

# INVESTIGATION OF TERATOGENIC CONCERNS IN THE COVID-19 ERA

Emily Daykin, MS

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Advisor: Myla Ashfaq, MS, CGC

## BACKGROUND: COVID-19 AND PREGNANCY

- COVID-19 disproportionately impacts vulnerable populations, including pregnant people<sup>1,2</sup>
- Research on the teratogenicity of COVID-19 infection, treatments, and vaccines is ongoing but no serious adverse outcomes reported<sup>3-7</sup>
- Providers largely agree pregnant people should get vaccinated while patients' vaccine hesitancy has been linked to lower access to healthcare<sup>8-10</sup>
- Concern for non COVID-19 related exposures persisted<sup>11</sup>

Dearth of studies relating to concerns of the teratogenicity of COVID-19

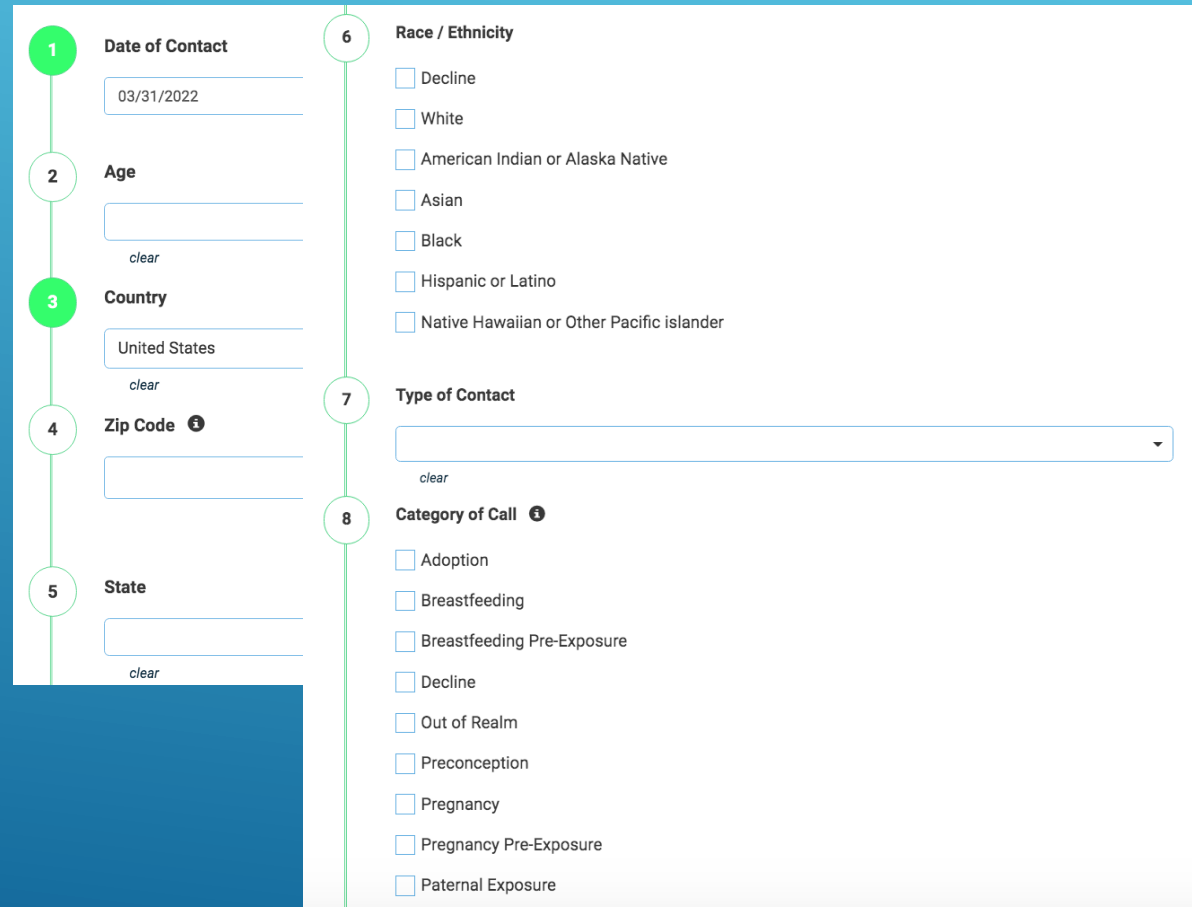
MotherToBaby (MTB) data has never been analyzed on national US scale

**Research question:**

What exposures did people contacting MTB ask about prior to the COVID-19 pandemic compared to during the pandemic?

