

# PCORnet CDC COVID-19 Project February Webinar



February 12, 2024

# Agenda

- Query updates and schedule
- COVID and Full CDM comparisons
- Patient-level data analysis plans
- Flu query results
- Chronic disease control trend analysis
- Initial glimpse of risk factors for death/hospitalization among patients 75+ years
- Manuscripts

## Scope of work for Year 4

- Contract period from October 2023-July 2024
- 1-2 queries per month with expected number of 12 for the 10-month period
- Refresh COVID CDMs when needed (though expect to be minimal)
- Contribute patient-level datasets for ongoing work, with access to CDC analysts and investigators
- Contribute as collaborative authors on manuscripts

## Queries completed for Year 4

- October 2023 – respiratory viral illness surveillance query, COVID CDM
  - Patient-level dataset on patients 20+ years of age
- November 2023 – repeat of above query, Full CDM
- December 2023 – flu surveillance from 2017-2023
  - Patient-level dataset on patients 50+ years of age who were initially evaluated outside of the ED or inpatient settings
- January 2023 – repeat of respiratory viral illness surveillance
  - Due last Monday, some troubleshooting with long run times

## Long run times noted in last query

- Made significant progress on reducing run times from last Summer
- Recent query has shown some increased run times
- Exploring with programmers about reasons
  - Added a pause/resume feature that could be contributing
  - Hoping to get more information on this soon

## Upcoming queries

- This week – rerun of query examining cardiac complications (pericarditis, myocarditis, MIS) after COVID infection and mRNA vax
- March 1 – assessment of use of pre-exposure prophylaxis for HIV (PrEP) over time
- Mid March – assessment of trends in diabetes and hypertension control and health debt from the pandemic
- April – respiratory viral illness surveillance
- May – July – topics still being explored, including possible assessment of maternal morbidity and mortality

# Comparisons of data from COVID and Full CDMs

- COVID CDM includes rapidly refreshed data as needed before queries
  - provides data without the lag time of quarterly refresh cycle
    - Filtered on SARS-CoV-2 tests, COVID meds and vaccines, viral illness diagnostic codes
- Ran same query on COVID and Full CDM to compare results
- Overall, found some differences, with more cases from Full CDM
  - 14% more cases for COVID and flu; 12% more for RSV – pretty similar for all vs. inpatient; demographics nearly identical between
  - Actually have more Paxlovid scripts in COVID CDM; oseltamivir similar across the CDMs

# Site level assessment of COVID vs. Full CDM

- Sites with more COVID cases in Full CDM
  - 12 adult sites have >1% more cases
  - 6 of these sites with >20% more
- Sites with more COVID cases in COVID CDM; more Paxlovid cases too
  - 5 adult sites with all at least 9% more cases
- Pattern was similar for children; one pediatric hospital had >20% more



# Reasons for differences: COVID and Full CDM

- Full CDM with more data
  - Possible ETL problems with COVID CDM, omitting some data
  - Possible misapplication of the inclusion criteria for the COVID CDM
- COVID CDM with more data
  - Some sites don't have a full month of the last data for update with Full CDM refresh
  - Medication coding fixes for Paxlovid might not have been carried over to the Full CDM

# Summary of CDM comparisons and CDM plans

- Will time surveillance queries to month of Full CDM refresh (Jan, April, July, October)
- Most sites can run surveillance queries on Full CDM and don't need to maintain a COVID CDM
- 4-5 sites will need to update their COVID CDMs for now because had more robust data
- May still need rapidly refreshed COVID CDM data though have not anticipation of that, for now, in current contract year

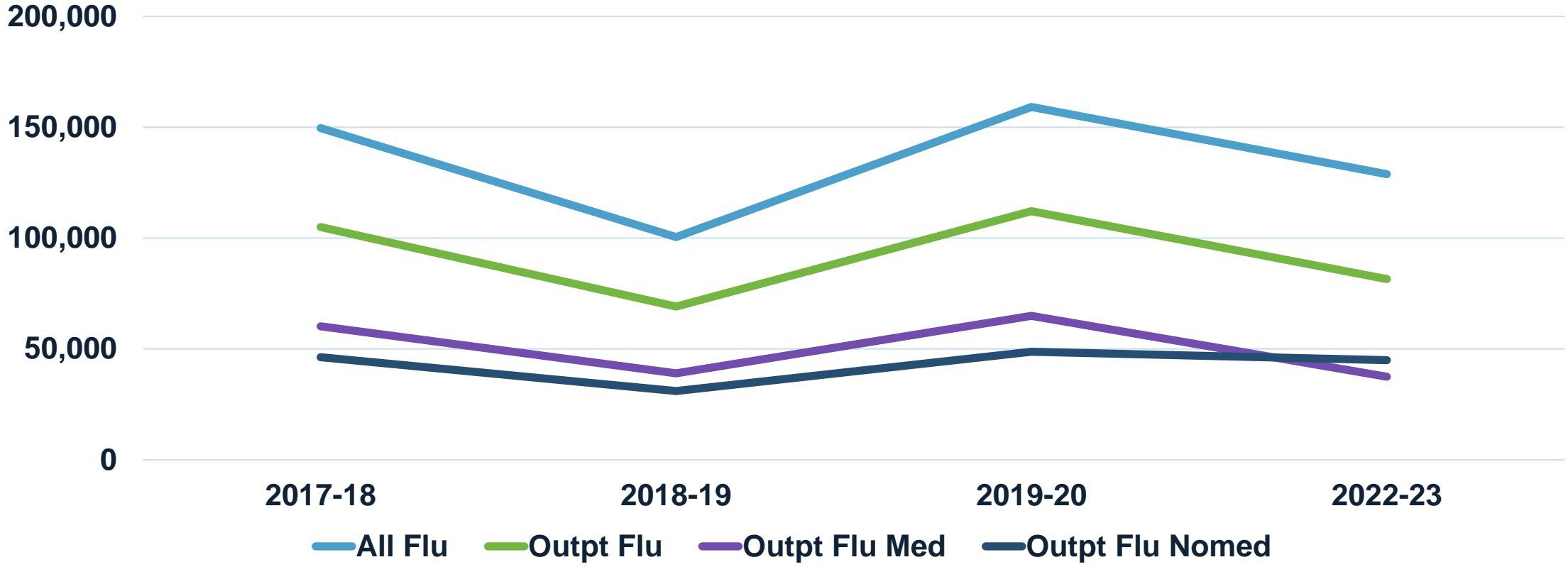
## Extraction of patient-level data

- Patients with COVID – currently have data from 28 sites for patients 20+ years of age, October 2022 – September 2023
  - Data updated from prior query that was through December 2022
  - Added a few additional variables with this new query – vaccines, census bureau region, area deprivation index
- Patients with flu, October 2022-April 2023 – data returned from 28 sites and will soon start with analytic dataset creation
- Stored on LPHI server with access given to CDC analysts

