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## Impact of the coronavirus pandemic on health in Barcelona

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The response to Covid-19 has imposed a huge challenge for public health, the economy and for the citizens' well-being. At the same time, it has brought to light structural problems such as the precariousness of the health system, the limitations in addressing communicable diseases, the situation of nursing homes, social inequalities, limitations in communication to the general population and the erosion of public confidence in public administrations.

This article reviews the action taken by public health in Barcelona with a view to the future and the lessons learned. The pandemic has highlighted the need for intersectional approaches that take into account social inequalities and the impact that goes beyond the incidence and mortality from Covid-19 and affects economy, mental health and access to healthcare, among other areas. The assessment of what has occurred should enable better preparedness for future large-scale emergencies.

### Introduction

Up to 28 March 2022, the day on which the epidemiological surveillance system for Covid-19 in Spain switched its focus onto people and areas in vulnerable health situations, almost 500,000 cases of Covid-19 had been diagnosed in Barcelona, with excess mortality of approximately 6,000 people (Agència de Salut Pública de Barcelona, 2022).

The pandemic response has posed an unprecedented challenge, both in scale and depth, to public health, the economy and the wellbeing of citizens. At the same time, it has shone a light on structural problems such as the precariousness of the health system, the situation of nursing homes, social inequalities, limitations in communication with the general population and the erosion of trust in public administrations.

To respond to these challenges, Barcelona City Council deployed unprecedented human, financial and technical resources very quickly. It mobilised practically all its areas (health, social services, education, urban planning, cleaning, security, mobility, etc.) through the creation of multiple working groups, and also made progress in the widespread adoption of new technologies.

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Moreover, following the city's long tradition of public health policies that are highly sensitive to social inequalities, inequalities in terms of Covid-19 infection —which was initially more frequent among the most disadvantaged groups— were quickly detected. These were later replicated in vaccination coverage, which required an equitable approach.

During the pandemic, decisions had to be taken very quickly in a context of uncertainty and lack of knowledge: some of which turned out to be the right decisions, and some turned out to be wrong. It is now necessary to reflect on past experiences in order to improve the response to future large-scale emergencies, like the current one.

This article aims to review the public health measures taken in the city of Barcelona, focusing on what we have learned and how this can help us to shape future responses. First, we will describe the evolution of the Covid-19 pandemic up until April 2022. Then, we will comment on the general population health response and the situation in three areas of particular interest: residential care for the elderly, schools and paid work. This will be followed by a section on vaccination in the city, communication strategies, a reflection on the pandemic as a complex issue that goes beyond Covid-19 infection, and then a series of conclusions.

## **1. Evolution of the pandemic**

The first case of Covid-19 in Barcelona was detected on 25 February 2020. Then, on 11 March, the World Health Organization (WHO) declared Covid-19 to be a pandemic. On 14 March, just three days later, the Spanish government declared a state of alarm and introduced a series of confinement measures that applied to the whole population, with the exception of individuals considered to be key workers.

Between 25 February 2020 and 27 March 2022, 484,409 cases of Covid-19 were diagnosed in the city of Barcelona (29% of the city's population). Overall, the majority of cases occurred among people aged 35-64 years (42%), followed by people aged 15-34 years (31%). The number of cases was always slightly higher in women (53%) than in men. The cumulative incidence was somewhat higher in men aged 0-14, 65-74 and 74 years and older. In terms of socio-economic status, disadvantaged groups were disproportionately affected in all waves but the sixth (both sexes) and third (men). During this period excess mortality of 5,748 deaths was recorded, with these fatalities being primarily concentrated on people aged 75 and over and with a higher rate among men (Agència de Salut Pública de Barcelona, 2022). A more detailed description of the different waves follows below.

Barcelona had undergone six waves of Covid-19 by April 2021, during which time measures such as the total confinement of the population, partial restrictions on mobility, the provision of diagnostic tests and the vaccination strategy of the moment were implemented. This response determined different characteristics in terms of the distribution of cases according to sex, age and neighbourhood in which the citizens lived (see graph 1). A brief description of the different waves follows below.

The first wave (25/02/2020 - 04/07/2020) of Covid-19 was characterised by the confinement of the population, the unavailability of diagnostic tests (which led to an under-reporting of cases) and a high number of cases in nursing homes. It primarily affected older people, among whom the incidence was higher in women. The highest incidence was found in the districts of Sants-Montjuïc, Horta-Guinardó, Sant Andreu, Sant Martí and Nou Barris. During the first wave, 42.6% of the cases (6,834) required hospitalisation. In later waves, the proportion of hospitalised cases did not exceed 5% of the total cases in the wave. This is partly explained by the fact that diagnostic tests were more readily available after the first wave, which meant that they could also be used for mild cases. During the first wave excess mortality of 3,439 deaths was recorded, making it the wave with the highest number of deaths.

The second wave (01/10/2020 - 06/12/2020) saw a resumption of activity in the workplace and schools. While there was no total confinement of the population, partial restrictions on mobility and a night-time curfew were implemented. In this wave, the group with the highest incidence was people aged 15-34 years and women aged 65 years and over. The districts with the highest incidence were Sant Martí, Sant Andreu and Nou Barris. On a neighbourhood level, meanwhile, incidence was higher in the most deprived neighbourhoods of the city. In this wave excess mortality of 573 deaths was recorded.

