

**Prepared for:**

## **Centers for Disease Control and Prevention**

**Centers for Medicare & Medicaid Services Alliance to Modernize  
Healthcare (Health FFRDC) A Federally Funded Research and  
Development Center**

**Clinical and Community Health Data Initiative**

**Contract No. 75FCMC18D0047**

**Task Order No. 75D30120F09743**

## **CODI Data Models Implementation Guide**

**For the North Carolina Site (2021–2022)**

**Version 4.1.4**

**June 1, 2022**

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Version 3.0 Approved for Public Release: 20-0932. Distribution Unlimited.

Version 4.1 Approved for Public Release: 21-3933. Distribution Unlimited.

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## Record of Changes

Version	Date	Author / Owner	Description of Change
1.0	Aug 7, 2019	P. Mork / Health FFRDC	Version approved for public release
1.1	Sep 4, 2019	P. Mork / Health FFRDC	Updated cover page to include CDC disclaimer
1.2	Oct 14, 2019	P. Mork / Health FFRDC	Additional clarifications based on feedback from CDC
2.0	Nov 6, 2019	P. Mork / Health FFRDC	<p>1) Added the BMIAGE reference table from CDC, which was subsequently deleted.</p> <p>2) Changed PROGRAM_MODE to SESSION_MODE to account for programs with multiple modes.</p> <p>3) Synchronized the CODI Research Data Model with PCORnet version 5.1 by a) updating the codes for VITAL_SOURCE_TYPE and b) changing the datatype for FACILITY_LOCATION within an ENCOUNTER.</p>
3.0	Mar 30, 2020	P. Mork / Health FFRDC	<p>1) Removed the BMI data elements from VITAL and the BMIAGE table.</p> <p>2) Added three new data elements to the PROGRAM table, which are documented in section 5.8.</p> <p>3) Added the CURRICULUM_COMPONENT table, which is documented in section 5.3.</p>
4.0	Sep 08, 2021	C. Macheret / Health FFRDC	<p>1) Removed CODI IDENTIFIER and IDENTITY_HASH_BUNDLE tables from the RLDM and added PRIVATE_DEMOGRAPHIC and PRIVATE_ADDRESS_HISTORY tables from PCORnet CDM 6.0.</p> <p>2) Added IMMUNIZATION, CONDITION, and PRO_CM from PCORnet CDM 6.0 to the RDM.</p> <p>3) Added SDOH_EVIDENCE_INDICATOR and HOUSEHOLD_LINK to the RDM.</p> <p>4) Expanded definitions in the RDM ancillary tables that were previously constrained to children to include adults as well as definitions previously constrained to obesity to all chronic disease and chronic comorbidities.</p>

4.1	Dec 2, 2021	K. Mork / Health FFRDC	Added ENROLLMENT and two tables related to PREGNANCY.
4.1.1	Jan 25, 2022	K. Mork / Health FFRDC	Clarified that pregnancy tables are relevant to any data owner that can populate the data. Clarified that WIC is not a CBO. Revised language for SDOH to align with CDC guidance. Added examples of how to populate SDOH data and evidence indicators.
4.1.2	Feb 7, 2022	K. Mork / Health FFRDC	Added section 3.5 to provide guidance to clinical organizations, CBOs, and government benefits organizations.
4.1.3	April 01, 2022	C. Macheret / Health FFRDC	<ol style="list-style-type: none"> <li>1) Replaced “Data Partner” with “CODI Implementer” or “Implementer” where appropriate to avoid having to distinguish between data owners implementing CODI for their own data versus data partners implementing CODI for another data owner.</li> <li>2) Clarified guidance on selection of private address data for the record linkage agent.</li> <li>3) Corrected cardinality in the RLDM for the relationship between DEMOGRAPHIC and the private tables because CODI PPRL requires only one record per individual.</li> <li>4) Added version numbering information to section 5.1 describing change control.</li> <li>5) Corrected the data dictionary appendix by removing duplicate rows for the following tables: ALERT, CENSUS_DEMOG, and adding missing rows in the following tables: LINK and HOUSEHOLD_LINK</li> <li>6) Added the record ids in the LINK table and HOUSEHOLD_LINK table. The former has record id equal to LINKID returned from linkage agent. The second table has meaningless record id just for purposes of following record id data modeling convention. Changes here match the DDL in CODI GitHub.</li> </ol>
4.1.4	June 1, 2022	C. Macheret / Health FFRDC	<ol style="list-style-type: none"> <li>1) Alex Beede improved readability</li> <li>2) Updated definitions and CODI overview in Section 2.1</li> <li>3) Removed duplicate rows from tables in the data dictionary appendix</li> <li>4) Added detail to Section 4.1.5</li> </ol>

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# 1. Introduction

The Centers for Disease Control and Prevention (CDC) promote health; prevent disease, injury, and disability; and prepare the nation for emerging health threats. The CDC's Division of Nutrition, Physical Activity, and Obesity and the Center for Surveillance, Epidemiology, and Laboratory Services partnered with the Centers for Medicare & Medicaid Services (CMS) Alliance to Modernize Healthcare federally funded research and development center (Health FFRDC), as well as local clinical and health partners, for the Clinical and Community Data Initiative (CODI). CODI expands the ability to capture, standardize, integrate, and query existing patient-level electronic health records (EHRs) and community-based program data via a common data model.

The CODI data models are an extension of the Patient Centered Outcomes Research Network's (PCORnet) Common Data Model (CDM),<sup>1</sup> a standard data model representing anonymized patient-level data for research. CODI augments the PCORnet CDM with a representation of chronic disease prevention programs and individual-level program participation data. Researchers can use CODI to access anonymized longitudinal record data for individuals that includes both clinical history and local public health program data.

This document describes how CODI implementers and end-users should interpret the CODI data tables. It also provides best practices for addressing situations in which CODI implementers may identify multiple ways to populate the CODI data models with local data. CODI end-users can query across the health and intervention data shared by multiple data owners.

## 1.1 Background

Version 4.1 of the CODI Data Models Implementation Guide (DM IG) is an update to the CODI DM IG, Version 3.0 (March 2020) that was developed for the CODI participants in Colorado (CODI@CO) starting in 2019. Version 4.1 accommodates expanded scope requests from the Scoping and Use Case Subgroup of the CODI Collaborative Work Group (CCWG). The North Carolina CODI implementation (CODI@NC), starting in January 2022, will implement Version 4.1 of the DM IG and may drive subsequent minor revisions to the IG as implementation progresses.

To determine the scope of available, relevant data owned by North Carolina organizations, the CCWG and its partners performed a clinical community linkages assessment (CCLA) and a technical environmental scan (TES) of North Carolina healthcare delivery and community-based organizations who may own data relevant for CODI@NC.

The Health FFRDC used the CCLA TES findings, the requested scope expansion, and the existing Version 3.0 data models as inputs to develop an analysis and subsequent data model change recommendations documented in the CODI@NC Gaps Analysis report.<sup>2</sup> The CODI data models and implementation guidance in Version 4.1 are a culmination of that analysis and feedback from CCWG. Clarifications to the implementation guidance that are not changes to the

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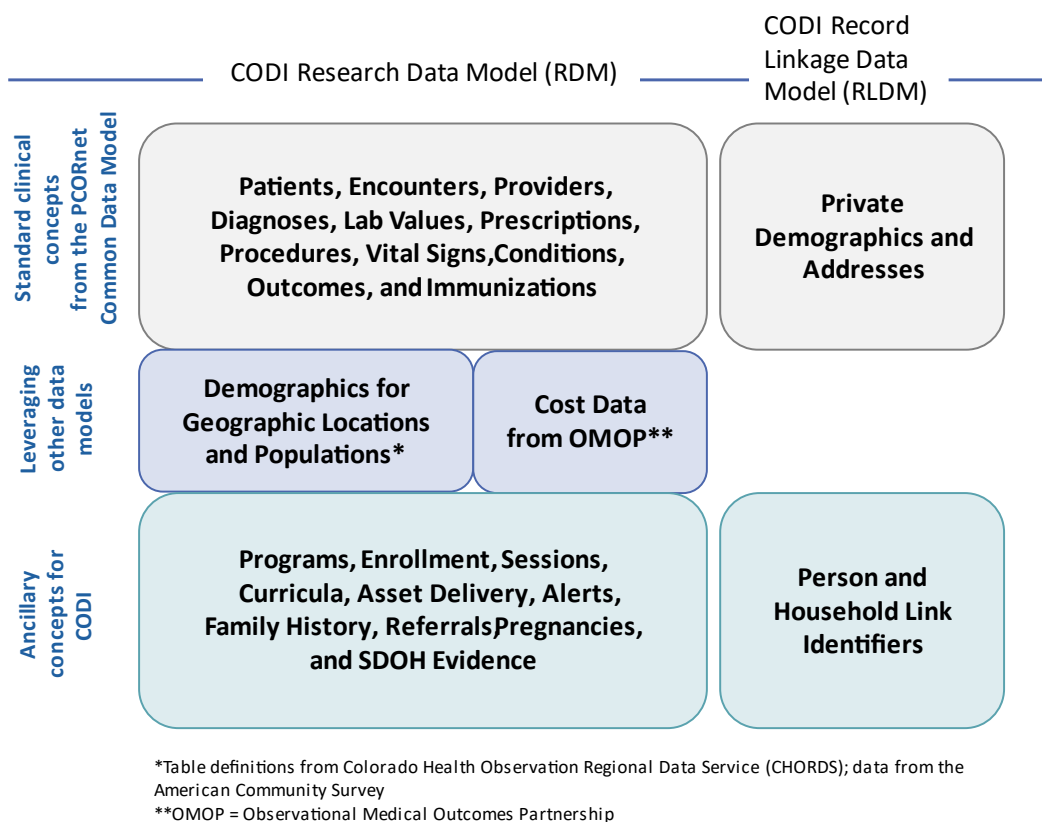
<sup>1</sup> The acronym CDM can refer to common data models from different authorities. Within this document, when used without qualification, it refers to the PCORnet Common Data Model.

<sup>2</sup> Contact Division of Nutrition, Physical Activity, and Obesity at CDC.gov for access to this report.

data model are expected during the North Carolina implementation process resulting in subsequent updates of the CODI Implementation Guide. For the IG change control process, see Section 5.1.

The CODI data models comprise two distinct data schemas: 1) the CODI Research Data Model (RDM), representing data needed to answer CODI end user queries on the health status, health intervention participation, and community-based program participation of individuals; and 2) the CODI Record Linkage Data Model (RLDM), needed for matching an individual's records across different data owners and for matching individuals to a household.

CODI's data models reuse parts of the CDM and introduce ancillary tables either borrowed from other data models or designed specifically for new functionality to a PCORnet or PCORnet-compatible clinical data network. Three of CODI's ancillary tables are inherited from the Colorado Health Observation Regional Data Service (CHORDS) virtual data warehouse (VDW) and the Observational Medical Outcomes Partnership (OMOP) common data model because they satisfied CODI data requirements and were used in CODI DM IG Version 3. The CODI project designed the remaining ancillary tables for CODI functionality not already supported by PCORnet, CHORDS VDW, or OMOP.



**Figure 1. Overview of CODI Research and Record Linkage Data Models**

Figure 1 illustrates the major components of the CODI data models and the provenance for those components.

## 1.2 Purpose

The purpose of this document is to provide the guidance necessary for implementers to build and populate the CODI data models. Toward that end, this document provides:

- Descriptions of the two CODI data models: RDM and RLDM
- General expectations regarding how to populate the tables in the CODI data models
- Specific guidance regarding individual data elements of the CODI data models

The data dictionary appendices to this guide are useful to both implementers and end-users for understanding the meaning of the data elements in CODI data models.

## 1.3 Scope

This document comprises the general implementation guidance for the ancillary tables (i.e., the lowest layer in Figure 1) and supplemental guidance specific to CODI's use of the CDM and other incorporated data models.

This document is not the authoritative source for detailed implementation guidance regarding CDM and the other, incorporated data models (the top two layers in Figure 1). Implementation guidance for those can be found in the following documents:

- [PCORnet Common Data Model v.6.0 Specification](https://pcorntest.org/wp-content/uploads/2020/12/PCORnet-Common-Data-Model-v60-2020_10_221.pdf)<sup>3</sup>
- CHORDS VDW 3.5 Data Model Manual<sup>4</sup>
- [OMOP Common Data Model v.6.0 Specifications](https://github.com/OHDSI/CommonDataModel/wiki)<sup>5</sup>

In addition to implementation guidance, this document provides the data definitions for all tables in the CODI data models, both incorporated and ancillary.

Data owners or partners are encouraged to supplement this implementation guide with their own data mapping specifications unique to their distinct information systems, so long as it does not conflict with the information presented here.

Because implementation of the full RDM may be initially complex, this guide recommends an implementation priority in Section 2.2.2 for RDM tables. Implementers familiar with Version 3 of the CODI Data Models should take note of the removal of components of RLDM as documented in Section 2.2.1.

## 1.4 Audience

The primary audience for this document is the technical staff of the CODI implementers—those individuals directly responsible for populating the CODI Data Models using data from participating data owners. The secondary audience includes project staff indirectly responsible for implementation and for potential new CODI participants trying to assess the feasibility of

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<sup>3</sup> [https://pcorntest.org/wp-content/uploads/2020/12/PCORnet-Common-Data-Model-v60-2020\\_10\\_221.pdf](https://pcorntest.org/wp-content/uploads/2020/12/PCORnet-Common-Data-Model-v60-2020_10_221.pdf)

<sup>4</sup> This document is available by sending a request to [CODI@cdc.gov](mailto:CODI@cdc.gov).

<sup>5</sup> <https://github.com/OHDSI/CommonDataModel/wiki>

implementing the CODI Data Models. Chronic disease researchers are likely most interested in the data model documentation appearing in the appendices or as a stand-alone data dictionary, needed to formulate data queries.

## 1.5 Document Organization

This document is organized as follows:

**Table 1: Document Organization**

Section		Purpose
Section 2:	CODI Overview	Provides an overview of the CODI data models and introduces common definitions
Section 3:	General Guidance	Provides general guidance for implementers
Section 4:	Specific Guidance	Provides guidance on how to implement the changes made by CODI to existing CDM tables and how to implement the CODI ancillary tables
Section 5:	Additional Resources	Provides additional information on contacts and governance for this implementation guide
Appendix A:	Additional Guidance for CODI@NC	Provides specific guidance for implementation in North Carolina
Appendix B:	RLDM Data Definitions	Presents the detailed RLDM data dictionary
Appendix C:	RDM Data Definitions	Presents the RDM data dictionary
Acronym List		Defines the acronyms used in this document
List of References		Lists the sources used in preparing this document

## 2. CODI Overview

This section begins with a brief description of CODI's concept of operation and defines the CODI roles that are relevant to implementing the CODI Data Models. This is followed by an overview of the CODI Data Models.

### 2.1 CODI Operational Concept and Roles

Different organizations within a community collect different types of data about an individual's health. CODI links these organizations' data systems to build anonymized, longitudinal individual health records. CODI users can then query the CODI system to access health data relevant to their research or program questions.

In the CODI model, the organizations that own the data of interest are called **data owners**. Data owners may be:

- Clinical healthcare providers, such as hospital systems, community health centers, or individual providers
- Community-based organizations (CBO)
- Government organizations such as Public Health Departments
- Other organizations that collect health or social risk factor data

Data owners contribute to CODI by allowing their data to be linked with that of other data owners within the same **clinical-community distributed data network** through a process called Privacy Preserving Record Linkage (PPRL), which is performed by the **linkage agent**.

The linkage agent is an organization that links data on behalf of CODI implementers. The linkage agent receives encrypted personally identifiable information (PII) from data owners and produces unique LINKIDs, which can link an individual's data across organizations. Figure 2 shows a linkage agent receiving hashed data from two data owners and linking individuals across those data owners. In practice, the linkage agent will perform this linkage across all data owners within the CODI clinical-community distributed data network at regular intervals.

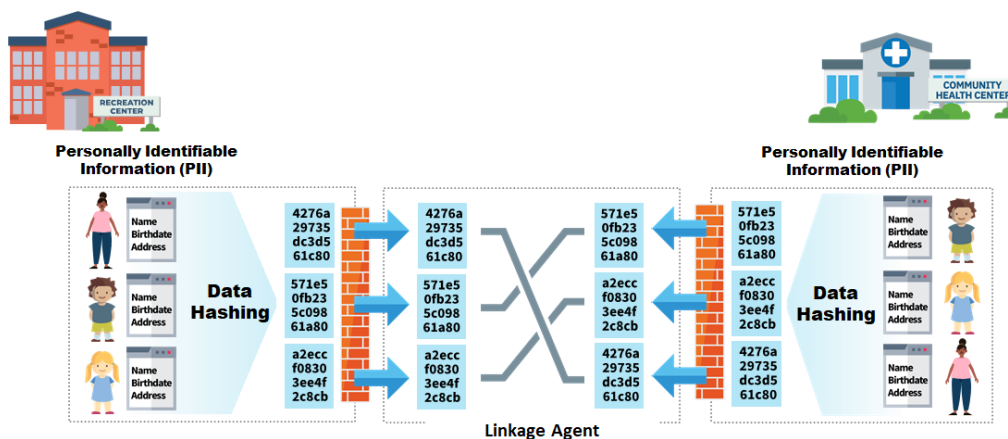
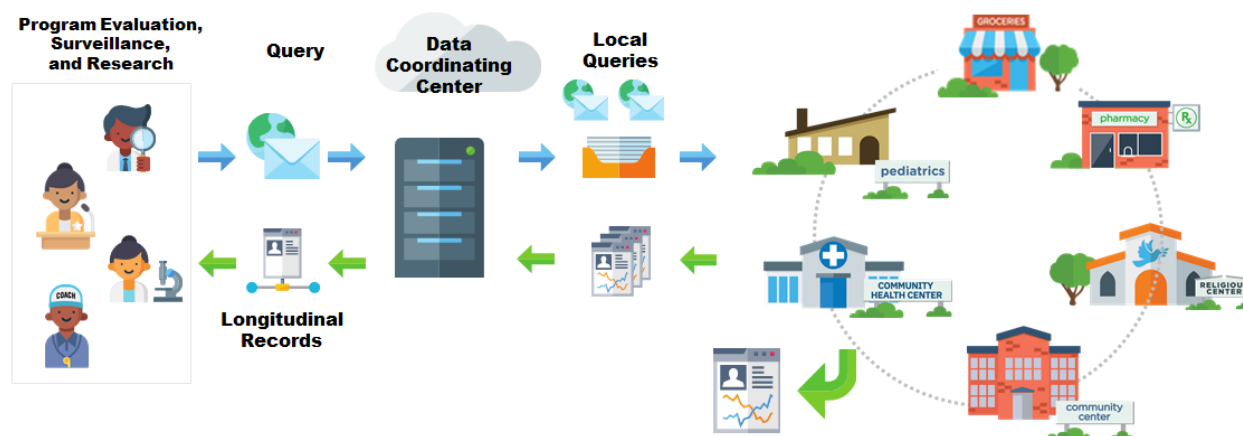


Figure 2. Example of Privacy Preserving Record Linkage Performed by a Linkage Agent



To facilitate the linkage, data owners must map their data (including the LINKIDs) to the CODI model so the data can be queried and assembled into a longitudinal record in a standardized way by the **data coordinating center**. Figure 3 shows how CODI users (e.g., researchers, community-based program evaluators) interact with the data coordinating center, which distributes the research queries throughout the CODI network. The data coordinating center assembles the results into longitudinal records, which are then sent to the CODI users.



**Figure 3. A clinical-community distributed data network**

If a data owner does not have the resources for these tasks, they may rely on an intermediary **data partner** to help with the data mapping and host their data. For the purposes of this implementation guide, any organization who is responsible for populating the CODI data model is referred to as a **CODI implementer**, whether they are a data owner or a data partner acting on behalf of a data owner. This implementation guide is intended to assist CODI implementers with populating the CODI data model.

## 2.2 CODI Data Models

The next two subsections provide a conceptual overview of the RLDM and RDM.

### 2.2.1 Record Linkage Data Model

CODI uses record linkage to construct a longitudinal record of an individual's health from the information supplied by multiple data partners, while protecting anonymity. CODI uses the individual-to-household linking to enable analysts to explore correlations among household members in their behavior and health.