# METHODS: DATA COLLECTION

- Data sharing agreement with MTB
- Raw data sent in Microsoft Excel documents
- Data points collected vary with different iterations of contact forms



The screenshot shows a data collection form with 8 numbered steps:

- 1 Date of Contact**: Text input field containing "03/31/2022".
- 2 Age**: Text input field with a "clear" button below it.
- 3 Country**: Text input field containing "United States" with a "clear" button below it.
- 4 Zip Code ⓘ**: Text input field.
- 5 State**: Text input field with a "clear" button below it.
- 6 Race / Ethnicity**: List of checkboxes:
  - Decline
  - White
  - American Indian or Alaska Native
  - Asian
  - Black
  - Hispanic or Latino
  - Native Hawaiian or Other Pacific islander
- 7 Type of Contact**: Dropdown menu with a "clear" button below it.
- 8 Category of Call ⓘ**: List of checkboxes:
  - Adoption
  - Breastfeeding
  - Breastfeeding Pre-Exposure
  - Decline
  - Out of Realm
  - Preconception
  - Pregnancy
  - Pregnancy Pre-Exposure
  - Paternal Exposure

# METHODS: DATA CLEANING

## Exclusion criteria

Contact from outside the US

Contact from within the US but without their state or zip code listed

Contact without an exposure listed

Contact with only an "out of realm" exposure listed

- ✓ "I'm transgender and pregnant"
- ✓ "My partner is 46, she has been on the BCP now for 5 weeks. I always use the
- ✓ "need help with dares"
- ✓ "newborn is just TOO MUCH!"
- ✓ "pregnancy questions"
- ✓ "pregnancy"
- ✓ "pregnant"
- ✓ "question about being pregnant"
- ✓ "questions about pregnancy"
- ✓ "questions"
- ✓ "scared I might be pregnant"
- ✓ "sum pregnancy questions" and terminated chat
- ✓ "symptoms"
- ✓ "When is the right time to stop going to school?"
- ✓ "Yes, I am pregnant"
- ✓ 1 day period
- ✓ 10 mos old baby with excessive diarrhea
- ✓ 14 weeks and fell. Should she be worried?
- ✓ 14 weeks pregnant. Felt flutters yesterday and today I felt nothing is it normal t

