



## MURDOCK STUDY

Managed by  Duke Clinical & Translational Science Institute

The MURDOCK Study Community Registry and Biorepository is a 12,526-participant community-based longitudinal cohort recruited from a 20-Zip Code region in the Southeastern United States (U.S.) that is centered in the city of Kannapolis, NC and encompasses Cabarrus County, NC.

Creation of the cohort was funded by a gift to Duke University from the David H. Murdock Institute for Business and Culture, with operational support from Duke's Clinical and Translational Science Award (CTSA) grant (UL1TR002553) and the Duke Clinical and Translational Science Institute (CTSI).

Consenting participants complete a baseline health questionnaire at enrollment, as well as a brief physical exam and collection of blood and urine. Consent includes permission to access to information from medical records, storage of collected samples in the biorepository, access to collected data and biospecimens for future approved research studies and contact regarding new research study opportunities.

“Storefronts” summarize characteristics of a population of research interest as well as available data and samples for that population. This storefront presents data that may be used for future research or otherwise to identify cohorts of interests with data related to COVID research use cases.

The **MURDOCK COVID STOREFRONT** presents data from three (3) sources: 1) a sponsored research study that recruited MURDOCK participants and followed them over time, 2) a COVID-specific survey sent to all MURDOCK Study participants, and 3) data from available electronic health record (EHR) data related to COVID. The three data sources are described in further detail below, in boxes corresponding to the same color coding used in the storefront to differentiate the different data.

The **MURDOCK Cabarrus County COVID-19 Prevalence and Immunity (C3PI) Study** was launched in June 2020. The C3PI Study was as a partnership with the N.C. Department of Health and Human Services (NCDHHS) to understand COVID-19 prevalence and immunity in the community and to monitor the disease over time.

The C3PI Study enrolled 1,410 participants from the MURDOCK Study between June 2020 and August 2020. Once enrolled, participants were asked to complete a baseline survey and biweekly surveys for up to a total follow-up of 74 weeks (December 2021). Included in the surveys were questions regarding demographic, socioeconomic, employment, and clinic data, as well as pandemic-specific data, including use of mitigation behaviors, participant perceptions, intent to receive COVID-19 vaccination when a vaccine became available, and vaccination data (date/s of initial vaccination/vaccination series and any boosters and type of vaccine administered).

The study included a nested, weighted, random sample (N=300) of participants that did biweekly SARS-CoV-2 reverse transcriptase-polymerase chain reaction (RT-PCR) testing, and every other month serum sampling for SARS-CoV-2 IgG antibodies during the initial study period (June 2020-April 2021) and monthly during a study extension (May 2021-December 2021).

A one-time **MURDOCK COVID Survey** was sent to all enrolled, living participants with an active email address in March 2023. Reminders were sent to non-responders via email and text. The goal of the survey was to collect information about COVID and the pandemic on all MURDOCK Study participants, regardless of whether or not they enrolled in the C3PI Study.

A total of 2,051 participants completed the survey, which collected information on COVID testing, infection(s), and vaccination, as well as behaviors and impact related to the pandemic.

Duke has partnered with regional healthcare providers to integrate data from **electronic health record (EHR)** systems for consented MURDOCK Study participants. Participants are identified in EHR systems with robust matching algorithms using common identifiers from the MURDOCK and EHR databases. Data are transferred under a data use agreement (DUA) with the specific provider organization which specifies the scope of data and frequency of transfers. Data availability vary by participant and depend on whether or not a participant has had one or more encounters with the healthcare provider system during the time period included in the dataset.

Available EHR data were queried to quantify unique participants with evidence of COVID infections via diagnosis codes, as well as by encounter types.

Sources of COVID data may be used independently or otherwise integrated as summarized in the first page of the COVID storefront. Samples collected at the time of enrollment in MURDOCK are available for analysis and summarized also.

