

Standards for Nationally Consistent Data and Measures within the Centers for Disease Control and Prevention's National Environmental Public Health Tracking Network

Version 4.0

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Foreword

This document was first published in March 2008, setting the standards for the first Nationally Consistent Data and Measures (NCDM) for the National Environmental Public Health Tracking Program (Tracking Program). The purpose of these NCDM was to develop standardized data and measures for understanding the impact of our environment on our health and to establish the beginnings of the National Environmental Public Health Tracking Network (Tracking Network). Subsequent updates to this document were made to:

- Include the lessons learned in implementing the first NCDM across local, state, and national tracking networks
- Improve the utility of specific measures
- Identify temporal and spatial resolution recommendations and requirements, specifically for health outcomes, based on confidentiality protection needs and data steward requests
- Expand the description of the process for creating and adopting the first set of NCDM
- Update existing measures to adopt new standards or data changes, address gaps, or improve their utility
- Add new measures to new or existing content areas

This new document modifies the existing NCDM requirements to correspond to the 2016 to 2020 Tracking Program Strategic Plan and to the 2017 funding opportunity for state, local, and territorial health departments. The new NCDM requirements reduces the amount of required NCDM measures for grantees' public portals, maintains NCDM data feeds to CDC, and adds NCDM data requirements for grantees' data repositories. This change allows for more flexibility, ensures access to key datasets, and places more emphasis on improving the utility and accessibility of data for informing environmental public health decision-making.

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Introduction

The mission of the National Environmental Public Health Tracking Program (Tracking Program) is to provide information from a nationwide network of integrated health and environmental data that drives actions to improve the health of communities. The National Environmental Public Health Tracking Network (Tracking Network) is a multi-tiered, web-based system with components at national, state, and local levels. In collaboration with federal, state, and local partners, the Tracking Program identifies priority environmental health issues, determines key surveillance questions, and evaluates the utility of existing data for answering the question and informing the issue. This work is largely conducted with the Tracking Program's Content Workgroup (CWG).

First Set of NCDM

As the Tracking Program began implementation of the Tracking Network in 2006, the CWG was established to:

1. Identify and recommend core measures for the Tracking Network;
2. Examine the availability and applicability of existing data and identify approaches for deriving or collecting needed data;
3. Identify and adapt standards and guidelines to facilitate nationally consistent data collection and ensure compatibility with existing standards efforts;
4. Recommend metadata elements to describe data quality;
5. Identify and recommend methods and tools for data integration, analysis and presentation.

The CWG structure included a Steering Group made up of the principal investigators from grantee health departments and academic partners. Content-specific teams advised the Steering Group. These teams included content experts from: grantee states, cities and academic partners; non-funded states and cities; CDC; other government agencies including the Environmental Protection Agency (EPA), the National Aeronautics and Space Administration (NASA), the US Geological Survey (USGS) and the National Institutes of Health (NIH); and non-governmental organizations including the American Association of Poison Control Centers (AAPCC), the National Birth Defects Prevention Network (NBDPN), the National Association of Health Data Organizations (NAHDO), the National Association for Public Health Statistics and Information Systems (NAPHSIS) and the North American Association of Central Cancer Registries (NAACCR).

Eight content teams were established, and each provided recommendations to CDC via the Steering Group for an initial set of Nationally Consistent Data and Measures (NCDM). Their recommendations consisted of measures, grouped by indicators, and the data required to generate them. A measure is a summary characteristic or statistic, such as a sum, percentage, or rate. There may be several measures of a specific indicator which when considered in conjunction fully describe the indicator. An indicator is a set of statistics, characteristics, or other measurable factors that provides information about a

population's health status, their environment, and other factors with the goal of allowing us to monitor trends, compare situations, and better understand the link between environment and health. It is assessed through direct and indirect measures (e.g. levels of a pollutant in the environment as a measure of possible exposure) that describe health or a factor associated with health (i.e., environmental hazard, age) in a specified population. In general, content teams focused on developing measures specific to one of these areas, but they also considered both proven and potential linkages to the other areas.

Recommendations from content teams were separated into two parts; the first part concerned indicators, measures, and how-to guides which described the methods for extracting necessary data and generating the measures. The second part was a data dictionary which described the data to be shared with CDC. Recommendations were reviewed by the CWG Steering Group for scientific rigor, utility for Tracking, and feasibility of each grantee generating the measures and where specified providing data to CDC for use on the National Public Portal. The first set of NCDM was adopted in 2008. Since that time, the CWG has continued developing new NCDM and improving existing NCDM.