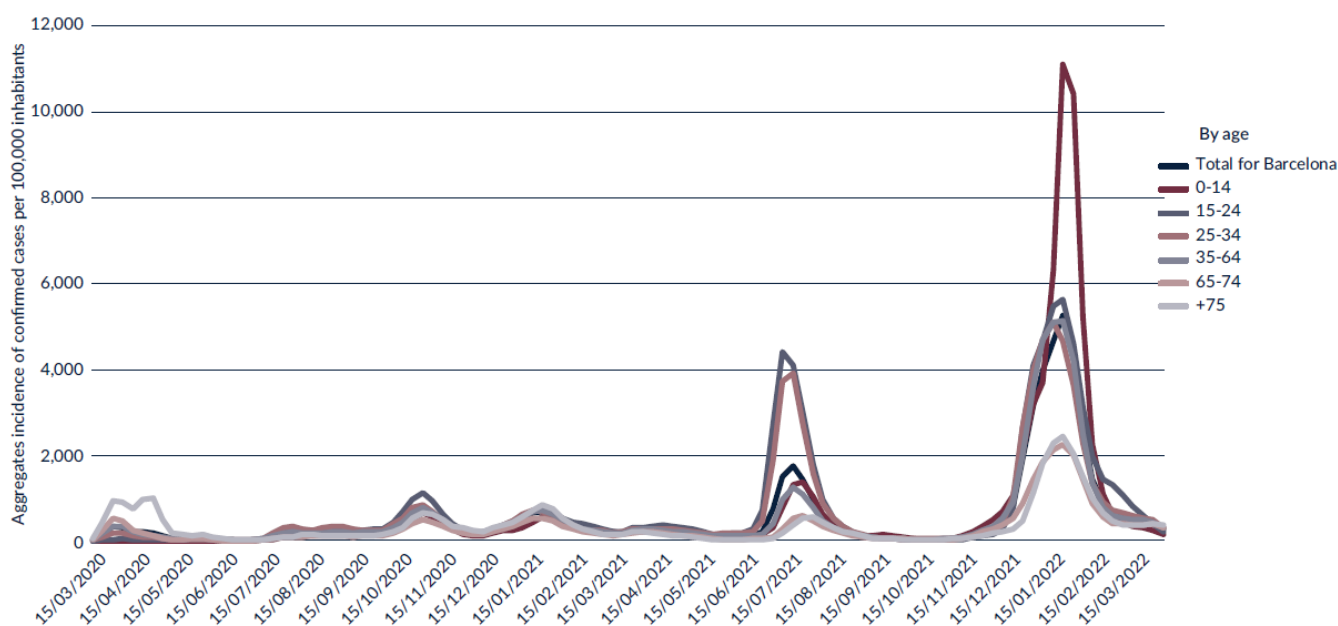
The third wave (07/12/2020 - 14/03/2021) coincided with the beginning of the vaccination roll-out, which began with older people and those with more risk factors. However, it was yet to have a clear impact. The groups with the highest incidence were men aged 75 years and above and women aged 15-34 years. The districts with the highest incidence were Eixample, Sants-Montjuïc, Sarrià-Sant Gervasi, Horta-Guinardó, Nou Barris and Sant Martí. In this wave excess mortality of 499 deaths was recorded.

In the fourth wave (15/03/2021 - 12/06/2021), with no mobility restrictions in place, the impact of the vaccination started to be felt. The highest incidence was found in people aged 15-34 years, with slightly higher incidence in men. The districts with highest incidence were Eixample, Sants-Montjuïc, Sarrià-Sant Gervasi, Nou Barris and Sant Andreu. Excess mortality of 245 deaths was recorded, marking a reduction of 44% compared to the previous wave. The decrease in deaths and incidence in people aged 65 years and older could be due to the vaccine first being rolled out in this age group in late December 2020.

The fifth wave (13/06/2021 - 01/11/2021) saw the highest incidence in people aged 15-34 years, with similar incidence rates being found in men and women. The districts with the highest incidence were Ciutat Vella, Eixample, Sarrià-Sant Gervasi and Nou Barris. In this wave there were 516 more deaths compared to the previous wave, which were concentrated in people aged 75 and over.

In the sixth wave (02/11/2021 - 27/03/2022), the highest incidence was found in people aged between 15 and 34 years old, with no differences noted between men and women. The districts with the highest incidence were Gràcia, Sarrià-Sant Gervasi, Sant Andreu and Nou Barris. In this wave excess mortality of 174 deaths was recorded.

**Graph 1. Daily evolution of the cumulative number of people with a confirmed diagnosis of Covid-19 per 100,000 inhabitants, by age. Barcelona, 2020-2022**



Source: Barcelona Public Health Agency, data from the website #COVID19aldiaBCN (shinyapps.io).

Social inequalities shifted with the different waves of Covid-19. During the first and second waves, a higher incidence was observed in men and women from the most deprived social classes (highest deprivation quintile). In the third wave, the highest incidence was found in men from more privileged social classes and women from disadvantaged social classes. In the fourth and fifth waves, meanwhile, there was a higher incidence among men and women from more disadvantaged social classes. Finally, in the sixth wave, incidence was higher among men and women from more privileged social classes.

## **2. Public health and health care system response**

It is important to distinguish between public health and public health care. The first refers to the set of actions taken by public administrations and society to protect and promote people's health and prevent disease. Therefore, the focus of public health is the health of the whole population and not just that of sick people. Public health care, meanwhile, is the care that each person receives from public health services to treat their disease or health problem. In Spain, this is provided through the National Health System.

The Covid-19 pandemic was a public health problem that clearly affected the ability of health care services to treat people when they became ill. The very sudden onset of the pandemic in early 2020, and the significant impact felt by the population, constituted a huge public health shock. We cannot lose sight of the fact that public health has historically been underfunded in Spain, with less than 2% of the total budget being allocated to health (Aboal-Viñas, 2010). Furthermore, the cuts that occurred in the wake of the 2008 financial crisis left both public health and the National Health System in an even more vulnerable situation.

