

Do vaccines reduce the harm of COVID-19 for people living with HIV and people who inject drugs in BC?



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COVAXHIV Study

A measure of how well vaccines work in the real world.

1

Effectiveness of COVID-19 vaccines in people living with HIV in British Columbia and comparisons with a matched HIV-negative cohort: a test-negative design

Fowokan A, Samji H*, Puyat JH, Janjua NZ, Wilton J, Wong J et al. Effectiveness of COVID-19 vaccines in people living with HIV in British Columbia and comparisons with a matched HIV-negative cohort: a test-negative design. *International Journal of Infectious Diseases*. 2023;127:162-70.

2

COVID-19 vaccine effectiveness by HIV status and history of injection drug use

Puyat JH, Wilton J, Fowokan A, Janjua NZ et al. COVID-19 vaccine effectiveness by HIV status and history of injection drug use. Submitted 2023



“In research terms”
or “in this study”



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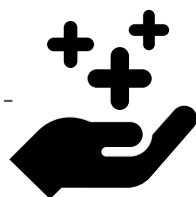
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Session Overview

COVAXHIV Team
Introductions



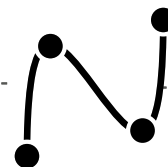
Importance and
purpose



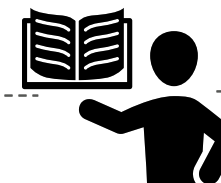
Conclusion from
the study



How we arrived at
the conclusion



Takeaways



Questions + input



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Who are we?

Aslam Anis Nominated Principal Investigator, National COVAXHIV Study



AIM 1

To compare the immunogenicity of COVID-19 vaccines among PLWH to people who are HIV-negative.

AIM 2

To estimate COVID-19 Vaccine Effectiveness among PLWH compared with people who are HIV-negative.



BC



ON



QC

Provincial Principal Investigators:

Hasina Samji

Ann N. Burchell

Cecilia T. Costiniuk



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Who are we?

BRITISH COLUMBIA COVAXHIV Study Team

Aslam Anis

Naveed Janjua

Hasina Samji

Jason Wong

Adeleke Fowokan

Troy Grennan

Joseph Puyat

Darren Lauscher

James Wilton

Monte Strong



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We wanted to find out...



Vaccine effectiveness (VE)

How well do vaccines protect people living with HIV against COVID-19 infection in the “real world”?

outcome of interest

Vaccine efficacy

- How well vaccines work under controlled conditions, such as in a clinical trial.
- May not reflect real world conditions.

VS

Vaccine effectiveness

- How well vaccines work outside of controlled conditions in the real world.
- Can help determine the true impact of vaccines on public health.



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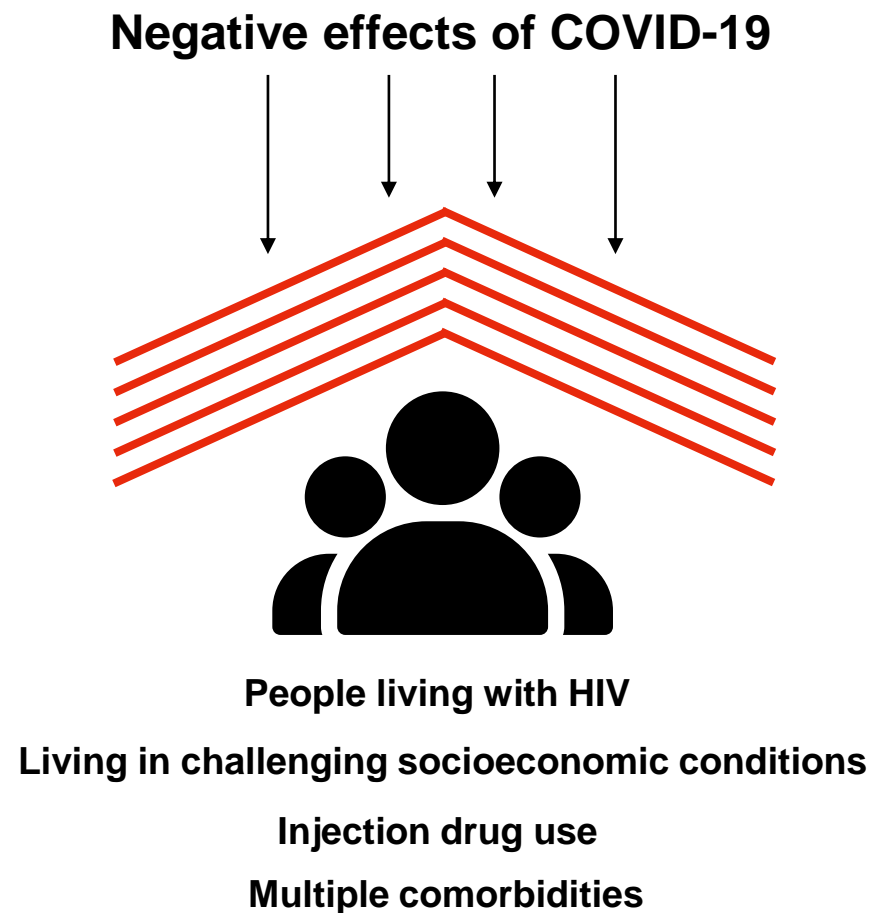


