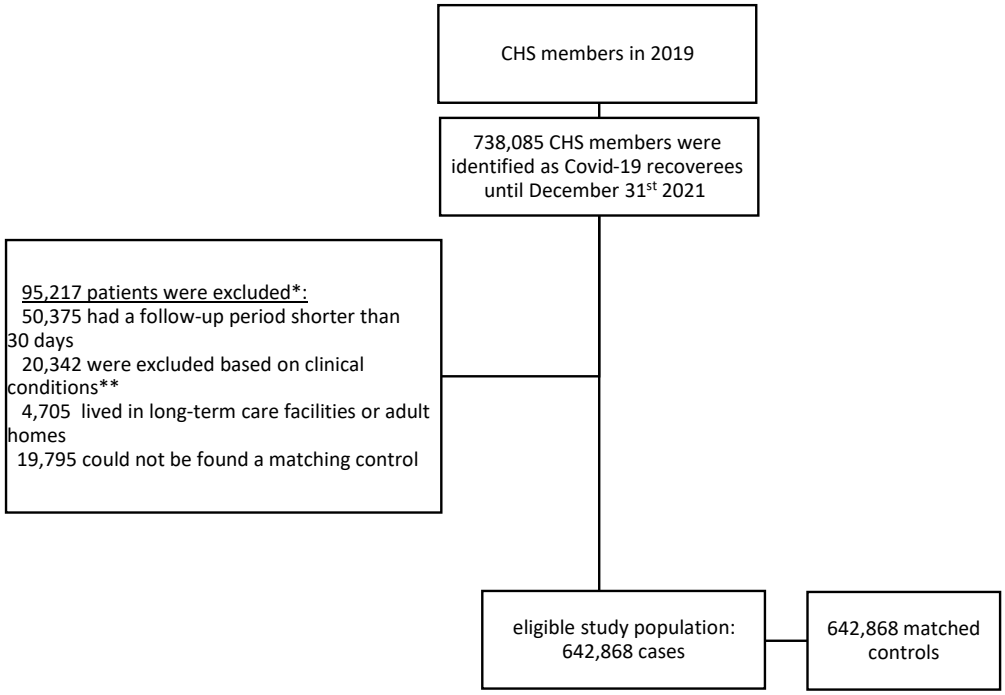
Supplementary files

Supplementary: Clinical Exclusion criteria

The following exclusion criteria were applied: oncological patients, patients undergoing organ transplants, HIV/AIDS patients treated with protease medications, dialysis patients, and patients with β-thalassemia major or intermedia, hemophilia or Gaucher disease. Persons living in long-term care facilities or adult homes (including assisted-living and nursing homes) were also excluded, as information regarding the utilization of healthcare services in this sub-group is not fully available.

Supplementary figure 1: Study population selection



Footnotes: *To ensure the representation of costs in a general community-dwelling population we have excluded CHS members not residing in the community, and those with diagnoses related to extreme costs: **oncological patients, patients undergoing organ transplants, HIV/AIDS patients treated with

protease medications, dialysis patients, and patients with β-thalassemia major or intermedia, hemophilia or Gaucher disease.

Supplementary: Study population- matching criteria

In this historical cohort study, each COVID-19 recoveree was matched to one paired control. Five matching criteria had to be met for each pair of cases and controls, ~~were applied, hence accounting for the main characteristics associated with differences in healthcare utilization in Israel. Matching criteria were~~ as follows: age (5-years intervals), sex, ethnicity,- socioeconomic status, and the Adjusted Clinical Groups (ACG) score (in 6 categories). ACG is a patient case-mix adjustment system, grouping individuals based on their age and sex and all medical diagnoses (1) (2).

The Socio-Economic Status (SES) was based on the small statistical areas (SSA) used in the 2008 Israeli census. The SSAs contain 3000–4000 people and are created to maintain homogeneity in terms of the sociodemographic composition of the population (3). The Israeli Central Bureau of Statistics (CBS) utilized demography, education, employment, housing conditions, and income to define the SSAs, and these were grouped into 20 categories. This data was updated by the POINTS Location Intelligence Company (4) to improve the accuracy of the SES measure, using up-to-date sociodemographic, commercial, and housing data (5). The entire CHS population was grouped into ten categories, ranging from 1 (lowest) to 10 (highest).

Ethnicity was classified as Israeli-Arab, ultra-orthodox Jewish, and general Jewish or other, based on geographical statistical areas (GSAs). The Israel Central Bureau of Statistics (CBS) classifies all neighborhoods in Israel into GSAs. This classification is further refined by a privately owned Location Intelligence company (POINS LTD), which gathers data from multiple sources, including various consumer and commercial data, and provides an estimation of the presence of each ethnic group by GSAs (4).

Supplementary: Study variables

The outcome of interest was the direct net healthcare costs as incurred by CHS for each participant, per month. Costs were examined overall, and by seven categories of expenses, as detailed:

(1) Hospital bills: emergency department visits, hospitalization days, outpatients consultations, inpatient and outpatients procedures, imaging and laboratory tests.

(2) Medical specialists' visits- in the CHS community healthcare setting

(3) Primary care physician visits

(4) Nurse visits

(5) Paramedical professions visits: physiotherapists, occupational therapists, speech-language-pathologist, dietitians, psychologists and social workers visits.