**COVID Research & Available Data for MURDOCK Study Participants N=3,489**

**MURDOCK participants with COVID data, by source**

C3PI Study	1,410 (11%)
COVID Survey	2,051 (17%)
EHR Data	1,206 (10%)
<b>Unique participants with COVID data</b>	<b>3,489 (28%)</b>
<i>Percentages based on total MURDOCK Study population (N=12,417)</i>	

**Participant vital status**

Alive	3,446 (99%)
Deceased	43 (1%)

Age	at MURDOCK enrollment	Current
Median (25 <sup>th</sup> , 75 <sup>th</sup> )	53 (42, 62)	65 (55, 74)
Min, Max	<18, 89	26, 90+

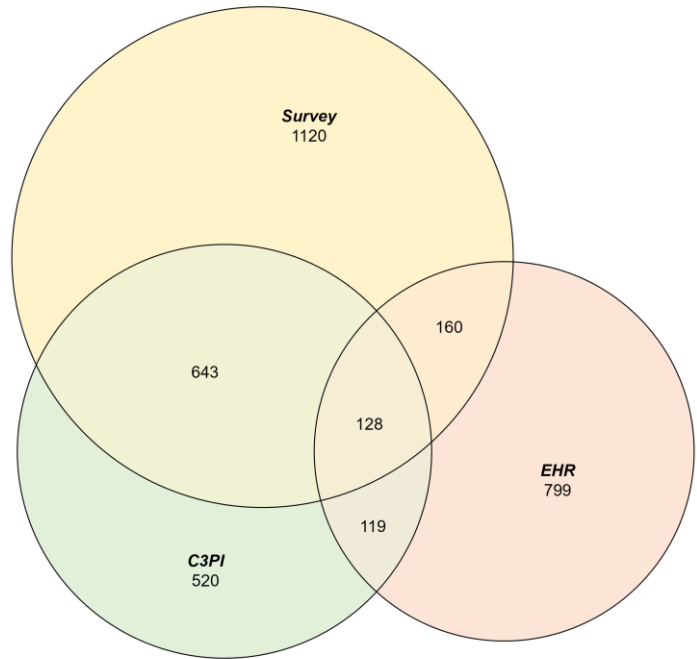
**Samples currently in inventory (collected at enrollment)**

Sample	Container, Size	Participants	Aliquots	Freezers
Plasma	Cryovial, 0.5 mL	3,271	39,069	0.689
Serum	Cryovial, 0.5 mL	3,298	28,228	0.498
	Cryovial, 5.0 mL	2,916	2,916	0.103
Whole blood	PAXgene RNA	3,104	6,900	0.402
	Vacutainer, 2.0 mL	1,530	2,461	0.072
Buffy coat	Cryovial, 2.0 mL	0	0	0
Urine	Cryovial, 0.5 mL	9	9	0.000
	Cryovial, 10.0 mL	3,117	3,117	0.247
<b>Total</b>			<b>82,700</b>	<b>2.011</b>

