchangeable and uniformity across component scores is not rewarded[1,2]. For instance, if a simple averaging approach is used, a population which receives perfect scores (1.0) in ten of the HECDI sub-targets and the lowest possible score (0) in the remaining ten sub-targets they would receive the same HECDI SVI value as a population which receives mid-range scores (0.5) across all twenty sub-targets. In order to improve the ability to discriminate between mid-range participants and allow for more subtle classification across the midrange of index scores, we utilise displaced ideal theory by employing the inverse of the normalised Euclidian distance from the ideal, as utilised by Golley et al. (2012)[3].

An unweighted single-value index for HECDI would be formulated as follows:

$$HECDI = 1 - \sqrt{\frac{(1 - cs_1)^2 + (1 - cs_2)^2 + ... + (1 - cs_{20})^2}{20}}$$

*Where cs_1, cs_2,..., cs_{20} represent the component scores
corresponding to each subtarget of the HECDI*

The HECDI may be interpreted as a measure of early childhood wellbeing for a given population, ranging from a value of 0 (representing the worst possible outcome) to a value of 1.0 (representing a perfect score – all children have perfect welfare across all domains).

In the above formulation of the SVI HECDI, each component score (and thus each

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1 Anand S, Sen A. Human development index: methodology and measurement. New York: Human Development Report Office; 1994.

2 Zeleny M. A concept of compromise solutions and the method of the displaced ideal. Comput Oper Res. 1974;1:479–96.

3 Rebecca K. Golley, Lisa G. Smithers, Murthy N. Mittinty, Laima Brazionis, Pauline Emmett, Kate Northstone, Karen Campbell, Sarah A. McNaughton, John W. Lynch, An Index Measuring Adherence to Complementary Feeding Guidelines Has Convergent Validity as a Measure of Infant Diet Quality, The Journal of Nutrition, Volume 142, Issue 5, May 2012, Pages 901–908.

sub-target of the HECDI that it corresponds to) has an equal contribution to the overall HECDI index score. In order to enable certain sub-targets (such as under 5 mortality) to be given prioritisation over others (such as obesity) in the formulation of the SVI, we define a weighted version of the HECDI SVI as follows:

$$HECDI = 1 - \sqrt{\frac{w_1(1 - cs_1)^2 + w_2(1 - cs_2)^2 + ... + w_{20}(1 - cs_{20})^2}{\sum w_i}}$$

Where $w_i \in (0,1)$ represents the weighting of component score cs_i

This will allow certain component scores (and by proxy certain sub-targets) that are deemed more or less important to the holistic measure of child wellbeing to have differing contributions to the overall HECDI single value index score, whilst still preserving the desirable mathematical and psychometric properties of the normalised Euclidian distance from the ideal formulation.

Defining HECDI sub-target weights

Having defined a robust aggregation formulation for the HECDI that allows for priority to be placed on certain important sub-targets via a weighted formula, the next step was to formulate what those weights should be.

We have used our substantive knowledge of the literature to formulate the weightings of each of the 20 sub-targets of the HECDI, which are displayed in the computations sheet of the spreadsheet file. Should it be deemed of value an extensive stakeholder consultation could be undertaken to ensure that the suggested weightings match the priorities that the HECDI measure seeks to capture as an index. In addition, a more formal, in-depth and cross-disciplinary meta-analysis of the relevant literature could also be conducted to validate the proposed formulation of weightings. It should be noted that the spreadsheet has been designed to make it possible to change the values of the weightings within the HECDI SVI calculator should it be determined that they should change.[4]

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4   Feeding Guidelines Has Convergent Validity as a Measure of Infant Diet Quality, The Journal of Nutrition, Volume 142, Issue 5, May 2012, Pages 901–908

3. Calculating the single value compact HECDI index for a population

Given the set of weights for each sub-target and the defined aggregation formula, a single value HECDI index may be calculated given data for a relevant population. In the computations sheet of the spreadsheet file, a user may input relevant population data related to each sub-target into the numerator column (highlighted in orange), and a computed single value HECDI between 0 and 1 will be calculated (also highlighted in orange) – based on the indicators, component score definitions and weightings as established above. That is, given relevant population data in a country, region, district, township, or other sub-population group a single value HECDI may be computed that indicates the wellbeing of young children in that population.

Statistical Simulations of the Single Value HECDI

Three statistical simulations of the single value HECDI are provided as examples. These are based on fabricated baskets of indicator data about three fictitious populations – Country A, Region B and Township C. Results for these simulations are summarised in Table 1, and separate simulation excel files for each are provided as attachments.