As a public health crisis, efforts were made to tackle the Covid-19 pandemic from a perspective of prevention, disease monitoring, the treatment of sick people and a consideration of the economic and social consequences. The main tasks undertaken from a public health perspective were: a) the definition of prevention measures, such as social distancing, face masks, ventilation, vaccinations, quarantines, etc., b) the surveillance of the disease with daily indicators, c) the elaboration of action protocols when cases of disease and outbreaks were detected, d) contact tracing, or following-up on people who were contacts of people who had tested positive, and e) the control and follow-up of preventive measures in centres such as nursing homes or schools. And we must not forget that Covid-19 has had an unequal impact on society, as it is the most disadvantaged people who have suffered the most from the disease and its economic and social consequences, particularly in terms of job losses. For this reason, it was necessary to implement specific actions to help these populations cope with the disease or manage its prevention.

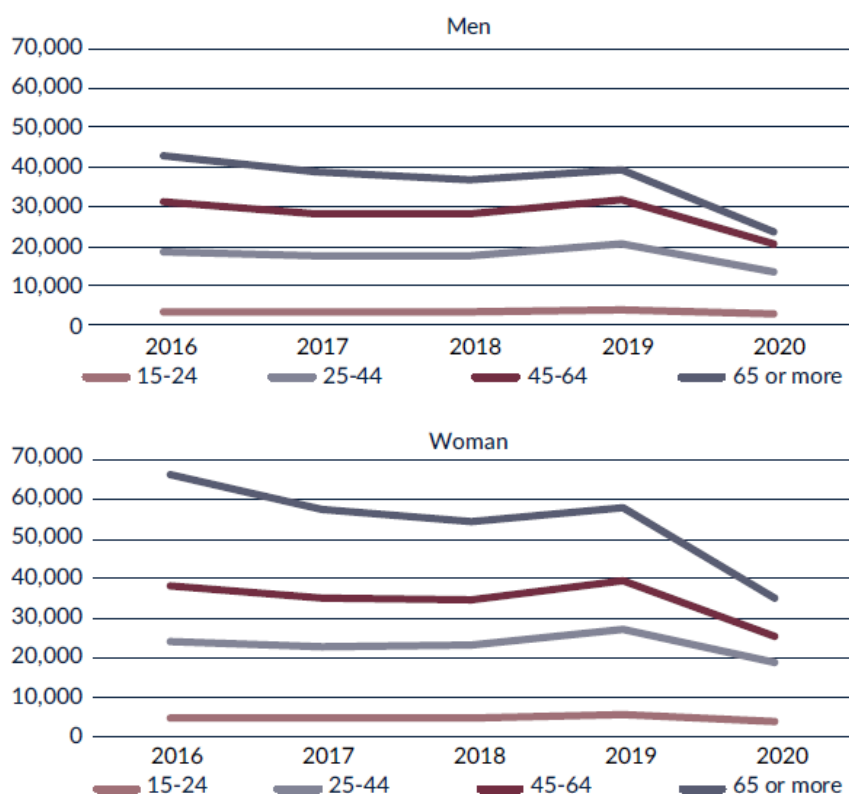
In Barcelona, with the arrival of Covid-19, the Barcelona Public Health Agency (ASPB) had to get to work in order to respond to the pandemic. This response varied from wave to wave. At the beginning, we were not sufficiently prepared and did not have the means to respond adequately. We were able to improve our response going forward because more human resources were made available: to both monitor and control the disease and to carry out screening. The pandemic highlighted the serious limitations of communicable disease reporting systems around the world. In Spain, progress was made in the information systems for Covid-19 surveillance, with a system providing daily information on new cases based on data from multiple health system information sources being set up within a matter of weeks. Technological developments made this easier. In Barcelona, the Covid-19 data website was launched in early April 2020 and was updated on a daily basis (Marí-dell'Olmo et al., 2020).

It is worth noting that, during this pandemic, we made great strides in working on a cross-sectoral basis with professionals from other disciplines and institutions. Four work groups were created for this purpose: a) Public Health Office, b) Nursing home Office, c) School Office and d) Vaccination Office. These groups were made up of professionals from the Barcelona Health Consortium (CSB), health care services, public health and also education (School Office) and personal care (Residence Office). They were useful for following the different guidelines, topics and incidences

over the course of the pandemic. This intersectoral collaboration will probably also bear fruits in the future.

With regard to the public health system, it should be noted that both primary care and hospital services were severely strained during the pandemic. These centres had to put many of their usual tasks to one side in order to devote themselves entirely to Covid-19. This led to other diseases being neglected. For example, as evidenced in the Barcelona Health Report released in late 2021 (Agència de Salut Pública de Barcelona, 2022), in 2020 there was a 36% reduction in new diagnoses of chronic diseases (graph 2). There was also a decrease in the number of communicable diseases being reported, partly due to a real reduction in incidence as a result of social distancing measures, but probably also due to under-diagnosis and under-reporting. The return to normal activity is essential in managing this exceptional situation.

**Graph 2. Number of newly diagnosed cases of chronic diseases in men and women by age. Barcelona, 2016-2020**



Source: Barcelona Health Report released in late 2020 (ASPB).

### 3. Areas of special impact

This section is dedicated to three areas where Covid-19 had a particular impact: nursing homes, schools and the labour market.

#### 3.1. Nursing homes in Barcelona

Residents in nursing homes are considered a vulnerable group due to the health problems most commonly associated with advancing age, such as the multi-pathology of chronic diseases and the progressive deterioration of the immune system. In addition, an intrinsic aspect of life in nursing homes is the continuous contact between residents and caregivers in a closed environment, which facilitates the transmission of infectious diseases and makes it difficult to implement prevention and control measures.