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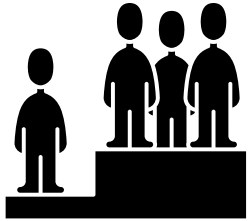
Why was this study conducted?

The possibility exists that people living with HIV (PLWH) might be less protected and at higher risk for worse COVID-19 outcomes.

Some PLWH can face intersecting factors that could equal being more vulnerable to COVID-19; potentially lowering the guard of immunity against the outcome of interest; COVID-19 infection.



Why don't we already know?



The PLWH population was underrepresented in vaccine trials that determined vaccine approvals. In cases where samples were included, the samples were not representative of the diverse nature of the PLWH population which can include people who inject drugs.



Evidence regarding real-world effectiveness of COVID-19 vaccines in PLWH and PWID remains sparse.



Given the fact we witnessed the rise of new COVID-19 variants, the conclusion from the study can help inform vaccine policies for people living with HIV and people who inject drugs.



Study Aims and Objectives

AIM 2

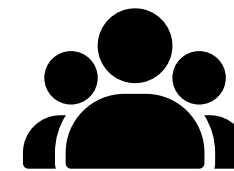
To estimate COVID-19 Vaccine Effectiveness among PLWH compared with people who are HIV-negative.

OBJECTIVE 1

To estimate VE of approved vaccines against laboratory-confirmed infection with SARS-CoV-2 and compare VE estimates with a matched HIV-negative cohort.



LIVING WITH HIV & TESTED FOR COVID-19 INFECTION



NOT LIVING WITH HIV & TESTED COVID-19 INFECTION



TEST NEGATIVE DESIGN - comparing the vaccination status of those that tested positive, referred to as cases, versus those that tested negative, referred to as controls.



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Study Aims and Objectives

AIM 2

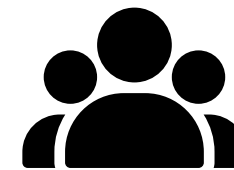
To estimate COVID-19 Vaccine Effectiveness among PLWH compared with people who are HIV-negative.

OBJECTIVE 2

To explore differences in VE for PLWH based on injection drug use.



INJECTION DRUG USE



NO INJECTION DRUG USE

PLWH



COHORT – a group of people who share one or more characteristics



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Conclusion from the study



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Conclusion

The purpose of a conclusion is to help you, the audience, understand why the research study should matter to you.



Research Study

The purpose of a research study is to discover new information or answer a question about how we learn, behave and function with an end-goal of benefiting a community or society.



Conclusion



In general, two doses of vaccine offered substantial protection against COVID-19 infection prior to the emergence of the Omicron variant. Findings may provide reassurance for people living with HIV and their healthcare providers, particularly for those without a history of IDU.

PLWH and people with a history of IDU may experience faster waning of protection which might have implications for timing of booster doses.



The study is not stating that stopping at two doses is recommended; subsequent booster doses in a timely manner are recommended.



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How we arrived at the conclusion



