

The Social Cost of the COVID-19 Pandemic in Israel during 2020-2021

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Abstract

Background: The Covid-19 pandemic hit Israel in February 2020. In response to the pandemic, the government has imposed preventive measures to reduce the spreading of the virus, including lockdowns and restrictions that have severely undermined the normal course of life.

Methods: The social cost of the Covid-19 pandemic in 2020-2021 is the sum of the direct and indirect costs and monetary values of the welfare loss that the pandemic has caused in various areas of life. We identified seven life/cost domains as follows: loss of GDP, fiscal cost, labor market, health, education, domestic violence and transportation. The cost of the pandemic includes components measured in monetary values (such as loss of GDP or government expenditure) and components caused by welfare loss (such as mortality, deterioration of mental health, or obesity) expressed as years of life or quality adjusted life years (QALYs) lost. The monetary value of a lost year of life or QALY adopted in this work is, according to the recommendation of the World Health Organization, three times GDP per capita (NIS 466,311 in 2019). The impact of the pandemic in the various domains was calculated by comparing the actual situation in 2020-2021 to the situation that was expected before the pandemic.

Results: The total cost of the Covid pandemic in Israel in 2020-2021 amounted to about NIS 783 billion, or 55% of GDP in 2019. This cost amounts to an average cost of about NIS 292,000 per Israeli household. The area most severely affected is health (33% of GDP), and most of the cost was caused by the increase in anxiety and depression levels. The labor market returned to normal quite rapidly, so no long-term unemployment costs were identified.

Conclusions: It is likely that the cost we estimated is an underestimation. Since we have not been able to locate similar works done in other countries, we performed a comparison with OECD countries in terms of the negative impact on GDP, loss of years of life and loss of school days. It shows that Israel has done better than the OECD average.

Keywords: Covid; Israel; social cost

Background

The Covid-19 pandemic is considered the most serious event for humanity since World War II, and economically - since the Great Depression of 1929. As of April 2022, the Covid-19 pandemic has caused the illness of half a billion people worldwide, and the deaths of 6.2 million. In Israel, about four million people have contracted the disease, and about 10,600 people have died. In response to the pandemic, many governments – including Israel – have instituted preventive measures and reduced severe contagion,

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including lockdowns and restrictions that have severely undermined the normal course of life. These measures have also expedited processes that began even before the outbreak of the pandemic – for example, digitization¹ and remote communication in the labor market, in the education system, and in health. At present, it is difficult to estimate the full social cost and benefit of such acceleration.

Because lack of data, we did not consider the harm to personal well-being and autonomy caused by the illness, lockdowns and restrictions beyond their effect on the life domains we considered. The study is a "cost of illness" study, in which the costs to society were estimated in a variety of areas of life. The bottom line is the cost to society as a whole, regardless of who bears it.

Methods

We have concentrated on seven areas that, in our opinion, cover most of the drivers of social cost of Covid-19 in Israel: Loss of GDP, fiscal cost, labor market, health, education, domestic violence against women in households, and transportation.

Some of the costs are direct costs in monetary terms that were relatively easy to collect. However, some of the costs are related to welfare loss (e.g., mortality or deterioration in mental health), which is more difficult to translate into monetary terms. We used the tools common in economics to estimate these costs: according to WHO guidelines, the value of a year of life and of a quality adjusted life year (QALY) is three times the GDP per capita, that is, NIS 466,311 in 2019.

In several areas, there was no national, representative statistics. Instead, we had to rely on local and relatively small surveys with limited reliability e.g., in mental health or obesity. This is clearly a major unavoidable limitation of the study.

Results

Loss of product

The rapid spread of the Covid-19 pandemic worldwide caused an exceptional negative impact on economic activity. According to estimates by the International Monetary Fund [2], the drop in global economic activity is the most extreme since World War II. In the year of the Covid-19 outbreak, gross product in Israel declined by 2.2% and per capita GDP declined by 3.9%. According to the Bank of Israel Research Department's assessment, the government's support policy prevented a decline of an additional 1.9–2.6 percent of GDP [3].

Most of the negative impact on GDP derived from the restrictions imposed by the government on business activity

and on the behavior of individuals in order to reduce the possibilities of infection and to break the chain of infection with the virus. These measures restricted the activity of businesses and individuals (closing businesses, prohibiting public reception, restrictions on public transportation, childcare closures, etc.), and were intensified during periods of acceleration in virus infections until lockdowns were imposed.

