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A Year of COVID-19 Pandemic Roller-Coaster: The Malta Experience, Lessons Learnt, and the Future

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Original Research

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Abstract

Objective: The coronavirus disease 2019 (COVID-19) pandemic had a global impact. The study explores the various COVID-19 experiences in Malta over the past year and provides a snapshot of acute and post-acute COVID-19 symptoms, as well as national vaccination roll-out and hesitancy.

Methods: Data on medical access, lifestyle habits, acute and post-acute COVID-19 symptoms, and vaccination hesitancy was gathered through a social media survey targeting adults of Malta. COVID-19 data were gathered from the Malta Ministry of Health COVID-19 dashboard.

Results: Malta controlled COVID-19 spread exceptionally well initially. Since August 2020, the positivity rate, mortality, and hospital admission rates saw a fluctuating incline. From COVID-19 onset, a decrease in physical activity and an increase in body weight was reported. Most participants acquiring COVID-19 were asymptomatic but nontrivial proportion experienced post-acute symptoms. The majority opted to take the COVID-19 vaccine with only a minority expressing safety concerns.

Conclusions: Malta has experienced roller coaster events over a year. The population faced elevated levels of morbidity, mortality, and economic hardship along with negative and positive risk-associated behaviors. Vaccination in combination with population adherence to social distancing, mask wearing, and personal hygiene are expected to be the beacons of hope in the coming months.

Coronavirus disease 2019 (COVID-19) has been pandemic since early 2020.[1] To date (April 9, 2021), a total of 134,641,198 positive cases have been reported of which 2,917,995 have died.[2] Every country has been affected, but each country exhibited unique positivity rates and mortality trends as well as different resilience patterns in health-care systems. Malta is a small archipelago of 316 km^2 over 6 districts and is situated in the middle of the Mediterranean Sea with a total population of 442,429. This small European state experienced different spectra of COVID-19 outcomes over this year, with 6670 per 100,000 having been infected to date. The main island of Malta has 1 acute state hospital, Mater Dei Hospital (MDH), that caters for all its residents, whereas its smaller sister island, Gozo, has its own acute hospital, General Hospital (GGH).

This study is a combination of an observational survey and a narrative review and aims to (i) address the different COVID-19 experiences through the population impact on morbidity, mortality, and hospital admission of this small state; (ii) provide a snapshot of the common acute and post-acute symptoms among the population; and (iii) discuss vaccine roll-out and vaccine hesitancy among the population, along with the future anticipated outcomes.

Methods

A literature search was conducted using PubMed database using the keywords "COVID-19 AND Malta". The search strategy was also repeated in the Google search engine and Maltese online newspapers. Malta's Ministry of Health official website and social media platforms were used to obtain COVID-19 data and vaccine roll-out information.[3] COVID-19 data were daily recorded by the authors and input into a spreadsheet. Graphical comparative analyses were then performed using the spreadsheet program and reported in this study.

During the month of February 2021, an anonymous online survey was conducted using social media as the distribution platform. The target population included all adults living in Malta with access to Facebook and LinkedIn. The social media post was linked to a survey on Google Forms. Informed consent was obtained electronically by participants opting to participate in the survey. The survey focused on the impact of COVID-19 on the health and well-being since the onset of the pandemic in Malta. It consisted of multiple-choice questions and open-ended questions centered around 8 themes. This included (i) whether the participants acquired COVID-19; (ii) what were the symptoms experienced; if so, (iii) whether

medical attention at hospital was required; (iv) whether after 4 weeks of being tested negative, symptoms persisted (post-acute symptoms); (v) what were the symptoms that persisted; and (vi) whether the participant intended to take the COVID-19 vaccine unless having already taken it; (vii) the impact of COVID-19 on general practitioner (GP) visits; and (viii) impact of COVID-19 on lifestyle and wellbeing. The survey was included as Supplementary Material.

Quantitative data were analyzed using IBM SPSS (IBM Corp. Release 2012 Version 21). All variables were stratified by gender to explore for any systematic difference between males and females. For ease of analyses and presentation of COVID-19 symptoms experienced by the participants, COVID-19 flu-like symptoms (fever, dry cough, headache, joint aches and pains, fatigue, diarrhea) were clustered together and labeled as "flu-like symptoms." Descriptive analyses are presented as frequencies. Categorical comparative analyses were performed using chi-squared test. Qualitative analysis was performed by subdividing the open-ended responses into themes (i) positive attitudes and outcomes (ii) negative attitudes and outcomes. Ethical clearance was obtained from the University of Malta Research Ethics Committee (ID: 7712_31012021).

Results

Section 1: Impact of COVID-19 on the Health and Wellbeing Survey Results

Snapshot of Adult's COVID-19 Symptoms and Vaccination Intention

A total of 1034 adults completed the online survey (no dropouts were noted throughout the survey), of which 6.38% (95% confidence interval [CI]: 5.04-8.05; $n = 66$) reported to have been infected by COVID-19. This corresponds to the global proportion of COVID-19 positive cases ($n = 29{,}511$; 6.67%) of the total population of Malta (442,413), to date (April 9, 2021). Only 2 COVID-19 positive participants were reported to have required hospital admission for further management. Table 1 presents the demographic characterizes of the survey population, while Table 2 presents the characteristics of those that acquired COVID-19, along with the most common experienced COVID-19 symptoms and post-acute COVID-19 symptoms. Although no significance differences were achieved possibly due to the small population size of those acquiring COVID-19, it was noted that the younger generation appeared to have a higher susceptibility to COVID-19 infection than other age groups, along with those with a higher education level. Additionally, females within the 30- to 49-year age group appeared to have suffered more COVID-19 symptoms and post-acute symptoms than their male counterparts.