In support of the Tracking Program's mission, grantees have historically maintained existing required NCDM including the dissemination of NCDM measures on their public portals and NCDM data flows to CDC. Grantees also ensured the availability and accessibility of data for development and reporting of new NCDM and to address other jurisdictional priorities. Following the initial launch of the Tracking Network in 2009, the Tracking Program and its grantees have placed greater emphasis and resources towards the use of NCDM data and other datasets to:

- Conduct descriptive analyses and assess spatial and temporal trends to better understand populations at risk;
- Identify or examine state and local environmental health issues;
- Inform public health activities and policy; and
- Link data for the non-research purposes of responding to community concerns, investigating environmental health problems, and planning and conducting state and local specific public health activities.

Updating the NCDM Framework

In 2016, the Tracking Program released a new five year strategic plan followed by a new funding opportunity for state, local, and territorial health departments in 2017. As such, an update to the existing NCDM framework is needed to better align to the current Tracking Program efforts and to respond to feedback from grantees, partners, and Tracking Network users. This document outlines the new NCDM requirements for all grantees under the funding opportunity: CDC-RFA-EH17-1702. Changes to the NCDM have been made to:

- Increase flexibility for grantee portals but maintain standards and a network

- Encourage the implementation of NCDM at finer temporal or spatial resolution on grantee portals
- Ensure the development and maintenance of grantee data repositories and data access
- Foster growth of grantee data submissions to CDC
- Encourage grantees to explore, validate, and use their data

NCDM Requirements

Grantees will continue to maintain existing and newly required NCDM and provide NCDM to CDC. The new NCDM framework encompasses three components: (1) measures disseminated on grantee public portals, (2) data within grantee data repositories, and (3) data submitted to CDC.

The number of required NCDM (Appendix A) for dissemination on public portals has decreased and the spatial resolution requirement now represents the maximum resolution to be disseminated (e.g., the requirement is county and as such any county or sub-county resolution would meet the standard). Grantees are encouraged to release data at the finest temporal and spatial resolutions possible. Previously required measures are now optional and are listed along with all required and optional measures in supplemental NCDM documentation on the National Public Portal. Grantees are required to use optional NCDM when disseminating measures for content areas where NCDM are available. Indicator templates describing the rationale, use and limitations of the measures and how-to-guides for extracting the necessary data elements and calculating the measures are available for all NCDM.

While the number of required NCDM for dissemination on public portals has decreased, a grantee must maintain all required NCDM data (Appendix B) within their data repository or within an agency data repository to which their staff have direct access. Data must contain the required elements described in Appendix B or contain the elements necessary to create the required elements (e.g., either childhood lead poisoning data by blood lead level category or individual blood lead level data). Data must either conform to corresponding NCDM standards as described by the how-to-guides or contain the elements necessary to generate the NCDM standardized data (e.g., either acute myocardial infarction hospitalization data with transfers excluded or data with transfer codes or necessary variables such as demographics, ZIP code, and date of hospitalization that can be used to exclude transfers). Advanced elements are provided to highlight where improvements in data utility can be made. Grantees must ensure the availability and accessibility of data as appropriate for program staff and internal and external partners.

NCDM submissions to CDC (Appendix C) remain with no changes. Current data include required submissions for birth defects, hospitalizations, emergency department visits, and community drinking water and optional submission for childhood lead poisoning. At this time, radon data submission has been piloted twice and NCDM are in development. Grantees are required to submit the corresponding metadata, validate data prior to submission, and ensure timely updates of data to CDC. How-to-guides,

data dictionaries, and XML schemas are available for each data feed and provide instructions for extracting, formatting, and submitting the NCDM data.

New NCDM and changes to existing NCDM will continue to be developed through CWG as a collaboration between the Tracking Program, grantees, data stewards, and other partners. The CWG makes recommendations for NCDM to the Tracking Program's Principle Investigator Forum (PI Forum), a group consisting of the principal investigators or their designee from each grantee. The PI Forum reviews and, when applicable, votes on CWG recommendations. The PI Forum then submits the final recommendation to the Tracking Program for consideration. Under the new framework, NCDM recommendations can include recommendations for data within grantee repositories, measures for dissemination, and data submitted to CDC but does not have to include all three components. The specific components of a recommendation depend on the environmental public health surveillance need and rationale. CWG and PI Forum designate their recommendation as required or optional. CDC will review and adopt the recommendation based on the PI Forum vote, the Tracking Programs' strategic plan, the upcoming Science-to-Action agenda, and other CDC priorities.