# METHODS: DATA CLEANING

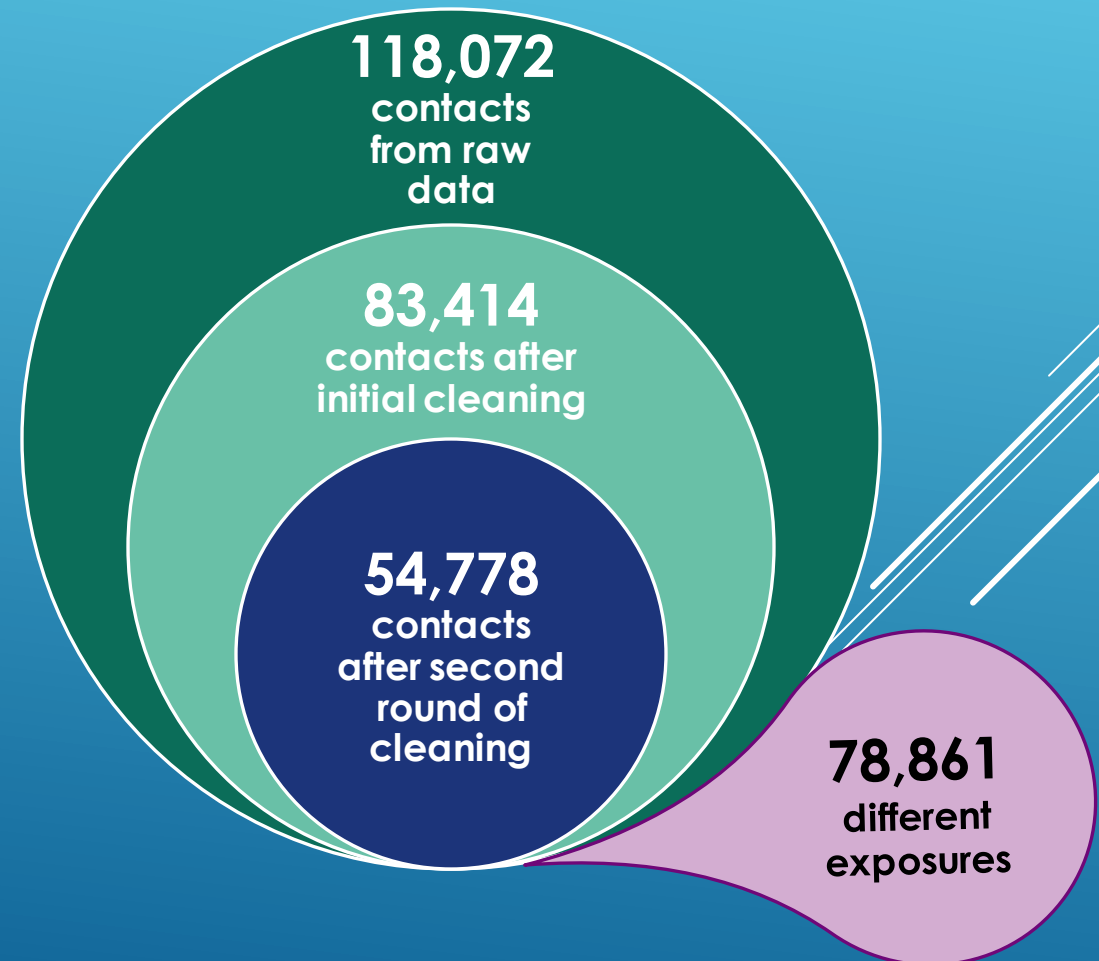
## Exclusion criteria

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# METHODS: DATA CODING

**Broad categories<sup>15</sup>**

**Specific categories**

**(1) prescription medications**

**Grouped medications**

	A	B	C	D	E	F	G	H	I	J
1	Exposure	Grouped Medications	Broad Categorization							
2	5-HTP	Dietary supplement	6				1 = prescription medication			
3	abilify	Psychiatric medication	1				2 = OTC medication			
4	abilify	Psychiatric medication	1				3 = maternal infection			
5	abilify	Psychiatric medication	1				4 = maternal condition			
6	abilify	Psychiatric medication	1				5 = immunization			
7	Abreva	Antiviral	2				6 = herbals, homeopathic, dietary supplements			
8	acacia gum	Dietary supplement	6				7 = cosmetic treatments, beauty products			
9	acacia gum	Dietary supplement	6				8 = environmental exposure			
10	acai berry	Food	10				9 = drugs and substance use			
11	Acetaminophen	Acetaminophen	2				10 = other non-medication			
12	Acetaminophen	Acetaminophen	2							
13	Acetaminophen	Acetaminophen	2							
14	Acetaminophen	Acetaminophen	2							
15	Acetaminophen	Acetaminophen	2							
16	Acetaminophen	Acetaminophen	2							
17	Acetaminophen	Acetaminophen	2							
18	Acetaminophen	Acetaminophen	2							

**(10) other non-medication**

**(11) COVID-19 related**

# RESULTS: DEMOGRAPHIC CHARACTERISTICS

Race/Ethnicity	Consumer N (%)
White	5,855 (57.0%)
Hispanic/Latin(o, a, e)	2,378 (23.2%)
AAPI	866 (8.4%)
Black or African American	666 (6.5%)
Mixed Race/Ethnicity	443 (4.3%)
AIAN	56 (0.5%)
<b>Total</b>	<b>10,264</b>
Insured	Consumer N (%)
Yes	7,674 (94.3%)
No	465 (5.7%)
<b>Total</b>	<b>8,139</b>

Similar proportions compared to 2020 US census data

~12% of nonelderly US adults are uninsured

AAPI = Asian American and Pacific Islander; AIAN = American Indian and Alaska Native

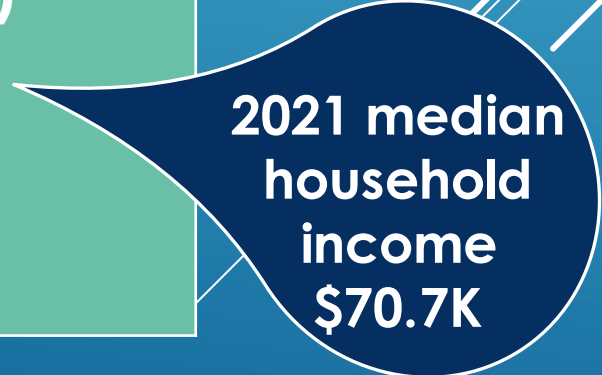
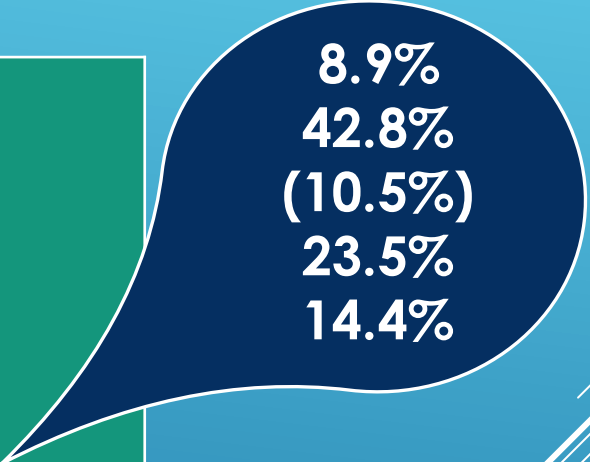


# RESULTS: DEMOGRAPHIC CHARACTERISTICS

Education Level	Consumer N (%)
No or some high school	959 (12.7%)
No or some college	2,524 (33.4%)
Bachelor's degree	2,213 (29.3%)
Advanced degree	1,868 (24.7%)
<b>Total</b>	<b>7,564</b>