The majority of the survey participants expressed an intention to take the COVID-19 vaccine (75.44%; 95% CI: 72.72-77.96) while 13.06% (95% CI: 11.13-15.25) reported to have already taken the vaccine. A low proportion of the participants reported vaccine hesitancy with the commonest reasons for this hesitancy being related to vaccines safety concerns and concern for long side-effects.

Snapshot of the Impact of COVID-19 on Medical Care, Lifestyle Habits, and Population Wellbeing

Since the onset of COVID-19, 36.85% of the survey participants reported to have visited their GP less than before the pandemic (males, 30.69%; females, 39.38%; $P = 0.09$). The commonest reason for this was noted to be due to having fewer sick days. Table 3 provides the different reasons for the reduced visits to GPs, as reported by the survey participants.

An increase in smoking (7.35%; 95% CI 95%: 5.90-9.11) and alcohol consumption (9.19%; 95% CI: 7.57-11.11) habits were reported by a minority of the participants. On gender stratification, males (11.72%; 95% CI: 8.48-15.97) reported a significant increase in alcohol consumption when compared to their female (8.25%; 95% CI: 6.47-10.47) counterparts ($P = 0.03$). However, this was not the case for smoking ($P = 0.09$). The increase in smoking and alcohol habits was mostly observed among the 30- to 39-year and 40- to 49-year age groups (smoking $P = 0.05$ and alcohol $P \leq 0.001$). Concurrently, a large proportion of the participants reported a decrease in physical activity (49.32%; 95% CI: 46.21-52.37) since the onset of the pandemic, although no gender differences were present ($P = 0.22$). Indeed, a high proportion of participants reported an increase in body weight during the pandemic (43.23%; 95% CI: 40.24-46.27), with no difference between males and females ($P = 0.18$). The decrease in physical activity was mostly noted within the 30- to 39-year age group ($P = 0.04$), while the highest reported weight gain noted within the 40- to 49-year age group ($P = 0.05$). Table 4 presents the collective qualitative themes of the participants' behavioral attitudes since the onset of COVID-19 pandemic.

Section 2: A Narrative Overview of the COVID-19 Situation in Malta in 1 Year

First COVID-19 Wave

Preparations for the inevitable onset of COVID-19 commenced in early January 2020. These including infra-structural changes and strategic planning targeting the only state hospital, Mater Dei Hospital, to increase both the intensive critical unit (ICU) beds and the COVID-19 isolation beds.[4] The first imported COVID-19 case was reported on March 7, 2020.[5] Several restrictions were instituted including the closure of schools, institutes, the only airport, the trading and tourist ports, nonessential retails, restaurants, and bars within days.[5] Social distancing, regular hand hygiene, mask wearing, and shifting to remote working were advocated. The number of people allowed to gather in 1 place was reduced drastically.[5] Extensive COVID-19 swabbing, and rigorous contact tracing strategies were implemented to pick up positive cases promptly. These timely restrictions and population adherence led to exceptional control of community spread (cumulative 480 positive cases; 108 per 100,000 population) and low mortality rates (1.13 per 100,000 population; $n = 5$; average age 86.5 y) during the first wave (March 7, to May 5, 2020).[3] Indeed, Malta was praised for its exemplary control by the World Health Organization (WHO) Europe Regional Director, Dr. Hans Henri P. Kluge.[5]

Transition Phase

Restrictions started to be lifted gradually, every 2 wk, from the first week of May 2020. The daily positive cases were reduced to zero per day by the end of June 2020 and remained stable until mid-July.[6] This period saw a low mortality rate of 0.9 per 100,000 population ($n = 4$; average age 68.5 y; all males). Social distancing and adherence to safety mitigation measures were still advocated, as the airport and ports opened on July 1. Restrictions banning organized events and group gatherings were then lifted swiftly, kick starting the second wave in Malta. Indeed, as of early August, the daily positivity rate went up to 3%.[7]

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Table 1. Demographic characteristics of the survey population and those that acquired COVID-19

Survey population by sex	Total (*n*=1034)			
Male	290 (28.05%)			
Female	739 (71.47%)			
Prefer not to say	5 (0.48%)			
Survey population by age groups	**Male (*n*=290)**	**Female (*n*=739)**	**Prefer not to say (*n*=5)**	**CHI sq.**
18-19 years	37 (12.76%)	66 (8.93%)	1 (20%)	<0.001
20-29 years	64 (22.07%)	162 (21.92%)	0	
30-39 years	63 (21.72%)	163 (22.06%)	1 (20%)	
40-49 years	57 (19.66%)	159 (21.52%)	1 (20%)	
50-59 years	39 (13.45%)	105 (14.21%)	1 (20%)	
60-69 years	21 (7.24%)	56 (7.58%)	0	
70-79 years	9 (3.10%)	27 (3.65%)	0	
80 years and above	0	1 (0.14%)	1 (20%)	
Survey population by highest education Level	**Male (*n*=290)**	**Female (*n*=739)**	**Prefer not to say (*n*=5)**	**CHI sq.**
Up to secondary school	27 (9.31%)	100 (13.53%)	1 (20%)	<0.001
Up to sixth form	45 (15.525)	121 (16.37%)	0	
Undergraduate degree	97 (33.45%)	271 (36.67%)	2 (40%)	
Post-graduate degree	121 (41.72%)	247 (33.42%)	2 (40%)	
Survey population by district	**Male (*n*=290)**	**Female (*n*=739)**	**Prefer not to say (*n*=5)**	**CHI sq.**
Southern Harbour	38 (13.10%)	88 (11.91%)	1 (20%)	0.23
Northern Harbour	78 (26.90%)	210 (28.42%)	0	
South Eastern	39 (13.45%)	87 (11.77%)	0	
Western	68 (23.45%)	161 (21.77%)	4 (80%)	
Northern	55 (18.97%)	154 (20.84%)	0	
Gozo	12 (4.14%)	39 (5.28%)	0	
Survey population by acquired or not of COVID-19	**Male (*n*=290)**	**Female (*n*=739)**	**Prefer not to say (*n*=5)**	**CHI sq.**
Acquired COVID-19	19 (6.55%)	47 (6.36%)	0	<0.001
Did not aquire COVID-19	271 (93.45%)	692 (93.64%)	5 (100%)	