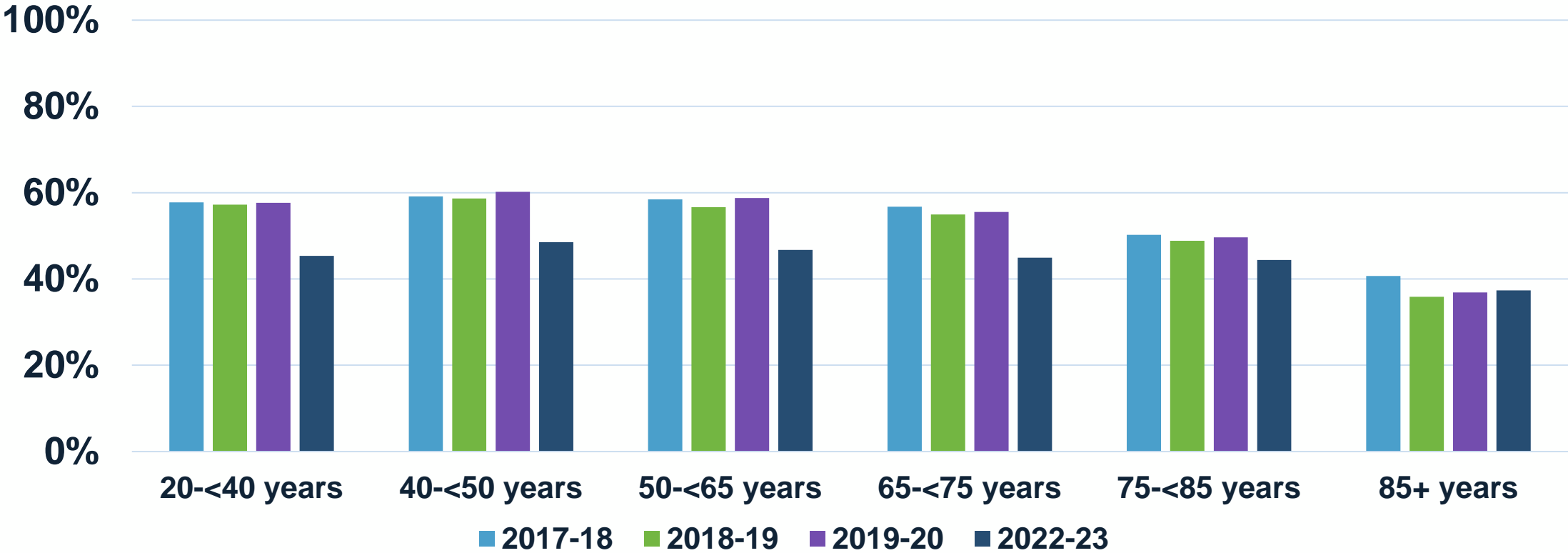
## Flu surveillance query

- Assessed adult and child/adolescent/young adult flu cases over 2017-18, 2018-19, 2019-20, 2022-23 flu seasons
- Stratified individuals in following ways:
  - All flu cases (dx codes and + tests)
  - Flu outpatient cases (excluding those inpatient or in emergency department -7 to +1 days of index)
    - with oseltamivir or baloxavir scripts
    - without meds
- Assessed % treated by age, race, ethnicity
- Will be assessing effectiveness of meds

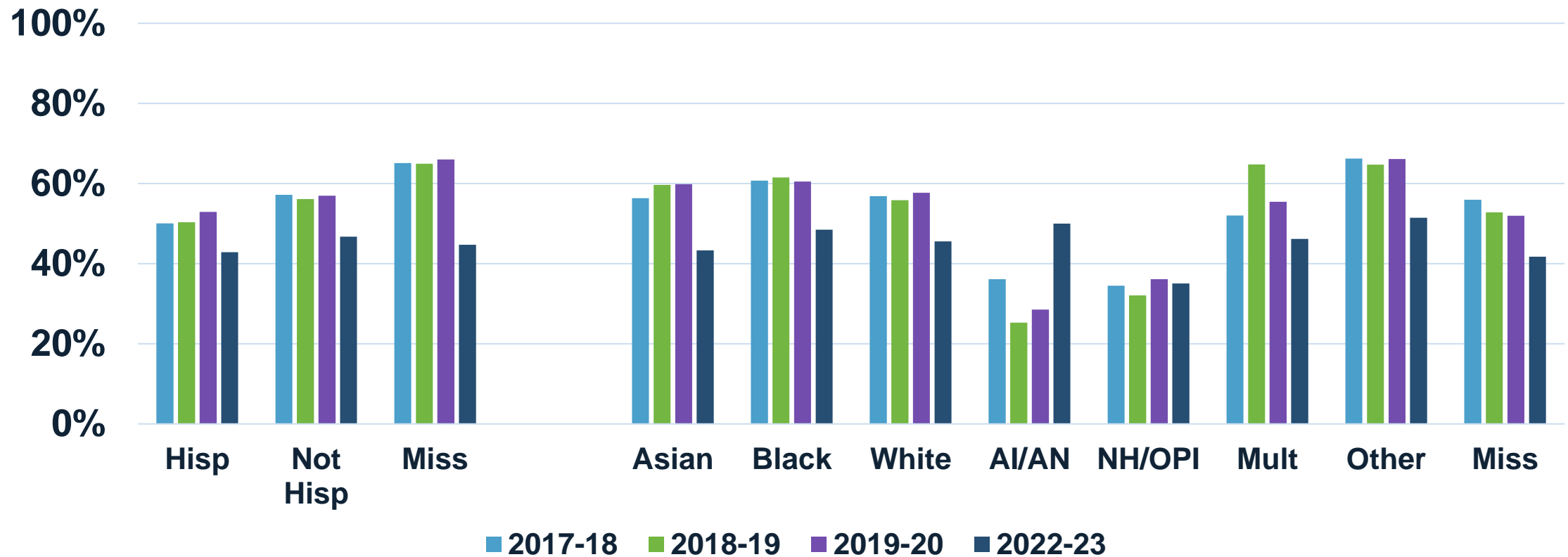
# Adult flu cases, with and without meds



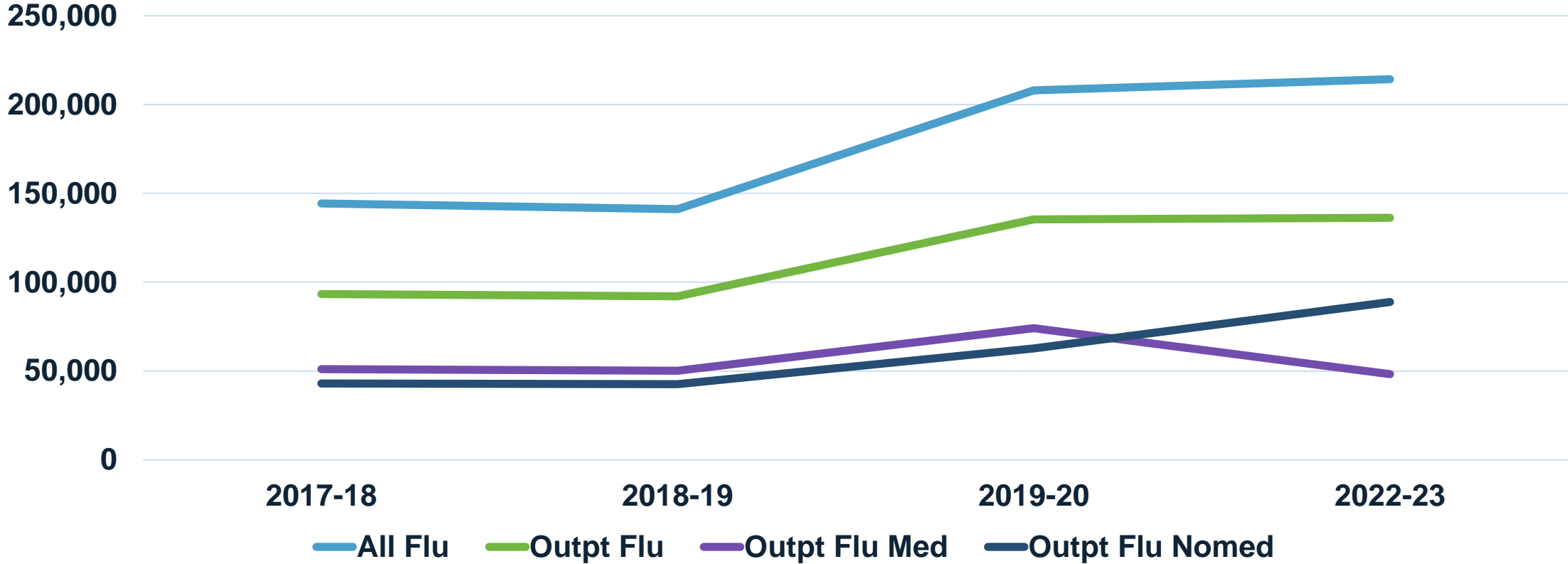
# Adult flu outpatient cases, % treated by age