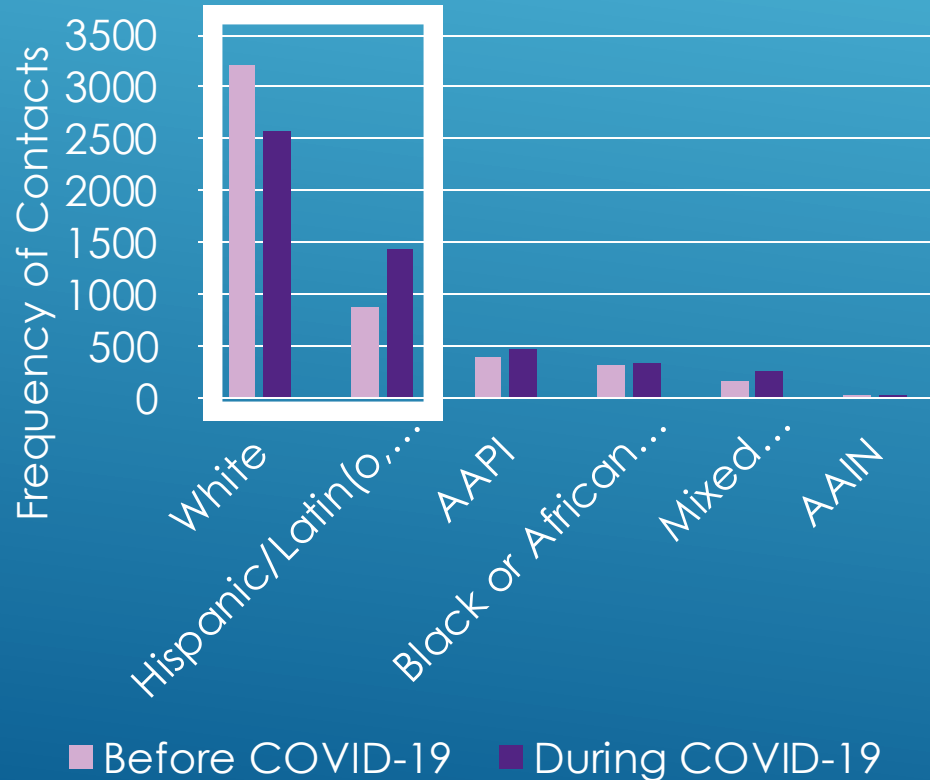
  

Household Income	Consumer N (%)
< 25K	816 (13.6%)
25K - 50K	1,044 (17.4%)
> 50K	4,135 (69.0%)
<b>Total</b>	<b>5,995</b>