The adverse impact on economic activity during the lockdowns was not uniform. During the first lockdown, activity declined to its lowest level. Subsequently, the economy underwent a process of learning and adaptation which mitigated the adverse effect of the various restrictions. by expanding the possibilities for remote work, streamlining and increasing the use of deliveries, digitizing part of the business activities and sales, and various other adjustments. Thus, businesses and households were able to moderate the negative impact on activity; however, as noted, even after these adjustments, the negative effect was severe and multidimensional.

The magnitude of the adverse impact on the activity of industries was not uniform. It was influenced largely by the characteristics of the activity and especially by those that affected physical proximity between people (and therefore influenced the chances of infection and the intensity of the restrictions). Industries in which physical proximity is required in the production process (prolonged proximity of workers in a shared space), or those requiring closeness or contact with many people (especially the service industries), and those in which the possibility of working from home is limited, were more severely affected. The most severe impact was on the dining and food services industry, the tourism industry, the transportation industry, and the entertainment industry. In some of these industries, revenue declined by more than 35% compared with the pre-crisis period.

During 2021, with the rapid progress of the vaccination campaign, the vaccination rate in the population rose to a high level, which allowed the government to institute a lenient policy and significantly reduce restrictions on activity and the behavior of individuals. As a result, there was a rapid recovery in economic activity and in employment, such that toward the end of 2021, the level of economic activity was close to the pre-crisis level. Thanks to the rapid improvement in economic activity in 2021 the average GDP growth in 2020-2021 was 2.9%.

Mechanisms of the pandemic's impact on GDP

The mechanisms of damage to the economy can be described according to the approach of Baldwin [4], which analyzes the impact of the crisis on each of the main players in the economy—firms, households, the government and the financial system—and on the relationships between them. The

¹ See Chapter 6 in Bank of Israel (2023) [1].

restrictions imposed led to a halt in the activity of many firms. The activity of many firms was also affected by the severing of supply chains. As a result, the firms significantly reduced the actual number of employed persons by activating the unpaid leave mechanism (**Furlough**). In industries that require great and prolonged physical proximity, such as tourism, the hotel industry, and the entertainment industry, many businesses have closed for more than a year.

The direct economic cost of the damage to firms and households is reflected in GDP through investments, foreign trade, and primarily through private consumption. The negative impact on private consumption reflects a negative impact on sales of goods and services consumed by households. The main adverse impact on households was economic stress, because of the decline in employment. The number of unemployed reached a peak of about one million during the first lockdown. In contrast, investments that were negatively impacted in the outbreak year of the pandemic returned to increase rapidly in 2021 (particularly in the area of residential construction and transportation infrastructure), such that the growth rate of investments in the two years of Covid-19 was only slightly lower than the average rate in previous years. In contrast, exports increased sharply, due to an increase in global demand for high-tech services during the Covid-19 period, such that the growth rate of Israeli exports was higher than its pre-crisis rate.

Estimating the loss of GDP in Israel

The Bank of Israel adopted an approach similar to Yeyati and Filippini [5] and assessed the pandemic's impact on gross product by comparing the GDP growth that was predicted prior to the outbreak of the pandemic to actual GDP growth during the crisis [3]. The gap between the two figures reflects the direct impact on GDP following the outbreak of the pandemic, and is estimated at 5.5% of GDP in 2020, and 2% in 2021 [6]². Hence, we estimated the negative impact on GDP because of the Covid-19 pandemic in 2020-2021 at about 7.5% of GDP, or about NIS 109 billion.

Fiscal costs

In order to moderate the decline in activity due to the pandemic, governments around the world initiated broad fiscal programs that include measures to support businesses and households. Israel has allocated about NIS 200 billion to deal with the economic ramifications of the pandemic, which have contributed to reducing its damage. In 2020-2021, about NIS 140 billion was allocated as fiscal measures. About half of the amount was intended to support households (through the payment of grants) and unemployment payments, about a quarter of the budget was transferred as assistance to businesses, including programs to encourage employment,

and about 16 percent was directed to the health system to deal directly with the pandemic [6].

The total government allocation to deal with the Covid-19 pandemic in 2020 – 2021 amounts to about 10 percent of GDP [1]. Some of the government's expenditures were on goods and services, primarily those of the Ministry of Health, which worked to reduce and cure morbidity. These expenses were included in the government's "Covid Package" and are discussed in the healthcare costs section below. The main share of this expenditure was in the form of government assistance programs for households and businesses. These constitute transfer payments, and therefore are not included in the calculation of the social costs of the Covid-19 pandemic.