During the pandemic, 8,664 cases of Covid-19 were detected in nursing homes in Barcelona among residents and workers. In the first wave there were 3,600 cases; the majority of which (64%) were among female residents or employees. This first wave was characterised by a lack of knowledge about the disease, a lack of diagnostic tests and severe limitations in the provision of

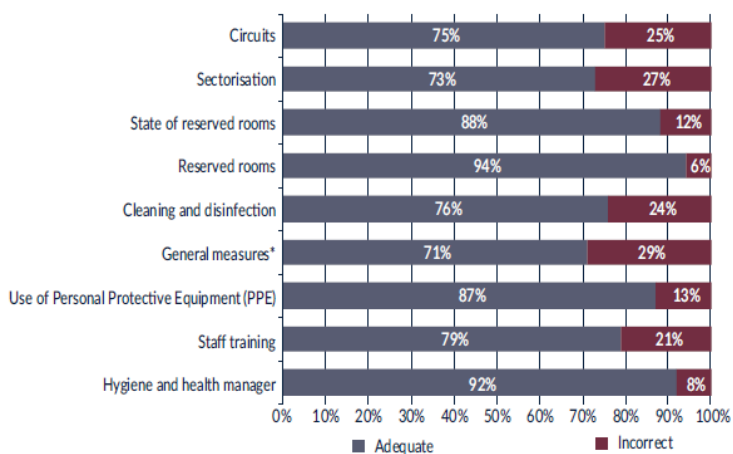
personal protective equipment (PPE) for professionals, which had a major impact on homes for the elderly and highlighted the fact that most of the city's centres were not prepared to deal with the pandemic.

Tough restrictions on visits by loved ones for months at a time, as well as various contingency plans, contributed to the prevention and control of the pandemic in this area (Behrens & Naylor, 2020). Finally, the vaccination greatly reduced the severity of cases and mortality (Domi et al., 2021). In addition to these measures, which were implemented throughout Catalonia, the ASPB introduced various interventions on a local scale.

In the ASPB, a working group on nursing homes was commissioned in April 2020 with people from various services. One of the first things that this group did was draw up a series of contingency plans, which began with a scheduled joint visit by the ASPB and the Barcelona Firefighting force to ascertain the health and epidemiological situation at the centre, as well as the prevention and control measures that were adopted. The centres were informed about the importance and need to have a contingency plan and about prevention and control measures. The visits also helped to identify needs for resident transfers and site disinfections. In this first intervention, around 300 ASPB-validated contingency plans were drawn up between June and August 2020. At the same time, the ASPB promoted training for staff at homes for the elderly.

In August 2020, the Technical Nursing Home Office was set up with staff from various sectors of the City Council, the ASPB and the Barcelona Health Consortium (CSB) to coordinate all the institutions involved in actions in homes for the elderly. In 2021, the ASPB carried out 244 on-site visits to 272 homes for the elderly in Barcelona, representing 89% of the centres. Graph 3 shows the shortcomings identified in the visits.

**Graph 3. Percentage of shortcomings identified in the second scheduled on-site visit in nursing homes. Barcelona, 2021**



Source: ASPB

\*General measures: Use of face mask, social distancing, hand hygiene, sufficient sanitary equipment, single-use equipment, the entry of people and objects from outside, outside visits and excursions and ventilation.

The pandemic has served to shine a light on the precarious nature of many nursing homes, both for residents and members of staff who work there, which calls for a reflection on residential models for elderly people. This is likely to involve increasing home support, promoting serviced housing and reducing the number but improving the quality of nursing homes, as in other European countries (Bofill-Poch, 2018; Deusdad et al., 2016).

### 3.2. Schools

The closure of schools was one of the measures that had the greatest impact, in terms of the health of children and teenagers as well as their parents. For example, the closure of schools was reported to have negative short to medium-term effects on well-being, mental health, sleep quality and other indicators in children and teenagers (Dooley et al., 2022). It also contributed to increased

gender inequalities, with mothers being disproportionately responsible for overseeing and supporting their children's education (Ahrendt et al., 2020). The impact was also greater in countries where schools were closed for longer. Closure was associated with a decline in the school's role with regard to child protection monitoring systems, with teachers being key actors in the detection of problems. Although rarely studied, it has been shown that more disadvantaged socio-economic groups feel the impact of school closures more greatly (Viner et al., 2022).

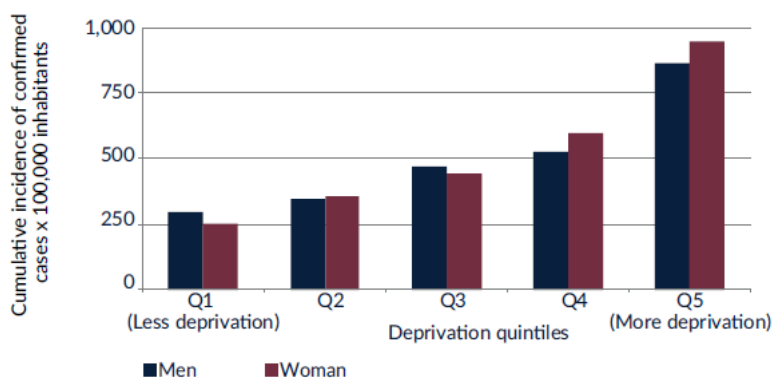
In accordance with what we know about social determinants and social inequalities in health, in Barcelona we argued against extending the closure of schools in the 2021-22 academic year from the perspective of public health and other areas. Although the pandemic was far from under control, when we weighed up the risks and benefits, we deemed it necessary for schools to open. It was necessary to weigh up what the resources for surveillance and pandemic control activities (case detection, contact tracing, recommendations according to protocols and advice to the schools, which carried out an important and difficult task in controlling the pandemic) meant for the health fields, especially public health and primary care. At the same time, it was necessary to evaluate the importance of the educational function, the socialisation of children and the work-family balance of mothers and fathers.