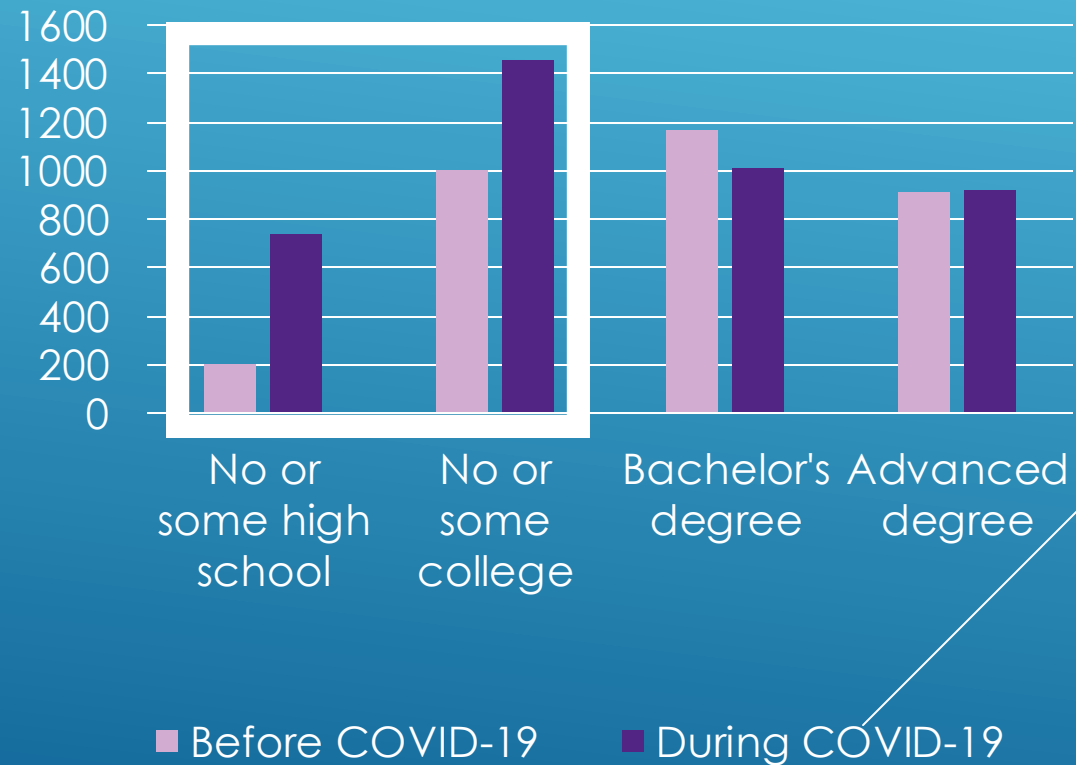


# RESULTS: DEMOGRAPHIC CHARACTERISTICS BEFORE VS DURING COVID-19

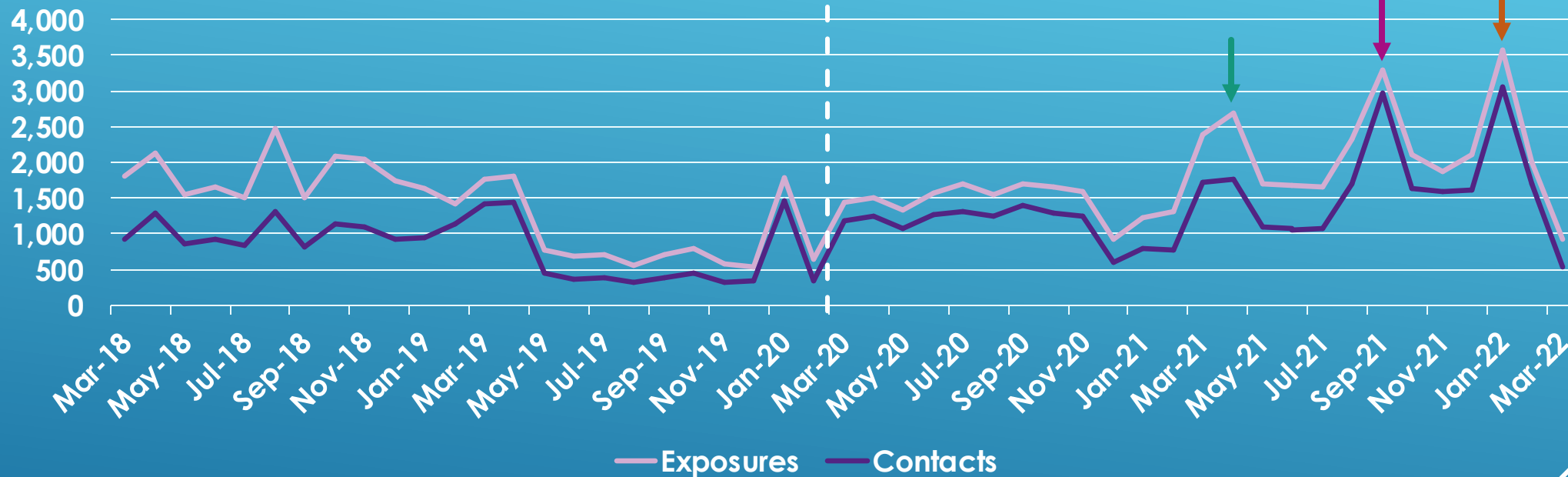
## Race/Ethnicity



## Education Level



# RESULTS: FREQUENCY OF CONTACTS & EXPOSURES



FDA approves Pfizer and Moderna EUA

CDC recommends pregnant people get vaccinated

ACOG and SMFM recommend vaccine

FDA approves booster (Moderna and J&J)

DEC 2020

FEB 2021

APR

JUN

7/30/21

SEP

OCT

DEC 2021

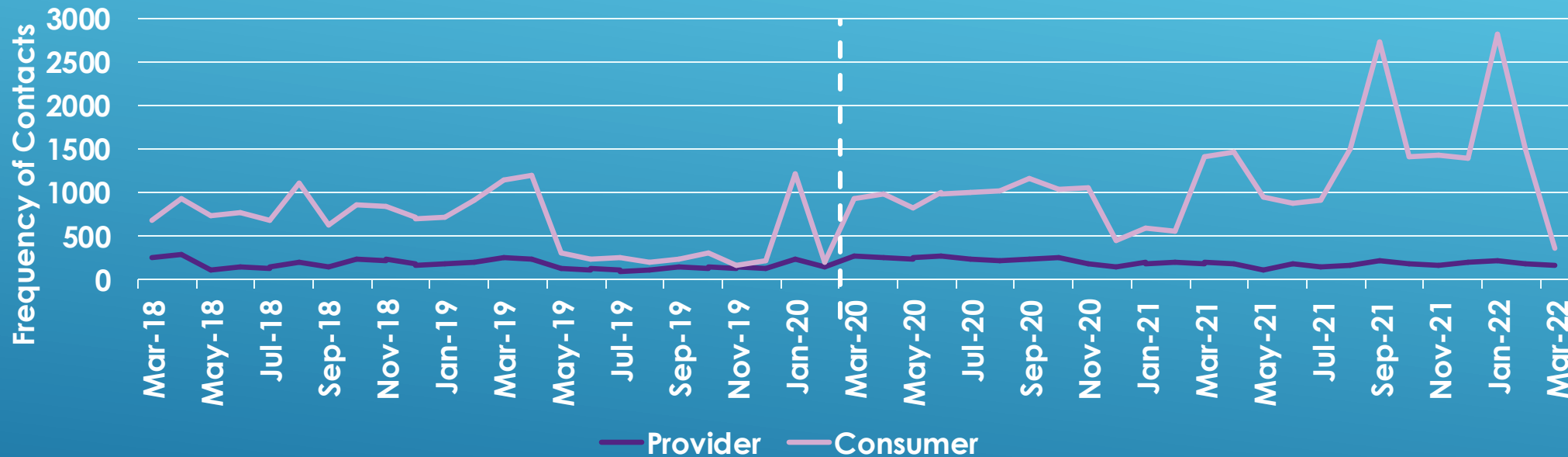
Death toll surpasses 500,000

Delta variant surge

FDA approves booster (Pfizer)

