

Effectiveness of mRNA COVID-19 vaccine booster doses against Omicron severe outcomes

Supplementary Appendix

This appendix has been provided by the authors to give readers additional information about their work.

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Supplementary Text: Determination of symptom status at the time of SARS-CoV-2 testing

The Ontario Laboratories Information System (OLIS) contains open fields (specifically, using the Patient Note Clinical Information field or reporting under the observation code XON13543-4 [Patient symptoms]) that records whether individuals tested for SARS-CoV-2 presented with symptoms at the time of the test. These character-based fields were originally delimited by commas, slashes, semicolons, or ampersands. Character text-strings were parsed and aggregated.

One of the authors, JCK, identified symptom classifications available in OLIS as of October 5, 2022 that were likely to be due to COVID-19. Low-frequency terms (appearing <25 times throughout) were excluded. Values listed in the symptoms fields were classified as “symptomatic” and “asymptomatic.” We purposely chose a broadly inclusive definition to capture all potentially relevant COVID-19 symptoms, including atypical symptoms and chronic conditions, based on our scientific and medical understanding of COVID-19-related symptoms

Terms determined to be indicative of COVID-19 symptoms (classified as ‘symptomatic’) are listed below. In addition to this list, we used SYMPTOMATIC (or partial spellings thereof) or mention of symptom onset.

0 TASTE, 100, 101, 102, 2021 - COUGH, 2021 - FEVER, 2021 - SORE THROAT, 21 - COUGH, 37.8, 37.9, 38, 38, 38.1, 38.2, 38.3, 38.4, 38.5, 38.6, 38.7, 38.8, 38.9, 39, 39, 39.1, 39.2, 39.3, 39.4, 39.5, 39.6, 40, A COLD, AB PAIN, ABD, ABD DISCOMFORT, ABD PAIN, ABD. PAIN, ABD.PAIN, ABDO CRAMPS, ABDO DISCOMFORT, ABDO PAIN, ABDO PAIN AND HEADACHE, ABDOMEN PAIN, ABDOMINAL, ABDOMINAL CRAMPING, ABDOMINAL CRAMPS, ABDOMINAL DISCOMFORT, ABDOMINAL PAIN, ABDOMINAL PAINS, ABDOMINAL UPSET, ABDOPAIN, ACHE, ACHEs, ACHEs AND CHILLS, ACHEs AND PAIN, ACHEs AND PAINS, ACHEs CHILLS, ACHEs FATIGUE, ACHEs HEADACHE, ACHEs RUNNY NOSE, ACHEY, ACHINESS, ACHING, ACHY, ACHY BODY, ACHY HEADACHE, ACHY JOINTS, ACHY MUSCLES, ACUTE STROKE, AFIB, ALLERGIES, ALLERGY SYMPTOMS, ALTERED LOC, ALTERED TASTE, AND HEADACHE, ANOREXIA, ANOSMIA, AP, APPENDICITIS, APPETITE, ARTHRALGIA, ARTHRITIS, ASTHMA, BACK ACHE, BACK ACHEs, BACK PAIN, BACKACHE, BACKPAIN, BAD HEADACHE, BARKING COUGH, BLOATING, BODY ACH, BODY ACHE, BODY ACHE AND HEADACHE, BODY ACHE HEADACHE, BODY ACHE., BODY ACHEA, BODY ACHEs, BODY ACHEs 12, BODY ACHEs AND CHILLS, BODY ACHEs AND HEADACHE, BODY ACHEs AND PAINS, BODY ACHEs CHILLS, BODY ACHEs CONGESTION, BODY ACHEs FATIGUE, BODY ACHEs HEADACHE, BODY ACHEs HEADACHES, BODY ACHEs RUNNY NOSE, BODY ACHEs., BODY ACHEs. 2022, BODY CHILLS, BODY MALAISE, BODY PAIN, BODY PAINS, BODY RASH, BODY WEAKNESS, BODYACH, BODYACHE, BODYACHES, BODYACHES CHILLS, BODYPAIN, BOSY ACHEs, BRAIN FOG, BREATHING DIFFICULTY, BREATHING ISSUES, BRONCHITIS, BURNING CHEST, BURNING EYES, BURNING IN CHEST, Bloating, CHANGE IN TASTE, CHANGE IN TASTE AND SMELL, CHEST, CHEST AND NASAL CONGESTION, CHEST BURNING, CHEST COLD, CHEST CONG, CHEST CONGESTED, CHEST CONGESTION, CHEST DISCOMFORT, CHEST HEAVINESS, CHEST HEAVY, CHEST HURTS, CHEST INFECTION, CHEST IRRITATION, CHEST PAIN, CHEST PAINS, CHEST PRESSURE, CHEST SORE, CHEST SORENESS, CHEST TIGHTNESS, CHEST TIGHT, CHEST TIGHTNESS, CHESTPAIN, CHF, CHI, CHILLS, CHIL, CHILL, CHILLA, CHILLS, CHILLS ACHEs, CHILLS AND BODY ACHE, CHILLS AND BODY ACHEs, CHILLS AND FATIGUE, CHILLS AND HEADACHE, CHILLS AND RUNNY NOSE, CHILLS AND SWEATS, CHILLS BODY ACHE, CHILLS BODY ACHEs, CHILLS CONGESTION, CHILLS DIARRHEA, CHILLS FATIGUE, CHILLS HEADACHE, CHILLS NAUSEA, CHILLS RUNNY NOSE, CHILLS SWEATS, CHILLS., CHILLS. 2021, CHILLS. 2022, CHILLS. HEADACHE, CHILs, CHRONIC COUGH, CLAMMY, CLEARING THROAT, COGESTION, COGUH, COLD, COLD CHILLS, COLD FLASHES, COLD LIKE, COLD LIKE SYMPTOMS, COLD RUNNY NOSE, COLD SWEAT, COLD SWEATS,

COLD SX, COLD SYMPTOMS, COLD-LIKE SYMPTOMS, COLDS, CONFUSED, CONFUSION, CONG,
 CONGE, CONGEATION, CONGES, CONGESITON, CONGEST, CONGESTED, CONGESTED CHEST,
 CONGESTED COUGH, CONGESTED FATIGUE, CONGESTED HEADACHE, CONGESTED NOSE,
 CONGESTED RUNNY NOSE, CONGESTED SNEEZING, CONGESTED., CONGESTI, CONGESTIO,
 CONGESTION, CONGESTION 2021, CONGESTION ACHES, CONGESTION AND FATIGUE, CONGESTION
 AND HEADACHE, CONGESTION AND RUNNY NOSE, CONGESTION BODY ACHES, CONGESTION
 CHILLS, CONGESTION DIARRHEA, CONGESTION FATIGUE, CONGESTION FATIGUE HEADACHE,
 CONGESTION HEADACHE, CONGESTION HEADACHES, CONGESTION NAUSEA, CONGESTION
 RUNNY NOSE, CONGESTION RUNNY NOSE HEADACHE, CONGESTION SNEEZING, CONGESTION
 SOB, CONGESTION., CONGESTION. 2021, CONGESTION. 2022, CONGESTION. HEADACHE,
 CONGESTION. RUNNY NOSE, CONGESTIONS, CONGETION, CONGSTION, CONJESTION,
 CONJUNCTION, CONJUNCTIVITIS, CONJUNCTION, CONJUNCTIVITIS, CONSTIPATION, COPD, CORE
 THROAT, COUGH, COUGH 12, COUGH 2021, COUGH CONGESTION, COUGH DRY, COUGH FEVER,
 COUGH ONSET 20, COUGH PRODUCTIVE, COUGH RUNNY NOSE, COUGH SOB, COUGH SORE
 THROAT, COUGH SORE THROAT RUNNY NOSE, COUGH., COUGH. 2021, COUGH. 2022, COUGHING,
 CP, CRAMPING, CRAMPS, CROUP, DAIRRHEA, DATE :2021, DATE OF SYMPTOM ONSET: 2021, DATE:
 2021, DATE:2021, DEC APPETITE, DEC.APPETITE, DECREASE APPETITE, DECREASE APPETITE. 2021,
 DECREASE TASTE, DECREASED APPETITE, DECREASED APPETITE., DECREASED LOC, DECREASED
 SMELL, DECREASED TASTE, DEHYDRATION, DELERIUM, DELIRIUM, DIA, DIAHERRA, DIAHHREA,
 DIAHREA, DIAHRREA, DIAPHORESIS, DIAPHORETIC, DIAR, DIAREHA, DIARHEA, DIARRHREA,
 DIARR, DIARRA, DIARRAH, DIARRHA, DIARRHEA, DIARRHEA, DIARRH, DIARRHE, DIARRHEA, DIARRHEA
 AND FATIGUE, DIARRHEA AND HEADACHE, DIARRHEA AND NAUSEA, DIARRHEA AND VOMITING,
 DIARRHEA BLOODY, DIARRHEA CHILLS, DIARRHEA FATIGUE, DIARRHEA HEADACHE, DIARRHEA
 NAUSEA, DIARRHEA RUNNY NOSE, DIARRHEA VOMITING, DIARRHEA WATERY, DIARRHEA.,
 DIARRHEA. 2021, DIARRHOEA, DIARROEA, DIFF BREATHING, DIFF SWALLOWING, DIFFICULT
 BREATHING, DIFFICULT SWALLOWING, DIFFICULTY, DIFFICULTY BREATHING, DIFFICULTY IN
 BREATHING, DIFFICULTY SWALLOWING, DIGESTIVE ISSUES, DIRRHEA, DISCOMFORT, DIZINESS,
 DIZZINES, DIZZINESS, DIZZY, DIZZY HEADACHE, DIZZY NAUSEA, DIZZYNESS, DOB, DROWSINESS,
 DROWSY, DRY COUGH, DRY EYES, DRY THROAT, DYSPEPSIA, DYSPHAGIA, DYSPNEA, EAR, EAR
 ACHE, EAR ACHES, EAR CONGESTION, EAR INFECTION, EAR PAIN, EAR PRESSURE, EARACHE,
 EARACHES, EARPAIN, EARS, EARS HURT, EARS PLUGGED, EMESIS, EMESIS DIARRHEA, EMESIS X 1,
 EMESIS X1, EMS SYMP, ENCEPHALITIS, EPIGASTRIC PAIN, EXHAUSTED, EXHAUSTION, EXTREME
 FATIGUE, EXTREME TIREDNESS, EYE DISCHARGE, EYE INFECTION, EYE IRRITATION, EYE PAIN,
 EYES, EYES BURNING, EYES HURT, Encephalitis, FAINT, FAITGUE, FAITUGE, FAT, FATGIUE, FATGUE,
 FATI, FATIG, FATIGE, FATIGU, FATIGUE, FATIGUE 12, FATIGUE 2021, FATIGUE ACHES, FATIGUE
 AND CONGESTION, FATIGUE AND HEADACHE, FATIGUE AND NAUSEA, FATIGUE AND RUNNY
 NOSE, FATIGUE BODY ACHES, FATIGUE CHILLS, FATIGUE CONGESTED, FATIGUE CONGESTION,
 FATIGUE DIARRHEA, FATIGUE HEADACHE, FATIGUE MALAISE, FATIGUE MUSCLE ACHES,
 FATIGUE MYALGIA, FATIGUE NASAL CONGESTION, FATIGUE NAUSEA, FATIGUE RUNNY NOSE,
 FATIGUE SOB, FATIGUE., FATIGUE. 2021, FATIGUE. 2022, FATIGUE. HEADACHE, FATIGUED,
 FATIGUES, FATIQUE, FATUGUE, FATUIGE, FEBRILE, FEELING FEVERISH, FEELING HOT, FEELING
 TIRED, FEELING UNWELL, FEELING WARM, FEELING WEAK, FEELS WARM, FELT FEVERISH, FELT
 WARM, FEVER, FEVER 37, FEVER 37.8, FEVER 37.9, FEVER 38, FEVER 38.1, FEVER 38.2, FEVER 38.5,
 FEVER AT HOME, FEVER COUGH, FEVER COUGH SORE THROAT, FEVER RESOLVED, FEVER
 TODAY, FEVER., FEVER. 2021, FEVERISH, FEVERS, FEVR, FLANK PAIN, FLEM, FLU, FLU LIKE, FLU
 LIKE SYMPTOMS, FLU SYMPTOMS, FLU-LIKE SYMPTOMS, FLUSHED, FOGGY, FOGGY HEAD, FUSSY,
 GASTRITIS, GASTRO, GASTRO ISSUES, GASTRO SYMPTOMS, GASTROENTERITIS,
 GASTROINTESTINAL, GEN UNWELL, GEN WEAKNESS, GENERAL FATIGUE, GENERAL MALAISE,
 GENERAL UNWELL, GENERAL WEAKNESS, GENERALIZED WEAKNESS, GENERALLY UNWELL,
 GERD, GI, GI ISSUE, GI ISSUES, GI SYMPTOMS, GI UPSET, GREEN PHLEGM, GREEN SPUTUM,
 H.VOICE, HA, HA ACHES, HA RN, HA., HADACHE, HALLUCINATIONS, HARD TO BREATH, HARD TO
 BREATHE, HARD TO SWALLOW, HEA, HEACHE, HEACHACHE, HEACHE, HEAD, HEAD ACHE, HEAD