Second Wave and Consecutive Waves

The second wave initiated in early August 2020, following an organized party of 800 people gathered in a hotel as well as the organization of a local feast celebration.[7] The swabbing rate increased from an average of 800 per day in July to 2500 swabs per day in August 2020. The positivity rate peaked several times with the highest peak observed in March 2021 (week 53), as shown in Figure 1.[3] Inevitably, this led to an increased mortality rate (Figure 1) and hospital admission rates, both at MDH and GGH.[3] As shown in Figure 2, admission rates to the ICU to both MDH and GGH, infectious disease unit (IDU) at MDH, other designated COVID-19 wards at MDH and GGH wards, were observed to fluctuate according to the number of positive cases.[3] Several restrictions were implemented according to the positivity rate, as shown in Figure 3.[3] Advocacy for social distancing, mandatory wearing of face masks, hand hygiene, as well as advise to avoid mixing with different family bubbles, were continuous throughout the weeks. However, a peak in COVID-19 positivity rate was seen following the Christmas-New Year festivity season (December 25, 2020, to December 31, 2020) as well as the Carnival period (February 5, 2021, to February 11, 2021). This was reported to be the result of the high spread of the B.1.17 variant among the community as well as individuals not adhering to social distancing.[8] Indeed, the Alpha variant (B.1.17) was first identified in Malta on December 30, 2020, and by April 9, 2021 it was responsible for 75% of the reported positive cases.[3,9] On February 16, the first case of the South African variant (B.1.351) was reported in Malta.[10]

Semi-lockdown and Restriction Relaxation Strategy

On March 10, 2021, the highest daily case record was reported with a positivity rate of 11.53% (115.3 per 100,000 population; $n = 510$). This led to an immediate institution of a semi-lockdown by the government and the health authorities. Several measures were announced including: (i) closure of nonessential shops and services; (ii) limitation in crossing to the sister island of Gozo; (iii) group gatherings limited to 4; (iv) cultural, social, and religious activities banned and closure of respective premises; (v) postponement of elective surgery in hospitals; and (vi) closure of schools and institutes.[11] Further restrictions were imposed just before Easter (2021), which included (i) further reduction in public gathering down to 2; (ii) increasing the fines for those breaking the regulations; and (iii) enhancing the travel restrictions where all arrivals to Malta need to present a negative polymerase chain reaction (PCR) test (≤72 hr). If not, a PCR test was to be performed at the airport. Anyone refusing or testing positive was quarantined.[12]

The daily positivity rate decreased following the institution of these restrictions as well as the commencement of the Maltese mass vaccination program (see below). This led government and the health authorities to issue a stepwise strategy for lifting of restrictions, provided the hospitalization admissions and the daily positivity did not peak again. A staggered re-opening of schools was proposed to occur between April 12 and April 16 for childcare centers, kindergartens, primary schools, middle schools, and secondary schools. Postsecondary schools were to

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Table 2. Survey population that acquired COVID-19 by sex, age groups, education, districts and most common reported Covid-19 symptoms and post-acute Covid-19 symptoms

Acquired COVID-19 survey cohort by age groups	Male (*n*=19)	Female (*n*=47)	CHI sq.
18-19 years	1 (5.26%)	3 (6.38%)	0.3
20-29 years	4 (21.05%)	12 (25.53%)	
30-39 years	7 (36.84%)	9 (19.15%)	
40-49 years	1 (5.26%)	10 (21.28%)	
50-59 years	3 (15.79%)	9 (19.15%)	
60-69 years	3 (15.79%)	2 (4.26%)	
70-79 years	0.00%	2 (4.26%)	
80 years and above	0.00%	0.00%	
Acquired COVID-19 survey cohort by highest education level	**Male (*n*=19)**	**Female (*n*=47)**	**CHI sq.**
Up to secondary school	3 (15.79%)	14 (29.79%)	0.49
Up to sixth form	3 (15.79%)	3 (6.39%)	
Undergraduate degree	7 (36.84%)	17 (36.17%)	
Post-graduate degree	6 (31.58%)	13 (27.66%)	
Acquired COVID-19 survey cohort by district	**Male (*n*=19)**	**Female (*n*=47)**	**CHI sq.**
Southern Harbour	3 (15.79%)	12 (25.53%)	0.69
Northern Harbour	5 (26.32%)	10 (21.28%)	
South Eastern	4 (21.05%)	4 (8.51%)	
Western	3 (15.79%)	7 (14.89%)	
Northern	3 (15.79%)	12 (25.53%)	
Gozo	1 (5.26%)	2 (4.26%)	
Most common Covid-19 symptoms	**Male (*n*=19)**	**Female (*n*=47)**	**CHI sq.**
Asymptomatic	2 (10.53%)	5 (10.64%)	0.07
Fatigue	0	3 (6.39%)	
Loss of taste and smell	2 (10.53%)	3 (6.39%)	
Fatigue + Loss of taste and smell	1 (5.26%)	2 (4.26%)	
Loss of taste and smell + Flu like symptoms	3 (15.79%)	4 (8.51%)	
Shortness of breath + Loss of taste and smell + Flu like symptoms	1 (5.26%)	2 (4.26%)	
Post-acute Covid-19 symptoms	**Male (*n*=19)**	**Female (*n*=47)**	**CHI sq.**
No post-acute symptoms	15 (78.95%)	20 (42.55%)	0.99
Fatigue	0%	1 (2.13%)	
Flu like symptoms	0%	7 (14.89%)	
Shortness of breath	0%	1 (2.13%)	
Loss of taste	1 (5.26%)	1 (2.13%)	
Shortness of breath + Chest pain	1 (5.26%)	0%	
Shortness of breath + Flu like symptoms	0%	3 (6.39%)	
Loss of smell + Headaches	0%	1 (2.13%)	
Loss of taste and smell	0%	4 (8.51%)	
Loss of taste and smell + Flu like symptoms	5 (26.32%)	6 (12.77%)	