Omicron variant surge

# RESULTS: FREQUENCY OF CONSUMERS & PROVIDERS



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CDC recommends pregnant people get vaccinated

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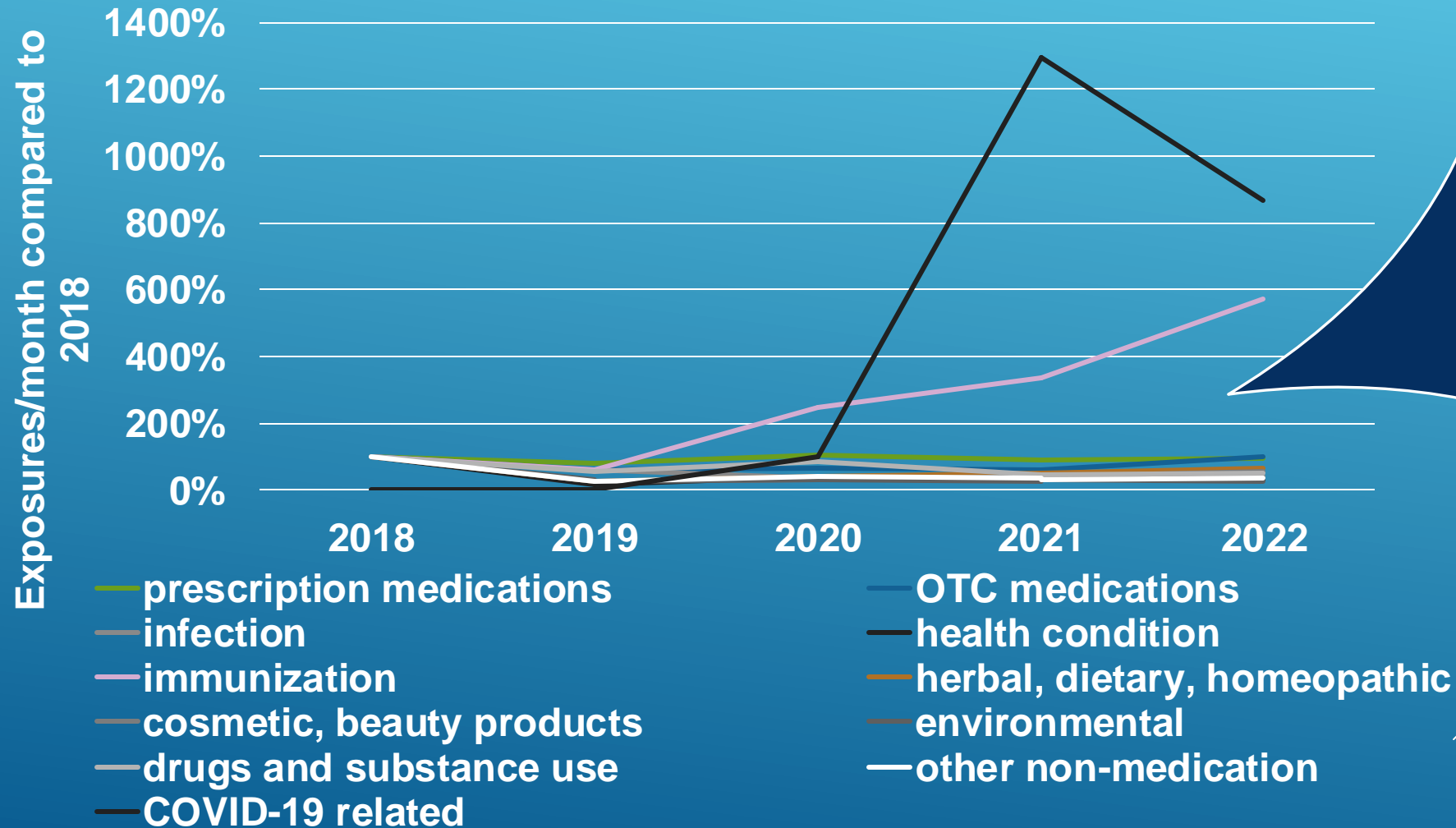
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Omicron variant surge