ACHES, HEAD AND BODY ACHE, HEAD COLD, HEAD CONGESTION, HEAD PRESSURE, HEADACHE, HEADACHE 9, HEADACHE (ONLY), HEADACHE 12, HEADACHE 2021, HEADACHE ACHES, HEADACHE ACHY, HEADACHE AND BODY ACHE, HEADACHE AND BODY ACHES, HEADACHE AND BODY PAIN, HEADACHE AND CHILLS, HEADACHE AND CONGESTION, HEADACHE AND DIARRHEA, HEADACHE AND FATIGUE, HEADACHE AND NASAL CONGESTION, HEADACHE AND NAUSEA, HEADACHE AND RUNNY NOSE, HEADACHE AND STUFFY NOSE, HEADACHE AND VOMITING, HEADACHE BODY ACHE, HEADACHE BODY ACHES, HEADACHE BODY PAIN, HEADACHE BODYACHE, HEADACHE CHEST PAIN, HEADACHE CHILLS, HEADACHE CONGESTED, HEADACHE CONGESTION, HEADACHE DIARRHEA, HEADACHE DIZZINESS, HEADACHE DIZZY, HEADACHE FATIGUE, HEADACHE FATIGUE NAUSEA, HEADACHE FATIGUED, HEADACHE LOSS OF TASTE, HEADACHE MALAISE, HEADACHE MUSCLE ACHE, HEADACHE MUSCLE ACHES, HEADACHE MUSCLE PAIN, HEADACHE MYALGIA, HEADACHE NASAL CONGESTION, HEADACHE NAUSEA, HEADACHE NAUSEA DIARRHEA, HEADACHE NAUSEA FATIGUE, HEADACHE NAUSEA VOMITING, HEADACHE RHINORRHEA, HEADACHE RUNNY NOSE, HEADACHE RUNNY NOSE FATIGUE, HEADACHE SINUS, HEADACHE SINUS CONGESTION, HEADACHE SNEEZING, HEADACHE SOB, HEADACHE STOMACH ACHE, HEADACHE STUFFY NOSE, HEADACHE TIRED, HEADACHE UPSET STOMACH, HEADACHE VOMITING, HEADACHE VSS, HEADACHE WEAKNESS, HEADACHE., HEADACHE. 2021, HEADACHE. 2022, HEADACHE. CHILLS, HEADACHE. FATIGUE, HEADACHE. NAUSEA, HEADACHE. RUNNY NOSE, HEADACHE.VSS, HEADACHE/STIFF NECK, HEADACHES, HEADACHES BODY ACHES, HEADACHES FATIGUE, HEADACHES RUNNY NOSE, HEADACHES., HEADACHCE, HEADACHE, HEADCAHE, HEADCHE, HEADCOLD, HEART FAILURE, HEART PALPITATIONS, HEARTBURN, HEAVINESS IN CHEST, HEAVY BREATHING, HEAVY CHEST, HEAVY HEAD, HEDACHE, HEMOPTYSIS, HIA, HOARSE, HOARSE THROAT, HOARSE VOI, HOARSE VOICE, HOARSENESS, HOARSENESS OF VOICE, HORSE VOICE, HOT, HOT AND COLD, HOT AND COLD FLASHES, HOT FLASHES, HURTS TO SWALLOW, HYPOXIA, Heart failure, INCREASED SOB, INCREASED WOB, INDIGESTION, IRRITATED EYES, IRRITATED THROAT, ITCHY EARS, ITCHY EYES, ITCHY NOSE, ITCHY THROAT, JAW PAIN, JOINT ACHES, JOINT PAIN, JOINT PAINS, LABOURED BREATHING, LACK OF APPETITE, LACK OF ENERGY, LACK OF TASTE, LACK OF TASTE AND SMELL, LARYNGITIS, LATHARGIC, LEFT EAR PAIN, LEG PAIN, LETHARGIC, LETHARGY, LETHARY, LIGHT HEADACHE, LIGHT HEADED, LIGHT HEADEDNESS, LIGHT-HEADED, LIGHTHEADED, LIGHTHEADEDNESS, LOA, LOOSE BM, LOOSE BOWEL, LOOSE BOWEL MOVEMENT, LOOSE BOWELS, LOOSE STOOL, LOOSE STOOLS, LOS, LOSE BOWEL MOVEMENT, LOSING VOICE, LOSS, LOSS APPETITE, LOSS OF APETITE, LOSS OF APPETITE, LOSS OF APPITITE, LOSS OF SENSE OF SMELL, LOSS OF SENSE OF TASTE, LOSS OF SENSE OF TASTE AND SMELL, LOSS OF SMELL, LOSS OF SMELL AND TASTE, LOSS OF SMELL OR TASTE, LOSS OF TASTE, LOSS OF TASTE AND SMELL, LOSS OF TASTE AND SMELL., LOSS OF TASTE OR SMELL, LOSS OF TASTE SMELL, LOSS OF VOICE, LOSS SMELL, LOSS SMELL AND TASTE, LOSS TASTE, LOSS TASTE AND SMELL, LOSS VOICE, LOST OF APPETITE, LOST OF SMELL, LOST OF TASTE, LOST OF TASTE AND SMELL, LOST TASTE, LOST VOICE, LOW APPEPTITE, LOW APPETITE, LOW BACK PAIN, LOW ENERGY, LOW FEVER, LOW GRADE FEVER, LOWER BACK PAIN, LUNG PAIN, LW INFASS (SYMP), LW INFASS SYMP, LW INFASS SYMPT, LW INFASS SYMPT., LW INFASS: COUGH, MACULOPAPULAR RASH, MALAISE, MALASIE, MENINGITIS, METALLIC TASTE, MIGRAINE, MIGRAINES, MIGRANE, MILD CHEST PAIN, MILD CONGESTION, MILD COUGH, MILD FEVER, MILD HEADACHE, MILD RUNNY NOSE, MILD SOB, MILD SORE THROAT, MUCOUS, MUCUS, MUSCLE, MUSCLE ACHE, MUSCLE ACHES, MUSCLE ACHES FATIGUE, MUSCLE AND JOINT PAIN, MUSCLE FATIGUE, MUSCLE PAIN, MUSCLE PAINS, MUSCLE SORE, MUSCLE SORENESS, MUSCLE WEAKNESS, MUSCLEACHE, MUSCLEACHES, MUSCLES ACHES, MYALGIA, MYALGIA HEADACHE, MYALGIA., MYALGIA. 2021, MYALGIAS, Meningitis, N+V, NAS, NAS.CONG, NASAL, NASAL AND CHEST CONGESTION, NASAL CON, NASAL CONG, NASAL CONG., NASAL CONGES, NASAL CONGESITON, NASAL CONGEST, NASAL CONGESTED, NASAL CONGESTI, NASAL CONGESTIO, NASAL CONGESTION, NASAL CONGESTION AND FATIGUE, NASAL CONGESTION AND HEADACHE, NASAL CONGESTION AND RUNNY NOSE, NASAL CONGESTION FATIGUE, NASAL CONGESTION HEADACHE, NASAL

CONGESTION RUNNY NOSE, NASAL CONGESTION SNEEZING, NASAL CONGESTION., NASAL
 CONGESTION. 2021, NASAL CONGESTION. 2022, NASAL CONGESTIONS, NASAL CONGSTION, NASAL
 CONJESTION, NASAL DISCHARGE, NASAL DRAINAGE, NASAL DRIP, NASAL SYMPTOMS,
 NASALCONGESTION, NASEAU, NASEL CONGESTION, NASIA, NASUEA, NAU, NAUAEA, NAUS,
 NAUSA, NAUSE, NAUSEA, NAUSEA AND DIARRHEA, NAUSEA AND FATIGUE, NAUSEA AND
 HEADACHE, NAUSEA AND VOMITING, NAUSEA AND VOMITTING, NAUSEA CHILLS, NAUSEA
 DIARRHEA, NAUSEA FATIGUE, NAUSEA HEADACHE, NAUSEA RUNNY NOSE, NAUSEA VOMIT,
 NAUSEA VOMITING, NAUSEA VOMITING DIARRHEA, NAUSEA VOMITING HEADACHE, NAUSEA
 VOMITTING, NAUSEA., NAUSEAS, NAUSEATED, NAUSEAU, NAUSEOUS, NAUSIA, NECK PAIN, NEW
 SMELL, NIGHT SWEATS, NO APPETITE, NO ENERGY, NO SENSE OF SMELL, NO SENSE OF TASTE, NO
 SMELL, NO SMELL AND TASTE, NO SMELL OR TASTE, NO TASTE, NO TASTE AND SMELL, NO
 TASTE NO SMELL, NO TASTE OR SMELL, NO VOICE, NON-SPECIFIC SYMPTOM(S) - SURVEILLANCE,
 NOSE, NOSE CONGESTION, NOT EATING, NOT FEELING WELL, NSTEMI, NV, NVD, N\T\V,
 OCCASIONAL COUGH, ONSET 20, ONSET 2020, ONSET UNKNOWN, ONSET YYYY-MM-DD, ONSET:
 2021, PAIN, PAIN IN CHEST, PAINS, PALPITATIONS, PANCREATITIS, PHELG, PHLEGM, PHLEGM IN
 THROAT, PHLEGMY, PHLEM, PINK EYE, PINK EYES, PINKEYE, PLUGGED EARS, PND, PNEUMONIA,
 PNEUMONIA (UNKNOWN), POOR APPETITE, POST NASAL, POST NASAL DRIP, PRESSURE, PRESSURE
 IN CHEST, PRESSURE IN HEAD, PROD COUGH, PRODUCTIVE COUGH, PUFFY EYES, Palpitations, R
 NOSE, R.NOSE, RASH, RASH - NOT SPECIFIED, RASHES, RASPY THROAT, RASPY VOICE, RECENT
 FEVER, RED EYE, RED EYES, RESPIRATORY SYMPTOMS, RHI, RHINITIS, RHINORRHEA,
 RHINORRHEA, RHINO, RHINORHEA, RHINORR, RHINORREA, RHINORRHE, RHINORRHEA,
 RHINORRHEA CONGESTED, RHINORRHEA HEADACHE, RHINORRHEA-NASAL CONGESTION,
 RHINORRHEA., RHINORRHEA. 2021, RHIONRHEA, RIGHT EAR PAIN, RN HA, RNNY NOSE, RUN NOSE,
 RUNN YNOSE, RUNNING NOSE, RUNNING NOSE., RUNNING NOSE.VSS, RUNNING NOSR, RUNNNY
 NOSE, RUNNT NOSE, RUNNU NOSE, RUNNY, RUNNY NOSE, RUNNY AND STUFFY NOSE, RUNNY
 CONGESTED NOSE, RUNNY EYES, RUNNY N, RUNNY NISE, RUNNY NO, RUNNY NOAE, RUNNY NOE,
 RUNNY NOISE, RUNNY NOS, RUNNY NOSE, RUNNY NOSE 9, RUNNY NOSE 11, RUNNY NOSE 12,
 RUNNY NOSE 2021, RUNNY NOSE ACHES, RUNNY NOSE AND BODY ACHE, RUNNY NOSE AND
 BODY ACHES, RUNNY NOSE AND CHILLS, RUNNY NOSE AND CONGESTED, RUNNY NOSE AND
 CONGESTION, RUNNY NOSE AND DIARRHEA, RUNNY NOSE AND FATIGUE, RUNNY NOSE AND
 HEAD ACHE, RUNNY NOSE AND HEADACHE, RUNNY NOSE AND NASAL CONGESTION, RUNNY
 NOSE AND SNEEZING, RUNNY NOSE BODY ACHE, RUNNY NOSE BODY ACHES, RUNNY NOSE
 CHEST CONGESTION, RUNNY NOSE CHILLS, RUNNY NOSE CONGESTED, RUNNY NOSE
 CONGESTION, RUNNY NOSE CONGESTION HEADACHE, RUNNY NOSE COUGH, RUNNY NOSE
 DIARRHEA, RUNNY NOSE FATIGUE, RUNNY NOSE FATIGUE HEADACHE, RUNNY NOSE HEAD
 ACHE, RUNNY NOSE HEADACHE, RUNNY NOSE HEADACHE FATIGUE, RUNNY NOSE HEADACHES,
 RUNNY NOSE HOARSE VOICE, RUNNY NOSE LOSS OF TASTE, RUNNY NOSE MUSCLE ACHES,
 RUNNY NOSE NASAL CONGESTI, RUNNY NOSE NASAL CONGESTION, RUNNY NOSE NAUSEA,
 RUNNY NOSE ONSET 20, RUNNY NOSE OR NASAL CONGESTION, RUNNY NOSE OR SNEEZING,
 RUNNY NOSE SNEEZING, RUNNY NOSE SOB, RUNNY NOSE SORE THROAT, RUNNY NOSE STUFFY
 NOSE, RUNNY NOSE TIRED, RUNNY NOSE VOMITING, RUNNY NOSE VS NA, RUNNY NOSE WATERY
 EYES, RUNNY NOSE., RUNNY NOSE. 2021, RUNNY NOSE. 2022, RUNNY NOSE. CONGESTION, RUNNY
 NOSE. FATIGUE, RUNNY NOSE. HEADACHE, RUNNY NOSE. SNEEZING, RUNNY NOSE. T-36.0, RUNNY
 NOSES, RUNNY NOSR, RUNNY NOSW, RUNNY NOZE, RUNNY NSOE, RUNNY OSE, RUNNY ROSE,
 RUNNY STUFFY NOSE, RUNNYNOS, RUNY NOSE, RUUNY NOSE, RYNNY NOSE, SCRATCH THROAT,
 SCRATCHY THROAT, SEASONAL ALLERGIES, SEIZURE, SEPSIS, SEVERE HEADACHE, SHAKES,
 SHAKY, SHIVERING, SHIVERS, SHORT BREATH, SHORT OF BREATH, SHORTNESS OF BREATH,
 SHORTNESS OF BREATH., SHORTNESS OF BREATHE, SHOULDER PAIN, SINUS, SINUS COLD, SINUS
 CONGESTED, SINUS CONGESTION, SINUS CONGESTION HEADACHE, SINUS HEADACHE, SINUS
 INFECTION, SINUS ISSUES, SINUS PAIN, SINUS PRESSURE, SINUS SYMPTOMS, SINUSES, SINUSITIS,
 SLEEPY, SLIGHT COUGH, SLIGHT FEVER, SLIGHT HEADACHE, SLIGHT RUNNY NOSE, SLIGHT SORE
 THROAT, SLUGGISH, SMELL, SMELL TASTE DISORDER, SNEEZ, SNEEZE, SNEEZING, SNEEZING AND