The RLDM defines the data tables and data elements needed to perform the record linkage process. It includes two tables from CDM that contain unencrypted PII. Those two tables must only be implemented by a data owner or partner in a secure repository, according to the CODI Privacy Preserving Record Linkage Implementation Guide.<sup>6</sup> Table 2 summarizes the conceptual components of the RLDM. Appendix B contains the RLDM data dictionary of table and attribute definitions used by CODI.

**Table 2. Conceptual Components of the RLDM**

Concept	Table	Description
Private individual demographics	PRIVATE_DEMOGRAPHIC	Includes PII on an individual that is not shared but is used to create anonymous identifiers
Private individual addresses	PRIVATE_ADDRESS_HISTORY	Includes personal address information for an individual that is not shared but is used to create anonymous household identifiers and to geocode an individual's location
Anonymous identifiers	LINK HOUSEHOLD_LINK	Includes the anonymous identifiers used to link information on individuals and households back to the DEMOGRAPHIC table

The RLDM is revised considerably from the model defined in the CODI DM IG, Version 3.0 for Colorado. The CDM private tables replace the IDENTIFIER table. Updates to the CDM, particularly the addition of the private tables, render the IDENTIFIER table obsolete.

### 2.2.2 Research Data Model

The RDM provides the data tables and data elements needed to answer selected chronic disease research and program evaluation questions. Table 3 summarizes the major conceptual

<sup>6</sup> <https://github.com/mitre/codi/blob/main/CODI%20PPRL%20Implementation%20Guide.pdf>

components of the RDM. High-priority data tables are required for a minimum CODI implementation. Medium-priority tables should only be implemented by data partners with the resources and local interest to do so. Low priority tables are included for completeness—there are no plans to implement them at this time.

**Table 3. Conceptual Components of the RDM**

Concept	Table	Description
The individual	DEMOGRAPHIC	Includes demographic information about a patient or program participant
Family health risk factors	FAMILY_HISTORY	Includes details about any family members' health conditions
Clinical care	ENCOUNTER DIAGNOSIS LAB_RESULT_CM PRESCRIPTION PROCEDURE PROVIDER VITAL	Includes information about an individual's interactions with the healthcare delivery system
Clinical or self-reported COVID-19 status	IMMUNIZATION CONDITION LAB_RESULT_CM	Includes information on an individual's COVID-19 disease and vaccination status
Individual-level social determinants of health	CONDITION DIAGNOSIS PRO_CM SDOH_EVIDENCE_INDICATOR	Includes responses to questionnaires for collecting an individual's social determinants of health and a person-specific map (SDOH_EVIDENCE_INDICATOR) of where to find that information in the RDM
Chronic disease-related interventions	PROGRAM CURRICULUM_COMPONENT SESSION ENROLLMENT ASSET_DELIVERY	Includes details about intervention aims and settings (PROGRAM); how the interventions are structured (CURRICULUM_COMPONENT); who is administering the intervention and how (SESSION); and if an asset (e.g., food, money) was provided (ASSET_DELIVERY)
Pregnancy	PREGNANCY PREGNANCY_OUTCOME	Includes information about prenatal care, delivery, and postnatal circumstances
Referrals	REFERRAL	Includes incoming and outgoing referrals within and across organizations
Clinical decision support	ALERT SESSION_ALERT	Includes details about the types of clinical alerts (ALERT) and when they triggered (SESSION_ALERT)
Cost of care	COST	Includes information about the amounts charged

Concept	Table	Description
Location area of Individual and associated population-level demographics	CENSUS_LOCATION CENSUS_DEMOG	Includes details about where within a geographic area that individuals reside (CENSUS LOCATION) and population-level demographic data about that location from the census <sup>7</sup> (CENSUS DEMOG)

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<sup>7</sup> Specifically, the American Community Survey

## 3. General Guidance

This section provides general guidance for CODI implementers to populate the CODI data models. This guidance applies to the tables in the RDM and RLDM.

### 3.1 Data Cleaning Expectations

In general, the CODI Data Models should be populated with structured data extracted from the EHR or other information technology (IT) systems, unless specified otherwise. For example, CODI implementers will not populate a data element in the RDM based on an analysis of free text, such as a progress note, nor should they attempt to suppress implausible values. CODI end-users can perform any data cleaning or inferencing post-hoc based on their data needs.

Exceptions to this general guidance are listed for specific data elements. For example, an exception is made for the process-related data elements of the SESSION table. This exception exists because only the data owners and their implementors can determine which process steps necessarily follow from observations recorded in their systems.

### 3.2 Data Transformation Expectations

#### 3.2.1 Mapping Codesets

Mapping from a local codeset to a CODI codeset is anticipated and does not constitute data cleaning. CODI implementers **should** map a data owner's native codes to CODI.

#### 3.2.2 Missing Data

CDM uses the Health Level 7 International ([HL7](https://www.hl7.org/fhir/v3/NullFlavor/cs.html)) [conventions](https://www.hl7.org/fhir/v3/NullFlavor/cs.html)<sup>8</sup> for missing or unknown values; these rules will therefore apply to the CODI ancillary tables as well:

- A data field that is not present in the source system uses a null value.
- If the source value is null or blank, CDM uses NI (no information).
- If the source value is an explicit unknown value, CDM uses UN (unknown).
- When the source value cannot be mapped to CDM, CDM uses OT (other).

### 3.3 Reference Tables

There are three tables likely to not be populated from an EHR or another IT system. These are ALERT, CENSUS\_DEMOG, and PROGRAM.

The CENSUS\_DEMOG table contains information from the Census Bureau, specifically the American Community Survey (ACS). The CODI project has access to a structured data file that CHORDS provides using their extraction logic for a five-year period of ACS data. The data coordinating center (DCC) is responsible for sharing the extracted ACS data with CODI

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<sup>8</sup> <https://www.hl7.org/fhir/v3/NullFlavor/cs.html>

implementers using an agreed upon sharing mechanism. The CODI implementers will populate the CENSUS\_DEMOG table using this static data.

The PROGRAM and ALERT tables must be populated manually. Implementers are encouraged to populate these tables with explicit program and alert values as part of the extract–transform–load (ETL) process that populates the remainder of the RDM. Implementers are further encouraged to test referential integrity to ensure the primary keys for these tables connect properly with the tables that reference them (such as SESSION and SESSION\_ALERT).

## 3.4 Start Date

Each clinical-community distributed data network should establish a **start date** for that network. The start date represents the earliest possible date for which data partners can reliably populate the CODI Data Models. Data partners should use the start date as the earliest event data to populate CODI tables. The purpose of a single start date is for the data from different partners in the same data-sharing network to be comparable. The CODI implementation subgroup will determine the start date.

## 3.5 Guidance by Organization Type

In the following subsections, we provide guidance for various kinds of organizations including clinical organizations, government benefits organizations, and CBOs. Regardless of organization type, the tables in the RLDM are relevant and required.

### 3.5.1 Clinical Organizations

Clinical organizations include any organization that provides clinical services. In CODI@NC, clinical organizations include Duke, University of North Carolina, and the Durham Local Health Department.

These data partners should create all RDM tables in their data warehouses and populate those tables to the best of their ability. If a table cannot be implemented, the data partner should create the table and leave it empty so queries that reference those tables do not fail.

- High Priority
  - CENSUS\_DEMOG
  - CENSUS\_LOCATION
  - DEMOGRAPHIC
  - DIAGNOSIS
  - ENCOUNTER
  - ENROLLMENT
  - LAB\_RESULT\_CM
  - PREGNANCY
  - PREGNANCY\_OUTCOME
  - PRESCRIBING
  - PROCEDURES

- PROGRAM
- PROVIDER
- PRO\_CM
- SDOH\_EVIDENCE\_INDICATOR
- SESSION
- VITAL
- Low Priority
  - ALERT
  - ASSET\_DELIVERY
  - CONDITION
  - COST
  - CURRICULUM\_COMPONENT
  - FAMILY\_HISTORY
  - IMMUNIZATION
  - REFERRAL
  - SESSION\_ALERT

### 3.5.2 Community-Based Organizations

CBOs are organizations in which non-clinical services or assets are delivered. These organizations do not deliver healthcare as would a clinic, hospital, health center, or other organization that provides clinical care. CBO examples include the local YMCA, local foodbanks, and county Divisions of Parks and Recreation. The tables listed as high priority are required for CODI's primary functions, while tables listed as lower priority may be relevant but are optional.

Within the RDM, only the subset of tables listed below are typically relevant<sup>9</sup> to CBOs. Data partners for CBOs should create all RDM tables in their data warehouses but leave those tables not listed empty so queries that reference those tables do not fail. The tables listed as high priority are required for CODI's primary functions, while tables listed as lower priority may be relevant but are optional.

- High Priority
  - CENSUS\_DEMOG
  - CENSUS\_LOCATION
  - DEMOGRAPHIC
  - ENROLLMENT
  - PREGNANCY
  - PREGNANCY\_OUTCOME

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<sup>9</sup> Additional data tables may become relevant to community-based organization partners after the initial pilot demonstration. For example, some community-based organization partners might capture VITAL signs, such as height and weight.

- PROGRAM
- PROVIDER
- PRO\_CM
- SDOH\_EVIDENCE\_INDICATOR
- SESSION
- Low Priority
  - ASSET\_DELIVERY
  - COST
  - CURRICULUM\_COMPONENT
  - REFERRAL

### **3.5.3 Government Benefits Organizations**

Government benefits organizations include any governmental organization that provides assets to individuals. In CODI@NC, the only government benefits organization is the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC).

Government benefits organizations should create all RDM tables in their data warehouses and populate those tables to the best of their ability. If a table cannot be implemented, the data partner should create the table and leave it empty so queries that reference those tables do not fail.

- High Priority
  - CENSUS\_DEMOG
  - CENSUS\_LOCATION
  - DEMOGRAPHIC
  - DIAGNOSIS
  - ENCOUNTER
  - ENROLLMENT
  - LAB\_RESULT\_CM
  - PREGNANCY
  - PREGNANCY\_OUTCOME
  - PRESCRIBING
  - PROCEDURES
  - PROGRAM
  - PROVIDER
  - PRO\_CM
  - SDOH\_EVIDENCE\_INDICATOR
  - SESSION
  - VITAL
- Low Priority



- ALERT
- ASSET\_DELIVERY
- CONDITION
- COST
- CURRICULUM\_COMPONENT
- FAMILY\_HISTORY
- IMMUNIZATION
- REFERRAL
- SESSION\_ALERT

## 4. Specific Guidance

The CODI RDM represents clinical encounter information by reusing parts of the CDM. CODI augments the CDM table subset with ancillary tables to represent community-based health intervention programs and participation. Together, the identified subset of CDM tables and the CODI ancillary tables comprise the CODI RDM. The RDM captures individual-level information that researchers, program evaluators, and other CODI users wish to explore to understand and improve interventions for community health.

The CODI RLDM supports identity management needed to link information on clinical encounter and program participation information from multiple data partners to the same individual. The RLDM also reuses parts of the CDM as well as CODI ancillary tables to manage identity while preserving privacy.

Section 0 provides CODI-specific implementation guidance for CDM tables used by CODI. Section 4.2 provides implementation guidance for each of the CODI-specific ancillary tables that augment CDM to complete the CODI scope of functionality. Within both sections, data tables and attributes appear in ALL CAPS; see Appendix B and Appendix C for a complete dictionary of these tables and attributes.

### 4.1 PCORnet CDM Data Tables

This section provides CODI implementation guidance for CDM tables that CODI reuses, thereby supplementing CDM's implementation guidance, including constraints on CDM table content. The CODI implementer should consult the primary implementation guidance in [PCORnet Common Data Model v6.0 Specification](#)<sup>10</sup> for all CDM tables that CODI uses, and then follow the supplemental guidance provided here that alters or adds to the CDM specification guidance.

CODI does not reuse all CDM tables, and for those CDM tables that CODI does use, it does not necessarily use all CDM attributes. The specific guidance in this section applies to the following CDM tables listed in alphabetic order: CONDITION, DEMOGRAPHIC, ENCOUNTER, IMMUNIZATION, and PRO\_CM. A dictionary for these tables and the other CDM tables used by the CODI data models appears in Appendix B and Appendix C.

#### 4.1.1 CONDITION

The CONDITION table contains a single record for each condition, problem, or disease that an individual reports directly to a health professional or CBO. Whereas a record in DIAGNOSIS indicates the results of diagnostic processes and medical coding within healthcare delivery, CONDITION information is an informal reporting of a problem. CODI only requires two types of CONDITION data to support the CCWG's designated research scope.

The first type of information needed is any non-clinical reporting of an individual having had COVID-19. The second is any reporting of health risks related to social determinants or social factors, for example an International Clinical Diagnosis (ICD) code of "Z59.1" meaning

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<sup>10</sup> [https://pcor.net/wp-content/uploads/2020/12/PCORnet-Common-Data-Model-v60-2020\\_10\\_221.pdf](https://pcor.net/wp-content/uploads/2020/12/PCORnet-Common-Data-Model-v60-2020_10_221.pdf)

“Inadequate housing.” Any report of ICD Z codes pertaining to social determinants of health as a condition is of importance to CODI.

All other condition data are not required for the CODI scope (anticipated queries) designated by CCWG for this version of the CODI data models. Other condition data may be provided if an organization chooses to do so.

### 4.1.2 DEMOGRAPHIC

The DEMOGRAPHIC table contains a single record for each individual. This table should include information for children and adults with the age of two or above<sup>11</sup> and with at least one clinical visit or program participation record since the clinical-community distributed data network’s start date. Implementers should not include individuals without other records in the RDM. For example, an individual who has no encounter or program participation information, **and** no other clinical or self-reported health or social status information, should not be included in the DEMOGRAPHIC table. Individuals should be included in the DEMOGRAPHIC table if, for example, they have ENCOUNTER data, even if they do not have VITAL data, or the other way around—VITAL data without ENCOUNTER data (explained further in 4.1.3).

To preserve referential integrity, there must be a DEMOGRAPHIC record for any individual for whom information exists in any other RDM table (such as ENCOUNTER or SESSION). Conversely, every DEMOGRAPHIC record should have corresponding records in at least one other RDM table.

CODI omits individuals without other information in the RDM because adding individuals to the DEMOGRAPHIC table without sufficient information to answer possible research questions introduces an unwarranted risk. For example, an individual might be selected as a member of a cohort based on age and sex, but absent any encounters, vital signs, or program participation, none of the CODI research questions benefit from the inclusion of that individual. Although the CODI privacy-preserving record linkage (PPRL) strategies are designed to mitigate the risks of sharing health information across organizations for research, those risks are not necessary for individuals who do not satisfy the research needs.

### 4.1.3 ENCOUNTER

The ENCOUNTER table contains a single record for each unique encounter. Several other CDM tables contain optional foreign key references to the ENCOUNTER table, including DIAGNOSIS, CONDITION, LAB\_RESULT\_CM, PRESCRIBING, PROCEDURES, and VITAL. These references are optional so that diagnoses, conditions, lab results, prescriptions, procedures, and vitals can be captured in the CDM even if there is no information available for any corresponding encounter or the corresponding encounter is unknown. In some cases, there may not even be a corresponding encounter, such as when vital signs are measured outside a clinical setting.

The CODI’s ancillary table SESSION supplements the CDM ENCOUNTER table by representing information on encounters that involve screening or interventions with a focus on

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<sup>11</sup> The growthcleanr package for cleaning longitudinal anthropometric observations is designed and optimized for evaluating height and weight measurements taken for subjects aged 2-65. However, data on individuals above 65 are allowed in CODI.

chronic disease prevention or management, including obesity, obesity prevention, healthy eating, or active living. This means that an ENCOUNTER record and a SESSION record may be linked. See the SESSION table implementation guidance for more detail.

#### **4.1.4 IMMUNIZATION**

The IMMUNIZATION table contains one record for each vaccination encounter or report for an individual regardless of whether the vaccination encounter is reported in ENCOUNTER or PROCEDURE. Vaccination status information may come from within the health system or elsewhere (including self-reported vaccinations and information from a vaccine registry).

To support the CCWG's designated scope of data queries for this version, only IMMUNIZATION records conveying vaccination status pertaining to the COVID-19 disease (e.g., the coronavirus SARS-CoV-2 vaccine) are needed. Other immunization data may be provided if an organization chooses to do so.

#### **4.1.5 PRIVATE\_DEMOGRAPHIC and PRIVATE\_ADDRESS\_HISTORY**

The PRIVATE\_DEMOGRAPHIC and PRIVATE\_ADDRESS\_HISTORY tables are used in the RLDM to temporarily contain information used in creating CODI record identification links. These tables are to be populated in a secure repository that the PPRL process can access, but will not be accessible by other users of the RDM or by anyone who does not own the private demographic and address data.

These private tables contain the protected PII that the CODI implementer will obfuscate using a [cryptographic hash function](https://en.wikipedia.org/wiki/Cryptographic_hash_function)<sup>12</sup> that generates deidentified hash bundles of the PII for each individual. Only the obfuscated PII in the hash bundles is shared with a linkage agent as part of the record linkage process. The plain text PII data is separated and protected for the time it exists to create the hash bundles. The CODI Privacy Preserving Record Linkage Implementation Guide describes in detail the procedures performed by a CODI implementer to encrypt the data and the steps performed by the linkage agent to generate link IDs.

The CODI implementer will need to populate the private tables and then delete the data from the private tables once the LINKIDs are created. Refer to the PPRL IG to learn more about the in-between steps.

A data owner will provide the private information to the CODI implementer using a sharing mechanism that both parties agree upon and that keep the PII secure until it is deleted in the final PPRL process step (if the data owner is a CODI implementer, this is an internal process).

CODI's PPRL process requires just one demographic record and one address record per individual per data source. This means that the implementer who is populating the CODI RLDM private demographic table must ensure that individuals (patients or participants) are not duplicated in the CODI RLDM private demographic table. Similarly, the implementer must ensure that the RLDM private address history table has only one address per individual. To choose the best address for the RLDM PRIVATE\_ADDRESS\_HISTORY table follow these rules as closely as possible:

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<sup>12</sup> [https://en.wikipedia.org/wiki/Cryptographic\\_hash\\_function](https://en.wikipedia.org/wiki/Cryptographic_hash_function)

- Using the terminology of the PCORnet private address history, select the record with the latest address period start-date and null address period end-date, or if no null end-date, then select the address with the latest period end-date. Select an address where the address usage is the home address. If the address preferred flag is set to a non-null value, select a record where the address preferred flag is true. Finally, select a record where the address type is physical or both physical and postal.
- If the data owner does not already use a PCORnet PRIVATE\_ADDRESS\_HISTORY table, then use the address from the owner's native representation selecting the address that approximates the same rules as described above. Transform the native address as needed to map to the RLDM PRIVATE\_ADDRESS\_HISTORY table. The PPRL hashing tool uses the contents of that table to prepare the data for the linkage agent.

The fields used by PPRL are listed below. While the private tables in the PCORnet model contain other fields, CODI does not use them to generate the record linkage.

**Table 4: Fields used by the PPRL process**

**CODI Private Address**

CODI Attribute	Cardinality	Type
PATID	1	FK::DEMOGRAPHIC
ADDRESS_STREET	0..1	String
ADDRESS_ZIP5	0..1	CHAR (5)

**Private Demographics**

CODI Attribute	Cardinality	Type
PATID	1	FK::DEMOGRAPHIC
PAT_FIRSTNAME	0..1	String
PAT_LASTNAME	0..1	String
BIRTH_DATE	0..1	date
SEX	0..1	SEX_TYPE
PRIMARY_PHONE	0..1	CHAR (10)

After the PPRL steps are executed and the link ids established, delete the contents of the RLDM private tables to minimize unintentional disclosures.

## 4.1.6 PRO\_CM

The CDM Patient-Reported Outcome Common Model (PRO\_CM) table is used to store responses to patient-reported outcome measures (PROs) or questionnaires. This table can be used to store item-level (i.e., single question) responses as well as the overall score for each measure associated with a related set of questions, for example in a screening segment.

To support the CCWG's designated scope of data queries for this version, only data for questions or measures relevant to understanding an individual's social circumstances are needed. These social determinants of health (SDOH) include access to adequate food, housing, transportation, and personal safety. Other social circumstances also apply. Data owners are encouraged to share any screening responses or measures for any SDOH using the PRO\_CM table. The implementation instructions are in the PCORnet CDM specification.

## 4.2 CODI Ancillary Tables

The ancillary tables are designed to augment the CDM so that CODI research inquiries that are not supported in CDM are supported in the RDM. There are 14 ancillary tables designed specifically for CODI and three tables reused from other models but ancillary to CDM.