# Adult flu outpatient cases, % treated by race/ethnicity

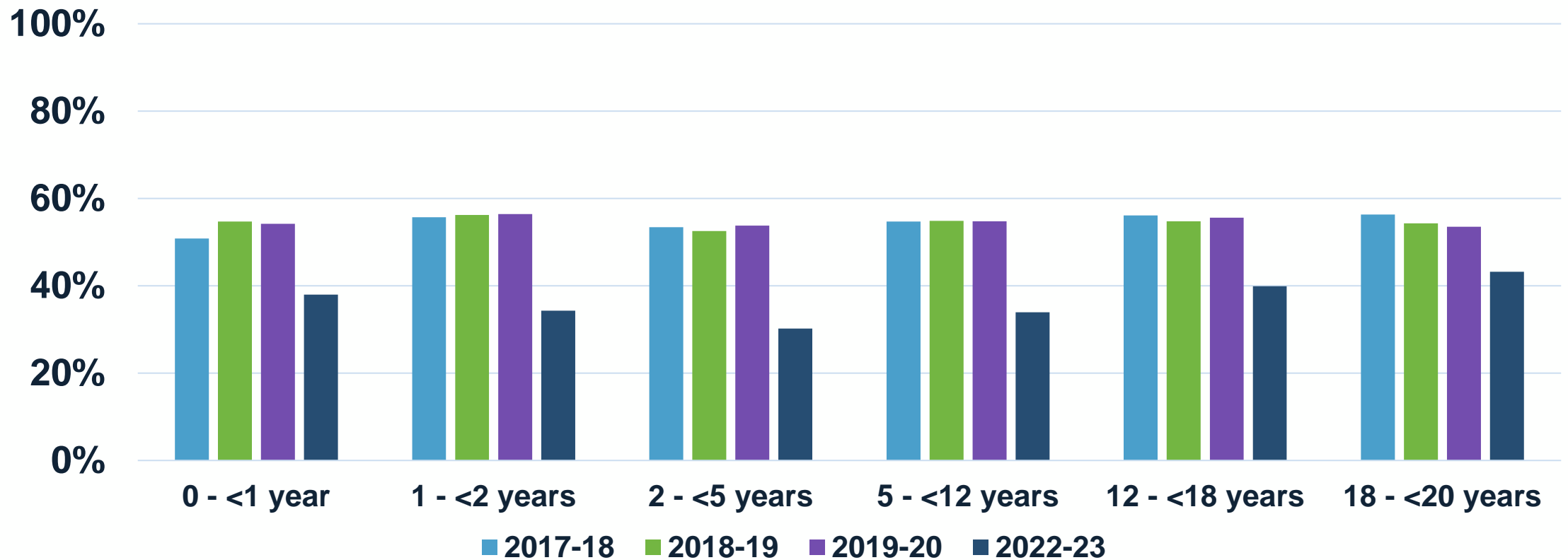


# Child and adolescent flu cases, with and without meds

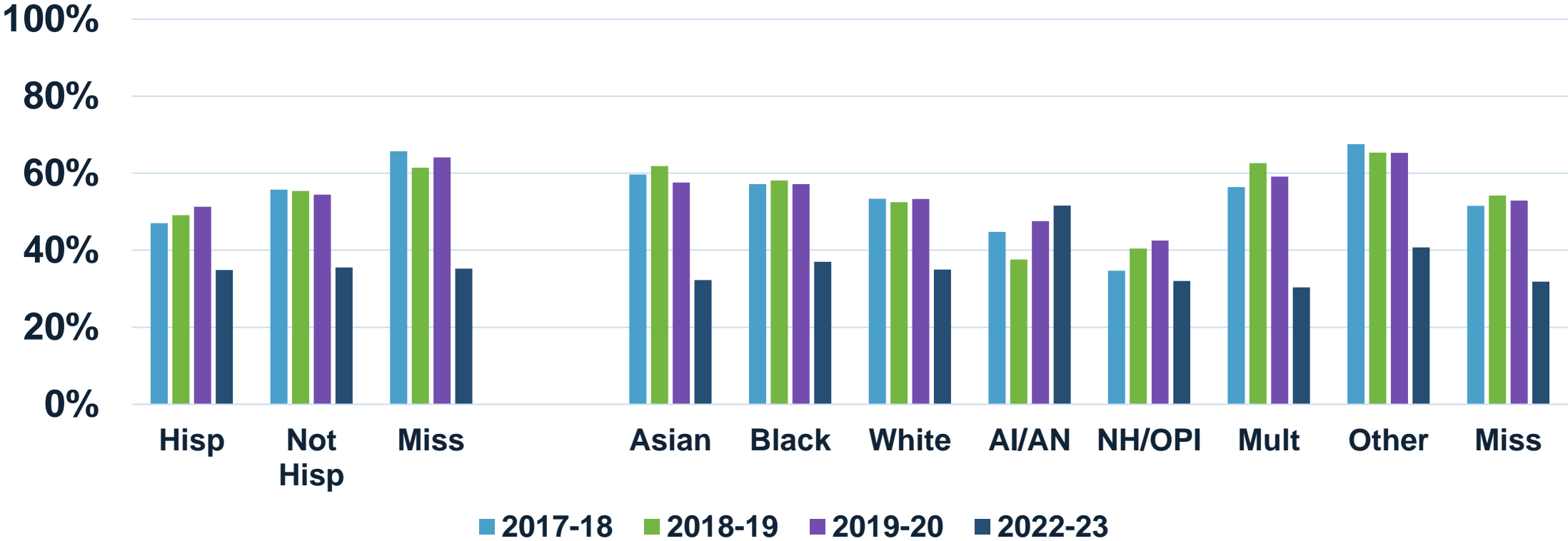




# Child and adolescent outpatient flu cases, % treated by age



# Child and adolescent outpatient flu cases, % treated by race/ethnicity



# Chronic disease control trends

- CDC has several data sources that can be used for disease surveillance
- EHR data can provide similar information but has unique capabilities around use of therapeutics and monitoring of disease control
- Conducted a query last summer to assess trends in hypertension and diabetes control over the pandemic
- Identified cohorts with hypertension and diabetes and tracked objective measures over time

# Disease control methods

- ◆ Included patients with evidence of disease in 3 years prior to January 1, 2019

## Hypertension

- 1+ ICD 9/10 or
- 1+ Rx for antihypertensive drug

## Type 2 Diabetes

- 1+ ICD 9/10 or
- 1+ a1c lab >6.5%, or
- 1+ Rx for diabetes drug – not metformin or SGLT2