**COVID-19 vaccination by type (manufacturer)**

PFIZER	1,374
MODERNA	698
JANSEN	119

**COVID data breakdown by source and overlap**

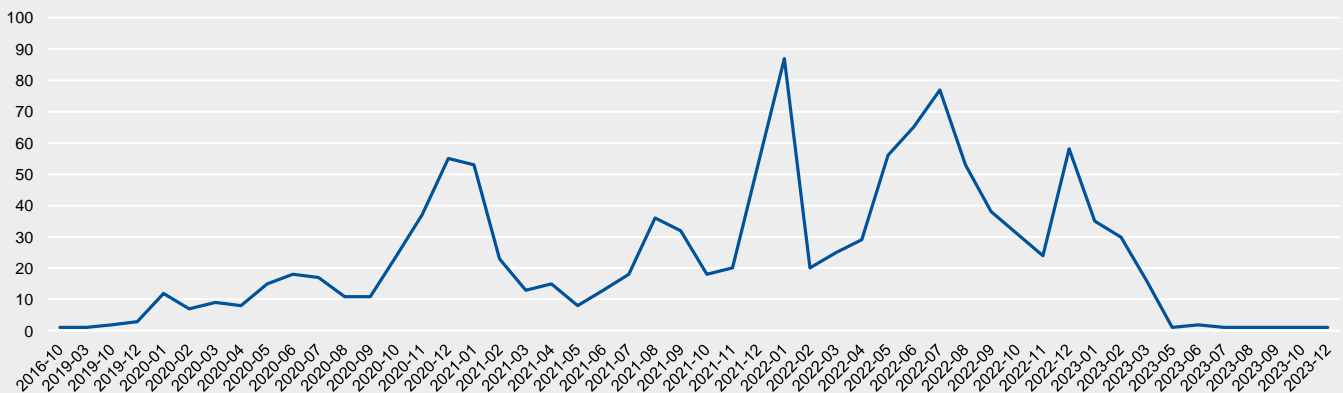


Note: N=3,489 total unique participants

**COVID-19 infections**

One infection	949
Two Infections	213
Three infections	30

**COVID Infections Over Time**



**Top 16 solicited medical conditions reported in the MURDOCK Study at any time**

High cholesterol	1,959 (56%)	Diabetes	701 (20%)
High blood pressure	1,681 (48%)	Asthma	578 (17%)
Obesity	1,274 (37%)	Rheumatoid arthritis	440 (13%)
Depression	1,156 (33%)	Other autoimmune disease	408 (12%)
Osteoarthritis	1,145 (33%)	Multiple sclerosis	304 (9%)
Osteoporosis/Osteopenia	768 (22%)	Coronary artery disease	296 (8%)
Skin cancer, not melanoma	735 (21%)	Atrial fibrillation	292 (8%)
Thyroid disease	711 (20%)	Other mental illness	275 (8%)

**MURDOCK Study Participants enrolled in the C3PI Study, N=1,410**

**C3PI Study, Participant Demographics**

	<b>Study Cohort N=1,410</b>	<b>Testing Sub-cohort N=300</b>
<b>Age</b>		
Median (25 <sup>th</sup> , 75 <sup>th</sup> )	53 (42, 61)	47 (39, 57)
Min, Max	<18, 88	18, 79
<b>Sex</b>		
Female	974 (69%)	183 (61%)
Male	436 (31%)	117 (39%)
<b>Race</b>		
American Indian & Alaska Native	2 (<1%)	1 (<1%)
Asian	6 (<1%)	0
Black or African American	117 (8%)	51 (17%)
Native Hawaiian & Other Pacific Islander	1,213 (86%)	0
White/Caucasian	43 (3%)	231 (77%)
Other	25 (2%)	13 (4%)
Multiple	4 (<1%)	4 (1%)
Don't know/Not sure/Not answered	2 (<1%)	0
<b>Ethnicity</b>		
Hispanic or Latino	71 (5%)	33 (11%)
Non-Hispanic or Latino	1,326 (94%)	265 (88%)
Don't know/Not sure/Not answered	13 (<1%)	2 (<1%)