Table 3. Different reasons for the reduced visits to the general practitioner as reported by the survey participants

	Male (*n*=290)	Female (*n*=739)	Chi
Concern to go out of house	1.38%	1.08%	0.14
Concern going to clinic/health centre	2.41%	9.74%	
Afraid of acquiring Covid19	7.24%	4.87%	
Family doctor reduced his practice	5.52%	4.60%	
Had less sick days/No sick days	12.07%	13.94%	
Concerned going to clinic & afraid to acquire Covid19	6.55%	7.98%	
Online GP services	0.00%	0.54%	
Afraid of acquiring Covid19 & family doctor reduced availability	0.69%	1.35%	
No concern	0.00%	0.14%	

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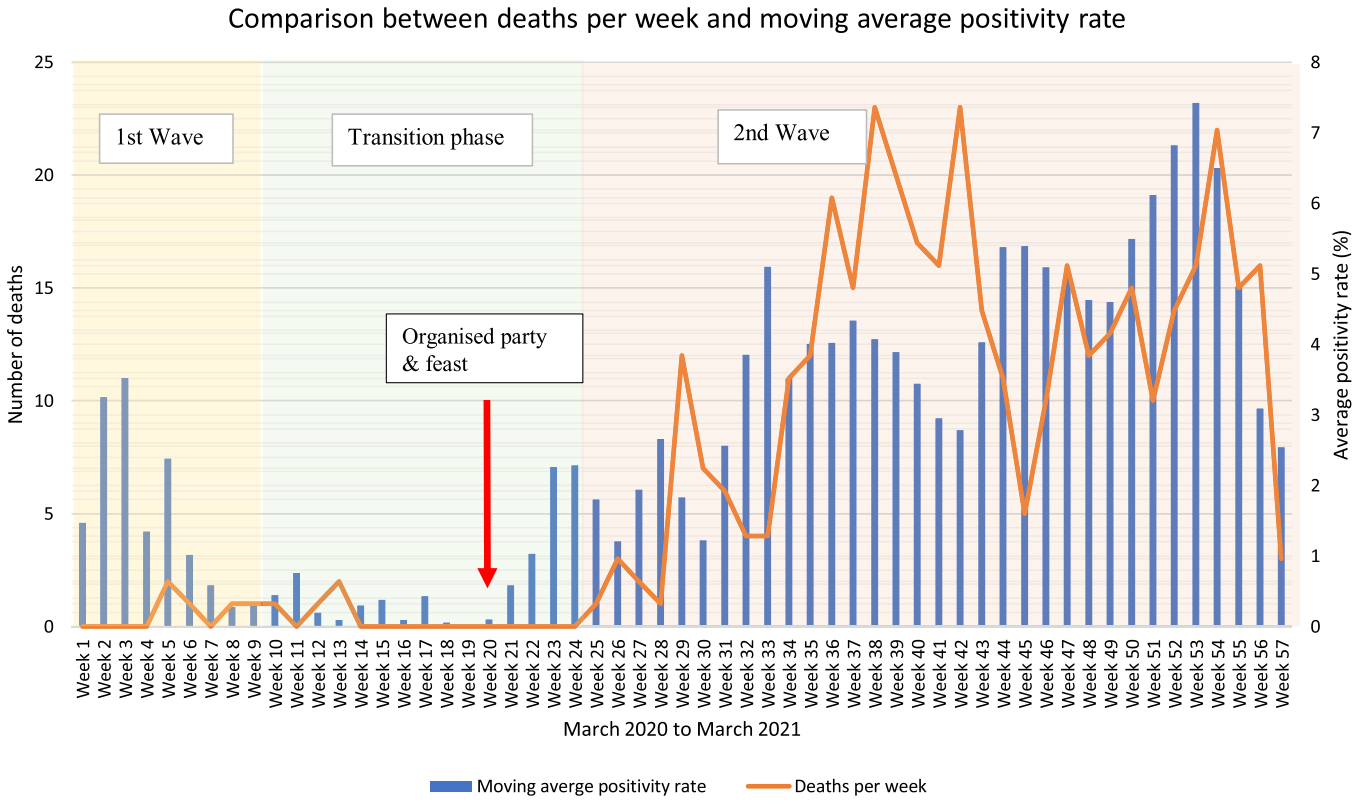
Table 4. Qualitative analyses outcome on the impact of the pandemic on behavioural habits among the survey participants

Positive attitudes and outcomes	Negative attitudes and outcomes
Staying at home provided more time for self-care including increase in physical activity and eating healthy food	Increased sedentary lifestyle including increase in screen time
Increased frequency of walks to secluded country and sea-side areas	Staying more at home and decreased outdoor physical activity
Life slowed down providing more time to focus on physical activity	Increased time at home lead to an increased in food consumption
Shifted performance of physical activity performed from a professional gym to a home gym	Living with vulnerable people reduced the ability to leave the house for physical activity in fear of contracting the virus
Alcohol consumption reduced due to lack of social activities	Mandatory mask wearing hinder breathing capacity and halted physical activity outside the home
Became more conscious of one's health status during the pandemic resulting in enhanced nutrition attention and performing of exercise	Fear of contracting the virus from gyms or from other physical activity classes/ activities
	Shifting to remote working/learning at home abolished the only physical activity performed during the day when working in office/ going to university
	Juggling home schooling and remote working decreased the time for self-care
	Decreased motivation for self-care and perform physical activities