As mentioned above, in the city of Barcelona it was agreed to create a space of co-governance for managing the pandemic in the school setting, involving people with maximum managerial and executive responsibility from the spheres of education (Barcelona Education Consortium, CEB; and Barcelona Municipal Institute of Education, IMEB) and health (ASPB; Catalan Health Institute, ICS; and CSB), accompanied by a technical commission with the same inter-institutional representation. The development of the action protocol for the control and surveillance of Covid-19 required the mobilisation of resources in the five areas involved. Co-governance was also highly necessary in order to meet the different needs requiring a response at various points of the pandemic. School staff played a crucial role in keeping schools open. They oversaw the application of the protocol, which is something that must be considered for possible future situations that may arise. In order to determine a protocol, among other criteria, one must consider what is involved in its implementation and analyse its feasibility. Covid-19, as a new disease, required many adaptations of the action protocol. It could be argued that the last of the school protocols was not well managed by the centres due to its complexity.

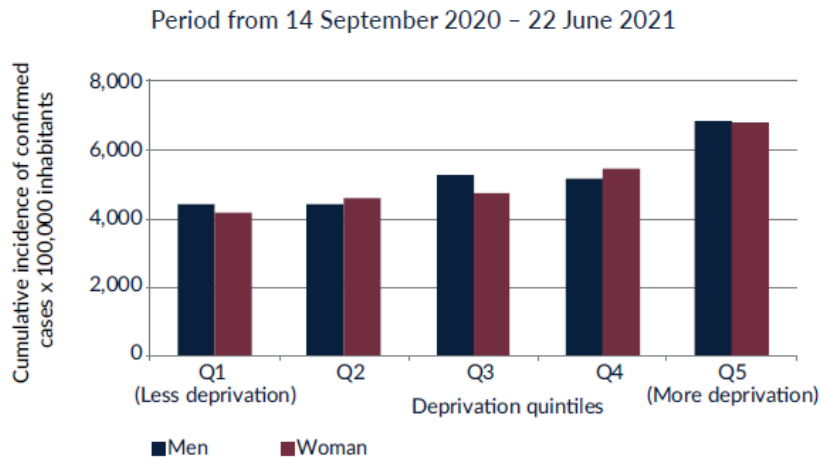
However, experience and data reinforce the fact that the decision to open schools, with consensual and evidence-based protocols, was indeed the right one. Graph 4 shows the cumulative incidence in the 0-14 age group, in three periods. In the first period (25 February - 7 September 2020) there were no open schools and face-to-face summer activities were also highly restricted; in the second and third periods (2020-21 and part of 2021-22, respectively), schools were open (Agència de Salut Pública de Barcelona, 2022). Relative inequalities are more pronounced in the first period.

**Graph 4. Cumulative incidence of Covid-19 in the 0-14 age group by level of deprivation in the periods indicated above each graph**

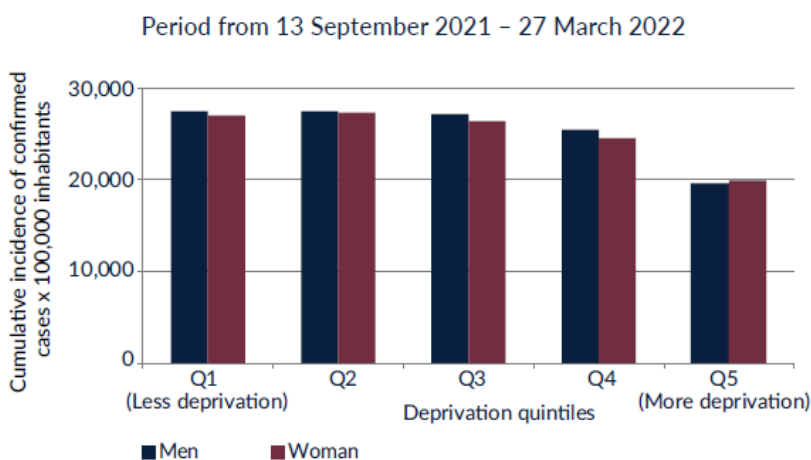
Period from 25 February - 7 September 2020 (period when schools were closed)



Source: Covid-19 Register, Department of Health, Generalitat de Catalunya.



Source: Covid-19 Register. Department of Health. Generalitat de Catalunya.



Source: Covid-19 Register. Department of Health. Generalitat de Catalunya.

They are also present in the second period, albeit with a lower relative inequality, and absent in the third period. Although analyses that take into account different variables in such complex phenomena as health and inequalities are necessary, a simple graph such as the one below shows that schools are a public service that must be preserved as far as possible. This is because the impacts are felt beyond the student-teacher interaction, since the life offered by a school that is open covers other aspects that promote health and ensure equity.

### 3.3. Labour market

Covid-19 has had a major impact in the field of work. Firstly, with regard to the infection of employees, but also with regard to the job market and working conditions. This includes issues such as company closures, with the subsequent rise in unemployment and fall in employment; the high number of temporary layoffs (ERTOs); and the rapid growth of teleworking and, with it, the increased use of digital technologies. Secondly, it has had a major impact with regard to inequalities. During the first wave in Spain, besides the increased psychosocial hazards, working and employment conditions were particularly poor for female essential workers (which include the fields of health care, social-health care, cleaning and food retail, among others). These are characterised by a high proportion of jobs that have little social recognition and which are significantly invisible (Utzet et al., 2022).