- ◆ HTN: Defined patients as 1) controlled, 2) Stage 1, 3) Stage 2, 4) missing every
- ◆ DM: Defined patients as A1c 1) <7%, 2) 7- <9%, 3) ≥ 9%, 4) Missing
- ◆ Controlled group is focus of this presentation
  - Hypertension = BP <130/80 - Categorization based on patient's most recent measure during 6-mo interval
  - Diabetes = <7% HbA1c - Categorization based on lab result closest to health event of interest during 6-mo interval

# Patients with HTN, 2016-2018, followed from 1/1/2019 on N=4,568,537

	Jan-Jun '19	Jul-Dec '19	Jan-Jun '20	Jul-Dec '20	Jan-Jun '21	Jul-Dec '21	Jan-Jun '22	Jul-Dec '22
<b>Controlled</b> BP < 130/80	962,104 (21)	886,841 (19)	665,103 (15)	655,633 (14)	686,726 (15)	686,057 (15)	686,641 (15)	668,110 (15)
<b>Stage 1</b> BP 130-139/80-89	853,832 (19)	811,025 (18)	623,891 (14)	649,880 (14)	655,272 (14)	666,675 (15)	645,471 (14)	639,813 (14)
<b>Stage 2</b> BP 140-159/90-99	644,725 (14)	618,144 (14)	487,449 (11)	509,200 (11)	496,642 (11)	516,106 (11)	476,049 (10)	481,432 (11)
<b>Stage 2+</b> BP 160+/100+	224,676 (5)	220,797 (5)	182,827 (4)	197,505 (4)	185,794 (4)	201,002 (4)	181,819 (4)	191,123 (4)
<b>Unknown/Missing</b>	1,883,200 (41)	2,031,730 (44)	2,609,267 (57)	2,556,319 (56)	2,544,103 (56)	2,498,697 (55)	2,578,557 (56)	2,588,059 (57)

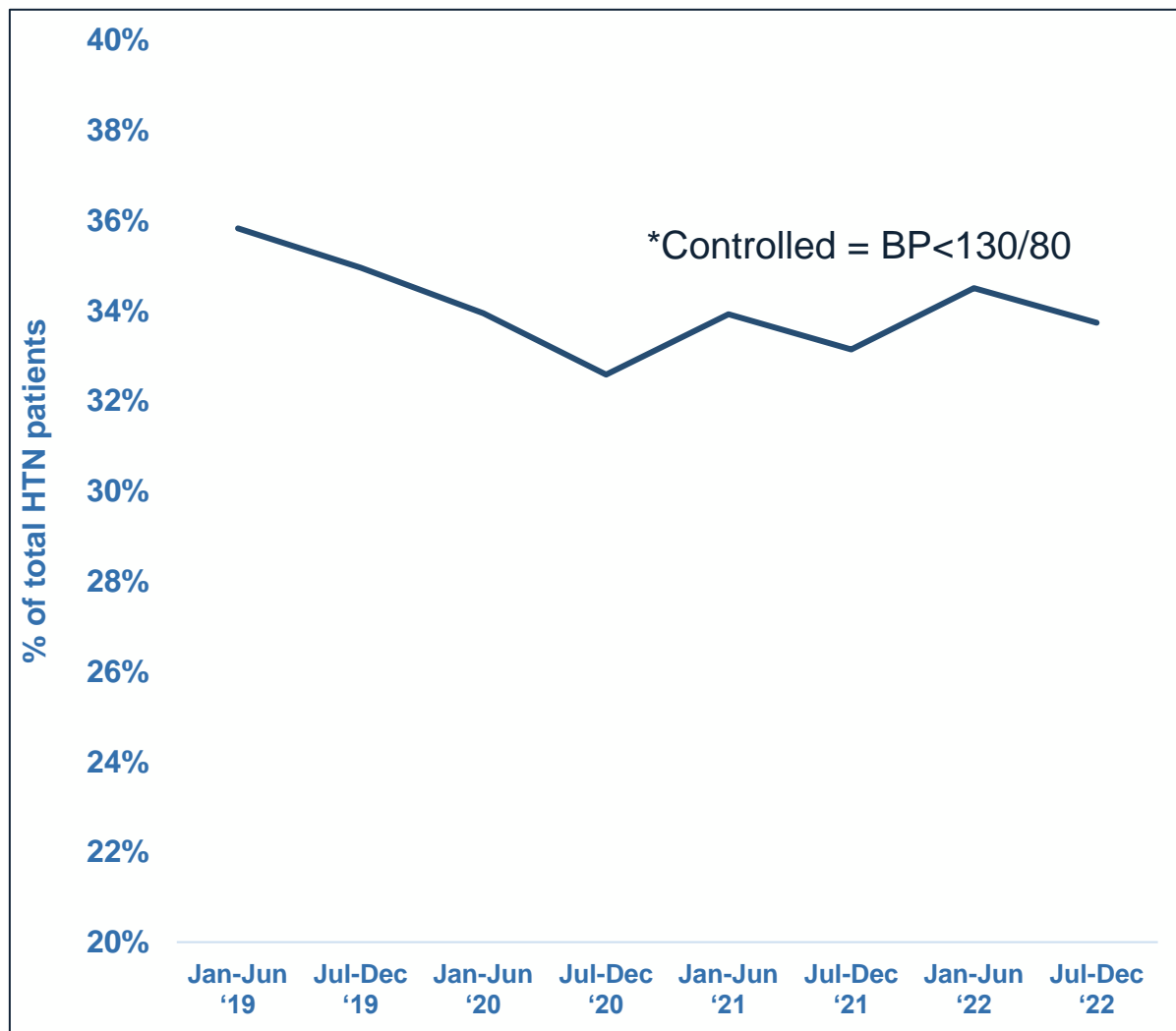
# Patients with Type 2 Diabetes, 2016-2018