RUNNY NOSE, SNEEZING CONGESTION, SNEEZING HEADACHE, SNEEZING RUNNY NOSE, SNEEZING., SNEEZY, SNEZZING, SNIFFING, SNIFFLE, SNIFFLES, SNIFFLING, SOB, SOB CONGESTION, SOB FATIGUE, SOB HEADACHE, SOB ON EXERTION, SOB RUNNY NOSE, SOB TODAY, SOB UPON EXERTION, SOB., SOBE, SOBOE, SOR ETHROAT, SOR THROAT, SORE, SORE BACK, SORE BODY, SORE CHEST, SORE EAR, SORE EARS, SORE EYE, SORE EYES, SORE JOINTS, SORE LEGS, SORE MUSCLE, SORE MUSCLES, SORE NECK, SORE STOMACH, SORE THOAT, SORE THORAT, SORE THRAOT, SORE THROAT, SORE THROAT 12, SORE THROAT 2021, SORE THROAT ONSET 20, SORE THROAT RUNNY NOSE, SORE THROAT., SORE THROAT. 2021, SORE THROAT. 2022, SORE THT, SORE TUMMY, SORENESS, SORETHROAT, SORETHT, SPUTUM, STEMI, STHROAT, STIFF NECK, STIFFNESS, STOMACH, STOMACH ACHE, STOMACH ACHES, STOMACH BUG, STOMACH CRAMPS, STOMACH DISCOMFORT, STOMACH FLU, STOMACH HURTS, STOMACH ISSUES, STOMACH PAIN, STOMACH PAINS, STOMACH UPSET, STOMACHACHE, STOMACHE, STOMACHE ACHE, STREP THROAT, STROKE, STUFF NOSE, STUFF Y NOSE, STUFFED NOSE, STUFFED UP, STUFFED UP NOSE, STUFFINESS, STUFFING NOSE, STUFFY, STUFFY NOSE, STUFFY AND RUNNY NOSE, STUFFY HEAD, STUFFY NOSE, STUFFY NOSE AND HEADACHE, STUFFY NOSE HEADACHE, STUFFY NOSE RUNNY NOSE, STUFFY NOSE SNEEZING, STUFFY NOSE., STUFFY NOSE. 2021, STUFFY RUNNY NOSE, STUFFYNOSE, SWALLOWING, SWEAT, SWEATING, SWEATS, SWEATS AND CHILLS, SWEATY, SWELLING, SWOLLEN EYES, SWOLLEN GLAND, SWOLLEN GLANDS, SWOLLEN LYMPH NODES, SWOLLEN THROAT, SWOLLEN TONSILS, SX, SY, SYM, SYMP, SYMP-COUGH, SYMPTOMATIC, SYMPT, SYMPTOMATIC, SYMPTOMS, SYNCOPÉ, Sepsis, Sneezing, Stroke, TACHYCARDIA, TACHYPNEA, TASTE, TASTE DISORDER, TEMPERATURE: 100, TEMPERATURE: 100.0, TEMPERATURE: 100.1, TEMPERATURE: 100.2, TEMPERATURE: 100.3, TEMPERATURE: 100.4, TEMPERATURE: 100.5, TEMPERATURE: 100.6, TEMPERATURE: 100.7, TEMPERATURE: 100.8, TEMPERATURE: 100.9, TEMPERATURE: 101, TEMPERATURE: 101.0, TEMPERATURE: 101.1, TEMPERATURE: 101.2, TEMPERATURE: 101.3, TEMPERATURE: 101.4, TEMPERATURE: 101.5, TEMPERATURE: 101.6, TEMPERATURE: 101.7, TEMPERATURE: 101.8, TEMPERATURE: 101.9, TEMPERATURE: 102, TEMPERATURE: 102.0, TEMPERATURE: 102.5, TEMPERATURE: 103, TEMPERATURE: 103.0, TEMPERATURE: 104, TEMPERATURE: 37.8, TEMPERATURE: 37.9, TEMPERATURE: 38, TEMPERATURE: 38., TEMPERATURE: 38.0, TEMPERATURE: 38.1, TEMPERATURE: 38.2, TEMPERATURE: 38.3, TEMPERATURE: 38.4, TEMPERATURE: 38.5, TEMPERATURE: 38.6, TEMPERATURE: 38.7, TEMPERATURE: 38.8, TEMPERATURE: 38.9, TEMPERATURE: 39, TEMPERATURE: 39.0, TEMPERATURE: 39.1, TEMPERATURE: 39.2, TEMPERATURE: 39.3, TEMPERATURE: 39.4, TEMPERATURE: 39.5, TEMPERATURE: 39.6, TEMPERATURE: 39.7, TEMPERATURE: 39.8, TEMPERATURE: 39.9, TEMPERATURE: 40, TEMPERATURE: 40.0, TEMPERATURE: 40.1, THROAT, THROAT CONGESTION, THROAT IRRITATION, THROAT PAIN, THROAT TICKLE, THROWING UP, TICKLE IN THROAT, TICKLE THROAT, TIGHT CHEST, TIGHTNESS, TIGHTNESS IN CHEST, TIGHTNESS IN THE CHEST, TIGHTNESS OF CHEST, TIRED, TIRED HEADACHE, TIRED., TIREDNESS, TRIEDNESS, TROUBLE BREATHING, TROUBLE SWALLOWING, TUMMY ACHE, UNEXP FATIGUE, UNEXPLAINED FATIGUE, UNKNOWN COUGH, UNKNOWN FEVER, UNKNOWN PNEUMONIA, UNKNOWN SOB, UNKNOWN SORE THROAT, UNWELL, UPSET STOMACH, UPSET STOMACH HEADACHE, UPSET STOMACHE, VERTIGO, VERY TIRED, VESICULAR RASH, VOICE, VOICE CHANGE, VOICE LOSS, VOM, VOMIT, VOMIT DIARRHEA, VOMIT X1, VOMITED, VOMITED X 1, VOMITED X1, VOMITIN, VOMITING, VOMITING AND DIARRHEA, VOMITING AND HEADACHE, VOMITING DIARRHEA, VOMITING HEADACHE, VOMITING NAUSEA, VOMITING OR DECREASED DRINKING, VOMITING RUNNY NOSE, VOMITING X1, VOMITING., VOMITING. DIARRHEA, VOMITINGS, VOMITNG, VOMITTED, VOMITTING, VOMITTING DIARRHEA, VOMITTING., VOMMIT, VOMMITING, VOMMITTING, VOMTING, WARM, WARM TO TOUCH, WATERY EYES, WEAK, WEAKNESS, WEIGHT LOSS, WET COUGH, WHEEZE, WHEEZING, WHEEZY, Y, YELLOW PHLEGM, YES, YES COUGH, YES FEVER, YES PNEUMONIA, YES SOB, YES SORE THROAT, YES- NOT SPECIFIED, YM

Figure 1: Flow chart of exclusion criteria

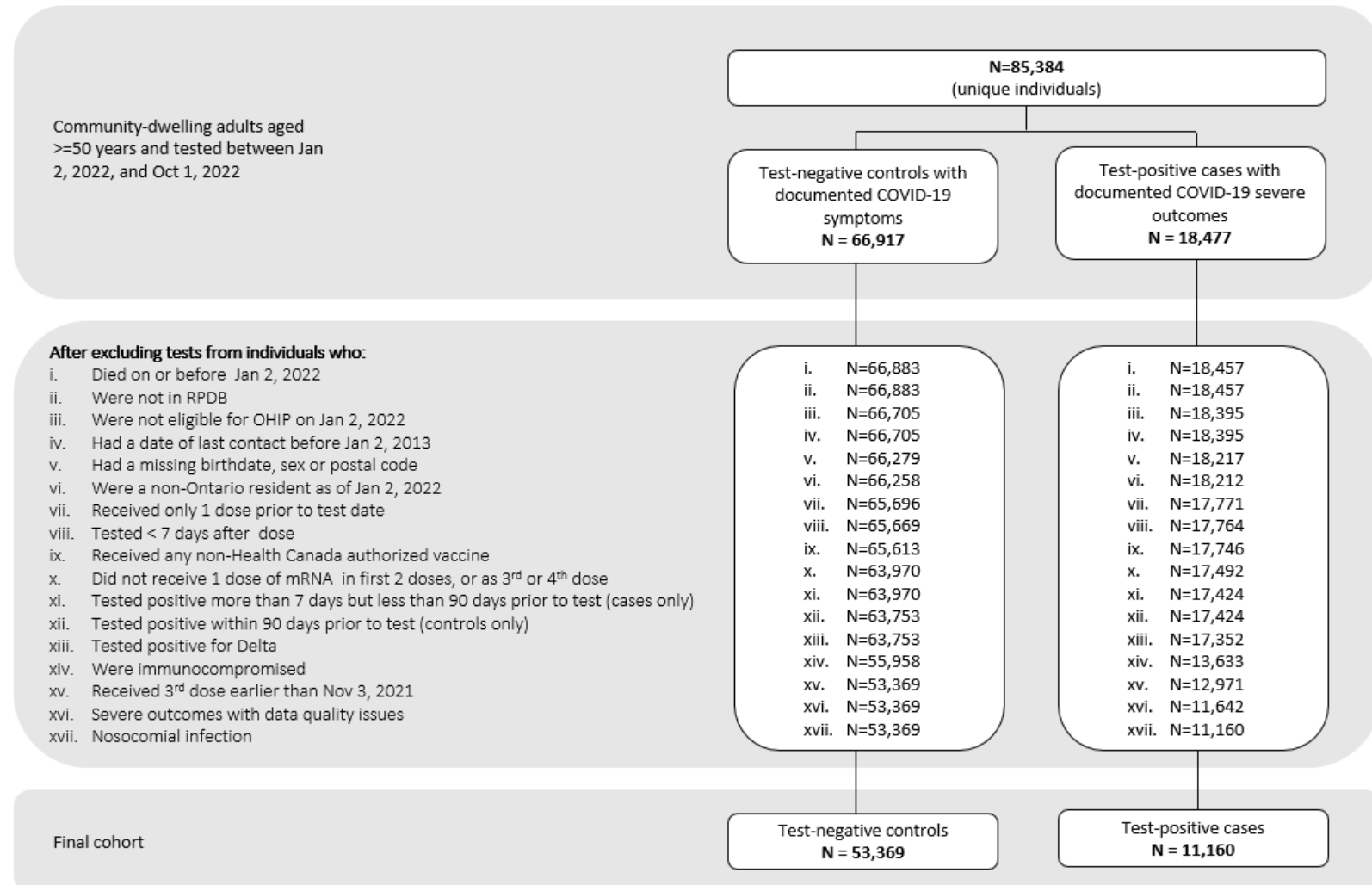


Table 1: List of exposure and covariates used in the analyses

Variable	Definition
Receipt of COVID-19 vaccine	Vaccine information was obtained from COVAXON, the central provincial database compiled and managed by the Ministry of Health. COVAXON contains information on COVID-19 vaccination events for all vaccinations administered in Ontario, including: date(s) of dose administration, reason for administration (e.g., health care worker, long-term care resident, other priority groups), vaccine product information (i.e., manufacturer, lot number, diluent), location and responsible Public Health Unit for vaccination event, and client information.
Age	Age was determined from the Registered Persons Database. This variable was included <i>a priori</i> as hypothesized to be directly related to COVID-19 infection risk.
Sex	Sex was determined from the Registered Persons Database. This variable was included <i>a priori</i> as hypothesized to be directly related to COVID-19 infection risk.
Public Health Unit region	<p>Taken from Public Health Unit (PHU) information using postal code of residence as recorded in the Registered Persons Database and Statistics Canada Postal Code Conversion File Plus (version 7B). Regions were defined as follows:</p> <p>Central East: PHU 35 (Haliburton, Kawartha, Pine Ridge District Health Unit), 55 (Peterborough County—City Health Unit), 60 (Simcoe Muskoka District Health Unit)</p> <p>Central West: PHU 27 (Brant County Health Unit), 34 (Haldimand-Norfolk Health Unit), 36 (Halton Regional Health Unit), 37 (City of Hamilton Health Unit), 46 (Niagara Regional Area Health Unit), 65 (Waterloo Health Unit), 66 (Wellington-Dufferin-Guelph Health Unit)</p> <p>Durham: PHU 30 (Durham Regional Health Unit)</p> <p>Eastern: PHU 38 (Hastings and Prince Edward Counties Health Unit), 41 (Kingston, Frontenac and Lennox and Addington Health Unit), 43 (Leeds, Grenville and Lanark District Health Unit), 57 (Renfrew County and District Health Unit), 58 (The Eastern Ontario Health Unit)</p> <p>North: PHU 26 (The District of Algoma Health Unit), 47 (North Bay Parry Sound District Health Unit), 49 (Northwestern Health Unit), 56 (Porcupine Health Unit), 61 (Sudbury and District Health Unit), 62 (Thunder Bay District Health Unit), 63 (Timiskaming Health Unit)</p> <p>Ottawa: PHU 51 (City of Ottawa Health Unit)</p> <p>Peel: PHU 53 (Peel Regional Health Unit)</p>

	<p>South West: PHU 31 (Elgin-St. Thomas), 33 (Grey Bruce Health Unit), 39 (Huron County Health Unit), 40 (Chatham-Kent Health Unit), 42 (Lambton Health Unit), 44 (Middlesex-London Health Unit), 52 (Oxford), 54 (Perth District Health Unit), 68 (Windsor-Essex County Health Unit), 75 (Southwestern Health Unit)</p> <p>Toronto: PHU 95 (City of Toronto Health Unit)</p> <p>York: PHU 70 (York Regional Health Unit)</p>
Weekly period of COVID-19 test	<p>Based on the index date (i.e. specimen collection date, or date of severe outcome if before specimen collection date):</p> <ul style="list-style-type: none"> • 2 January to 8 January 2022 • 9 January to 15 January 2022 • 16 January to 22 January 2022 • 23 January to 29 January 2022 • 30 January to 5 February 2022 • 6 February to 12 February 2022 • 13 February to 19 February 2022 • 20 February to 26 February 2022 • 27 February to 5 March 2022 • 6 March to 12 March 2022 • 12 March to 18 March 2022 • 19 March to 26 March 2022 • 27 March 2022 to 2 April 2022 • 3 April to 9 April 2022 • 10 April to 16 April 2022 • 17 April to 23 April 2022 • 24 April to 30 April 2022 • 1 May to 7 May 2022 • 8 May to 14 May 2022 • 15 May to 21 May 2022 • 22 May to 28 May 2022 • 29 May to 4 June 2022 • 5 June to 11 June 2022 • 12 June to 18 June 2022 • 19 June to 25 June 2022 • 26 June to 2 July 2022 • 3 July to 9 July 2022 • 10 July to 16 July 2022 • 17 July to 23 July 2022 • 24 July to 30 July 2022 • 31 July to 6 August 2022 • 7 August to 13 August 2022