Unpaid care and domestic work were also impacted by the pandemic, including increased care for the sick, increased childcare during school closures and increased domestic work due to the increased presence of people at home.



- **The impact of Covid-19.** Between July 2020 and May 2021, 8,022 cases were reported in 4,836 different workplaces of people who were working face-to-face when they were diagnosed with Covid-19 and could therefore transmit the disease to their work colleagues. 228 workplace outbreaks (excluding nursing homes, formal education institutions, health and social care institutions and other types of special institutions) were also reported.

- The sector most affected by the infection was health and social work. The trade and repair sector was the most affected in terms of unemployment and ERTOs. While measures to mitigate the negative effects of Covid-19, such as ERTOs, served to partially maintain incomes and employment, they have not been able to eliminate uncertainty about the future of employment. Uncertainty which, like unemployment, is a factor associated with mental health problems.

The 2020 data indicate a significant effect on working women, both in relation to those who test positive for Covid-19 and the increase in the amount of unpaid care and domestic work (Cortès Franch et al., 2021)

- **Public health action.** From the beginning of the pandemic, health authorities emphasised the role to be played by Occupational Health Services (SPRL) in the surveillance and control of the pandemic. The procedures indicated the need to coordinate their action with public health services. This coordination has hardly been developed, with some notable exceptions such as the Basque Country (Guisasola Yeregui & Ibañez Vallejo, 2021). Barcelona was another such exception. The ASPB deployed a series of actions aimed at supporting the city's SPRLs in dealing with an exceptional situation marked by immediacy, constantly changing information and a lack of epidemic management experience. Coordination with the Labour Inspectorate, which sought to direct its inspection work towards workplaces that fail to comply with preventive measures, was another experience of cross-sectoral work beyond the SPRL and companies (Agència de Salut Pública de Barcelona, 2021).

As in so many other areas, Covid-19 has also highlighted constraints and opportunities in the field of employment. It has highlighted the need for intersectoral work between all stakeholders, the improvement of information systems (which should include, among others, the SPRL) and the involvement and mobilisation of all the resources available in the field of occupational health (in addition to the SPRL, the mutual insurance companies that collaborate with Spanish Social Security). Apart from aspects specifically related to the surveillance and control of Covid-19, the field of labour has to face new challenges that the epidemic has brought to light. These include the rapid growth of teleworking, the importance of care work (both paid and unpaid) and the impact of the pandemic on the mental health of working people.

#### **4. Vaccines**

One notable aspect of the response to the crisis was the rapid development of Covid-19 vaccines. However, due to the time required for vaccine production and limited scientific knowledge at the start of the pandemic, vaccination strategies based on prioritisation were established worldwide. The main objectives were to reduce mortality and morbidity in the most at-risk populations and to improve the resilience of health systems. In a short amount of time, vaccines reduced the incidence and severity of Covid-19 in countries that had access to them, while exposing persistent inequities in terms of distribution.

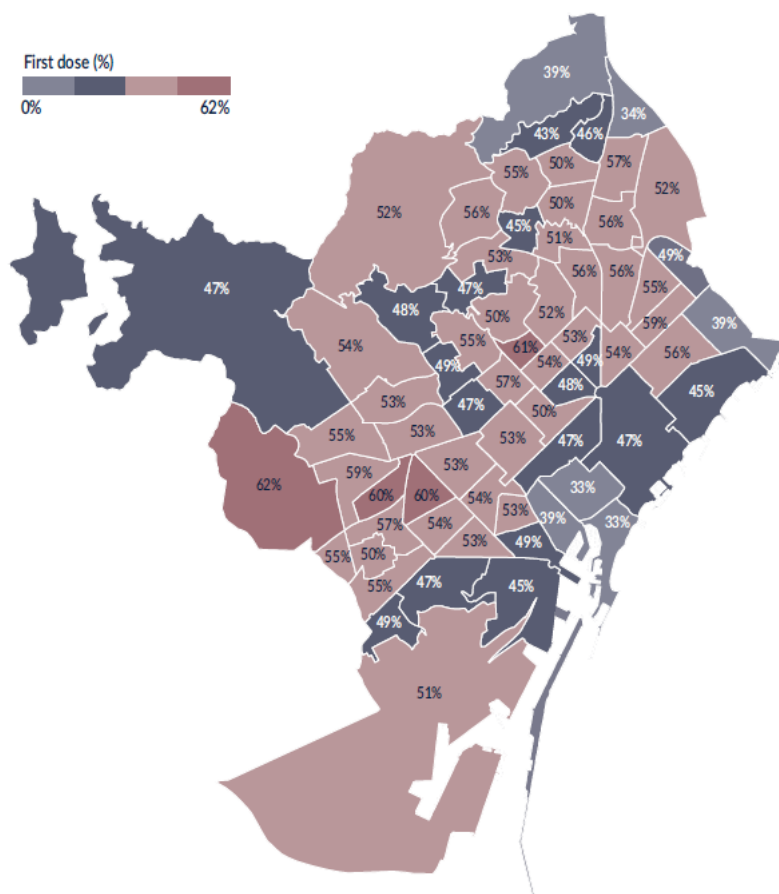
In the initial stages, the prioritised groups included elderly people, those living and working in nursing homes, health and essential public service workers and those deemed to be in vulnerable groups. The vaccination was later expanded to younger age groups. Subsequently, once vaccines were approved for these age groups, teenagers and children aged five and above were included. Vaccination coordinating boards were established at national and regional levels to ensure that evidence is properly translated into policy and practice. In Catalonia, the organisation of the early phases of the vaccination—in which workers from essential services, health services and nursing homes were all vaccinated—fell to the city hospitals. Vaccination was subsequently reoriented

towards primary care, while mass vaccination points were set up to administer most of the vaccines to the public. The logistics and distribution of vaccines in the city were strained, with a five-fold increase in the number of doses distributed compared to the previous year.

