

National Collaborative on Childhood Obesity  
Research Efforts to Advance Childhood Obesity  
Research: Progress and Next Steps

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## INTRODUCTION

The National Collaborative on Childhood Obesity Research (NCCOR), a public–private partnership of 4 leading childhood obesity research funders—the Centers for Disease Control and Prevention, NIH, Robert Wood Johnson Foundation, and U.S. Department of Agriculture—was formed in 2008 with a goal of accelerating progress to reduce childhood obesity by improving measurement and increasing access to childhood obesity data.<sup>1</sup> NCCOR has a shared ownership model. Each organization contributes funding, which supports projects as well as coordination by a nonprofit human development organization, FHI 360.

A decade ago, considerably less was known about the macrolevel determinants of childhood obesity, and there was limited knowledge of available data sets and measures suitable for childhood obesity research.<sup>2</sup> In response to this challenge, NCCOR introduced 2 landmark tools: (1) the Catalogue of Surveillance Systems, 1-stop access to publicly available data sets, and (2) the Measures Registry, a searchable database of diet and physical activity measures across 4 domains relevant to childhood obesity: individual diet, food environment, individual physical activity, and physical activity environment.<sup>3</sup> NCCOR has also carried out a series of activities to further advance childhood obesity research (Table 1).

This paper reflects on changes in these 2 tools across the decade, additional work NCCOR has done to advance measurement for childhood obesity, and potential next steps for the field. Links to NCCOR resources related to measurement are shown in Table 1, and details of their development are available elsewhere.<sup>3</sup>

THE CATALOGUE OF SURVEILLANCE  
SYSTEMS: THEN AND NOW

The Catalogue provides access to resources maintained by federal, state, academic, and private-sector institutions

that provide data related to health behaviors, outcomes, and determinants of obesity. Each system has a 7-page profile, including an At-a-Glance summary and information on sampling design, key variables, data access and cost, geocoding and other linkage variables, selected publications, and resources. Since its launch in 2011, it has been updated regularly through searches for data sources and surveillance systems, with final selection by an NCCOR expert panel. The Catalogue has increased from 79 systems to 114 systems today.

Over the last decade, the Catalogue has expanded to include 83% (from 6 to 11) more schools and 73% (from 11 to 19) more community-level data sources. In addition, there has been a 43% (from 21 to 30) increase in sources with data on Asian and Pacific Islander persons, a 64% (from 11 to 18) increase in sources with data on Native American/Alaskan Native persons, and a 28% (from 40 to 51) increase for sources with data on both Black American and Hispanic American persons (Table 2). Furthermore, more systems with data at the policy level (e.g., Classification of Laws Associated with School Students,<sup>4</sup> Supplemental Nutrition Assistance Program Policy Database,<sup>5</sup> and School Health Policies and Practices Study<sup>6</sup>) exist. Some of the most accessed systems include the National Health and Nutrition Examination Survey<sup>7</sup> and the National Eating Trends,<sup>8</sup> which have been in

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**Table 1.** Elements of the National Collaborative on Childhood Obesity Research's Tools and Resources