## N=1,890,882

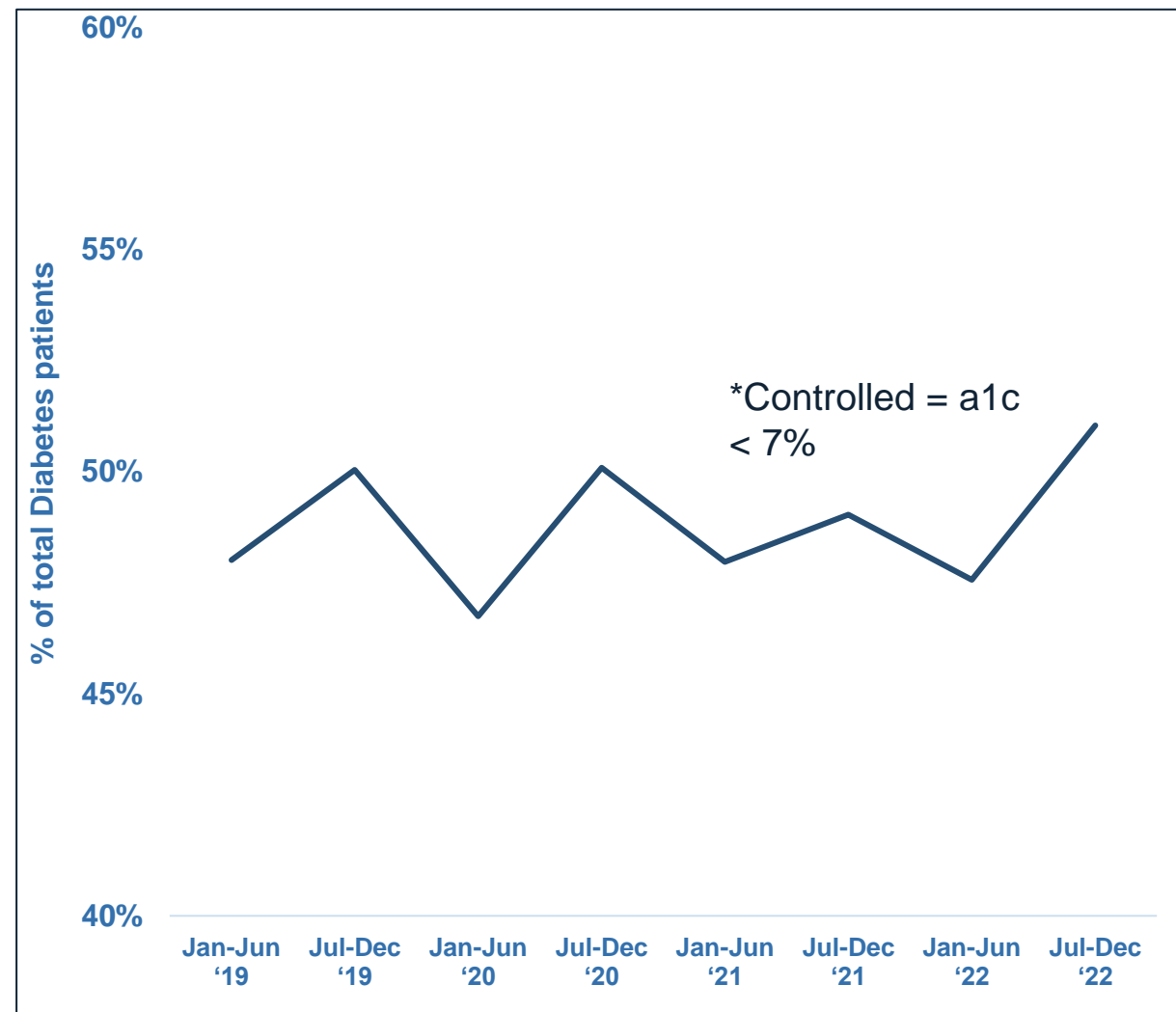
	Jan-Jun '19	Jul-Dec '19	Jan-Jun '20	Jul-Dec '20	Jan-Jun '21	Jul-Dec '21	Jan-Jun '22	Jul-Dec '22
<b>A1c &lt;7%</b>	321,222 (17)	318,676 (17)	240,154 (13)	288,251 (15)	271,206 (14)	264,547 (14)	252,575 (13)	252,122 (13)
<b>A1c 7-9%</b>	239,623 (13)	225,605 (12)	190,279 (10)	201,039 (11)	203,251 (11)	195,680 (10)	197,165 (10)	176,129 (9)
<b>A1c &gt;9%</b>	108,202 (6)	92,521 (5)	83,286 (4)	86,199 (5)	90,936 (5)	79,278 (4)	81,215 (4)	65,669 (3)
<b>Unknown/Missing</b>	1,221,835 (65)	1,254,080 (66)	1,377,163 (73)	1,315,393 (70)	1,325,489 (70)	1,351,377 (71)	1,359,927 (72)	1,396,962 (74)

\*at least 1 Dx for DM, qualifying med, or qualifying a1c between 1/1/2016 – 12/31/2018

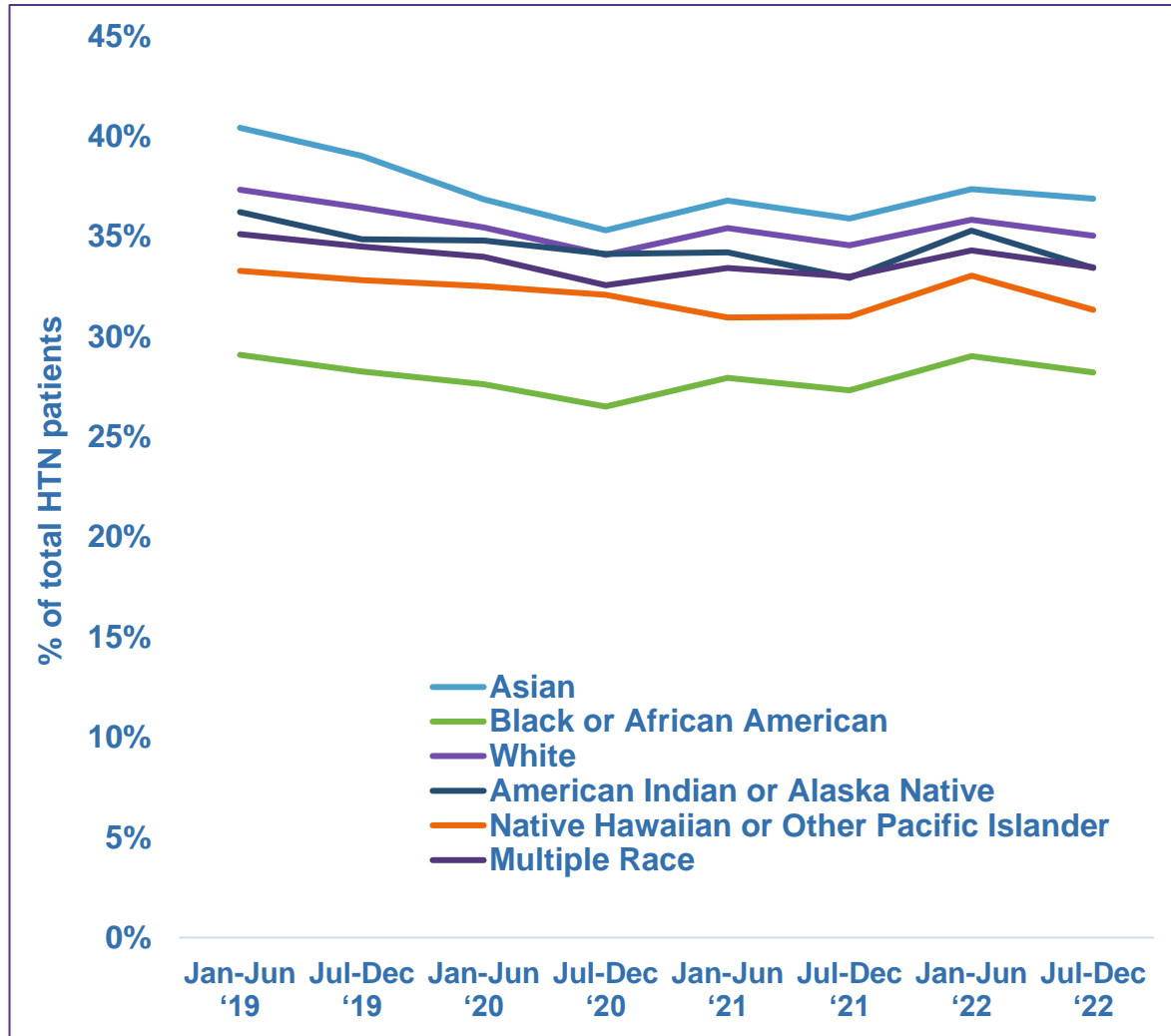
## % of Hypertensive Patients with Controlled Blood Pressure\*