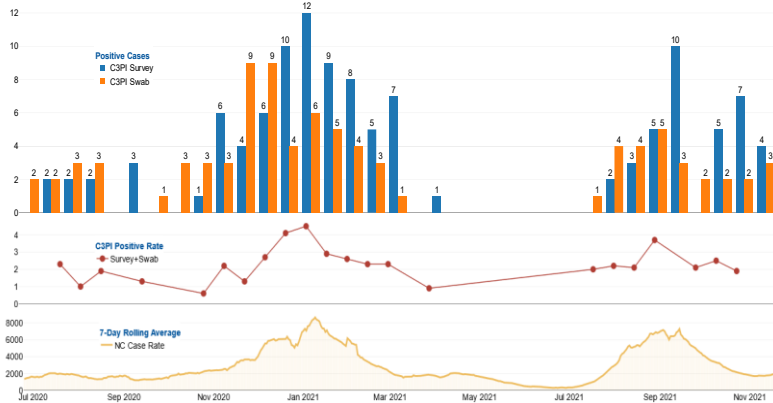
**C3PI Study Survey & Testing Metrics**

Surveys completed	42,189
Nasal swabs tested	8,372
Blood draws tested	2,290

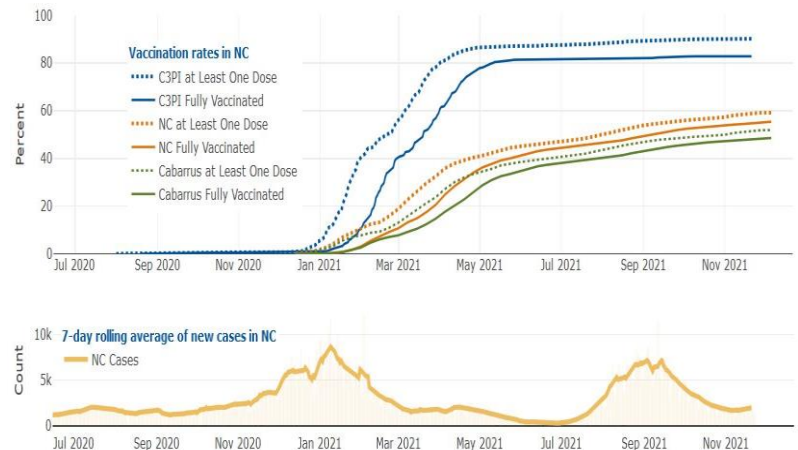
**C3PI Study Highlighted Counts**

Unique COVID infections	135 (10%)
Unique COVID vaccines	1,129 (80%)
Not vaccinated	297 (21%)

**Figure: COVID infections over time, C3PI Study**



**Figure: COVID vaccinations vs. infections, C3PI Study**



### MURDOCK Study participants responding to COVID Survey, N=2,051

#### MURDOCK COVID Survey, Participant Demographics

Age	Baseline
Median (25 <sup>th</sup> , 75 <sup>th</sup> )	54 (43, 62)
Min, Max	<18, 89
Sex	
Female	1,448 (71%)
Male	603 (29%)
Race	
American Indian & Alaska Native	9 (<1%)
Asian	12 (<1%)
Black or African American	152 (7%)
Native Hawaiian & Other Pacific Islander	2 (<1%)
White/Caucasian	1,647 (80%)
Other	169 (8%)
Multiple	36 (2%)
Don't know/Not sure/Not answered	24 (1%)
Ethnicity	
Hispanic or Latino	236 (12%)
Non-Hispanic or Latino	1,788 (87%)
Don't know/Not sure/Not answered	27 (1%)

#### COVID Survey, highlighted counts

Unique participants with infection(s)	818 (40%)
Unique participants vaccinated	1,253 (61%)
Unique participants not vaccinated	801 (39%)

#### "Long COVID"

Participants with data suggestive of long COVID	242 (11%)
Reported diagnosis of long COVID	66 (3%)
Meets criteria based on reported symptoms	184 (8%)

### MURDOCK Study participants with COVID data in EHR, N=1,206

#### EHR Date, Participant Demographics

Age	Baseline
Median (25 <sup>th</sup> , 75 <sup>th</sup> )	53 (43, 62)
Min, Max	<18, 88
Sex	
Female	828 (69%)
Male	378 (31%)
Race	
American Indian & Alaska Native	
Asian	5 (<1%)
Black or African American	6 (<1%)
Native Hawaiian & Other Pacific Islander	221 (18%)
White/Caucasian	1 (<1%)
Other	824 (68%)
Multiple	103 (9%)
Don't know/Not sure/Not answered	31 (3%)
Ethnicity	
Hispanic or Latino	149 (12%)
Non-Hispanic or Latino	1,040 (86%)
Don't know/Not sure/Not answered	17 (1%)

#### EHR Data, highlighted counts

Unique participants with infection(s)	74 (6%)
Unique participants vaccinated	1,156 (96%)
Unique participants not vaccinated	50 (4%)

#### Encounters with COVID data by type, EHR data

Emergency	58
Inpatient	30
Observation	7
Outpatient	11

Note: total n=106 encounters for n=53 unique participants