In 2020, fiscal expansion increased government expenditures sharply, while government tax revenues declined due to a decline in economic activity, resulting in a sharp increase in the government deficit and public debt. The public debt to GDP ratio in Israel stabilized at around 60 percent on the eve of the outbreak of the pandemic—the target level for advanced economies, reflecting fiscal resilience. Because of the rapid increase in expenditures, the debt to GDP ratio increased by 11.8 percent of GDP in 2020, to 70.6 percent of GDP. In 2021, government expenditures on coping with the virus declined with the increasing level of vaccinations, lower morbidity and easing of the restrictions. The rapid recovery in economic activity and employment contributed to an increase in government revenues. As a result, the government deficit narrowed, and the public debt at the end of the year stood at 67.9 percent of GDP. Increasing the public debt in 2020 by more than 160 billion NIS entails an increase in financing expenses—expenses (such as interest payments) that should be included in the calculation of Covid-19 costs.

Assuming that without the outbreak of the Covid-19 pandemic, the public debt in 2020 would have remained at a level similar to that in previous years, around 60 percent of GDP, the increase beyond that level – 11.8% of GDP - may be attributed to the consequences of the pandemic. The relative share of interest expenses and principal indexation expenses recorded in 2020 (2.04% of GDP) is attributed to financing expenses of debt due to the Covid-19 pandemic (about 0.36% of GDP). At the end of 2020, the average redemption of all government debt was 9.3 years, and assuming that the debt created due to the Covid-19 pandemic will be repaid within a similar period, the total financing costs of the new debt are estimated at about 2.6% of GDP over the next 9 years. It should be noted that this is a minimal estimate in view of the global increase in inflation and in interest rates that is already becoming apparent.

The total fiscal costs (mostly interest payments) therefore amount to about NIS 40 billion, or 2.8% of 2019 GDP.

²The 2021 military operation "Guardian of the Walls" had a negligible effect on GDP.

The cost in the labor market

At the beginning of the crisis, when strict limitations were imposed on workers and businesses, it was expected that the crisis might have a “scarring effect” on the unemployed persons' future earnings and productivity. It turned out that the indirect effect of Covid on future earnings was limited, and most probably outweighed by positive effect on productivity, through increased digitization and flexibility in the labor market. Thus, we estimate that the effect of Covid on the labor market was fully reflected in GDP loss during 2020-2021 discussed above.

The cost in health

Naturally, much of the social cost of the pandemic occurred in health.

Mortality

The MOH database estimates that during 2020 and 2021, 8,185 people died directly from the disease itself. The welfare loss as a result of mortality is reflected in years of life lost. To give a financial estimate of the loss of years of life, we used the practice proposed by the World Health Organization (WHO), which estimates one year of life at three times the GDP per capita. Based on the age distribution at death from Covid and the age-specific life expectancy, a total of 105,029 years of life were lost. Without discount of future (lost) years, the monetary value of the loss of welfare due to mortality from the pandemic is NIS 49 billion. With discount (3%), the present value of the lost years of life is 80,680 years, a social cost of NIS 38 billion. The main impact of death from the disease is concentrated in those aged 60+.

Budgetary costs

The government allocated a special (emergency) budget to the Ministry of Health, known as the "Covid package". The budget was intended to cover all medical expenses which were required in inpatient and outpatient (the health plans) and preventive care. The total Covid-19 MOH budget in 2020-2021 amounted to about NIS 22 billion (out of about NIS 28 billion allocated to the pandemic).

The cost of Long Covid

One of the troubling phenomena resulting from Covid-19 morbidity is the decline in the quality of life and the increase in the use of health services among those who have recovered. In the U.S., the rate of those suffering from persistent morbidity after one year of recovery stands at about a third among the adult population that has recovered.

Wolf-Sagie et al. [7] estimated the additional cost of overuse of health services during an average of 7.5 months of follow-up among approximately 360,000 matched members (recovered and uninfected) from Clalit Health Services. They found that the excess cost amounted to about NIS 40

per month for those who recovered, most of it as a result of hospitalization. Assuming that the duration of Long Covid is one year, the excess cost for those who recover is about NIS 480, and given 3.7 million recoveries in the years in question, the total cost of using the services amounts to about NIS 2 billion. This cost does not include the loss of well-being as a result of the symptoms of fatigue and cognitive decline that characterize Long Covid and impaired productivity in the labor market and at home.

Net costs resulting from the postponement of elective treatments and preventive care

During the lockdowns, hospitals and clinics have diverted most of their resources to treating Covid-19 patients, and some elective treatments have been postponed or cancelled. At the same time, the scope of preventive care in the community declined. Some citizens preferred to postpone or cancel contacts with medical services for fear of contracting the disease. Therefore, on the one hand, there has been a decrease in medical expenditure on these treatments and services, but on the other hand, it is possible that postponing or canceling treatments will lead to a worsening of the state of health and a negative impact on welfare and a greater expenditure in the future.