	<ul style="list-style-type: none"> • 14 August to 20 August 2022 • 21 August to 27 August 2022 • 28 August to 3 September 2022 • 4 September to 10 September 2022 • 11 September to 17 September 2022 • 18 September to 24 September 2022 • 25 September to 1 October 2022
Prior positive SARS-CoV-2 flag	Laboratory confirmed SARS-CoV-2 by reverse transcription polymerase chain reaction (RT-PCR) >90 days prior to index test records in the Ontario Laboratories Information System (OLIS)
Household income quintile	Calculated at the dissemination area (DA) level using Census data by multiplying the median income (before-tax) by the number of households and dividing by the sum of single-person equivalent to obtain income per single person equivalent.
Essential workers quintile	Calculated at the DA level, using Census data. For each DA, we calculated the number of individuals ≥ 15 years old that were working in one of the following Census-defined work categories: Sales and service occupations; trades, transport and equipment operators and related occupations; natural resources, agriculture, and related production occupations; and occupations in manufacturing and utilities. DAs across the province were then ranked by these percentages into quintiles.
Persons per dwelling quintile	The average number of persons in private households, calculated at the DA level using Census data. DAs across the province were ranked by average number of persons per household into 5 categories (quintiles), such that each group contained approximately one-fifth of the DAs.
Self-identified visible minority quintile	Calculated at the DA level, using Census data. An individual was marked as “self-identify as a visible minority” if they reported being one or more of the following (wording from the Census): “South Asian (e.g., East Indian, Pakistani, Sri Lankan, etc.), Chinese, Black, Filipino, Latin American, Arab, Southeast Asian (e.g., Vietnamese, Cambodian, Laotian, Thai, etc.), West Asian (e.g., Iranian, Afghan, etc.), Korean, Japanese, or Other—specify”. DAs across the province were then ranked by these percentages into quintiles.
Number of COVID-19 tests within 3 months prior to December 14, 2020	The number of tests for an individual recorded in the ICES-derived COVID-19 Integrated Testing Database (which combines data from the Ontario Laboratories Information System, distributed testing data from laboratories within the COVID-19 Diagnostic Network, and Public Health Case & Contact Management (CCM) solution) between September 14, 2020, and December 14, 2020.
Comorbidities	<p>Chronic Respiratory Disease</p> <p>An ICES-specific asthma and COPD database was used to identify patients with chronic respiratory disease.</p>

	<p>Chronic Heart Disease</p> <p>Individuals were defined as having chronic heart disease if they had congestive heart failure (as identified through an ICES-derived database)¹, ischemic heart disease (ICD-10 codes I20, I25, I21, I22 in the past 5 years or CCI procedure codes 1IJ76, 1IJ50, 1IJ54, 1IJ57GQ or CCP procedure codes 481, 4802, 4803 in the past 20 years)², or atrial fibrillation (ICD-9 codes 427.31, 427.32, ICD-10 code I48, or OHIP dxcode 427)³ in the past 5 years.</p> <p>Hypertension</p> <p>An ICES-specific database was used to identify patients with hypertension.⁴</p> <p>Diabetes</p> <p>An ICES-specific database was used to identify patients with diabetes.⁵</p> <p>Immunocompromised</p> <p>Individuals were defined as being immunocompromised if they had HIV(as identified through an ICES-specific HIV database)⁶, solid organ transplants [as identified through an ICES-specific database or ICD-10 codes, CCI procedure codes, and OHIP feecodes (codes available upon request)], if they received an allogenic/ autologous bone marrow transplant (CCP procedure code 53.0, CCI procedure codes 1WY19, 1LZ19HHU7, 1LZ19HHU8, OHIP feecode Z426), sickle-cell disease (ICD-10 D57.0 – D57.2; D57.8 or ICD-9 282.6), other immune system disorders (ICD-9 273.2, 279.0, 279.1, 279.2, 279.3, 279.8, 279.9, 289.8; ICD-10 D80, D81, D82, D83, D84, D89; OHIP dxcode 279), received immunosuppressive therapy (>30 days of oral corticosteroid in 6 months before index or receipt of other immunocompromising drugs in the 6 months before index), or active cancer (any of the following treatments in the past 6 months: cancer surgery (codes available upon request), radiation (if the ICD-10 code listed was Z510 in NACRS), chemotherapy (if the ICD-10 code listed was Z511 or Z512 and any evidence of cancer diagnosis in the Ontario Cancer Registry (OCR) prior to the last treatment date) or cancer diagnosis in OCR in the year prior to the index date). Other immune disorders: Individuals were identified as having disorders of the immune system based on health care encounters recorded in DAD, SDS, NACRS, and OHIP in the 2-years prior to index using Expanded Diagnostic Clusters from the Johns Hopkins ACG® System Version 10.⁸</p> <p>Autoimmune disease</p>
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	<p>An ICES-specific database was used to identify individuals with rheumatoid arthritis, or inflammatory bowel disease. Individuals were considered to have psoriasis if they had 1 hospitalization (ICD-9: 696.1, 696.8; ICD-10: L40.0, L40.1, L40.2, L40.3, L40.4, L40.8, L40.9) or 3 physician billings (OHIP code 696). Individuals were considered to have psoriatic arthritis if they had 1 hospitalization (ICD-9 code 696.0 or ICD-10 codes L40.5, M07.0, M07.1, M07.2, M07.3, M09.0) or 3 physician billings [OHIP dxcode = 721 (at least one of these billings must be billed by a rheumatologist, where spec=48)]. Individuals were considered to have multiple sclerosis if they had 1 hospitalization (ICD-9 code 340 or ICD-10 code G35) or 5 physician billings over 2 years (OHIP dxcode 340).</p> <p>Chronic kidney disease Diagnosis in DAD, NACRS or OHIP in the past 5 years (ICD-10 codes E102, E112, E132, E142, I12, I13, N08, N18, N19 or OHIP codes 403, 585)⁷, at least 1 dialysis code in each of the 3 months prior to index, or patients who were on chronic dialysis in the year before index date (at least 2 of any of the following codes in OHIP, DAD, or SDS separated by at least 90 days, but less than 150 days OHIP service codes: R849, G323, G325, G326, G860, G862, G865 G863, G866, G330, G331, G332, G333, G861, G082, G083, G085, G090, G091, G092, G093, G094, G095, G096, G294, G295, G864, H540, H740; CCI procedure codes 5195, 6698; CCP procedure code 1PZ21).⁹</p> <p>Advanced liver disease Identified as patients having cirrhosis [2 or more physician visits (diagnosis code 571), or 1+ hospital diagnosis of cirrhosis (ICD-9 codes 456.1, 571.2, 571.5; ICD-10 codes I85.9, I98.2, K70.3, K71.7, K74.6)] or decompensated cirrhosis [1+ physician visits with diagnosis code 571 and 1+ hospital diagnosis or 1+ procedure (ICD-9 codes 456.0, 456.2, 572.2, 572.3, 572.4, 782.4, 789.5l; ICD-10 codes I85.0, I86.4, I98.20, I98.3, K721, K729, K76.6, K76.7, R17, R18; CCI procedure codes 1.NA.13.BA-FA, 1.NA.13.BA-X7, 1.NA.13.BA-BD, 1.KQ.76GP-NR, 1.OT.52.HA; CCP procedure codes 1006, 6691; OHIP feecode J057, Z591)].¹⁰</p> <p>Dementia An ICES-specific database was used to identify patients with dementia.¹¹</p> <p>Frailty Individuals were identified as having medical conditions associated with frailty based on health care encounters recorded in DAD, SDS, NACRS,</p>
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	<p>and OHIP in the 2-years prior to index using the Johns Hopkins ACG® System Version 10.</p> <p>History of stroke or transient ischemic attack Individuals were identified as having a history of transient ischemic attack if they had 1+ hospitalizations or ED visits with ICD-9 codes 435, 3623 or ICD-10 codes G450, G451, G452, G453, G458, G459, H340. Individuals were identified as having a history of acute ischemic stroke if they had 1+ hospitalization with a main diagnosis coded with ICD-9 codes 434, 436 or ICD-10 codes I63, I64, H34.1.</p>
Receipt of home care services	<p>Individuals were defined as receiving home care services if they met the following criteria:</p> <p>Short stay: Defined in HCD as SRC_admission in (“91”, “92”)</p> <p>Long-stay: Defined in HCD as “SRC_admission in (“93”, “94”) or SRC_discharge in (“93”, “94”)”.</p> <p>Palliative: Defined in HCD as SRC_admission in (“95”).</p>
Receipt of influenza vaccine	<p>An OHIP billing with any of the following fee codes from October 1, 2019, to September 30, 2020, or October 1, 2020, to September 30, 2021: G590, G591, G592, Q130, Q590, Q690, Q691; or, an ODB billing with any of the following Drug Identification Numbers from October 1, 2019 up to September 30, 2020: 02420643, 02420783, 02432730, 02473283, or October 1, 2020, up to September 30, 2021: 02420643, 02420783, 02432730, 02445646, 02494248, 09857645, 09857646.</p>

Table 2: Descriptive characteristics of community-dwelling adults aged 50-59 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing unvaccinated individuals to vaccinated individuals

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	1,360	6,279		17,941		558	
Characteristics							
Age (years), mean (standard deviation)	54.69 ± 2.89	54.32 ± 2.90	0.13	54.50 ± 2.91	0.06	55.12 ± 2.95	0.15
Male sex	722 (53.1%)	2,348 (37.4%)	0.32	4,812 (26.8%)	0.56	147 (26.3%)	0.57
Public health unit region							
Central East	68 (5.0%)	491 (7.8%)	0.12	1,690 (9.4%)	0.17	45 (8.1%)	0.12
Central West	281 (20.7%)	1,008 (16.1%)	0.12	2,633 (14.7%)	0.16	96 (17.2%)	0.09
Durham	41 (3.0%)	402 (6.4%)	0.16	1,132 (6.3%)	0.16	25 (4.5%)	0.08
Eastern	58 (4.3%)	256 (4.1%)	0.01	1,106 (6.2%)	0.09	41 (7.3%)	0.13
North	212 (15.6%)	1,087 (17.3%)	0.05	3,383 (18.9%)	0.09	140 (25.1%)	0.24
Ottawa	40 (2.9%)	124 (2.0%)	0.06	475 (2.6%)	0.02	17 (3.0%)	0.01
Peel	143 (10.5%)	787 (12.5%)	0.06	1,432 (8.0%)	0.09	29 (5.2%)	0.20
South West	275 (20.2%)	1,041 (16.6%)	0.09	2,741 (15.3%)	0.13	69 (12.4%)	0.21
Toronto	185 (13.6%)	706 (11.2%)	0.07	2,313 (12.9%)	0.02	61 (10.9%)	0.08
York	47 (3.5%)	350 (5.6%)	0.10	977 (5.4%)	0.10	29 (5.2%)	0.09
Missing	10 (0.7%)	27 (0.4%)	0.04	59 (0.3%)	0.06	6 (1.1%)	0.04
Household income quintile							
1 (lowest)	415 (30.5%)	1,444 (23.0%)	0.17	3,031 (16.9%)	0.32	92 (16.5%)	0.34
2	286 (21.0%)	1,335 (21.3%)	0.01	3,354 (18.7%)	0.06	87 (15.6%)	0.14
3	263 (19.3%)	1,259 (20.1%)	0.02	3,542 (19.7%)	0.01	107 (19.2%)	0.00
4	204 (15.0%)	1,210 (19.3%)	0.11	3,766 (21.0%)	0.16	126 (22.6%)	0.19
5 (highest)	185 (13.6%)	1,012 (16.1%)	0.07	4,208 (23.5%)	0.26	146 (26.2%)	0.32
Missing	7 (0.5%)	19 (0.3%)	0.03	40 (0.2%)	0.05	0 (0.0%)	0.10
Essential workers quintile							
1 (0%–32.5%)	154 (11.3%)	705 (11.2%)	0.00	3,083 (17.2%)	0.17	109 (19.5%)	0.23
2 (32.5%–42.3%)	233 (17.1%)	1,276 (20.3%)	0.08	4,232 (23.6%)	0.16	164 (29.4%)	0.29
3 (42.3%–49.8%)	261 (19.2%)	1,390 (22.1%)	0.07	3,909 (21.8%)	0.06	105 (18.8%)	0.01
4 (50.0%–57.5%)	317 (23.3%)	1,396 (22.2%)	0.03	3,581 (20.0%)	0.08	98 (17.6%)	0.14
5 (57.5%–100%)	374 (27.5%)	1,455 (23.2%)	0.10	3,000 (16.7%)	0.26	73 (13.1%)	0.36
Missing	21 (1.5%)	57 (0.9%)	0.06	136 (0.8%)	0.07	9 (1.6%)	0.01
Persons per dwelling quintile							

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
1 (0–2.1)	336 (24.7%)	1,222 (19.5%)	0.13	3,095 (17.3%)	0.18	128 (22.9%)	0.04
2 (2.2–2.4)	329 (24.2%)	1,312 (20.9%)	0.08	3,688 (20.6%)	0.09	126 (22.6%)	0.04
3 (2.5–2.6)	161 (11.8%)	843 (13.4%)	0.05	2,576 (14.4%)	0.07	68 (12.2%)	0.01
4 (2.7–3.0)	242 (17.8%)	1,275 (20.3%)	0.06	4,336 (24.2%)	0.16	119 (21.3%)	0.09
5 (3.1–5.7)	270 (19.9%)	1,569 (25.0%)	0.12	4,111 (22.9%)	0.07	107 (19.2%)	0.02
Missing	22 (1.6%)	58 (0.9%)	0.06	135 (0.8%)	0.08	10 (1.8%)	0.01
Self-identified visible minority quintile							
1 (0.0%–2.2%)	312 (22.9%)	1,363 (21.7%)	0.03	4,278 (23.8%)	0.02	158 (28.3%)	0.12
2 (2.2%–7.5%)	260 (19.1%)	1,272 (20.3%)	0.03	3,978 (22.2%)	0.08	116 (20.8%)	0.04
3 (7.5%–18.7%)	217 (16.0%)	1,014 (16.1%)	0.01	3,241 (18.1%)	0.06	107 (19.2%)	0.08
4 (18.7%–43.5%)	262 (19.3%)	1,053 (16.8%)	0.06	2,989 (16.7%)	0.07	101 (18.1%)	0.03
5 (43.5%–100%)	288 (21.2%)	1,520 (24.2%)	0.07	3,319 (18.5%)	0.07	67 (12.0%)	0.25
Missing	21 (1.5%)	57 (0.9%)	0.06	136 (0.8%)	0.07	9 (1.6%)	0.01
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	113 (8.3%)	1,519 (24.2%)	0.44	7,199 (40.1%)	0.80	322 (57.7%)	1.23
Prior positive SARS-CoV-2 test	69 (5.1%)	511 (8.1%)	0.12	1,083 (6.0%)	0.04	40 (7.2%)	0.09
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020							
0	1,175 (86.4%)	4,635 (73.8%)	0.32	10,743 (59.9%)	0.63	362 (64.9%)	0.52
1	130 (9.6%)	996 (15.9%)	0.19	3,266 (18.2%)	0.25	89 (15.9%)	0.19
≥2	55 (4.0%)	648 (10.3%)	0.24	3,932 (21.9%)	0.55	107 (19.2%)	0.49
Any comorbidity	914 (67.2%)	3,831 (61.0%)	0.13	10,484 (58.4%)	0.18	373 (66.8%)	0.01
Receipt of home care services							
None	1,317 (96.8%)	6,132 (97.7%)	0.05	17,677 (98.5%)	0.11	543 (97.3%)	0.03
Short stay	28 (2.1%)	96 (1.5%)	0.04	184 (1.0%)	0.08	12 (2.2%)	0.01
Long stay	10-14 (0.7-1.0%) ^c	46-50 (0.7-0.8%) ^c	0.01	70 (0.4%)	0.05	≤5 (≤0.9%) ^c	0.06
Palliative	≤5 (≤0.4%) ^c	≤5 (≤0.1%) ^c	0.05	10 (0.1%)	0.06	≤5 (≤0.9%) ^c	0.02

