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Multidimensional Index of Child Growth to Achieve Sustainable Development Goals (SDGs): A Comprehensive Review

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Abstract

Traditional measures of child nutrition—such as stunting, wasting, and underweight—are still essential for evaluating how well children are nourished. However, these measures only show the physical effects of more complex factors like nutrition, social conditions, environmental influences, and the quality of care children receive. New evidence from around the world shows that a child's growth is influenced by a variety of connected factors, including nutrition, caregiving, health, exposure to infections, and the social and economic environment. To better capture these influences, the Multidimensional Index of Child Growth (MICG) combines different areas into one overall measure. This index helps identify issues that traditional measurements might miss and is more in line with the Sustainable Development Goals (SDGs), especially SDG 2 (Zero Hunger), SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), SDG 6 (Clean Water and Sanitation), and SDG 10 (Reduced Inequalities). This review explores findings from studies and models, and how MICG can be used in policy. The paper also discusses the difficulties in implementing MICG, the lack of data, and recommendations on how to include it in national monitoring systems, especially in countries like India.

Keywords: Multidimensional Index, Child Growth, SDGs

1. Introduction

Child growth is a key measure of human development and how society is progressing. In the past, evaluations have focused on biological factors like height compared to age, weight compared to height, and weight compared to age—standards used around the world to monitor undernutrition and overweight (WHO, 2020). But modern research on child development shows that while physical growth is important, it doesn't fully explain a child's overall development or the wider factors in their environment that affect them (UNICEF, 2021). Using only physical measurements can miss the bigger picture, like how nutrition, illness, care, learning conditions, and social and economic factors all interact.

The global policy direction—especially the Sustainable Development Goals (SDGs)—calls for looking at things in a more complete way. SDG 2 aims to end hunger and malnutrition; SDG 3 is about good health; SDG 4 covers early learning and child development; SDG 6 is about clean water and sanitation; and SDG 10 is about reducing inequality. If these areas aren't connected, progress is only

partial and doesn't address the full picture. Because of this, researchers and organizations like UNICEF stress the need for approaches that include nutrition, mental health, cognitive growth, safe environments, and social and economic conditions (UNICEF, 2023; Sehgal et al., 2024).

A Multidimensional Index of Child Growth (MICG) fits these goals by looking at a child's well-being in a comprehensive way. It helps spot overlapping issues and makes it easier to plan interventions across many areas. This review brings together the scientific, methodological, and policy reasons for using MICG as a main tool for tracking child development.

Limitations of Traditional Anthropometric Measures

Although widely used, anthropometric measures have well-established shortcomings.

a) Limited biological perspective:

Anthropometry reflects physical condition but does not account for cognitive, psychosocial, or emotional growth. A child might appear to be growing normally but still encounter significant developmental challenges because of insufficient stimulation or exposure to harmful environments (Grantham-McGregor et al., 2007).

b) Poor predictive value for cognitive results:

While being stunted is often linked to lower cognitive abilities on average, there is considerable variation.

Some children who are stunted perform well cognitively, while others who are not stunted may struggle due to lack of supportive environments or social deprivation (Black et al., 2013).

c) Failure to reflect environmental and caregiving influences:

Important factors like access to water, sanitation, and hygiene (WASH), maternal mental health, responsive parenting, and early learning opportunities are not captured by anthropometric data (UNICEF, 2021).

d) Overlap with hidden hunger:

Deficiencies in essential micronutrients such as iron, zinc, and vitamin A can exist even when a child's weight and height are within normal ranges, meaning that anthropometry alone cannot identify hidden hunger (FAO, 2020).

e) Inability to highlight inequalities:

Anthropometric indicators do not show differences based on caste, gender, economic status, ethnicity, or geographic location, which limits their effectiveness in monitoring fairness and equity (NFHS-5, 2021).

These shortcomings have prompted a global move towards using multidimensional indices, especially for tracking progress towards the Sustainable Development Goals.

