

Descriptive statistics and disease prevalence validation of an electronic health record data collective across 30+ US health systems

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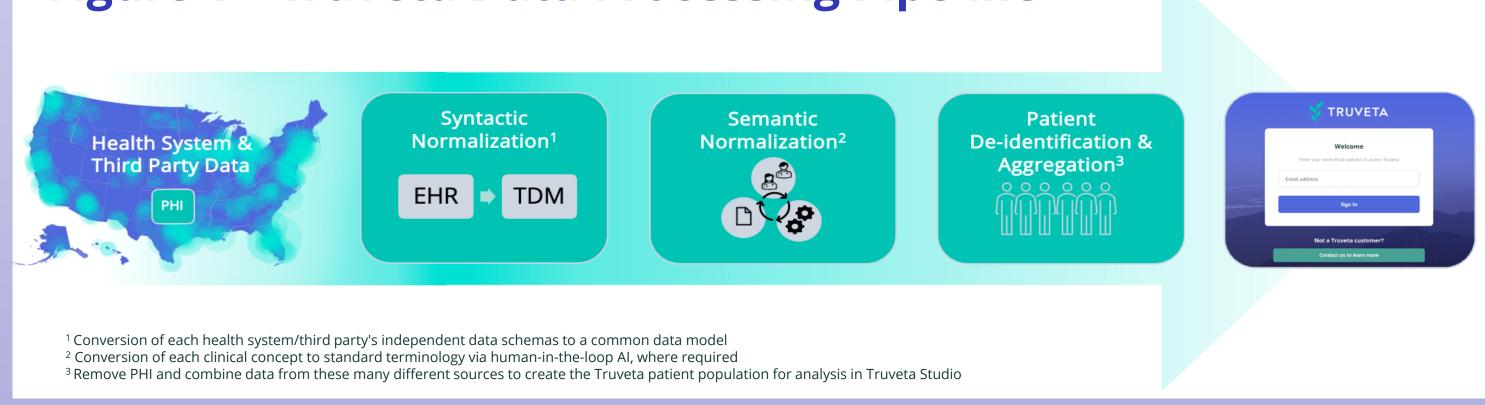
Background

Truveta is a collective of more than 30 member health systems in the United States with a goal of enabling scientifically rigorous research across all disease areas, treatments, and devices. Truveta normalizes complete electronic health record (EHR) data to a common schema referred to as the Truveta Data Model (TDM). Truveta provides access to linked EHR data that is updated daily and enriched with third-party claims, social drivers of health, and mortality data. Through Truveta Studio, Truveta's data analytics platform, users can define their patient cohorts of interest and perform detailed analyses (Figure 1).

Objective

• To provide an overview of Truveta Data via descriptive statistics and to validate the 2023 prevalence of four chronic conditions in Truveta Data to that of other published sources.

Figure 1 – Truveta Data Processing Pipeline



Methods

- Two analyses of all patients in Truveta Data were performed using Truveta Studio.
- A descriptive analysis was performed to examine demographic trends, clinical history, income, and payer type to understand dataset representativeness.
- The prevalences of asthma, chronic obstructive pulmonary disease (COPD), type 2 diabetes (T2D), and heart failure in the Truveta population were also evaluated by dividing the number of patients with condition by number of patients with ≥1 encounter in 2023.
- Prevalences were juxtaposed against 5 results from other established data sources to validate Truveta's results.
- These analyses reflect the Truveta Data as of January 3, 2024. They included data from Truveta member health systems representing over 112 million total patients in the United States (US).

References

- 1. Pate CA, Zahran HS, Bailey CM. "Impaired health-related quality of life and related risk factors among US adults with asthma." *Journal of Asthma.* 2019 Apr;56(4):431-439. DOI: 10.1080/02770903.2018.1466314. PMID: 29667453; PMCID: PMC7202887.