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing vaccinated subjects to unvaccinated subjects.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 3: Descriptive characteristics of community-dwelling adults aged 60-69 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing unvaccinated individuals to vaccinated individuals

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	1,535	3,882		11,018		1,630	
Characteristics							
Age (years), mean (standard deviation)	64.39 ± 2.88	63.90 ± 2.86	0.17	63.96 ± 2.86	0.15	64.58 ± 2.88	0.07
Male sex	873 (56.9%)	1,781 (45.9%)	0.22	4,219 (38.3%)	0.38	622 (38.2%)	0.38
Public health unit region							
Central East	70 (4.6%)	236 (6.1%)	0.07	898 (8.2%)	0.15	141 (8.7%)	0.17
Central West	265 (17.3%)	657 (16.9%)	0.01	1,648 (15.0%)	0.06	255 (15.6%)	0.04
Durham	44 (2.9%)	172 (4.4%)	0.08	588 (5.3%)	0.12	77 (4.7%)	0.10
Eastern	65 (4.2%)	128 (3.3%)	0.05	504 (4.6%)	0.02	92 (5.6%)	0.07
North	237 (15.4%)	710 (18.3%)	0.08	2,261 (20.5%)	0.13	403 (24.7%)	0.23
Ottawa	24 (1.6%)	65 (1.7%)	0.01	224 (2.0%)	0.04	44 (2.7%)	0.08
Peel	198 (12.9%)	506 (13.0%)	0.00	1,051 (9.5%)	0.11	127 (7.8%)	0.17
South West	328 (21.4%)	740 (19.1%)	0.06	1,954 (17.7%)	0.09	229 (14.0%)	0.19
Toronto	235 (15.3%)	463 (11.9%)	0.10	1,292 (11.7%)	0.10	184 (11.3%)	0.12
York	64 (4.2%)	186 (4.8%)	0.03	570 (5.2%)	0.05	69 (4.2%)	0.00
Missing	5 (0.3%)	19 (0.5%)	0.03	28 (0.3%)	0.01	9 (0.6%)	0.03
Household income quintile							
1 (lowest)	493 (32.1%)	1,100 (28.3%)	0.08	2,248 (20.4%)	0.27	288 (17.7%)	0.34
2	365 (23.8%)	830 (21.4%)	0.06	2,241 (20.3%)	0.08	321 (19.7%)	0.10
3	252 (16.4%)	719 (18.5%)	0.06	2,085 (18.9%)	0.07	281 (17.2%)	0.02
4	225 (14.7%)	667 (17.2%)	0.07	2,158 (19.6%)	0.13	335 (20.6%)	0.16
5 (highest)	195 (12.7%)	553 (14.2%)	0.05	2,254 (20.5%)	0.21	400 (24.5%)	0.31
Missing	5 (0.3%)	13 (0.3%)	0.00	32 (0.3%)	0.01	5 (0.3%)	0.00
Essential workers quintile							
1 (0%–32.5%)	122 (7.9%)	419 (10.8%)	0.10	1,616 (14.7%)	0.21	318 (19.5%)	0.34
2 (32.5%–42.3%)	238 (15.5%)	718 (18.5%)	0.08	2,402 (21.8%)	0.16	357 (21.9%)	0.16
3 (42.3%–49.8%)	332 (21.6%)	819 (21.1%)	0.01	2,463 (22.4%)	0.02	341 (20.9%)	0.02
4 (50.0%–57.5%)	386 (25.1%)	896 (23.1%)	0.05	2,292 (20.8%)	0.10	303 (18.6%)	0.16
5 (57.5%–100%)	442 (28.8%)	991 (25.5%)	0.07	2,158 (19.6%)	0.22	295 (18.1%)	0.25
Missing	15 (1.0%)	39 (1.0%)	0.00	87 (0.8%)	0.02	16 (1.0%)	0.00
Persons per dwelling quintile							
1 (0–2.1)	395 (25.7%)	967 (24.9%)	0.02	2,385 (21.6%)	0.10	389 (23.9%)	0.04

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
2 (2.2–2.4)	363 (23.6%)	836 (21.5%)	0.05	2,536 (23.0%)	0.01	343 (21.0%)	0.06
3 (2.5–2.6)	223 (14.5%)	477 (12.3%)	0.07	1,533 (13.9%)	0.02	230 (14.1%)	0.01
4 (2.7–3.0)	288 (18.8%)	730 (18.8%)	0.00	2,259 (20.5%)	0.04	351 (21.5%)	0.07
5 (3.1–5.7)	250 (16.3%)	828 (21.3%)	0.13	2,210 (20.1%)	0.10	297 (18.2%)	0.05
Missing	16 (1.0%)	44 (1.1%)	0.01	95 (0.9%)	0.02	20 (1.2%)	0.02
Self-identified visible minority quintile							
1 (0.0%–2.2%)	352 (22.9%)	869 (22.4%)	0.01	2,769 (25.1%)	0.05	456 (28.0%)	0.12
2 (2.2%–7.5%)	267 (17.4%)	738 (19.0%)	0.04	2,605 (23.6%)	0.16	359 (22.0%)	0.12
3 (7.5%–18.7%)	273 (17.8%)	663 (17.1%)	0.02	1,859 (16.9%)	0.02	332 (20.4%)	0.07
4 (18.7%–43.5%)	279 (18.2%)	668 (17.2%)	0.03	1,659 (15.1%)	0.08	229 (14.0%)	0.11
5 (43.5%–100%)	349 (22.7%)	905 (23.3%)	0.01	2,039 (18.5%)	0.10	238 (14.6%)	0.21
Missing	15 (1.0%)	39 (1.0%)	0.00	87 (0.8%)	0.02	16 (1.0%)	0.00
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	210 (13.7%)	1,419 (36.6%)	0.55	6,101 (55.4%)	0.98	1,111 (68.2%)	1.33
Prior positive SARS-CoV-2 test	52 (3.4%)	213 (5.5%)	0.10	500 (4.5%)	0.06	45 (2.8%)	0.04
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020							
0	1,393 (90.7%)	3,125 (80.5%)	0.30	7,642 (69.4%)	0.56	1,129 (69.3%)	0.56
1	97 (6.3%)	496 (12.8%)	0.22	1,661 (15.1%)	0.29	270 (16.6%)	0.33
≥2	45 (2.9%)	261 (6.7%)	0.18	1,715 (15.6%)	0.45	231 (14.2%)	0.41
Any comorbidity	1,196 (77.9%)	3,124 (80.5%)	0.06	8,364 (75.9%)	0.05	1,217 (74.7%)	0.08
Receipt of home care services							
None	1,460 (95.1%)	3,654 (94.1%)	0.04	10,577 (96.0%)	0.04	1,586 (97.3%)	0.11
Short stay	40 (2.6%)	126 (3.2%)	0.04	266 (2.4%)	0.01	34 (2.1%)	0.03
Long stay	30-34 (2.0-2.2%) ^c	87 (2.2%)	0.02	149 (1.4%)	0.05	10 (0.6%)	0.12
Palliative	≤5 (≤0.3%) ^c	15 (0.4%)	0.02	26 (0.2%)	0.00	0	0.07

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing vaccinated subjects to unvaccinated subjects.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 4: Descriptive characteristics of community-dwelling adults aged 70-79 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing unvaccinated individuals to vaccinated individuals

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	1,452	2,427		8,098		2,583	
Characteristics							
Age (years), mean (standard deviation)	74.30 ± 2.82	74.37 ± 2.87	0.02	74.27 ± 2.81	0.01	74.45 ± 2.80	0.06
Male sex	729 (50.2%)	1,226 (50.5%)	0.01	3,904 (48.2%)	0.04	1,243 (48.1%)	0.04
Public health unit region							
Central East	61 (4.2%)	104 (4.3%)	0.00	497 (6.1%)	0.09	185 (7.2%)	0.13
Central West	243 (16.7%)	398 (16.4%)	0.01	1,313 (16.2%)	0.01	454 (17.6%)	0.02
Durham	30 (2.1%)	67 (2.8%)	0.05	305 (3.8%)	0.10	61 (2.4%)	0.02
Eastern	81 (5.6%)	108 (4.4%)	0.05	285 (3.5%)	0.10	138 (5.3%)	0.01
North	193 (13.3%)	401 (16.5%)	0.09	1,640 (20.3%)	0.19	548 (21.2%)	0.21
Ottawa	40 (2.8%)	42 (1.7%)	0.07	140 (1.7%)	0.07	91 (3.5%)	0.04
Peel	215 (14.8%)	407 (16.8%)	0.05	960 (11.9%)	0.09	263 (10.2%)	0.14
South West	267 (18.4%)	472 (19.4%)	0.03	1,664 (20.5%)	0.05	431 (16.7%)	0.04
Toronto	231 (15.9%)	323 (13.3%)	0.07	965 (11.9%)	0.12	307 (11.9%)	0.12
York	87 (6.0%)	102 (4.2%)	0.08	303 (3.7%)	0.10	100 (3.9%)	0.10
Missing	4 (0.3%)	3 (0.1%)	0.03	26 (0.3%)	0.01	5 (0.2%)	0.02
Household income quintile							
1 (lowest)	455 (31.3%)	676 (27.9%)	0.08	1,819 (22.5%)	0.20	448 (17.3%)	0.33
2	317 (21.8%)	579 (23.9%)	0.05	1,691 (20.9%)	0.02	491 (19.0%)	0.07
3	252 (17.4%)	498 (20.5%)	0.08	1,533 (18.9%)	0.04	484 (18.7%)	0.04
4	240 (16.5%)	382 (15.7%)	0.02	1,545 (19.1%)	0.07	505 (19.6%)	0.08
5 (highest)	180 (12.4%)	283 (11.7%)	0.02	1,476 (18.2%)	0.16	648 (25.1%)	0.33
Missing	8 (0.6%)	9 (0.4%)	0.03	34 (0.4%)	0.02	7 (0.3%)	0.04
Essential workers quintile							
1 (0%–32.5%)	182 (12.5%)	283 (11.7%)	0.03	1,168 (14.4%)	0.06	531 (20.6%)	0.22
2 (32.5%–42.3%)	261 (18.0%)	421 (17.3%)	0.02	1,659 (20.5%)	0.06	608 (23.5%)	0.14
3 (42.3%–49.8%)	301 (20.7%)	513 (21.1%)	0.01	1,735 (21.4%)	0.02	575 (22.3%)	0.04
4 (50.0%–57.5%)	316 (21.8%)	551 (22.7%)	0.02	1,788 (22.1%)	0.01	428 (16.6%)	0.13
5 (57.5%–100%)	384 (26.4%)	646 (26.6%)	0.00	1,689 (20.9%)	0.13	432 (16.7%)	0.24
Missing	8 (0.6%)	13 (0.5%)	0.00	59 (0.7%)	0.02	9 (0.3%)	0.03
Persons per dwelling quintile							
1 (0–2.1)	399 (27.5%)	657 (27.1%)	0.01	2,171 (26.8%)	0.02	709 (27.4%)	0.00

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
2 (2.2–2.4)	305 (21.0%)	571 (23.5%)	0.06	1,873 (23.1%)	0.05	561 (21.7%)	0.02
3 (2.5–2.6)	192 (13.2%)	300 (12.4%)	0.03	1,077 (13.3%)	0.00	347 (13.4%)	0.01
4 (2.7–3.0)	271 (18.7%)	434 (17.9%)	0.02	1,595 (19.7%)	0.03	569 (22.0%)	0.08
5 (3.1–5.7)	276 (19.0%)	450 (18.5%)	0.01	1,326 (16.4%)	0.07	387 (15.0%)	0.11
Missing	9 (0.6%)	15 (0.6%)	0.00	56 (0.7%)	0.01	10 (0.4%)	0.03
Self-identified visible minority quintile							
1 (0.0%–2.2%)	304 (20.9%)	510 (21.0%)	0.00	1,994 (24.6%)	0.09	608 (23.5%)	0.06
2 (2.2%–7.5%)	257 (17.7%)	488 (20.1%)	0.06	1,851 (22.9%)	0.13	627 (24.3%)	0.16
3 (7.5%–18.7%)	237 (16.3%)	395 (16.3%)	0.00	1,407 (17.4%)	0.03	514 (19.9%)	0.09
4 (18.7%–43.5%)	262 (18.0%)	440 (18.1%)	0.00	1,355 (16.7%)	0.03	461 (17.8%)	0.01
5 (43.5%–100%)	384 (26.4%)	581 (23.9%)	0.06	1,433 (17.7%)	0.21	364 (14.1%)	0.31
Missing	8 (0.6%)	13 (0.5%)	0.00	58 (0.7%)	0.02	9 (0.3%)	0.03
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	290 (20.0%)	1,256 (51.8%)	0.70	5,933 (73.3%)	1.26	2,209 (85.5%)	1.74
Prior positive SARS-CoV-2 test	36 (2.5%)	82 (3.4%)	0.05	215 (2.7%)	0.01	47 (1.8%)	0.05
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020							
0	1,337 (92.1%)	2,088 (86.0%)	0.19	6,720 (83.0%)	0.28	2,139 (82.8%)	0.28
1	84 (5.8%)	245 (10.1%)	0.16	946 (11.7%)	0.21	291 (11.3%)	0.20
≥2	31 (2.1%)	94 (3.9%)	0.10	432 (5.3%)	0.17	153 (5.9%)	0.19
Any comorbidity	1,264 (87.1%)	2,264 (93.3%)	0.21	7,359 (90.9%)	0.12	2,266 (87.7%)	0.02
Receipt of home care services							
None	1,371 (94.4%)	2,184 (90.0%)	0.17	7,412 (91.5%)	0.11	2,442 (94.5%)	0.01
Short stay	36 (2.5%)	101 (4.2%)	0.09	337 (4.2%)	0.09	89 (3.4%)	0.06
Long stay	37 (2.5%)	126 (5.2%)	0.14	319 (3.9%)	0.08	47-51 (1.8-2.0%) ^c	0.05
Palliative	8 (0.6%)	16 (0.7%)	0.01	30 (0.4%)	0.03	≤5 (≤0.2%) ^c	0.06