Conceptual Foundations of Multidimensional Child Growth

a) Ecological Systems Theory:

Bronfenbrenner's ecological model explains that children grow within various layers of their environment—such as families, communities, institutions, and society—which all influence their physical, mental, and emotional development (Bronfenbrenner, 1979). Therefore, delays in growth and developmental challenges are often the result of how these different systems interact, not just because of a lack of nutrition alone.

b) Rights-Based Approaches:

The UN Convention on the Rights of the Child outlines that children have a right to health, proper nutrition, education, and protection. A multidimensional index supports these rights by including all the areas necessary for a child's full growth and development.

c) Capability Approach:

Sen's capability theory focuses on increasing the real opportunities people have to achieve well-being. The Multidimensional Index of Child Growth (MICG) follows this idea by looking at capabilities like good nutrition, learning opportunities, and safe environments, rather than only measuring physical growth (Sen, 1999).

d) Multidimensional Poverty Measurement:

The Alkire–Foster method offers a technical way to measure poverty across different areas using clear guidelines for choosing indicators, setting thresholds, assigning weights, and combining them (Alkire & Foster, 2011). MICG uses this approach to assess child growth in a comprehensive way. These ideas justify the creation of an index that reflects the real-life experiences of children, going beyond just biological factors.

Nutrition-Centric Determinants of Child Growth

Recent studies show strong connections between diet, illness, care, and environmental factors.

a) Dietary Intake and Feeding Practices:

A varied diet, regular meals, and proper intake of essential nutrients strongly affect a child's physical and mental growth (UNICEF, 2023).

b) Micronutrient Deficiencies:

Lack of key nutrients like iron, vitamin D, and zinc continues to harm how the body functions and weakens the immune system in low- and middle-income countries (Global Nutrition Report, 2022–2024).

c) Morbidity and Infection Burden:

Frequent infections, especially diarrhea and acute respiratory infections, can stop the body from absorbing nutrients and increase its energy needs.

Programs like deworming and immunization greatly reduce this problem.

d) Food Insecurity and Household Diet Diversity:

Factors such as food prices, climate changes, and poverty affect what families can eat.

e) WASH and Environmental Hygiene:

Poor sanitation and contaminated water lead to environmental enteric dysfunction (EED), which makes it harder for the body to absorb nutrients and support growth (UNICEF/WHO, 2023).

f) Maternal Nutrition and Caregiving:

A mother's weight, anemia, level of education, and how she cares for her child directly affect the child's eating habits and ability to get medical help. Overall, these findings show the importance of creating a multidimensional index that is based on nutrition.

Core Dimensions of a Multidimensional Index of Child Growth

By combining results from UNICEF, ECDI2030, AF methods, and global nutrition research, the Multidimensional Index of Child Growth (MICG) typically covers six key areas:

a) Nutrition: Variety of foods in the diet, Number of meals eaten in a day, Exclusive breastfeeding and introduction of appropriate foods after six months, Use of supplements for essential vitamins and minerals, Availability of food in the household
b) Health: Vaccination status, Recent illness (like diarrhea, acute respiratory infection, or fever), Access to healthcare services, Weight of the child at birth
c) Early Learning and Cognitive Development: Attendance at preschool or early learning programs, Activities that encourage learning and development at home, Items from ECDI2030 related to learning and social-emotional skills
d) Caregiving and Psychosocial Environment: Supportive and responsive care from caregivers, Education level of the mother, Protection from harmful experiences like violence
e) Environmental Safety (WASH): Access to clean drinking water, Access to proper toilets and waste disposal systems, Availability of facilities for washing hands, Use of clean fuel for cooking
f) Socio-Economic Status: Wealth of the household, Access to social support or safety nets, Employment status of the household members.

Empirical Evidence

a) Nurturing Care Index Modelling:

McCoy et al. (2022) developed a multidimensional index for the first 1000 days of life.
This index was better at predicting a child's cognitive and physical development than measuring only height or weight.

b) Community Participation and Multidimensional Growth:

Martinez et al. (2022) found that involving communities in programs greatly improves child well-being, supporting the case for involving multiple sectors in child development efforts.

c) Child Health Index for India (2024):

Sehgal et al. (2024) developed and tested a composite index that combines health and nutrition indicators for use at the district level.
This index is ready for use at a national level.

d) UNICEF ECDI2030 Global Testing:

The technical manual strengthens how early learning, social-emotional skills, and caregiver support are measured—key parts of the MICG. These studies together support the use of a multidimensional approach and show how it can be useful for policies aimed at improving child growth and well-being.