 2. Liu Y, Carlson SA, Watson KB, Xu F, Greenlund KJ. "Trends in the Prevalence of Chronic Obstructive Pulmonary Disease Among Adults Aged ≥18 Years United States, 2011–2021." *MMWR Morbidity and Mortality Weekly Report.* 2023;72:1250–1256. DOI: http://dx.doi.org/10.15585/mmwr.mm7246a1.
- 3. Zhou Y, Liu Y. "Recent trends in current asthma prevalence among US adults, 2009-2018." *Journal of Allergy and Clinical Immunology: In Practice.* 2020 Sep;8(8):2814-2816. DOI: 10.1016/j.jaip.2020.04.041. PMID: 32353605.

 4. Oraka E, King ME, Callahan DB. "Asthma and serious psychological distress: prevalence and risk factors among US adults, 2001-2007." *Chest.* 2010 Mar;137(3):609-16. DOI: 10.1378/chest.09-1777. PMID: 19837824.
- 4. Oraka E, King ME, Callahan DB. "Asthma and serious psychological distress: prevalence and risk factors among US adults, 2001-2007." *Chest.* 2010 Mar;137(3):609-16. DOI: 10.1378/chest.09-1777. PMID: 19837824.

 5. Nurmagambetov T, Kuwahara R, Garbe P. "The Economic Burden of Asthma in the United States, 2008-2013." *Annals of the American Thoracic Society.* 2018 Mar;15(3):348-356. DOI: 10.1513/AnnalsATS.201703-259OC. PMID: 2932393
- 7. American Lung Association. (n.d.). COPD Prevalence. Lung.org. https://www.lung.org/research/trends-in-lung-disease/copd-trends-brief/copd-prevalence

 8. Safiri S, Carson-Chahhoud K, Noori M, Nejadghaderi SA, Sullman MJM, Ahmadian Heris J, Ansarin K, Mansournia MA, Collins GS, Kolahi AA, Kaufman JS. "Burden of chronic obstructive pulmonary disease and its attributable risk factors in 204 countries and territories, 1990-2019: results from the Global Burden of Disease Study 2019."
- *BMJ.* 2022 Jul 27;378:e069679. DOI: 10.1136/bmj-2021-069679. PMID: 35896191; PMCID: PMCD: PMCD:
- 10. Syamilai G, Doney B, Hendricks S, Mazurek JM. "Chronic Obstructive Pulmonary Disease and U.S. Workers: Prevalence, Irends, and Attributable Cases Associated With Work." *American Journal of Preventive Medicine.* 2021 Sep;61(3):e127-e137. DOI: 10.1016/j.amepre.2021.04.011. PMID: 34419236; PMCID: PMC8672326.

 11. Ward BW, Nugent CN, Blumberg SJ, Vahratian A. "Measuring the Prevalence of Diagnosed Chronic Obstructive Pulmonary Disease in the United States Using Data From the 2012-2014 National Health Interview Survey." *Public Health Reports.* 2017 Mar/Apr;132(2):149-156. DOI: 10.1177/0033354916688197. PMID: 28135423 PMCID: PMC5349479
- PMCID: PMC5349479.

 12. Centers for Disease Control and Prevention (CDC). "Chronic obstructive pulmonary disease among adults---United States, 2011." *MMWR. Morbidity and Mortality Weekly Report.* 2012 Nov 23;61(46):938-43. PMID: 23169314.
- 12. Centers for Disease Control and Prevention (CDC). "Chronic obstructive pulmonary disease among adults--United States, 2011." *MMWR. Morbidity and Mortality weekly Report. 2012 Nov 23;61(46):938-43. PMID: 23169314.

 13. Siontis GC, Bhatt DL, Patel CJ. "Secular Trends in Prevalence of Heart Failure Diagnosis over 20 Years (from the US NHANES)." *The American Journal of Cardiology. * 2022 Jun 1;172:161-164. DOI: 10.1016/j.amjcard.2022.02.037. PMID: 35361480; PMCID: PMC9277570.
- 15. Ruiz-García A, Serrano-Cumplido A, Escobar-Cervantes C, et al. "Heart Failure Prevalence Rates and Its Association with Other Cardiovascular Diseases and Chronic Kidney Disease: SIMETAP-HF Study." *Journal of Clinical Medicine.* 2023 Jul 26;12(15):4924. DOI: 10.3390/jcm12154924. PMID: 37568326; PMCID: PMC10419820.