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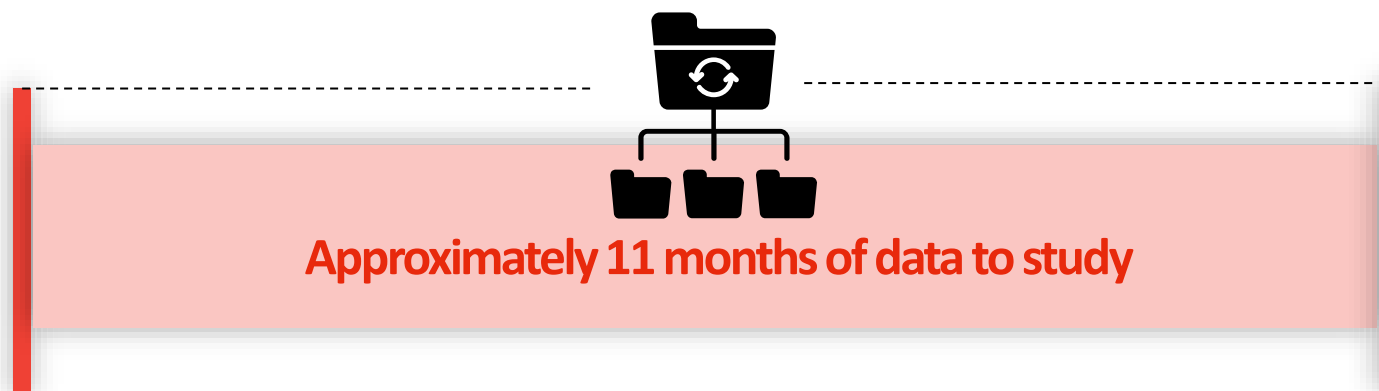


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Study period



The duration of time when data is collected from to be studied.



Approximately 11 months of data to study

December 15, 2020

COVID-19 vaccines first became available in BC

November 21, 2021

OMICRON period of the pandemic begins



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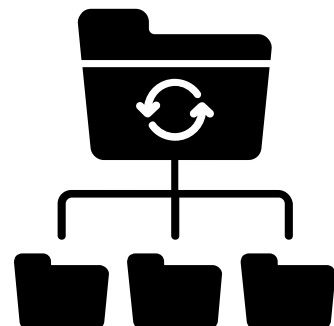


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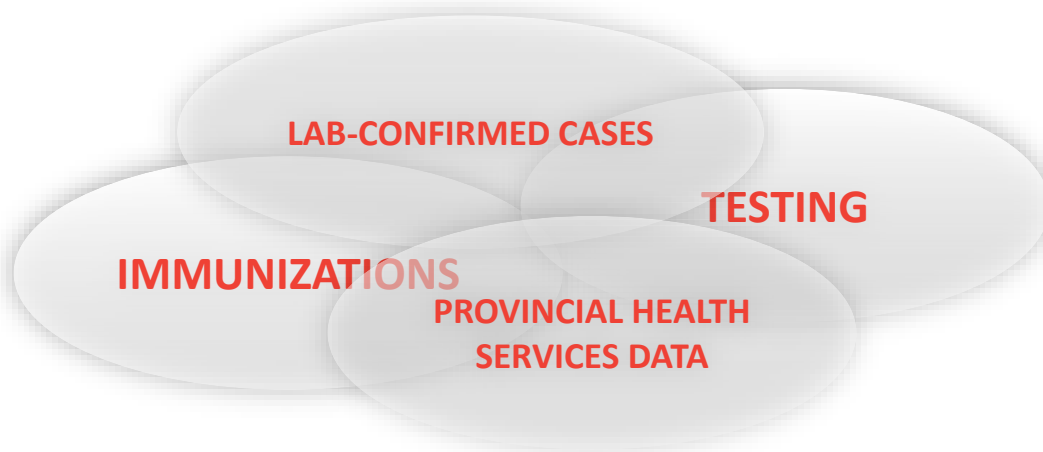
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Where did we get the data from?



British Columbia COVID-19 Cohort (BCC19C)

Collaboration between the BCCDC, PHSA, and Ministry of Health



Where did we get the data from?

DATASET	DESCRIPTION
Provincial COVID-19 Monitoring Solution (PCMS)	The PCMS data set contains critical care & COVID-19 admission data.
Integrated Lab Dataset for COVID-19	Comprehensive diagnostic laboratory test results from private and public laboratories across British Columbia
COVID-19 Vaccine Database	Contains provincial COVID-19 vaccination data
Medical Services Plan of British Columbia (MSP)	Data on medically necessary services provided by fee-for-service practitioners using ICD-9 diagnostic codes
Chronic Disease Registry (CDR)	The CDR contains records/diagnoses of chronic health conditions for all residents of BC registered for provincial health insurance
Client Roster	The Client Roster represents the best available demographic and geographic information for all BC residents
Discharge Abstract Database (DAD)	The DAD includes demographic, clinical, and administrative records for all hospital inpatient discharges.
National Ambulatory Care Reporting System	NACRS captures information on patient visits to hospital-based and community-based ambulatory care



Who was included in this study?