The conclusions from a small number of analyses and conversations with the health plans regarding the postponement of elective treatments yields contradictory results. For example, Appelbaum et al. [8] found mixed trends in the number of elective surgeries in 2020 compared to 2017-2019. The number of cataract, prostate and hip replacement surgeries increased, while the number of hernia and tonsil removal surgeries decreased, and the number of hysterectomies and knee replacement remained stable. From conversations with the health plans, it became clear that there was indeed a decline in the average expenditure per insured person in 2020, but this decline was more than offset in 2021. In addition, it is very difficult to estimate the extent of postponement or cancellation of treatments, in particular when some of the designated treatments have not even been scheduled. At the same time, it is very difficult to identify the effect of postponement of treatments on morbidity and mortality in the coming years. Moreover, recent calculations from the Central Bureau of Statistics of mortality rates in 2020-2021 compared to 2017-2019 indicate that there has been a decline in these rates from non-Covid causes of death among those aged 75+, so it seems that the temporary postponement of elective treatments did not have a significant worsening effect. In light of all this, it was decided not to include in the cost calculations those resulting from the postponement of elective treatments in 2020-2021.

In contrast, the decrease in the performance of screening tests and the use of preventive care was significant. The report of the National Program for Quality Indicators in

Community Medicine in Israel for 2020 shows a decline in a number of quality indicators of community care in 2020 compared to 2019: diabetes control, hypertension balance, mammography, and occult blood tests. In all of them, most of the decline occurred during the first lockdown period (March-April). In the examination of mammography, it turned out that in 2019, of the 858,085 insured women aged 50-74, 635,233 performed the test in the two years prior to 2019. In 2020, out of 901,980 insured women, 629,924 were tested in the past two years, a decrease of 2.2% in the performance rate. Among women aged 70-74, the decrease amounted to 4.5%. As of the end of the study, there were no data for 2021.

Based on a cost-effectiveness analysis of mammography performed by Mittmann et al. [9], we estimate the loss of QALYs because of the decrease in the volume of tests. For our needs, we compare the results of a biennial test with a triennial test, to simulate the delay in performing the tests. A once-in-two-year mammography routine will lead to 14,076 QALYs per 1,000 women, while a once-in-three-year routine will lead to 14,072 QALYs per 1,000 women. In other words, the change in routine will lead to the loss of 4 QALYs per 1,000 women. In 2020 compared to 2019, there were 5,309 fewer women who performed mammography, which translates into the loss of 21 QALYs because of breast cancer. This translates into a cost of almost NIS 10 million. However, according to the MOH price list, the cost of performing mammography decreased by about NIS 2 million, so that the net cost of postponing mammography amounts to about NIS 8 million.

Data from the Program for Quality Indicators in Community Medicine further indicate that in 2020 there was a decrease of about 9,000 colonoscopies and about 40,000 occult blood tests for the early detection of colon and rectum cancer. Based on Flugelman et al. [10], assuming that the delay in performing these tests was 12 months or more, these postponements are expected to lead to the death of 35 people, and the loss of 730 years of life. According to the Ministry of Health's price list, the cost of a colonoscopy is about NIS 1,300, so the net cost of postponing the early detection of colorectal cancer is estimated at NIS 320 million.

In total, it appears that the cost resulting from the postponement of screening tests and preventive medicine for breast and colon cancer amounts to about NIS 330 million.

Costs due to increased obesity

The policy of lockdowns has greatly disrupted the health behavior regimes of the citizens. This is reflected in changes in physical activity because of the closure of gyms and sports centers, frequent disruptions in the daily routines of citizens, and changes in eating habits due to the prolonged stay at home. It was found, for example, [11] that the percentage of obese 18+ year olds increased from 23% in 2019 to 31% in

2020. The rate of hypertension sufferers increased from 37% to 46% and the rate of those suffering from eating disorders in the ages of 15-24 increased by 56% compared to 2019. The lack of a daily framework and mental conditions such as depression and stress made it difficult to stay in shape and increased the temptation to consume high-sugar, high-fat processed foods. On the other hand, some people who were previously busy with work have found time to invest in their physical fitness and prepare food themselves. It should be noted that even in the years before the pandemic, obesity rates in Israel were high: Israel ranked third (after Turkey and Malta) in the obesity rate of its population.

We calculated the cost of obesity due to Covid in two ways: one, assuming that this obesity is a transient phenomenon that lasts for a year, calculates the loss of personal wellbeing as a result of being overweight. The second, refers to this obesity as a continuous phenomenon, and refers to three cost components: direct treatment costs for the diseases associated with obesity, a decrease in life expectancy, and a decrease in work productivity.