 16. Rethy L, Petito LC, Vu THT, et al. "Trends in the Prevalence of Self-reported Heart Failure by Race/Ethnicity and Age From 2001 to 2016." *JAMA Cardiology.* 2020 Dec 1;5(12):1425-1429. DOI: 10.1001/jamacardio.2020.3654. PMID: 32876652; PMCID: PMC7489385.
- 10.1161/CIRCHEARTFAILURE.117.004402. PMID: 29129828; PMCID: PMC6057614.

 18. Centers for Disease Control and Prevention. *National Diabetes Statistics Report* website. [https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/https://www.cdc.gov/diabetes/data/statistics-report/index.html]/h
- 18. Centers for Disease Control and Prevention. *National Diabetes Statistics Report* website. [https://www.cdc.gov/diabetes/data/statistics-report/index.html](https://www.cdc.gov/diabetes/data/statistics-report/index.html](https://www.cdc.gov/diabetes/data/statistics-report/index.html). Accessed [3/29/2024].

 19. American Diabetes Association. *Statistics About Diabetes* website. [https://diabetes.org/about-diabetes/statistics/ab

23. Cheng YJ, Kanaya AM, Araneta MRG, et al. "Prevalence of Diabetes by Race and Ethnicity in the United States, 2011-2016." *JAMA.* 2019 Dec 24;322(24):2389-2398. DOI: 10.1001/jama.2019.19365. PMID: 31860047; PMCID: PMC69906

- 19. American Diabetes Association. *Statistics About Diabetes* website. [https://diabetes.org/about-diabetes/statistics/about-diabetes/statistics/about-diabetes). Accessed [3/29/2024].
 20. Khan MAB, Hashim MJ, King JK, et al. "Epidemiology of Type 2 Diabetes Global Burden of Disease and Forecasted Trends." *Journal of Epidemiology and Global Health.* 2020 Mar;10(1):107-111. DOI: 10.2991/jegh.k.191028.001. PMID: 32175717; PMCID: PMC7310804.
- 21. Xu G, Liu B, Sun Y, et al. "Prevalence of diagnosed type 1 and type 2 diabetes among US adults in 2016 and 2017: population based study." *BMJ.* 2018 Sep 4;362:k1497. DOI: 10.1136/bmj.k1497. PMID: 30181166; PMCID: PMC6122253.

 22. German, Jashalynn, and Estelle Everett. "Epidemiology of Type 2 Diabetes." *Johns Hopkins Diabetes Guide,* 2020. Johns Hopkins Guides, [www.hopkinsguides.com/hopkins/view/lohns Hopkins Diabetes Guide/547049/all/Epidemiology of Type 2 Diabetes](www.hopkinsguides.com/hopkins/view/lohns Hopkins Diabetes).

Table 1 – Summary of Truveta patient and record counts

TDM Table	Patients, Millions (n= 112,220,373)	Records, Billions
Observation	66	32
Lab Result	58.2	12
Condition	81.4	7.3
Medication Dispense	31.4	6
Medication Administration	47.1	4
Medication Request	66.6	3
Procedure	46.7	3
Immunization	32	0.3
Device Use	6	0.1

