HEALTHCARE COST AND UTILIZATION PROJECT — HCUP
A FEDERAL-STATE-INDUSTRY PARTNERSHIP IN HEALTH DATA
Sponsored by the Agency for Healthcare Research and Quality

INTRODUCTION TO

THE HCUP NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS) 2022

Please read all documentation carefully.

THE NEDS CONTAINS A FULL YEAR OF INTERNATIONAL CLASSIFICATION OF DISEASES, TENTH REVISION, CLINICAL MODIFICATION/PROCEDURE CODING SYSTEM (ICD-10-CM/PCS) CODES BEGINNING WITH DATA YEAR 2016.

These pages provide an introduction to the 2022 NEDS.

For full documentation and notification of changes, visit the HCUP User Support (HCUP-US) website at www.hcup-us.ahrq.gov.

Issued November 2024
Agency for Healthcare Research and Quality
Healthcare Cost and Utilization Project (HCUP)

NEDS Data and Documentation Distributed through the
HCUP Central Distributor
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SUMMARY OF DATA USE LIMITATIONS

******* REMINDER *******

All users of the NEDS must take the online HCUP Data Use Agreement (DUA) Training Course as well as read and sign a DUA. Details and links may be found on the following page.

Authorized users of HCUP data agree to the following restrictions:[a]

- Will not use the data for any purpose other than research, analysis, and aggregate statistical reporting.
- Will not rerelease any data to unauthorized users.
- Will not redistribute HCUP data by posting on any website or publishing in any other publicly accessible online repository. If a journal or publication requests access to data or analytic files, will cite restrictions on data sharing in the DUA and direct them to AHRQ HCUP User Support (HCUP-US) website (www.hcup-us.ahrq.gov) for more information on accessing HCUP data.
- Will not identify or attempt to identify any individual, including by the use of vulnerability analysis or penetration testing. Methods that could be used to identify individuals directly or indirectly shall not be disclosed or published.
- Will not report any statistics where the number of observations (i.e., individual discharge records) in any given cell of tabulated data is less than or equal to 10 (≤10).
- Will not publish information that could identify individual establishments (e.g., hospitals) and will not contact establishments.
- Will not use the data concerning individual establishments for commercial or competitive purposes affecting establishments or to determine rights, benefits, or privileges of individual establishments.
- Will not use the data for criminal and civil litigation, including expert witness testimony or for law enforcement activities.
- Will acknowledge in reports that data from the "Healthcare Cost and Utilization Project (HCUP)" were used, including names of the specific databases used for analysis.[b]

Any violation of the limitations in the DUA is punishable under Federal law by a fine, up to 5 years in prison, or both. Violations may also be subject to penalties under State statutes.

[a] This is a summary of key terms of the DUA for Nationwide Databases; please refer to the DUA for full terms and conditions.

[b] Suggested citations for the HCUP databases are provided in the Requirements for Publishing With HCUP Data page of the HCUP-US website.

HCUP DATA USE AGREEMENT REQUIREMENTS

All HCUP data users, including data purchasers and collaborators, must complete the online HCUP Data Use Agreement (DUA) Training Course and read and sign the HCUP DUA. Proof of training completion and signed DUAs must be submitted to the HCUP Central Distributor.

Data purchasers will be required to provide their DUA training completion code and will execute their DUAs electronically as a part of the online ordering process. The DUAs and training certificates for collaborators and others with access to HCUP data should be submitted directly to the HCUP Central Distributor using the contact information below.

The online DUA Training Course is available at www.hcup-us.ahrq.gov/tech_assist/dua.jsp.

The HCUP Nationwide DUA is available on the HCUP-US website at https://www.hcup-us.ahrq.gov/team/NationwideDUA.pdf.

HCUP CONTACT INFORMATION

HCUP Central Distributor and HCUP User Support

Information about the content of the HCUP databases is available on the HCUP User Support (HCUP-US) website (www.hcup-us.ahrq.gov).

If you have questions, please review the HCUP Frequently Asked Questions located at www.hcup-us.ahrq.gov/tech_assist/faq.jsp.

If you need further technical assistance, please contact the HCUP Central Distributor and User Support team at:

Phone: (866) 290-HCUP (4287) (toll free)

Email: hcup@ahrq.gov

Fax: (866) 551-4587

WHAT IS THE NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)?

- The Nationwide Emergency Department Sample (NEDS) tracks information about emergency department (ED) visits across the country. Information includes geographic characteristics, hospital characteristics, patient characteristics, and the nature of visits (e.g., common reasons for ED visits, acute and chronic conditions, and injuries).
- The NEDS was constructed using the Healthcare Cost and Utilization Project (HCUP) State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID). The SEDD capture discharge information on ED visits that do not result in an admission (e.g., treat-and-release visits and transfers to another hospital). The SID contain information on patients initially seen in the emergency room and then admitted to the same hospital.
- There are 41 HCUP Partner organizations that contributed SID and SEDD from which the 2022 NEDS was built: Alaska, Arkansas, Arizona, California, Colorado, Connecticut, the District of Columbia, Florida, Georgia, Hawaii, Iowa, Illinois, Indiana, Kansas, Kentucky, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, Mississippi, Montana, New Mexico, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, New York, Ohio, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Wisconsin, and Wyoming. These States are geographically dispersed and account for 84.7 percent of the total U.S. resident population and 83.9 percent of all U.S. ED visits.
- Unweighted, the NEDS contains data from 32 million ED visits in 2022. Weighted, the 2022 NEDS describes nearly 137 million ED visits. One of the most distinctive features of the NEDS is its large sample size, which allows for analysis across hospital types and the study of relatively uncommon disorders and procedures. The NEDS is an exceptional resource for conducting research on high-profile emergent health delivery issues.
- The NEDS is a publicly available database that can be purchased through the HCUP Central Distributor. Annual data files are available for 2006–2022.
- Users must complete the HCUP Data Use Agreement Training Course prior to receiving the data.

WHAT'S NEW IN THE 2022 NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)?

- Beginning with data year 2022, emergency departments (EDs) in New Mexico are included in the NEDS sampling frame.
- Beginning in the 2022 NEDS, EDs with no records representing admissions directly from the ED to the same hospital were excluded from the NEDS sampling frame. EDs included in the NEDS sampling frame were required to have two types of ED records reported in the HCUP databases: ED admissions from the State Inpatient Databases (SID) and ED visits that did not result in admission to the same hospital from the State Emergency Department Databases (SEDD).

UNDERSTANDING THE NEDS

- This document, *Introduction to the NEDS, 2022,* summarizes the content of the NEDS and describes the development of the 2022 NEDS sample and weights.
- Important considerations for data analysis are provided along with references to detailed reports.
- In-depth documentation for the NEDS is available on the HCUP-US website (www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.jsp). Please refer to the detailed documentation before using the data.
- The coding system used to report diagnoses and *inpatient* procedures has changed over time (whereas the coding of emergency department procedures continues to use CPT codes):
    - Beginning with data year 2016, the NEDS includes a full calendar year of data with diagnosis and inpatient procedure codes reported using the International Classification of Diseases, Tenth Revision, Clinical Modification (ICD-10-CM/PCS) coding system.
    - In data year 2015, the first 9 months of the NEDS contain ICD-9-CM codes and the last 3 months contain ICD-10-CM/PCS codes.
    - In data year 2014 and prior years, the NEDS contains ICD-9-CM diagnosis and procedure codes.
- The HCUP-US website has an ICD-10-CM/PCS Resources section that summarizes key issues for researchers using HCUP and other administrative databases that include ICD-10-CM/PCS and ICD-9-CM coding. The web page provides general guidance to users analyzing outcomes that may be affected by the transition to the ICD-10-CM/PCS coding system and lists other related web resources.

HCUP NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)

ABSTRACT

The Nationwide Emergency Department Sample (NEDS) is part of the Healthcare Cost and Utilization Project (HCUP), sponsored by the Agency for Healthcare Research and Quality (AHRQ). The NEDS was created to enable analyses of emergency department (ED) utilization patterns and to support researchers, public health professionals, administrators, policymakers, and clinicians in their decision making regarding this critical source of care. The ED serves a dual role in the U.S. healthcare system infrastructure—as a point of entry for approximately 50 percent of inpatient hospital admissions and as a setting for treat-and-release outpatient visits.[1] The NEDS has many research applications, because it contains information about geographic, hospital, and patient characteristics as well as descriptions of the nature of the visits (e.g., common reasons for ED visits, including injuries).

The NEDS is the largest all-payer ED database that is publicly available in the United States, containing information from 32 million ED visits at 993 sampled hospital-owned EDs in the U.S. Weights are provided to calculate national estimates representing about 137 million ED visits in the United States in 2022.

The NEDS is made possible by the voluntary participation of statewide data organizations that provide HCUP with data from ED visits that may or may not have resulted in a hospital admission. Forty-one HCUP Partner organizations participated in the 2022 NEDS. See Appendix A, Table A1 for a list of HCUP Partner organizations participating in the NEDS.

By stratifying on important hospital characteristics, the NEDS sample is designed to represent all U.S. hospital-owned EDs. The stratified sample design is based on the following five hospital characteristics:

1. Geographic region (Northeast, Midwest, South, and West)
2. Trauma center designation (trauma level I, II, III, and nontrauma)
3. Urban-rural location of the hospital (large metropolitan, small metropolitan, micropolitan, and nonurban residual)
4. Teaching status (teaching or non-teaching)
5. Hospital ownership or control (public, for profit, and not for profit).

Because the ICD-10-CM/PCS coding system was introduced on October 1, 2015, trends that rely on diagnoses and procedures may be interrupted. Analyses that do not rely on diagnosis and procedure coding should not be affected.

Access to the NEDS is open to users who sign a Data Use Agreement. Uses are limited to research and aggregate statistical reporting.

For more information on the NEDS, visit the AHRQ-sponsored HCUP User Support (HCUP-US) website at www.hcup-us.ahrq.gov/db/nation/neds/nedsdbdocumentation.jsp.

[1] Merrill CT, Owens PL. Hospital Admissions That Began in the Emergency Department for Children and Adolescents, 2004. HCUP Statistical Brief #32. Rockville, MD: Agency for Healthcare Research and Quality; June 2007. www.hcup-us.ahrq.gov/reports/statbriefs/sb32.pdf

INTRODUCTION TO THE NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS)

Overview of NEDS Data

The Healthcare Cost and Utilization Project (HCUP) Nationwide Emergency Department Sample (NEDS) was created to enable analyses of emergency department (ED) utilization patterns and to support researchers, public health professionals, administrators, policymakers, and clinicians in their decision making regarding this critical source of care. The ED serves a dual role in the U.S. healthcare system infrastructure, as a point of entry for approximately 50 percent of inpatient hospital admissions and as a setting for treat-and-release outpatient visits.[2] The NEDS supports many research applications, because it contains detailed information about geographic, hospital, and patient characteristics as well as the nature of visits (e.g., common reasons for ED visits, acute and chronic conditions, and injuries).

NEDS Data Sources, Hospitals, and ED Visits

The numbers of States, hospital-owned EDs, and ED visits included in the NEDS vary by year (Table 1). The names of the HCUP Partner organizations that contribute to the NEDS are in Appendix A, Table A1.