1. ALERT
2. ASSET\_DELIVERY
3. CENSUS\_DEMOG (from CHORDS)
4. CENSUS\_LOCATION (from CHORDS)
5. COST (from OMOP)
6. CURRICULUM\_COMPONENT
7. ENROLLMENT
8. FAMILY\_HISTORY
9. HOUSEHOLD\_LINK
10. LINK
11. PREGNANCY
12. PREGNANCY\_OUTCOME
13. PROGRAM
14. REFERRAL
15. SDOH\_EVIDENCE\_INDICATOR
16. SESSION
17. SESSION\_ALERT

#### 4.2.1 ALERT

The ALERT table contains one record for each distinct **kind** of alert directly related to chronic disease, especially cardiometabolic-related diseases. Each CODI implementer will determine on behalf of their organization which alerts qualify. For each such alert, the ALERT table captures information about the circumstances surrounding that alert. ALERT is a reference table that will likely need to be populated manually because the information it contains requires human curation. The attributes appearing in this table are intended to help a researcher understand when and why an alert might trigger.

Once [CDS Hooks](https://cds-hooks.org/)<sup>13</sup> (or a similar standard) becomes more widely adopted, the ALERT table should be updated to reflect that standard rather than relying solely on prose documentation and human identification of relevant alert types.

#### 4.2.2 ASSET\_DELIVERY

The ASSET\_DELIVERY table contains one record for each contiguous time period during which a person consistently receives assets. An asset is a resource transferred by a program to an individual. The intention is that each record represents a series of asset deliveries that regularly transpires. In situations where each delivery is ad hoc, the expectation is that a separate record appears for each such delivery. Otherwise, CODI assumes the deliveries occur on a recurring

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<sup>13</sup> <https://cds-hooks.org/>

basis as described by the record. DELIVERY\_FREQ indicates the number of deliveries within each unit of time. DELIVERY\_FREQ\_UNIT establishes the corresponding unit of time.

Monthly refers to calendar months. Deliveries that happen every 28 days should be encoded as 0.25 deliveries every week (i.e., once every four weeks). For example, an individual might receive cash benefits twice every calendar month. The start and end dates indicate the period during which these benefits were received, with a DELIVERY\_FREQ\_UNIT of monthly and a DELIVERY\_FREQ of 2.

CODI implementers acting on behalf of data owners that participate in asset delivery are encouraged to populate the ASSET\_PURPOSE at a minimum because it provides researchers with insight into the circumstances surrounding the delivery of assets.

### **4.2.3 CENSUS\_DEMOG**

The CENSUS\_DEMOG table represents community-level attributes for census tracts or counties using data from the ACS.<sup>14</sup> The attributes include race, housing characteristics, income levels, education, poverty, language spoken, marital status, unemployment, and Medicare or Medicaid recipient status. The ACS is an ongoing survey, conducted annually by the United States Census Bureau, which provides vital information about the United States population. The ACS has an annual sample size of about 3.5 million addresses, with surveys administered and information collected nearly every day of the year. Data are pooled across a calendar year to produce annual estimates.

The CHORDS VDW designed this table, and because it met the needs for CODI@CO, it was incorporated into the RDM. It continues to satisfy CODI's population demographic data needs, so it is carried over in this version of the RDM. For complete implementation documentation, see the CHORDS VDW Data Model Manual.<sup>15</sup>

The DCC will provide all CODI implementers with a formatted data file to populate their CENSUS\_DEMOG table. At the time of writing, the available data are from years 2015 to 2019. Location information for individuals is represented in CENSUS\_LOCATION, and every CENSUS\_LOCATION record must correspond to a location record in CENSUS\_DEMOG.

### **4.2.4 CENSUS\_LOCATION**

The CHORDS VDW CENSUS\_LOCATION table links an individual to a census tract or county represented in CENSUS\_DEMOG. Every record in DEMOGRAPHICS may have one or more records in CENSUS\_LOCATION. A null end date in a census location record is interpreted as representing a person's current known location.

CODI implementers assign a census tract or county to an individual in the DEMOGRAPHIC table based on the individual's geocoded<sup>16</sup> home address. Implementation requires that the implementers geocode an individual's address to a geographic tract or county level found in the CENSUS\_DEMOG.

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<sup>14</sup> <https://www.census.gov/programs-surveys/acs/>

<sup>15</sup> This document is available by sending a request to CODI@cdc.gov.

<sup>16</sup> A string up to 15 digits long (11 for the tract level) with geographic information hierarchically documented through the string of digits.

Detailed implementation instructions are provided in the CENSUS\_LOCATION section of the CHORDS VDW Data Model Manual.

### 4.2.5 COST

The OMOP COST table captures records containing the cost of any medical event or program participation occurrence recorded in CODI RDM tables. This table does not capture the cost of providing the service, but rather the amounts billed and received. The COST table can link to ENCOUNTER, LAB\_RESULT\_CM, PROCEDURES, or SESSION.

### 4.2.6 CURRICULUM\_COMPONENT

The CURRICULUM\_COMPONENT table enumerates the standard elements of a program. It supports both a fixed curriculum, in which the components are ordered using SESSION\_INDEX, and a recurring curriculum, in which the components repeat. Repeating components are documented with a combination of SESSION\_FREQ and SESSION\_FREQ\_UNIT, as described above.

The remaining attributes mirror those in the SESSION table (as described below). The CURRICULUM\_COMPONENT table describes what is intended to happen throughout the course of the program. The SESSION table describes what has been documented as having transpired. The CURRICULUM\_COMPONENT table provides researchers with insight into what likely happened when session information is missing or incomplete.

### 4.2.7 ENROLLMENT

The ENROLLMENT table captures information about an individual's enrollment in a chronic disease-related program or specific program provided by a CBO (see PROGRAM, below). Enrolling in a program does not mean the individual participated in the program, only that they were registered to participate. The individual's participation is captured in the SESSION table. The ENROLLMENT table also captures the individual's completion of the program. How a program defines completion is left to the discretion of each program. Researchers should consult the program's documentation to understand how best to interpret program completion. If an individual disenrolls from the program, implementers should populate the disposition description to document the circumstances involved.

### 4.2.8 FAMILY\_HISTORY

The FAMILY\_HISTORY table stores information regarding an individual's family health. Each entry records a single condition reported for a family member. Thus, if an individual's parents both have a history of chronic disease, two records would be present in this table. The intention is that CODI implementers only retrieve family history information present in a patient's or program participant's own record. If the EHR provides links to a parent's medical record, that information should **not** be included in FAMILY\_HISTORY. Reported conditions must be linked to controlled vocabulary—an ICD-9, ICD-10, or Systematized Nomenclature of Human Medicine (SNOMED) code—so researchers can easily interpret the reported family condition. Implementers will need to map from whatever terminology is used for family history to one of these vocabularies.



### 4.2.9 HOUSEHOLD\_LINK

The HOUSEHOLD\_LINK table contains one record for each person in the demographics table for each iteration of the record linkage process. When the RLDM is initially populated, this table will be empty. Each time the record linkage process is completed is a distinct iteration. For each iteration, the linkage agent will provide each CODI implementer with the information needed to establish an iteration-specific mapping from HOUSEHOLDID to HOUSEHOLD\_LINK\_ID. Upon receipt of this mapping, implementers should populate the HOUSEHOLD\_LINK table with contents from the mapping for that iteration, leaving previous iterations in the HOUSEHOLD\_LINK table.

Each household link record includes a designated household. More than one record may have the same household designation, indicating multiple people belong to the same household. The household designation indicates the existence of a household address where one or more persons in the demographics table are believed to reside for a given iteration of household linkage.

The linkage agent aligns households across partners and generates corresponding household link IDs using obfuscated information from the PRIVATE\_ADDRESS\_HISTORY table. The plain text household address is not shared with the linkage agent, nor is it given a CENSUS\_LOCATION. Only an anonymized household identifier in the HOUSEHOLD\_LINK record conveys the household to which a person is linked.

A household does not have an enduring ID; it is changed for each iteration of the record linkage process. There is no longitudinal information on a household; a user cannot track changes in household composition. Finally, a household says nothing about relationships (e.g., child, spouse, roommate) among household members, only that the household member is co-located with other members based on the address information available at the time of the record linkage iteration.

### 4.2.10 LINK

The LINK table contains one record for each person in the DEMOGRAPHIC table for each iteration of record linkage. When the RLDM is initially populated, this table will be empty. The LINKID is populated as part of the record linkage process. Each time the record linkage process is completed is a distinct iteration. For each iteration, the linkage agent will provide the information needed for the CODI implementer to establish an iteration-specific mapping from PATID to LINKID for each data owner. Upon receipt of this mapping, the implementer should populate the LINK table with contents from the mapping for that iteration, leaving previous iterations in the LINK table.

### 4.2.11 PREGNANCY

The PREGNANCY table contains one record for each time an individual is pregnant. It stores information about the pregnant person and the circumstances of the pregnancy. For example, it provides a single place for information about the pregnant person's weight, body mass index (BMI), use of tobacco, use of alcohol, and prenatal care. This table was designed to be compatible with WIC information systems.

Much of the information about an individual's pregnancy is captured in CDM. The PREGNANCY table consolidates that information into a single location. Implementers should

only populate this table if they can do so with certainty—clinical implementers are likely to find that pregnancy information cannot feasibly be assembled from the EHR. For example, CIGARETTE\_FIRST captures information about tobacco usage during the first trimester. If an implementer is not certain that its information about tobacco usage is specific to the first trimester, that implementer should leave that attribute blank.

#### 4.2.12 PREGNANCY\_OUTCOME

The PREGNANCY\_OUTCOME table contains one record for each infant resulting from a given pregnancy. It stores information about the individual(s) resulting from the pregnancy. It consolidates information about the child's height and weight at birth, breastfeeding, and exposure to tobacco. This table was designed to be compatible with WIC information systems. As with PREGNANCY, clinical implementers are likely to find that this table cannot feasibly be populated.

If an implementer has multiple values for an attribute in this table, the most current datum should be selected. For example, if the parent has reported about breastfeeding multiple times, the most recent breastfeeding information should appear in PREGNANCY\_OUTCOME.

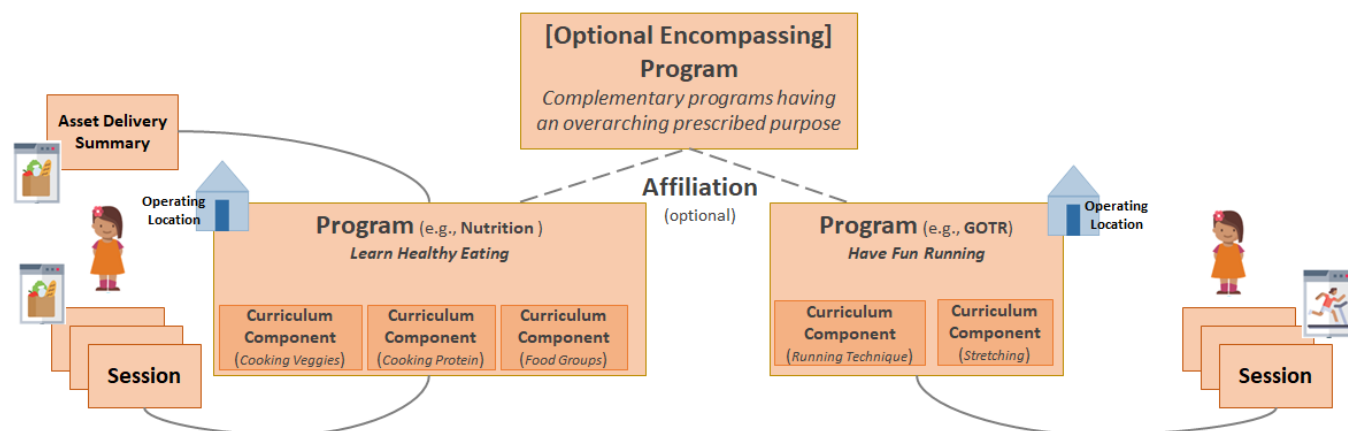
To maintain referential integrity, each record in the PREGNANCY\_OUTCOME table must link back to a corresponding record in the PREGNANCY table. A link back to the DEMOGRAPHICS table should also appear, **if** the implementer has a record for the child. If the normal demographic information is not available for the child, then the PATID fields should be left blank.

#### 4.2.13 PROGRAM

The PROGRAM table contains one record for each distinct chronic disease-related program. For the purposes of CODI, each location at which a program is administered constitutes a distinct program. For example, each clinic that administers a weight management program appears separately in the PROGRAM table.

This is the second table that will likely need to be manually populated. It captures a program manager's best understanding of how a weight-related program is administered and for what purpose. The attributes with the PROGRAM\_ and AIM\_ prefixes apply to every program. The attributes with the PRESCRIBED\_ prefix only apply to those programs with a predefined frequency of interaction, such as a program that lasts for 10 weeks and meets twice a week, two hours each time. This regularity allows researchers to know the intended dose and intensity (i.e., frequency of interaction) for the program. Programs without a predefined dose should leave these attributes blank.

The AFFILIATED\_PROGRAM attribute provides a way to document that a given program is affiliated with an encompassing program. For example, consider a weight-related program with two component programs (a cooking class and a physical activity program); participation in each is based on each individual's needs: this configuration includes three programs. The affiliated programs (i.e., cooking class, physical activity program) include prescribed doses and have specific aims, while the parent program has no set dose, and its aims are broad. The AFFILIATED\_PROGRAM attribute allows the affiliated programs to indicate the parent program with which they are affiliated.

**Figure 4. Illustration of Affiliated Programs**

The attributes with the LOCATION\_ prefix describe the location at which the program is typically administered. Three variants of location are supported: address, geospatial coordinates (latitude and longitude), and geocode (typically census tract). Implementers should provide all three variants for each program they are extracting, if possible.

The attributes with the SESSION\_OMISSION\_ prefix describe the circumstances under which session information is missing for the program. For example, some clinical programs only record sessions with a clinical component. The sessions lacking a clinical component are not documented and therefore do not appear in the SESSION table. Other programs exhibit less systematic omissions (e.g., because attendance is sometimes captured on paper). These attributes are included to help researchers better decide how to handle missing session information.

#### 4.2.14 REFERRAL

The REFERRAL table contains one record for each outgoing or incoming referral. The DIRECTION attribute indicates if the record represents a data owner initiating a referral (outgoing) or receiving a referral (incoming). Internal referrals should result in two records in the REFERRAL table: one outgoing referral and a second incoming referral. The purpose of the source and destination organization attributes is to link outgoing referrals with incoming referrals so researchers can see whether a referral successfully connected an individual with a weight-related program. Implementers will need to map organizations to CMS Certification Numbers; see ORGANIZATION\_TYPE in Appendix C for more information about coding organizations.

#### 4.2.15 SDOH\_EVIDENCE\_INDICATOR

A CODI SDOH evidence indicator signals that evidence exists on an individual pertaining to social conditions that may determine an individual's health risks. Examples of social conditions linked to health risks are those concerning housing, food, and personal safety. Examples of evidence types are results from any screenings (e.g., surveys, questionnaires), or specific screening items (e.g., a question/response pair), and any self-reported or professionally assessed risks that may be declared as a diagnosis or condition (e.g., using ICD Z codes). Participating in programs whose enrollment requires certain social circumstances may also be evidence.

SDOH are divided into topic areas. The evidence indicator declares the topic area in which evidence is available for an individual. CODI's topic areas are enumerated and defined in SDOH\_CATEGORY\_TYPE and also listed below. CODI's SDOH categories currently align with SDOH domains used in the Gravity Project to organize existing standard SDOH screeners and data elements. To understand the purpose of the Gravity Project,<sup>17</sup> its SDOH domains,<sup>18,19</sup> and how they align with CODI SDOH categories, see Section 4.2.15.3. Gravity terms assert dispositive the presence of a social condition—CODI categories assert that evidence related to a social condition exists, and it is the responsibility of the researcher to decide how to interpret that evidence.

- High Priority
  - FINANCIAL\_DOMAIN
  - FOOD\_DOMAIN
  - HEALTH\_INSURANCE\_DOMAIN
  - HOUSING\_ADEQUACY\_DOMAIN
  - HOUSING\_STABILITY\_DOMAIN
  - INTERPERSONAL\_VIOLENCE\_DOMAIN
  - TRANSPORTATION\_DOMAIN
- Low Priority
  - EDUCATION\_DOMAIN
  - ELDER\_CARE\_DOMAIN
  - EMPLOYMENT\_DOMAIN
  - MATERIAL\_NECESSITIES\_DOMAIN
  - SOCIAL\_CONNECTION\_DOMAIN
  - STRESS\_DOMAIN
  - VETERAN\_DOMAIN

Note that an SDOH\_EVIDENCE\_INDICATOR record linked to an individual does not convey whether the evidence is for or against the individual having a health risk; it is merely asserted to raise the user's awareness that some information in one of the SDOH categories is available on an individual in CODI. This approach allows clinical and community organizations to contribute whatever information the organization has, without modification. A researcher will have to decide how to interpret that evidence, based on their research needs. For example, a CBO that addresses homelessness might provide detailed information about housing stability. A CBO that addresses nutrition might provide detailed information about food insecurity.

#### **4.2.15.1 Purpose of the SDOH\_EVIDENCE\_INDICATOR**

The purpose of a record in the SDOH\_EVIDENCE\_INDICATOR table is to provide a shortcut to knowing that SDOH evidence exists on an individual, in which SDOH category and in which

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<sup>17</sup> <https://www.hl7.org/gravity/>

<sup>18</sup> <https://confluence.hl7.org/display/GRAV/Terminology+Workstream+Dashboard>

<sup>19</sup> <https://confluence.hl7.org/display/GRAV/SDOH+Data+Elements+And+Status>

CODI table the user can find it. The shortcut lets users filter individuals based on the presence of an indicator and its category. Filtering allows the CODI user to ascertain whether an individual has evidence without having to address the complex and disparate ways in which each data provider represents social determinants. If the user wishes to look directly at the more complex source evidence, it is captured in the CODI tables including PRO\_CM, DIAGNOSIS, and CONDITION. A CBO will likely rely heavily on PRO\_CM, which captures the question that was posed of the individual patient, and the answer to that question. For example, if the CBO codes the person's housing status, the PRO\_CM table allows the CBO to store their housing status codes directly.

#### **4.2.15.2 Implementation Guidance for SDOH\_EVIDENCE\_INDICATOR**

The SDOH\_EVIDENCE\_INDICATOR table contains zero or more records for each PATID in the DEMOGRAPHICS table. A record must have a PATID, an SDOH\_CATEGORY field value from SDOH\_CATEGORY\_TYPE, and either an EVIDENCE\_TABLE value matching a CODI table name, or an EVIDENCE\_EXPLANATION value, or may have both. There may be more than one record with the same SDOH category for the same PATID because there may be more than one piece of SDOH evidence in that category for that individual.

CODI implementers shall insert SDOH evidence indicator records based on evidence in the data owners' extracted dataset. For example, if the implementer inserts data from a social determinants screening into the PRO\_CM table, then the implementer should insert one or more records into the SDOH\_EVIDENCE\_INDICATOR table (if associated with a CODI SDOH category) using the applicable category name(s). The ROWID attribute captures the primary key of the table (if any) containing the evidence. For example, if the evidence can be found in the PRO\_CM table, the ROWID indicates the corresponding PRO\_CM\_ID for the evidence.

To automate this process, implementers can pre-map their data owner's standard SDOH screening instruments, by item, or by whole instrument to the appropriate SDOH category. For example, the implementer should map all housing instability and homelessness-related questions from screening tools that the data owner administers to the HOUSING\_INSTABILITY\_DOMAIN category, and likewise with other categories, pairing screening items with categories.

Then, as the ETL program populates the PRO\_CM table with an individual's screening responses, the ETL program can reference the SDOH question-to-category mapping. For every screening item (or set of items) entered in the PRO\_CM table, no matter the response value, and pre-mapped to an SDOH category, the ETL program will enter an evidence indicator record for that individual in the SDOH\_EVIDENCE\_INDICATOR table.

The ETL program shall also enter the name "PRO\_CM" in the EVIDENCE\_TABLE field to declare where the evidence is located. This information gives CODI end-users the name of the CODI table (e.g., PRO\_CM) in which to see raw SDOH data on an individual. Multiple evidence indicator records with the same category name for the same individual, with different or the same evidence tables, are acceptable in SDOH\_EVIDENCE\_INDICATOR, each with a distinct ROWID.