Resource	Description	Date launched	Link <sup>a</sup>
Catalogue of Surveillance Systems	Provides access to U.S. data concerning childhood obesity and its influences	2011	<a href="https://www.nccor.org/nccor-tools/catalogue/">https://www.nccor.org/nccor-tools/catalogue/</a>
Measures Registry <sup>b</sup>	Facilitates access to validated measures of diet, physical activity, and their environmental influences	2011	<a href="https://www.nccor.org/nccor-tools/measures/">https://www.nccor.org/nccor-tools/measures/</a>
Measures Registry User Guides <sup>b</sup>	Offers an overview of measurement, descriptions of general principles of measure selection, and additional resources	2017	<a href="https://www.nccor.org/nccor-tools/mruserguides/">https://www.nccor.org/nccor-tools/mruserguides/</a>
Youth Compendium of Physical Activities	Allows for estimation of MET scores on the basis of reported activities of children	2017	<a href="https://www.nccor.org/nccor-tools/youthcompendium/">https://www.nccor.org/nccor-tools/youthcompendium/</a> <a href="https://pubmed.ncbi.nlm.nih.gov/28938248/">https://pubmed.ncbi.nlm.nih.gov/28938248/</a>
Measures Registry Learning Modules <sup>b</sup>	Introduces self-guided video lessons concerning measurement and the Registry	2019	<a href="https://www.nccor.org/nccor-tools/measures-registry-learning-modules/">https://www.nccor.org/nccor-tools/measures-registry-learning-modules/</a>
Identification of measurement needs to prevent childhood obesity in high-risk populations and environments <sup>b</sup>	Identifies measures used for high-risk populations and settings	2020	<a href="https://pubmed.ncbi.nlm.nih.gov/32919827/">https://pubmed.ncbi.nlm.nih.gov/32919827/</a>
A Guide to Methods for Assessing Childhood Obesity	Aids in selecting the most appropriate method of measuring adiposity in children when conducting population-level research and/or evaluation on obesity	2020	<a href="https://www.nccor.org/nccor-tools/a-guide-to-methods-for-assessing-childhood-obesity/">https://www.nccor.org/nccor-tools/a-guide-to-methods-for-assessing-childhood-obesity/</a>
Measures for Children at High Risk of Obesity Decision Tree <sup>b</sup>	Walks researchers and practitioners through a series of questions regarding whether to develop, adapt, or apply an instrument for obesity measures in high-risk populations	2021	<a href="https://www.nccor.org/projects/measures-for-children-at-high-risk-for-obesity/">https://www.nccor.org/projects/measures-for-children-at-high-risk-for-obesity/</a>
A Toolkit for Evaluating Childhood Healthy Weight Programs	Provides an overview of program evaluation and provides guidance on evaluation readiness, process measures, outcome measures, contextual factors, program sustainability, and remote evaluation of CHWPs	2021	<a href="https://www.nccor.org/nccor-tools/toolkit-evaluating-childhood-healthy-weight-programs/">https://www.nccor.org/nccor-tools/toolkit-evaluating-childhood-healthy-weight-programs/</a>
Create Thriving, Activity-Friendly Communities	Helps public health practitioners, decision makers, and community members make the business case for improving the built environment	2022	<a href="https://www.nccor.org/nccor-tools/create-thriving-activity-friendly-communities/">https://www.nccor.org/nccor-tools/create-thriving-activity-friendly-communities/</a>

CHWPs, Childhood Healthy Weight Programs.

<sup>a</sup>All links were last accessed on January 12, 2023.

<sup>b</sup>Resources part of the Measures Registry Resource Suite.

the top 5 accessed systems for most of the last 11 years. Overall, usage climbed to 18,000-page visits in 2012, with 4,000–10,000-page visits annually in subsequent years. Over the last decade, the Catalogue has provided a model for how to compile and make available listings of data sets for childhood obesity researchers and has proven helpful for students and researchers seeking resources on childhood obesity.

## THE MEASURES REGISTRY: THEN AND NOW

Each entry in the Registry is a published validation study that includes information on validity and reliability; protocols on the use of the measure; and settings, geographic areas, and populations for which the measure has been used. Users can search and filter by domain,

**Table 2.** Key Characteristics for the Catalogue of Surveillance Systems and Measures Registry

<b>Catalogue of Surveillance Systems</b>			
Level	Number of systems 2011 <sup>a</sup>	Number of systems 2021 <sup>a</sup>	% increase
Individual	41	59	44
Household	14	20	43
School	6	11	83
Community	11	19	73
Macro/policy	9	14	56
<b>Scope</b>			
Local	27	39	44
State	36	43	19
National	70	101	44
<b>Key variables</b>			
Diet	58	86	48
Physical activity	39	53	36
Weight	33	43	30
Geocode	69	85	23
<b>Age groups</b>			
Infants	44	51	16
Preschool children	41	50	22
School-age children	52	65	25
Teenagers/adolescents	61	71	16
Adult	60	78	30
<b>Racial/ethnic groups</b>			
Asian/Pacific islanders	21	30	43
Blacks	40	51	28
Hispanics	40	51	28
Native Americans/Alaskan natives	11	18	64
Whites	45	58	29
<b>Design</b>			
Panel/longitudinal	15	23	53
Cross-sectional	47	70	49
<b>Measures Registry</b>			
Domain	Number of articles 2011 <sup>a</sup>	Number of articles 2021 <sup>a</sup>	% increase
Individual dietary behavior	171	544	218
Food environment	226	389	72
Individual physical activity behavior	212	575	171
Physical activity environment	200	320	60
<b>Measure type<sup>b</sup></b>			
Geographic information systems	104	135	30
24-hour dietary recall or food frequency	64	162	153
Physical activity electronic monitor	59	172	192
Environmental observation	125	202	62
Questionnaire	274	718	163
Record or log	57	105	84
Other	113	302	167
<b>Age (years)</b>			
2–5	104	363	249
6–11	263	741	182
12–18	213	635	198
Adults	146	250	71