Table 1. Number of States, Hospital-Owned Emergency Departments, and Records in the NEDS by Year

Data Year	Number of HCUP States in the NEDS	HCUP States in the NEDS	Number of Hospital-Owned EDs Sampled	Number of ED Visits in Sample (Unweighted)	Number of ED Visits, Weighted National Estimate
2022	41	AK, AR, AZ, CA, CO, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NM, NY, OH, OR, RI, SC, SD, TN, TX, UT, VT, WI, and WY (Added NM)	993	32,298,120	136,974,618
2021	40	AK, AR, AZ, CA, CO, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NY, OH, OR, RI, SC, SD, TN, TX, UT, VT, WI, and WY (NV data were not available)	993	30,099,368	126,968,321
2020	41	AK, AR, AZ, CA, CO, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NV, NY, OH, OR, RI, SC, SD, TN, TX, UT, VT, WI, and WY	995	28,037,034	123,278,165
2019	41	AK, AR, AZ, CA, CO, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NH, NJ, NV, NY, OH, OR, RI, SC, SD, TN, TX, UT, VT, WI, and WY (Added AK, HI, NH, and UT)	989	33,147,251	143,432,284

[2] Merrill CT, Owens PL. Hospital Admissions That Began in the Emergency Department for Children and Adolescents, 2004. HCUP Statistical Brief #32. Rockville, MD: Agency for Healthcare Research and Quality; June 2007. www.hcup-us.ahrq.gov/reports/statbriefs/sb32.pdf

Data Year	Number of HCUP States in the NEDS	HCUP States in the NEDS	Number of Hospital-Owned EDs Sampled	Number of ED Visits in Sample (Unweighted)	Number of ED Visits, Weighted National Estimate
2018	37	AR, AZ, CA, CO, CT, DC, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MI, MN, MO, MS, MT, NC, ND, NE, NJ, NV, NY, OH, OR, RI, SC, SD, TN, TX, VT, WI, and WY (Added MI; UT data were not available)	990	35,807,950	143,454,430
2017	37	AR, AZ, CA, CO, CT, DC, FL, GA, IA, IL, IN, KS, KY, MA, MD, ME, MN, MO, MS, MT, NC, ND, NE, NJ, NV, NY, OH, OR, RI, SC, SD, TN, TX, UT, VT, WI, and WY (Added CO; HI data were not available)	984	33,506,645	144,814,803
2016	37	AR, AZ, CA, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MN, MO, MS, MT, NC, ND, NE, NJ, NV, NY, OH, OR, RI, SC, SD, TN, TX, UT, VT, WI, and WY (Added OR and MS)	953	32,680,232	144,842,742
2015	35	AR, AZ, CA, CT, DC, FL, GA, HI, IA, IL, IN, KS, KY, MA, MD, ME, MN, MO, MT, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, TX, UT, VT, WI, and WY (Added TX)	953	31,465,407	143,469,670
2014	34	AR, AZ, CA, CT, DC, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, MT, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, WI, and WY (Added DC, MT, and WY)	945	31,026,417	137,807,901
2013	30	AR, AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI (Added AR; ME data were not available)	947	29,581,718	134,869,015
2012	30	AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI	950	31,091,029	134,399,179
2011	30	AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, NC, ND, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI (Added ND; NH data were not available)	951	29,421,411	131,048,605
2010	28	AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, MN, MO, NC, NE, NJ, NV, NY, OH, RI, SC, SD, TN, UT, VT, and WI (Added NV; ME and NH data were not available)	961	28,584,301	128,970,364

Data Year	Number of HCUP States in the NEDS	HCUP States in the NEDS	Number of Hospital-Owned EDs Sampled	Number of ED Visits in Sample (Unweighted)	Number of ED Visits, Weighted National Estimate
2009	29	AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, IL, MA, MD, ME, MN, MO, NC, NE, NH, NJ, NY, OH, RI, SC, SD, TN, UT, VT, and WI (Added IL)	964	28,861,047	128,885,040
2008	28	AZ, CA, CT, FL, GA, HI, IA, IN, KS, KY, MA, MD, ME, MN, MO, NC, NE, NH, NJ, NY, OH, RI, SC, SD, TN, UT, VT, and WI (Added KY)	980	28,447,148	124,945,264
2007	27	AZ, CA, CT, FL, GA, HI, IA, IN, KS, MA, MD, ME, MN, MO, NC, NE, NH, NJ, NY, OH, RI, SC, SD, TN, UT, VT, and WI (Added NC, NY, RI)	966	26,627,923	122,331,739
2006	24	AZ, CA, CT, FL, GA, HI, IA, IN, KS, MA, MD, ME, MN, MO, NE, NH, NJ, OH, SC, SD, TN, UT, VT, and WI	955	25,702,597	120,033,570

Abbreviations: ED, emergency department; HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample.

Appendix A, Figure A1 represents the geographic distribution of the 41 HCUP Partner organizations participating in the 2022 NEDS. Based on U.S. Census Bureau data, the HCUP NEDS States (with the District of Columbia) account for 84.7 percent of the U.S. population in 2022. The 41 Partner organizations account for 83.9 percent of the ED visits reported in the 2022 American Hospital Association (AHA) Annual Survey Database. Details on the percentage of population and ED visits by region are provided in Appendix A, Table A2.

Identification of HCUP Records With Emergency Department Services

Records for ED visits are contained in two existing HCUP databases:

- The State Emergency Department Databases (SEDD) capture discharge information on all ED visits that do not result in an admission to that hospital (e.g., treat-and-release visits, transfers to another hospital, deaths).
- The State Inpatient Databases (SID) contain information on patients initially seen in the emergency room and then admitted to the same hospital.

Both of these HCUP databases contain a core set of clinical and nonclinical data elements defined in a uniform scheme for all patients, regardless of payer. This scheme makes it possible to combine records across databases.

Selection of ED records from the SEDD and SID for the NEDS is based on evidence of ED services reported on the record. HCUP Partner organizations use differing methods to identify ED records. The HCUP criterion for identifying an ED record (i.e., a discharge record for a patient with an ED visit) is that it meets at least one of the following conditions:

- Revenue center code of 450–459 reported on discharge record, indicating ED services.
- ED charge greater than zero dollars, when revenue center codes were not available.
- Current Procedural Terminology (CPT®) code of 99281–99285 reported on discharge record, indicating ED physician services.
- ED identified by admission source (National Uniform Billing Committee [NUBC] preferred coding prior to October 1, 2007), point of origin (NUBC preferred coding from October 1, 2007, to June 30, 2010), or condition code of P7 (NUBC preferred coding for public reporting as of July 1, 2010). These criteria are used primarily for ED admissions.

Of the 41 HCUP Partner organizations contributing to the 2022 NEDS, 13 (Arkansas, Arizona, California, Connecticut, Florida, Massachusetts, Mississippi, Montana, New Hampshire, New Mexico, North Carolina, Rhode Island, and Utah) provided a source file that contained only ED treat-and-release records. Because the data source provided a dedicated outpatient ED file, all of the SEDD records were considered ED records, even though information may not have been available to determine whether HCUP criteria were met.

Partner-Specific Restrictions

Some HCUP Partner organizations that contributed data to the NEDS imposed restrictions on the release of certain data elements or on the number and types of hospitals that could be included in the database. In addition, because of confidentiality laws, some data sources were prohibited from providing HCUP with discharge records that indicated specific medical conditions, such as HIV/AIDS or behavioral health conditions. Detailed information on these Partner-specific restrictions is available in Appendix B, Table B1.

ICD-10-CM/PCS Started October 1, 2015, at the Beginning of Fiscal Year 2016

On October 1, 2015, the United States transitioned from using the International Classification of Diseases, Ninth Revision, Clinical Modification (ICD-9-CM) to the Tenth Revision (ICD-10-CM/Procedure Coding System [PCS]) code sets for reporting medical diagnoses and inpatient procedures. ICD-10-CM/PCS consists of two parts:

- ICD-10-CM: diagnosis coding on inpatient and outpatient data
- ICD-10-PCS: procedure coding on inpatient data

The HCUP User Support (HCUP-US) website has an ICD-10-CM/PCS Resources section that summarizes key issues for researchers using HCUP and other administrative databases that include ICD-9-CM and ICD-10-CM/PCS coding. The web page provides general guidance and forewarning to users analyzing outcomes that may be affected by the transition to the ICD-10-CM/PCS coding system and lists other related web resources.

File Structure of the NEDS

Because of the size of the NEDS and the difference in information collected on records for patients admitted into the hospital directly from the ED (SID records) and for ED patients that are not admitted (SEDD records), the NEDS is divided into five types of files:

- **Core File:** This file contains records for all the ED visits in the SID and SEDD—whether resulting in admission or not—from the sample of hospitals in participating States and the District of Columbia.
    - This file is available in all years of the NEDS.

- **Supplemental ED File:** This file contains additional information for patients who were treated in the ED and not admitted directly to the hospital (e.g., released home, transferred). This information came from the SEDD.
    - This file is available in all years of the NEDS.
    - The unique NEDS record identifier (KEY_ED) provides the linkage between the NEDS Core File and the Supplemental ED File. For patients seen in the ED and admitted to the same hospital (SID records), information about the stay is contained in the Supplemental Inpatient File.
- **Supplemental Inpatient File:** This file contains data elements that are specific to the inpatient stay, such as total charges, length of inpatient stay, and procedure codes from the SID record. Procedures reported on the SID records may have been performed in the ED, but currently there is no way to verify this information.
    - This file is available in all years of the NEDS.
    - The unique NEDS record identifier (KEY_ED) provides the linkage between the NEDS Core File and the Supplemental Inpatient File.
- **Hospital Weights File:** This file contains one observation for each hospital-owned ED sampled for the NEDS, with its weight and variance estimation data elements. The unit of observation is the *ED*.
    - This file is available in all years of the NEDS.
    - The HCUP ED hospital identifier (HOSP_ED) provides the linkage between the NEDS Core File and the Hospital Weights File.
- **Diagnosis and Procedure Groups File:** Contains additional information on ICD-10-CM/PCS diagnoses and procedures, which is generally derived from the HCUP software tools.
    - This file is available in the NEDS beginning with data year 2018.

File structure of the NEDS in all years except 2015. The NEDS is an annual, calendar year file based on discharge date. Prior to 2015, the NEDS includes ICD-9-CM diagnosis and procedure codes. Starting in 2016, the NEDS includes ICD-10-CM/PCS codes.

File structure of the 2015 NEDS. The introduction of ICD-10-CM/PCS in the United States on October 1, 2015, means that the 2015 NEDS includes a combination of codes:

- Nine months of the data with ICD-9-CM codes (January 1, 2015–September 30, 2015)
- Three months of data with ICD-10-CM/PCS codes (October 1, 2015–December 31, 2015)

To alert users to this change in the ICD coding scheme, the file structure of the 2015 NEDS differs from the annual files for other data years in three primary ways:

- The names of diagnosis- and procedure-related data elements under ICD-10-CM/PCS have been changed to identify the coding scheme with a prefix of “I10_.”
- Diagnoses and procedures, and related data elements, have been moved out of the Core File and into Supplemental ED and Inpatient Files where the first three quarters of data (with ICD-9-CM codes) are stored separately from the fourth quarter of data (with ICD-10-CM/PCS codes).
- Data elements based on the HCUP software tools that are derived from ICD-10-CM/PCS codes are not included in the fourth quarter data.

More information about the file structure of the 2015 NEDS is available in the *Introduction to the Nationwide Emergency Department Sample (NEDS), 2015*, and on the NEDS Database Documentation page of the HCUP-US website.

NEDS Data Elements

The coding of data elements in the NEDS is consistent with other HCUP databases. The following three objectives guided the definition of data elements in all HCUP databases:

- Ensure usability; minimize editing by analysts
- Retain the largest amount of information available from the original sources, while maintaining consistency among sources
- Structure the information for efficient storage, manipulation, and analysis.

More information on the coding of HCUP data elements is available on the HCUP Coding Practices page of the HCUP-US website.

After analyzing the availability of information from the HCUP Partner organizations, a set of common fields to be available in the NEDS was created. The NEDS contains more than 100 clinical and nonclinical variables provided in a hospital discharge abstract, such as the following:

- Patient demographics (e.g., sex, age, urban-rural designation of residence, national quartile of the median household annual income for the patient's ZIP Code)
- Expected payment source (e.g., Medicare, Medicaid, private insurance, self-pay)
- Hospital characteristics (e.g., indicator of trauma center level, including pediatric trauma centers, urban-rural designation of county, ownership, teaching status, region of the United States)
- ICD-10-CM diagnoses and external cause of morbidity codes (starting October 1, 2015, at the beginning of fiscal year 2016) and ICD-9-CM diagnoses and external cause of injury codes (prior to October 1, 2015)
- Identification of injury-related ED visits and the mechanism and intent of the injury
- ICD-9-CM, ICD-10-PCS, and CPT procedure codes
- ED charges and total hospital charges for patients admitted as an inpatient through the ED
- Data elements derived from the HCUP software tools for ICD-10-CM/PCS beginning data year 2018 or the HCUP software tools for ICD-9-CM through quarter 3 of data year 2015.[3]

Appendix C identifies the data elements in each NEDS file:

- Table C1 for the NEDS Core File (record = ED visit)
- Table C2 for the NEDS Supplemental ED File (record = ED visit that did not result in direct inpatient admission to the same hospital)
- Table C3 for the NEDS Supplemental Inpatient File (record = ED visit that resulted in a direct inpatient admission to the same hospital)
- Table C4 for the Hospital Weights File (record = hospital-owned ED)

[3] Users interested in applying HCUP software tools to the NEDS to produce data elements not available for a certain data year may do so by downloading the respective tool(s) from the HCUP Research Tools section of the HCUP-US website. Further, users may wish to review the HCUP Software Tools Tutorial, which provides instructions on how to apply the HCUP software tools to HCUP or other administrative databases.

- Table C5 for the Diagnosis and Procedure Groups File (record = ED visit).

The tables in Appendix C provide summary documentation for the data. Please refer to the NEDS Description of Data Elements page on the HCUP-US website for more comprehensive information about the data elements.