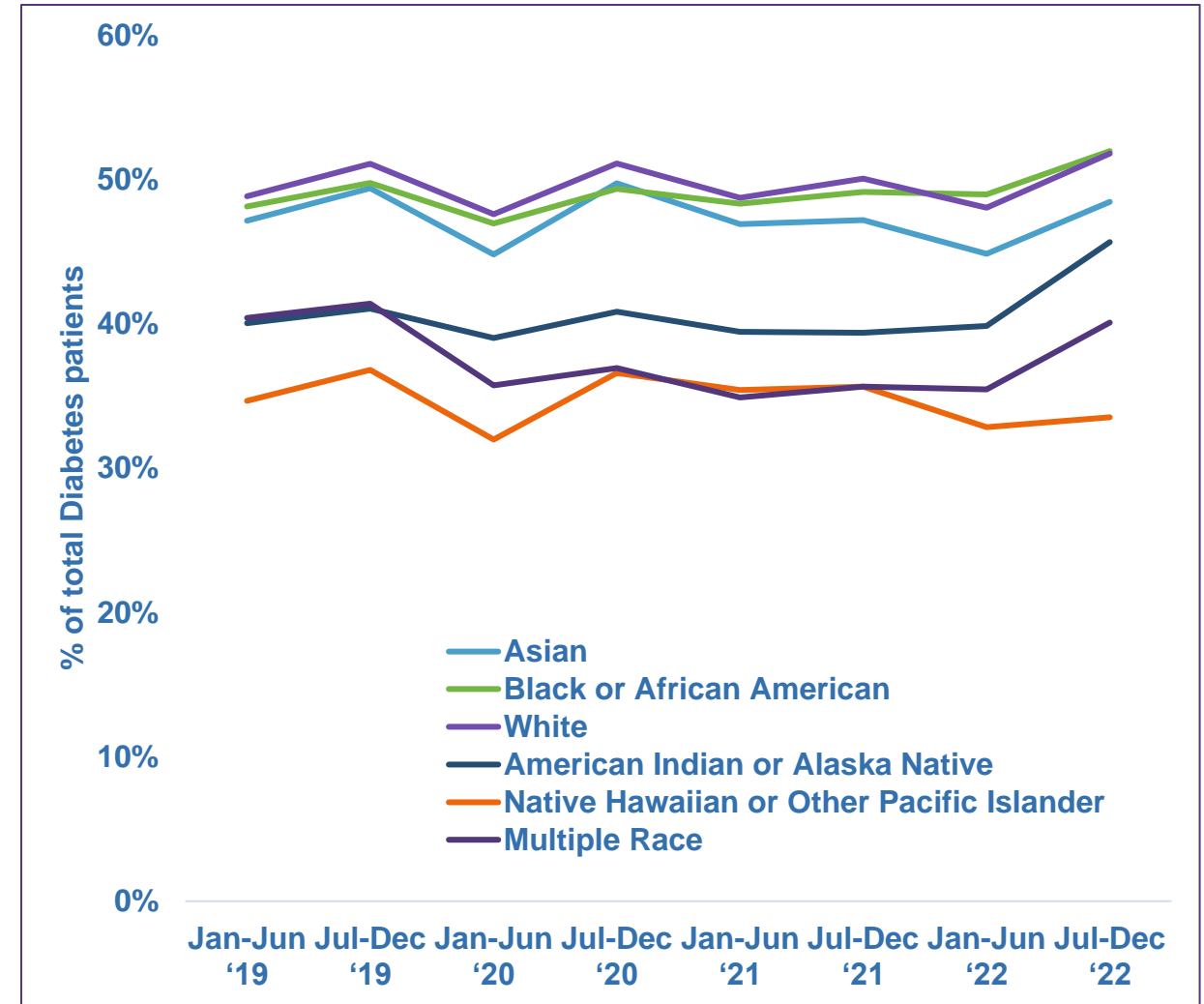
## % of Diabetes Patients with Controlled HbA1c Levels\*



## % of Hypertensive Patients with Controlled Blood Pressure By Race



## % of Diabetes Patients with Controlled HbA1c Levels By Race





# Next chronic disease control query

- Prior query limited by missing data, making it difficult to really determine exact trends over time
- In discussions with CDC about most important questions that can derive from this work
  - Explore characteristics of patients who did not receive care during pandemic and then patterns of control when returned to care
  - Explore in more detail characteristics of patients, defined by their control prior to the pandemic
- May require a tailored patient-level dataset as with COVID and flu

# COVID patient-level data analyses

- Obtained data on 20+ year old with positive tests, COVID dx codes, or COVID prescriptions, October 2022 – September 2023
- Plan is to use this data for two main analyses
  - Explore risk factors for hospitalization and death among those who received COVID meds and those who did not – stratified assessment knowing that likely missing some COVID treatments
  - Explore predictors of uptake of COVID medications, focused on racial and ethnic disparities
- Some initial work completed on 65+ year olds

# Methods

- **Study design:** Retrospective cohort
- **Inclusion Criteria:**
  - $\geq 75$  years old
  - Positive for COVID-19 (by diagnosis code, lab code, or prescription), index diagnosis is the earliest of these
- **Outcome:**
  - All-cause hospitalization within 16 days or all-cause death within 30 days

Slides from Claire Quinlan, CDC intern  
and Harvard Medical School student



# % of COVID patients 75+ with severe outcomes

	Overall 75+ N (%)	75+, not severe N (%)	75+ severe N (%)	P Value*	SM D
	<b>200,989 (100)</b>	<b>163,579 (81.3)</b>	<b>37,410 (18.6)</b>		
<b>By Sex</b>				<0.001	0.07
Female	113,559 ( 56.5)	93,462 ( 57.1)	20,097 ( 53.7)		
Male	87,422 ( 43.5)	70,109 ( 42.9)	17,313 ( 46.3)		
Unknown	8 ( 0.0)	8 ( 0.0)	0 ( 0.0)		
<b>By Race</b>				<0.001	0.242
American Indian or Alaska Native	623 ( 0.3)	502 ( 0.3)	121 ( 0.3)		
Asian	5,371 ( 2.7)	4,038 ( 2.5)	1,333 ( 3.6)		
Black or African American	15,796 ( 7.9)	1,1379 ( 7.0)	4,417 ( 11.8)		
Multiple Race	388 ( 0.2)	299 ( 0.2)	89 ( 0.2)		
Native Hawaiian or Pacific Islander	160 ( 0.1)	125 ( 0.1)	35 ( 0.1)		
White	162,631 ( 80.9)	135,295 ( 82.7)	27,336 ( 73.1)		
Other	6,140 ( 3.1)	4,333 ( 2.6)	1,807 ( 4.8)		
Unknown	9,880 ( 4.9)	7,608 ( 4.7)	2,272 ( 6.1)		
<b>By Ethnicity</b>				<0.001	0.302
Hispanic	9,858 ( 4.9)	7,316 ( 4.5)	2,542 ( 6.8)		
Non-Hispanic	164,466 ( 81.8)	131,873 ( 80.6)	32,593 ( 87.1)		
Unknown	26,665 ( 13.3)	24,390 ( 14.9)	2,275 ( 6.1)		

# A lower proportion of those 75+ with severe outcomes are receiving COVID-19 therapeutics

COVID-19 Medication in +/- 30d of index event^	Overall	No Severe Outcomes	Severe Outcomes*	P values* *	SMD
Any oral COVID Rx (Nirmatrelvir-Ritonavir or Molnupiravir)	64948 ( 32.3)	63070 ( 38.6)	1878 ( 5.0)	<0.001	0.889
Nirmatrelvir-Ritonavir	58196 ( 29.0)	56528 ( 34.6)	1668 ( 4.5)	<0.001	0.821
Molnupiravir	7127 ( 3.5)	6898 ( 4.2)	229 ( 0.6)	<0.001	0.236
Monoclonal Antibodies	6616 ( 3.3)	5951 ( 3.6)	665 ( 1.8)	<0.001	0.115
Remdesivir	13990 ( 7.0)	2983 ( 1.8)	11007 ( 29.4)	<0.001	0.822