The Gravity Project has already categorized many standard screening tools and their questions by Gravity SDOH domains, and these align with CODI's SDOH categories (as shown in Section 4.2.15.3). The implementer can reference Gravity's mappings of questions to domains to

determine what to insert into the SDOH\_EVIDENCE\_INDICATOR. The Gravity Terminology Workstream Dashboard<sup>20</sup> provides access to the latest categorization of screeners to Gravity domains.

For those SDOH screening questions used by clinics or CBOs that are not already categorized by the Gravity Project, the data provider shall map them to an appropriate CODI SDOH category.

The PRO\_CM table is not the only CODI table that can hold social determinant evidence. Clinical organizations may assign social determinant diagnosis or condition codes (e.g., an ICD Z code) to individuals, which will go into the DIAGNOSIS or CONDITION tables. PRO\_CM allows clinical and community organizations to store any information obtained from an individual, such as the housing status codes assigned by a CBO. Additionally, the ETL program should insert an evidence indicator record with the appropriate SDOH category and set the EVIDENCE\_TABLE field value to where the data users will find the evidence.

The Gravity Project has already categorized SDOH diagnosis or problem codes into Gravity SDOH domains, just as they have with screening questions. Based on Gravity's categorization, the implementer will insert evidence indicators using the corresponding CODI SDOH category as shown in Table 5.

There are scenarios in which a implementer can deduce a social circumstance that warrants an SDOH evidence indicator, but the data owner does not have any explicit evidence that in a diagnosis, condition, or PRO\_CM table. One example is in cases where organizations do not capture income level for participants, but they do capture whether a program participant is receiving financial aid for participation fees. This is evidence pertaining to an individual's financial security, but the CODI RDM does not include a financial aid data element. For this case, the implementer can insert an indicator record and use the EVIDENCE\_EXPLANATION attribute to explain the reason for the indicator and leave the indicator table and row fields empty.

Other examples of evidence not contained in diagnosis, condition, or PRO\_CM, include social circumstances that are implied based merely on the program in which an individual participates (e.g., participants qualify to participate in the WIC program by being financially insecure). In this scenario, an evidence indicator record can be added with an EVIDENCE\_EXPLANATION of "low income qualified."

CODI does not currently provide a standard set of string values for the evidence explanation data element, but a CODI implementation network can choose to establish one for their network.

#### **4.2.15.3 CODI SDOH Categories and the Gravity Project Domains**

There are several local and national efforts to standardize the way clinical organizations and CBOs assess SDOH among the populations they serve.<sup>21</sup> Interviewees from CODI participating clinical organizations and CBOs noted that these tools are in early development and not yet widely adopted. Therefore, SDOH data are collected and represented in many ways across CODI data owners.

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<sup>20</sup> <https://confluence.hl7.org/display/GRAV/Terminology+Workstream+Dashboard>

<sup>21</sup> Agency for Healthcare Research and Quality, <https://www.ahrq.gov/sdoh/index.html>

“The Gravity Project was initiated in November 2018 by SIREN with funding from the Robert Wood Johnson Foundation to convene broad stakeholder groups in identifying and harmonizing social risk factor data for interoperable electronic health information exchange.”<sup>22</sup>

As part of Gravity’s ongoing harmonization effort, they have categorized existing SDOH data elements used for screening, diagnosis, goal setting, and interventions into topic areas, which they call SDOH Domains.<sup>23</sup> For example, Gravity has categorized questions from the Hunger Vital Sign<sup>24</sup> screening tool to their domain “Food Insecurity” so that they can compare those questions and codes to the food insecurity questions and codes from PRAPARE,<sup>25</sup> another screening tool.

From Gravity’s Terminology Workstream Dashboard in the HL7 Confluence site, one can download a spreadsheet for each Gravity domain that contains screening questions, diagnoses, and more mapped to that domain by Gravity. This is work in progress and will continue to update after the major release dates of any standards that they have mapped (e.g., SNOMED: March and September, ICD: October, Logical Observation Identifiers, Names, and Codes [LOINC]: August and February).

As of the writing of Version 4.1 of this implementation guide, the CODI SDOH categories are aligned with the Gravity SDOH domains. Table 5 shows a correspondence between CODI SDOH categories and Gravity SDOH domains. The CODI categories and Gravity domains are closely aligned. The CODI categories are more general; they define topic areas without committing to any necessary risk. The evidence category does not depend on a screening question’s response value; any response, whether suggesting risk or lack of risk, is still evidence. It falls to researchers to determine how best to use the available evidence.

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<sup>22</sup> <https://www.hl7.org/gravity/>

<sup>23</sup> <https://confluence.hl7.org/display/GRAV/SDOH+Data+Elements+And+Status>

<sup>24</sup> <https://childrenshealthwatch.org/public-policy/hunger-vital-sign/>

<sup>25</sup> Protocol for Responding to and Assessing Patients’ Assets, Risks, and Experiences (PRAPARE)

**Table 5: Suggested Alignment of SDOH Topic Areas**

<b>CODI SDOH Category</b>	<b>Definition</b>	<b>Gravity SDOH Domain</b>	<b>Definition</b>
<b>FOOD_DOMAIN</b>	Pertaining to an individual's access to adequate, nutritional, safe, and culturally acceptable food.	<b>Food Insecurity</b>	Uncertain, limited, or unstable access to food that is: adequate in quantity and in nutritional quality; culturally acceptable; safe and acquired in socially acceptable ways.
<b>HOUSING_STABILITY_DOMAIN</b>	Pertaining to an individual's access to temporary or permanent reliable shelter.	<b>Housing Instability and Homelessness</b>	Gravity's domain definition is unavailable at the time of writing, on the Gravity Project webpage ( <a href="https://confluence.hl7.org/display/GRAV/Housing+Instability+and+Homelessness">https://confluence.hl7.org/display/GRAV/Housing+Instability+and+Homelessness</a> ).
<b>HOUSING_ADEQUACY_DOMAIN</b>	Pertaining to the habitability of an individual's housing.	<b>Inadequate Housing</b>	Housing does not meet habitability standards.
<b>TRANSPORTATION_DOMAIN</b>	Pertaining to an individual's access to transportation for routine life sustaining activities such as to place of employment, medical facilities, and school.	<b>Transportation Insecurity</b>	Uncertain, limited, or no access to safe, reliable, accessible, affordable, and socially acceptable transportation infrastructure and modalities necessary for maintaining one's health, well-being, or livelihood.
<b>INTERPERSONAL_VIOLENCE_DOMAIN</b>	Pertaining to an individual's physical and emotional safety in close relationships.	<b>Intimate Partner Violence</b>	The term "intimate partner violence" describes physical violence, sexual violence, or psychological harm by a current or former partner or spouse. Often including a pattern of methods and



CODI SDOH Category	Definition	Gravity SDOH Domain	Definition
			tactics to gain and maintain power and control over the other person.
<b>FINANCIAL_DOMAIN</b>	Pertaining to an individual's ability to or feeling about meeting current and/or ongoing financial obligations.	<b>Financial Insecurity</b>	A state of being wherein a person has difficulty fully meeting current and/or ongoing financial obligations and/or does not feel secure in their financial future.
<b>MATERIAL_NECESSITIES_DOMAIN</b>	Pertaining to an individual's access to socially perceived physical necessities.	<b>Material Hardship</b>	The lack of specific socially perceived based physical necessities.
<b>EMPLOYMENT_DOMAIN</b>	Pertaining to an individual's status on having, looking for, or being without a job or work.	<b>Employment Status</b>	Unemployment definition: Jobless, looking for a job, and available for work.
<b>HEALTH_INSURANCE_DOMAIN</b>	Pertaining to an individual's access to health insurance.	-----	-----
<b>ELDER_CARE_DOMAIN</b>	Pertaining to an elder's exposure to physical, psychological, sexual, or financial abuse, or neglect by caregivers.	<b>Elder Abuse</b>	An intentional act or failure to act by a caregiver or another person in a relationship involving an expectation of trust that causes or creates a risk of harm to an older adult and can be in the form of physical abuse, psychological abuse, sexual abuse, financial abuse, and neglect by someone in a caregiving role.

CODI SDOH Category	Definition	Gravity SDOH Domain	Definition
<b>EDUCATION_DOMAIN</b>	Pertaining to an individual's academic achievements	<b>Educational Attainment</b>	Less than high education definition: Failing to meet academic criteria for high school diploma or equivalent.
<b>VETERAN_DOMAIN</b>	Pertaining to an individual's current and historical status in military service	<b>Veteran Status</b>	Having served as active military and honorably released or discharged.
<b>STRESS_DOMAIN</b>	Pertaining to an individual's perceived ability to meet, mitigate, or alter perceived excesses in environmental demands and stimuli	<b>Stress</b>	Stress: occurs when a person perceives the demands of environmental stimuli to be greater than their ability to meet, mitigate, or alter those demands.
<b>SOCIAL_CONNECTION_DOMAIN</b>	Pertaining to an individual's actual or perceived frequency of social contact, and actual or perceived access to informational, tangible, and emotional support from others.	<b>Social Connection</b>	<p><u>Social Isolation</u>: Is objectively being alone, having few relationships, or infrequent social contact.</p> <p><u>Loneliness</u>: Is subjectively feeling alone. The discrepancy between one's desired level of connection and one's actual level.</p> <p><u>Social support</u>: The actual or perceived availability of resources (e.g., informational, tangible, emotional) from others. Four types of social supportive behaviors: emotional, instrumental, informational and appraisal.</p>

## 4.2.16 SESSION

The SESSION table contains one record for each interaction between an individual and a healthcare provider or program representative. In its most basic incarnation, the SESSION table is an extension of the ENCOUNTER table, to include CODI-specific attributes. For example, during a well-child visit or adult's annual check-up, exercise and nutrition screening may transpire. When an ENCOUNTER involves multiple providers interacting with an individual, multiple SESSION records should be created. For example, a single encounter sometimes includes an individual interacting with multiple providers, such as the primary care physician and a dietician. Each of these interactions is a separate session because they involve different providers.

As an example of the difference between PROGRAM data and SESSION data, consider Figure 5. For Girls on the Run, there would be one entry for each school where Girls on the Run is offered. In the figure, only a single program record is shown (and many details, including location, are omitted for brevity). In the SESSION table, there is one record for each time an individual attends the program. In this example, there are two children (G234 and G567). The first child attended Girls on the Run three times, and the second child attended twice. The ENCOUNTERID is missing because Girls on the Run is a community program that does not collect clinical information.

**Figure 5. Sample Program and Session Data**

PROGRAM ID	PROGRAM_NAME	PROGRAM_SETTING	PROGRAM_MODE	AIM_NUTRITION	AIM_ACTIVITY	AIM_WEIGHT	TOTAL_DOSE
001	Girls on the Run	CO	G	False	True	False	20.0

SESSION ID	PAT ID	ENCOUNTER ID	PROVIDER ID	PROGRAM ID	SESSION_DATE	DOSE
001	G234		003	001	14-Jan-2019	1.0
002	G234		003	001	16-Jan-2019	1.0
003	G234		003	001	21-Jan-2019	1.0
004	G567		003	001	14-Jan-2019	1.0
005	G567		003	001	21-Jan-2019	1.0

At a minimum, implementers should populate the SESSION table for wellness visits and for encounters that are part of a chronic disease intervention program (e.g., Diabetes Prevention Program, MEND, Healthy Weight Clinic, Girls on the Run, or Hunger Free Colorado). The next highest priority is to populate the SESSION table for primary care encounters and for encounters related to chronic diseases or chronic-related comorbidities (e.g., a follow-up weight check, a

visit for nutritional counseling, or a visit with a specialist such as endocrinology or cardiology). Finally, if the implementation budget allows, implementers should populate the SESSION table for every encounter type having session data

If the data owner or implementer chooses only some encounter types to extend with session data, then there should be no session records created for encounter types that are not one of those chosen encounter types. For example, if an implementer populates the SESSION table for only well visits and chronic disease intervention program encounters, then no record in the SESSION table should be created for emergency department encounters.

For programs related to chronic disease and based in a community setting, each SESSION record corresponds to an individual's participation in the program. For example, an individual who completes a program that meets weekly for 10 weeks should have 10 distinct SESSION records.

The DOSE attribute indicates the amount of time spent interacting with the individual (in hours). This attribute should only be populated based on what is documented in the EHR or other IT system. If the duration of the session is not documented, the DOSE attribute should remain empty. For example, the DOSE attribute would not be populated for interventions conducted by mail and may not be populated for Web-based interventions.

The SESSION table includes several process-related attributes (SCREENING, COUNSELING, and those with the INTERVENTION\_ prefixes). In some cases, the values of these attributes need to be established based on local program knowledge as opposed to what is present in the EHR. For example, if a program stipulates that every session includes physical activity, that attribute can be set solely based on attendance information, because the EHR or IT system may not track whether physical activity happened—it always happens.

#### **4.2.17 SESSION\_ALERT**

The SESSION\_ALERT table contains one record for each alert triggered during a session. In other words, it indicates an alert triggered in the context of a session. The intention is that a record in this table indicates that the provider responsible for a SESSION was made aware of a given ALERT.

## 5. Additional Resources

### 5.1 Requesting Changes

CODI Implementers and researchers are likely to find limitations with the Implementation Guide or CODI Data Models. The following process will be followed to process those change requests.

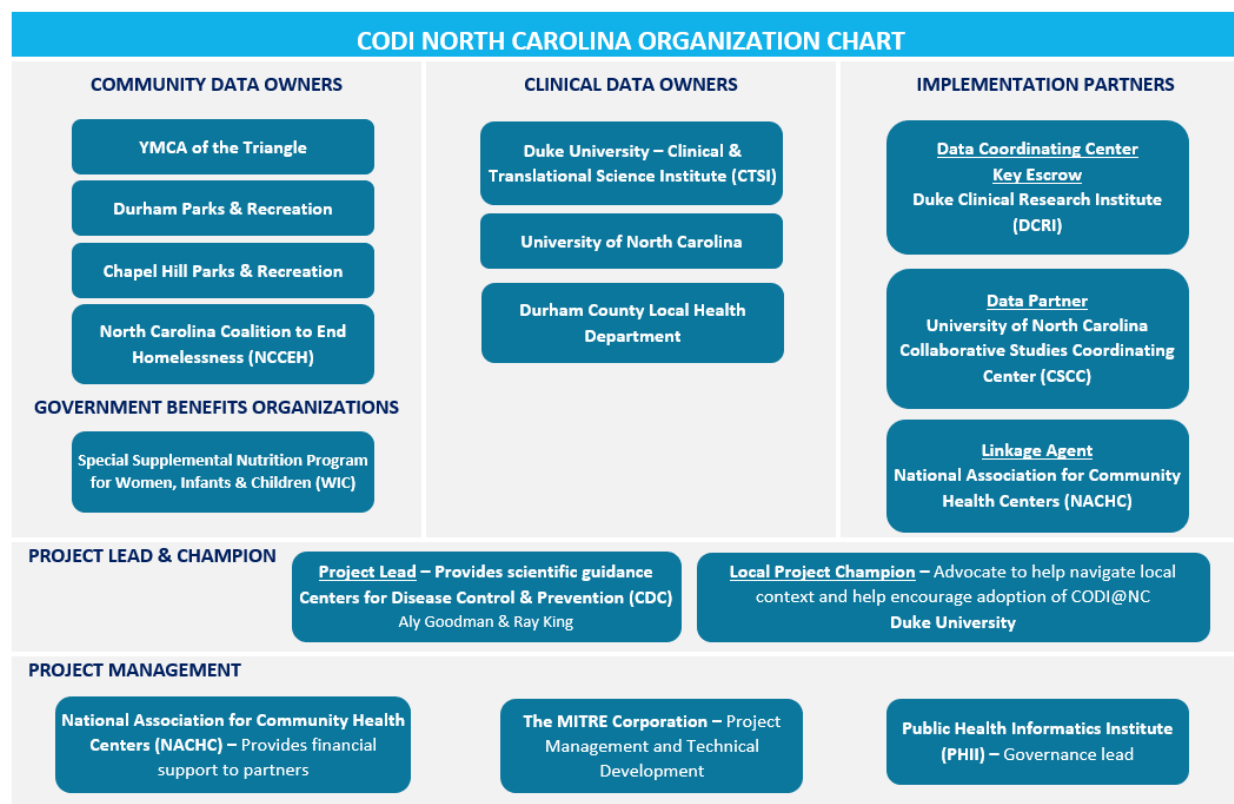
18. The data owner, implementer, or researcher shall document the change request and send that request to [CODI@cdc.gov](mailto:CODI@cdc.gov).
19. MITRE determines which documents or data models, if any, might need to be changed.
20. MITRE presents the potential changes to the Scoping and Use Case Subgroup, also known as the Research Question Subgroup (within two weeks of the initial request) for feedback.
21. CDC decides how to handle the request based on the subgroup feedback.
22. MITRE implements any necessary changes and uploads the new documents to the MITRE external Microsoft Team's web site for the Implementation Subgroup.
23. CODI Teams site notifies subscribers of the availability of the updated documents.

Changes will follow typical semantic versioning. Changes that are backwards compatible increment the minor version number of the Implementation Guide (e.g., from 1.4 to 1.5). Changes that are not backwards compatible (e.g., replacing an ancillary table with a table from CDM) will increment the major version number (e.g., from 3.3 to 4.0). Changes in the implementation guidance that do not require any data model change such as revising guidance to improve clarity, will increment the iteration number of the minor version (e.g., from 4.1.2 to 4.1.3).

### 5.2 Questions

Any questions regarding this implementation guide should be sent to [CODI@cdc.gov](mailto:CODI@cdc.gov).

## Appendix A. Additional Guidance for CODI@NC



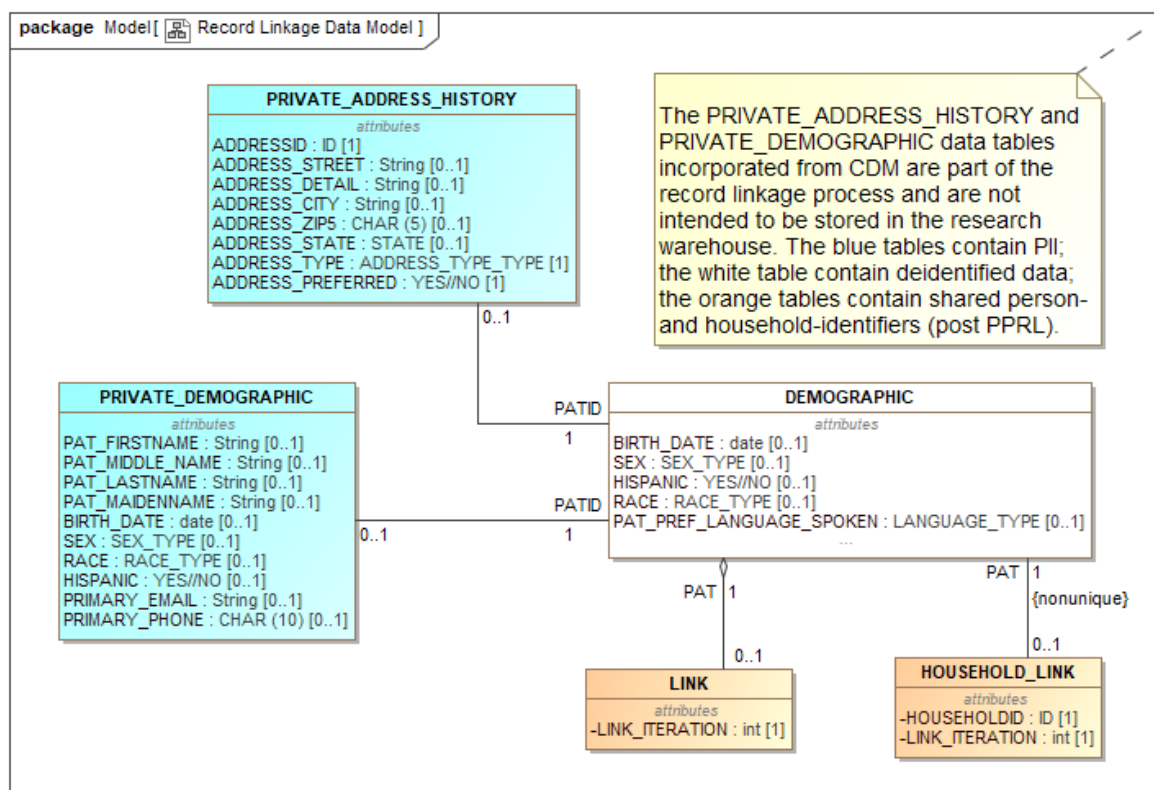
**Figure 6: CODI@NC Organization Chart**

Figure 6 shows the organization chart for CODI@NC (as of June 2022). The start date for healthcare and program participation data populated in CODI@NC warehouses has not been decided by the implementation work group. Factors to consider are the earliest available data from data partners, as well as the available period of population demographics data from ACS. The RDM should be populated with information after the start date. Data partners are free to include information prior to that date if it is easier to implement the CODI tables without that date restriction or if they would prefer to make earlier data available to researchers. Researchers should be aware that data prior to the start date are necessarily incomplete. The NC pilot anticipates completing the record linkage process yearly; however, a final decision is yet to be made by the CODI governance committee and CCWG.