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing vaccinated subjects to unvaccinated subjects.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 5: Descriptive characteristics of community-dwelling adults aged ≥80 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing unvaccinated individuals to vaccinated individuals

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	1,674	2,632		7,932		3,039	
Characteristics							
Age (years), mean (standard deviation)	87.03 ± 5.25	86.49 ± 4.82	0.11	86.27 ± 4.67	0.15	86.81 ± 5.05	0.04
Male sex	782 (46.7%)	1,247 (47.4%)	0.01	3,815 (48.1%)	0.03	1,355 (44.6%)	0.04
Public health unit region							
Central East	76 (4.5%)	84 (3.2%)	0.07	343 (4.3%)	0.01	196 (6.4%)	0.08
Central West	261 (15.6%)	435 (16.5%)	0.03	1,343 (16.9%)	0.04	520 (17.1%)	0.04
Durham	31 (1.9%)	55 (2.1%)	0.02	127 (1.6%)	0.02	41 (1.3%)	0.04
Eastern	77 (4.6%)	117 (4.4%)	0.01	320 (4.0%)	0.03	190 (6.3%)	0.07
North	166 (9.9%)	367 (13.9%)	0.12	1,442 (18.2%)	0.24	583 (19.2%)	0.27
Ottawa	48 (2.9%)	50 (1.9%)	0.06	192 (2.4%)	0.03	137 (4.5%)	0.09
Peel	255 (15.2%)	451 (17.1%)	0.05	1,118 (14.1%)	0.03	368 (12.1%)	0.09
South West	277 (16.5%)	439 (16.7%)	0.00	1,632 (20.6%)	0.10	544 (17.9%)	0.04
Toronto	394 (23.5%)	480 (18.2%)	0.13	1,123 (14.2%)	0.24	335 (11.0%)	0.34
York	84 (5.0%)	146 (5.5%)	0.02	270 (3.4%)	0.08	101 (3.3%)	0.08
Missing	5 (0.3%)	8 (0.3%)	0.00	22 (0.3%)	0.00	24 (0.8%)	0.07
Household income quintile							
1 (lowest)	446 (26.6%)	681 (25.9%)	0.02	1,801 (22.7%)	0.09	688 (22.6%)	0.09
2	405 (24.2%)	593 (22.5%)	0.04	1,746 (22.0%)	0.05	717 (23.6%)	0.01
3	285 (17.0%)	549 (20.9%)	0.10	1,636 (20.6%)	0.09	517 (17.0%)	0.00
4	313 (18.7%)	433 (16.5%)	0.06	1,395 (17.6%)	0.03	541 (17.8%)	0.02
5 (highest)	220 (13.1%)	369 (14.0%)	0.03	1,337 (16.9%)	0.10	546 (18.0%)	0.13
Missing	5 (0.3%)	7 (0.3%)	0.01	17 (0.2%)	0.02	30 (1.0%)	0.09
Essential workers quintile							
1 (0%–32.5%)	248 (14.8%)	359 (13.6%)	0.03	1,338 (16.9%)	0.06	619 (20.4%)	0.15
2 (32.5%–42.3%)	344 (20.5%)	529 (20.1%)	0.01	1,739 (21.9%)	0.03	703 (23.1%)	0.06
3 (42.3%–49.8%)	360 (21.5%)	581 (22.1%)	0.01	1,709 (21.5%)	0.00	701 (23.1%)	0.04
4 (50.0%–57.5%)	367 (21.9%)	562 (21.4%)	0.01	1,595 (20.1%)	0.04	526 (17.3%)	0.12
5 (57.5%–100%)	348 (20.8%)	591 (22.5%)	0.04	1,514 (19.1%)	0.04	462 (15.2%)	0.15
Missing	7 (0.4%)	10 (0.4%)	0.01	37 (0.5%)	0.01	28 (0.9%)	0.06
Persons per dwelling quintile							
1 (0–2.1)	461 (27.5%)	677 (25.7%)	0.04	2,427 (30.6%)	0.07	1,065 (35.0%)	0.16

	Unvaccinated, n (%) ^a	2 doses, n (%) ^a	SD ^b	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
2 (2.2–2.4)	335 (20.0%)	536 (20.4%)	0.01	1,784 (22.5%)	0.06	647 (21.3%)	0.03
3 (2.5–2.6)	226 (13.5%)	344 (13.1%)	0.01	1,114 (14.0%)	0.02	393 (12.9%)	0.02
4 (2.7–3.0)	329 (19.7%)	541 (20.6%)	0.02	1,474 (18.6%)	0.03	562 (18.5%)	0.03
5 (3.1–5.7)	316 (18.9%)	523 (19.9%)	0.03	1,092 (13.8%)	0.14	334 (11.0%)	0.22
Missing	7 (0.4%)	11 (0.4%)	0.00	41 (0.5%)	0.01	38 (1.3%)	0.09
Self-identified visible minority quintile							
1 (0.0%–2.2%)	282 (16.8%)	462 (17.6%)	0.02	1,619 (20.4%)	0.09	628 (20.7%)	0.10
2 (2.2%–7.5%)	275 (16.4%)	420 (16.0%)	0.01	1,738 (21.9%)	0.14	774 (25.5%)	0.22
3 (7.5%–18.7%)	304 (18.2%)	495 (18.8%)	0.02	1,658 (20.9%)	0.07	648 (21.3%)	0.08
4 (18.7%–43.5%)	358 (21.4%)	559 (21.2%)	0.00	1,547 (19.5%)	0.05	499 (16.4%)	0.13
5 (43.5%–100%)	448 (26.8%)	686 (26.1%)	0.02	1,333 (16.8%)	0.24	462 (15.2%)	0.29
Missing	7 (0.4%)	10 (0.4%)	0.01	37 (0.5%)	0.01	28 (0.9%)	0.06
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	485 (29.0%)	1,524 (57.9%)	0.61	6,238 (78.6%)	1.15	2,575 (84.7%)	1.36
Prior positive SARS-CoV-2 test	36 (2.2%)	74 (2.8%)	0.04	148 (1.9%)	0.02	33 (1.1%)	0.08
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020							
0	1,533 (91.6%)	2,295 (87.2%)	0.14	6,882 (86.8%)	0.16	2,562 (84.3%)	0.22
1	86 (5.1%)	244 (9.3%)	0.16	680 (8.6%)	0.14	304 (10.0%)	0.18
≥2	55 (3.3%)	93 (3.5%)	0.01	370 (4.7%)	0.07	173 (5.7%)	0.12
Any comorbidity	1,602 (95.7%)	2,583 (98.1%)	0.14	7,713 (97.2%)	0.08	2,923 (96.2%)	0.02
Receipt of home care services							
None	1,486 (88.8%)	2,287 (86.9%)	0.06	6,893 (86.9%)	0.06	2,732 (89.9%)	0.04
Short stay	50 (3.0%)	94 (3.6%)	0.03	406 (5.1%)	0.11	123-127 (4.0-4.2%) ^c	0.06
Long stay	128 (7.6%)	243 (9.2%)	0.06	585 (7.4%)	0.01	179 (5.9%)	0.07
Palliative	10 (0.6%)	8 (0.3%)	0.04	48 (0.6%)	0.00	≤5 (≤0.2%) ^c	0.08

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing vaccinated subjects to unvaccinated subjects.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 6: Descriptive characteristics of community-dwelling adults aged 50-59 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing those who received 2 doses of monovalent mRNA COVID-19 vaccines with those with received 3 or 4 doses

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	6,279	17,941		558	
Characteristics					
Age (years), mean (standard deviation)	54.32 ± 2.90	54.50 ± 2.91	0.06	55.12 ± 2.95	0.27
Male sex	2,348 (37.4%)	4,812 (26.8%)	0.23	147 (26.3%)	0.24
Public health unit region					
Central East	491 (7.8%)	1,690 (9.4%)	0.06	45 (8.1%)	0.01
Central West	1,008 (16.1%)	2,633 (14.7%)	0.04	96 (17.2%)	0.03
Durham	402 (6.4%)	1,132 (6.3%)	0.00	25 (4.5%)	0.08
Eastern	256 (4.1%)	1,106 (6.2%)	0.09	41 (7.3%)	0.14
North	1,087 (17.3%)	3,383 (18.9%)	0.04	140 (25.1%)	0.19
Ottawa	124 (2.0%)	475 (2.6%)	0.04	17 (3.0%)	0.07
Peel	787 (12.5%)	1,432 (8.0%)	0.15	29 (5.2%)	0.26
South West	1,041 (16.6%)	2,741 (15.3%)	0.04	69 (12.4%)	0.12
Toronto	706 (11.2%)	2,313 (12.9%)	0.05	61 (10.9%)	0.01
York	350 (5.6%)	977 (5.4%)	0.01	29 (5.2%)	0.02
Missing	27 (0.4%)	59 (0.3%)	0.02	6 (1.1%)	0.07
Household income quintile					
1 (lowest)	1,444 (23.0%)	3,031 (16.9%)	0.15	92 (16.5%)	0.16
2	1,335 (21.3%)	3,354 (18.7%)	0.06	87 (15.6%)	0.15
3	1,259 (20.1%)	3,542 (19.7%)	0.01	107 (19.2%)	0.02
4	1,210 (19.3%)	3,766 (21.0%)	0.04	126 (22.6%)	0.08
5 (highest)	1,012 (16.1%)	4,208 (23.5%)	0.18	146 (26.2%)	0.25
Missing	19 (0.3%)	40 (0.2%)	0.02	0 (0.0%)	0.08
Essential workers quintile					
1 (0%–32.5%)	705 (11.2%)	3,083 (17.2%)	0.17	109 (19.5%)	0.23
2 (32.5%–42.3%)	1,276 (20.3%)	4,232 (23.6%)	0.08	164 (29.4%)	0.21
3 (42.3%–49.8%)	1,390 (22.1%)	3,909 (21.8%)	0.01	105 (18.8%)	0.08
4 (50.0%–57.5%)	1,396 (22.2%)	3,581 (20.0%)	0.06	98 (17.6%)	0.12
5 (57.5%–100%)	1,455 (23.2%)	3,000 (16.7%)	0.16	73 (13.1%)	0.26
Missing	57 (0.9%)	136 (0.8%)	0.02	9 (1.6%)	0.06
Persons per dwelling quintile					

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
1 (0–2.1)	1,222 (19.5%)	3,095 (17.3%)	0.06	128 (22.9%)	0.09
2 (2.2–2.4)	1,312 (20.9%)	3,688 (20.6%)	0.01	126 (22.6%)	0.04
3 (2.5–2.6)	843 (13.4%)	2,576 (14.4%)	0.03	68 (12.2%)	0.04
4 (2.7–3.0)	1,275 (20.3%)	4,336 (24.2%)	0.09	119 (21.3%)	0.03
5 (3.1–5.7)	1,569 (25.0%)	4,111 (22.9%)	0.05	107 (19.2%)	0.14
Missing	58 (0.9%)	135 (0.8%)	0.02	10 (1.8%)	0.08
Self-identified visible minority quintile					
1 (0.0%–2.2%)	1,363 (21.7%)	4,278 (23.8%)	0.05	158 (28.3%)	0.15
2 (2.2%–7.5%)	1,272 (20.3%)	3,978 (22.2%)	0.05	116 (20.8%)	0.01
3 (7.5%–18.7%)	1,014 (16.1%)	3,241 (18.1%)	0.05	107 (19.2%)	0.08
4 (18.7%–43.5%)	1,053 (16.8%)	2,989 (16.7%)	0.00	101 (18.1%)	0.04
5 (43.5%–100%)	1,520 (24.2%)	3,319 (18.5%)	0.14	67 (12.0%)	0.32
Missing	57 (0.9%)	136 (0.8%)	0.02	9 (1.6%)	0.06
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	1,519 (24.2%)	7,199 (40.1%)	0.35	322 (57.7%)	0.72
Prior positive SARS-CoV-2 test	511 (8.1%)	1,083 (6.0%)	0.08	40 (7.2%)	0.04
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020					
0	4,635 (73.8%)	10,743 (59.9%)	0.30	362 (64.9%)	0.19
1	996 (15.9%)	3,266 (18.2%)	0.06	89 (15.9%)	0.00
≥2	648 (10.3%)	3,932 (21.9%)	0.32	107 (19.2%)	0.25
Any comorbidity	3,831 (61.0%)	10,484 (58.4%)	0.05	373 (66.8%)	0.12
Receipt of home care services					
None	6,132 (97.7%)	17,677 (98.5%)	0.06	543 (97.3%)	0.02
Short stay	96 (1.5%)	184 (1.0%)	0.04	12 (2.2%)	0.05
Long stay	46-50 (0.7-0.8%) ^c	70 (0.4%)	0.05	≤5 (≤0.9%) ^c	0.05
Palliative	≤5 (≤0.1%) ^c	10 (0.1%)	0.00	≤5 (≤0.9%) ^c	0.03

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing subjects who received 3 or 4 doses to those who received 2 doses.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 7: Descriptive characteristics of community-dwelling adults aged 60-69 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing those who received 2 doses of monovalent mRNA COVID-19 vaccines with those with received 3 or 4 doses

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	3,882	11,018		1,630	
Characteristics					
Age (years), mean (standard deviation)	63.90 ± 2.86	63.96 ± 2.86	0.02	64.58 ± 2.88	0.24
Male sex	1,781 (45.9%)	4,219 (38.3%)	0.15	622 (38.2%)	0.16
Public health unit region					
Central East	236 (6.1%)	898 (8.2%)	0.08	141 (8.7%)	0.10
Central West	657 (16.9%)	1,648 (15.0%)	0.05	255 (15.6%)	0.03
Durham	172 (4.4%)	588 (5.3%)	0.04	77 (4.7%)	0.01
Eastern	128 (3.3%)	504 (4.6%)	0.07	92 (5.6%)	0.11
North	710 (18.3%)	2,261 (20.5%)	0.06	403 (24.7%)	0.16
Ottawa	65 (1.7%)	224 (2.0%)	0.03	44 (2.7%)	0.07
Peel	506 (13.0%)	1,051 (9.5%)	0.11	127 (7.8%)	0.17
South West	740 (19.1%)	1,954 (17.7%)	0.03	229 (14.0%)	0.14
Toronto	463 (11.9%)	1,292 (11.7%)	0.01	184 (11.3%)	0.02
York	186 (4.8%)	570 (5.2%)	0.02	69 (4.2%)	0.03
Missing	19 (0.5%)	28 (0.3%)	0.04	9 (0.6%)	0.01
Household income quintile					
1 (lowest)	1,100 (28.3%)	2,248 (20.4%)	0.19	288 (17.7%)	0.26
2	830 (21.4%)	2,241 (20.3%)	0.03	321 (19.7%)	0.04
3	719 (18.5%)	2,085 (18.9%)	0.01	281 (17.2%)	0.03
4	667 (17.2%)	2,158 (19.6%)	0.06	335 (20.6%)	0.09
5 (highest)	553 (14.2%)	2,254 (20.5%)	0.16	400 (24.5%)	0.26
Missing	13 (0.3%)	32 (0.3%)	0.01	5 (0.3%)	0.00
Essential workers quintile					
1 (0%–32.5%)	419 (10.8%)	1,616 (14.7%)	0.12	318 (19.5%)	0.24
2 (32.5%–42.3%)	718 (18.5%)	2,402 (21.8%)	0.08	357 (21.9%)	0.08
3 (42.3%–49.8%)	819 (21.1%)	2,463 (22.4%)	0.03	341 (20.9%)	0.00
4 (50.0%–57.5%)	896 (23.1%)	2,292 (20.8%)	0.06	303 (18.6%)	0.11
5 (57.5%–100%)	991 (25.5%)	2,158 (19.6%)	0.14	295 (18.1%)	0.18
Missing	39 (1.0%)	87 (0.8%)	0.02	16 (1.0%)	0.00
Persons per dwelling quintile					