Appendix A: Measures for grantees' public portals

Details are provided in NCDM calculation how-to-guides and indicator templates. Required measures are listed here. A full list of required and optional NCDM is available on SharePoint and the National Public Portal. Note that for CO Poisoning and Climate Change, there are no required measures at this time due to the small numbers of emergency department visits and hospitalizations. However, these outcomes remain required within the grantee data repositories and submissions to CDC.

Required measures for grantees' portals

Content Area	Indicator	Measure	Temporal Resolution	Geographic Resolution
Air Quality	Ozone—Days Above Regulatory Standard	Number of days with maximum 8-hour average ozone concentration over the National Ambient Air Quality Standard	Annual	County
Air Quality	Fine Particle (PM _{2.5})—Days Above Regulatory Standard	Percent of days with PM _{2.5} levels over the National Ambient Air Quality Standard	Annual	County
Air Quality	Annual PM _{2.5} Level	Average ambient concentrations of PM _{2.5} in micrograms per cubic meter	Annual	County
Asthma	Hospitalizations for Asthma	Rate of hospitalization for asthma by age group (total, 0-4, 5-14, 15-34, 35-64, and 65+) per 10,000 population	Annual	County
Asthma	Hospitalizations for Asthma	Age-adjusted rate of hospitalization for asthma per 10,000 population	Annual	County
Asthma	Emergency Department Visits for Asthma	Rate of emergency department visits for asthma by age group (total, 0-4, 5-14, 15-34, 35-64, and 65+) per 10,000 population by age group	Annual	County
Asthma	Emergency Department Visits for Asthma	Age-adjusted rate of emergency department visits for asthma per 10,000 population	Annual	County
Birth Defects	Prevalence of Birth Defects	Prevalence of anencephaly per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of spina bifida (without anencephaly) per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of hypoplastic left heart syndrome per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of tetralogy of Fallot per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of transposition of the great arteries (vessels) per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of cleft lip with cleft palate per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of cleft lip without cleft palate per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of cleft palate without cleft lip per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of hypospadias per 10,000 live male births	5 year	County

Birth Defects	Prevalence of Birth Defects	Prevalence of gastroschisis per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of limb deficiencies per 10,000 live births	5 year	County
Birth Defects	Prevalence of Birth Defects	Prevalence of trisomy 21 per 10,000 live births by maternal age at delivery (<35 and >=35)	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of mesothelioma per 100,000 population	5 year	State
Cancer	Cancer Incidence	Age-adjusted incidence rate of melanoma of the skin per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of liver and intrahepatic bile duct cancer per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of kidney and renal pelvis cancer per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of breast cancer in females per 100,000 population by age group (<50, ≥50, total)	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of lung and bronchus cancer per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of bladder cancer (including in situ) per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of brain and other nervous systems cancer per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of brain and central nervous system cancer in children <20 years per 1,000,000 population	Annual	State
Cancer	Cancer Incidence	Age-adjusted incidence rate of thyroid cancer per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of non-Hodgkin's lymphoma per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of leukemia per 100,000 population	5 year	County
Cancer	Cancer Incidence	Age-adjusted incidence rate of leukemia in children <20 years per 1,000,000 population	Annual	State
Cancer	Cancer Incidence	Age-adjusted incidence rate of chronic lymphocytic leukemia per 100,000 population	Annual	State
Cancer	Cancer Incidence	Age-adjusted incidence rate of acute myeloid leukemia per 100,000 population	Annual	State
Cancer	Cancer Incidence	Age-adjusted incidence rate of acute myeloid leukemia in children <20 years per 1,000,000 population	Annual	State
Cancer	Cancer Incidence	Age-adjusted incidence rate of acute lymphocytic leukemia in children <20 years per 1,000,000 population	Annual	State
Chronic Obstructive	Emergency Department Visits for COPD	Rate of emergency department visits for COPD by age group among persons 25 and	Annual	County