According to the findings in Sheffer et al. [11], in 2020 the virus caused an increase of 8 percentage points in the proportion of those suffering from obesity) among members of Clalit Health Services aged 18+). In 2020, the 18+ population in Israel included 5.8 million people. That is, approximately 463,000 people suffered from obesity as a result of the virus. The average disutility of the health status of obesity (obese 1, 2, 3) is 0.04 lower than the average utility among those of normal weight [12]. Hence, a year of obesity results in a loss of 0.04 QALYs, or a loss of 18,520 QALYs in the 18+ year old population in 2020. Using our value of a QALY as NIS 466,311, the total loss of welfare as a result of obesity for a year is estimated at about NIS 9 billion.

The cost of obesity as a permanent phenomenon includes direct treatment costs, loss of life years and decreased productivity. Based on the distribution of BMI before the pandemic and an increase of 0.75 kg on average during 2020 [13], we determined an increase of 0.48 in BMI for women, and of 0.45 for men. Based on Ginsberg and Rosenberg [12], the direct treatment costs were estimated at NIS 275 million. Based on Chang, Pollack and Colditz [14], this increase in BMI will result in the loss of 35,384 years of life at a total value of NIS 15 billion. Finally, based on Vuik et al. [15], the cost of the decrease in productivity as a result of obesity is approximately NIS 2 billion. In total, the cost of obesity as a permanent phenomenon is estimated at NIS 18 billion. Assuming that half of the Covid-obese persons will develop a permanent obesity, we estimated the obesity cost of Covid as NIS 14 billion.

Mental health costs

Many in the world claim that the Covid crisis is the biggest

threat to mental health since World War II. The morbidity (including Long Covid), the deterioration of the economic situation and the loss of employment of many, together with the prolonged closures at home and away from work and school, the general uncertainty that prevailed during the pandemic, caused a deterioration in the mental state of the population and an increase in anxiety and depression. In particular, the rates of anxiety and depression among children and youth have risen dramatically. To this was added the anxiety and post-traumatic syndrome of patients, their relatives and the medical staff because of hospitalization or death in the isolated Covid wards. Sheffer et al. [11] estimated that the rate of mental illness increased by 60% between 2019 and 2020. Data from the Abarbanal Psychiatric Hospital on children and adolescents up to the age of 18 indicated that in 2021 compared to 2019, there was a 260% increase in suicidal thoughts, an increase of 410% of suicidal attempts, a 230% increase in anxiety and depression disorders, and a 460% increase in behavioral disorders. There was also a 30% rise in referrals for mental health care.

In this section, we estimated the costs of the increase in the rates of depression and anxiety in the population. In the absence of national and official morbidity data (the last national survey is from 2004), we use diverse pieces of information to arrive at a reasonable estimate of these costs.

One of the studies examined the anxiety levels among the population during the period 19/2/2020 to 1/4/2020 [16]. They identified a group - 'threat-sensitive' -, which makes up about 29% of the population, where a 100% increase in the level of anxiety was reported in the first four weeks of the crisis. In other words, 2.6 million Israelis experienced a dramatic increase in the level of anxiety. Assuming that these individuals experienced high anxiety for six months [17], this constitutes a loss of 0.85 million QALYs with monetary value of approximately NIS 400 billion.

In total, the costs of the epidemic in the health sector amount to NIS 476 billion (31% of 2019 GDP), the main part of which is the cost of the deterioration in mental health.

Two other important changes occurred in the health care system during the pandemic: a change in practice and the transition to remote medicine, and attrition of the medical staff, culminating in 15% of the medical staff members considering leaving their profession. The cost of these two changes was not included in this work.

The cost in education

The spreading infection and closures caused changes in teaching and a shift to online teaching, which was not always able to replace direct teaching. A combination of technical difficulties in connecting and the reluctance of many pupils to use distant learning resulted in pupils losing teaching

material. In addition, the impact of the pandemic on pupils from different sectors and different socio-economic status was not uniform. At the same time, the socio-emotional condition of many pupils was affected by the fear and uncertainty regarding the health effects, the economic situation of the family, and due to the closing of the educational institutions and the lockdowns. All of these caused harm to Israel's future human capital, which is expected to be reflected in the quality of the workforce, productivity and output.

We focus on pupils in primary and secondary schools. We estimated the expected effect on the results in skills tests [18,19] and the significance of this effect on wages and future employment rates [20]. The connection between closures of the education system and the harm to the students' future achievements was studied before the current crisis, under different circumstances [3,21,22].