# RESULTS: TOP 3 EXPOSURES BY CATEGORY

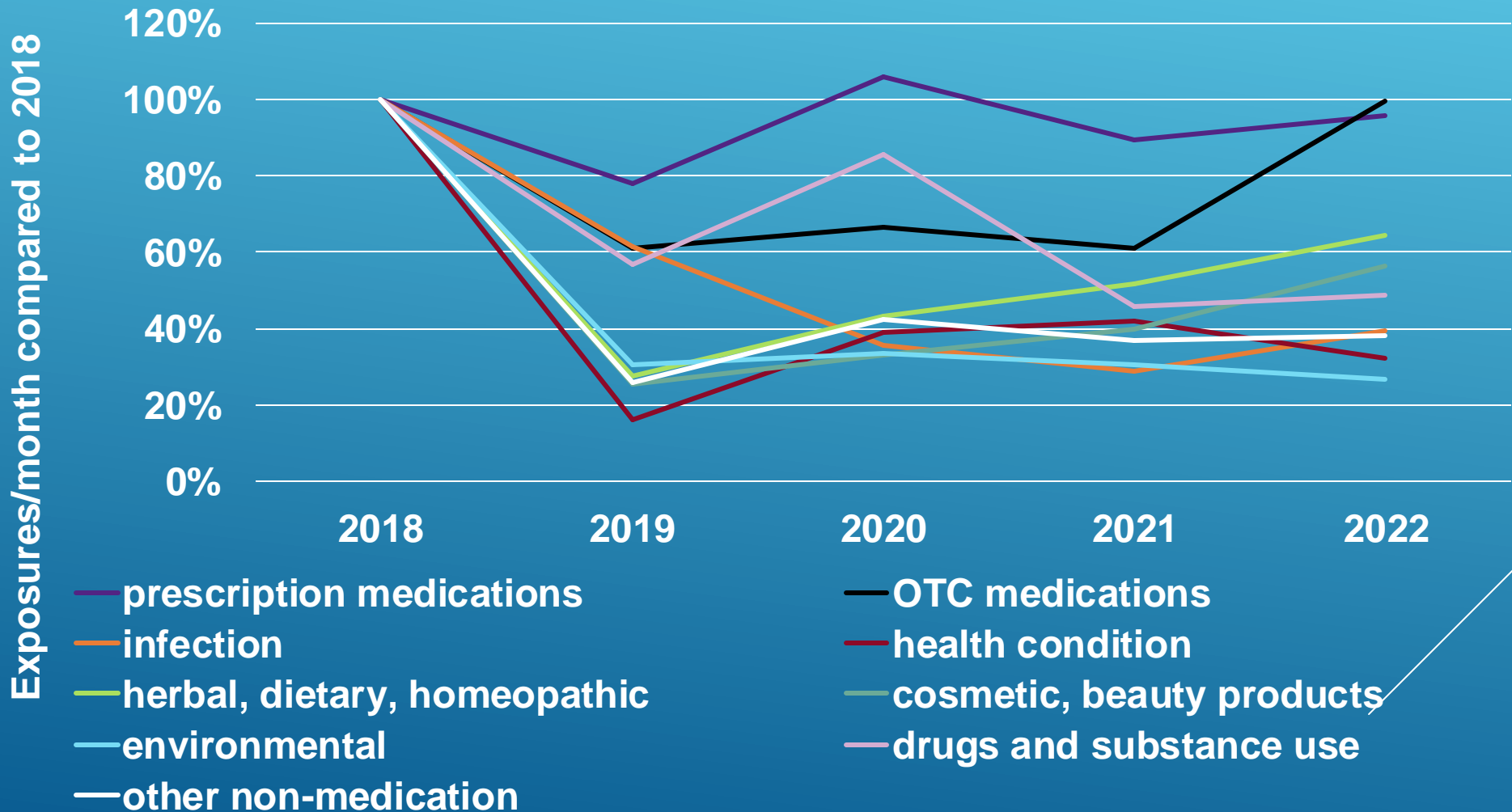
Prescription Medications		N (%)	Health Condition		N (%)
Psychiatric medication	←	7,650 (28.5%)	Anxiety		304 (29.4%)
Antibiotic		2,180 (8.1%)	Depression		226 (21.9%)
Anticonvulsant		1,788 (6.7%)	Hyperthermia		84 (8.1%)
OTC Medications		N (%)	Immunization		N (%)
Cold medication	}	2,599 (23.2%)	Flu v		3,903 (56.3%)
Antihistamine		2,281 (20.4%)	TDA	2018	340 (8.7%)
Acetaminophen		2,222 (19.9%)	MM	2019	266 (6.8%)
				2020	<b>1140 (29.2%)</b>
				2021	<b>1530 (39.2%)</b>
				2022	627 (16.1%)
Year	N (%)	N (%)	COV		N (%)
2018	<b>695 (38.8%)</b>	1,791 (61.3%)	COVID		9,037 (83.3%)
2019	<b>643 (35.9%)</b>	305 (10.4%)	COVID		1,781 (16.4%)
2020	223 (12.5%)	130 (4.4%)	COVID treatment		22 (0.2%)
2021	168 (9.4%)				
2022	62 (3.5%)				