Country A provides an example of a population with data indicating young children are doing well – with data on the 20 HECDI sub-targets leading to a HECDI score of 0.854 (out of 1). Region B provides an example of a population that is doing moderately well across indicators of child wellbeing, with a HECDI score of 0.664 (out of 1). Township C provides an example of a population in which young children are doing poorly, with a HECDI score of 0.389 (out of 1).

In this way, the single value HECDI formulation developed here

can be seen to demonstrate validity in its intended goal of converting baskets of data on indicators relating to a broad range of HECDI sub-targets into a single numerical value that provides a holistic measure of early childhood wellbeing.

To exemplify the HECDI spreadsheet calculations further, five real country examples are provided. These can be found in Appendix 1.

Summary

This User Manual and Technical guide has provided documentation of the process and results of developing a single value Compact HECDI. Further, this guide has stepped through the accompanying excel spreadsheet file that can be used to compute the index when population data on the 20 HECDI sub-targets are provided. The results of the three statistical simulations demonstrate validity in the formulation of the single value Compact HECDI as a measure of early childhood wellbeing that encompasses a broad range of indicators spanning health, nutrition, education, social protection, poverty and parental support. In short, the formulation of the single value HECDI presented in this report provides an easily interpretable numerical value that reflects in a holistic sense whether children in a region, country, district or town (or any other population) are achieving their developmental potential.

Table 3: Statistical simulations of the Single Value Compact HECDI for 3 populations with different indicator basket values

HECDI Subtarget	Indicator Definition	Country A data	Region B data	Township C data
1.1 - Under 5 Mortality	% Die before age 5	5	15	30
1.2 - LBW	% low BW	5	10	25
1.3 - Disability	% with severe disability	10	10	30
1.4 - Developmentally on track	% developmentally on track	80	70	25
1.5 - Obesity	% overweight	10	20	20
1.6 - Stunting	% stunted	5	25	50
2.1 – Water and Sanitation	% access to water & sanitation	98	75	30
2.2 - Parental Leave policy	0 if no parental leave policy, 50% if either maternal or paternal, 100% if both maternal and paternal leave policy	100	50	0
2.3 - Parenting programs	% with access to parenting programs	50	30	0
2.4 - Maternal education	Av. Years	12	8	5
2.5 - Maternal happiness	% Happy	85	70	50
2.6 - Domestic violence	% experience violent discipline	5	25	50
2.7 - Early stimulation	% receiving early cognitive stimulation and responsive care	80	50	20
2.8 - Supervision	% children with inadequate supervision	10	30	50

HECDI Subtarget	Indicator Definition	Country A data	Region B data	Township C data
2.9 - Child poverty	% children living in poverty	10	25	55
3.1 - Growth monitoring	% with access to child growth monitoring	85	40	10
3.2 – Immunisation & PostNatal check	% children full immunization coverage and adequate post-natal care	98	75	50
3.3 - Antenatal&Birth service	% women with a live birth who received skilled birth attendant and four or more antental visits	98	85	50
3.4 - ECE Attendance	% attendance to early childhood education	85	50	10
4.1 - Birth registration	% registered births	98	80	60
Computed Single Value HECDI		**0.854**	**0.664**	**0.389**

Appendix 1: Five countries example

The HECDI has been designed pragmatically, with common and well supported indicators/data sources (i.e. UNICEF MICS etc). The targets themselves are uncontentious with general support from the field. Further each sub target has a clear definition for ease of calculation and use.

To illustrate the HECDI, a score has been calculated for 5 different countries (Laos, Eswatini, Rwanda, Seychelles and Cameroon), providing real world examples of the merits of the index.

An excel workbook, with each country as a work-sheet is provided for the full working details, however the table below provides an overview of the subtarget component scores and the resultant HECDI score.

Note that the scores are still calculated despite there being missing data for some of the subtargets. Ideally there would be complete data, but some countries won't have information for all subtargets, and as such the calculator has been designed to compute on the basis of the data that is available. However, although a score can be computed, the less confident we can be that the HECDI score is a true reflection of the countries support for early childhood development. For example if a country only had data available on targets where they were performing well, and no data for those targets where they weren't doing so well, then the HECDI would provide a higher score than warranted for that country. As such, where countries have missing data, then efforts should be taken to enhance monitoring systems in those countries.