Positivity rate = Number of positive cases per day / Total number of swabs per day
1st wave = 6th March to 5th May 2020
Transition period = 6th May to 30th July 2020
2nd wave = 31st July to 31st March 2021

Figure 1. Comparative assessment of the 7-day moving positivity rate and the mortality rate for 56 weeks with Covid-19 in Malta.
Source: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/covid-19-infographics.asp

remain following an online education system. During the same period, elective surgeries were to resume. A week later, on April 26, nonessential shops and services were to re-open and public gatherings increased up to a maximum of 4 people. It is anticipated that Malta opens its doors for tourism on June 1, 2021.[13]

COVID-19 Vaccination in Malta

Malta forms part of the European Union (EU) joint purchasing strategy and was provided early access to the approved vaccines by the European Medicines Agency along with the other EU countries. On December 26, 2020, Malta received the first Pfizer-

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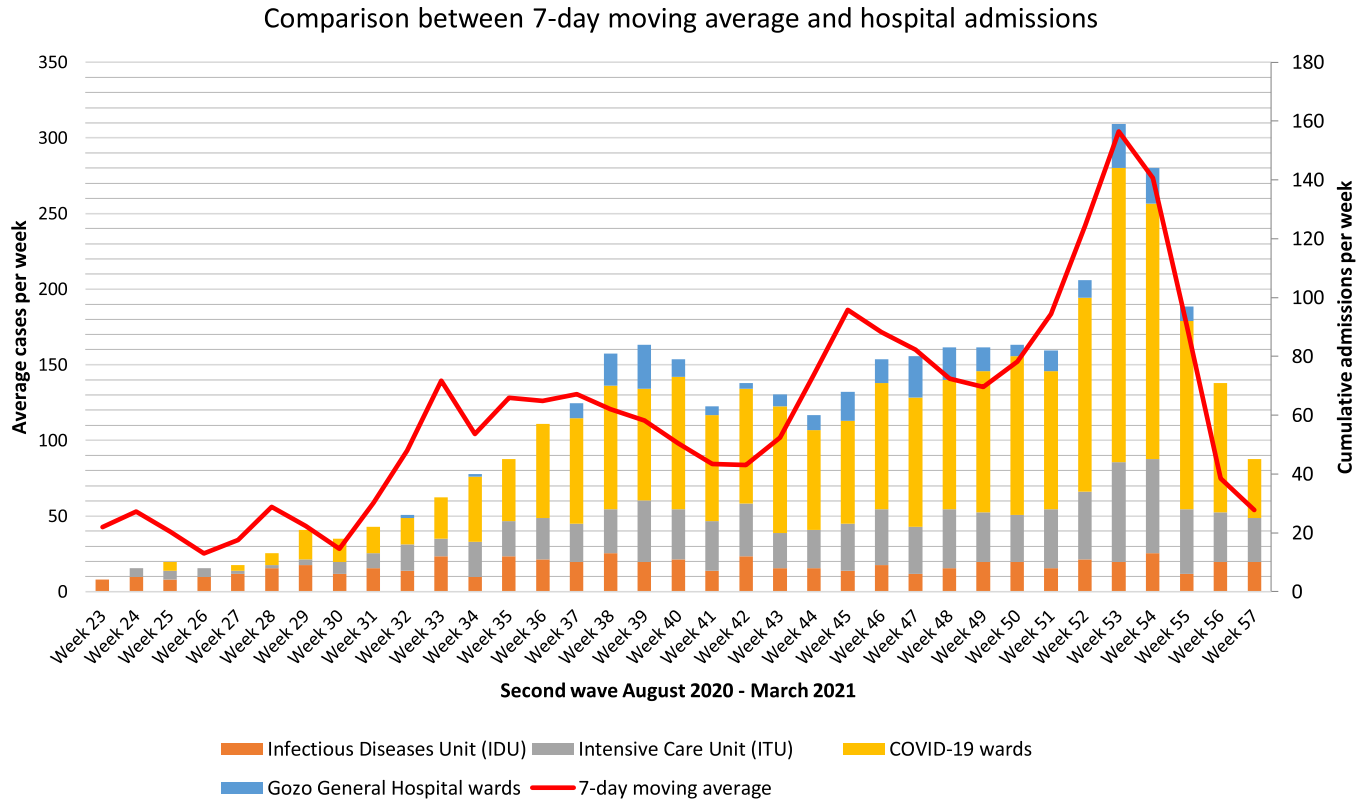

Figure 2. Comparative assessment of 7-day moving average and hospital admissions during the second Covid-19 wave in Malta.
Source: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/covid-19-infographics.asp

BioNTech vaccine batch.[14] The vaccination roll-out initiated a day later, targeting the first priority group. The vaccine roll-out strategy subdivided the population into 4 population groups. The first group included health-care workers, long-term care facility workers, persons living in long-term care facilities (elderly and mental health) and persons aged 85 y and over.[15] The second priority group included all other frontliners and persons in the 80- to 85-y age group. The third group included persons with chronic diseases, persons aged 70-80 y, and staff at schools and child-care centers. Meanwhile, the fourth group included persons over 55 y of age and the rest of the population.[15] The second COVID-19 vaccine, Moderna, arrived in Malta on January 10, 2021, followed by the AstraZeneca vaccine on February 13, 2021.[16,17] Up to May 27, 2021, a total of 505,100 doses have been administered, with 200,199 being second doses.[3] To facilitate and expedite the vaccination roll-out, 40 vaccination hubs across Malta and Gozo were set up.[18] This swift vaccination roll-out placed Malta as the leading European country in population vaccination.[19] As the vaccination roll-out covered a large proportion of the elderly population of Malta, it was observed that the average mortality age has decreased when compared with the prevaccination period, as shown in Figure 4.[3]