Pulmonary Disorder		over per 10,000 population (total, 25-44, 45-64, 65-84, and 85+)		
Chronic Obstructive Pulmonary Disorder	Emergency Department Visits for COPD	Age-adjusted rate of emergency department visits for COPD among persons 25 and over per 10,000 population by age group (total, 25-44, 45-64, 65-84, and 85+)	Annual	County
Chronic Obstructive Pulmonary Disorder	Hospitalizations for COPD	Rate of hospitalization for COPD among persons 25 and over per 10,000 population	Annual	County
Chronic Obstructive Pulmonary Disorder	Hospitalizations for COPD	Age-adjusted rate of hospitalization for COPD among persons 25 and over per 10,000 population	Annual	County
Childhood Lead Poisoning	Annual Blood Lead Levels	Number of children tested, by age group (total, 0-<3, 3-<6)	Annual	County
Childhood Lead Poisoning	Annual Blood Lead Levels	Percent of children tested, by age group (total, 0-<3, 3-<6)	Annual	County
Childhood Lead Poisoning	Annual Blood Lead Levels	Number of children tested with confirmed blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$, by age group (total, 0-<3, 3-<6)	Annual	County
Childhood Lead Poisoning	Annual Blood Lead Levels	Percent of children tested with confirmed blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$, by age group (total, 0-<3, 3-<6)	Annual	County
Childhood Lead Poisoning	Annual Blood Lead Levels	Number of children tested with confirmed blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$ by blood lead level category, by age group (total, 0-<3, 3-<6)	Annual	State
Childhood Lead Poisoning	Annual Blood Lead Levels	Percent of children tested with confirmed blood lead levels ≥ 10 $\mu\text{g}/\text{dL}$, by blood lead level category, by age group (total, 0-<3, 3-<6)	Annual	State
Childhood Lead Poisoning	Annual Blood Lead Levels	Number of children tested with blood lead levels between 5 and <10 $\mu\text{g}/\text{dL}$, by age group (total, 0-<3, 3-<6)	Annual	County
Childhood Lead Poisoning	Annual Blood Lead Levels	Percent of children tested with blood lead levels between 5 and <10 $\mu\text{g}/\text{dL}$, by age group (total, 0-<3, 3-<6)	Annual	County
Community Drinking Water	Arsenic Level and Potential Population Exposures	Mean concentration of arsenic (micrograms per liter) by community water system	Annual	CWS by County
Community Drinking Water	Nitrate Level and Potential Population Exposures	Mean concentration of nitrate (milligrams per liter) by community water system	Annual	CWS by County
Community Drinking Water	Disinfection Byproducts Level and Potential Population Exposure	Mean concentration of total trihalomethanes (TTHM) (micrograms per liter) by community water system	Annual	CWS by county
Community Drinking Water	Disinfection Byproducts Level and Potential Population Exposure	Mean concentration of (haloacetic acids [five]) HAA5 (micrograms per liter) by community water system	Annual	CWS by County

Community Drinking Water	Public Water Use	Number of people receiving water from community water system	Annual	State
Heart Attacks	Hospitalizations for Heart Attacks	Rate of hospitalization for heart attack among persons 35 and over by age group (total, 35-64, 65+) per 10,000 population	Annual	County
Heart Attacks	Hospitalizations for Heart Attacks	Age-adjusted rate of hospitalization for heart attack among persons 35 and over per 10,000 population	Annual	County
Reproductive Health Outcomes	Prematurity	Percent of preterm (less than 37 weeks gestation) live singleton births	Annual	County
Reproductive Health Outcomes	Prematurity	Percent of very preterm (less than 32 weeks gestation) live singleton births	5 year	County
Reproductive Health Outcomes	Low Birthweight	Percent of low birthweight (less than 2500 grams) live term singleton births	Annual	County
Reproductive Health Outcomes	Low Birthweight	Percent of very low birthweight (less than 1500 grams) live singleton births	5 year	County
Reproductive Health Outcomes	Mortality	Rate of infant (less than 1 year of age) mortality per 1000 live births	5 year	County