The estimate of the intensity of the harm to the education system is based on data regarding the closing of schools and distance learning [23]. We calculated the number of school days lost according to the effectiveness of online learning relative to face-to-face learning, assuming that the effectiveness of online learning was uniform for all pupils.

During 2020-2021, the education system was under complete closure for an average of 19 weeks, and in a hybrid-learning format for an average of 19 weeks. According to the National Parent Leadership survey, and the rate of access to end devices by pupils during the closures, we estimate that the effectiveness of online learning is 42% on average. Consequently, we estimate that on average, 16 study weeks were lost, which is equal to 0.46 a school year.

Previous studies have estimated that the loss of a year of schooling leads to a decrease of about one-third of a standard deviation in the average score of skills tests [18]. Other studies have shown for Israel that a decrease of one standard deviation in the skills test correlates with a significant decrease (25%-32%) in future salary (as an indicator of labor productivity) and a 9%-12% decrease in employment rate [20]. In our case, a loss of 0.46 years of schooling due to the virus leads to a future decrease of 3.4-5.4 % in wages and a decrease of 1.2-2% in employment rates.

Under plausible assumptions concerning the 12 cohorts of pupils, we estimated the expected cost of the pandemic in education at about NIS 160 billion or 11% of 2019 GDP.

The estimate presented may be an underestimation because the assessment of the effectiveness of online learning is upwards biased, and the estimate refers to harm from a lack of progress in learning only³.

³ Blass (2020) [24] discussed other important aspects of Covid and their effects on education, learning and students' well-being. These aspects were not taken into consideration in our calculations, because they cannot be measured accurately.

The cost of the increase in domestic violence

As was described above, the Covid pandemic worsened the welfare of households. Such worsening is often associated with increased domestic violence, in particular against women.

Three indicators of domestic violence in Israel were published in 2020-2021: The annual violence index of Wizo (women organization), the Parliament's research and information center, and the legal aid unit of the Ministry of Justice. These indicators point to an increase of about 25% in the number of violent incidents.

In the absence of Israeli data on the cost of an incident of domestic violence, we used several international studies that did this [25,26]. Based on these studies and a 25% increase in the number of incidents, we estimated the cost of the increase in domestic violence in 2020-2021 as NIS 5 billion (about 0.4% of 2019 GDP).

The cost in transportation

Traffic limitations and the closures imposed on the public caused a decrease in well-being and autonomy. These limitations, together with the increase in the number of unemployed and workers in unpaid leave and the transition to working from home, caused a drop in total travel in 2020 and in part of 2021.

The CBS data (Quarterly for Transportation Statistics, 2022) shows a decrease of about 10% on average in the daily traffic volumes at selected interchanges in Israel. This decrease is expected to result in savings in the social costs of traffic accidents, pollutant emissions, and time spent in travel.

On average, during 2015-2019, 354 people were killed, 2,292 were seriously injured, and 21,241 were slightly injured in traffic accidents. In 2020, 305 people were killed, 2,072 were seriously injured, and 15,849 were slightly injured. That is, in 2020, 49 persons were "saved" from death, 220 were saved from serious injury, and 5,392 people – from minor injury. In 2021, 364 persons were killed, 2,459 were seriously injured, and 17,412 were slightly injured. The number of fatalities and seriously injured in 2021 was higher than the historical average; the number of lightly injured was lower than that.

The cost savings as a result of a drop in bodily and property damages in traffic accidents was calculated on the basis of the governmental Transportation Projects Procedure ("PRAT") which provides monetary values for damages according to the types of injuries and their severity, as well as for property damage. We estimated the 2020-2021 cost savings in bodily and property damages at approximately NIS 705 million.

Based on the travel tables published by the CBS (Vehicle Travel, 2020) and an increase of 2% in 2021 compared to 2019, on the "Green Book" produced by the Ministry of

Environmental Protection in 2020 presenting the costs of air pollutants, and based on the values recommended regarding carbon dioxide pollution, savings to the economy in 2020 reached NIS 700 million and an increase in these costs in the amount of NIS 150 million in 2021. In total for the years 2020-2021, the cost saving of the change in vehicle pollutant emissions reached NIS 550 million.

The CBS work-force surveys in the years 2019-2021 show that approximately 155 million travel hours were saved in the years 2020-2021 compared to 2019. According to the PRAT procedure, the value of an hour of travel to and from work is NIS 22, therefore the savings to the economy because of reducing travel times in the years 2020-21 amounts to approximately NIS 3 billion. We emphasize that the savings consist, first, of the decrease in the total number of working days, which is the main cause of the decrease and second from the shortening of the time to get to work because of reducing the load on the roads.