Discussion

Malta, like the rest of the other European countries, was affected by COVID-19 and sustained an increase in population morbidity and mortality as well as economic hardship. Over the past year, several lessons were learnt. Early hospital preparedness enabled the provision of critical care to all COVID-19 victims, even though at - one point, the health-care system was close to full capacity.[20] However, the institution of a second semi-lockdown along with the continuation of a swift vaccine roll-out covering the elderly and the vulnerable population resulted in decreased hospital admission rates. Although the second set of lockdown restrictions (March 2021) were similar to the initial lockdown in March 2020, the latter lockdown did not stop or cancel any hospital outpatient clinics or screening services. On a global level, it has been reported that vulnerable populations, including those with chronic diseases, were negatively impacted when the health-care access was limited and all resources were shifted to deal with just COVID-19.[21] Although this study did not specifically explore the vulnerable population, it was evident that a general declining trend in GP visits was present among adults. This may impact the population's general health and the wellbeing. Such limited health-care access is anticipated to have negative repercussions on the management and screening of chronic diseases.[22] It is, therefore, imperative that immediate action to ensure that health-care services are not strained, especially because COVID-19 is a synergistic pandemic that is exacerbated by chronic diseases.[23,24]

It needs to be noted that the higher female participation rate in this survey coincides with the slightly higher female than male population on a country level.[25] Additionally, females tend to have a higher participation rate in online surveys than their male counterparts.[26] The younger age groups participating in this survey were noted have a higher susceptibility to COVID-19 infection. This coincides with the evidence that this generation experienced the highest viral incidence due to higher daily contact rates.[27] The study's participants reported several different COVID-19 symptoms, although "asymptomatic" was the most common

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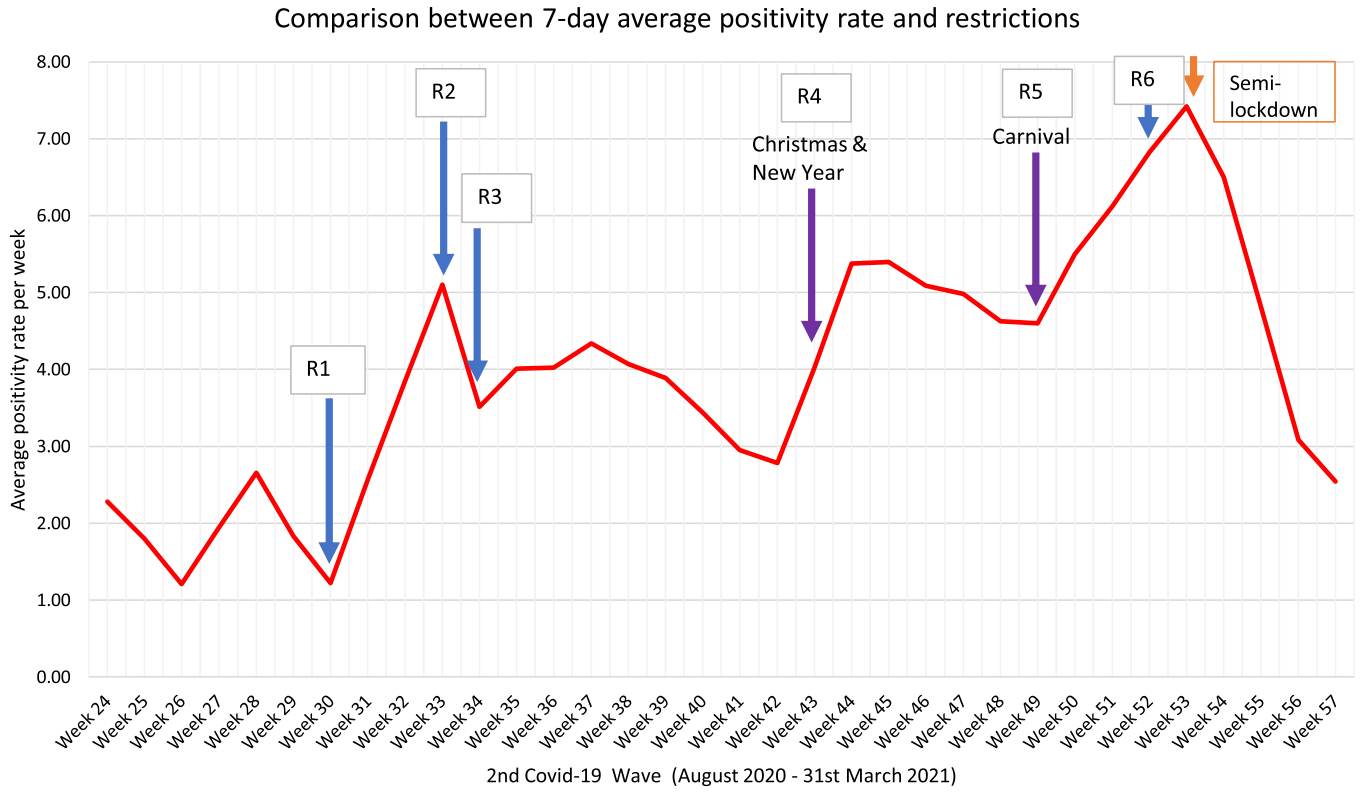

R= Restrictions
R1 = Decreased number of people in a gathering to 10 (Week 30)
R2 = Mandatory masks outside the individual's home. Bars to close up at 11pm (Week 33)
R3 = Bars closed for business (Week 34)
R4 = Restaurants to close up at 11pm (Week 43)
R5 = Restrictions to traveling and accommodation to Gozo for Carnival festivities (Week 49)
R6 = Restaurants closed for business. Limit number of people in gatherings to 6 (Week 52)