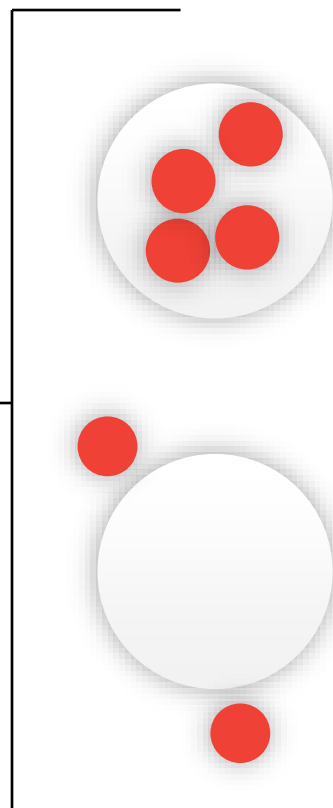


Inclusion and exclusion criteria help researchers identify the study population in a consistent, reliable, and objective manner.



People living with HIV

People's data used in this study is de-identified; meaning no information such as name, address, phone number, email, etc. is disclosed.



- Alive as of December 15, 2020 *
- Aged 19 years or older on December 15, 2020
- BC resident
- Individuals who received non-Health Canada approved COVID-19 vaccine or non-BC vaccine stock
- Records after Nov. 21, 2021 (start of Omicron)

* (when COVID-19 vaccines first became available in BC)



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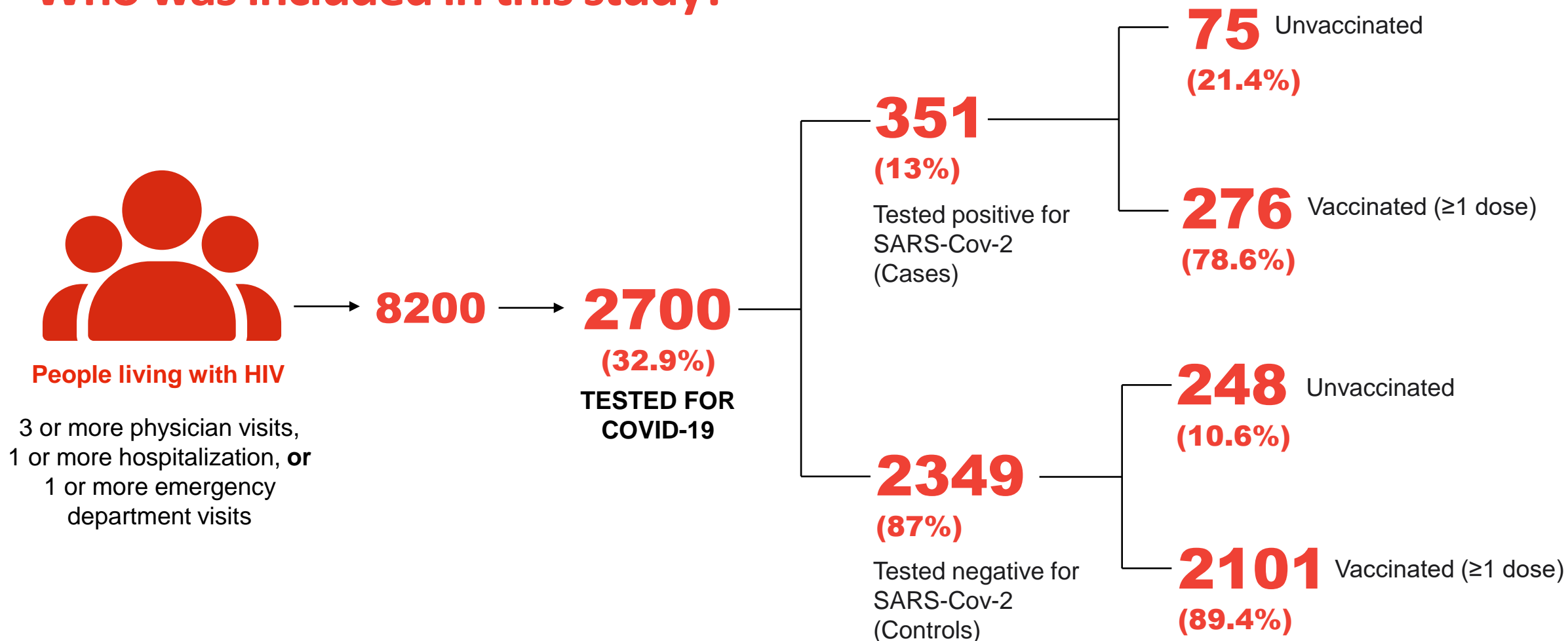


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Who was included in this study?



Who was included in this study?