# RESULTS: FREQUENCY OF BROAD CATEGORIES

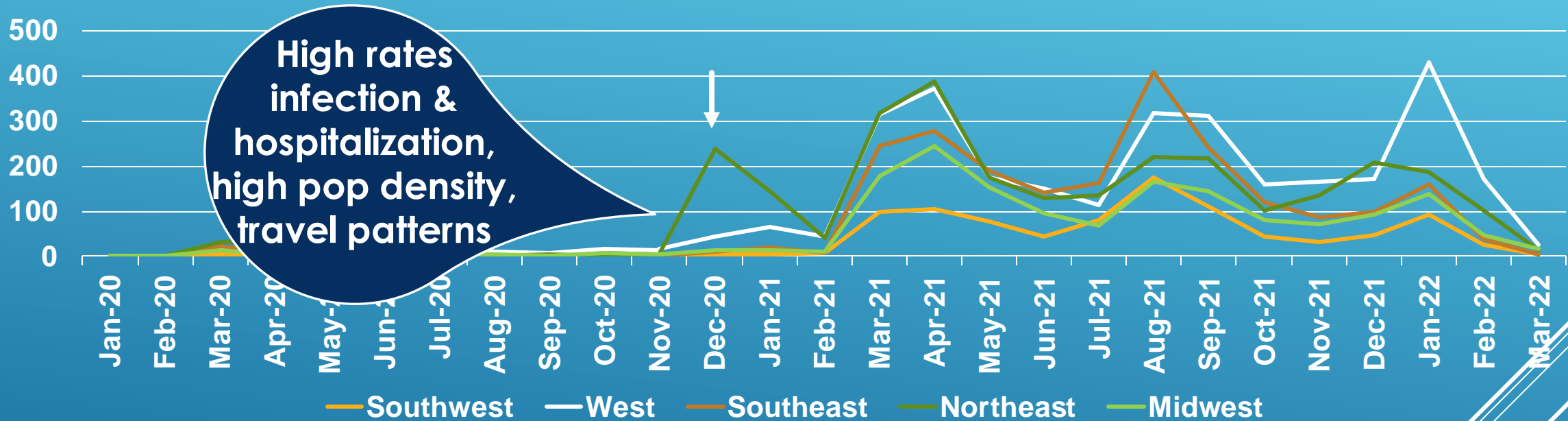


**Flu Vaccine Rates:**  
 34.9% in 2018-2019  
 38.4% in 2019-2020  
 37.7% in 2021-2022  
 37.1% in 2022-2023

# RESULTS: FREQUENCY OF BROAD CATEGORIES



# RESULTS: FREQUENCY OF COVID-18 EXPOSURES



FDA approves Pfizer and Moderna EUA

CDC recommends pregnant people get vaccinated

ACOG and SMFM recommend vaccine

FDA approves booster (Moderna and J&J)



Death toll surpasses 500,000

Delta variant surge

FDA approves booster (Pfizer)

Omicron variant surge



# CONCLUSION: KEY TAKEAWAYS

## EXPOSURES

- PRESCRIPTION MEDICATIONS, OTC MEDICATIONS, IMMUNIZATIONS, AND HERBAL/HOMEOPATHIC/ DIETARY SUPPLEMENTS WERE CONSISTENTLY COMMONLY ASKED ABOUT
- INCREASE IN CONTACTS AND EXPOSURES OVER THE COURSE OF THE STUDY

## COVID-19

- FLUCTUATIONS IN THE BREAKDOWN OF RACE/ETHNICITY, EDUCATION LEVEL, AND US REGION IN THE STUDY POPULATION BEFORE COMPARED TO DURING COVID-19
- QUESTIONS ABOUT OTHER IMMUNIZATIONS INCREASED DURING COVID-19

# CONCLUSION: PRACTICE IMPLICATIONS

## Present Day

Knowing most commonly  
asked about exposures

Create generalized informational  
materials at clinics/hospitals

## Future Pan/Epidemics

Evolving information about  
infection and vaccination

Concern about unrelated  
exposures continued

Importance of accessible resources

# CONCLUSION: LIMITATIONS & FUTURE DIRECTIONS

## LIMITATIONS

- EXCLUSION OF CONTACTS WITHOUT US STATE
- EXCLUDED UTAH MTB SITE
- ONLY ONE AUTHOR CODED THE MAJORITY OF EXPOSURES
- INCONSISTENCIES IN CODING
- SOME COVID-19 RELATED EXPOSURES COULD BE UNACCOUNTED FOR

## FUTURE DIRECTIONS

- REINCORPORATE SOME CONTACTS THAT WERE EXCLUDED
- EXPAND TIME FRAME OF DATA COLLECTION
- CODE EXPOSURES BASED ON INDICATION
- ASSESS ADDITIONAL DATAPPOINTS, PERFORM QUALITATIVE ANALYSIS

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# THANK YOU

# QUESTIONS?