Appendix B: Data for grantees' repositories

Air Quality, Census, and Weather/Climate – accessible directly from CDC

Birth Defects

	Required Elements	Advanced Elements
Time	Birth year	Month, Day
Geography	County	Census Tract
Outcomes	Birth defects among live births for: Anencephaly Cleft lip with cleft palate Cleft lip w/o cleft palate Cleft palate w/o cleft lip Gastroschisis Hypoplastic left heart syndrome Hypospadias Limb deficiencies combined Spina bifida (w/o anencephaly) Tetralogy of Fallot Transposition of the great arteries (vessels) Trisomy 21	Others
Other	Infant sex Maternal age Maternal race Maternal ethnicity	BD among fetal deaths and terminations

Cancer

	Required Elements	Advanced Elements
Time	Year diagnosed	
Geography	County	Census Tract
Outcomes	Cancer cases: Acute myeloid leukemia Brain and other nervous system Breast Chronic lymphocytic leukemia Kidney and renal pelvis Leukemias, all types Liver and bile duct Lung and bronchus Melanoma of the skin Mesothelioma Non-Hodgkins lymphoma Prostate Thyroid Urinary bladder Childhood cancers: Acute myeloid leukemia Brain and central nervous system Leukemias Lymphoid leukemia	Others including Esophagus Larynx Oral cavity and pharynx Pancreas
Other	Age group Sex Race Ethnicity	

Childhood Lead Poisoning

	Required Elements	Advanced Elements
Time	Date tested	
Geography	County	Census Tract
Outcomes	Blood lead test results by blood lead category	Blood lead test results not aggregated
Other	Date of birth Limit of detection	

Community Drinking Water – Sample results

	Required Elements	Advanced Elements
Time	Date sampled	
Geography	Principle county served	Service area boundary
Analyte	Arsenic Atrazine DBP – HAA5, TTHM DEHP Nitrates PCE Radium TCE Uranium	
Other	PWS id Concentration/non-detect Units Limit of detection Sample point	

Community Drinking Water – PWS Inventory

	Required Elements	Advanced Elements
Time	Year	
Geography	Principle county served	Service area boundary
Other	PWS ID Water source Population served Lat/long Sample point Total connections	

Emergency Department

	Required Elements	Advanced Elements
Time	Month, Year of admission	Date of admission
Geography	County	Census Tract
Outcomes	Asthma CO Poisoning COPD Heat Stress	All cardio and respiratory diseases
Other	Out of state visits by residents Age group	Race Ethnicity ICD code

Hospitalization

	Required Elements	Advanced Elements
Time	Month, Year of admission	Date of admission
Geography	County	Census Tract
Outcomes	AMI Asthma CO Poisoning COPD Heat Stress	All cardio and respiratory diseases
Other	Out of state visits by residents Age group AMI transfers removed	Race Ethnicity ICD code

Vital Statistics - Births

	Required Elements	Advanced Elements
Time	Month, Year	Day
Geography	County	Census Tract
Outcomes	Birth weight Term	
Other	Infant sex Maternal age Maternal race Maternal ethnicity	

Vital Statistics – Natality

	Required	Advanced
Time	Month, Year	Day
Geography	County	Census Tract
Outcomes	Infant Neonatal Perinatal Postneonatal	
Other	Date of birth Plurality Infant sex Maternal age Maternal race Maternal ethnicity	

Vital Statistics – Mortality

	Required	Advanced
Time	Month, Year	Day
Geography	County	Census Tract
Outcomes	CO poisoning COPD Heart Attack Heat Stress	Others
Other	Age Race Ethnicity	

Appendix C: Grantee data to CDC

This table contains basic data feed requirements. Please review data submission how-to-guides and data dictionaries for each data feed for complete listing of all required elements and details for extracting and formatting the data.

Data Feed	Status	Outcomes/Events	Geography	Time	Other
Birth defects	Required	12 defects	County	Year	Infant sex, maternal age group, maternal race, maternal ethnicity
Childhood lead poisoning - annual	Optional	Number tested, number BLL > 10, number BLL 5 - <10	County	Year	Age group, BLL category
Childhood lead poisoning – birth cohort	Optional	Number tested, number BLL > 10, number BLL 5 - <10	County	Year	BLL category
Community drinking water	Required	Mean and max for 10 analytes	Public water system (PWS)	Year or quarter	Principle county served
Community drinking water – PWS inventory	Required	PWS	Principle county served	Year	Lat/long, Pop served
Emergency department visits	Required	4 diseases	County	Year, Month	Age group
Hospitalizations	Required	5 diseases	County	Year, Month	Age group