People living with HIV

2700 Received a test for SARS-Cov-2

VE was estimated by comparing...
UNVACCINATED vs VACCINATED

If both are equally likely to get COVID

VE = 0%

If none of the vaccinated got COVID

VE = 100%



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Who was included in this study?



People living with HIV

2700 Received a test for SARS-Cov-2



Comparator Group

People not living with HIV

Received a test for SARS-Cov-2

To better understand how COVID-19 vaccines work in PLWH and how this compares to those who do not live with HIV.



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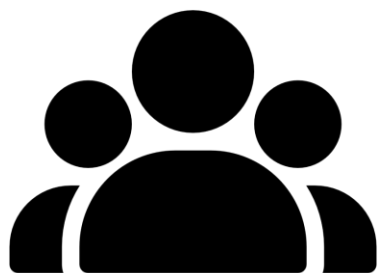
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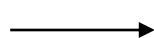
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Who was included in this study?

Comparator Group



People not living with HIV

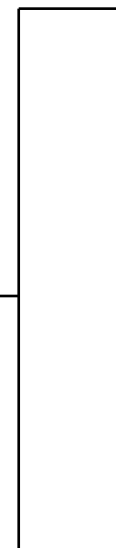


5M
(approximately)



375 043
(7.5%)

TESTED FOR COVID-19



103 049
(27.5%)

Tested positive for SARS-Cov-2 (Cases)

271 994
(72.5%)

Tested negative for SARS-Cov-2 (Controls)

We identified a matched HIV-negative comparator using age, sex, community health service area, and testing status.



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Who was included in this study?

Testing rate appears to be higher in the PLWH group **(32.9%)**



People living with HIV

2700 Received a test for SARS-Cov-2

351 Tested positive for SARS-Cov-2 **(13%)** (Cases)



People not living with HIV

Testing rate **(7.5%)**

375 043 Received a test for SARS-Cov-2

103 049 Tested positive for SARS-Cov-2 **(27.5%)** (Cases)



How did the researchers analyze the data?



Statistical analysis The science of collecting, exploring, and presenting data to discover underlying patterns and trends was used.

Multivariable logistic regression analysis A mathematical rule, a formula, was applied to estimate VE by comparing the odds, or likelihood, of testing positive for COVID-19, in the vaccinated vs. unvaccinated individuals while accounting for other factors (or confounders/covariates) that may influence the likelihood.

Confounders (Covariates) Variables that may influence likelihood of COVID-19 infection but were not the focus of the study (which was vaccination).

In this study, the variables were age, sex, income based on geographical area, health authority, number of COVID-19 tests 3 months prior to study period, Elixhauser comorbidity index, injection drug use, and bi-weekly testing periods.

Characteristics of Participants



People living with HIV



People not living with HIV

Study Characteristics	Test Positive (n = 351)	Test Positive (n = 103 049)
Mean Age (SD)	48.7 (11.9)	44.8 (17.3)
Sex (Female)	127 (36.2%)	51 354 (49.8%)
Age		
19-29	19 (5.4%)	23 447 (22.8%)
30-39	68 (19.4%)	22 557 (21.6%)
40-49	97 (27.6%)	19 098 (18.5%)
50-59	100 (28.5%)	16 810 (16.3%)
60-69	51 (14.5%)	11 642 (11.3%)
70-79	14 (4.0%)	5 924 (5.8%)
≥80	<5	3 871 (3.8%)



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Characteristics of Participants



People living with HIV



People not living with HIV

Study Characteristics	Test Positive (n = 351)	Test Positive (n = 103 049)
Income Quintiles		
1 (Lowest)	<u>157 (44.7%)</u>	23 361 (22.9%)
2	60 (17.1%)	21 143 (20.5%)
3	57 (16.2%)	20 170 (19.6%)
4	51 (14.5%)	20 389 (19.8%)
5 (Highest)	26 (7.4%)	17 522 (17.0%)
Vaccine Doses		
0	75 (21.4%)	21 153 (20.5%)
1	26 (7.4%)	6 437 (6.3%)
2	<u>224 (63.8%)</u>	<u>71 217 (69.1%)</u>
3	26 (7.4%)	4 242 (4.1%)



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Characteristics of Participants