Therefore, in total, the saving to the economy as a result of the pandemic during 2020-2021 in the area of transportation is about NIS 5 billion (about 0.4% of 2019 GDP).

International comparisons

As of the time the research was completed, we found one American study that estimates the social cost of the pandemic [27]. They calculated the loss of product, mortality, long-term disability, and an increase in anxiety and depression in the US. They estimated that the social cost of the Covid is approximately 16 trillion dollars, 90% of GDP in 2019. The paper was written in the fall of 2020 and was based on the assumption that the pandemic will continue until the fall of 2021, so it is likely that the actual cost until the end of 2021 is even higher. The authors did not include in their calculations the costs in education. They see the pandemic as the greatest threat to the well-being and prosperity of the American economy since the Great Depression of 1929.

In order to place, nevertheless, the economic consequences of the Covid in Israel in an international context, we examined three indicators: direct loss of GDP, loss of life years and loss of school days.

Figure 1 presents the economic consequences of Covid in direct loss of GDP and the monetary cost implied by premature mortality (the value of a life-year lost is three times the national GDP per capita) as percent of national GDP in 2019, according to OECD data. Based on these components, Israel (14% GDP) is below the OECD average (17%) in terms of the severity of the impact of the crisis.

Figure 2 shows the proportion of school days under full or partial closure in the OECD countries, during 2020 and 2021 (Data from: <https://data.humdata.org/dataset/global-school-closures-covid19>).

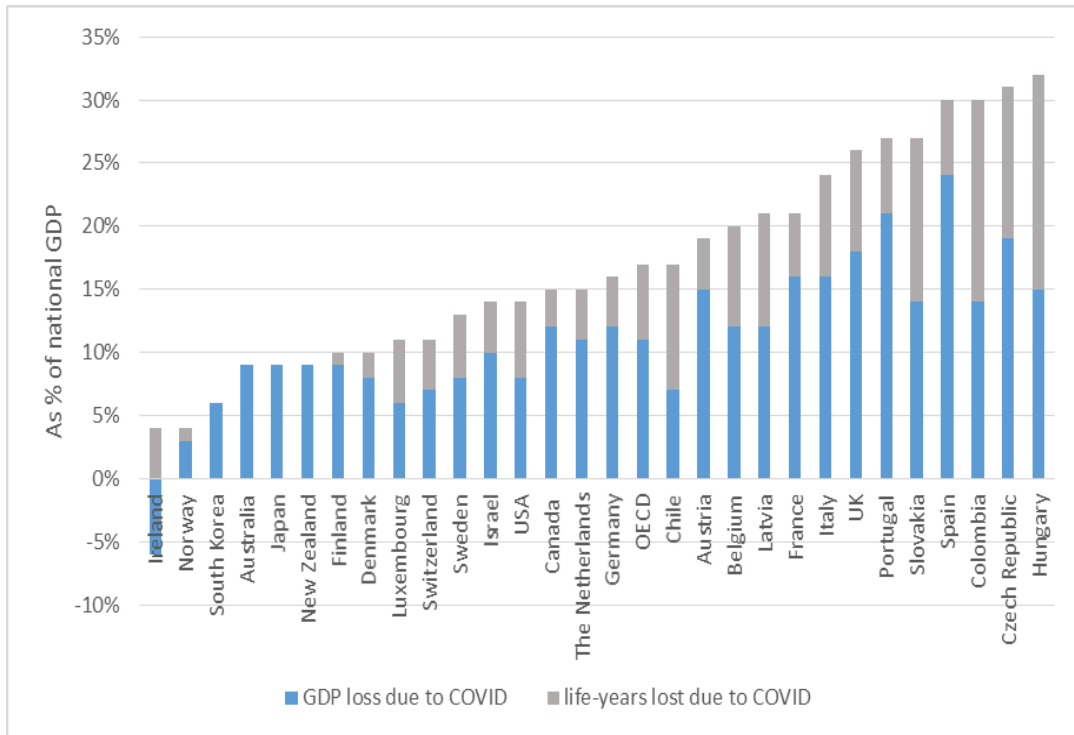


Figure 1: GDP loss and life-years lost because of Covid in the OECD.