Figure 3. Instituted restrictions in accordance with the 7-day moving average of the positivity rate during the second Covid-19 wave in Malta.
Source: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/covid-19-infographics.asp

presentation within this cohort. However, the study's asymptomatic cohort proportion was lower than the literature, which reports that asymptomatic COVID-19 makes up 20% of the positive population.[28] These findings could be the result of low study power. Similar effects could have affected the results on COVID-19 symptoms when stratified by sex. Even though a small COVID-19 cohort was investigated, the presence of post-acute symptoms was clearly observed, with a predominance in females and between the ages of 30 and 49 years, which coincides with the literature.[29] A difference in prevalence of common post-acute symptoms was observed, where fatigue has been reported to be the commonest symptom in different studies, this was in contrast to this study where flu-like symptoms were commoner.[30,31] Again, this could be the result of the very small COVID-19 cohort participating in this study and, hence, this study cannot provide definite conclusions. Further research on "long COVID-19" within Malta is needed.

This study noted that the most prevalent behavioral changes during COVID-19 was a decrease in physical activity followed by an increase in body weight, coinciding with another recent study.[32] The measures instituted by governments and public health officials that were intended to curb viral spread also had a negative impact on a proportion of the population's behaviors. Lockdowns and the shift to working from home increased sedentary lifestyles and indirectly effected daily physical activity for most. Indeed, a study based in Malta noted that the occurrence of low back pain has increased since the onset of the pandemic, further supporting this study's observations.[33] However, it was noted that some participants rose to the occasion and took this imposed change in their daily routine as empowerment to start following a healthier lifestyle, including increasing physical activity and eating healthier. This was reported by some participants "*I actually started to do some exercise*" and "*During the pandemic I increased the amount of exercise I was doing due to more time spent at home*".

It has been reported that physical activity has a positive effect on mental health status with a reduction in negative moods, depression, and anxiety, as well as improves the quality of life.[34] Hence, for some individuals the isolation and lockdowns reduced the opportunity to perform any physical activity with a consequential negative mental impact. In fact, it was reported by a participant that "*physical activity varied a lot and depended mostly on motivation*". Decrease in physical activity invariably leads to lower energy expenditure, enhancing the risk to increase in body weight.[35] Additionally, confinement to the home and interruption from

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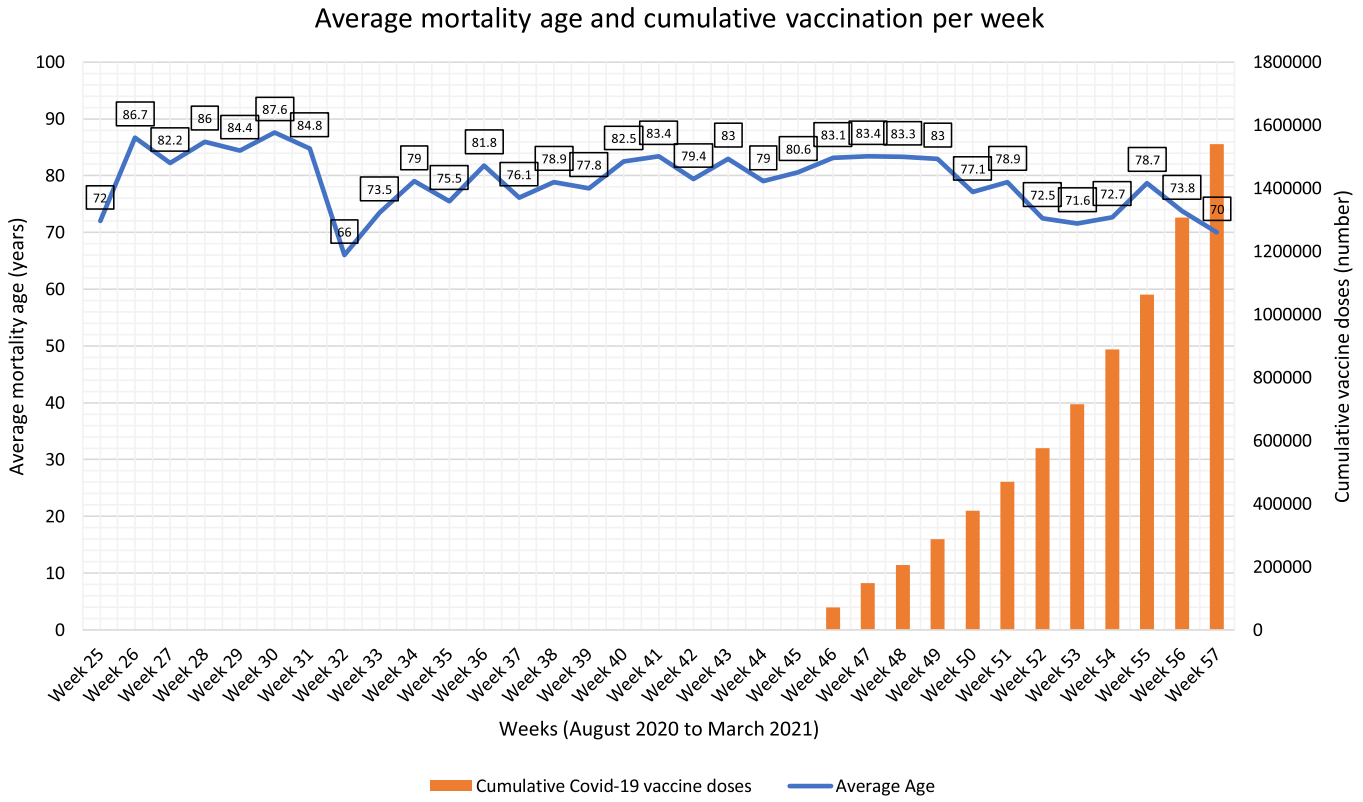