Getting Started

The HCUP NEDS is distributed as comma-separated values (CSV) files delivered via secure digital download from the online HCUP Central Distributor. The files are compressed and encrypted with 7-Zip©.

The NEDS product is downloaded in a single zipped file for each year that contains several data-related files and accompanying documentation. The five compressed data-related files are as follows:

1) Core File (NEDS_2022_Core.zip)
2) Supplemental ED File (NEDS_2022_ED.zip)
3) Supplemental Inpatient File (NEDS_2022_IP.zip)
4) Hospital Weights File (NEDS_2022_Hospital.zip)
5) Diagnosis and Procedure Groups File (NEDS_2022_DX_PR_GRPS.zip)

To load and analyze the NEDS data on a computer, users will need the following:

- The password provided by the HCUP Central Distributor
- A hard drive with *at least* 300 gigabytes (GB) of space available
- A third-party zip utility such as ZIP Reader, SecureZIP, WinZip®, 7-Zip©, or Stuffit Expander®
- SAS®, SPSS®, Stata®, or similar analysis software
- Load program (described below)

The total size of the CSV version of the NEDS is 56 GB. The NEDS files loaded into SAS are about 82 GB. Most SAS data steps will require twice the storage capacity so that the input and output files can coexist. In addition, the largest use of space in SAS typically occurs during PROC SORT, which requires workspace about three times the size of the file. Thus, the NEDS files would require approximately 246 GB of available workspace to perform a sort. The NEDS files loaded into SPSS are estimated to be about 60 GB (under estimate). Because Stata loads the entire file into memory, it may not be possible to load every data element in the NEDS Core file into Stata. Stata users will need to maximize memory and use the "_skip" option to select a subset of data elements. More details are provided in the Stata load programs.

With a file of this size and without careful planning, space could easily become a problem in a multistep process. It is common to produce several versions of a file during data preparation, as well as further multiple versions for analysis. Therefore, the amount of space required could escalate rapidly.

Decompressing the NEDS Files

To extract the data files from the compressed download file, follow these steps:

1) Create a directory for the NEDS on your hard drive.

2) Unzip the compressed NEDS product file into the new directory using a third-party zip utility. This will place four compressed, encrypted data-related files in the new directory. You will be prompted to enter the encryption password (sent separately by email) to decrypt the file.

   Please note that attempts to unzip encrypted files using the built-in zip utility in Windows® (Windows Explorer) or Macintosh® (Archive Utility) will produce an error message warning of incorrect password and/or file or folder errors. The solution is to use a third-party zip utility.

   Third-party zip utilities are available from the following reputable vendors on their official websites.

   - 7-Zip© (Windows) (free download offered by 7-Zip)
   - ZIP Reader (Windows) (free download offered by the PKWARE corporation)
   - SecureZIP for Mac or Windows (free evaluation and licensed/fee software offered by the PKWARE corporation)
   - WinZip (Windows) (evaluation and fee versions offered by the WinZip corporation)
   - Stuffit Expander® (Mac) (free evaluation and licensed/fee software offered by Smith Micro corporation)

3) Unzip each of the compressed, encrypted data-related files using the same password and third-party zip utility method. This will place the data-related CSV files in this same directory by default.

Downloading and Running the Load Programs

Programs to load the data into SAS, SPSS, or Stata are available on the HCUP-US website. To download and run the load programs, follow these steps:

1) Go to the NEDS Database Documentation page on the HCUP-US website.
2) Go to the File Specifications and Load Programs section on this page.
3) Click on “Nationwide SAS Load Programs,” “Nationwide SPSS Load Programs,” or “Nationwide Stata Load Programs” to go to the corresponding Load Programs page.
4) Select the data year and the database (NEDS) from the drop-down lists on this page. Or you may select “NEDS Load All Years” to obtain a zipped file with all load programs for multiple years at once.
5) Select and save the load programs you need. **The load programs are specific to the data year and data-related file**. For example, the load program for the 2022 NEDS Core File is found under the link “SAS NEDS 2022 Core File” in the list generated by selecting “2022” and “NEDS.” Save the load programs into the same directory as the NEDS CSV files on your computer.
6) Edit and run the load programs as appropriate for your computing environment to create the analysis files. For example, modify the directory paths to point to the location of your input and output files.

NEDS Documentation

Comprehensive documentation for the NEDS files is available on the NEDS Database Documentation page of the HCUP-US website. Users of the NEDS can access complete file documentation, including variable notes, file layouts, summary statistics, and related technical reports. Data users can also download SAS, SPSS, and Stata load programs. These important

resources help the user understand the structure and content of the NEDS and aid in using the database. Appendix A, Table A3 details the comprehensive NEDS documentation available on HCUP-US.

HCUP Online Tutorials

For additional assistance, AHRQ has created the HCUP Online Tutorial Series, a series of free, interactive courses that provide information on using HCUP data and tools and training on technical methods for conducting research with HCUP data. Topics include an HCUP Overview Course and these tutorials:

- The Load and Check HCUP Data tutorial provides instructions on how to unzip (decompress) HCUP data, save it on your computer, and load the data into a standard statistical software package. This tutorial also describes how to verify that the data have loaded correctly.
- The HCUP Software Tools Tutorial introduces users to the HCUP software tools, which can be applied to HCUP and other administrative databases to create new data elements from existing data, thereby enhancing a researcher's ability to conduct analyses. There are four modules within this course grouping the HCUP tools by the following coding systems: ICD-10-CM diagnoses, ICD-10-PCS procedures, CPT and HCPCS Level II codes, and ICD-9-CM diagnoses and procedures. Users will learn about the purpose of each tool and receive technical guidance for applying the tools to their data. The HCUP Sample Design tutorial is designed to help users learn how to account for sample design in their work with HCUP nationwide databases.
- The Producing National HCUP Estimates tutorial is designed to help users understand how three of the nationwide databases—the National (Nationwide) Inpatient Sample (NIS), the NEDS, and the Kids' Inpatient Database (KID)—can be used to produce national and regional estimates.
- The Calculating Standard Errors tutorial shows how to accurately determine the precision of the estimates produced from the HCUP nationwide databases. Users will learn two methods for calculating standard errors for estimates produced from the HCUP nationwide databases.
- The Multi-year Analysis tutorial presents solutions that may be necessary when conducting analyses that span multiple years of HCUP data.

New tutorials are added periodically. The tutorials can be found on the HCUP Online Tutorial Series page of the HCUP-US website.

SAMPLING DESIGN OF THE NEDS

The NEDS is built using a 20-percent stratified sample of hospital-owned EDs in the United States. The main objective of a stratified sample is to ensure that it is representative of the target universe. By stratifying on important hospital characteristics, the NEDS represents a "microcosm" of EDs in the United States. For example, by including *trauma center designation* in the sampling strategy, the NEDS has the same percentage of trauma hospitals as the entire United States. The NEDS contains all of the ED visits that occurred at the hospital-owned EDs in the sample.

Universe of Hospital-Owned Emergency Departments

A feasibility study performed in 2008 assessed several possible data sources comprising the universe of hospital-owned EDs in the United States: the American Hospital Association (AHA)

Annual Survey Database (Health Forum LLC© 2007), Verispan LLC databases (now called IMS Health, Inc.), and the Centers for Medicare & Medicaid Services Hospital Cost Reports. The AHA Annual Survey Database was chosen, for two main reasons. First, the AHA data provide the necessary hospital characteristics, such as ownership type and teaching status, and also report total ED visits for hospitals. Second, the crosswalk linkage from the HCUP databases to the AHA data is already established. The universe of hospital-owned EDs is therefore defined as the AHA community, non-rehabilitation hospitals that reported total ED visits. The AHA defines community hospitals as "all non-Federal, short-term, general, and other specialty hospitals open to the public."[4] Included among community hospitals are pediatric institutions, public hospitals, and academic medical centers.

Sampling Frame of the NEDS

The sampling frame of the NEDS does not cover the entire target universe. The target universe consists of all the hospital-owned EDs in the U.S. (including the District of Columbia). The coverage of the sampling frame is limited because HCUP ED data (SID and SEDD) are not available in all States, the identification of HCUP hospitals in the AHA is imperfect, and the AHA data is incomplete. The sampling frame, a set of hospital-owned EDs, consists of AHA community, non-rehabilitation hospitals that report total ED visits and *that could be accurately matched to the ED data provided to HCUP*. If an ED in the AHA survey could not be matched to the ED data provided by the HCUP data source, it was eliminated from the sampling frame (but not from the target universe).

Stratification Variables

The following hospital characteristics were used for sample stratification: U.S. census region, trauma center designation, urban-rural location of the hospital, ownership, and teaching status. ED bed size was not used because no data source for this information could be identified. A number of data sources report the bed size of the hospital, but no source distinguishes between inpatient and ED beds.

The NEDS stratification variables are described below and detailed in Appendix A, Table A4.

U.S. Census Region

The four census regions—Northeast, Midwest, South, and West—were used to stratify EDs by geographic location because practice patterns may vary substantially by region. Appendix A, Figure A1 maps the NEDS States by region.

Trauma Centers

A *trauma center* is a hospital equipped to provide comprehensive emergency medical services 24 hours a day, 365 days a year to patients with traumatic injuries. In 1976, the American College of Surgeons Committee on Trauma (ACS/COT) defined five levels of trauma centers:[5]

- Level I centers have comprehensive resources, can care for the most severely injured patients, and provide leadership in education and research.
- Level II centers have comprehensive resources and can care for the most severely injured patients but do not provide leadership in education and research.

[4] More of the AHA "community hospital designation" is available at www.ahadataviewer.com/glossary.

[5] MacKenzie EJ, Hoyt DB, Sacra JC, et al. National inventory of hospital trauma centers. JAMA. 2003;289:1515-22.

- Level III centers provide prompt assessment and resuscitation, emergency surgery, and, if needed, transfer to a level I or II center.
- Level IV/V centers provide trauma support in remote areas in which no higher level of care is available. These centers resuscitate and stabilize patients and arrange transfer to an appropriate trauma facility.

The ACS/COT verifies hospitals as trauma level I, II, or III.[6] It is important to note that although all level I, II, and III trauma centers offer a high level of trauma care, there may be differences in the specific services and resources offered by hospitals between the different levels. Trauma levels IV and V are designated at the State level (and not by ACS/COT) with varying criteria applied across States.

The level of the trauma centers in the NEDS was identified using the Trauma Information Exchange Program (TIEP) database, a national inventory of trauma centers in the United States collected by the American Trauma Society (ATS).[7] The TIEP database identifies all U.S. trauma centers that are level I, II, or III that treat both adults and children. TIEP includes some information on trauma centers within children's hospitals, but this is not the focus. To ensure that all trauma centers are identified for the NEDS, ATS reviews the ACS/COT list of trauma centers and all State-specific websites on emergency services to identify any additional trauma centers within children's hospitals and their associated trauma levels.

The stratum for trauma center in the NEDS was limited to trauma levels I, II, and III. The distinction between Level IV and V centers was not incorporated because the criteria for these designations varied across States. For hospital confidentiality purposes, a collapsed stratification was necessary if the stratum size in the universe or the frame was fewer than two hospitals. In such situations, the collapsed categories varied by data year:

- Level I and II trauma centers could be grouped together in all years of the NEDS.
- Level I, II, and III trauma centers could be grouped together in the 2006–2010 NEDS.
- Level III trauma centers could be grouped with non-trauma hospitals beginning in the 2011 NEDS.

The change between the 2010 and 2011 NEDS was prompted by differences between injury-related services provided by level I and II trauma centers versus injury-related services provided by level III trauma centers. Services at level III trauma centers were more similar to non-trauma hospitals.

Urban-Rural Location of the ED

The urban-rural location of hospital-owned EDs was determined by the county in which the hospital was located. The categorization is based on Urban Influence Codes (UIC).[8] Starting in the 2014 NEDS, the categorization is a simplified adaptation of the 2013 version of the UIC. Prior to 2014, the categorization is a simplified adaptation of the 2003 version of the UIC. The

[6] American College of Surgeons Committee on Trauma, Verification, Review, and Consultation Program for Hospitals. Verification, Review, and Consultation (VRC) Program. https://www.facs.org/quality-programs/trauma/tqp/center-programs/vrc. Accessed September 2018.

[7] American Trauma Society. Trauma Information Exchange Program. https://www.amtrauma.org/page/TIEP. Accessed December 2019.

[8] U.S. Department of Agriculture Economic Research Service. Urban Influence Codes. Last updated October 23, 2019. www.ers.usda.gov/data-products/urban-influence-codes.aspx. Accessed June 26, 2020.