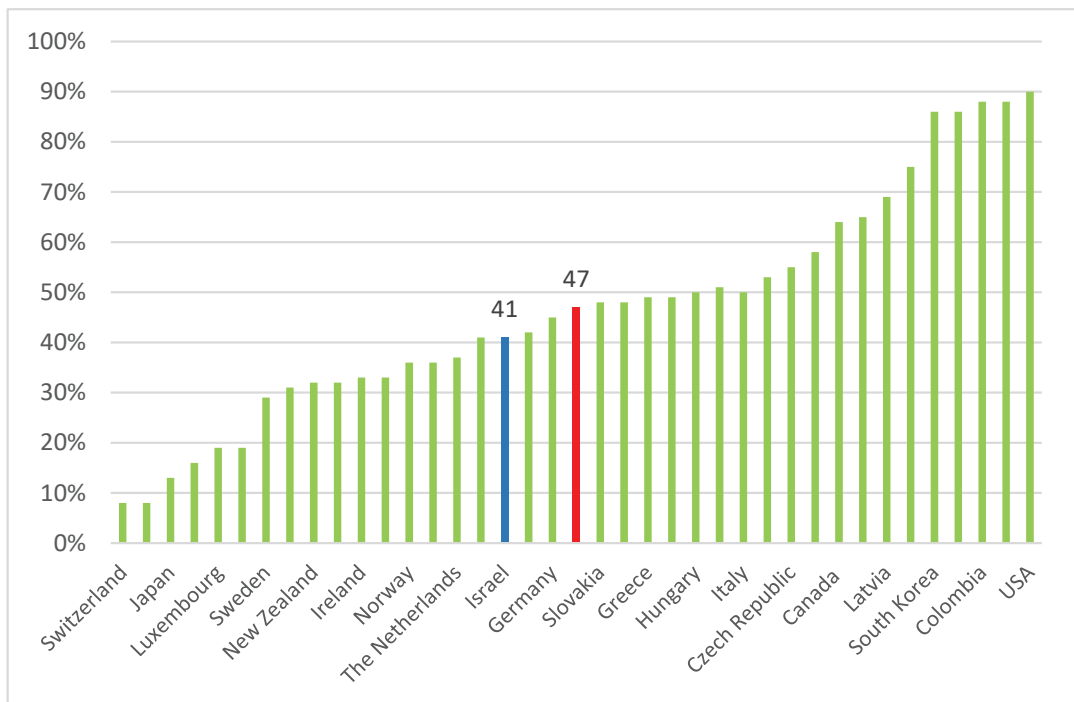


Figure 2: School days lost during 2020-2021 in OECD countries.

Here too, the Israeli rate (41%) is below the OECD average (47%). It should be noted that the above comparison does not capture the full cost of schools' closure, since it depends on the effectiveness and coverage of distant learning as well.

Discussion

Table 1 summarizes the components of the social cost of Covid in Israel during 2020-2021.

Table 1: The social cost of Covid in Israel 2020-2021.

Cost domain	Cost	
	As percentage of 2019 GDP	In billions of NIS at current prices
Product loss	7.5	107
Fiscal cost	2.8	40
Health	33.4	476
Education	11.2	160
Violence in households	0.3	5
Transportation	-0.3	-5
Total	54.9	783

The social cost of Covid in 2020-2021 amounted to NIS 783 billion or 55% of GDP. This figure translates into a cost of about NIS 293 thousand per household on average. The loss of the product is a relatively small component of the cost: about half of the cost includes the social costs in health (the main component of which is the cost of deteriorated mental health) and in education (deterioration of human capital).

As we emphasized throughout the paper, there is a reasonable chance that our cost estimate is an underestimation: there were elements that we identified but could not quantify (for example, the increase in economic inequality), and it is likely that there are elements that we did not identify at all. However, it seems to us that the estimate we arrived at is a good indication of the order of magnitude of the social cost of Covid in Israel in 2020-2021.

Conclusions

Many researchers and policy makers globally claim that the burden of the Covid pandemic during 2020-2021 is comparable to that of the Second World War. Due to its good healthcare system and the early and rapid vaccination campaign, Israel seems to go through the pandemic with relatively low burden. Nonetheless, the social cost of the pandemic in Israel during 2020-2021 was more than half the 2019 GDP, higher than the cost of any previous economic or national security crisis.

The political instability that characterizes the last few years in Israel has greatly reduced the power of the

government to introduce fundamental reforms and changes, the necessity of which has been clarified and strengthened with Covid. This enhances the fear that the cost of Covid as missed opportunities is immeasurably higher than the cost of Covid as a crisis, the focus of this work.

Declarations

Ethics approval of consent to participate: not applicable

Consent for publication – not applicable

Availability of data and materials – the study collected and used an enormous amount of data from published and unpublished material. These sources are cited in the paper.

Competing interests

AS, OP and ES have no competing interests.

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Authors' contributions

OP and ES wrote the sections on loss of GDP, Fiscal costs and Education. AS initiated the study and wrote the remaining sections. All authors provided comments and suggestions on the full draft, and AS wrote the final version.

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