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
1 (0–2.1)	967 (24.9%)	2,385 (21.6%)	0.08	389 (23.9%)	0.02
2 (2.2–2.4)	836 (21.5%)	2,536 (23.0%)	0.04	343 (21.0%)	0.01
3 (2.5–2.6)	477 (12.3%)	1,533 (13.9%)	0.05	230 (14.1%)	0.05
4 (2.7–3.0)	730 (18.8%)	2,259 (20.5%)	0.04	351 (21.5%)	0.07
5 (3.1–5.7)	828 (21.3%)	2,210 (20.1%)	0.03	297 (18.2%)	0.08
Missing	44 (1.1%)	95 (0.9%)	0.03	20 (1.2%)	0.01
Self-identified visible minority quintile					
1 (0.0%–2.2%)	869 (22.4%)	2,769 (25.1%)	0.06	456 (28.0%)	0.13
2 (2.2%–7.5%)	738 (19.0%)	2,605 (23.6%)	0.11	359 (22.0%)	0.07
3 (7.5%–18.7%)	663 (17.1%)	1,859 (16.9%)	0.01	332 (20.4%)	0.08
4 (18.7%–43.5%)	668 (17.2%)	1,659 (15.1%)	0.06	229 (14.0%)	0.09
5 (43.5%–100%)	905 (23.3%)	2,039 (18.5%)	0.12	238 (14.6%)	0.22
Missing	39 (1.0%)	87 (0.8%)	0.02	16 (1.0%)	0.00
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	1,419 (36.6%)	6,101 (55.4%)	0.38	1,111 (68.2%)	0.67
Prior positive SARS-CoV-2 test	213 (5.5%)	500 (4.5%)	0.04	45 (2.8%)	0.14
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020					
0	3,125 (80.5%)	7,642 (69.4%)	0.26	1,129 (69.3%)	0.26
1	496 (12.8%)	1,661 (15.1%)	0.07	270 (16.6%)	0.11
≥2	261 (6.7%)	1,715 (15.6%)	0.28	231 (14.2%)	0.25
Any comorbidity	3,124 (80.5%)	8,364 (75.9%)	0.11	1,217 (74.7%)	0.14
Receipt of home care services					
None	3,654 (94.1%)	10,577 (96.0%)	0.09	1,586 (97.3%)	0.16
Short stay	126 (3.2%)	266 (2.4%)	0.05	34 (2.1%)	0.07
Long stay	87 (2.2%)	149 (1.4%)	0.07	10 (0.6%)	0.14
Palliative	15 (0.4%)	26 (0.2%)	0.03	0	0.09

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing subjects who received 3 or 4 doses to those who received 2 doses.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 8: Descriptive characteristics of community-dwelling adults aged 70-79 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing those who received 2 doses of monovalent mRNA COVID-19 vaccines with those with received 3 or 4 doses

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	2,427	8,098		2,583	
Characteristics					
Age (years), mean (standard deviation)	74.37 ± 2.87	74.27 ± 2.81	0.04	74.45 ± 2.80	0.03
Male sex	1,226 (50.5%)	3,904 (48.2%)	0.05	1,243 (48.1%)	0.05
Public health unit region					
Central East	104 (4.3%)	497 (6.1%)	0.08	185 (7.2%)	0.12
Central West	398 (16.4%)	1,313 (16.2%)	0.01	454 (17.6%)	0.03
Durham	67 (2.8%)	305 (3.8%)	0.06	61 (2.4%)	0.03
Eastern	108 (4.4%)	285 (3.5%)	0.05	138 (5.3%)	0.04
North	401 (16.5%)	1,640 (20.3%)	0.10	548 (21.2%)	0.12
Ottawa	42 (1.7%)	140 (1.7%)	0.00	91 (3.5%)	0.11
Peel	407 (16.8%)	960 (11.9%)	0.14	263 (10.2%)	0.19
South West	472 (19.4%)	1,664 (20.5%)	0.03	431 (16.7%)	0.07
Toronto	323 (13.3%)	965 (11.9%)	0.04	307 (11.9%)	0.04
York	102 (4.2%)	303 (3.7%)	0.02	100 (3.9%)	0.02
Missing	3 (0.1%)	26 (0.3%)	0.04	5 (0.2%)	0.02
Household income quintile					
1 (lowest)	676 (27.9%)	1,819 (22.5%)	0.12	448 (17.3%)	0.25
2	579 (23.9%)	1,691 (20.9%)	0.07	491 (19.0%)	0.12
3	498 (20.5%)	1,533 (18.9%)	0.04	484 (18.7%)	0.04
4	382 (15.7%)	1,545 (19.1%)	0.09	505 (19.6%)	0.10
5 (highest)	283 (11.7%)	1,476 (18.2%)	0.18	648 (25.1%)	0.35
Missing	9 (0.4%)	34 (0.4%)	0.01	7 (0.3%)	0.02
Essential workers quintile					
1 (0%–32.5%)	283 (11.7%)	1,168 (14.4%)	0.08	531 (20.6%)	0.24
2 (32.5%–42.3%)	421 (17.3%)	1,659 (20.5%)	0.08	608 (23.5%)	0.15
3 (42.3%–49.8%)	513 (21.1%)	1,735 (21.4%)	0.01	575 (22.3%)	0.03
4 (50.0%–57.5%)	551 (22.7%)	1,788 (22.1%)	0.01	428 (16.6%)	0.15
5 (57.5%–100%)	646 (26.6%)	1,689 (20.9%)	0.14	432 (16.7%)	0.24
Missing	13 (0.5%)	59 (0.7%)	0.02	9 (0.3%)	0.03
Persons per dwelling quintile					

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
1 (0–2.1)	657 (27.1%)	2,171 (26.8%)	0.01	709 (27.4%)	0.01
2 (2.2–2.4)	571 (23.5%)	1,873 (23.1%)	0.01	561 (21.7%)	0.04
3 (2.5–2.6)	300 (12.4%)	1,077 (13.3%)	0.03	347 (13.4%)	0.03
4 (2.7–3.0)	434 (17.9%)	1,595 (19.7%)	0.05	569 (22.0%)	0.10
5 (3.1–5.7)	450 (18.5%)	1,326 (16.4%)	0.06	387 (15.0%)	0.10
Missing	15 (0.6%)	56 (0.7%)	0.01	10 (0.4%)	0.03
Self-identified visible minority quintile					
1 (0.0%–2.2%)	510 (21.0%)	1,994 (24.6%)	0.09	608 (23.5%)	0.06
2 (2.2%–7.5%)	488 (20.1%)	1,851 (22.9%)	0.07	627 (24.3%)	0.10
3 (7.5%–18.7%)	395 (16.3%)	1,407 (17.4%)	0.03	514 (19.9%)	0.09
4 (18.7%–43.5%)	440 (18.1%)	1,355 (16.7%)	0.04	461 (17.8%)	0.01
5 (43.5%–100%)	581 (23.9%)	1,433 (17.7%)	0.15	364 (14.1%)	0.25
Missing	13 (0.5%)	58 (0.7%)	0.02	9 (0.3%)	0.03
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	1,256 (51.8%)	5,933 (73.3%)	0.46	2,209 (85.5%)	0.78
Prior positive SARS-CoV-2 test	82 (3.4%)	215 (2.7%)	0.04	47 (1.8%)	0.10
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020					
0	2,088 (86.0%)	6,720 (83.0%)	0.08	2,139 (82.8%)	0.09
1	245 (10.1%)	946 (11.7%)	0.05	291 (11.3%)	0.04
≥2	94 (3.9%)	432 (5.3%)	0.07	153 (5.9%)	0.10
Any comorbidity	2,264 (93.3%)	7,359 (90.9%)	0.09	2,266 (87.7%)	0.19
Receipt of home care services					
None	2,184 (90.0%)	7,412 (91.5%)	0.05	2,442 (94.5%)	0.17
Short stay	101 (4.2%)	337 (4.2%)	0.00	89 (3.4%)	0.04
Long stay	126 (5.2%)	319 (3.9%)	0.06	47-51 (1.8-2.0%) ^c	0.18
Palliative	16 (0.7%)	30 (0.4%)	0.04	≤5 (≤0.2%) ^c	0.07

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing subjects who received 3 or 4 doses to those who received 2 doses.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 9: Descriptive characteristics of community-dwelling adults aged ≥ 80 years tested for SARS-CoV-2 between January 2, 2022 and October 1, 2022 in Ontario, Canada, comparing those who received 2 doses of monovalent mRNA COVID-19 vaccines with those who received 3 or 4 doses

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
Total	2,632	7,932		3,039	
Characteristics					
Age (years), mean (standard deviation)	86.49 \pm 4.82	86.27 \pm 4.67	0.05	86.81 \pm 5.05	0.06
Male sex	1,247 (47.4%)	3,815 (48.1%)	0.01	1,355 (44.6%)	0.06
Public health unit region					
Central East	84 (3.2%)	343 (4.3%)	0.06	196 (6.4%)	0.15
Central West	435 (16.5%)	1,343 (16.9%)	0.01	520 (17.1%)	0.02
Durham	55 (2.1%)	127 (1.6%)	0.04	41 (1.3%)	0.06
Eastern	117 (4.4%)	320 (4.0%)	0.02	190 (6.3%)	0.08
North	367 (13.9%)	1,442 (18.2%)	0.12	583 (19.2%)	0.14
Ottawa	50 (1.9%)	192 (2.4%)	0.04	137 (4.5%)	0.15
Peel	451 (17.1%)	1,118 (14.1%)	0.08	368 (12.1%)	0.14
South West	439 (16.7%)	1,632 (20.6%)	0.10	544 (17.9%)	0.03
Toronto	480 (18.2%)	1,123 (14.2%)	0.11	335 (11.0%)	0.21
York	146 (5.5%)	270 (3.4%)	0.10	101 (3.3%)	0.11
Missing	8 (0.3%)	22 (0.3%)	0.00	24 (0.8%)	0.07
Household income quintile					
1 (lowest)	681 (25.9%)	1,801 (22.7%)	0.07	688 (22.6%)	0.08
2	593 (22.5%)	1,746 (22.0%)	0.01	717 (23.6%)	0.03
3	549 (20.9%)	1,636 (20.6%)	0.01	517 (17.0%)	0.10
4	433 (16.5%)	1,395 (17.6%)	0.03	541 (17.8%)	0.04
5 (highest)	369 (14.0%)	1,337 (16.9%)	0.08	546 (18.0%)	0.11
Missing	7 (0.3%)	17 (0.2%)	0.01	30 (1.0%)	0.09
Essential workers quintile					
1 (0%–32.5%)	359 (13.6%)	1,338 (16.9%)	0.09	619 (20.4%)	0.18
2 (32.5%–42.3%)	529 (20.1%)	1,739 (21.9%)	0.04	703 (23.1%)	0.07
3 (42.3%–49.8%)	581 (22.1%)	1,709 (21.5%)	0.01	701 (23.1%)	0.02
4 (50.0%–57.5%)	562 (21.4%)	1,595 (20.1%)	0.03	526 (17.3%)	0.10
5 (57.5%–100%)	591 (22.5%)	1,514 (19.1%)	0.08	462 (15.2%)	0.19
Missing	10 (0.4%)	37 (0.5%)	0.01	28 (0.9%)	0.07
Persons per dwelling quintile					

	2 doses, n (%) ^a	3 doses, n (%) ^a	SD ^b	4 doses, n (%) ^a	SD ^b
1 (0–2.1)	677 (25.7%)	2,427 (30.6%)	0.11	1,065 (35.0%)	0.20
2 (2.2–2.4)	536 (20.4%)	1,784 (22.5%)	0.05	647 (21.3%)	0.02
3 (2.5–2.6)	344 (13.1%)	1,114 (14.0%)	0.03	393 (12.9%)	0.00
4 (2.7–3.0)	541 (20.6%)	1,474 (18.6%)	0.05	562 (18.5%)	0.05
5 (3.1–5.7)	523 (19.9%)	1,092 (13.8%)	0.16	334 (11.0%)	0.25
Missing	11 (0.4%)	41 (0.5%)	0.01	38 (1.3%)	0.09
Self-identified visible minority quintile					
1 (0.0%–2.2%)	462 (17.6%)	1,619 (20.4%)	0.07	628 (20.7%)	0.08
2 (2.2%–7.5%)	420 (16.0%)	1,738 (21.9%)	0.15	774 (25.5%)	0.24
3 (7.5%–18.7%)	495 (18.8%)	1,658 (20.9%)	0.05	648 (21.3%)	0.06
4 (18.7%–43.5%)	559 (21.2%)	1,547 (19.5%)	0.04	499 (16.4%)	0.12
5 (43.5%–100%)	686 (26.1%)	1,333 (16.8%)	0.23	462 (15.2%)	0.27
Missing	10 (0.4%)	37 (0.5%)	0.01	28 (0.9%)	0.07
Receipt of 2019-2020 and/or 2020-2021 influenza vaccination	1,524 (57.9%)	6,238 (78.6%)	0.46	2,575 (84.7%)	0.62
Prior positive SARS-CoV-2 test	74 (2.8%)	148 (1.9%)	0.06	33 (1.1%)	0.13
Number of SARS-CoV-2 tests within 3 months prior to December 14, 2020					
0	2,295 (87.2%)	6,882 (86.8%)	0.01	2,562 (84.3%)	0.08
1	244 (9.3%)	680 (8.6%)	0.02	304 (10.0%)	0.02
≥2	93 (3.5%)	370 (4.7%)	0.06	173 (5.7%)	0.10
Any comorbidity	2,583 (98.1%)	7,713 (97.2%)	0.06	2,923 (96.2%)	0.12
Receipt of home care services					
None	2,287 (86.9%)	6,893 (86.9%)	0.00	2,732 (89.9%)	0.09
Short stay	94 (3.6%)	406 (5.1%)	0.08	123-127 (4.0-4.2%) ^c	0.03
Long stay	243 (9.2%)	585 (7.4%)	0.07	179 (5.9%)	0.13
Palliative	8 (0.3%)	48 (0.6%)	0.04	≤5 (≤0.2%) ^c	0.04

*Note, not unique by person; individuals may be included more than once.