Figure 2 - Clinical history, payer type and income distribution

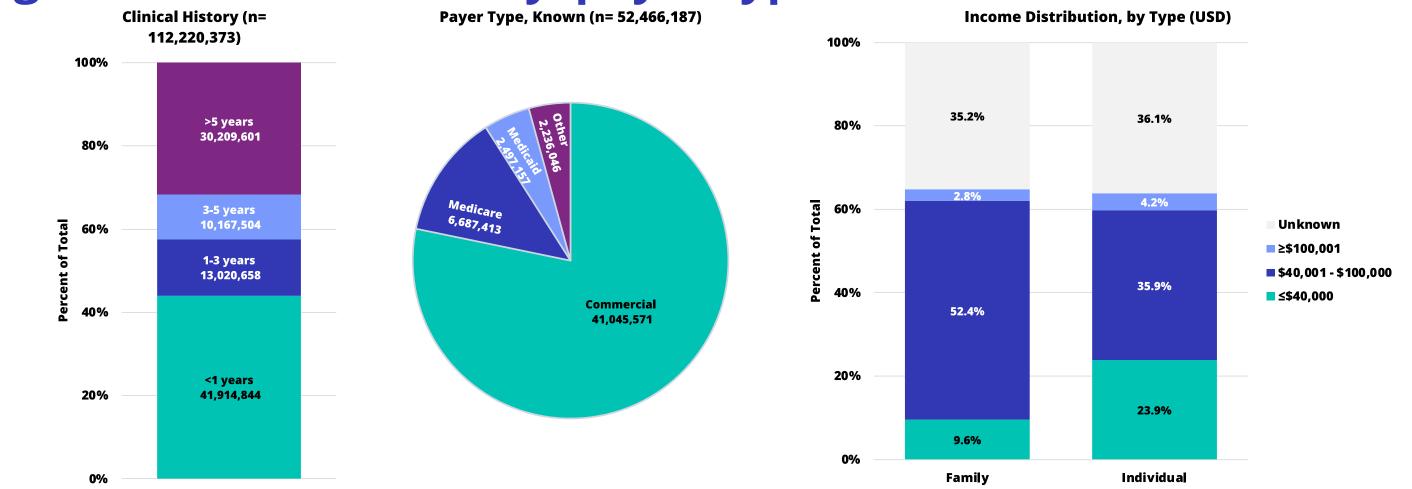
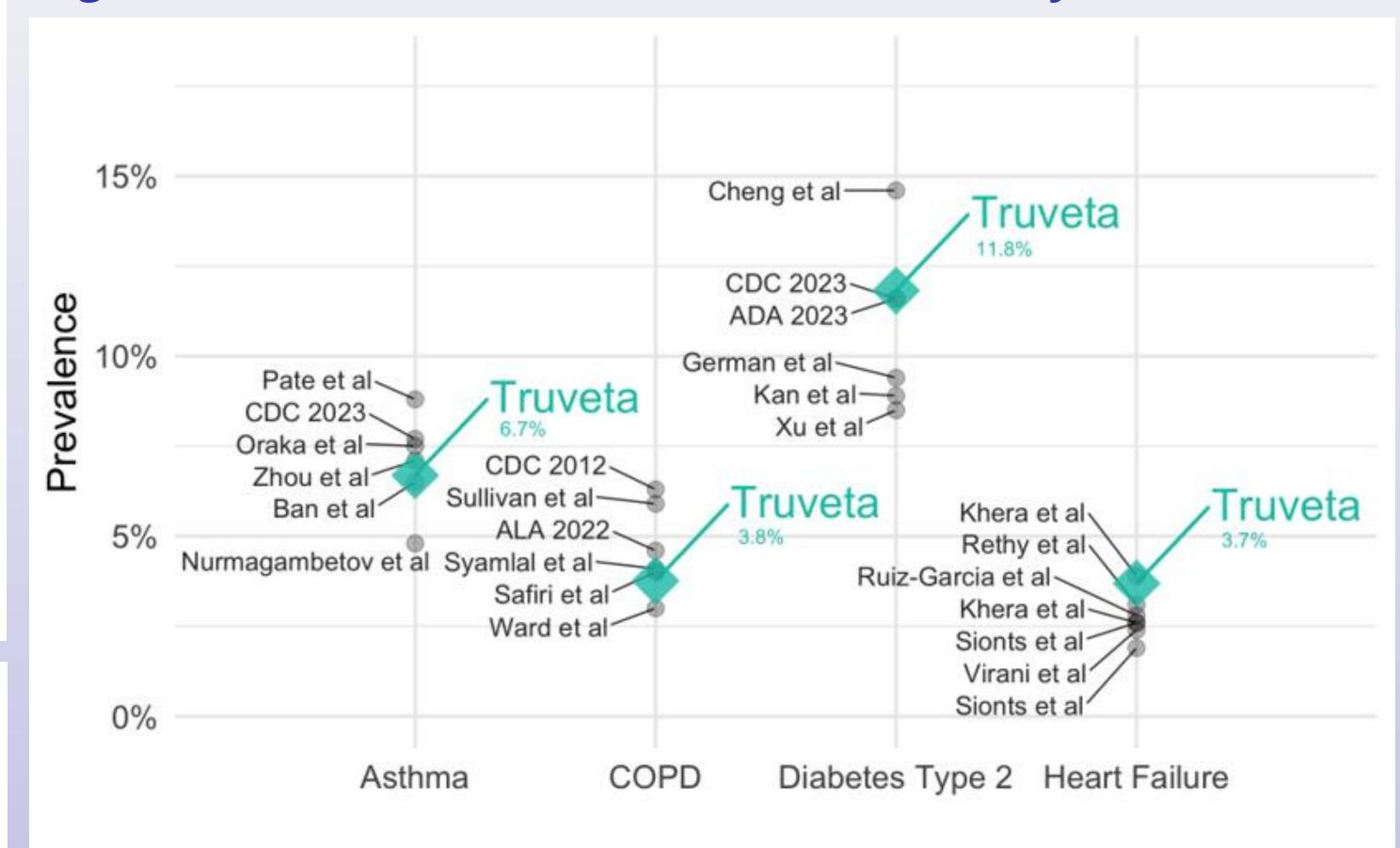


