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The Manchester Briefing COVID-19

International lessons for local and national government recovery and renewal

What is 'The Manchester Briefing on COVID-19'?

The Manchester Briefing on COVID-19 is aimed at those who plan and implement recovery from COVID-19, including government emergency planners and resilience officers.

We bring together international lessons and examples which may prompt your thinking on the recovery from COVID-19, as well as other information from a range of sources and a focus on one key topic. The lessons are taken from websites (e.g. UN, WHO), documents (e.g. from researchers and governments), webinars (e.g. those facilitated by WEF, GCRN), and other things we find.

We aim to report what others have done without making any judgement on the effectiveness of the approaches or recommending any specific approach.

This week we have provided information on our webinar series and three briefings:

Click here to explore the new database

Contribute your knowledge to the briefing (via a 30-minute interview) by contacting duncan.shaw-2@manchester.ac.uk

We also produce a blog series which you can access here along with other news about our team and our work.

Join the conversation
#RecoveryRenewal #Covid19Recovery

Previous briefings. If this is the first briefing you have received and you'd like to access more, they can be found here.

>>>>>>>> Please register at ambs.ac.uk/covidrecovery to receive future briefings <<<<<<<<

Recovery, Renewal, Resilience:
The Manchester Webinar Series

Over the coming months, our team, in collaboration with partners, will be running a series of webinars that will explore recovery and renewal from COVID-19. The webinars will mark key dates, discuss the themes emerging and developing through our project and report on key findings, good practice and global learning. We will sometimes also share webinars external to our project that we think might be of interest. Register for our upcoming and watch our most recent webinars:

Upcoming Webinars

03/09/2021, 1pm BST: Continuity & Resilience Series: Human Aspects of Resilience

In this, the third in our three-part series of webinars co-produced with the British Standards Institute (BSI), we examine the human aspects of resilience.

Register: https://tinyurl.com/4enx9685

08/09/2021, 6pm BST: Spontaneous volunteers lessons learned in Argentina and Chile

Highlights from the National CERT Association Conference, with speakers Duncan Shaw (University of Manchester, UK) and Jenny Moreno (University of Concepcion, Chile).

Register: https://tinyurl.com/2w2u7vnc

09/09/2021, 2pm BST: Cities on the Frontline Speaker Series #15 Resilient Sanitation Systems

Organised by Resilient Cities Network in collaboration with The Wolrd Bank

Register: https://tinyurl.com/atwurvyw

21/09/2021, 6pm BST: Disasterville

Highlights from the National CERT Association Conference, presented by James Ray (Utah Division of Emergency Management)

Register: https://tinyurl.com/4crvth2d

Past webinars

07/07/2021: GCH–UN Habitat Geneva Urban Debate (GUD)

Post covid Economic & Financial Recovery. Local government representatives around the world share their experiences of COVID-19 response, the lessons and key considerations that enable cities to be resilient.

Watch: https://tinyurl.com/488p6mpc

Briefing A:

Financial Technology (FinTech) and Digital Government as Policy Delivery Tools – Examples from the Pandemic

Written by Fábio M. V. Sousa, University of Manchester and the Manchester Briefing Team

COVID-19 has caused significant disruptions to the delivery of many services, leading to the increased digitization of our everyday lives in an effort to ensure service continuity while maintaining social distancing[1],[2]. FinTech and Digital Government have been prominent in these developments. FinTech is the "application of technology to improve financial products and services", according to a report supported by the Alliance Manchester Business School[3]. Digital Government refers to the use of digital technologies by governments to deliver services[4].

During COVID-19, FinTech in combination with Digital Government, facilitated public responses and enabled secure ways to reach vulnerable populations quickly and efficiently[1],[5]. FinTech and Digital Government also played an important role in the delivery of rapid support to Micro- and Small-Medium Enterprises (MSMEs)[6]. Given the potential usefulness of these tools during the pandemic, governments may consider:

- Reflecting on, supporting, and regulating approaches to the challenges and risks associated with digital tools[1],[7]
- Necessary prerequisites, including investments in mobile broadband infrastructure expansion, digital identification, and open application programming interfaces[4],[8]
- Including Digital Government in recovery strategies. For example, Portugal is planning investments in digital transition worth around €578M, that include expanding the digital presence and capabilities of courts, business registers, schools, and public services as part of the country's [Recovery and Resilience Program](#)
- Collaborating with FinTech companies to develop ways to increase financial inclusion, streamline application processes, and increase transparency and compliance with regulations. The partnership between Los Angeles and Mastercard (mentioned below) is such an example

This briefing presents examples of how FinTech and Digital Government have been used in countries as a policy delivery tool to help individuals and companies cope with the disruption created by the pandemic. In the final section, we present some examples of how governments can include FinTech and Digital Government in their recovery and renewal strategies.