*\*\*P values estimated based on Chi-squared test for categorical variables, and t test for continuous variables*

*^Medications may have been administered in the outpatient or inpatient setting.*

## Proportion of Receipt of Antivirals among those 65+ with an Outpatient COVID-19 Diagnosis

Age	Outpatient COVID-19 + N (%)	Received an Oral Antiviral N (%)	Did not Receive Oral Antiviral N (%)
65+	393,357	159,642 (40.6)	233,715 (59.4)
65-74	221,777	97,969 (44.2)	123,813 (55.8)
75-89	154,907	57,233 (36.9)	97,674 (63.1)
90+	16,673	4,445 (26.7)	12,228 (73.3)

\*Row percentages

# Manuscript updates

- 4 papers submitted to date with collaborative authors, including site representatives
- Zhang Y, Romieu-Hernandez A, Boehmer TK, Azziz-Baumgartner E, Carton TW, Gundlapalli AV, Farrington J, Nagavedu K, Dea K, Moyneur E, Cowell LG, Kaushal R, Mayer KH, Puro J, Rasmussen SA, Thacker D, Weiner MG, Saydeh S, Block JP, PCORnet Network Partners. Association between SARS-CoV-2 infection and select symptoms and conditions 31 to 150 days after testing among children and adults. *BMC Infect Dis.* 2024; in press.
- Jackson SL, Woodruff R, Nagavedu K, Farrington J, Rolka D, Twentyman E, Carton T, Puro J, Denson JL, Kappelman MD, Paranjape A, Thacker D, Weiner MG, Goodman AB, Lekachvili A, Boehmer TK, Block JP, on behalf of PCORnet Collaborative Authors. Association between hypertension and diabetes control and COVID-19 severity, PCORnet, United States, March 2020-February 2022. *J Am Heart Assoc.* 2023. 12(21): e030240. PMID: 37850404.
- Adult trend paper covering data through November 2022, revised and resubmitted to PLoS One.
- Preventive care use and incident disease trends, 2018-2022, revised and resubmitted to Preventing Chronic Dz

## Expect a few more papers coming in next few months

- Exploration of trend in disease severity from COVID, May 2020 – November 2022
- Predictors of hospitalizations and death among patients with COVID, all patients 20+ years of age
- Predictors of uptake of oral antivirals
- When possible, we add collaborative authors to manuscripts



## Future of this project

- In discussions with PHII and CDC about what future years might look like
- PHII will be going through a recompetete for their cooperative agreement this Spring
- Mutual interest in continuing work, which likely would be more expansive topic-wise than current pandemic-focused approach
- Efforts to have more specific discussions hampered by lack of full year federal budget

# Thank you!

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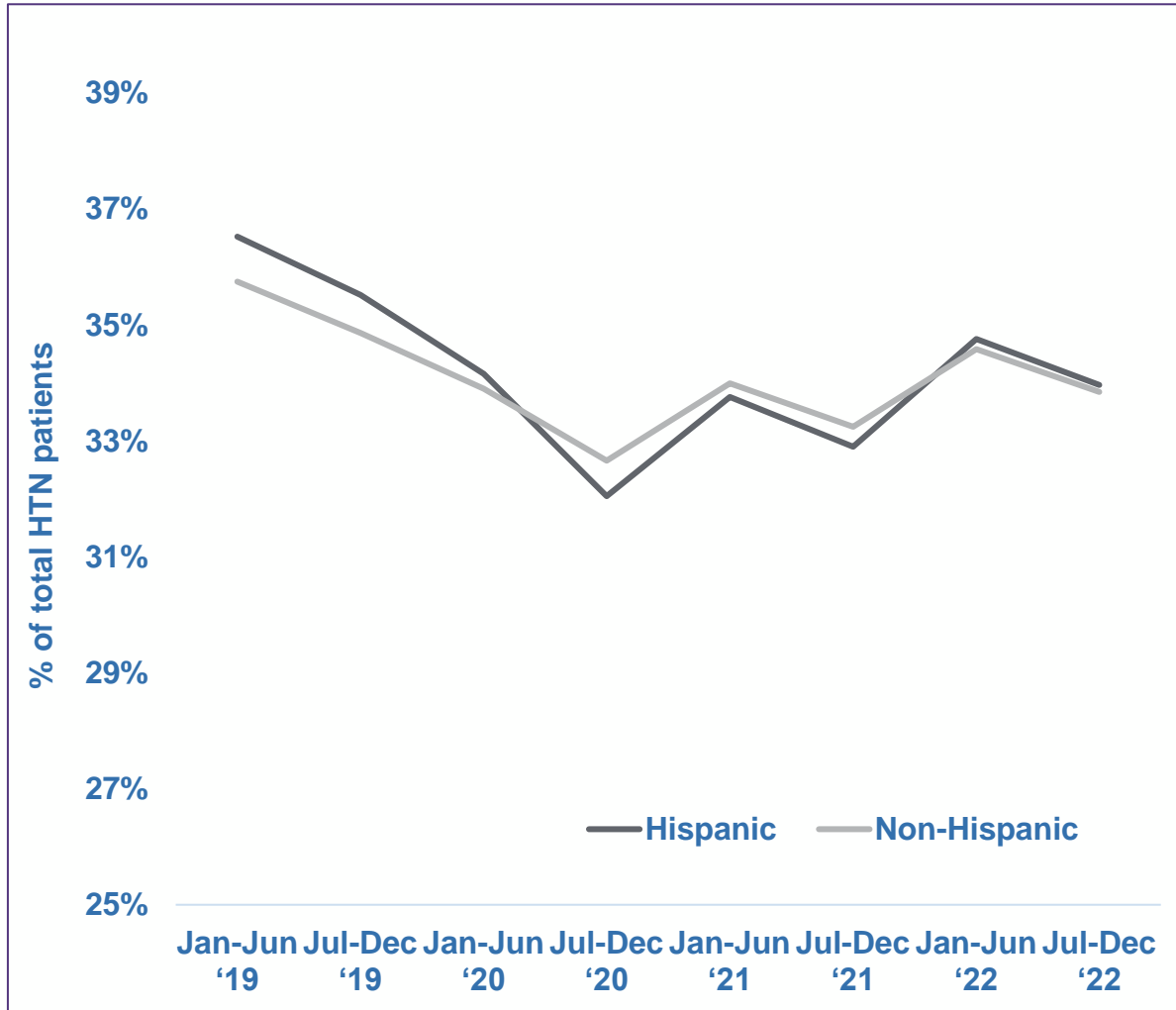
[tcarton@lphi.org](mailto:tcarton@lphi.org)

[Lauren.Cleveland@hphci.harvard.edu](mailto:Lauren.Cleveland@hphci.harvard.edu)