(6) Medications - It should be noted that the net costs of medications is the sum of CHS direct expenses and incomes. The source of the latest is the patient's medications purchases in CHS pharmacies (both prescription and OTC medications).

(7) Other costs: continuing care units; CHS payments to private providers; and co-payments and refunds. The two latest encompasses diverse medical services including imaging, ambulatory services, laboratory tests, physician visits, home care, medical equipment and more.

For each of the primary case categories, the number of visits was multiplied by their estimated salary-cost, as deducted from the total annual costs of salaries in 2020 divided by the number of visits during the same period. Hence, other costs (e.g., facilities, equipment) were not included.

The sum of the above categories of expenses encompasses the direct insurer-provider economic burden at the patient level, and was expressed as average monthly rates. We also present the relative difference between groups (and 95% CIs) for the entire study period and by months of follow-up; hence expressing the additive long-term cost of COVID-19 recoverees compared to the control group.

Supplementary: Data Analysis

In order to include costs associated with the long-term effects of COVID-19, and not those associated with its acute period, follow-up for the post-COVID period was initiated as of an index date set 30 days

after the first positive COVID-19 PCR test of the recoveree in persons who were treated only in the community, or 30 days after hospital discharge in persons who were hospitalized during their corona disease episode. Follow-up was initiated as early as April 2020, starting from each pairs' index date, and ended on January 1st 2022 for all participants.

Only pairs with a minimal follow-up time of 30-days were included. Either cases or controls who died as well as those who ceased being insured by CHS during the follow-up period contributed time until their death or cessation of CHS-insurance status. Controls contributed the same amount of time as their matched patients.

Differences in costs between cases and controls were examined both for the pre-pandemic period of March 2019 to February 2020, and for a post-Covid-19 individual follow up period, and up to 15 months after the index date.

Differences in costs between cases and controls in the pre-pandemic period were deducted from cost differences found in the post-Covid-19 period, hence reflecting the additive cost attributable to the effects of the Covid-19 infection, LONG-COVID (Difference-in-Differences, DiD). This approach permits to control for any clinical characteristics that may be related both to higher healthcare costs and to the risk of contracting COVID. DIDs were also examined by age, sex, and severity of the COVID-19 disease, as reflected by hospitalization during the acute phase.

Supplementary table 1: Population characteristics, positive and not positive for SARS-CoV-2

	Positive SARS-Cov-2 N (%)	**Not** positive for SARS-CoV-2 N (%)
Total	1,845,492	2,863,001
Female	1001554 (54)	1382633 (48)
Age groups		
0-17	694578 (38)	881535 (31)
18-45	684834 (37)	984672 (34)
45-64	307669 (17)	511120 (18)
65+	158411 (9)	485674 (0.17)
Ethnicity		
Unknown	2631 (0)	22131 (1)
Israeli-Arab	410611 (22)	938156 (33)
Ultra-orthodox Jewish	145979 (08)	227365 (08)
General Jewish or other	1286271 (7)	1675349 (59)
Unknown	2631 (0)	22131 (01)
SES score		
1-3	394242 (21)	929694 (32)
4-5	512410 (28)	719633 (25)
6-7	584602 (32)	755803 (26)
8-10	353692 (19)	451906 (16)
Unknown	546 (0)	5965 (0)
ACG comorbidity score		
1-4	1065115 (0.58)	1756963 (0.51)
5-6	95477 (05)	211857 (07)
Unknown	684900 (37)	894181 (31)

Supplementary table 2: Mean monthly difference-in-differences in US dollars, by severity, sex and age groups over the first 15 months of follow-up

Hospital admission during the COVID-19 episode		By age groups				By sex	
Outpatients		0-19, 268,080	20-39 n=195,407	40-59, n=123,470	60+, n=56,638	Male, n=296,969	Female, n=346,626
	Net DID, $	3.17	1.36	2.85	26.00	4.70	4.90
	Relative DID, %	7.04%	1.54%	2.27%	9.17%	5.08%	4.81%
	By age groups					**By sex**	
Inpatients		0-19, n=868	20-39, n=3,904	40-59, n=4,832	60+, n=6,413	Male, n=7,414	Female, n=8,603
	Net DID, $	54.45	26.31	81.31	128.71	93.73	76.75
	Relative DID, %	126.80%	24.27%	48.95%	35.02%	37.71%	36.70%

Supplementary References

1. Weiner JP, Starfield BH, Steinwachs DM, Mumford LM. Development and application of a population-oriented measure of ambulatory care case-mix. *Med Care.* 1991;**29**:452–472. doi: 10.1097/00005650-199105000-00006. [PubMed] [CrossRef] [Google Scholar]

2. The Johns Hopkins University ACG Case-Mix System http://www.acg.jhsph.edu
3. Central Bureau of Statistics Israel. Characterization and classification of geographical units by the socio-economic level of the population 2008. Jerusalem, 2013.
4. Points location intelligence, 2021. https://points.co.il/en/points-location-intelligence/[Accessed Oct 3, 2021].
5. Weisband, Y.L., Kaufman-Shriqui, V., Sagy, Y.W., Krieger, M., Ahmad, W.A. and Manor, O., 2020. Area-level socio-economic disparity trends in nutritional status among 5–6-year-old children in Israel. Archives of disease in childhood, 105(11), pp.1049-1054.