People living with HIV



People not living with HIV

Study Characteristics	Test Positive (n = 351)	Test Positive (n = 103 049)
Elixhauser Comorbidity Index		
0	39 (11.1%)	32 433 (31.5%)
1	37 (10.5%)	25 722 (25.0%)
2	58 (16.5%)	16 982 (16.5%)
3 or more	217 (61.8%)	27 912 (27.1%)
Health Authority		
Fraser Health	111 (31.6%)	70 581 (26.0%)
Interior	23 (6.6%)	19 046 (18.5%)
Northern	22 (6.3%)	25 976 (9.6%)
Vancouver Coastal	175 (49.9%)	63 013 (23.2%)
Vancouver Island	20 (5.7%)	57 540 (21.2%)



Characteristics of Participants



People living with HIV



People not living with HIV

Study Characteristics	Test Positive (n= 351)	Test Positive (n = 103 049)
Persons who inject drugs		
Yes	176 (50.1%)	5 703 (5.5%)
Pandemic Wave Testing Periods		
Wave 2: Dec. 15, 2020 to Feb. 6, 2021	74 (21.1%)	16 886 (16.4%)
Wave 3: Feb. 7, 2021 to Jul. 3, 2021	124 (35.3%)	45 220 (43.9%)
Wave 4: Jul. 4, 2021 to Dec 4, 2021	153 (43.6%)	40 943 (39.7%)



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Adjusted VACCINE EFFECTIVENESS estimates against symptomatic infection (by time since vaccine dose)



People living with HIV



People not living with HIV

STUDY PERIOD (Dec 202 – Nov 2021)	PLWH (n =2700)	Matched HIV-negative cohort (n = 375 043)
	VE (%)	VE (%)
1 st dose (≥14 days)	49.0	54.5
2 nd dose (7 to 59 days)	71.1	91.4
2 nd dose (60 to 89 days)	89.3	89.6
2 nd dose (90 to 119 days)	80.8	87.5
2 nd dose (120 to 179 days)	51.3	84.2

49% is the
“educated guess”



Waning immunity



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Adjusted VACCINE EFFECTIVENESS estimates against symptomatic infection (by time since vaccine dose)



People living with HIV



People not living with HIV

STUDY PERIOD (Dec 202 – Nov 2021)	PLWH (n =2700)			Matched HIV-negative cohort (n = 375 043)		
	VE (%)	Lower CI (%)	Upper CI (%)	VE (%)	Lower CI (%)	Upper CI (%)
1 st dose (≥14 days)	49.0	-14.6	77.3	54.5	51.0	57.7
2 nd dose (7 to 59 days)	71.1	39.7	86.1	91.4	90.9	91.8
2 nd dose (60 to 89 days)	89.3	72.2	95.9	89.6	89.1	90.1
2 nd dose (90 to 119 days)	80.8	59.3	90.9	87.5	86.9	88.1
2 nd dose (120 to 179 days)	51.3	4.8	75.0	84.2	83.4	85.0



Confidence interval A range of estimated values that a particular measurement or statistic is likely to fall within, based on a sample of data.



Adjusted VACCINE EFFECTIVENESS estimates against symptomatic infection (by time since vaccine dose)



People living with HIV

STUDY PERIOD (Dec 202 - Nov 2021)	PLWH + Injection Drug Use (n=176)			PLWH without history of Injection Drug Use (n=175)		
	VE (%)	Lower CI (%)	Upper CI (%)	VE (%)	Lower CI (%)	Upper CI (%)
2 nd dose (≥ 7 days*)	65.8	43.5	79.3	80.3	62.7	89.6
2 nd dose (7-59)	65.7	17.9	85.7	80.3	50.9	92.1
2 nd dose (60-89)	91.3	62.3	98.0	85.9	56.8	95.4
2 nd dose (90-119)	65.9	21.6	85.2	88.1	63.6	96.1
2 nd dose (120-179)	42.4	-17.8	71.8	64.0	15.7	84.7



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Key Takeaways

- 1.** COVID-19 vaccine uptake among people living with HIV was similar to the general population up to November 21, 2021.
 - 88.0% had at least one dose vs 88.1% in general population
 - 81.3% had at least two doses vs 83.7% in general population
- 2.** The prevalence of IDU history (50.1% vs. 5.5%) and history of three or more comorbidities (61.8% vs 27.1%) was substantially higher among PLWH compared to HIV-negative individuals for COVID-19 cases.



Key Takeaways

- 3.** When compared to the HIV-negative cohort, VE estimates appeared to peak later in PLWH than in the matched HIV-negative cohort and the degree of waning was relatively quicker in PLWH.
- 4.** The higher prevalence of IDU among PLWH may partly explain our previously published finding of slower buildup / quicker waning among PLWH overall compared to HIV-negative individuals.