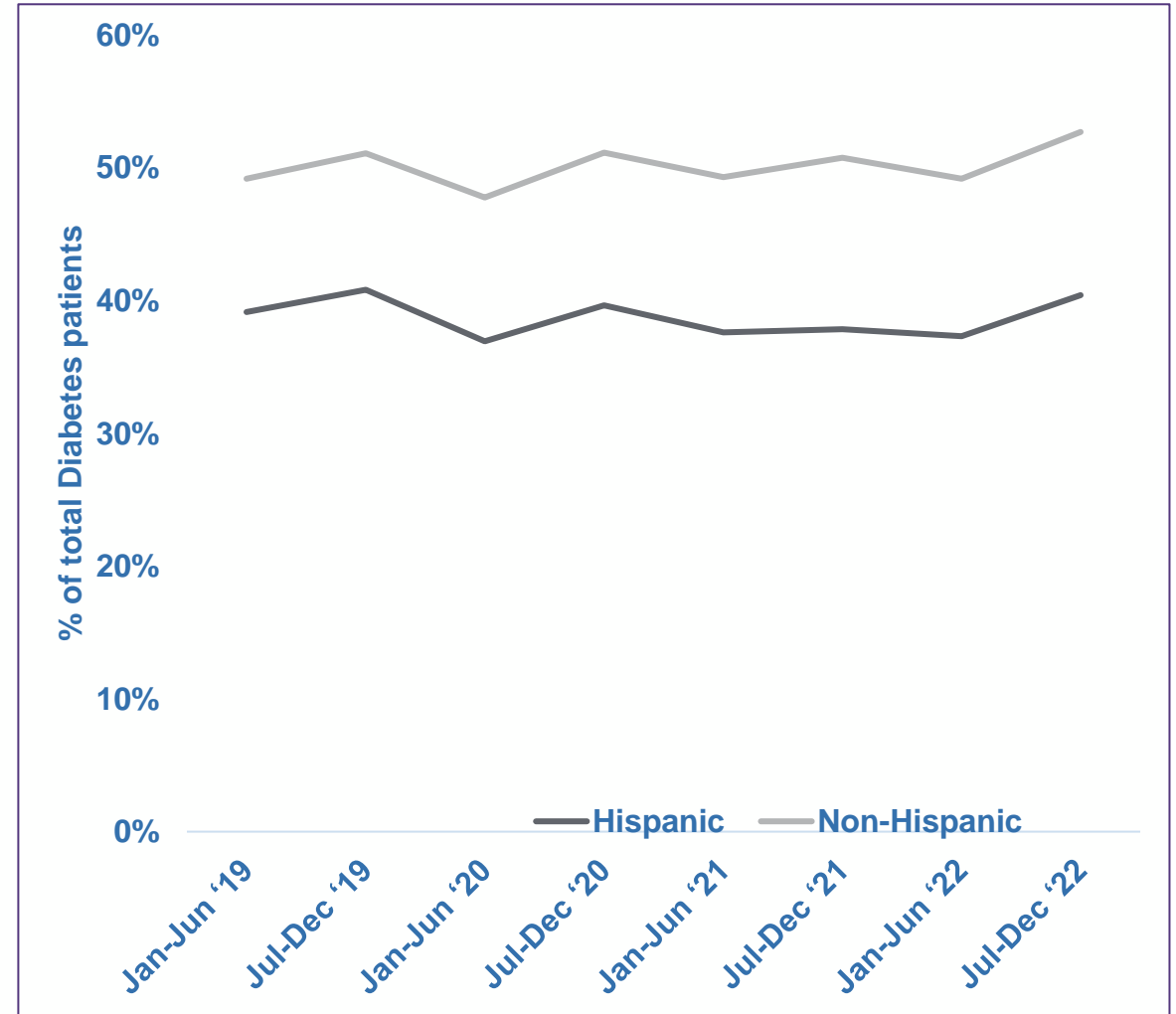
Thanks to Liz Crull and Claire Quinlan for reuse of slides

# Extra Slides

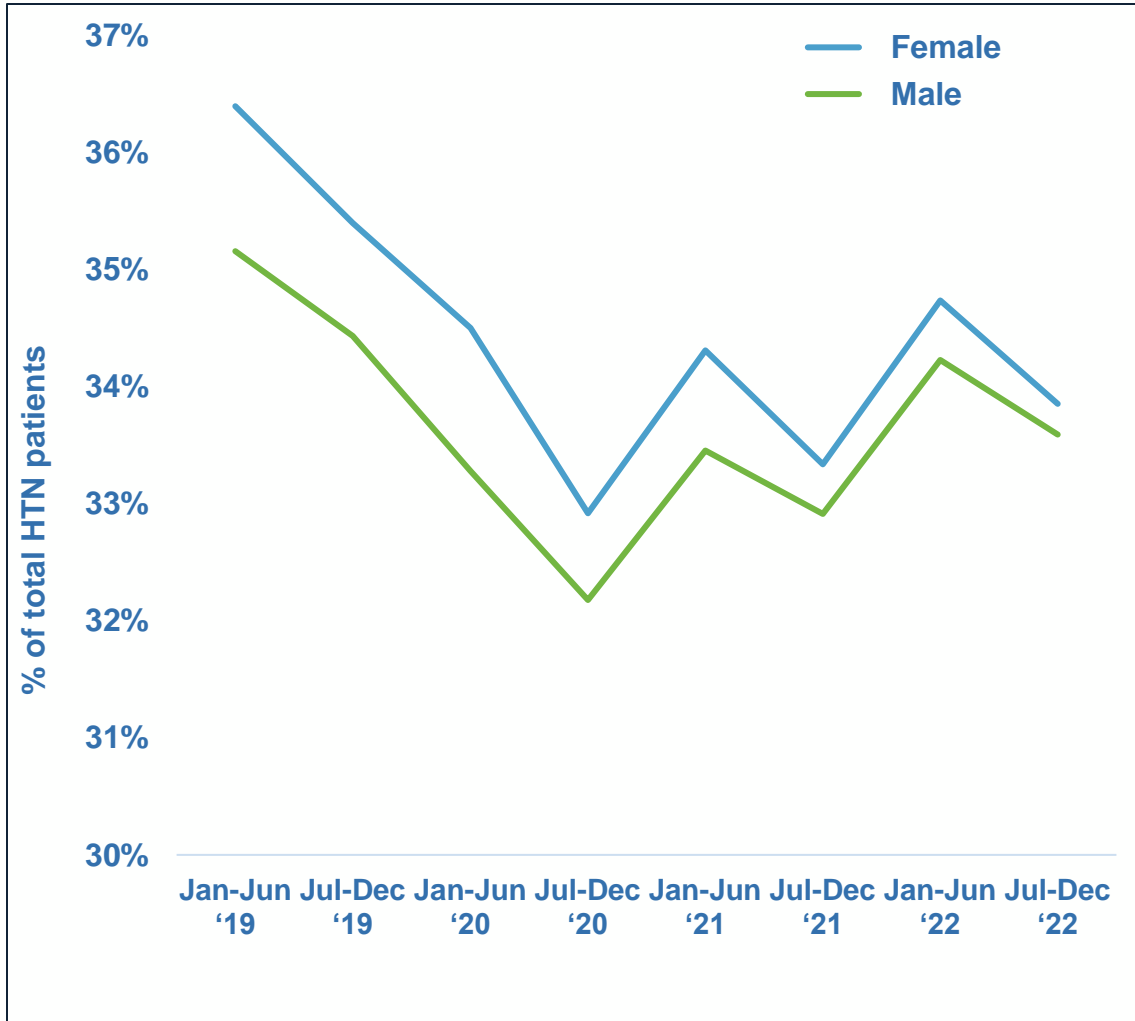
## % of Hypertensive Patients with Controlled Blood Pressure By Ethnicity



## % of Diabetes Patients with Controlled HbA1c Levels By Ethnicity



## % of Hypertensive Patients with Controlled Blood Pressure By Sex



## % of Diabetes Patients with Controlled HbA1c Levels By Sex