In Barcelona, by 20 April 2022, 1,402,438 people had received the first dose of the vaccine and 1,368,412 people had received the full initial vaccination. Cumulative coverage in the population aged five years and above had reached 88.5% for the first dose alone, while 86.4% were fully vaccinated. For the additional dose, coverage was 88.6% in people aged 75 years and above and 77.4% in people aged 65-74 years.

Despite the overall good outcomes, social inequalities were anticipated, as these exist in most human health indicators. In order to ascertain possible inequalities, the health services and the Department of Health were asked for coverage by Basic Health Area (BHA) according to sex, neighbourhood of residence, age and nationality. These were reported on a weekly basis, while differences between the most and least vaccinated neighbourhoods were also analysed. From the outset, coverage was higher among women. This may be explained by their greater adherence to health interventions and their involvement in care work, although the gap between genders progressively narrowed over time. Coverage by nationality showed significant gaps between certain nationalities and those of Spanish nationality. Inequalities by area of residence became evident when the population aged 60-70 years old was asked to apply for an appointment online. Inequalities by area of residence were reproduced as the vaccine was rolled out to different age groups. Figure 1 shows the coverage by April 2022 for children aged 5 to 11 in Barcelona, the latest age group the vaccine has been rolled out to.

**Figure 1. Vaccination coverage of the first dose in persons aged 5 to 11 years in Barcelona by BHA**



Source: Generalitat de Catalunya open-access data portal.

To address inequalities, in the first quarter of 2021 the ASPB launched an inter-institutional alliance, the Vaccination Office, with the CSB, the ICS and Barcelona City Council, which assessed coverage on a weekly basis. Given the emerging inequalities, the causes were identified through a survey of community agents in the neighbourhoods with the highest vaccination delays, which highlighted the existence of digital, language and cultural barriers that made it difficult to obtain appointments, as well as time barriers to accessing vaccination centres.

To address this, interventions were designed and implemented in neighbourhoods with low coverage. 26 municipal points which offered support in securing appointments online were established. 1,865 people (53% male, 55% ≤ 49 years, 37% from Ciutat Vella, 27% Spanish nationals) attended. 32% obtained a vaccination appointment, 43% had their questions answered and the remaining 25% were referred to other services. 18 community days were also held where 1,960 people were vaccinated without an appointment (63% men, 58% aged 18-39 years, 76% residents of Barcelona, 41% Spanish nationals).

During 2021, the total difference between the BHAs with the best and worst coverage in people aged 60-69 years narrowed considerably, from a difference of 31.3% in May to a difference of 13% in November.

## **5. Communication**

During the pandemic there was a huge information from a wide range of sources, sometimes not sufficiently qualified (Ioannidis et al., 2021), with an abundance of fake news and no clear public health leadership which contributed to mistrust among the population. Communicating the necessary messages to deal with the uncertainties brought about by crisis situations in a timely, assertive and transparent manner, as well as to facilitate trust, acceptability and compliance with the corresponding individual and collective prevention measures, is of utmost importance (Gragera et al., 2022).

Since the beginning of the pandemic, one of the ASPB's main roles has been to generate knowledge about Covid-19 in order to meet the information needs of decision-makers and professionals, as well as those of the media and the general population. For this reason, several communication actions were developed with new content related to Covid-19. These contained up-to-date, informative and accessible information that was adapted to different audiences, tackling fake news to help build trust (Hyland-Wood et al., 2021). There has been a large increase in visits to the website and a significant increase in the number of people following ASPB's profiles on social media, which shows the benefits of a strategy based on transparency and continuous information (Pulido-Polo et al., 2021). The relationship with the media was also strengthened and ASPB's presence in the press, radio and TV also increased. However, the appearance of public health professionals was minor (Rebolledo et al., 2021).

The first communication action was the launch of a website with Covid-19 FAQs for professionals and the general population, which was kept up-to-date as new information became available. Between 18 February 2020 and 31 December 2021, it was visited around 375,000 times. In addition, the interactive data website #COVID19aldiaBCN (Marí-dell'Olmo et al., 2020) was published with daily information on cases and incidence of Covid-19 and excess mortality in Barcelona according to sex, age, territory and socio-economic level, which proved very useful for surveillance and planning. The #COVID19aldiaBCN website had almost 222,000 visits between 21 June 2020 and 31 December 2021 (Agència de Salut Pública de Barcelona, 2020). Subsequently, a daily informative report was produced with a selection of the main monitoring indicators for Covid-19 in the city, which had nearly 7,000 visits between 8 January 2021 and 31 December 2021. This was followed by the launch of a new online portal called 'Web covid-19', where wide-ranging information on Covid-19 and related issues was presented, including:

- Information on areas of public health with regards to Covid-19, such as environmental health, food safety, health, work and community health.

- Other communication actions developed, which are available on the ASPB YouTube channel, included the professional training sessions and scientific sessions. One of the Art and Health exhibitions was also dedicated to the ASPB's Covid-19 approach.