(continued on next page)

**Table 2.** Key Characteristics for the Catalogue of Surveillance Systems and Measures Registry (*continued*)

Catalogue of Surveillance Systems			
Context			
Metro/urban	463	1,132	144
Small town/rural	89	198	122

<sup>a</sup>Categories are not mutually exclusive; articles can be in >1 category.

<sup>b</sup>Unless indicated, all measure types are for all 4 domains.

measure type, age, and context. An expert panel developed a search strategy and inclusion criteria for included studies and literature reviews. Updates are conducted by current NCCOR members. Since its launch in 2011, the number of articles in the Registry has increased from 733 to 1,637, representing >100 discrete measures.

When the Measures Registry was first launched, measures were sparse for small town or rural environments (89) and Spanish language versions (so few that they were not counted); there were no measures for populations under age 2 years.<sup>3</sup> In 2013, the National Academy of Medicine (known then as the Institute of Medicine) published a report describing the dearth of measures for high-risk populations and urged researchers to develop new measures for these populations.<sup>9</sup> The Registry has expanded over the last decade, including increases in measures for small town/rural populations, Spanish-language measures, and the addition of measures for children aged 0–2 years (Table 2).


Access to the availability of the Measures Registry has ranged from 3,000 to 7,000 visits yearly. Among the top 5 most accessed measures are Prochaska et al,<sup>10</sup> a screening measure for assessing dietary fat intake among adolescents, and Rodriguez and colleagues,<sup>11</sup> a comparison of the TriTrac-R3D accelerometer and self-report activity diary with heart rate monitoring for the assessment of energy expenditure in children. It has been disseminated at scientific conferences, workshops, and social media. Links to the Registry can be found on major websites for the nutrition, public health, and childhood obesity fields as well as those of NCCOR partner agencies, state health agencies, and universities.

## THE MEASURES REGISTRY RESOURCE SUITE EXPANDS


Even with the availability of the Measures Registry, it can be difficult for users to choose the most appropriate measure because the best measure depends on the research question and type of research. To address this challenge, NCCOR has developed resources to provide guidance on selecting measures, identifying key research questions, and adapting and tailoring measures for different populations (Table 1).

Two key additional resources include the Measures Registry User Guides (2017) and the Measures Registry Learning Modules (2019). The Guides are organized by the same 4 domains as the Measures Registry and provide monograph-length overviews of how to select measures for childhood obesity in these domains. The Measures Registry Learning Modules are designed for students, faculty, and users who were newer to research and evaluation in diet and physical activity. They complement the information in the User Guides but are shorter and include quizzes to enhance classroom learning and understanding of key concepts (Figure 1).


In 2020, in collaboration with academic researchers, NCCOR published a review on measures available for high-risk populations detailing progress and highlighting research gaps.<sup>12</sup> NCCOR members recognized that children and their families at high risk for obesity are often under-represented in instrument validation studies that measure obesity and related psychosocial, behavioral, and environmental factors. Culturally and linguistically appropriate assessments are important to assess effective interventions and for research. The literature suggests that there are 3 ways to use measures in high-risk populations: (1) apply the existing measure as originally developed, (2) adapt an existing instrument, or (3) develop a new instrument.<sup>13</sup> However, little guidance exists on when each approach is best. To address this gap, NCCOR created a new resource for the suite: “Measures for children at high risk for obesity: Choosing whether to apply, adapt, or develop a measure.” This resource includes a decision tree and 5 real-world case

-  **START** with an overview of the domains by watching the **Measures Registry Learning Modules**


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-  **SELECT** the domain(s) and review the corresponding **Measures Registry User Guides**

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-  **USE** the **Measures Registry**, select the appropriate measure to address your research or evaluation question.