^aProportion reported, unless stated otherwise.

^bSD=standardized difference. Standardized differences of >0.10 are considered clinically relevant. Comparing subjects who received 3 or 4 doses to those who received 2 doses.

^cDue to institutional privacy policies, any cells ≤5 (except for missing values) must be suppressed and ranges must be provided for complementary cells to prevent back calculation.

Table 10: Vaccine effectiveness of 2, 3, and 4 doses of monovalent mRNA COVID-19 vaccines (compared to unvaccinated subjects) against Omicron-associated severe outcomes among community-dwelling adults aged ≥ 50 years in Ontario, Canada, January 2, 2022 to October 1, 2022

	Age 50-59 years		Age 60-69 years		Age 70-79 years		Age ≥ 80 years	
Days since last dose	Median days	VE ^a	Median days	VE ^a	Median days	VE ^a	Median days	VE ^a
Second dose								
7-59 days	37	79 (60, 89)	40	80 (62, 90)	39	84 (57, 94)	27	84 (61, 93)
60-119 days	97	77 (65, 84)	94	81 (69, 88)	94	86 (78, 92)	94	57 (27, 75)
120-179 days	163	85 (79, 89)	163	79 (73, 84)	164	76 (67, 82)	166	60 (47, 70)
180-239 days	202	86 (82, 89)	202	84 (80, 87)	205	69 (62, 75)	210	46 (34, 56)
240-299 days	268	82 (75, 87)	268	72 (64, 78)	271	75 (67, 80)	268	68 (59, 75)
≥ 300 days	357	77 (69, 83)	356	70 (62, 77)	361	71 (63, 78)	364	64 (55, 71)
Third dose								
0-6 days	4	96 (91, 98)	4	95 (91, 97)	4	88 (81, 92)	3	66 (48, 77)
7-59 days	32	97 (96, 98)	30	98 (97, 98)	34	96 (95, 97)	36	91 (89, 92)
60-119 days	89	95 (93, 96)	90	94 (92, 95)	91	92 (90, 94)	90	86 (84, 89)
120-179 days	145	94 (91, 96)	143	91 (88, 93)	141	89 (86, 91)	142	82 (79, 86)
180-239 days	206	88 (83, 92)	208	82 (77, 87)	208	79 (73, 84)	209	75 (68, 80)
≥ 240 days	261	87 (81, 92)	260	85 (78, 90)	259	79 (71, 85)	260	76 (68, 82)
Fourth dose								
0-6 days	4	- ^b	4	98 (91, 99)	4	93 (86, 97)	4	86 (77, 91)
7-59 days	29	97 (91, 99)	31	94 (91, 96)	31	93 (91, 95)	31	92 (90, 94)
60-119 days	74	93 (72, 98)	84	89 (84, 93)	88	92 (89, 94)	87	90 (87, 92)
≥ 120 days	142	86 (44, 96)	140	88 (79, 93)	140	89 (84, 92)	147	88 (85, 91)

^aVE = Vaccine effectiveness. Includes 95% confidence interval.

^bNot reported due to unstable estimate (95% confidence interval width exceeded 100 percentage points).

Table 11: Numbers of vaccinated cases and controls included in the analyses of vaccine effectiveness (2, 3, and 4 doses compared to unvaccinated subjects) and marginal effectiveness (3 or 4 doses compared to 2 doses) of monovalent mRNA COVID-19 vaccines against Omicron-associated severe outcomes among community-dwelling adults aged ≥ 50 years in Ontario, Canada, January 2, 2022 to October 1, 2022

	Age 50-59 years		Age 60-69 years		Age 70-79 years		Age ≥ 80 years	
Days since last dose	Cases ^a	Controls ^b	Cases ^a	Controls ^b	Cases ^a	Controls ^b	Cases ^a	Controls ^b
Second dose								
7-59 days	10	119	10	60	6	25	10	27
60-119 days	37	396	27	149	27	82	34	32
120-179 days	65	1,066	107	544	112	205	125	135
180-239 days	136	2,246	206	1,230	332	538	542	423
240-299 days	55	848	108	524	133	357	180	290
≥ 300 days	86	1,215	139	778	163	447	363	471
Third dose								
0-6 days	8	402	14	233	30	109	49	65
7-59 days	68	5,681	94	3,650	182	2,101	299	1,496
60-119 days	80	4,830	145	2,892	243	1,994	503	1,902
120-179 days	50	3,583	117	2,104	246	1,699	509	1,400
180-239 days	73	2,086	128	1,116	226	816	448	685
≥ 240 days	40	1,040	46	479	109	343	252	324
Fourth dose								
0-6 days	≤ 5	32	≤ 5	95	10	103	29	83
7-59 days	≤ 5	357	28	730	85	979	152	905
60-119 days	≤ 5	119	40	511	106	837	255	835
≥ 120 days	≤ 5	38	20	204	85	378	237	543

^aNumber of vaccinated Omicron-positive cases.

^bNumber of vaccinated SARS-CoV-2-negative controls.

^cDue to institutional privacy policies, any cells ≤ 5 must be suppressed.

Table 12: Marginal effectiveness of 3 or 4 doses of monovalent mRNA COVID-19 vaccines (compared to 2 doses) against Omicron-associated severe outcomes among community-dwelling adults aged ≥ 50 years in Ontario, Canada, January 2, 2022 to October 1, 2022

Days since last dose	Age 50-59 years		Age 60-69 years		Age 70-79 years		Age ≥ 80 years	
	Median days	ME ^a	Median days	ME ^a	Median days	ME ^a	Median days	ME ^a
Third dose								
0-6 days	4	67 (33, 84)	4	68 (41, 82)	4	46 (18, 65)	3	13 (-30, 42)
7-59 days	32	79 (72, 84)	30	87 (83, 90)	34	83 (79, 86)	36	77 (72, 80)
60-119 days	89	74 (66, 81)	90	75 (69, 80)	91	71 (65, 76)	90	66 (61, 71)
120-179 days	145	76 (66, 83)	143	69 (61, 76)	141	64 (56, 71)	142	59 (52, 66)
180-239 days	206	60 (44, 71)	208	52 (37, 63)	208	46 (32, 57)	209	45 (33, 54)
≥ 240 days	261	57 (35, 72)	260	62 (45, 75)	259	45 (24, 59)	260	48 (33, 60)
Fourth dose								
0-6 days	4	- ^b	4	92 (69, 98)	4	77 (53, 89)	4	67 (46, 80)
7-59 days	29	89 (69, 96)	31	83 (74, 89)	31	80 (74, 85)	31	82 (78, 86)
60-119 days	74	77 (-1, 95)	84	71 (57, 80)	88	78 (71, 84)	87	77 (72, 82)
≥ 120 days	142	- ^b	140	69 (47, 82)	140	69 (57, 78)	147	75 (68, 81)

^aME = marginal effectiveness. Includes 95% confidence interval.

^bNot reported due to unstable estimate (95% confidence interval width exceeded 100 percentage points).

Table 13: Vaccine effectiveness against Omicron-associated severe outcomes among community-dwelling adults aged ≥ 50 years in Ontario, Canada, comparing those who received ≥ 2 doses of monovalent mRNA COVID-19 vaccines to those who received none, by time since vaccination and age, during BA.1/BA.2 and BA.4/BA.5-predominant periods

Age group (years)	Days since last dose	BA.1/BA.2-predominant period (January 2, 2022 to July 2, 2022)				BA.4/BA.5-predominant period (July 3, 2022 to October 1, 2022)				Percentage point difference in VE between periods ^c	p-value
		Median days	Cases ^a	Controls ^b	VE ^c	Median days	Cases ^a	Controls ^b	VE ^c		
50-59	Dose 2 (240-299)	268	53	759	83 (76, 88)	274	$\leq 5^d$	89	87 (43, 97)	-4	0.723
	Dose 2 (≥ 300)	333	31	629	83 (74, 89)	393	55	586	56 (30, 72)	27	0.003
	Dose 3 (120-179)	144	40	3,351	96 (93, 97)	168	10	232	77 (50, 89)	19	<0.001
	Dose 3 (180-239)	192	$\leq 5^d$	684	98 (93, 99)	213	70	1,402	75 (60, 84)	23	<0.001
	Dose 4 (7-59)	28	$\leq 5^d$	91	97 (77, 100)	29	$\leq 5^d$	266	95 (82, 98)	2	0.653
60-69	Dose 2 (≥ 300)	327	48	402	79 (71, 86)	395	91	376	43 (16, 61)	36	<0.001
	Dose 3 (60-119)	90	144	2,859	95 (93, 96)	97	$\leq 5^d$	33	94 (53, 99)	1	0.901
	Dose 3 (120-179)	142	104	1,958	92 (90, 94)	168	13	146	74 (48, 87)	18	0.001
	Dose 3 (180-239)	191	10	233	90 (79, 95)	212	118	883	69 (55, 78)	21	0.007
	Dose 4 (7-59)	27	14	476	96 (93, 98)	39	14	254	88 (78, 94)	8	0.015
	Dose 4 (60-119)	69	$\leq 5^d$	72	95 (77, 99)	86	38	439	81 (70, 88)	14	0.111
70-79	Dose 2 (≥ 300)	328	62	223	80 (72, 86)	403	101	224	48 (25, 64)	32	<0.001
	Dose 3 (7-59)	34	180	2,082	96 (96, 97)	41	$\leq 5^d$	19	86 (37, 97)	10	0.083
	Dose 3 (60-119)	91	239	1,962	93 (92, 95)	103	$\leq 5^d$	32	86 (57, 95)	7	0.187
	Dose 3 (120-179)	140	213	1,606	92 (90, 94)	162	33	93	58 (30, 75)	34	<0.001
	Dose 3 (180-239)	189	20	210	91 (85, 95)	214	206	606	59 (44, 70)	32	<0.001
	Dose 4 (7-59)	27	43	689	96 (94, 97)	39	42	290	85 (77, 90)	11	<0.001
	Dose 4 (60-119)	70	15	144	93 (87, 96)	91	91	693	86 (80, 90)	7	0.062
≥ 80	Dose 2 (≥ 300)	328	148	236	72 (62, 79)	406	215	235	40 (18, 56)	32	<0.001
	Dose 3 (7-59)	36	294	1,482	92 (90, 93)	40	$\leq 5^d$	14	76 (27, 92)	16	0.071
	Dose 3 (60-119)	90	494	1,869	88 (85, 90)	99	9	33	83 (61, 93)	5	0.461
	Dose 3 (120-179)	141	455	1,305	85 (82, 88)	165	54	95	64 (44, 77)	21	<0.001
	Dose 3 (180-239)	193	62	184	87 (80, 91)	215	386	501	52 (36, 64)	35	<0.001
	Dose 4 (7-59)	29	94	678	94 (92, 95)	38	58	227	86 (79, 90)	8	0.001
	Dose 4 (60-119)	73	35	233	95 (92, 97)	92	220	602	80 (73, 85)	15	<0.001

Dose 4 (≥ 120)	133	6	22	92 (78, 97)	148	231	521	80 (72, 85)	12	0.084
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Note: The difference in VE between periods was estimated using an interaction term in the multivariable logistic regression models. All tests were 2-sided. Estimates were not reported if they were unstable for either period. Bolded p-values considered significant at $p < 0.05$.

^aNumber of vaccinated Omicron-positive cases.

^bNumber of vaccinated SARS-CoV-2-negative controls.

^cVE = Vaccine effectiveness. Includes 95% confidence interval.

^dDue to institutional privacy policies, any cells ≤ 5 must be suppressed.

Table 14: Vaccine effectiveness of 2, 3, and 4 doses of monovalent mRNA COVID-19 vaccines (compared to unvaccinated subjects) against Omicron-associated severe outcomes among community-dwelling adults aged ≥ 50 years in Ontario, Canada, January 2, 2022 to October 1, 2022 with individuals prescribed Paxlovid removed (n=177)

Days since last dose	Age 50-59 years	Age 60-69 years	Age 70-79 years	Age ≥ 80 years
	Vaccine effectiveness, 95% CI	Vaccine effectiveness, 95% CI	Vaccine effectiveness, 95% CI	Vaccine effectiveness, 95% CI
Second dose				
7-59 days	79 (60, 89)	80 (62, 90)	84 (57, 94)	84 (61, 93)
60-119 days	77 (65, 84)	81 (69, 88)	86 (78, 92)	57 (27, 75)
120-179 days	85 (79, 89)	79 (73, 84)	76 (67, 82)	60 (47, 70)
180-239 days	86 (82, 89)	84 (80, 87)	70 (63, 75)	46 (34, 56)
240-299 days	82 (75, 87)	72 (64, 78)	75 (67, 80)	68 (59, 75)
≥ 300 days	77 (69, 83)	70 (62, 77)	72 (64, 78)	65 (56, 72)
Third dose				
0-6 days	96 (91, 98)	95 (91, 97)	88 (81, 92)	66 (49, 77)
7-59 days	97 (96, 98)	98 (97, 98)	96 (95, 97)	91 (89, 92)
60-119 days	95 (93, 96)	94 (92, 95)	92 (90, 94)	86 (84, 89)
120-179 days	94 (91, 96)	91 (88, 93)	89 (86, 91)	82 (79, 86)
180-239 days	88 (83, 92)	83 (77, 87)	79 (73, 84)	74 (68, 80)
≥ 240 days	87 (81, 92)	85 (78, 90)	79 (71, 85)	77 (70, 83)
Fourth dose				
0-6 days	75 (-9, 94)	98 (91, 99)	93 (86, 97)	86 (76, 91)
7-59 days	97 (91, 99)	95 (92, 97)	94 (92, 95)	92 (90, 94)
60-119 days	93 (72, 98)	89 (84, 93)	92 (89, 94)	90 (87, 92)
≥ 120 days	86 (44, 96)	88 (79, 93)	89 (84, 92)	89 (85, 92)

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