Finally, it is worth highlighting the reinforcement of the Covid-19 preventive measures and risk communication initiatives in the neighbourhoods, considering socio-economic vulnerability and the language and/or cultural barriers of the residents. Simple messages and formats were designed and translated into the languages of the largest international communities residing in the city. Various community-based communication initiatives were carried out involving street information workers and neighbourhood organisations and representatives, as well as cultural mediation and translation teams, through face-to-face information sessions and communication channels such as WhatsApp.

All this new information led to a significant number of new visits to the ASPB's official channels. Thus, more than 740,000 visits were made in 2020 and more than 1,251,000 in 2021, compared to 300,000 visits in 2019. The number of people following ASPB on social media also increased; by the end of 2021 there were 8,882 followers on Twitter (up from 5,312 in 2019), 2,526 followers on LinkedIn (up from 1,308 in 2019) and 1,185 followers on Facebook (up from 1,047 in 2019).

ASPB also became another source of reference for the media on matters relating to Covid-19 in the city of Barcelona. In 2020 and 2021, 42 press releases were written and 14 press conferences were held (most of them jointly with the Barcelona City Council), which led to the ASPB appearing more than 300 times in the press and several times in TV and radio interviews. BTV, Barcelona's local TV channel, also published data from the #COVID19aldiaBCN website on a daily basis.

## **6. Covid-19, a complex issue**

From an ethical point of view, public health policies seek to maximise the common good, striving to preserve individual rights from a perspective of equity. During the first wave of the pandemic, there was a strong consensus on the need for very strict confinement measures in order to reduce transmission, morbidity and mortality in the short term and to avoid the collapse of the health system in a context of uncertainty and lack of knowledge.

Subsequently, measures such as stay-at-home orders, mandatory restrictions on certain activity sectors, the compulsory use of face masks and pressure for vaccination sparked a debate on the restrictions of freedom and individual rights. Many of these measures were perceived as disproportionate, contradictory or incoherent and often made up as they went along.

Thus, after the first wave of the pandemic, it became clear that the response could not be strictly biomedical, focusing on preventing infection. Rather, it was apparent that Covid-19 was a complex issue that required an intersectoral approach (Angeli et al., 2021). Complex issues are characterised by being difficult to define; by having multiple interdependencies and interactions; and by solutions that can generate unexpected problems for which there are no clear solutions. They are socially complex; may require behavioural changes and cross-sectoral approaches; and are seemingly intractable, with consistent errors in the approaches taken.

For a complex issue such as a pandemic, the common good should not only be formulated in the short term, such as reducing the incidence and number of Covid-19-related deaths at a given point in time. Rather, it should take into account the medium and long-term future, as well as the side effects of measures focused on the prevention of Covid-19. With a view to future responses, the pandemic highlighted the need to address at least three consequences of Covid-19 and interventions aimed at preventing it: the reduced access to health care services for problems other than Covid-19; mental health; and the economic consequences. This means that the response cannot be solely health-related, but that it must involve, as seen throughout the chapter, other sectors and disciplines as well as community participation (Angeli et al., 2021).

The impact on health care went far beyond the treatment of Covid-19 patients. As mentioned above, access to health care services for problems other than Covid-19 (such as chronic health disorders, cardiovascular problems and cancer) was reduced during the pandemic. This is because professionals had to deal with the high numbers of Covid-19 patients, and also because some people were afraid of going to the health centres out of fear of infection. A substantial part of health care was also provided online, which also reduced access - especially for the most disadvantaged groups (Davies et al., 2021).

Mental health problems also increased significantly as a result of the pandemic. This is explained by the direct effects of the infection itself and the indirect effects related to the loss of loved ones and the widespread application of strict infection control measures, resulting in isolation, restrictions on accompanying loved ones in their final days/hours or visits to homes for the elderly, fear and economic problems, among others (Philip Rajkumar, 2021). Resources for mental health care have been insufficient for many years. However, even if these are increased, care alone is not enough to reduce and prevent mental health problems which, in general, have social causes.

The pandemic had a major impact on the economy around the world. However, its consequences were particularly noticeable in Spain where the productive system is overly dependent on sectors which are vulnerable to the pandemic, such as tourism, construction, the food industry and the catering trade (Pinilla et al., 2021). The impact on people's health and wellbeing would have been even greater had measures such as the ERTOS not been strongly promoted as an instrument to maintain employment and household incomes, and thus consumption and domestic demand (Ruesga et al., 2021).

## **7. Conclusions**

The Covid-19 pandemic has had an enormous impact on the health and wellbeing of citizens and on the economy. However, it has also allowed for the development—in record time— of new tools and ways of working that will help societies cope better with crises in the future.

In terms of information, the pandemic has highlighted the serious limitations of communicable disease and vaccine information systems. However, it has also opened our eyes to ways of improving them and turning them into agile systems with daily, up-to-date data. Social inequalities in terms of incidence and vaccination coverage highlight the importance of including data on social determinants and inequalities, in addition to biomedical information.

Widespread vaccination, in a country that relies on vaccines and the health care system, reduced Covid-19-related hospitalisation and deaths. The establishment of inter-institutional work groups helped to include equity in Barcelona's vaccination strategy.

During the pandemic there was excess information from a wide variety of sources, which were often contradictory and sometimes fake. Clearer public health leadership with accurate, verified and rapid information is required in order to build public trust and facilitate decision-making and evaluation.

Covid-19 has shown that individual interventions, based exclusively on health care or the tracking of cases, are not sufficient. Rather, these must be complemented by a population-based approach with intersectoral actions that address the complexity of such a pandemic.

Finally, Covid-19 demonstrates the need to increase research on social determinants and inequalities in communicable diseases and to assess the impact of interventions—whether promoted by the health sector or not— on various health outcomes, including from an equity perspective.

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