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-  **DETERMINE** whether adaptation is needed for your population using the **Measures for Children at High Risk for Obesity Decision Tree**.

**Figure 1.** How to use the Measures Registry Resource Suite.

scenarios that describe the rationale for choosing one of the 3 measurement approaches. The Measures Registry Resource Suite tools were moved to a landing page that had 240,000 page views in 2020 and 179,000 in 2021.

## FUTURE DIRECTIONS

Assessing childhood obesity and its determinants remains as important as it was when the Registry and Catalogue were first released. Concurrently with the pandemic, the U.S. has seen an increase in childhood obesity rates in some groups<sup>14</sup> and an increase in food insecurity in households with children,<sup>15</sup> strongly reinforcing the need to address this public health challenge. Furthermore, there is a need for more granular data on diet, physical activity, and their environmental influences to better respond to challenges such as the pandemic and to evaluate new programs and policies at the local level.

From 2019 to 2020, NCCOR hosted a series of 3 workshops to discuss the future of measurement to advance childhood obesity research and evaluation. Key challenges identified included how to optimally integrate assessment and modeling of 24-hour behavior patterns; enhance measurement methods in children aged <6 years; and balance the tradeoffs between validity and feasibility in measuring diet, physical activity, sedentary time, and sleep. The most valid measures can be expensive or technically demanding to properly collect and analyze (e.g., accelerometry), have a high respondent burden, and can be impossible for younger children to complete without assistance (e.g., multiple 24-hour diet or physical activity recalls). NCCOR members have been working to address several of these gaps. For example, an NCCOR Birth–24 months Diet Assessment Work Group was formed to identify existing measurement tools, methods, and measurement needs.

NCCOR has been actively engaged in 3 further challenges related to measurement and data informed by the Catalogue and Registry. First, NCCOR has helped to advance the measurement of indicators by updating the Youth Compendium for Physical Activities, developing economic metrics for community-level interventions, addressing needs for surveillance of active transportation to schools, and working to add sleep data sets to the catalog. Second, the childhood obesity epidemic in the U.S. affects diverse communities with different immigration histories. NCCOR collaborated with the NIH Fogarty International Center to organize and disseminate the results of a workshop focusing on childhood obesity and measurement issues across the Americas.<sup>16</sup> Importantly, this work and other NCCOR resources are available in Spanish. Further research is needed on other large and

growing immigrant communities in the U.S., including African and Asian persons from multiple countries. Third, each of NCCOR's 4-member organizations has placed an increased emphasis on data modernization. For example, the Centers for Disease Control and Prevention's Clinical and Community Data Initiative<sup>17</sup> uses modern technology to link individual-level data across clinical and community sectors, and NIH's *All of Us* Research Program<sup>18</sup> engages people and communities who have historically been left out of medical research through multiple data sources.

Attention must also be paid to the interplay of measurement and equity, the social determinants of health, and community engagement. There is still a dearth of measures for different racial and ethnic populations; for children with increased risk for obesity, such as those with special healthcare needs; and for relevant factors such as language, country of origin, and acculturation. Furthermore, the balance between tailoring measures for diverse populations and having standard measures can also be explored. Moving forward, measure development and data collection could include efforts to engage communities in concrete ways, such as reimbursement for their time and inclusion of key informants and community leaders in both the design and implementation stages of research projects.<sup>19</sup>

The Catalogue of Surveillance Systems and Measures Registry Resource Suite are tools worthy of celebration after a decade of use. NCCOR's website highlights the many ways they have been used by academicians, students, and researchers alike. However, despite the contribution of these tools, more work is needed to optimize the use of appropriate measures and increase access to data for surveillance, evaluation, and public health action, ultimately contributing to a reduced prevalence of childhood obesity in the U.S. and around the world.

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