## Appendix B. CODI Record Linkage Data Model Documentation

The CODI Record Linkage Data Model introduces four ancillary tables that support the PPRL process and the creation of longitudinal records. Because two of these tables contain PII, The Health FFRDC recommends that sites establish sufficient business rules to protect these sensitive data, such as housing them separately from research data and deleting the data once the linkage process is complete. Figure 7 shows these new ancillary data tables, which constitute the CODI Record Linkage Data Model.

Figure 7. CODI Record Linkage Ancillary Tables



## B.1 HOUSEHOLD\_LINK

A household link represents a connection between people (identified anonymously) who are determined to be members of the same household because they have the same physical address at the time the household link is established. The household's physical address is not shared. Household linkage is not based on family relationships. A household link is regenerated periodically, with a new identity, and therefore cannot provide longitudinal information on changes in household membership.

The HOUSEHOLD\_LINK table contains one record for each of the household members (persons in the demographics table) for each iteration of a household record linkage. Each iteration establishes a new HOUSEHOLD\_LINKID for each household.

**Table 6. HOUSEHOLD\_LINK Details**

Attribute	Cardinality	Type	Documentation
HOUSEHOLD_LINK_ID	1	ID	The unique id for a row which is the result of linking an individual to a household in an iteration of the household linkage process. There is no business meaning to this field.
PATID	1	FK::DEMOGRAPHIC	A member of a household who is a person and who is anonymously identified in the demographics table.
HOUSEHOLDID	1	ID	A globally unique identifier for a (virtual) household. More than one patient or participant (PATID) may be linked to the same household (HOUSEHOLDID)
LINK_ITERATION	1	int	An iteration of the household record linkage process.

## B.2 LINK

The LINK table contains one record for each person in the demographics table for each iteration of record linkage. Each iteration establishes a new LINKID for each person.

**Table 7. LINK Details**

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAPHIC	A link back to the demographics table.
LINKID	1	ID	A globally unique identifier linking individuals across data sources.



Attribute	Cardinality	Type	Documentation
LINK_ITERATION	1	int	An iteration of the record linkage process.

### B.3 PRIVATE\_ADDRESS\_HISTORY

[All definitions from CDM. See PCORnet CDM Specification for implementation details.]

Protected table that can be used to store elements of a patient's address that are considered personal health information (PHI). These data can be used for geocoding or other linkage projects.

**Table 8. PRIVATE\_ADDRESS\_HISTORY Details**

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAPHIC	Arbitrary person-level identifier. Used to link across tables.
ADDRESSID	1	ID	Arbitrary identifier for each unique address record.
ADDRESS_STREET	0..1	String	Primary address line (e.g., street name and number)
ADDRESS_DETAIL	0..1	String	Remaining address details (e.g., suite, post office box, other details)
ADDRESS_CITY	0..1	String	The name of the city, town, village or other community
ADDRESS_ZIP5	0..1	CHAR (5)	5-digit postal code for the address.
ADDRESS_STATE	0..1	STATE	State, as represented by 2-digit postal abbreviation.
ADDRESS_TYPE	1	ADDRESS_TYPE_TYPE	Type of address. Details of categorical definitions: Postal: mailing address – PO Boxes and careof addresses. Physical: A physical address that can be visited. Both: An address that is both physical and postal.
ADDRESS_PREFERRED	1	YES//NO	Indicates whether this address is the preferred one for a given patient, address use and address type within a given address period.
ADDRESSID	1	ID	Arbitrary identifier for each unique address record.
ADDRESS_STREET	0..1	String	Primary address line (e.g., street name and number)
ADDRESS_DETAIL	0..1	String	Remaining address details (e.g., suite, post office box, other details)
ADDRESS_CITY	0..1	String	The name of the city, town, village or other community
ADDRESS_ZIP5	0..1	CHAR (5)	5-digit postal code for the address.

Attribute	Cardinality	Type	Documentation
ADDRESS_STATE	0..1	STATE	State, as represented by 2-digit postal abbreviation.
ADDRESS_TYPE	1	ADDRESS_TYPE	Type of address. Details of categorical definitions: Postal: mailing address – PO Boxes and careof addresses. Physical: A physical address that can be visited. Both: An address that is both physical and postal.
ADDRESS_PREFERRED	1	YES//NO	Indicates whether this address is the preferred one for a given patient, address use and address type within a given address period.

## B.4 PRIVATE\_DEMOGRAPHIC

[All definitions from CDM. See PCORnet CDM Specification for implementation details.]

Protected table that is intended to provide a standardized representation of the personally-identifiable information (PII) that is needed to support local activities related to record linkage.

**Table 9. PRIVATE\_DEMOGRAPHIC Details**

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAPHIC	Arbitrary person-level identifier. Used to link across tables. Corresponds to PATID in the DEMOGRAPHIC table
PAT_FIRSTNAME	0..1	String	Given name of the patient.
PAT_MIDDLE_NAME	0..1	String	Middle name of the patient.
PAT_LASTNAME	0..1	String	Surname or family name.
PAT_MAIDENNAME	0..1	String	Surname or family name prior to marriage.
BIRTH_DATE	0..1	date	Date of birth. Corresponds to BIRTH_DATE in the DEMOGRAPHIC table.
SEX	0..1	SEX_TYPE	Sex assigned at birth. Corresponds to SEX in the DEMOGRAPHIC table.
RACE	0..1	RACE_TYPE	Please use only one race value per patient. Corresponds to RACE in the DEMOGRAPHIC table.
HISPANIC	0..1	YES//NO	A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race. Corresponds to HISPANIC in the DEMOGRAPHIC table.
PRIMARY_EMAIL	0..1	String	Primary e-mail address for the patient.

Attribute	Cardinality	Type	Documentation
PRIMARY_PHONE	0..1	CHAR (10)	Primary phone number for the patient (if known). 10-digit US phone number.

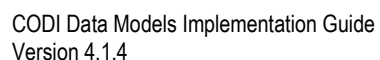
## Appendix C. CODI Research Data Model Documentation

### C.1 Overview

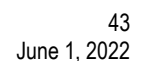
The CODI Research Data Model is based primarily on CDM. The CODI Research Data Model also incorporates additional census and location tables from VDW and an additional cost table from OMOP (Figure 8). Finally, the CODI Research Data Model introduces seven new ancillary data tables (Figure 9).

Within these figures:

- Color indicates the source of the table.
  - White tables are from CDM.
  - Yellow tables from VDW or OMOP.
  - Orange tables are new ancillary data tables specific to CODI.
- Lines indicate PK/FK relationships among the tables.
  - Labels in ALL CAPS are the column names of the foreign key (e.g., PATID is a column in the ENCOUNTER table that is a foreign key that references the DEMOGRAPHIC table).
  - Labels in CamelCase are provided to document the intended meaning of the relationship; these will not appear in a CODI data warehouse.
  - Labels in lower\_case are unique to OMOP and can be interpreted the same as those in ALL CAPS.
- Numbers indicate cardinality constraints.
  - 0..1 means a column is optional.
  - 1 means a column is required.
  - 0..\* and 1..\* document the intended meaning of a relationship; these will not appear in a CODI warehouse (they are the inverses of FK columns).



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## C.2 CODI Research Data Model Table Details

### C.2.1 ALERT

The ALERT table contains one record for each distinct kind of alert. Alerts are components of a clinical decision support system (CDS). Given the gamut of possible alerts and the idiosyncrasies of CDS implementations, CODI only captures a prose description of the intended function of the alert. Only obesity- or weight-related alerts should be captured for CODI.

**Table 10. ALERT Details**

Attribute	Cardinality	Type	Documentation
ALERTID	1	ID	
ALERT_PURPOSE	1	String	A description of the purpose of the alert.
ALERT_TRIGGER	1	String	A description of the conditions under which the alert triggers.
ALERT_FORM	1	String	A description of how the alert is presented to the user.
SessionAlert	0..*	FK::SESSION_ALERT	A set of sessions during which this alert triggered.

### C.2.2 ASSET\_DELIVERY

The ASSET\_DELIVERY table contains one record for each contiguous period of time during which a person consistently receives assets. An asset is a resource transferred by a program to an individual.

**Table 11. ASSET\_DELIVERY Details**

Attribute	Cardinality	Type	Documentation
ASSET_DELIVERY_ID	1	ID	
PATID	1	FK::DEMOGRAPHIC	A link back to the demographic table.
PROGRAMID	1	FK::PROGRAM	A link back to the program table.
ASSET_PURPOSE	0..1	ASSET_TYPE	An intended purpose for the use of a monetary asset (e.g., health insurance or food).
DELIVERY_START_DATE	0..1	date	A date the asset delivery began.

Attribute	Cardinality	Type	Documentation
DELIVERY_END_DATE	0..1	date	A date the asset delivery ended.
DELIVERY_FREQ	0..1	float	A number of times an asset is delivered each unit of time.
DELIVERY_FREQ_UNIT	0..1	FREQ_TYPE	A unit of time used to describe how often an asset is delivered. For example, an asset delivered twice a week has a frequency of 2 and a unit of Weekly. An asset delivered every other week has a frequency of 0.5 and a unit of Weekly.

### C.2.3 CENSUS\_DEMOG

The [VDW] CENSUS\_DEMOG table is a static reference table that will be provided to each data partner [by the Data Coordinating Center]. This data is used to provide community level attributes for each census tract or county of a patient's residence.

For complete documentation, see the CHORDS VDW Data Model Manual.

**Table 12. CENSUS\_DEMOG Details**

Attribute	Cardinality	Type	Documentation
BLOCK	0..1	CHAR (3)	A three-character numeric code assigned to census blocks.
CENSUS_DATA_SRC	0..1	CHAR (16)	Source of the data in the record
GEOCODE	1	CHAR (15)	A numeric code signifying the geographic location of the address where the person was found.
CHORDS_GEOLEVEL	0..1	CHAR (10)	[Indicates the specificity of the GEOCODE. It is the same variable as CENSUS_LOCATION::GEOLEVEL using a different value set: Block, BlkGrp, or Tract.]
STATE	0..1	CHAR (2)	A two-character numeric code assigned to US states, districts, territories and protectorates.
COUNTY	0..1	CHAR (3)	A three-character numeric code assigned to census counties.
TRACT	0..1	CHAR (6)	A six-character numeric code assigned to census tracts.
BLOCKGP	0..1	CHAR (1)	A one-character numeric code assigned to census block groups.
HOUSES_N	0..1	NUMERIC(6,4)	Number of housing units in geography
RA_X	0..1	NUMERIC(6,4)	Percent [Race X]
HOUSES_X	0..1	NUMERIC(6,4)	Proportion of occupied housing units that are X.
EDUCATION_N	0..1	NUMERIC(6,4)	[Education level]



Attribute	Cardinality	Type	Documentation
MEDFAMINCOME	0..1	Integer	Median family income
FAMINCOME_N	0..1	NUMERIC(6,4)	[Income level]
MEDHOUSEINCOME	0..1	Integer	Median household income
HOUSINCOME_N	0..1	NUMERIC(6,4)	[Income level]
POV_X	0..1	NUMERIC(6,4)	[Poverty range]
X_SPEAKER	0..1	NUMERIC(6,4)	Proportion of people over age 5 that speak only X or speak X "very well"
ETC	0..1		[For complete documentation, see the CHORDS VDW Data Model Manual.]
CENSUS_YEAR	1	Integer	Year the census data was collected
ZIP	0..1	CHAR (5)	A five-character numeric code assigned by the US Postal Service to various regions where it delivers mail.
RURAL_URBAN_CODE	0..1	RUCA_CODE_T YPE	A classification of the population density, urbanization, and commuting patterns of the census region.
CensusLocation	0..*	FK::CENSUS_LO CATION	A set of patient locations that correspond to this census area.

## C.2.4 CENSUS\_LOCATION

The VDW CENSUS\_LOCATION table holds patient geographic location information collected at healthcare encounters. Patient addresses should be geocoded, and FIPS codes down to the census tract level should be populated in the CENSUS\_LOCATION table.

**Table 13. CENSUS\_LOCATION Details**

Attribute	Cardinality	Type	Documentation
PERSON_ID	1	FK::DEMOGRAP HIC	Person ID.
LOC_START	1	date	Beginning date address for individual is valid (if date is unknown, assign a date estimated to when electronic address data began collection.
LOC_END	0..1	date	Ending date address for individual is valid (dates prior to 01/01/2010 should default to 01/01/2010. If location record is a patient's current location, leave null. Queries will use this criterion to identify a patient's current address.

Attribute	Cardinality	Type	Documentation
GEOCODE	0..1	FK::CENSUS_DEMOG	Numeric string of multiple census variables. The geocode can be up to 15 digits long with geographic information hierarchically documented through the string of digits: state(2) + county(3) + tract(6), blockgp(1) + block(3) = GeoCode(15) When an address can be geocoded to a tract, the geocode is 11 digits long. When an address cannot be geocoded to a tract but can be geocoded to a county, the geocode is 5 digits long. Geocodes with block group and block information should be truncated to 11 digits to meet the requirements of a limited dataset (state(2) + county(3) + tract(6)).
GEOCODE_BOUNDARY_YEAR	0..1	NUMERIC(8)	Indicating the census year for which geocode applies (year in which geocode is valid)
GEOLEVEL	0..1	GEOLEVEL_TYPE	Indicates the specificity of the GEOCODE match This can be assessed using logic that considers the length of the GEOCODE value (2 characters for state; 5 characters for county; 11 characters for census tract)Data partners should have the values T or C. Data partners should not map to B or G.
LATITUDE	0..1	NUMERIC(8)	The latitude of the location.
LONGITUDE	0..1	NUMERIC(8)	The longitude of the location.

### C.2.5 CONDITION

A condition represents a patient's diagnosed and self-reported health conditions and diseases. The patient's medical history and current state may both be represented.

**Table 14. CONDITION Details**

Attribute	Cardinality	Type	Documentation
CONDITIONID	1	ID	
PATID	1	FK::DEMOGRAPHIC	Arbitrary person-level identifier. Used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTER	Arbitrary encounter-level identifier used to link across tables. This is an optional field and should only be populated if the item was collected as part of a healthcare encounter. If more than one encounter association is present, this

Attribute	Cardinality	Type	Documentation
			field should be populated with the ID of the encounter when the condition was first entered into the system. However, please note that many conditions may be recorded outside of an encounter context.
CONDITION	1	CHAR (18)	Some codes will contain leading zeroes, and different levels of decimal precision may also be present. This field is a character field, not numeric, to accommodate these coding conventions. Please populate the exact value of this diagnosis code, but remove any source-specific suffixes and prefixes. (Description updated in v3.1.)
CONDITION_SOURCE	1	CONDITION_SOURCE_TYPE	Please note: The "Patient-reported" category can include reporting by a proxy, such as patient's family or guardian.
CONDITION_STATUS	0..1	CONDITION_STATUS_TYPE	Condition status corresponding with REPORT_DATE.
CONDITION_TYPE	1	CONDITION_TYPE_TYPE	Condition code type. Please note: The "Other" category is meant to identify internal use ontologies and codes.
REPORT_DATE	0..1	date	Date condition was noted, which may be the date when it was recorded by a provider or nurse, or the date on which the patient reported it. Please note that this date may not correspond to onset date.
RESOLVE_DATE	0..1	date	Date condition was resolved, if resolution of a transient condition has been achieved. A resolution date is not generally expected for chronic conditions, even if the condition is managed.
ONSET_DATE	0..1	date	The onset date concept here refers to "the date and time when problem (illness, disorder, or symptom) started" (ONC:MU Clinical Data Set, caDSR 4973971). This is a different concept than report date, which is the date on which the medical status was collected. An onset date should generally be considered independently of the observer or provider. However, the judgment of when a condition "started" depends on the disease, the frequency of visits, and many other factors. It is not clear that any facility or physician employs this field in a manner which can be trusted without validation during analysis. (New definition added in v3.1.)

## C.2.6 COST

The OMOP COST table captures records containing the cost of any medical event recorded in one of the OMOP clinical event table.

- 1) This table does not capture the cost of providing the service, but rather the amounts billed and received.
- 2) The COST table can link to ENCOUNTER, LAB\_RESULT\_CM, PROCEDURES, or SESSION.

**Table 15. COST Details**

Attribute	Cardinality	Type	Documentation
cost_id	1	ID	A unique identifier for each COST record.
person_id	1	FK::DEMOGRAP HIC	A unique identifier for each PERSON.
cost_event_id	1	Integer	A foreign key identifier to the event (e.g. Measurement, Procedure, Visit, Drug Exposure, etc) record for which cost data are recorded. 1) A reference to one of ENCOUNTER, LAB_RESULT_CM, PROCEDURES, or SESSION.
cost_event_field_concept_id	1	Integer	A foreign key identifier to a concept in the CONCEPT table representing the identity of the field represented by COST_EVENT_ID 1) One of ENCOUNTER, LAB_RESULT_CM, PROCEDURES, or SESSION.
cost_concept_id	1	Integer	A foreign key that refers to a Standard Cost Concept identifier in the Standardized Vocabularies belonging to the 'Cost' vocabulary. 1) CODI will only capture charge data, not payments.
cost	1	float	The actual financial cost amount
incurred_date	1	date	The first date of service of the clinical event corresponding to the cost as in table capturing the information (e.g. date of visit, date of procedure, date of condition, date of drug etc).
billed_date	0..1	date	The date a bill was generated for a service or encounter
paid_date	0..1	date	The date payment was received for a service or encounter

## C.2.7 CURRICULUM\_COMPONENT

A curriculum component is a standard element of a program. A program can comprise a fixed curriculum with a predefined endpoint and an enumerated set of standard sessions. Alternatively, a program can comprise a recurring curriculum with no endpoint and a set of standard sessions that recur with some frequency.

**Table 16. CURRICULUM\_COMPONENT Details**

Attribute	Cardinality	Type	Documentation
CURRICULUM_COMPO NENT_ID	1	ID	
PROGRAMID	1	FK::PROGRAM	A link back to the program this component of a curriculum belongs to.
SESSION_INDEX	0..1	int	An ordinal used to establish a total ordering on the sessions within a fixed curriculum.
SESSION_FREQ	0..1	float	A number of times a session is administered each unit of time.
SESSION_FREQ_UNIT	0..1	FREQ_TYPE	A unit of time used to describe how often a session is administered. For example, a session administered twice a week has a frequency of 2 and a unit of Weekly. A session administered every other week has a frequency of 0.5 and a unit of Weekly.
SCREENING	0..1	PROCESS_PERF ORMED_TYPE	True if the sessions associated with this curriculum include any assessment of lifestyle behaviors related to obesity, such as physical activity, nutrition, screen time, or sleep.
COUNSELING	0..1	PROCESS_PERF ORMED_TYPE	True if the sessions associated with this curriculum include any advice or direction regarding lifestyle related to obesity, such as physical activity, nutrition, screen time, or sleep.
INTERVENTION_ACTIVI TY	0..1	PROCESS_PERF ORMED_TYPE	True if the sessions associated with this curriculum include performing at least moderate physical activity; moderate activity requires a moderate amount of effort (5-6 on a scale of 0 to 10) and noticeably accelerates the heart rate and breathing.
INTERVENTION_NUTRI TION	0..1	PROCESS_PERF ORMED_TYPE	True if the sessions associated with this curriculum include an activity designed to improve nutrition.
INTERVENTION_NAVIG ATION	0..1	PROCESS_PERF ORMED_TYPE	True if the sessions associated with this curriculum include a navigational service to access benefits or to overcome barriers to care.
DOSE	0..1	float	A measure of the amount of time sessions associated with this curriculum are expected to last.
Session	0..*	FK::SESSION	A set of sessions associated with this curriculum component.