MICG as a Tool for Accelerating SDG Achievement

a) SDG 2 (Zero Hunger): MICG helps identify issues such as dietary variety, micronutrient gaps, and food insecurity, which cannot be detected through physical measurements alone.
b) SDG 3 (Good Health): By combining data on illness, immunization, and access to healthcare, MICG gives a more accurate view of children's health.

c) SDG 4 (Quality Education): MICG includes information about cognitive development and preschool attendance, showing how early learning is connected to nutrition.
d) SDG 6 (Clean Water and Sanitation): WASH-related indicators in MICG show how environmental risks impact children's growth.
e) SDG 10 (Reduced Inequalities): The ability to break down MICG results by factors like caste, gender, wealth, and region helps governments spot differences and address them.

Operational and Data Challenges

a) Data Limitations: Not all surveys collect detailed information on feeding habits, stimulation, or psychological well-being.
b) Measurement Quality: Reports on caregiving and hygiene practices might be influenced by people's desire to appear more favorable.
c) Standardization: Differences in weight measurements and thresholds can affect how data is compared, making sensitivity analysis important.
d) Capacity Constraints: Government teams need training in understanding and using multidimensional data effectively.

Policy Recommendations

a) Include MICG in National Surveys: Add ECDI2030 modules, dietary diversity, and micronutrient measurements to NFHS and MICS.
b) Enhance Nutrition and Early Childhood Programs: Programs like ICDS, POSHAN Abhiyaan, and health initiatives can use MICG to plan better, multi-sectoral actions.
c) Build Analytical Skills: Train frontline workers, local officials, and nutritionists in calculating and interpreting MICG scores.
d) Develop National Dashboards: GIS-linked dashboards help visualize and track multidimensional deprivation across areas.
e) Connect MICG to Service Delivery: Using MICG scores can help link families to services like nutrition support, hygiene programs, and early education.

Conclusion

Child growth is influenced by many factors, including diet, health, care, early learning, and environment.

While physical measurements are important, they don't show all the factors that affect growth. The Multidimensional Index of Child Growth (MICG), based on ecological theories, capability models, and multidimensional methods, offers a full picture. Recent studies show that MICG is both reliable and useful for policy. Including MICG in national surveys and child development efforts can help move towards achieving the SDGs, improve targeting, and ensure that no child is left behind.

References

1. Alkire, S., & Foster, J. (2011). Understandings and misunderstandings of multidimensional poverty measurement. Journal of Economic Inequality, 9(2), 289–314.
2. Basu, K., & Mitra, A. (2019). Multidimensional child deprivation measurement: Evidence from India. Child Indicators Research, 12(3), 845–863.
3. Black, R. E., Walker, S. P., Fernald, L. C. H., Andersen, C. T., DiGirolamo, A. M., Lu, C., et al. (2013). Early childhood development coming of age: Science through the life course. The Lancet, 389(10064), 77–90.
4. Bronfenbrenner, U. (1979). The ecology of human development. Harvard University Press.
5. FAO. (2020). The State of Food Security and Nutrition in the World. Food and Agriculture Organization.
6. Grantham-McGregor, S., Cheung, Y. B., Cueto, S., et al. (2007). Developmental potential in the first 5 years for children in developing countries. The Lancet, 369(9555), 60–70.
7. Martinez, R. G., et al. (2022). Community participation and multidimensional child growth. Children and Youth Services Review.
8. McCoy, D. C., et al. (2022). Estimates of a multidimensional index of nurturing care in the first 1000 days. The Lancet Child & Adolescent Health.
9. NFHS-5. (2021). National Family Health Survey 2019–21. Ministry of Health and Family Welfare, India.
10. Sehgal, M., et al. (2024). Assessing child health in India: Development and validation of a Child Health Index. Child Indicators Research.
11. Sen, A. (1999). Development as Freedom Oxford University Press Shaw TM & Heard. The Politics of Africa: Dependence and Development.
12. UNICEF. (2021). The State of the World's Children 2021: Promoting, protecting and caring for children's mental health..
13. UNICEF.(2023). The Early Childhood Development Index 2030: A New Measure of Early Childhood Development; United Nations Children's Fund: New York, NY, USA, 2023.
14. World Health Organization, & United Nations Children's Fund. (2023). Water, sanitation, hygiene, waste and electricity services in health care facilities: progress on the fundamentals. 2023 global report. World Health Organization.
15. WHO. (2020). Child Growth Standards: Methods and Development.