Conclusion

In general, two doses of vaccine offered substantial protection against COVID-19 infection prior to the emergence of the Omicron variant. Findings may provide reassurance for people living with HIV and their healthcare providers, particularly for those without a history of IDU.

PLWH and people with a history of IDU may experience faster waning of protection which might have implications for timing of booster doses.



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Takeaways

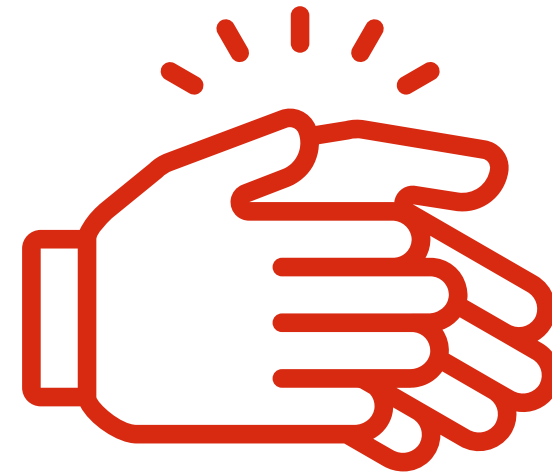


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Acknowledgments

- Public Health Agency of Canada
- COVID-19 Immunity Task Force
- Canadian Institutes for Health Research
- Canadian HIV Trials Network
- Provincial Health Services Authority
- BC Centre for Disease Control
- BC Ministry of Health
- The population of PLWH in BC whose data have been used in this study



BCC19C Acknowledgments

Thank you to the people of British Columbia, whose data are integrated in the BCC19C, and for whom this research is intended to benefit.

PHSA teams

Data & Analytic
Services (BCCDC)

Data Analytics, Evaluation, and
Reporting (PHSA)

Data Stewards



Funding

The BCC19C was established and is maintained through operational support from Data Analytics, Reporting and Evaluation (DARE) and the BC Centre for Disease Control (BCCDC) at the Provincial Health Services Authority. The COVAXHIV project is supported by funding from the Public Health Agency of Canada, through the Vaccine Surveillance Reference group and the COVID-19 Immunity Task Force, and the Canadian Institutes for Health Research Canadian HIV Trials Network.

Disclaimer

All inferences, opinions, and conclusions drawn in this presentation are those of the authors, and do not reflect the opinions or policies of the Data Steward(s).



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MOH Data citations

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SUPPLEMENTAL SLIDES



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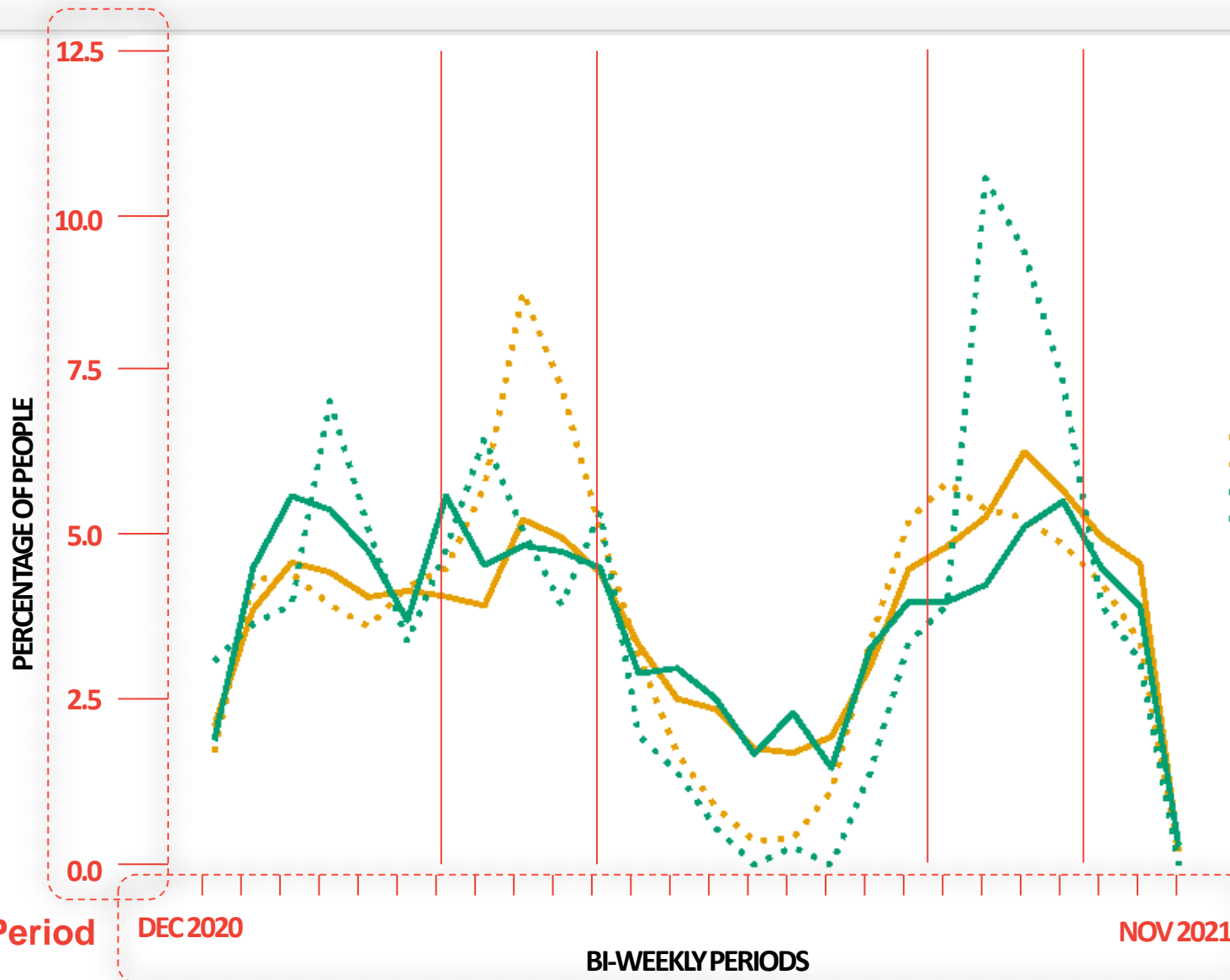
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Proportion of PLWH and HIV negative people who tested positive and negative for SARS-CoV-2