12 detailed UIC categories are combined into 4 broader categories:

- Large metropolitan area—areas with at least 1 million residents
- Small metropolitan area—areas with fewer than 1 million residents
- Micropolitan area—nonmetropolitan area with at least 10,000 people or more
- Nonurban residual.

If the stratum size in the universe or frame was fewer than two hospitals, a collapsed stratification of metropolitan (large and small), nonmetropolitan (micropolitan and nonurban residual), small metropolitan and micropolitan,[9] or all areas[10] was necessary.

Teaching Status

A hospital-owned ED is considered a teaching hospital if it has one or more Accreditation Council for Graduate Medical Education (ACGME)-approved residency program, is a member of the Council of Teaching Hospitals, or has a ratio of full-time equivalent interns and residents to beds of 0.25 or higher. Beginning with the 2014 NEDS, there is an increase in the number of hospitals identified as teaching facilities because the AHA Annual Survey reported an increase in facilities with approved residency programs. About this time, the ACGME became the primary organization for residency training approval. Because there are very few teaching hospitals in micropolitan and rural areas, teaching status was only used to stratify EDs in metropolitan areas.

Hospital Ownership

Hospital ownership or control was categorized according to information reported in the AHA Annual Survey Database. The ownership categories include (1) public (government, non-Federal), (2) voluntary (private, not for profit), and (3) proprietary (private, investor owned/for profit).

When there were enough hospitals of each type, EDs were stratified into public, voluntary, and proprietary categories. If necessary, because of small stratum size in the universe, a collapsed stratification of public versus private was used; that is, the voluntary, nonprofit, and proprietary/for-profit hospitals were combined to form a single “private” category. Stratification based on ownership or control was not implemented in some regions (e.g., Northeast) because of the dominance of one hospital type.

Sample Weights

To enable nationwide estimates, weights were developed using the AHA universe as the standard. Two weights were developed to allow analysis of two distinct units of observation: facilities (hospital-owned EDs) and ED visits. Hospital-level weights expand the NEDS sample of EDs to represent the universe of hospital-owned EDs. Similarly, discharge-level weights expand the ED visits in the NEDS sample to represent the universe of ED visits.

Hospital Weights

Hospital weights were calculated by stratum. Hospital-owned EDs were stratified on the same variables that were used for sampling: geographic region, trauma center designation, urban-rural location, teaching status, and ownership or control. The strata that were collapsed for

[9] The collapsing of small metropolitan and micropolitan areas was required in the South in 2011–2015.

[10] The collapsing of all areas was required in the South in 2014.

sampling were also collapsed for sample weight calculations. Within each stratum, *s*, each ED in the NEDS sample received a weight:

$$HOSPWT = W_s(universe) = N_s(universe) \div N_s(sample)$$

where W_s(universe) was the ED universe weight, and N_s(universe) and N_s(sample) were the number of hospital-owned EDs within stratum *s* in the universe and sample, respectively. Thus, each hospital's universe weight (HOSPWT) is equal to the number of universe hospitals it represents during that year. Because 20 percent of the hospitals in each stratum were sampled when possible, the ED weights were usually near a value of 5.

Discharge Weights

Discharge weights were also calculated by stratum. Hospital-owned EDs were stratified in a manner similar to that for universe hospital-weight calculations. Within stratum *s* for hospital *i*, the universe weight for each visit in the NEDS sample was calculated as follows:

$$DISCWT = DW_{is}(universe) = [DN_s(universe) \div ADN_s(sample)] * (4 \div Q_i)$$

where DW_{is}(universe) is the discharge weight; DN_s(universe) is the number of ED visits from community, non-rehabilitation hospitals in the universe within stratum *s*; ADN_s(sample) is the number of adjusted ED visits from sample hospitals selected for the NEDS; and Q_i represents the number of quarters of ED visits contributed by hospital *i* to the NEDS (usually $Q_i = 4$). Thus, each discharge's weight (DISCWT) is equal to the number of universe ED visits it represents in stratum *s* during that year.

Final NEDS Sample

The target universe for the NEDS was: (1) community, non-rehabilitation hospital-owned EDs in the United States that were included in the 2022 AHA Annual Survey Database, and (2) reported total ED visits. Excluded were 7 nonrural hospitals that reported fewer than 10 ED visits in data year 2022.

The NEDS sampling frame included hospital-owned ED visits from community, non-rehabilitation hospitals in the 41 HCUP Partner organizations that provided discharge abstracts on patients admitted to the hospital through the ED and on patients treated and released or transferred to another hospital from the ED. The HCUP hospitals were required to be represented in the AHA data and have no more than 90 percent of their ED visits resulting in admission. Starting in the 2022 NEDS, EDs included in the NEDS sampling frame were also required to have two types of ED records reported in the HCUP databases: ED admissions from the SID and ED visits that did not result in admission to the same hospital from the SEDD. Appendix A, Table A5 lists the number of EDs and ED visits in the target universe, the sampling frame, and the sample.

The NEDS is a stratified probability sample of hospital-owned EDs in the frame. Sampling probabilities were calculated to select 20 percent of the universe contained in each stratum, which was defined by region, trauma designation, urban-rural location, teaching status, and hospital ownership or control. A sample size of 20 percent was based on previous experience with similar research databases. A larger sample would be cumbersome for data users, given that a 20-percent sample contains about 30 million records. A 20-percent sample also enables an analyst to split the NEDS into two 10-percent subsamples for estimation and validation of models.

Using the universe of U.S. hospital-owned EDs, strata were defined by region, trauma designation, urban-rural location, teaching status, and hospital ownership or control. Strata with fewer than two hospitals in the universe and frame were collapsed with adjacent strata on the dimensions of urban-rural location, trauma designation, or ownership or control. Prior to sampling, the list of frame hospitals within each stratum is sorted as follows to ensure geographic representation within strata: (1) sorted by the first three digits of the hospital's ZIP Code and (2) sorted by a random number within the three-digit ZIP Code.[11] After stratifying and sorting the frame hospitals, a random sample of up to 20 percent of the total number of hospital-owned EDs in the United States was selected within each stratum. A stratum with a shortfall was defined as having an insufficient number of EDs in the frame to meet the threshold of 20 percent of the universe for that stratum. In strata with shortfalls, the sampling rate from the universe was less than 20 percent and all possible EDs in the frame were selected for the NEDS. In contrast, the sampling rate is larger than 20 percent in some strata because protecting hospital confidentiality required a minimum of two sampled EDs in each stratum.

HOW TO USE THE NEDS FOR DATA ANALYSIS

This section provides a brief synopsis of special considerations for analyzing NEDS data. For more details, refer to the comprehensive documentation on the NEDS Database Documentation page of the HCUP-US website.

Data Use Agreement

Anyone accessing the NEDS (whether or not they are the original recipient of the data) must complete the online HCUP Data Use Agreement Training available on the HCUP-US website and then read and sign a Data Use Agreement. A copy of the signed Data Use Agreements must be sent to the HCUP Central Distributor.

Limitations of the NEDS

The NEDS contains about 32 million ED records and more than 100 clinical and nonclinical data elements. A multitude of research studies can be conducted with the data, but there are some limitations.

- The NEDS is an extremely large database that requires sophisticated statistical software for analysis and at least 300 GB of available computer space. The CSV version of the 2022 NEDS is 56 GB. When loaded into statistical software such as SAS or SPSS, the file size generally will increase.
- Some data elements in the NEDS may be missing for a given hospital. For example, RACE is not reported for some hospitals; thus, national estimates using RACE should be reported with caution.
- In 2022, about 5 percent of all ED visits (weighted) are missing information about ED charges. For ED visits that result in admission, 30 percent of records are missing ED charges. For ED visits that do not result in admission, 1 percent of records are missing ED charges. The missing information is concentrated in the Midwest and West. Estimates of aggregate charges should be calculated as the product of the number of discharges times the average charge to account for records missing charge information.
- In 2021, Current Dental Terminology (CDT) codes were removed from the NEDS Supplemental ED File because of inconsistent reporting of information across States.

[11] The ZIP Code of the hospital is not included in the NEDS data files.

- The NEDS contains *encounter*-level records, not *patient*-level records. This means that individual patients who visit the ED multiple times in a year may be present in the NEDS multiple times. There is no uniform patient identifier available that would allow a patient-level analysis to identify individuals with more than one ED visit. (In contrast, other HCUP State databases may support this type of analysis.)
- If a patient is directly admitted from the ED to the same hospital, one discharge record is included in the NEDS. If a patient is transferred from an ED to another ED, there would be two discharge records—one from the "transfer out" hospital and one from the receiving hospital. However, both of these records will be included in the NEDS only if both hospitals were selected for inclusion in the NEDS sample. It is possible that only one of these two records will be included in the NEDS if only one of the hospitals was sampled. This type of transfer (from an ED to another ED or acute care hospital) occurs in under 2 percent of the NEDS records.
- For a patient who was directly admitted to the same hospital through the ED, clearly identifying whether a procedure was performed in the ED or as part of the inpatient stay is not currently possible. Information on procedures for ED admissions is stored in the NEDS Supplemental Inpatient File.
- The reporting of outpatient surgery records that originate in the ED (e.g., fracture and dislocation procedures, appendectomies) can vary by State. These types of events are captured in the NEDS if they are included in the SEDD.
- For hospital confidentiality purposes, if there are less than two hospitals in a stratum, trauma hospitals are grouped together in the HCUP data elements HOSP_TRAUMA and NEDS_STRATUM in one of the following ways:
    - Level I and II trauma centers (in all years of the NEDS);
    - Level I–III trauma centers (in the 2006–2010 NEDS);
    - Level III trauma centers and non-trauma facilities (beginning in the 2011 NEDS); or
    - Level II and III trauma centers (beginning in the 2018 NEDS).

  This grouping protects hospital identification and limits the analyses that can be performed by individual levels of trauma centers, but it does preserve the general distinction of trauma versus non-trauma facilities.
- The NEDS is not linkable to other HCUP databases, does not intentionally contain the same hospitals as the HCUP Nationwide Inpatient Sample (NIS), and cannot be used for State-level analyses. In fact, States and the District of Columbia are not identified in the NEDS.

Identifying Different Types of ED Events

The HCUP data element *ED event* distinguishes among the different types of ED visits. Appendix A, Table A7 provides the number and percentage of records in the 2022 NEDS for each of the five ED event types.

Calculating National Estimates

To produce national estimates, weights MUST be applied to the sample.

- The hospital weight (HOSPWT) should be used for producing nationwide hospital-level statistics for analyses that use the hospital-owned ED as the unit of analysis.
- The discharge weight (DISCWT) should be used for producing nationwide visit-level statistics for analyses that use the ED visit as the unit of analysis.

Because the NEDS is a stratified sample, proper statistical techniques must be used to calculate standard errors and confidence intervals. For detailed instructions, refer to the HCUP Methods Series report #2003-02, *Calculating Nationwide Inpatient Sample (NIS) Variances for Data Years 2011 and Earlier*, on the HCUP-US website. The NEDS uses a stratified sampling design similar to the HCUP NIS prior to 2012, so techniques appropriate for the NIS prior to 2012 are also appropriate for the NEDS.

When creating national estimates, it is advisable to check results against other data sources, if available. Summary of independent benchmarks for NEDS estimates are in Appendix D. Other ED data sources include, for example, the National Hospital Ambulatory Medical Care Survey which has an ED component and publishes national health statistics annually.

To ensure that weights are applied appropriately and estimates and variances are calculated accurately, researchers can also access HCUPnet, the free online query system. HCUPnet is a web-based query tool for identifying, tracking, analyzing, and comparing statistics on hospitals at the national, regional, and State levels. HCUPnet offers easy access to national statistics and trends as well as selected State statistics about hospital stays, ED visits, and ambulatory surgeries. This tool provides step-by-step guidance, helping researchers quickly obtain the statistics they need. HCUPnet generates statistics from the HCUP databases.

Choosing Data Elements for Analysis

For any data element of interest, the analyst should first examine descriptive statistics such as the range of values and the number of missing values. Summary statistics are also available on the NEDS Summary Statistics page of the HCUP-US website. When anomalies (e.g., a large amount of missing values) are detected, descriptive statistics by region or by hospital (HOSP_ED) may be informative.