The aim of the HECDI is not to shame countries through league tables, but to help policy makers understand where their country stands, to help advocate for early child development (let's count what counts) and to foster learning from each other (i.e. why might one country be doing better than another despite similar socio-economic standing). Alike countries may indeed compare each other not just on the overall HECDI score, but also on the sub-target scores to see where they may be falling down. The HECDI shows what countries are doing to support early child development and where they can improve. As an international yardstick, the HECDI should be used to promote policy reform by exposing areas where improvements can be made. Noting that the HECDI is holistic, those reforms may need to be across multiple fields (eg health, education, social protection).

Should the HECDI be computed for all countries in 2021, then the task would want to be repeated, (potentially annually or maybe once every three years), allowing for the

monitoring of progress over time. Each country would not only be able to see their own change on the HECDI (i.e. comparing one's own HECDI scores over time), but also how their rank amongst other countries changes over time.

Given the above context, when comparing the 5 country examples as illustrated in the table below to each other, Seychelles is ranked the highest with 0.836 (a score closest to 1 is best) and Cameroon the lowest with 0.545. Laos and Eswatini scored similarly to each other (0.562 and 0.568 respectively) and then Rwanda gained a score of 0.595. When looking within countries across the subtargets, Seychelles performed extremely well on all targets (where data was available), however fell down on subtarget 3.2 which captured the level of immunisation and postnatal care. Whereas, Eswatini performed better than Seychelles on that subtarget, however fell down on indicators capturing the level of domestic violence as well as early childhood education attendance. Rwanda showed the poorest score for early childhood education attendance in comparison to the other countries bringing the overall score for that country down. Cameroon, also didn't score well on early childhood education and domestic violence.

These 5 county illustrations highlight the utility of the HECDI. The overall score and rank prompts the policy maker to dig deeper and review the scores on the subcomponent targets to identify which targets might be pulling the country up or dragging it down. Additionally, by being able to compare the subtargets across countries highlights areas for investments, for example the HECDI identifies how some countries seem to be investing deeper in health than others, or perhaps where they are not addressing difficult and often culturally imbedded practices that are often difficult for systems to address (such as domestic violence). By simply highlighting the areas of concern, the HECDI should act as a powerful mobiliser for action. Further each of the subtargets are important indicators of a countries support to early child development. For those countries where data is not available, the HECDI should also prompt enhanced monitoring systems, building better evidence to inform systems.

Table of HECDI scores by country

HECDI Subtarget	Indicator Definition	Laos	Eswatini	Rwanda	Seychelles	Cameroon
1.1 - Under 5 Mortality	% Die before age 5	0.914	0.946	0.9621	0.9858	0.916
1.2 - LBW	% low BW	0.85	0.92	0.92	0.957	0.89
1.3 - Disability	% with severe disability		0.81	0.81		
1.4 - Develop-mentally on track	% developmentally on track	0.891	0.649	0.649		
1.5 - Obesity	% overweight	0.98	0.91	0.91	0.86	0.935
1.6 - Stunting	% stunted	0.67	0.745	0.63	0.921	0.68
2.1 – Water and Sanitation	% access to water & sanitation	0.685	0.625	0.61	1	0.61
2.2 - Parental Leave policy	0 if no parental leave policy, 50% if either maternal or pater-nal, 100% if both maternal and paternal leave policy					
2.3 - Parenting programs	% with access to parenting pro-grams					
2.4 - Maternal education	Av. Years	0.447				
2.5 - Maternal happiness	% Happy		0.755			
2.6 - Domestic violence	% experience violent discipline	0.31	0.12			0.15
2.7 - Early stimulation	% receiving early cognitive stimulation and responsive care	0.298	0.39	0.48		0.44
2.8 - Supervision	% children with inadequate su-pervision	0.876	0.84	0.65		0.66

HECDI Subtarget	Indicator Definition	Laos	Eswatini	Rwanda	Seychelles	Cameroon
2.9 - Child poverty	% children living in poverty		0.435	0.61		0.54
3.1 - Growth monitoring	% with access to child growth monitoring					
3.2 – Immunisation & Post Natal check	% children full immunization coverage and adequate post-natal care	0.476	0.804	0.705	0.5	0.77
3.3 - Antenatal & Birth service	% women with a live birth who received skilled birth attendant and four or more antental visits	0.633	0.873	0.675	0.99	0.62
3.4 - ECCE Attendance	% attendance to early child-hood education	0.321	0.295	0.13	0.9	0.3
4.1 - Birth registration	% registered births	0.73	0.535	0.56	0.9858	0.66
Computed Single Value HECDI		**0.562**	**0.568**	**0.595**	**0.836**	**0.545**