- HIV- & C19-
- HIV- & C19+
- PLWH & C19-
- PLWH & C19+



Characteristics of Participants



People living with HIV

Study Characteristics	Test Positive (n = 351)	Test Negative (n = 2349)
Mean Age (SD)	48.7 (11.9)	50.6 (13.2)
Sex (Female)	127 (36.2%)	646 (27.5%)
Age		
19-29	19 (5.4%)	146 (6.2%)
30-39	68 (19.4%)	393 (16.7%)
40-49	97 (27.6%)	497 (21.2%)
50-59	100 (28.5%)	729 (31.0%)
60-69	51 (14.5%)	414 (17.6%)
70-79	14 (4.0%)	135 (5.8%)
≥80	<5	35 (1.5%)



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How we arrived to
the conclusion



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Characteristics of Participants



People living with HIV

Study Characteristics	Test Positive (n = 351)	Test Negative (n = 2349)
Income Quintiles		
1 (Lowest)	157 (44.7%)	971 (41.3%)
2	60 (17.1%)	461 (19.6%)
3	57 (16.2%)	421 (17.9%)
4	51 (14.5%)	319 (13.6%)
5 (Highest)	26 (7.4%)	174 (7.4%)
Vaccine Doses		
0	75 (21.4%)	248 (10.6%)
1	26 (7.4%)	155 (6.6%)
2	224 (63.8%)	1549 (65.9%)
3	26 (7.4%)	397 (16.9%)



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Characteristics of Participants

Study Characteristics	Test Positive (n = 351)	Test Negative (n = 2349)
Elixhauser Comorbidity Index		
0	31 (7.8%)	239 (9.3%)
1	42 (10.6%)	335 (13.0%)
2	63 (15.8%)	348 (13.5%)
3 or more	262 (65.8%)	1659 (64.3%)
Health Authority		
Fraser Health	124 (31.2%)	718 (27.8%)
Interior	29 (7.3%)	197 (7.6%)
Northern	25 (6.3%)	81 (3.1%)
Vancouver Coastal	191 (48.0%)	1333 (51.7%)
Vancouver Island	29 (7.3%)	250 (9.7%)



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Characteristics of Participants



People living with HIV

Study Characteristics	Test Positive (n= 351)	Test Negative (n = 2349)
Persons who inject drugs		
Yes	176 (50.1%)	922 (39.3%)
Pandemic Wave Testing Periods		
Wave 2: Dec. 15, 2020 to Feb. 6, 2021	74 (21.1%)	467 (19.9%)
Wave 3: Feb. 7, 2021 to Jul. 3, 2021	124 (35.3%)	963 (41.0%)
Wave 4: Jul. 4, 2021 to Dec 4, 2021	153 (43.6%)	919 (39.1%)



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