ICD-9-CM and ICD-10-CM/PCS Diagnosis and Procedure Codes and CPT Procedure Codes

- The HCUP-US website has a ICD-10-CM/PCS Resources section that summarizes key issues for researchers using HCUP and other administrative databases that include ICD-9-CM and ICD-10-CM/PCS coding. The web page provides general guidance and forewarning to users analyzing outcomes that may be affected by the transition to the ICD-10-CM/PCS coding system and lists other related web resources.
- The meaning of the first-listed diagnosis (DX1) differs depending on the type of ED visit. The first-listed diagnosis on an ED admission (SID record) is the condition principally responsible for the inpatient stay. The first-listed diagnosis on an ED treat-and-release visit (SEDD record) is the condition, problem, or symptom identified in the medical record to be chiefly responsible for the services provided. Secondary diagnoses reported on an inpatient admission from the ED may be from both the ED and inpatient hospital settings. It may be useful to compare diagnosis-specific ED visits that do not result in hospitalization to those resulting in hospitalization. Please refer to HCUP Methods Series Report #2011-03, *Special Study on the Meaning of the First-Listed Diagnosis on Emergency Department and Ambulatory Surgery Records*.
- The NEDS includes ICD-9-CM diagnosis and procedure codes on inpatient discharges prior to October 1, 2015. Starting on October 1, 2015, diagnosis and procedure codes are reported using ICD-10-CM/PCS. HCUP has developed recommendations for reporting statistics (e.g., counts, rates, averages) that are based on HCUP data with a mixture of ICD-9-CM and ICD-10-CM/PCS codes (see *Recommendations for Reporting Trends Using ICD-9-CM and ICD-10-CM/PCS Data*). These recommendations apply to

calendar year 2015 data (which includes both ICD-9-CM and ICD-10-CM/PCS codes), as well as reporting trends that span the October 1, 2015, transition date (before and after the introduction of ICD-10-CM/PCS).

- ICD-9-CM and ICD-10-CM diagnosis and ICD-10-PCS procedure codes provide valuable insights into the reasons for hospitalization and what procedures patients receive, but these codes need to be used and interpreted carefully. ICD-9-CM and ICD-10-CM/PCS codes change every October as new codes are introduced, and some codes are retired. It is critical to check all ICD-9-CM and/or ICD-10-CM/PCS codes used for analysis to ensure that the codes are in effect during the period studied.
- The NEDS contains fields for up to 40 diagnoses in 2021-2022 and up to 35 diagnoses in data years 2017-2020 (30 diagnoses for data years 2014–2016 and 15 diagnoses prior to 2014), and external cause of morbidity codes are now included at the end of the ICD-10-CM diagnosis array (prior to data year 2017, 4 E codes per ED record were included as a separate array). Some States provide more than the maximum code fields retained on the NEDS. To reduce the file size of the NEDS, the number of codes was limited. Less than 1 percent of all ED records report more codes than the maximum allowed on the NEDS.
- The NEDS contains fields for up to 15 ICD-9-CM or ICD-10-PCS procedures (nine prior to data year 2017) and 50 CPT procedures per ED record (35 prior to data year 2021; 15 prior to data year 2017), although the number of code fields populated varies by State because of reporting differences. Some States provide more than the maximum code fields retained on the NEDS.
- The collection and reporting of external cause of injury (E codes under ICD-9-CM) and external cause of morbidity (V, W, X, and Y codes under ICD-10-CM) also vary across hospitals depending on the presence of State laws or mandates for the collection of these codes. Some States do not require hospitals to report codes for “misadventures to patients during surgical and medical care” (codes E870–E879 under ICD-9-CM), which means that these occurrences will be underreported. Beginning with the 2017 NEDS, separate data elements for external cause diagnosis codes are discontinued (formerly HCUP data elements I10_ECAUSEn). External cause codes are now included at the end of the ICD-10-CM diagnosis array. The length of the diagnosis array has increased from 30 to 35 codes to accommodate this change.

Missing Values

Missing data values can compromise the quality of estimates. For example, if the outcome for ED visits with missing values differs from the outcome for ED visits with valid values, then estimates for that outcome will be biased and inaccurately represent the ED utilization patterns. Several techniques are available to help overcome this bias. One strategy is to use imputation to replace missing values with acceptable values. Another strategy is to use sample weight adjustments to compensate for missing values. Descriptions of such data preparation and adjustment are outside the scope of this report; however, it is recommended that researchers evaluate and adjust for missing data, if necessary.

Alternatively, if the cases with and without missing values are assumed to be similar with respect to their outcomes, no adjustment may be necessary for estimates of means and rates because the nonmissing cases would be representative of the missing cases. However, some adjustment may still be necessary for the estimates of totals. Sums of data elements (e.g., aggregate ED charges) containing missing values would be incomplete because cases with missing values would be omitted from the calculations. Estimates of the sum of charges can be

calculated as the product of the number of cases times the average charge to account for records with missing information.

Variance Calculations

It may be important for researchers to calculate a measure of precision for some estimates based on the NEDS sample data. Variance estimates must account for both the sampling design and the form of the statistic. The sampling design consisted of a stratified, single-stage cluster sample. A stratified random sample of hospital-owned EDs (clusters) was drawn, and then all ED visits were included from each selected hospital. **To accurately calculate variances from the NEDS, appropriate statistical software and techniques must be used.** For detailed instructions, refer to the HCUP Methods Series report #2003-02, *Calculating Nationwide Inpatient Sample (NIS) Variances for Data Years 2011 and Earlier*. Prior to 2012, the NIS used a stratified sample design similar to the NEDS, so techniques appropriate for the NIS prior to 2012 are also appropriate for the NEDS.

A multitude of statistics can be estimated from the NEDS data. Several computer programs that calculate statistics and their variances from sample survey data are listed in the next section. Some of these programs use general methods of variance calculations (e.g., the jackknife and balanced half-sample replications) that account for the sampling design. However, it may be desirable to calculate variances using formulas specifically developed for certain statistics.

Variance calculations that factor in the cluster and strata are based on finite-sample theory, which is an appropriate method for obtaining cross-sectional, nationwide estimates of outcomes. According to finite-sample theory, the intent of the estimation process is to obtain estimates that are precise representations of the nationwide population at a specific point in time. In the context of the NEDS, any estimates that attempt to accurately describe characteristics and interrelationships among hospitals and ED visits during a specific year should be governed by finite-sample theory. Examples would be estimates of expenditure and utilization patterns.

Alternatively, in the study of hypothetical population outcomes not limited to a specific point in time, the concept of a "superpopulation" may be useful. Analysts may be less interested in specific characteristics of the finite population (and period) from which the *sample* was drawn than they are in hypothetical characteristics of a conceptual superpopulation from which any particular finite *population* in a given year might have been drawn. According to this superpopulation model, the nationwide population in a given year is only a snapshot in time of the possible interrelationships between hospital, market, and discharge characteristics. In a given year, all possible interactions between such characteristics may not have been observed, but analysts may wish to predict or simulate interrelationships that may occur in the future.

Under the finite-population model, the variances of estimates approach zero as the sampling fraction approaches one. This is the case because the population is defined at that point in time and because the estimate is for a characteristic as it existed when sampled. The superpopulation model, in contrast, adopts a stochastic viewpoint rather than a deterministic viewpoint. That is, the nationwide population in a particular year is viewed as a random sample of some underlying superpopulation over time. Different methods are used for calculating variances under the two sample theories. The choice of an appropriate method for calculating variances for nationwide estimates depends on the type of measure and the intent of the estimation process.

Computer Software for Applying Weights and Calculating Variance

The hospital weights produce hospital-level statistics for analysis at the *hospital-owned ED* unit of analysis. In contrast, the discharge weights produce visit-level statistics for analysis that centers on the *ED visit* as the unit of analysis.

In most cases, computer programs are readily available to perform both types of calculations. Several statistical programming packages allow weighted analyses.[12] For example, nearly all SAS procedures can incorporate weights. In addition, several statistical analysis programs have been developed to specifically calculate statistics and their standard errors from survey data. Version 8 or later of SAS contains procedures (PROC SURVEYMEANS and PROC SURVEYREG) for calculating statistics from complex sampling designs. Stata and SUDAAN® are two other common statistical software packages that perform calculations for numerous statistics arising from the stratified, single-stage cluster sampling design. Examples of the use of SAS, SUDAAN, and Stata to calculate NIS variances are presented in the special report *Calculating Nationwide Inpatient Sample (NIS) Variances for Data Years 2011 and Earlier*. Although the examples using the NIS also apply to the NEDS, it should be noted that the NEDS is a much larger dataset. Please consult the documentation for the different software packages concerning the use of large databases. For a review of programs to calculate statistics from survey data, visit the Summary of Survey Analysis Software page on the Harvard Medical School website.

The NEDS includes a Hospital Weights File with variables required by these programs to calculate finite-population statistics. The file includes hospital identifiers (Primary Sampling Units), stratification variables, and stratum-specific totals for the number of ED visits and hospitals so that finite-population corrections can be applied to variance estimates.

In addition to these subroutines, standard errors can be estimated by validation and cross-validation techniques. Given that a very large number of observations will be available for most NEDS analyses, it may be feasible to set aside a part of the data for validation purposes. Standard errors and confidence intervals then can be calculated from the validation data.

If the analytic file is too small to set aside a large validation sample, cross-validation techniques may be used. For example, 10-fold cross-validation would split the data into 10 subsets of equal size. The estimation would take place in 10 iterations. In each iteration, the outcome of interest is predicted for one-tenth of the observations by an estimate based on a model that is fit to the other nine-tenths of the observations. Unbiased estimates of error variance are then obtained by comparing the actual values to the predicted values obtained in this manner.

COMPARABLE ED DATA SOURCES

To aid in understanding the NEDS, analysts can compare national estimates from the NEDS to other available data sources (Table 2). Each of the ED data sources in Table 2 has potential for use in research addressing ED utilization and policy.

[12] Carlson BL, Johnson AE, Cohen SB. An evaluation of the use of personal computers for variance estimation with complex survey data. J Of Statistics. 1993;9(4):795-814.

Table 2. Sources of Emergency Department (ED) Data by Type

Type of ED Data	ED Data Source	Description
National inventories of EDs	AHA Annual Survey Database	Database containing characteristics and descriptions of hospitals in the United States reported by hospitals via survey. Owned by Health Forum.
	National Emergency Department Inventory – USA	Inventory of ED locations in the United States and annual ED visit volume that integrates information from the AHA Annual Survey Database, the Hospital Market Profiling Solution©, internet searches, and direct communication with hospital staff. Created by the Emergency Medicine Network.
ED visit information from a sample of EDs	HCUP Nationwide Emergency Department Sample	Nationwide sample drawn from the HCUP SID and SEDD, stratified and weighted to be nationally representative of ED visits and facilities. Sponsored by AHRQ.
	National Hospital Ambulatory Medical Care Survey	National probability sample survey of utilization and provision of ambulatory services in hospital emergency and outpatient departments. Sponsored by the National Center for Health Statistics of the CDC.
	National Electronic Injury Surveillance System – All Injury Program	National probability sample providing counts of injuries seen in the ED. Sponsored by the National Center for Injury Prevention and Control of the CDC and the U.S. Consumer Product Safety Commission.
ED visit information from a sample of patients	National Health Interview Survey	A comprehensive survey of the civilian noninstitutionalized population residing in the United States at the time of the interview. Sponsored by the National Center for Health Statistics of the CDC.

Abbreviations: AHA, American Hospital Association; AHRQ, Agency for Healthcare Research and Quality; CDC, the Centers for Disease Control and Prevention; HCUP, Healthcare Cost and Utilization Project; SEDD, State Emergency Department Databases; SID, State Inpatient Databases.

Information on total ED visits in 2022 for the United States was available from four data sources (AHA, NEDS, National Health Interview Survey, and National Hospital Ambulatory Medical Care Survey). Appendix D, Figure D1 displays the range of aggregate ED visits; Appendix D, Table D1 lists the total ED visits in the United States by census region. The total U.S. ED visit counts are relatively consistent across the data sources. The South consistently had the highest number of ED visits.

Estimates of the number of hospital-owned EDs by ED visit volume are available from two data sources (NEDS and AHA) and are displayed in Appendix D, Table D2.

Estimates of the number of ED visits related to nonfatal ED visits are available from two data sources (NEDS and National Electronic Injury Surveillance System – All Injury Program) and are displayed in Appendix D, Table D3.