Table 2 – Truveta patient characteristics

	(n= 112,220,373)	Total
Gender		
Female	60,792,773	54.2%
Male	50,852,352	45.3%
Unknown/Other	575,248	0.5%
Race		
White	58,566,140	52.2%
Asian	3,715,975	3.3%
Black or African American	12,680,753	11.3%
Native Hawaiian or Other Pacific Islander	419,100	0.4%
American Indian or Alaska Native	444,763	0.4%
Unknown/Other	36,393,642	32.4%
Ethnicity		
Hispanic or Latino	12,101,704	10.8%
Not Hispanic or Latino	68,149,864	60.7%
Unknown/Other	31,968,805	28.5%
Age		
<18	16,168,762	14.4%
18 – 49	39,439,269	35.1%
50 – 64	18,652,913	16.6%
65 – 79	15,114,029	13.5%
80+	5,937,634	5.3%
US Region		
Midwest	24,558,808	21.9%
Northeast	11,987,703	10.7%
South	44,451,464	39.6%
West	21,838,004	19.5%

Figure 3 – Prevalence of common conditions, by source



Results

Percent of

Number

Patient characteristics

- As of January 2024, data from >112 million patients was available for analysis, including 12 billion lab records and 32 billion observation records (Table 1).
- Patients were predominantly female (54.2%), white (52.2%), and non-Hispanic or Latino (60.7%). More than one-third of patients (35.1%) were 18–49 years of age and 14.4% were minors (<18 years old) (Table 2)
- 36.6% of patients carried commercial insurance. 35.9% and 52.4% had individual and family income between \$40K and \$100K, respectively (Figure 2).

Prevalence results

• Prevalence of common conditions among the patient population compares to CDC and other published resources, including asthma (Truveta=6.7%, others=7%-8%), COPD (Truveta=3.8%, others=3.3%-6.5%), T2D (Truveta=11.8%, others=10%-11.6%), and heart failure (Truveta=3.7%, others=1.9%-2.6%) (Figure 3).

Conclusions

- Truveta Data contains complete health information for a large cohort of patients.
- Truveta's patients are diverse across demographics and social drivers of health.
- Observed disease prevalence is comparable to government-reported and peer-reviewed resources, validating Truveta's representativeness.