Figure 4. Average mortality rate and cumulative Covid-19 vaccination doses across weeks.
Source: https://deputyprimeminister.gov.mt/en/health-promotion/covid-19/Pages/covid-19-infographics.asp

the normal work/school routine increase the susceptibility to irregular eating patterns and snacking, which also increase the susceptibility to enhanced body weight.[36] This was noted by participants "*Due to being more sedentary and home working, my eating habits have changed resulting in weight gain*" and "*I increased in cooking and eating*" as well as "*I increased eating habits as comfort*". Furthermore, the pandemic resulted in a negative psychological impact on individuals, which might also have led to an increased food consumption,[37] as noted by a participant "*I am eating more, I put on weight . . . resulting in feeling depressed and have nothing to look forward to*". This coincides with this study's finding where a proportion of the responders reported an increase in weight. In light of the fact that Malta is known to have a high prevalence of overweight and obesity among both adults and children,[38,39] this study's observations bring forward alarming evidence that this noncommunicable disease burden is projected to rise. This is further supported by a recent study set to explore the impact of COVID-19 and noncommunicable diseases in Malta.[40] Moreover, obesity has been associated with severe COVID-19 symptoms, complications, and mortality.[41-43] Consequently, this brings forward the recommendation that additional efforts are needed to encourage physical activity within the safe home environment through simple implementable exercises, such as climbing the stairs, doing sit-ups, and push-ups. This should be complemented by broadcasting of online exercises as well as healthy eating initiatives to encourage and motive the population.

This study identified other changes in behavioral attitudes with regard to smoking and alcohol habits. Approximately a quarter of the Malta population has been reported to smoke tobacco before the onset of the pandemic.[44] The pandemic has brought with it several stressors that may have led to an increased in smoking habits.[45] Although this increase was reported by a small proportion of the participants, this habit was mostly observed within the fourth and fifth generations. These sub-group of adults could possibly be representing those that had to shift their work to remote working while simultaneously home schooling their children or else represent those that had disruptions in their work such as "*the pandemic effected my work, as I work as a hairdresser, and due to financial problems and also no events like weddings and other occasions, my work was effected*". It was also reported "[I] *had to adapt to working online and at the same time home school 2 kids* [. . . .] *I had to work around his online school schedule as he needs to be supervised all the time*" and "*Increased stress when children have lessons online*" as well as "*Struggle to work from home with two kids 8/12 years*". Of interest, although a proportion of participants reported to have increased their alcohol habits since the onset of COVID-19, others reported the opposite behavioral attitudes "*Because many events have stopped, my drinking has been reduced*" and "*At the beginning of the pandemic my alcohol intake initially increased but I am now drinking less than I ever have*". Furthermore "*I stopped smoking, have decreased my alcohol intake greatly and started working out daily. To be honest, prior to the pandemic, my health was deteriorating since I was smoking and drinking much more frequently and had very little time to exercise*".

COVID-19 is here to stay but vaccination largely prevents symptomatic infection. Furthermore, if a substantial proportion of the population is vaccinated, herd immunity is expected to be approached or achieved.[46] Indeed, the rapid vaccination program led to herd immunity being approached in Malta by the end of May 2021.[47] This further supports this study's observations where

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COVID-19 vaccination hesitancy was among a small proportion of the respondents. The commonest hesitancy reasons as reported by this study coincides with another study conducted in Malta.[48] On a global level, vaccine hesitancy varies between countries,[49] which might affect the level of population mobility and safety to travel to certain countries, as well as for countries to progress toward normality.

Study Limitations

The survey was distributed through social media platforms targeting the adult residents of Malta. Such methodology limited participation to those that were registered to the social media platforms (Facebook and LinkedIn), as well as it presented a difficulty to validate the survey. Additionally, the survey distribution depended on shares and likes carried out by the author's social network. Hence, although this study provides a snapshot of the adult population, it does not necessarily represent the whole population. However, the proportion distribution of the survey participants by geographical districts followed that of the whole population, as reported by Malta National Statistics Office.[50] Of note, all participants that opted to participate in the survey completed all the questions. Adults without access to the Internet, digital illiterate or do not have social media accounts could not participate in the survey. This study provides a satisfactory insight into the population's working age group, which is the economy driving force of the country. Understanding their perspectives, health and wellbeing is important to ensure productivity and economic stability in the country. Due to the nature of the survey, results were subjected to self-reporting and recall bias. The cohort that reported to have been infected by COVID-19 represented a very small population size, which might have affected the results. Furthermore, since the survey was available on social media and anonymous data was gathered, anyone from across the globe could have accessed the survey and participated.

Conclusions

Malta has experienced roller coaster events over the 57 weeks since the onset of COVID-19. The pandemic has imposed different experiences and attitudes. Some strove and made the best of the pandemic mitigation measures while others experienced demoralization and resorted to comfort eating as well as a sedentary lifestyle. Therefore, efforts are needed to target these at-risk population, including their mental health, so as to ensure that such diseases are prevented and managed in a timely manner while simultaneously continuing to deal with the ramifications of the COVID-19 pandemic. The population also faced a significant level of morbidity, mortality, and economic hardship, but several lessons were learnt. Similar to the exemplary first wave containment outcome, Malta is yet again an exemplary country in swift vaccination roll-out. Vaccination in combination with population adherence to social distancing, mask wearing, and personal hygiene are expected to be the beacon of hope for the coming months.

Supplementary material. To view supplementary material for this article, please visit https://doi.org/10.1017/dmp.2022.100

Conflicts of interest. The authors declare that there is no conflict of interest.

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