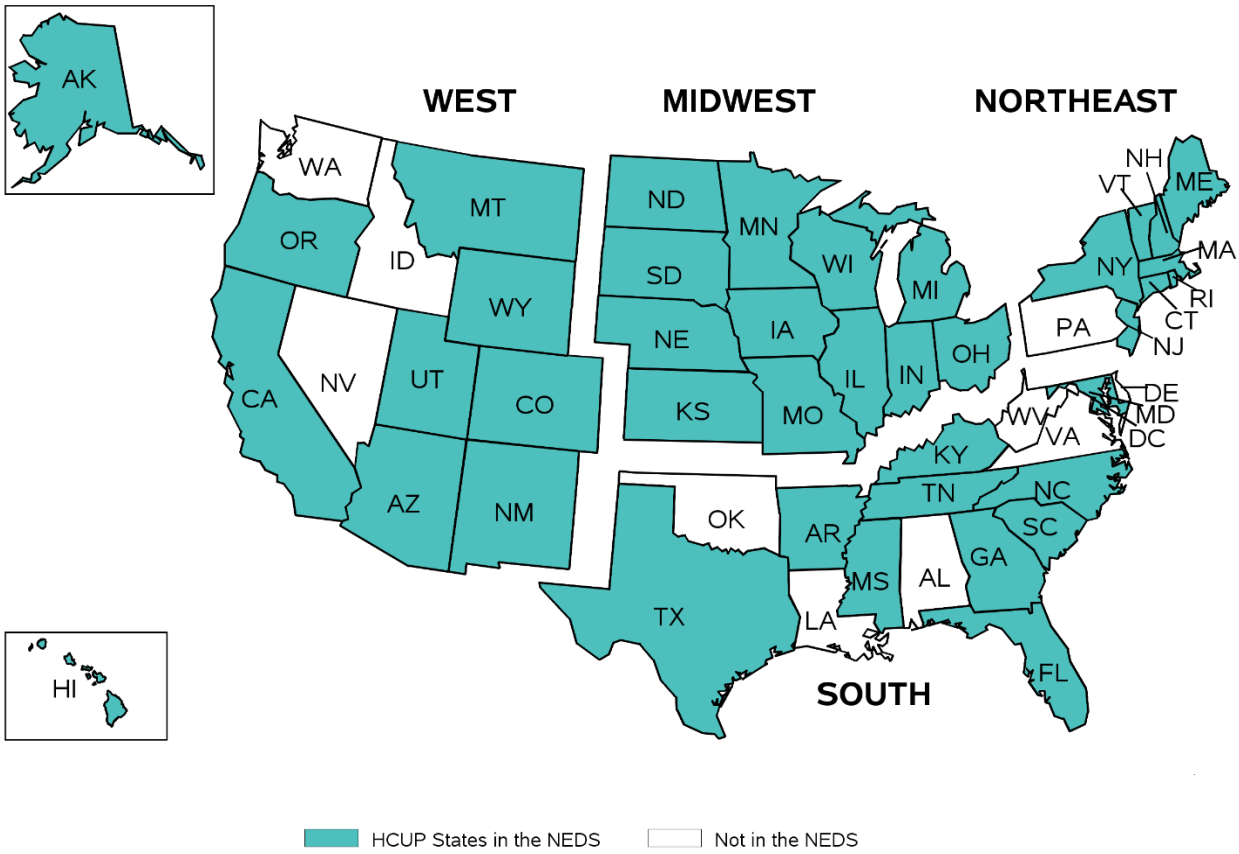
Appendix A: NEDS States, Sampling Strata and Rates, and Website Resources

Table A1. States Data Organizations Providing SID and SEDD and Participating in the 2022 NEDS

State	Data Organization
AK	Alaska Department of Health
AR	Arkansas Department of Health
AZ	Arizona Department of Health Services
CA	California Office of Statewide Health Planning & Development
CO	Colorado Hospital Association
CT	Connecticut Hospital Association
DC	District of Columbia Hospital Association
FL	Florida Agency for Health Care Administration
GA	Georgia Hospital Association
HI	Hawaii Laulima Data Alliance
IA	Iowa Hospital Association
IL	Illinois Department of Public Health
IN	Indiana Hospital Association
KS	Kansas Hospital Association
KY	Kentucky Cabinet for Health and Family Services
MA	Massachusetts Center for Health Information and Analysis
MD	Maryland Health Services Cost Review Commission
ME	Maine Health Data Organization
MI	Michigan Health and Hospital Association
MN	Minnesota Hospital Association
MO	Missouri Hospital Industry Data Institute
MS	Mississippi State Department of Health
MT	Montana Hospital Association
NC	North Carolina Department of Health and Human Services
ND	North Dakota (data provided by the Minnesota Hospital Association)
NE	Nebraska Hospital Association
NH	New Hampshire Department of Health & Human Services
NJ	New Jersey Department of Health
NM	New Mexico Department of Health
NY	New York State Department of Health
OH	Ohio Hospital Association
OR	Oregon Association of Hospitals and Health Systems Oregon Office of Health Analytics
RI	Rhode Island Department of Health
SC	South Carolina Revenue and Fiscal Affairs Office
SD	South Dakota Association of Healthcare Organizations
TN	Tennessee Hospital Association
TX	Texas Health Care Information Collection
UT	Utah Department of Health
VT	Vermont Association of Hospitals and Health Systems
WI	Wisconsin Department of Health Services
WY	Wyoming Hospital Association

Abbreviation: NEDS, Nationwide Emergency Department Sample.

Figure A1. Map of States Providing SID and SEDD to HCUP and Participating in the 2022 NEDS



Abbreviations: HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample.

Table A2. Coverage of the U.S. Population and AHA ED Visits by the 41 NEDS States, 2022

Region	Population, 2022	Population Residing in NEDS States	Percent of Population Residing in NEDS States	Number of AHA ED Visits, 2022	Number of ED Visits in NEDS States	Percent of ED Visits in NEDS States
Northeast	57,026,847	44,054,756	77.3	24,417,279	18,583,871	76.1
Midwest	68,783,028	68,783,028	100.0	30,299,023	30,299,023	100.0
South	128,702,030	103,548,240	80.5	55,130,029	43,610,660	79.1
West	78,759,506	65,858,612	83.6	27,128,287	22,403,512	82.6
U.S.	**333,271,411**	**282,244,636**	**84.7**	**136,974,618**	**114,897,066**	**83.9**

Abbreviations: AHA, American Hospital Association; ED, emergency department; HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample.

Source: U.S. Census Bureau, Population Division, Annual Estimates of the Resident Population for the United States, Regions, States, District of Columbia, and Puerto Rico: April 1, 2020 to July 1, 2023 (NST-EST2023-POP), released December 2023). AHA ED visit counts from the American Hospital Association Annual Survey of Hospitals, 2022. ED visit counts for NEDS States from the HCUP SID and SEDD.

Table A3. NEDS-Related Reports and Database Documentation Available on the HCUP-US Website

Description of NEDS Database

- NEDS Overview
  - HCUP Partners in the NEDS
- Introduction to the NEDS, 2022 (*this document*) and prior years
- NEDS Related Reports

Restrictions on Use

- HCUP Data Use Agreement Training
- Data Use Agreement for the HCUP Nationwide Databases
- Requirements for Publishing With HCUP Data

File Specifications and Load Programs

- NEDS File Specifications—details data file names, number of records, record length, and record layout
- Nationwide SAS Load Programs
- Nationwide SPSS Load Programs
- Nationwide Stata Load Programs

Data Elements

- NEDS Description of Data Elements—details uniform coding and State-specific idiosyncrasies
- NEDS Summary Statistics—lists means and frequencies on nearly all data elements
- Frequencies by Diagnosis and Procedure Codes, NEDS – includes frequency distributions for ICD-10-CM/PCS codes (individually and by the CCSR categories).

Additional Resources for NEDS Data Elements

- HCUP Quality Control Procedures—describes procedures used to assess data quality
- HCUP Coding Practices—describes how HCUP data elements are coded
- HCUP Hospital Identifiers—explains data elements that characterize individual hospitals

ICD-10-CM/PCS Data Included in the NEDS Starting With 2015

- NEDS Changes Beginning Data Year 2016
- Caution: 2015 NEDS includes ICD-9-CM and ICD-10-CM/PCS
  - 2015 NEDS Revised File Structure and New Data Elements
- Additional ICD-10-CM/PCS Resources—contains documentation to assist with the transition to ICD-10-CM/PCS
- HCUP Software Tools Tutorial

Known Data Issues

- 2011
- 2006 and 2007

HCUP Tools: Labels and Formats

- Format Programs—to create value labels
  - DRG Formats
  - HCUP Formats
  - HCUP Diagnoses and Procedure Groups Formats, including Clinical Classifications Software Refined (CCSR) categories
  - ICD-9-CM Formats
  - ICD-10-CM Formats

Obtaining HCUP Data

- Purchase HCUP Data from the HCUP Central Distributor

Abbreviations: DRG, diagnosis-related group; HCUP, Healthcare Cost and Utilization Project; HCUP-US, Healthcare Cost and Utilization Project User Support; ICD-9-CM, International Classification of Diseases, Ninth Revision, Clinical Modification; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification; NEDS, Nationwide Emergency Department Sample.

Table A4. NEDS Sampling Stratifiers

Stratifier	Values
Region	1: Northeast 2: Midwest 3: South 4: West
Trauma	0: Not a trauma center 1: Trauma center level I 2: Trauma center level II 3: Trauma center level III Collapsed categories used for strata with small sample sizes 4: Non-trauma or trauma center level III (beginning in the 2011 NEDS) 7: Trauma center level II or III (beginning in the 2018 NEDS) 8: Trauma center level I or II (in all years of the NEDS) 9: Trauma center level I, II or III (only in the 2006–2010 NEDS)
Urban-Rural	1: Large metropolitan 2: Small metropolitan 3: Micropolitan 4: Nonurban residual Collapsed categories used for strata with small sample sizes 6: Any urban-rural location (used in the South in 2014) 7: Small metropolitan and micropolitan (used in the South in 2011–2015) 8: Metropolitan (large and small) 9: Nonmetropolitan (micropolitan and nonurban location)
Teaching	0: Metropolitan nonteaching 1: Metropolitan teaching 2: Nonmetropolitan teaching and nonteaching
Control	0: All (used for combining public, voluntary, and private) 1: Public—government, non-Federal 2: Voluntary—private, nonprofit 3: Proprietary—private, investor owned/for profit 4: Private (used for combining private voluntary and proprietary)

Abbreviation: NEDS, Nationwide Emergency Department Sample.

Table A5. Size of NEDS Target Universe, Sampling Frame, and Sample, 2022

Category	Description	Number of Hospital-Owned EDs, 2022	Number of ED visits, 2022
Target Universe	EDs in community, non-rehabilitation U.S. hospitals that reported total ED visits in the AHA Annual Survey Database	4,515	136,974,618
Sampling Frame	EDs in the 41 States and the District of Columbia that provide information on ED visits that result and do not result in admission	3,421	112,061,695
2022 NEDS	20 percent sample of target universe drawn from the sampling frame	993	32,298,120

Abbreviations: ED, emergency department; NEDS, Nationwide Emergency Department Sample.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2022.

Table A6. Number and Percent of ED Visits by Discharge Status, NEDS 2022

Type of ED Visit Based on Discharge Status from the ED	Number of ED Visits	ED Visits, %
ED visit in which the patient was treated and released	114,186,550	83.36
ED visit in which the patient was admitted to the same hospital	20,031,450	14.62
ED visit in which the patient was transferred to another short-term hospital	2,311,549	1.69
ED visit in which the patient died in the ED	212,095	0.15
ED visit in which patient was not admitted to the same hospital, destination unknown	232,338	0.17
ED visit in which the patient was discharged alive, destination unknown (but not admitted)	635	<0.01
Total	136,974,618	100

Abbreviation: ED, emergency department; NEDS, Nationwide Emergency Department Sample.

Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project, Nationwide Emergency Department Sample, 2022.

Appendix B: Partner-Specific Restrictions

Table B1 enumerates the types of restrictions applied to the 2022 Nationwide Emergency Department Sample. Restrictions include the following types:

- Confidentiality of hospitals
- Confidentiality of records
- Limited reporting of diagnosis codes for medical misadventures and adverse effects
- Missing discharges for specific populations of patients

Table B1. Partner-Specific Restrictions

Confidentiality of Hospitals

Limitations on sampling to ensure hospital confidentiality
• For a subset of Partners
  ○ Prior to collapsing strata: If there is a "unique" hospital in the State, it is excluded from sampling. *Unique* is defined as the only hospital in the State universe for a stratum. For example, if there is only one rural, nonteaching, trauma level III hospital in a State, then it is excluded from the sampling frame.
  ○ After sampling: Stratifier data elements are set to missing if the stratum had fewer than two hospitals in the universe of the State's hospitals.