## C.2.8 DEMOGRAPHIC

The CDM DEMOGRAPHIC table contains a single record for each patient. Demographics record the direct attributes of individual patients.

**Table 17. DEMOGRAPHIC Details**

Attribute	Cardinality	Type	Documentation
PATID	1	ID	
BIRTH_DATE	0..1	date	Date of birth.
SEX	0..1	SEX_TYPE	Sex assigned at birth.
HISPANIC	0..1	YES//NO	A person of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race.
RACE	0..1	RACE_TYPE	Please use only one race value per patient.
PAT_PREF_LANGUAGE_SPOKEN	0..1	LANGUAGE_TYPE	Preferred spoken language of communication as expressed by the patient.
Birth	0..1	FK::PREGNANCY_OUTCOME	A pregnancy outcome for this individual describing this individual's birth.
CensusLocation	0..*	FK::CENSUS_LOCATION	A set of census locations associated with this person.
Condition	0..*	FK::CONDITION	A set of conditions associated with this person.
Cost	0..*	FK::COST	A set of charges associated with this person.
FamilyHistory	0..*	FK::FAMILY_HISTORY	A set of family histories associated with this person.
Encounter	0..*	FK::ENCOUNTER	A set of encounters associated with this person.
AssetDelivery	0..*	FK::ASSET_DELIVERY	A set of asset deliveries associated with this person.
Enrollment	0..*	FK::ENROLLMENT	A set of enrollments associated with this person.
Diagnosis	0..*	FK::DIAGNOSIS	A set of diagnoses associated with this person.
Immunization	0..*	FK::IMMUNIZATION	A set of immunizations associated with this person.

Attribute	Cardinality	Type	Documentation
LabResult	0..*	FK::LAB_RESULT_CM	A set of lab results associated with this person.
Outcome	0..*	FK::PRO_CM	A set of patient-reported outcomes associated with this person.
Pregnancy	0..*	FK::PREGNANCY	A set of pregnancies associated with this person.
Prescribing	0..*	FK::PRESCRIBING	A set of prescriptions associated with this person.
Procedure	0..*	FK::PROCEDURES	A set of procedures associated with this person.
SdohEvidence	0..*	FK::SDOH_EVIDENCE_INDICATOR	A set of SDOH evidence indicators associated with this person.
Session	0..*	FK::SESSION	A set of sessions associated with this person.
Referral	0..*	FK::REFERRAL	A set of referrals associated with this person.
Vital	0..*	FK::VITAL	A set of vital signs associated with this person.
HouseholdLink	0..1	FK::HOUSEHOLD_LINK	A set of household linkage identifiers associated with this person.
Link	0..1	FK::LINK	A set of record linkage identifiers associated with this person.
PrivateAddressHistory	0..1	FK::PRIVATE_ADDRESS_HISTORY	An address for this patient used for record linkage at the household level and geocoding.
PrivateDemographic	0..1	FK::PRIVATE_DEMOGRAPHIC	A private demographic record for this patient used for record linkage at the individual level.

## C.2.9 DIAGNOSIS

The CDM DIAGNOSIS table contains one record for each diagnosis of a patient. Diagnosis codes indicate the results of diagnostic processes and medical coding within healthcare delivery. Data in this table are expected to be from healthcare-mediated processes and reimbursement drivers.

**Table 18. DIAGNOSIS Details**

Attribute	Cardinality	Type	Documentation
DIAGNOSISID	1	ID	
PATID	1	FK::DEMOGRAPHIC	Arbitrary person-level identifier. Used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTER	Arbitrary encounter-level identifier. Used to link across tables.
ENC_TYPE	0..1	ENCOUNTER_TYPE	This is a field replicated from the ENCOUNTER table. See the ENCOUNTER table for definitions.
ADMIT_DATE	0..1	date	This is a field replicated from the ENCOUNTER table. See the ENCOUNTER table for definitions.
PROVIDERID	0..1	FK::PROVIDER	Identifier associated with the provider most responsible for the diagnosis.
DX	1	CHAR (18)	Diagnosis code.
DX_TYPE	1	DX_TYPE	Diagnosis code type. We provide values for ICD and SNOMED code types. Other code types will be added as new terminologies are more widely used.
DX_SOURCE	1	DX_SOURCE_TYPE	Classification of diagnosis source. We include these categories to allow some flexibility in implementation. The context is to capture available diagnoses recorded during a specific encounter.
DX_ORIGIN	0..1	ORIGIN_TYPE	Source of the diagnosis information.

## C.2.10 ENCOUNTER

The CDM ENCOUNTER table contains one record for each unique encounter. Encounters are interactions between patients and providers within the context of healthcare delivery. An encounter comprises multiple visits, diagnoses, procedures, etc.

**Table 19. ENCOUNTER Details**

Attribute	Cardinality	Type	Documentation
ENCOUNTERID	1	ID	
PATID	1	FK::DEMOGRAPHIC	Arbitrary person-level identifier used to link across tables.
ADMIT_DATE	1	date	Encounter or admission date.



Attribute	Cardinality	Type	Documentation
ADMIT_TIME	0..1	time	Encounter or admission time.
DISCHARGE_DATE	0..1	date	Discharge date.
DISCHARGE_TIME	0..1	time	Discharge time.
PROVIDER_ID	0..1	FK::PROVIDER	Code for the provider who is most responsible for this encounter. As with the PATID, the provider code is a pseudoidentifier with a consistent crosswalk to the real identifier.
FACILITY_LOCATION	0..1	CHAR (5)	Geographic location (5 digit zip code).
ENC_TYPE	1	ENCOUNTER_T YPE	Encounter type.
DISCHARGE_DISPOSITI ON	0..1	DISCHARGE_TY PE	Vital status at discharge.
DISCHARGE_STATUS	0..1	DISCHARGE_ST ATUS_TYPE	Discharge status.
DRG	0..1	CHAR (3)	3-digit Diagnosis Related Group (DRG).
DRG_TYPE	0..1	DRG_TYPE	DRG code version.
ADMITTING_SOURCE	0..1	ADMITTING_SO URCE_TYPE	Admitting source.
PAYER_TYPE_PRIMARY	0..1	PAYER_TYPE	Categorization of payer type for primary payer associated with the encounter.
PAYER_TYPE_SECONDA RY	0..1	PAYER_TYPE	Categorization of payer type for secondary payer associated with the encounter.
FACILITY_TYPE	0..1	FACILITY_TYPE	Description of the facility where the encounter occurred.
Condition	0..*	FK::CONDITION	A set of conditions associated with this encounter.
Diagnosis	0..*	FK::DIAGNOSIS	A set of diagnoses associated with this encounter.
Immunization	0..*	FK::IMMUNIZA TION	A set of immunizations associated with this encounter.
LabResult	0..*	FK::LAB_RESUL T_CM	A set of lab results associated with this encounter.
Outcome	0..*	FK::PRO_CM	A set of patient-reported outcomes associated with this encounter.
Prescribing	0..*	FK::PRESCRIBIN G	A set of prescriptions associated with this encounter.

Attribute	Cardinality	Type	Documentation
Procedure	0..*	FK::PROCEDURES	A set of procedures associated with this encounter.
Referral	0..*	FK::REFERRAL	A set of referrals associated with this encounter.
Session	0..*	FK::SESSION	A set of sessions associated with this encounter.
Vital	0..*	FK::VITAL	A set of vital signs associated with this encounter.

## C.2.11 ENROLLMENT

The ENROLLMENT table contains one record for each person who enrolls in a program.

**Table 20. ENROLLMENT Details**

Attribute	Cardinality	Type	Documentation
ENROLLMENTID	1	ID	
PATID	1	FK::DEMOGRAPHIC	A link back to the demographics table.
PROGRAMID	1	FK::PROGRAM	A link back to the program this enrollment belongs to.
ENROLLMENT_DATE	0..1	date	A date on which the enrollment was performed.
COMPLETION_DATE	0..1	date	A date on which the individual who enrolled completed the program.
DISPOSITION_DESCRIPTION	0..1	String	A description of the circumstances under which an individual ended their participation in the program. For example, an individual might complete a program successfully, they might drop out, or they might move to a different state.

## C.2.12 FAMILY\_HISTORY

The FAMILY\_HISTORY table stores information regarding an individual's family history of disease. A separate record is created for each report of a condition that a family member has. Absence of a record in this table is not indicative the absence of a condition.

This information is intended to be pulled from the patient's record, not by linking to a family member's medical record.

**Table 21. FAMILY\_HISTORY Details**

Attribute	Cardinality	Type	Documentation
FAMILY_HISTORY_ID	1	ID	
PATID	1	FK::DEMOGRAP HIC	A link back to the demographic table.
CONDITION	1	CHAR (18)	A condition that the patient has a family history of.
CONDITION_TYPE	1	DX_TYPE	A condition coding system from which the condition code is drawn.
RELATIONSHIP	0..1	RELATIONSHIP_ TYPE	An indication of which relative has the condition
REPORT_DATE	0..1	date	A date the family history of the condition was reported.

### C.2.13 IMMUNIZATION

[From PCORnet CDM]

The IMMUNIZATION table contains records of immunizations that have been delivered within the health system as well as reports of those administered elsewhere.

**Table 22. IMMUNIZATION Details**

Attribute	Cardinality	Type	Documentation
IMMUNIZATIONID	1	ID	
VX_RECORD_DATE	0..1	date	Date immunization was recorded (i.e., date record was created).
PATID	1	FK::DEMOGRAP HIC	Arbitrary person-level identifier used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTE R	Arbitrary encounter-level identifier. This should be present if the immunization activity is directly associated with an encounter.
PROCEDURESID	0..1	FK::PROCEDUR ES	This is an optional relationship to the PROCEDURES table and is not expected to be available for all immunizations. One procedure may generate multiple immunization records.
VX_PROVIDERID	0..1	FK::PROVIDER	Provider code for the provider who delivered the immunization. The provider code is a pseudo-identifier with a consistent crosswalk to the real identifier.

Attribute	Cardinality	Type	Documentation
VX_ADMIN_DATE	0..1	date	Date immunization was administered, if known.
VX_CODE_TYPE	1	VX_CODE_TYPE _TYPE	Immunization code type.
VX_CODE	1	String	Immunization code
VX_STATUS	1	VX_STATUS_TY PE	Status of the immunization.
VX_STATUS_REASON	0..1	VX_STATUS_RE ASON_TYPE	Reason immunization is incomplete or not done.
VX_SOURCE	0..1	VX_SOURCE_TY PE	Source of the prescribing information.
VX_MANUFACTURER	0..1	VX_MANUFACT URER_TYPE	Manufacturer of the immunization.
RAW_VX_NAME	0..1	String	Field for originating, full textual immunization name from the source.
RAW_VX_MANUFACTU RER	0..1	String	Field for originating value, prior to mapping into the PCORnet CDM value set.

### C.2.14 LAB\_RESULT\_CM

The CDM LAB\_RESULT\_CM table contains one record for each lab result of a patient. This table is used to store quantitative and qualitative measurements from blood and other body specimens.

**Table 23. LAB\_RESULT\_CM Details**

Attribute	Cardinality	Type	Documentation
LAB_RESULT_CM_ID	1	ID	
PATID	1	FK::DEMOGRAP HIC	Arbitrary person-level identifier. Used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTE R	Arbitrary encounter-level identifier. Not all lab results will be associated with a healthcare encounter.
SPECIMEN_SOURCE	0..1	SPECIMEN_SOU RCE_TYPE	Specimen source. All records will have a specimen source; some tests have several possible values for SPECIMEN_SOURCE.
LAB_LOINC	0..1	CHAR (10)	Use this field to store the LOINC code of the laboratory result.

Attribute	Cardinality	Type	Documentation
RESULT_LOC	0..1	RESULT_LOC_T YPE	Location of the test result. Point of Care locations may include anticoagulation clinic, newborn nursery, finger stick in provider office, or home. The default value is 'L' unless the result is Point of Care. There should not be any missing values.
LAB_PX_TYPE	0..1	PX_TYPE	Procedure code type, if applicable.
LAB_PX	0..1	CHAR (11)	Variable for local and standard procedure codes, used to identify the originating order for the lab test.
LAB_ORDER_DATE	0..1	date	Date test was ordered.
SPECIMEN_DATE	0..1	date	Date specimen was collected.
SPECIMEN_TIME	0..1	time	Time specimen was collected.
RESULT_DATE	1	date	Result date.
RESULT_QUAL	0..1	QUAL_TYPE	Standardized result for qualitative results. This variable should be NI for quantitative results.
RESULT_TIME	0..1	time	Result time.
RESULT_SNOMED	0..1	CHAR (x)	If the qualitative result has been mapped to SNOMED CT, the corresponding SNOMED code can be placed here.
RESULT_MODIFIER	0..1	MODIFIER_TYP E	Modifier for result values.
RESULT_UNIT	0..1	UNIT_TYPE	Converted/standardized units for the quantitative result.
ABN_IND	0..1	ABN_TYPE	Abnormal result indicator. This value comes from the source data; do not apply logic to create it.
RESULT_NUM	0..1	NUMERIC(8)	Standardized/converted result for quantitative results.

## C.2.15 PREGNANCY

The PREGNANCY table contains one record for each pregnancy.

**Table 24. PREGNANCY Details**

Attribute	Cardinality	Type	Documentation
PREGNANCYID	1	ID	

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAP HIC	A link back to the demographics table.
LAST_MENSES_DATE	0..1	date	A date of the parent's last menstrual period.
ESTIMATED_DELIVERY_DATE	0..1	date	An estimated date of delivery.
DELIVERY_DATE	0..1	date	An actual date of delivery.
FETUS_COUNT	0..1	Integer	A number of fetuses involved in this pregnancy.
FIRST_PRENATAL_DATE	0..1	date	A date of the parent's first prenatal healthcare visit.
DIETARY_SUPPLEMENT	0..1	Boolean	True if the parent took dietary supplements during pregnancy.
CIGARETTE_PRE	0..1	float	A number of cigarettes the parent smoked (per day) before becoming pregnant.
CIGARETTE_FIRST	0..1	float	A number of cigarettes the parent smoked (per day) during the first trimester.
CIGARETTE_SECOND	0..1	float	A number of cigarettes the parent smoked (per day) during the second trimester.
CIGARETTE_LAST	0..1	float	A number of cigarettes the parent smoked (per day) during the last trimester.
CIGARETTE_POST	0..1	float	A number of cigarettes the parent smoked (per day) postpartum.
DRINKS_PRE	0..1	float	A number of alcoholic drinks the parent consumed (per day) before becoming pregnant.
DRINKS_LAST	0..1	float	A number of alcoholic drinks the parent consumed (per day) during the last trimester.
GRAVIDA	0..1	Integer	A number of times the parent has been pregnant, including this pregnancy.
PARA	0..1	Integer	A number of viable pregnancies that had multiple fetuses.
PRE_PREGNANCY_WT	0..1	float	A measure of the parent's weight (in pounds) before becoming pregnant.
PRE_PREGNANCY_BMI	0..1	float	A measure of the parent's body mass index before becoming pregnant.
DELIVERY_WT	0..1	float	A measure of the parent's weight (in pounds) at delivery.
DELIVERY_PROCEDURE_ID	0..1	FK::PROCEDUR ES	A link to the procedures table (when applicable) that corresponds to the delivery.
Outcome	0..*	FK::PREGNANC Y_OUTCOME	A set of outcomes for this pregnancy.

## C.2.16 PREGNANCY\_OUTCOME

The PREGNANCY\_OUTCOME table contains one record for each fetus resulting from the pregnancy.

**Table 25. PREGNANCY\_OUTCOME Details**

Attribute	Cardinality	Type	Documentation
PREGNANCY_OUTCOME_ID	1	ID	
CHILDID	0..1	FK::DEMOGRAPHIC	A link back to the demographics table for the child (when applicable).
PARENTID	1	FK::PREGNANCY	A link to the information about the child's parent's pregnancy.
GESTATION_WEEKS	0..1	float	A number of weeks of gestation.
BIRTH_WT	0..1	float	A measure of the child's weight (in pounds) at birth.
BIRTH_HT	0..1	float	A measure of the child's length (in inches) at birth.
DISCHARGE_WT	0..1	float	A measure of the child's weight (in pounds) when discharged.
DISCHARGE_DATE	0..1	date	A date on which the child was discharged.
HAS_SMOKER_IN_HOUSE	0..1	Boolean	True if the child lives with an individual who smokes.
EVER_BREASTFED	0..1	Boolean	True if the child has ever been breastfed.
BREAST_FEEDING_FREQUENCY	0..1	float	A number of times (per day) the child was breastfed, on average.
BREAST_FEEDING_STOPPED_AGE	0..1	Float	An age of the child (in weeks) when breastfeeding stopped.
BREAST_FEEDING_STOPPED_REASON	0..1	String	A reason the child stopped breastfeeding. [TODO: Get the codes from WIC and decide if we're going to use those codes.]

## C.2.17 PRESCRIBING

The CDM PRESCRIBING table contains one record for each prescription ordered. Provider orders for medication dispensing and/or administration. These orders may take place in any setting, including the inpatient or outpatient basis.

**Table 26. PRESCRIBING Details**

Attribute	Cardinality	Type	Documentation
PRESCRIBINGID	1	ID	

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAP HIC	Arbitrary person-level identifier. Used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTE R	Arbitrary encounter-level identifier. This should be present if the prescribing activity is directly associated with an encounter.
RX_PROVIDERID	0..1	FK::PROVIDER	Provider code for the provider who prescribed the medication. The provider code is a pseudoidentifier with a consistent crosswalk to the real identifier.
RX_ORDER_DATE	0..1	date	Order date of the prescription by the provider.
RX_ORDER_TIME	0..1	time	Order time of the prescription by the provider.
RX_START_DATE	0..1	date	Start date of order. This attribute may not be consistent with the date on which the patient actually begin taking the medication.
RX_END_DATE	0..1	date	End date of order (if available).
RX_DOSE_ORDERED	0..1	NUMERIC(8)	Dose of a given mediation, as ordered by the provider
RX_DOSE_ORDERED_U NIT	0..1	UNIT_TYPE	Units of measure associated with the dose of the medication as ordered by the provider
RX_QUANTITY	0..1	NUMERIC(8)	Quantity ordered.
RXNORM_CUI	0..1	CHAR (8)	Where an RxNorm mapping exists for the source medication, this field contains the RxNorm concept identifier (CUI) at the highest possible specificity.
RX_SOURCE	0..1	RX_ORIGIN_TY PE	Source of the prescribing information.

## C.2.18 PROCEDURES

The CDM PROCEDURES table contains one record per procedure for a patient. Procedure codes indicate the discrete medical interventions and diagnostic testing, such as surgical procedures and lab orders, delivered within a healthcare context.

**Table 27. PROCEDURES Details**

Attribute	Cardinality	Type	Documentation
PROCEDURESID	1	ID	
PATID	1	FK::DEMOGRAP HIC	Arbitrary person-level identifier. Used to link across tables.



Attribute	Cardinality	Type	Documentation
ENCOUNTERID	0..1	FK::ENCOUNTER	Arbitrary encounter-level identifier. Used to link across tables.
ENC_TYPE	0..1	ENCOUNTER_TYPE	This is a field replicated from the ENCOUNTER table. See the ENCOUNTER table for definitions.
ADMIT_DATE	0..1	date	This is a field replicated from the ENCOUNTER table. See the ENCOUNTER table for definitions.
PROVIDERID	0..1	FK::PROVIDER	Identifier of the PROVIDER most associated with the procedure order.
PX_DATE	0..1	date	Date the procedure was performed.
PX	1	CHAR (11)	Procedure code.
PX_TYPE	1	PX_TYPE	Procedure code type. We include a number of code types for flexibility, but the basic requirement that the code refer to a medical procedure remains.
PX_SOURCE	0..1	ORIGIN_TYPE	Source of the procedure information.
Immunization	0..*	FK::IMMUNIZATION	A set of immunizations associated with this procedure.
Pregnancy	0..1	FK::PREGNANCY	A pregnancy associated with a delivery procedure.

### C.2.19 PROGRAM

The PROGRAM table contains one record for each distinct program. A program comprises a collection of interventions intended to produce a particular outcome.