Confidentiality of Records
Limitations on selected data elements to ensure patient confidentiality • Age (AGE) values greater than 90 are set to 90 for all NEDS records. • At least one Partner requires that ages in years (AGE) be set to the midpoints of age ranges. • At least one Partner requires that admission month (AMONTH) be set to missing on all records.
Limited Reporting of Diagnosis Codes for Medical Misadventures and Adverse Effects
• At least one Partner removes diagnosis codes for medical misadventures and adverse effects from the data files supplied to HCUP.
Missing Information for Specific Populations of Patients

• HIV
  ○ At least one Partner excludes records for HIV patients from the files provided to HCUP. Therefore, these records are not included in the NEDS.
  ○ Alternatively, at least one Partner includes records for HIV patients in the data provided to HCUP but removes the diagnosis codes identifying HIV.
• At least one Partner removes diagnosis codes from the records of children aged 18 years or younger for the following conditions: mental, behavioral, and neurodevelopmental disorders (including those related to pregnancy and childbirth and excluding those due to psychoactive substances), symptoms and signs involving emotional state (including suicide attempt), and poisoning and adverse effect of drugs and other biological substances.
• At least one Partner excludes records for patients treated in two types of alternate level of care units: skilled nursing and swing bed. Therefore, these records are not included in the NEDS.
• At least one Partner masks the type of abortion (e.g., spontaneous, legally induced) by setting all abortion-specific diagnosis and procedure codes to "unspecified" abortions.

Abbreviations: HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample.

Appendix C: NEDS Data Elements and Codes

Table C1. Data Elements in the 2022 NEDS Core File

Core File		
Type of Data Element	**HCUP Data Element**	**Coding Notes**
Admission timing	AWEEKEND	Admission on weekend: (0) admission on Monday through Friday, (1) admission on Saturday or Sunday
	AMONTH	Admission month coded from (1) January to (12) December
Age at admission	AGE	Age in years coded 0–90 years. Any ages greater than 90 were set to 90.
Diagnosis information	I10_DX1 – I10_DX40	ICD-10-CM diagnoses, with external cause of morbidity codes at the end of the array
	I10_NDX	Number of diagnoses coded on the original record received from Partner organizations
	I10_INJURY	ICD-10-CM initial injury diagnosis[a] reported: (0) no injury diagnoses reported, (1) injury is reported in first-listed diagnosis, (2) injury is reported in a diagnosis other than the first-listed diagnosis
	I10_MULTINJURY	Multiple ICD-10-CM initial injury diagnoses[a] reported: (0) one or no injury diagnosis reported, (1) more than one injury diagnosis reported, regardless of position
	I10_INJURY_CUT	External cause of morbidity codes indicating injury by cutting or piercing: (0) no injury by cutting or piercing, (1) injury by cutting or piercing
	I10_INJURY_DROWN	External cause of morbidity codes indicating injury by drowning or submersion: (0) no injury by drowning or submersion, (1) injury by drowning or submersion
	I10_INJURY_FALL	External cause of morbidity codes indicating injury by falling: (0) no injury by falling, (1) injury by falling
	I10_INJURY_FIRE	External cause of morbidity codes indicating injury by fire, flame, or hot object: (0) no injury by fire, flame, or hot object, (1) injury by fire, flame, or hot object
	I10_INJURY_FIREARM	External cause of morbidity codes indicating injury by firearm: (0) no injury by firearm, (1) injury by firearm
	I10_INJURY_MACHINERY	External cause of morbidity codes indicating injury by machinery: (0) no injury by machinery, (1) injury by machinery
	I10_INJURY_MVT	External cause of morbidity codes indicating injury involving motor vehicle traffic, including the occupant of a car, motorcyclist, pedal cyclist, pedestrian, or unspecified person: (0) no injury involving motor vehicle traffic, (1) injury involving motor vehicle traffic

Core File		
Type of Data Element	**HCUP Data Element**	**Coding Notes**
	I10_INJURY_NATURE	External cause of morbidity codes indicating injury involving natural or environmental causes, including bites and stings: (0) no injury involving natural or environmental causes, (1) injury involving natural or environmental causes
	I10_INJURY_OVEREXERTION	External cause of morbidity codes indicating injury by overexertion: (0) no injury by overexertion, (1) injury by overexertion
	I10_INJURY_POISON	External cause of morbidity codes indicating injury by poisoning: (0) no injury by poisoning, (1) injury by poisoning
	I10_INJURY_STRUCK	External cause of morbidity codes indicating injury involving being struck by or against something: (0) no injury involving being struck by or against, (1) injury involving being struck by or against
	I10_INJURY_SUFFOCATION	External cause of morbidity codes indicating injury by suffocation: (0) no injury by suffocation, (1) injury by suffocation
	I10_INTENT_ASSAULT	External cause of morbidity codes indicating injury by assault: (0) no injury by assault, (1) injury by assault
	I10_INTENT_SELF_HARM	External cause of morbidity codes indicating intended self harm: (0) not intended self harm, (1) intended self harm
	I10_INTENT_UNINTENTIONAL	External cause of morbidity codes indicating injury was unintentional: (0) no unintentional injury, (1) unintentional injury
Discharge timing	DQTR	Discharge quarter coded: (1) January–March, (2) April–June, (3) July–September, (4) October–December
	YEAR	Calendar year of ED visits
Disposition of patient from the ED	DISP_ED	Disposition from ED: (1) routine; (2) transfer to short-term hospital; (5) other transfers, including skilled nursing facility, intermediate care, and another type of facility; (6) home health care; (7) against medical advice; (9) admitted as an inpatient to this hospital; (20) died in ED; (21) discharged/transferred to court/law enforcement; (98) not admitted, destination unknown; (99) discharged alive, destination unknown (but not admitted)
	DIED_VISIT	Died in ED: (0) did not die, (1) died in the ED, (2) died in the hospital

Core File		
Type of Data Element	**HCUP Data Element**	**Coding Notes**
ED event	EDevent	Type of ED event: (1) ED visit in which the patient is treated and released, (2) ED visit in which the patient is admitted to the same hospital, (3) ED visit in which the patient is transferred to another short-term hospital, (9) ED visit in which the patient died in the ED, (98) ED visits in which patient was not admitted, destination unknown, (99) ED visit in which patient was discharged alive, destination unknown (but not admitted)
Sex of patient	FEMALE	Indicates sex: (0) male, (1) female
Race and ethnicity of patient	RACE	Race, uniform coding: (1) White, (2) Black, (3) Hispanic, (4) Asian or Pacific Islander, (5) Native American, (6) Other. (For 2020, RACE contains missing values on just 2.2 percent of the records.)
Urban-rural location of the patient's residence	PL_NCHS	Urban-rural designation for patient's county of residence: (1) large central metropolitan, (2) large fringe metropolitan, (3) medium metropolitan, (4) small metropolitan, (5) micropolitan, (6) not metropolitan or micropolitan
National quartile for median household income of patient's ZIP Code	ZIPINC_QRTL	Median household income quartiles for patient's ZIP Code. For 2022, the median income quartiles are defined as: (1) $1–$55,999; (2) $56,000– $70,999; (3) $71,000–$93,999; and (4) $94,000 or more
Payer information	PAY1	Expected primary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other
	PAY2	Expected secondary payer, uniform: (1) Medicare, (2) Medicaid, (3) private including HMO, (4) self-pay, (5) no charge, (6) other
Total ED charges	TOTCHG_ED	Total charges for ED services, edited
HCUP source file	HCUPFILE	Source of HCUP record: (SEDD) from SEDD file, (SID) from SID file
Discharge weight	DISCWT	Discharge weight used to calculate national estimates. Weights ED visits to AHA universe.
NEDS hospital identifier, synthetic	HOSP_ED	Unique HCUP NEDS hospital number—links to NEDS Hospital Weights file, but not to other HCUP databases
NEDS stratum	NEDS_STRATUM	Stratum used to sample hospitals, based on geographic region, trauma, location/teaching status, and control. Stratum information is also contained in the Hospital Weights File.

Core File		
Type of Data Element	**HCUP Data Element**	**Coding Notes**
Record identifier, synthetic	KEY_ED	Unique HCUP NEDS record number—links to NEDS Supplemental Files but not to other HCUP databases

Abbreviations: ED, emergency department; HCUP, Healthcare Cost and Utilization Project; HMO, health maintenance organization; ICD-10-CM, International Classification of Diseases, Tenth Revision, Clinical Modification; NEDS, Nationwide Emergency Department Sample; SEDD, State Emergency Department Databases; SID, State Inpatient Databases.

Notes: For data years prior to 2022, refer to the NEDS Description of Data Elements page on the HCUP-US website or to previous versions of the Introduction to the NEDS.

[a] Injuries are identified by diagnosis codes in the Clinical Classifications Software Refined for ICD-10-CM categories of INJ001-INJ027 and INJ032. Injuries are limited to the initial encounter with a 7th character of A, B, C, or missing.

Table C2. Data Elements in the 2022 NEDS Supplemental ED File

Type of Data Element	HCUP Data Element	Coding Notes
CPT procedure information	CPT1–CPT50	CPT procedures performed in the ED
	CPTCCS1–CPTCCS50	Clinical Classifications Software category for all CPT procedures
	NCPT	Number of procedures coded on the original record. A maximum of 50 CPT codes are retained on the NEDS.
NEDS hospital identifier, synthetic	HOSP_ED	Unique HCUP NEDS hospital number—links to NEDS Hospital Weights File but not to other HCUP databases
Record identifier, synthetic	KEY_ED	Unique HCUP NEDS record number—links to NEDS Supplemental Files but not to other HCUP databases

Abbreviations: CPT, Current Procedural Terminology; ED, emergency department; HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample.

Notes: For data years prior to 2022, refer to the NEDS Description of Data Elements page on the HCUP-US website or to previous versions of the Introduction to the NEDS.

Table C3. Data Elements in the 2022 NEDS Supplemental Inpatient File

Type of Data Element	HCUP Data Element	Coding Notes
Disposition of patient from the hospital	DISP_IP	Disposition from hospital admission: (1) routine; (2) transfer to short-term hospital; (5) other transfers, including skilled nursing facility, intermediate care, and another type of facility; (6) home health care; (7) against medical advice; (20) died in hospital; (99) discharged alive, destination unknown
Diagnosis-related group (DRG)	DRG	DRG in use on discharge date
	DRG_NoPOA	DRG assignment made without the use of the present on admission flags for the diagnoses
	DRGVER	Grouper version in use on discharge date
	MDC	Major diagnostic category (MDC) in use on discharge date
	MDC_NoPOA	MDC in use on discharge date, calculated without the use of the present on admission flags for the diagnoses
Length of hospital inpatient stay	LOS_IP	Length of stay, edited
Total charges for inpatient stay	TOTCHG_IP	Total charges for ED and inpatient services, edited
ICD-10-PCS procedure information	I10_PR_IP1 – I10_PRI_IP15	ICD-10-PCS procedures coded on ED admissions. Procedure may have been performed in the ED or during the hospital stay.
	I10_NPR_IP	Number of procedures coded on the original record.
Data elements derived from the HCUP Software Tools for ICD-10-PCS	PCLASSn[1]	Procedure Classes Refined for ICD-10-PCS procedure codes
	PCLASS_VERSION	Version of the Procedure Classes Refined for ICD-10-PCS procedure codes
	PRCCSR_aaannn[2]	Indication that at least one ICD-10-PCS procedure on the record is included in the Clinical Classification Software Refined (CCSR) aaannn
	PRCCSR_VERSION	Version of CCSR for ICD-10-PCS procedure codes
NEDS hospital identifier, synthetic	HOSP_ED	Unique HCUP NEDS hospital number—links to NEDS Hospital Weights File but not to other HCUP databases
Record identifier, synthetic	KEY_ED	Unique HCUP NEDS record number—links to NEDS Supplemental Files but not to other HCUP databases

Abbreviations: ED, emergency department; HCUP, Healthcare Cost and Utilization Project; ICD-10-PCS, International Classification of Diseases, Tenth Revision, Procedure Coding System; NEDS, Nationwide Emergency Department Sample

Notes: For data years prior to 2022, refer to the NEDS Description of Data Elements page on the HCUP-US website or to previous versions of the Introduction to the NEDS.

[1] PCLASS_IPn was available on the NEDS through quarter 3 of data year 2015 and was specific to the coding of ICD-9-CM procedures.
[2] Where aaa denotes the clinical domain and nnn denotes the CCSR number within the clinical domain.