**Table 28. PROGRAM Details**

Attribute	Cardinality	Type	Documentation
PROGRAMID	1	ID	
PROGRAM_NAME	1	String	A name of the program (e.g., Girls on the Run).
PROGRAM_DESCRIPTION	0..1	String	A description of the program.
PROGRAM_SETTING	0..1	SETTING_TYPE	A setting in which the program is offered (clinical or community).

Attribute	Cardinality	Type	Documentation
AFFILIATED_PROGRAM_ID	0..1	FK::PROGRAM	A parent program which encompasses this and other programs that are often prescribed together. A parent program may not have any sessions of its own, nor a physical location but may serve only to encompass affiliated programs.
AIM_NUTRITION	0..1	Boolean	True if the aim of the program includes improving nutrition.
AIM_ACTIVITY	0..1	Boolean	True if the aim of the program includes improving physical activity.
AIM_WEIGHT	0..1	Boolean	True if the aim of the program includes improving weight status.
PRESCRIBED_TOTAL_DOSE	0..1	float	A total amount of time (in hours) an individual should spend in the program. This field should equal DURATION x FREQUENCY x LENGTH (weeks x sessions/week x hours/session).
PRESCRIBED_PROGRAM_DURATION	0..1	float	A measure of the time (in weeks) from start to finish.
PRESCRIBED_SESSION_FREQUENCY	0..1	float	A number of sessions delivered each week.
PRESCRIBED_SESSION_LENGTH	0..1	float	A number of hours delivered each session.
LOCATION_ADDRESS	0..1	String	A primary location at which this program's sessions are administered, expressed as an address.
LOCATION_LATITUDE	0..1	NUMERIC(8)	A latitude of the corresponding address location.
LOCATION_LONGITUDE	0..1	NUMERIC(8)	A latitude of the corresponding address location.
LOCATION_GEOCODE_ID	0..1	FK::CENSUS_DEMOG	A primary location at which this program's sessions are administered, expressed as a geocode.
LOCATION_BOUNDARY_YEAR	0..1	NUMERIC(8)	A census year for which the corresponding geocode location applies.
LOCATION_GEOLEVEL	0..1	GEOLEVEL_TYPE	A specificity of the geocode location. This can be assessed using logic that considers the length of the GEOCODE value (2 characters for state; 5 characters for county; 11 characters for census tract).
SESSION_OMISSION_PERCENT	0..1	float	A numeric estimate of the percentage of all sessions missing from the SESSION table (based on intended dose) for this program; 0% indicates a belief that the session information is fully populated.

Attribute	Cardinality	Type	Documentation
SESSION_OMISSION_DESCRIPTION	0..1	String	A description of the circumstances under which session information for this program is missing; this field is required when the omission percent is greater than 0%.
SESSION_OMISSION_SYSTEMATIC	0..1	Boolean	True if session information for this program is systematically missing (e.g., because only half of the sessions are documented in an EHR).
AssetDelivery	0..*	FK::ASSET_DELIVERY	A set of asset deliveries associated with this program.
CurriculumComponent	0..*	FK::CURRICULUM_COMPONENT	A set of curriculum components for this program.
Enrollment	0..*	FK::ENROLLMENT	A set of enrollments associated with this program.
Session	0..*	FK::SESSION	A set of sessions associated with this program.

## C.2.20 PROVIDER

The CDM PROVIDER table contains one record per PROVIDER ID. Data about the providers who are involved in the care processes documented in the CDM.

**Table 29. PROVIDER Details**

Attribute	Cardinality	Type	Documentation
PROVIDERID	1	ID	
PROVIDER_SEX	0..1	SEX_TYPE	Sex assigned at birth.
PROVIDER_SPECIALTY_PRIMARY	0..1	SPECIALTY_TYPE	Primary specialty of the provider
Diagnosis	0..*	FK::DIAGNOSIS	A set of diagnoses associated with this provider.
Encounter	0..*	FK::ENCOUNTER	A set of encounters associated with this provider.
Immunization	0..*	FK::IMMUNIZATION	A set of immunizations associated with this provider.

Attribute	Cardinality	Type	Documentation
Prescribing	0..*	FK::PRESCRIBING	A set of prescriptions ordered by this provider.
Procedure	0..*	FK::PROCEDURES	A set of procedures ordered by this provider.
Referral	0..*	FK::REFERRAL	A set of referrals made by this provider.
Session	0..*	FK::SESSION	A set of sessions associated with this provider.

## C.2.21 PRO\_CM

[Definitions from PCORnet]

This table is used to store responses to patient-reported outcome measures (PROs) or questionnaires. This table can be used to store item-level responses as well as the overall score for each measure.

**Table 30. PRO\_CM Details**

Attribute	Cardinality	Type	Documentation
PRO_CM_ID	1	ID	
PATID	1	FK::DEMOGRAPHIC	Arbitrary person-level identifier for the patient for whom the PRO response was captured. Used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTER	Arbitrary encounter-level identifier used to link across tables. This is an optional field, and should only be populated if the item was collected as part of a healthcare encounter.
PRO_DATE	1	date	The date of the response.
PRO_TIME	0..1	time	The time of the response.
PRO_TYPE	0..1	PRO_TYPE_TYPE	Terminology / vocabulary used to describe the PRO item. More information on PROMIS, Neuro-QoL and ASQC-Me and the NIH Toolbox can be found on the HealthMeasures website. ( <a href="http://www.healthmeasures.net">www.healthmeasures.net</a> ) The Patient-Reported Outcome version of the Common Terminology Criteria for Adverse Events (PRO-CTCAE™) is maintained by the National Cancer Institute. ( <a href="https://healthcaredelivery.cancer.gov/pro-ctcae/">https://healthcaredelivery.cancer.gov/pro-ctcae/</a> )

Attribute	Cardinality	Type	Documentation
			Information on the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) is located here: <a href="http://www.hcahpsonline.org">http://www.hcahpsonline.org</a>
PRO_ITEM_NAME	0..1	String	Short name or code of the PRO item in the vocabulary/terminology specified in PRO_TYPE.
PRO_ITEM_LOINC	0..1	CHAR (10)	LOINC® code for the PRO item, if available. Logical Observation Identifiers, Names, and Codes (LOINC) from the Regenstrief Institute. Current LOINC codes are from 3-7 characters long but Regenstrief suggests a length of 10 for future growth. The last digit of the LOINC code is a check digit and is always preceded by a hyphen. All parts of the LOINC code, including the hyphen, must be included. Do not pad the LOINC code with leading zeros.
PRO_RESPONSE_TEXT	0..1	String	Text version of the response recorded for the item, if available/applicable.
PRO_RESPONSE_NUM	0..1	NUMERIC(8)	The numeric response recorded for the item, if available/applicable.
PRO_METHOD	0..1	PRO_METHOD_TYPE	Method of administration. Electronic includes responses captured via a personal or tablet computer, at web kiosks, or via a smartphone.
PRO_MODE	0..1	PRO_MODE_TYPE	The person who responded on behalf of the patient for whom the response was captured. A proxy report is a measurement based on a report by someone other than the patient reporting as if he or she is the patient, such as a parent responding for a child, or a caregiver responding for an individual unable to report for themselves. Assistance excludes providing interpretation of the patient's response.
PRO_CAT	0..1	PRO_CAT_TYPE	Indicates whether Computer Adaptive Testing (CAT) was used to administer the survey or instrument that the item was part of. May apply to electronic (EC) and telephonic (PH or IV) modes.
PRO_SOURCE	0..1	PRO_SOURCE_TYPE	Source of the information for the PRO result.
PRO_ITEM_VERSION	0..1	String	Version of the item/question.
PRO_MEASURE_NAME	0..1	String	Short name or code of the PRO measure/form that item belongs to, if item is being administered as part of a measure
PRO_MEASURE_SEQ	0..1	String	Arbitrary ID/sequence number used to link PRO item responses that are associated with the same measure/form.

Attribute	Cardinality	Type	Documentation
PRO_MEASURE_SCORE	0..1	NUMERIC(8)	Overall raw score for the PRO measure.
PRO_MEASURE_THETA	0..1	NUMERIC(8)	The value of theta reported from the CAT PROMIS results. Only applies to items that are administered as part of a measure.
PRO_MEASURE_SCALE D_TSCORE	0..1	NUMERIC(8)	Standardized score based on the total raw score for the instrument. Only applies to items that are administered as part of a measure.
PRO_MEASURE_STAND ARD_ERROR	0..1	NUMERIC(8)	Possible range of the actual final score based on the scaled T-score. Only applies to items that are administered as part of a measure.
PRO_MEASURE_COUN T_SCORED	0..1	NUMERIC(8)	Number of PRO item responses that were involved in the scoring of the measure.
PRO_MEASURE_LOINC	0..1	CHAR (10)	LOINC® code for the PRO item, if available. Logical Observation Identifiers, Names, and Codes (LOINC) from the Regenstrief Institute. Current LOINC codes are from 3-7 characters long but Regenstrief suggests a length of 10 for future growth. The last digit of the LOINC code is a check digit and is always preceded by a hyphen. All parts of the LOINC code, including the hyphen, must be included. Do not pad the LOINC code with leading zeros.
PRO_MEASURE_VERSI ON	0..1	String	Version of the measure.
PRO_ITEM_FULLNAME	0..1	String	Full name of the PRO item.
PRO_ITEM_TEXT	0..1	String	Text of the PRO item question.
PRO_MEASURE_FULLN AME	0..1	String	Full name of the PRO measure. (CODI note: Used for "raw" or original source name for nonstandard measures.)

## C.2.22 REFERRAL

The REFERRAL table contains one record for each outgoing or incoming referral.

**Table 31. REFERRAL Details**

Attribute	Cardinality	Type	Documentation
REFERRALID	1	ID	

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAP HIC	A link back to the demographic table.
ENCOUNTERID	0..1	FK::ENCOUNTE R	A link back to the encounter table, if the referral can be unambiguously associated with an encounter.
DIRECTION	1	DIRECTION_TYP E	An indication of whether the referral was incoming or outgoing.
REFERRAL_DATE	1	date	A date the referral was made.
REFERRAL_STATUS	0..1	REFERRAL_STA TUS_TYPE	A final disposition of the referral.
REFERRAL_PRIOR_AUT H	0..1	YES//NO	An indication of whether prior authorization was required for the referral.
SOURCE_PROVIDER_ID	0..1	FK::PROVIDER	A provider responsible for initiating this referral.
SOURCE_ORGANIZATIO N	1	ORGANIZATION _TYPE	An organization that initiated the referral.
DESTINATION_ORGANI ZATION	1	ORGANIZATION _TYPE	An organization to which the referral was sent.
DESTINATION_SPECIAL TY	0..1	SPECIALTY_TYP E	A clinical specialty for which the patient is being referred.

### C.2.23 SDOH\_EVIDENCE\_INDICATOR

A signal conveying the existence of information about social circumstance(s) considered to be a determinant of health for an individual patient or program participant. The information may come from an administered SDOH screening or diagnosis or problem associated with the individual and is relevant to one of the SDOH categories (e.g., FOOD\_DOMAIN, FINANCIAL\_DOMAIN). The purpose of the evidence indicator is to provide a short-cut for knowing if relevant information exists and does not indicate whether a social risk exists.

Table 32. SDOH\_EVIDENCE\_INDICATOR Details

Attribute	Cardinality	Type	Documentation
SDOH_EVIDENCE_INDI CATOR_ID	1	ID	

Attribute	Cardinality	Type	Documentation
PATID	1	FK::DEMOGRAPHIC	A link back to the demographics table.
SDOH_CATEGORY	1	SDOH_CATEGORY_TYPE	A social topic area pertaining to circumstances which can determine health outcomes for an individual.
EVIDENCE_DATE	1	date	A date on which a data owner, partner, or researcher has made an assertion indicating the presence of SDOH evidence. This date corresponds to the data partner's most recent determination of available evidence and does not necessarily match submission dates of any of the SDOH evidence. CODI is not expected to maintain a history of assertions, only one assertion based on the data partner's supplied evidence.
EVIDENCE_TABLE_NAME	0..1	String	A name of a table in the CODI schema in which there is some evidence pertaining to the CODI SDOH indicator category. The evidence may be a screening response (in PRO_CM), or a reported problem (in CONDITION or DIAGNOSIS), or some other information stored in a CODI table.
EVIDENCE_EXPLANATION	0..1	String	For indicator assertions without CODI data evidence; an explanation for the assertion.
EVIDENCE_ROWID	0..1	ID	An identifier for a specific row in the table referenced in the EVIDENCE_TABLE_NAME that contains evidence of a potential social determinant.

### C.2.24 SESSION

The SESSION table contains one record for each session. A session is a specific point in time where an individual or family is involved in programming that focuses on the prevention or intervention of chronic disease, or chronic-related comorbidities.

In a clinical setting, a session corresponds to a visit. There may be multiple visits in a single encounter. The ENCOUNTERID field is required for clinical sessions.

In a community setting, a session corresponds to one component of a program. The PROGRAMID field is required for sessions that are components of a program.

At least one of those fields should be present in every case.



**Table 33. SESSION Details**

Attribute	Cardinality	Type	Documentation
SESSIONID	1	ID	
PATID	1	FK::DEMOGRAPHIC	A link back to the demographics table.
ENCOUNTERID	0..1	FK::ENCOUNTER	A link back to the encounter this session corresponds to (if any).
PROVIDERID	0..1	FK::PROVIDER	A provider primarily responsible for this session.
PROGRAMID	0..1	FK::PROGRAM	A link back to the program this session belongs to (if any).
SESSION_DATE	0..1	date	A date on which the session was conducted.
SESSION_MODE	0..1	MODE_TYPE	An indication of the way the session was delivered (e.g., individual, group, phone).
SCREENING	0..1	PROCESS_PERFORMED_TYPE	True if the session included any assessment of lifestyle behaviors related to obesity, such as physical activity, nutrition, screen time, or sleep.
COUNSELING	0..1	PROCESS_PERFORMED_TYPE	True if the session included any advice or direction regarding lifestyle related to obesity, such as physical activity, nutrition, screen time, or sleep.
INTERVENTION_ACTIVITY	0..1	PROCESS_PERFORMED_TYPE	True if the session included performing at least moderate physical activity; moderate activity requires a moderate amount of effort (5-6 on a scale of 0 to 10) and noticeably accelerates the heart rate and breathing.
INTERVENTION_NUTRITION	0..1	PROCESS_PERFORMED_TYPE	True if the session included an activity designed to improve nutrition.
INTERVENTION_NAVIGATION	0..1	PROCESS_PERFORMED_TYPE	True if the session included a navigational service to access benefits or to overcome barriers to care.
DOSE	0..1	float	A measure of the amount of time spent on this encounter. Researchers can compare the total dose to the prescribed total dose to assess the extent to which an individual completed a program.
CURRICULUM_COMPONENT_ID	0..1	FK::CURRICULUM_COMPONENT	A link back to the curriculum component (if any) associated with this session.
Alert	0..*	FK::SESSION_ALERT	A set of triggered alerts associated with this session.

## C.2.25 SESSION\_ALERT

The SESSION\_ALERT table contains one record for each alert that triggered during a session.

**Table 34. SESSION\_ALERT Details**

Attribute	Cardinality	Type	Documentation
SESSION_ALERT_ID	1	ID	
ALERTID	1	FK::ALERT	An alert that triggered during a session.
SESSIONID	1	FK::SESSION	A session during which an alert triggered.
ALERT_DATE	0..1	date	A date that an alert triggered.
ALERT_TIME	0..1	time	A time that an alert triggered.

## C.2.26 VITAL

The CDM VITAL table contains one record for each measurement of vital signs. Vital signs (such as height, weight, and blood pressure) directly measure an individual's current state of attributes.

**Table 35. VITAL Details**

Attribute	Cardinality	Type	Documentation
VITALID	1	ID	
PATID	1	FK::DEMOGRAP HIC	Arbitrary person-level identifier. Used to link across tables.
ENCOUNTERID	0..1	FK::ENCOUNTE R	Arbitrary encounter-level identifier. Not all vital sign measures will be associated with a healthcare encounter.
MEASURE_DATE	1	date	Date of vitals measure.
MEASURE_TIME	0..1	time	Time of vitals measure.
VITAL_SOURCE	1	VITAL_SOURCE _TYPE	Please note: The "Patient-reported" category can include reporting by patient's family or guardian.
HT	0..1	NUMERIC(8)	Height (in inches) measured by standing. Only populated if measure was taken on this date. If missing, this value should be null. Decimal precision is permissible.

Attribute	Cardinality	Type	Documentation
WT	0..1	NUMERIC(8)	Weight (in pounds). Only populated if measure was taken on this date. If missing, this value should be null. Decimal precision is permissible.
DIASTOLIC	0..1	NUMERIC(8)	Diastolic blood pressure (in mmHg). Only populated if measure was taken on this date. If missing, this value should be null.
SYSTOLIC	0..1	NUMERIC(8)	Systolic blood pressure (in mmHg). Only populated if measure was taken on this date. If missing, this value should be null.
ORIGINAL_BMI	0..1	NUMERIC(8)	BMI if calculated in the source system. Decimal precision is permissible.

## C.3 CODI Research Data Model Codeset Details

### C.3.1 ABN\_TYPE

[From CDM]

**Table 36. ABN\_TYPE Details**

Attribute	Documentation
AB	Abnormal
AH	Abnormally high
AL	Abnormally low
CH	Critically high
CL	Critically low
CR	Critical
IN	Inconclusive
NL	Normal
NI	No information
UN	Unknown
OT	Other

### C.3.2 ADDRESS\_TYPE\_TYPE

[From CDM]

**Table 37. ADDRESS\_TYPE\_TYPE Details**

Attribute	Documentation
PO	Postal
PH	Physical
NI	No information
UN	Unknown
OT	Other

### C.3.3 ADMITTING\_SOURCE\_TYPE

[From CDM]

**Table 38. ADMITTING\_SOURCE\_TYPE Details**

Attribute	Documentation
AF	Adult Foster Home
AL	Assisted Living Facility
AV	Ambulatory Visit
ED	Emergency Department

Attribute	Documentation
HH	Home Health
HO	Home / Self Care
HS	Hospice
IP	Other Acute Inpatient Hospital
NH	Nursing Home (Includes ICF)
RH	Rehabilitation Facility
RS	Residential Facility
SN	Skilled Nursing Facility
IH	Intra-hospital
NI	No information
UN	Unknown
OT	Other

### C.3.4 ASSET\_TYPE

This codeset enumerates different kinds of assets a person might receive.

**Table 39. ASSET\_TYPE Details**

Attribute	Documentation
CC	Child care
FO	Food
HI	Health insurance
TR	Transportation
NI	No information
UN	Unknown
OT	Other

### C.3.5 CONDITION\_SOURCE\_TYPE

[From CDM]

**Table 40. CONDITION\_SOURCE\_TYPE Details**

Attribute	Documentation
PR	Patient-reported medical history
HC	Healthcare problem list
RG	Registry cohort
CC	Patient Chief Complaint
PC	PCORnet-defined condition algorithm
DR	Derived
NI	No information
UN	Unknown

Attribute	Documentation
OT	Other

### C.3.6 CONDITION\_STATUS\_TYPE

[From CDM]

Table 41. CONDITION\_STATUS\_TYPE Details

Attribute	Documentation
AC	Active
RS	Resolved
IN	Inactive
NI	No information
UN	Unknown
OT	Other

### C.3.7 CONDITION\_TYPE\_TYPE

[From CDM]

Table 42. CONDITION\_TYPE\_TYPE Details

Attribute	Documentation
09	ICD-9-CM
10	ICD-10-CM
11	ICD-11-CM
SM	SNOMED CT
HP	Human Phenotype Ontology
AG	Algorithmic
NI	No information
UN	Unknown
OT	Other

### C.3.8 DIRECTION\_TYPE

This codeset enumerates the direction of a referral.

Table 43. DIRECTION\_TYPE Details

Attribute	Documentation
I	Incoming: A referral to this data contributor.
O	Outgoing: A referral from this data contributor.