Table C4. Data Elements in the 2022 NEDS Hospital Weights File

Type of Data Element	HCUP Data Element	Coding Notes
Discharge counts	N_DISC_U	Number of AHA universe ED visits in the stratum
	S_DISC_U	Number of sampled ED visits in the sampling stratum
	TOTAL_EDvisits	Total number of ED visits for this hospital in the NEDS
Weights	DISCWT	Discharge weight used to calculate national estimates. Weights ED visits to AHA universe.
	HOSPWT	Weight to hospital-owned EDs in AHA universe (i.e., total U.S.)
Discharge year	YEAR	Discharge year
Hospital counts	N_HOSP_U	Number of AHA universe hospital-owned EDs in the stratum
	S_HOSP_U	Number of sampled hospital-owned EDs in the stratum
NEDS hospital identifier, synthetic	HOSP_ED	Unique HCUP NEDS hospital number—links to NEDS Hospital Weights file, but not to other HCUP databases
Hospital characteristics	HOSP_URCAT4	Hospital urban-rural location: (1) large metropolitan areas with at least 1 million residents; (2) small metropolitan areas with less than 1 million residents; (3) micropolitan areas; (4) not metropolitan or micropolitan; (6) collapsed category of any urban-rural location; (7) collapsed category of small metropolitan and micropolitan; (8) metropolitan, collapsed category of large and small metropolitan; (9) nonmetropolitan, collapsed category of micropolitan and rural
	HOSP_CONTROL	Control/ownership of hospital: (0) government or private, collapsed category, (1) government, non-Federal, public, (2) private, nonprofit, voluntary, (3) private, invest-own, (4) private, collapsed category
	HOSP_REGION	Region of hospital: (1) Northeast, (2) Midwest, (3) South, (4) West
	HOSP_TRAUMA	Trauma center level: (0) nontrauma center, (1) trauma level I, (2) trauma level II, (3) trauma level III, (4) nontrauma or trauma level III, collapsed category beginning in the 2011 NEDS, (8) trauma level I or II, collapsed category, (9) trauma level I, II, or III, collapsed category in the 2006–2010 NEDS. Children's hospitals with trauma centers are classified with adult/pediatric trauma centers.
	HOSP_UR_TEACH	Teaching status of hospital: (0) metropolitan nonteaching, (1) metropolitan teaching, (2) nonmetropolitan
	NEDS_STRATUM	Stratum used to sample EDs, includes geographic region, trauma, location/teaching status, and control

Abbreviations: AHA, American Hospital Association; ED, emergency department; HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample

For data years prior to 2022, refer to the NEDS Description of Data Elements page on the HCUP-US website or to previous versions of the Introduction to the NEDS.

Table C5. Data Elements in the 2022 NEDS Diagnosis and Procedure Groups File

Type of Data Element	HCUP Data Element	Coding Notes
Clinical Classifications Software Refined (CCSR) for ICD-10-CM diagnoses	DXCCSR_aaannn[3]	Indication that at least one ICD-10-CM diagnosis on the record is included in CCSR AAAnnn
	DXCCSR_Default_DX1	Default CCSR for principal/first-listed ICD-10-CM diagnosis
	DXCCSR_VERSION	Version of CCSR for ICD-10-CM diagnoses
Elixhauser Comorbidity Software Refined for ICD-10-CM	CMR_aaa[4]	Comorbidity measures (aaa) identified by the AHRQ Elixhauser Comorbidity Software Refined for ICD-10-CM diagnosis codes
	CMR_VERSION	Version of the Elixhauser Comorbidity Measure Refined for ICD-10-CM
NEDS identifiers, synthetic	HOSP_ED	Unique HCUP NEDS hospital number—links to NEDS Hospital Weights File but not to other HCUP databases
	KEY_ED	Unique HCUP NEDS record number—links to NEDS Core and Supplemental Files but not to other HCUP databases

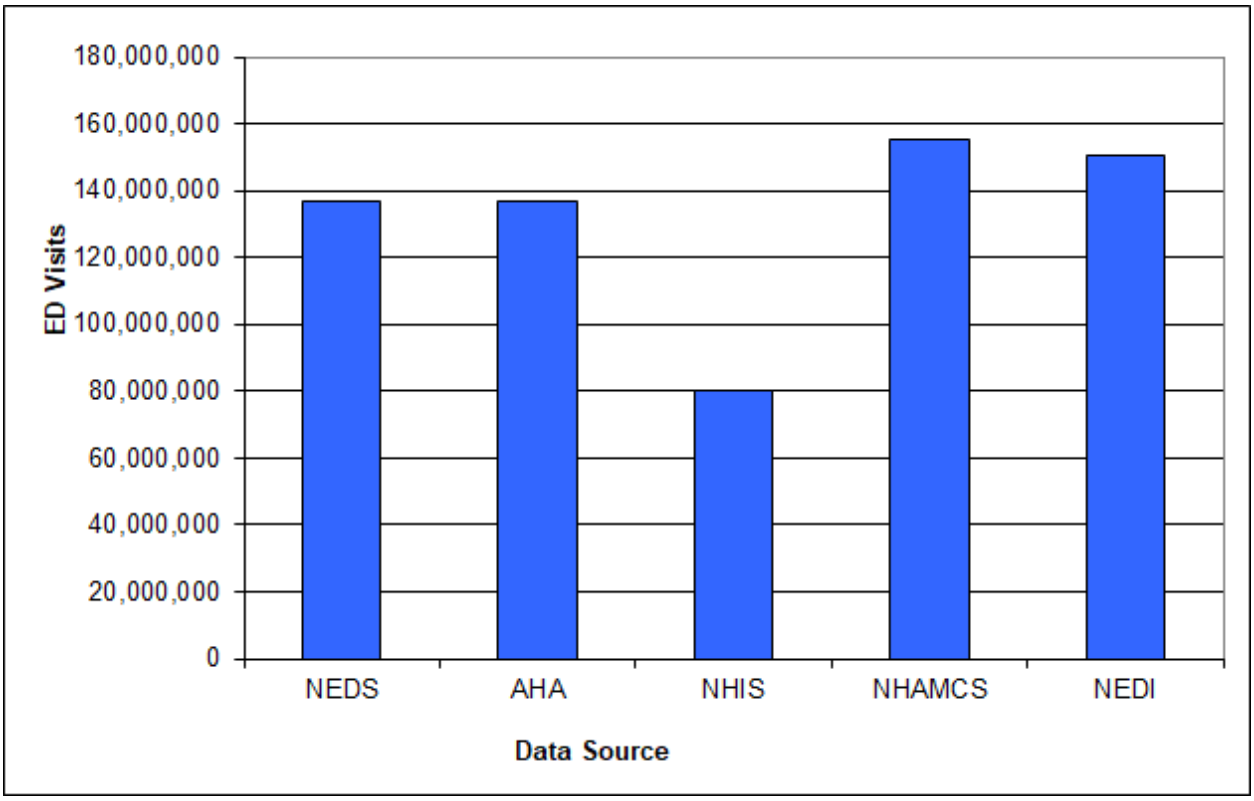
Abbreviations: AHA, American Hospital Association; ED, emergency department; HCUP, Healthcare Cost and Utilization Project; NEDS, Nationwide Emergency Department Sample

For data years prior to 2022, refer to the NEDS Description of Data Elements page on the HCUP-US website or to previous versions of the Introduction to the NEDS.

[3] Where aaa denotes the body system and nnn denotes the CCSR number within the body system.
[4] Where aaa denotes the specific comorbidity measure.

Appendix D: Comparisons of the NEDS With Other Sources of ED Data

Figure D1. Number of Emergency Department (ED) Visit in the U.S., by Data Source, 2022



Abbreviations: NEDS, Nationwide Emergency Department Sample; AHA, American Hospital Association Annual Survey Database; NHIS, National Health Interview Survey; NHAMCS, National Hospital Ambulatory Medical Care Survey; NEDI, National Emergency Department Inventory

Table D1. Number and Percent of Emergency Department (ED) Visits in the U.S., by Census Region and Data Source, 2022

Region	NEDS[1]		AHA		NHIS[2]		NHAMCS	
	Number of Visits (weighted)	Percent of Visits	Number of Visits	Percent of Visits	Number of Visits	Percent of Visits	Number of Visits	Percent of Visits
Northeast	24,417,279	17.8	24,417,279	17.8	13,273,694	16.6	25,143.149	16.2
Midwest	30,299,023	22.1	30,299,023	22.1	16,485,712	20.6	33,576,551	21.6
South	55,130,029	40.2	55,130,029	40.2	32,979,869	41.2	61,812,025	39.8
West	27,128,287	19.8	27,128,287	19.8	17,393,707	21.7	34,866,022	22.4
Total U.S.	136,974,618	100.0	136,974,618	100.0	80,132,982	100.0	155,397,747	100.0

Abbreviations: NEDS, Nationwide Emergency Department Sample; AHA, American Hospital Association Annual Survey Database; NHIS, National Health Interview Survey; NHAMCS, National Hospital Ambulatory Medical Care Survey.

[1] NEDS weighted counts by geographic region exactly match the AHA counts because the AHA data were used as control totals for the NEDS discharge weights.

[2] NHIS estimates were calculated using the values provided in the survey (0, 1, 2, 3, 4+). For the upper range of visits in the survey (4 or more ED visits), 4 ED visits were used for the estimate.

Table D2. Distribution of Hospital-Owned Emergency Departments (ED) by Number of Visits, NEDS and AHA, 2022

Volume of ED Visits	NEDS		AHA	
	Number of EDs (weighted)	Percent of EDs	Number of EDs	Percent of EDs
Less than 10,000 visits	1,409	31.2	1,593	35.3
10,000 - 19,999 visits	792	17.6	764	16.9
20,000 - 29,999 visits	595	13.2	531	11.8
30,000 - 39,999 visits	482	10.7	427	9.5
40,000 - 49,999 visits	372	8.2	315	7.0
50,000 or more visits	864	19.1	885	19.6
All Hospital-based EDs	4,515	100.0	4,515	100.0

Abbreviations: NEDS, Nationwide Emergency Department Sample; AHA, American Hospital Association Annual Survey Database.

Table D3. Number of and Percent of ED Visits Resulting in Inpatient Admission in the U.S., by Census Region, NEDS and NHAMCS, 2022

Region	NEDS			NHAMCS		
	Number of ED Visits (weighted)	Number of ED Visits Resulting in Admission (weighted)	Percent of ED Visits Resulting in Admission	Number of ED Visits	Number of ED Visits Resulting in Admission	Percent of ED Visits Resulting in Admission
Northeast	24,417,279	4,116,728	16.9	25,143,149	4,152,082	16.5
Midwest	30,299,023	3,875,065	12.8	33,576,551	4,802,357	14.3
South	55,130,029	8,369,886	15.2	61,812,025	5,072,598	8.2
West	7,128,287	3,669,771	13.5	34,866,022	3,776,444	10.8
Total U.S.	136,974,618	**20,031,450**	**14.6**	**155,397,747**	**17,803,480**	**11.5**

Abbreviations: NEDS, Nationwide Emergency Department Sample; NHAMCS, National Hospital Ambulatory Medical Care Survey.

Table D4. Number of Injuries by Type of Injury-Related ED Visit, NEDS and NEISS-AIP, 2022

Type of Injury-Related- ED Visit	NEDS (All Injuries)		NEDS (Initial Encounter for Injuries)[a]		NEISS-AIP[b]	
	Number of Visits (weighted)	95% CI	Number of Visits (weighted)	95% CI	Number of Visits (weighted)	95% CI
Total number of ED visits for nonfatal injuries	25,764,863	(24,769,652 – 26,760,074)	25,082,922	(24,115,086 – 26,050,757)	26,564,105	(22,510,000 – 30,610,000)
Treated and released from ED	22,230,281	(21,367,685 – 23,092,878)	21,690,227	(20,848,700 – 22,531,754)	21,583,048	(18,310,000 – 24,850,000)
Admitted to the same hospital	2,762,042	(2,590,916 – 2,933,168)	2,634,218	(2,469,978 – 2,798,458)	3,283,414	(2,340,000 – 4,220,000)
Transferred	479,965	(454,952 – 504,977)	473,945	(449,226 – 498,664)	572,250	(466,435 – 678,065)
Other[3]	292,575	(268,291 – 316,859)	284,532	(261,292 – 307,772)	1,125,393	(767,560 – 1,480,000)

Abbreviations: NEDS, Nationwide Emergency Department Sample; NEISS-AIP, National Electronic Injury Surveillance System All-Injury Program, CI, confidence interval.

[a] Injuries are identified by diagnosis codes in the Clinical Classifications Software Refined for ICD-10-CM categories of INJ001-INJ027 and INJ032. Initial encounters are limited to diagnoses with a 7th character of A, B, C, or missing.

Counts for all injuries allowed any 7th character for the injury diagnosis code; counts for the initial encounter limited injury diagnosis codes to those with a 7th character of A, B, C, or missing.

[b] Data from the Web-based Injury Statistics Query and Reporting System (WISQARS™) (https://webappa.cdc.gov/sasweb/ncipc/nfirates.html). Includes nonfatal, all-cause injuries . Patients who died on arrival to the ED or during treatment in the ED are excluded. Queried on October 23, 2024.

[b] For the NEISS-AIP, other includes left against medical advice, sent for observations, and unknown destination.