**C.3.9 DISCHARGE\_STATUS\_TYPE**

[From CDM]

**Table 44. DISCHARGE\_STATUS\_TYPE Details**

Attribute	Documentation
AF	Adult Foster Home
AL	Assisted Living Facility
AM	Against Medical Advice
AW	Absent without leave
EX	Expired
HH	Home Health
HO	Home / Self Care
HS	Hospice
IP	Other Acute Inpatient Hospital
NH	Nursing Home (Includes ICF)
RH	Rehabilitation Facility
RS	Residential Facility
SH	Still In Hospital
SN	Skilled Nursing Facility
NI	No information
UN	Unknown
OT	Other

**C.3.10 DISCHARGE\_TYPE**

[From CDM]

**Table 45. DISCHARGE\_TYPE Details**

Attribute	Documentation
A	Discharged alive
E	Expired
NI	No information
UN	Unknown
OT	Other

**C.3.11 DRG\_TYPE**

[From CDM]

**Table 46. DRG\_TYPE Details**

Attribute	Documentation
01	CMS-DRG (old system)
02	MS-DRG (current system)
NI	No information
UN	Unknown
OT	Other

**C.3.12 DX\_SOURCE\_TYPE**

[From CDM]

**Table 47. DX\_SOURCE\_TYPE Details**

Attribute	Documentation
AD	Admitting
DI	Discharge
FI	Final
IN	Interim
NI	No information
UN	Unknown
OT	Other

**C.3.13 DX\_TYPE**

[From CDM]

**Table 48. DX\_TYPE Details**

Attribute	Documentation
09	ICD-9-CM
10	ICD-10-CM
11	ICD-11-CM
SM	SNOMED CT
NI	No information
UN	Unknown
OT	Other

**C.3.14 ENCOUNTER\_TYPE**

[From CDM]



**Table 49. ENCOUNTER\_TYPE Details**

Attribute	Documentation
AV	Ambulatory Visit: Includes visits at outpatient clinics, physician offices, same day/ambulatory surgery centers, urgent care facilities, and other same-day ambulatory hospital encounters, but excludes emergency department encounters.
ED	Emergency Department (ED): Includes ED encounters that become inpatient stays (in which case inpatient stays would be a separate encounter). Excludes urgent care facility visits. ED claims should be pulled before hospitalization claims to ensure that ED with subsequent admission won't be rolled up in the hospital event. Does not include observation stays, where known.
EI	Emergency Department Admit to Inpatient Hospital Stay: Permissible substitution for preferred state of separate ED and IP records. Only for use with data sources where the individual records for ED and IP cannot be distinguished.
IP	Inpatient Hospital Stay: Includes all inpatient stays, including: same-day hospital discharges, hospital transfers, and acute hospital care where the discharge is after the admission date. Does not include observation stays, where known.
IS	Non-Acute Institutional Stay: Includes hospice, skilled nursing facility (SNF), rehab center, nursing home, residential, overnight non-hospital dialysis, and other non-hospital stays.
OS	Observation Stay: "Hospital outpatient services given to help the doctor decide if the patient needs to be admitted as an inpatient or can be discharged. Observations services may be given in the emergency department or another area of the hospital." Definition from Medicare, CMS Product No. 11435, <a href="https://www.medicare.gov/Pubs/pdf/11435.pdf">https://www.medicare.gov/Pubs/pdf/11435.pdf</a> .
IC	Institutional Professional Consult: Permissible substitution when services provided by a medical professional cannot be combined with the given encounter record, such as a specialist consult in an inpatient setting; this situation can be common with claims data sources. This includes physician consults for patients during inpatient encounters that are not directly related to the cause of the admission (e.g. a ophthalmologist consult for a patient with diabetic ketoacidosis) guidance updated in v4.0).

Attribute	Documentation
OA	Other Ambulatory Visit: Includes other non-overnight AV encounters such as hospice visits, home health visits, skilled nursing visits, other non-hospital visits, as well as telemedicine, telephone and email consultations. May also include "lab only" visits (when a lab is ordered outside of a patient visit), "pharmacy only" (e.g., when a patient has a refill ordered without a face-to-face visit), "imaging only", etc.
NI	No information
UN	Unknown
OT	Other

### C.3.15 FACILITY\_TYPE

See CDM Value Set Appendix for a list of acceptable values.

**Table 50. FACILITY\_TYPE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

### C.3.16 FREQ\_TYPE

This codeset enumerates different frequencies that something happens.

**Table 51. FREQ\_TYPE Details**

Attribute	Documentation
O	Once
D	Daily
W	Weekly
M	Monthly
Y	Yearly

### C.3.17 GEOLEVEL\_TYPE

[From VDW]

**Table 52. GEOLEVEL\_TYPE Details**

Attribute	Documentation
B	Block
G	Block Group
T	Census Tract

Attribute	Documentation
C	County
Z	Zip Code
P	Post Office
U	Unknown, unable to append

### C.3.18 LANGUAGE\_TYPE

See CDM Value Set Appendix for a list of acceptable values.

**Table 53. LANGUAGE\_TYPE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

### C.3.19 MODE\_TYPE

This codeset enumerates different ways in which interventions can be delivered.

**Table 54. MODE\_TYPE Details**

Attribute	Documentation
I	Individual Meeting
G	Group Meeting
W	Web
T	Telephone
M	Mail

### C.3.20 MODIFIER\_TYPE

[From CDM]

**Table 55. MODIFIER\_TYPE Details**

Attribute	Documentation
EQ	Equal
GE	Greater than or equal to
GT	Greater than
LE	Less than or equal to
LT	Less than
TX	Text
NI	No information
UN	Unknown
OT	Other

### C.3.21 ORGANIZATION\_TYPE

For clinical organizations, use the CMS Certification Number (CCN); each clinical-community distributed data network will need to choose a representative CCN for its clinical data partners. For community organizations, each clinical-community distributed data network will need to establish a set of community organization codes. These additional codes should include at least one letter so that they do not conflict with CCNs.

**Table 56. ORGANIZATION\_TYPE Details**

Attribute	Documentation
<i>Refer to the CMS Certification Number note above.</i>	

### C.3.22 ORIGIN\_TYPE

[From CDM]

**Table 57. ORIGIN\_TYPE Details**

Attribute	Documentation
OD	Order/EHR
BI	Billing
CL	Claim
DR	Derived
NI	No information
UN	Unknown
OT	Other

### C.3.23 PAYER\_TYPE

See CDM Value Set Appendix for a list of acceptable values.

**Table 58. PAYER\_TYPE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

### C.3.24 PROCESS\_PERFORMED\_TYPE

This codeset enumerates the extent to which process steps might be conducted. Process steps include screening, counseling, and interventions

**Table 59. PROCESS\_PERFORMED\_TYPE Details**

Attribute	Documentation
Y	Yes, the process step was conducted.
N	No, the process step was not conducted.
NI	No information
UN	Unknown
OT	Other

**C.3.25 PRO\_CAT\_TYPE**

[From CDM]

**Table 60. PRO\_CAT\_TYPE Details**

Attribute	Documentation
Y	Yes
N	No
NI	No Information
UN	Unknown
OT	Other

**C.3.26 PRO\_METHOD\_TYPE**

[From CDM]

**Table 61. PRO\_METHOD\_TYPE Details**

Attribute	Documentation
PA	Paper
EC	Electronic
PH	Telephonic
IV	Telephonic with interactive voice response (IVR) technology
NI	No information
UN	Unknown
OT	Other

**C.3.27 PRO\_MODE\_TYPE**

[From CDM]

**Table 62. PRO\_MODE\_TYPE Details**

Attribute	Documentation
SF	Self without assistance

Attribute	Documentation
SA	Self with assistance
PR	Proxy without assistance
PA	Proxy with assistance
NI	No information
UN	Unknown
OT	Other

### C.3.28 PRO\_SOURCE\_TYPE

[From CDM]

Table 63. PRO\_SOURCE\_TYPE Details

Attribute	Documentation
OD	Order/EHR
BI	Billing
CL	Claim
SR	Survey system/mobile app
DR	Derived
NI	No information
UN	Unknown
OT	Other

### C.3.29 PRO\_TYPE\_TYPE

[From CDM]

Table 64. PRO\_TYPE\_TYPE Details

Attribute	Documentation
NQ	Neuro-QoL
PM	PROMIS
AM	ASQC-Me
NT	NIH Toolbox
PC	PRO_CTCAH
LC	LOINC
HC	HCAHPS
NI	No Information
UN	Unknown
OT	Other

### C.3.30 PX\_TYPE

[From CDM]

**Table 65. PX\_TYPE Details**

Attribute	Documentation
09	ICD-9-CM
10	ICD-10-PCS
11	ICD-11-PCS
CH	CPT or HCPCS
LC	LOINC
ND	NDC
RE	Revenue
NI	No information
UN	Unknown
OT	Other

**C.3.31 QUAL\_TYPE**

See CDM Value Set Appendix for a list of acceptable values.

**Table 66. QUAL\_TYPE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

**C.3.32 RACE\_TYPE**

[From CDM]

**Table 67. RACE\_TYPE Details**

Attribute	Documentation
01	American Indian or Alaska Native
02	Asian
03	Black or African American
04	Native Hawaiian or Other Pacific Islander
05	White
06	Multiple race
07	Refuse to answer
NI	No information
UN	Unknown
OT	Other

**C.3.33 REFERRAL\_STATUS\_TYPE**

[From CDM]

**Table 68. REFERRAL\_STATUS\_TYPE Details**

Attribute	Documentation
A	Approved
D	Denied
NI	No information
UN	Unknown
OT	Other

**C.3.34 RELATIONSHIP\_TYPE**

See <https://www.hl7.org/fhir/valueset-relatedperson-relationshiptype.html>

**Table 69. RELATIONSHIP\_TYPE Details**

Attribute	Documentation
<i>Refer to <a href="https://www.hl7.org/fhir/valueset-relatedperson-relationshiptype.html">https://www.hl7.org/fhir/valueset-relatedperson-relationshiptype.html</a></i>	

**C.3.35 RESULT\_LOC\_TYPE**

[From CDM]

**Table 70. RESULT\_LOC\_TYPE Details**

Attribute	Documentation
L	Lab
P	Point of Care
NI	No information
UN	Unknown
OT	Other

**C.3.36 RUCA\_CODE\_TYPE**

The rural-urban commuting area (RUCA) codes classify U.S. census tracts using measures of population density, urbanization, and daily commuting. The most recent RUCA codes are based on data from the 2010 decennial census and the 2006-10 American Community Survey. (See <https://www.ers.usda.gov/data-products/rural-urban-commuting-area-codes.aspx> for more information.)

**Table 71. RUCA\_CODE\_TYPE Details**

Attribute	Documentation
1.0	Metropolitan area core: primary flow within an urbanized area (UA)—No additional code



Attribute	Documentation
1.1	Metropolitan area core: primary flow within an urbanized area (UA)—Secondary flow 30% to 50% to a larger UA
2.0	Metropolitan area high commuting: primary flow 30% or more to a UA—No additional code
2.1	Metropolitan area high commuting: primary flow 30% or more to a UA—Secondary flow 30% to 50% to a larger UA
3.0	Metropolitan area low commuting: primary flow 10% to 30% to a UA—No additional code
4.0	Micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)—No additional code
4.1	Micropolitan area core: primary flow within an urban cluster of 10,000 to 49,999 (large UC)—Secondary flow 30% to 50% to a UA
5.0	Micropolitan high commuting: primary flow 30% or more to a large UC—No additional code
5.1	Micropolitan high commuting: primary flow 30% or more to a large UC—Secondary flow 30% to 50% to a UA
6.0	Micropolitan low commuting: primary flow 10% to 30% to a large UC—No additional code
7.0	Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)—No additional code
7.1	Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)—Secondary flow 30% to 50% to a UA
7.2	Small town core: primary flow within an urban cluster of 2,500 to 9,999 (small UC)—Secondary flow 30% to 50% to a large UC
8.0	Small town high commuting: primary flow 30% or more to a small UC—No additional code
8.1	Small town high commuting: primary flow 30% or more to a small UC—Secondary flow 30% to 50% to a UA
8.2	Small town high commuting: primary flow 30% or more to a small UC—Secondary flow 30% to 50% to a large UC
9.0	Small town low commuting: primary flow 10% to 30% to a small UC—No additional code
10.0	Rural areas: primary flow to a tract outside a UA or UC—No additional code
10.1	Rural areas: primary flow to a tract outside a UA or UC—Secondary flow 30% to 50% to a UA
10.2	Rural areas: primary flow to a tract outside a UA or UC—Secondary flow 30% to 50% to a large UC

Attribute	Documentation
10.3	Rural areas: primary flow to a tract outside a UA or UC— Secondary flow 30% to 50% to a small UC

### C.3.37 RX\_ORIGIN\_TYPE

[From CDM]

**Table 72. RX\_ORIGIN\_TYPE Details**

Attribute	Documentation
OD	Order/EHR
DR	Derived
NI	No information
UN	Unknown
OT	Other

### C.3.38 SDOH\_CATEGORY\_TYPE

This codeset enumerates categories of social factors related to the same topic (e.g., housing, food) that can determine health outcomes. These align with the harmonization effort by the Gravity Project.

**Table 73. SDOH\_CATEGORY\_TYPE Details**

Attribute	Documentation
FOOD_DOMAIN	Pertaining to an individual's access to adequate, nutritional, safe, and culturally acceptable food.
HOUSING_STABILITY_DOMAIN	Pertaining to an individual's access to temporary or permanent reliable shelter.
HOUSING_ADEQUACY_DOMAIN	Pertaining to the habitability of an individual's housing.
TRANSPORTATION_DOMAIN	Pertaining to an individual's access to transportation for routine life sustaining activities such as to place of employment, medical facilities, and school.
INTERPERSONAL_VIOLENCE_DOMAIN	Pertaining to an individual's physical and emotional safety in close relationships.
FINANCIAL_DOMAIN	Pertaining to an individual's ability to or feeling about meeting current and/or ongoing financial obligations.
MATERIAL_NECESSITIES_DOMAIN	Pertaining to an individual's access to socially perceived physical necessities.
EMPLOYMENT_DOMAIN	Pertaining to an individual's status on having, looking for, or being without a job or work.
HEALTH_INSURANCE_DOMAIN	Pertaining to an individual's access to health insurance.
ELDER_CARE_DOMAIN	Pertaining to an elder's exposure to physical, psychological, sexual, or financial abuse, or neglect by caregivers.

Attribute	Documentation
EDUCATION_DOMAIN	Pertaining to an individual's academic achievements.
STRESS_DOMAIN	Pertaining to an individual's ability to meet, mitigate, or alter perceived excesses in environmental demands and stimuli.
VETERAN_DOMAIN	Pertaining to an individual's current and historical status in military service.

### C.3.39 SETTING\_TYPE

This codeset enumerates different settings in which interventions can be delivered.

**Table 74. SETTING\_TYPE Details**

Attribute	Documentation
CL	Clinical: Healthcare organization that provides clinical services to patients. [Pulled from glossary]
CO	Community: Setting in which weight-related services or assets are delivered that is NOT a clinic, hospital, health center, or other site of clinical care; examples include YMCA, Boys & Girls Club, Parks & Rec sites [Pulled from glossary]

### C.3.40 SEX\_TYPE

[From CDM]

**Table 75. SEX\_TYPE Details**

Attribute	Documentation
A	Ambiguous
F	Female
M	Male
NI	No information
UN	Unknown
OT	Other

### C.3.41 SPECIALTY\_TYPE

See <http://nucc.org/index.php/code-sets-mainmenu-41/provider-taxonomy-mainmenu-40/pdf-mainmenu-53>

**Table 76. SPECIALTY\_TYPE Details**

Attribute	Documentation
<i>Refer to <a href="http://nucc.org/index.php/code-sets-mainmenu-41/provider-taxonomy-mainmenu-40/pdf-mainmenu-53">http://nucc.org/index.php/code-sets-mainmenu-41/provider-taxonomy-mainmenu-40/pdf-mainmenu-53</a></i>	

**C.3.42 SPECIMEN\_SOURCE\_TYPE**

See CDM Value Set Appendix for a list of acceptable values.

**Table 77. SPECIMEN\_SOURCE\_TYPE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

**C.3.43 STATE**

A 2 character code for a state or territory of the United States of America. For example, AL for Alabama. See the CDM Value Set Appendix for a list of acceptable values.

**Table 78. STATE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

**C.3.44 UNIT\_TYPE**

See CDM Value Set Appendix for a list of acceptable values.

**Table 79. UNIT\_TYPE Details**

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

**C.3.45 VITAL\_SOURCE\_TYPE**

[From CDM]

**Table 80. VITAL\_SOURCE\_TYPE Details**

Attribute	Documentation
PR	Patient-reported
PD	Patient device direct feed

Attribute	Documentation
HC	Healthcare delivery setting
HD	Healthcare device direct feed
DR	Derived
NI	No information
UN	Unknown
OT	Other

### C.3.46 VX\_CODE\_TYPE\_TYPE

[From CDM]

Table 81. VX\_CODE\_TYPE\_TYPE Details

Attribute	Documentation
CX	CVX
ND	NDC
CH	CPT or HCPCS
RX	RXNORM
NI	No information
UN	Unknown
OT	Other

### C.3.47 VX\_MANUFACTURER\_TYPE

[From CDM] See CDM Value Set documentation for manufacturer code list.

Table 82. VX\_MANUFACTURER\_TYPE Details

Attribute	Documentation
<i>Refer to the value set appendix to the PCORnet CDM documentation</i>	

### C.3.48 VX\_SOURCE\_TYPE

[From CDM]

Table 83. VX\_SOURCE\_TYPE Details

Attribute	Documentation
OD	International administration
EF	External Feed
IS	Immunization Information System
PR	Patient-reported
DR	Derived

Attribute	Documentation
NI	No information
UN	Unknown
OT	Other

### C.3.49 VX\_STATUS\_REASON\_TYPE

[From CDM]

**Table 84. VX\_STATUS\_REASON\_TYPE Details**

Attribute	Documentation
IM	Immunity
MP	Medical precaution
OS	Out of stock
PO	Patient objection
NI	No information
UN	Unknown
OT	Other

### C.3.50 VX\_STATUS\_TYPE

[From CDM]

**Table 85. VX\_STATUS\_TYPE Details**

Attribute	Documentation
CP	Completed
ER	Entered in error
ND	Not Done
IC	Incomplete
NI	No information
UN	Unknown
OT	Other

### C.3.51 YES//NO

[From CDM]

**Table 86. YES//NO Details**

Attribute	Documentation
Y	Yes
N	No
R	Refuse to answer

Attribute	Documentation
NI	No information
UN	Unknown
OT	Other

## Acronyms

<b>Term</b>	<b>Definition</b>
<b>ACS</b>	American Community Survey
<b>BMI</b>	Body Mass Index
<b>CAT</b>	Computer Adaptive Testing
<b>CBO</b>	Community-Based Organization
<b>CCLA</b>	Clinical Community Linkages Assessment
<b>CCN</b>	CMS Certification Number
<b>CCWG</b>	CODI Collaborative Work Group
<b>CDC</b>	Centers for Disease Control and Prevention
<b>CDM</b>	Common Data Model
<b>CDS</b>	Clinical Decision Support System
<b>CHORDS</b>	Colorado Health Observation Regional Data Service
<b>CMS</b>	Centers for Medicare & Medicaid Services
<b>CODI</b>	Clinical and Community Health Data Initiative (formally Childhood Obesity Data Initiative)
<b>DM IG</b>	Data Models Implementation Guide
<b>DCC</b>	Data Coordinating Center
<b>EHR</b>	Electronic Health Record
<b>ETL</b>	Extract–Transform–Load
<b>FFRDC</b>	Federally Funded Research and Development Center
<b>HL7</b>	Health Level Seven International
<b>HPCAHPS</b>	Hospital Consumer Assessment of Healthcare Providers and Systems
<b>ICD</b>	International Clinical Diagnosis
<b>IT</b>	Information Technology
<b>LOINC</b>	Logical Observation Identifiers, Names, and Codes
<b>OMOP</b>	Observational Medical Outcomes Partnership
<b>PCORnet</b>	Patient Centered Outcomes Research Network
<b>PII</b>	Personally Identifiable Information
<b>PPRL</b>	Privacy-Preserving Record Linkage



<b>PRO</b>	Patient-Reported Outcome
<b>PRO-CTCAE</b>	Patient-Reported Outcome version of the Common Terminology Criteria for Adverse Events
<b>RDM</b>	Research Data Model
<b>RLDM</b>	Record Linkage Data Model
<b>RUCA</b>	Rural-Urban Commuting Area
<b>SDOH</b>	Social Determinants of Health
<b>SNOMED</b>	Systematized Nomenclature of Human Medicine
<b>TES</b>	Technical Environmental Scan
<b>VDW</b>	Virtual Data Warehouse
<b>WIC</b>	Women, Infants, and Children

## Resources

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