Supporting citizens through FinTech and Digital Government

In several developing countries, FinTech and Digital Government have been used by national governments to increase financial inclusion and reduce poverty, so could be deployed to address additional issues raised by the pandemic.

Consider India's example[8] where, thanks to the country's digital infrastructure, the share of adults with a bank account "surged from 53% in 2014 to 80% in 2017, and the gender gap shrunk from 20% to 6% in the same period". Hence, during COVID-19, government managed to digitally distribute approximately $5bn in monetary benefits to its citizens via those bank accounts, ensuring social distancing, reducing the distribution of physical money, and producing significant savings by eliminating potential erroneous beneficiaries

India's infrastructure includes[8]:

- A public biometric identity program ([Aadhaar](#)) that has simplified documentation requirements and decreased the cost of opening bank accounts
- A set of public Application Programming Interfaces (APIs) ([India Stack](#)) that allows the sharing of various pieces of information - including biometric identity and digital payment address (e.g. phone number) - for efficient digital transactions

Such tools play an important role in advanced economies, to reduce inequalities and increase resilience during public emergencies such as COVID-19 (e.g. the [Angeleno Card](#) discussed below).

Consider the same situation but in the USA[9], where financial exclusion persists in certain areas. For example, in 2017, the FDIC's (Federal Deposit Insurance Corporation) "National Survey of Unbanked and Underbanked Households" found that nearly half of ethnic minority households did not have sufficient access

1 https://blogs.worldbank.org/psd/fintech-can-help-response-covid-19-where-should-policymakers-start

2 https://www.weforum.org/agenda/2020/10/covid-19-financial-technology-fintech-regulation/

3 https://www.whitecapconsulting.co.uk/wp-content/uploads/2020/04/Greater-Manchester-FinTech-Ecosystem-Report-20-20.pdf

4 https://www.oecd.org/gov/digital-government/Recommendation-digital-government-strategies.pdf

5 https://www.worldbank.org/en/topic/financialsector/publication/digital-financial-services

6 https://www.jbs.cam.ac.uk/wp-content/uploads/2021/03/2020-ccaf-global-covid-fintech-market-rapid-assessment-study-v2.pdf

7 https://pubdocs.worldbank.org/en/230281588169110691/Digital-Financial-Services.pdf

8 https://www.weforum.org/agenda/2020/08/covid-19-has-accelerated-india-s-digital-reset/

9 https://www.mckinsey.com/industries/public-and-social-sector/our-insights/the-case-for-accelerating-financial-inclusion-in-black-communities

to mainstream financial services or any bank account (35,217 households participated in the survey)[10]. During COVID-19, financial exclusion made distributing financial benefits to poor residents in the USA more difficult[11]. In the case of Los Angeles (LA), the city responded to these challenges by[12]:

- Partnering with Mastercard and Accelerator for America (a non-profit economic development organisation) and creating the Angeleno Card – a prepaid debit card targeted at the unbanked, among others
- Distributing more than $36 million to 38,000 families via these cards, aiming to support the cost of basic needs like medical aid and assistance, food, clothing, and rent payments

Other US cities replicated LA's program through partnerships with non-governmental organizations and private companies, potentially triggering an expansion of digital services around the country.

Supporting businesses through FinTech and Digital Government

The OECD recently produced a comprehensive analysis of SME and entrepreneurship policy responses to COVID-19 and noted that the first months of the pandemic will likely be remembered as the period when governments introduced the highest number of MSME policy initiatives in history to counter the effects of containment measures[13]. The report highlights how policymakers responded quickly to the needs of MSMEs by ensuring the rapid delivery of several financial support measures (e.g. loans) via streamlined administrative processes (e.g. decreased eligibility checks) and digital delivery systems (e.g. dedicated portals).

Some examples of Digital Government supporting businesses offered by this OECD report include:

- Estonia's robust digital infrastructure meant that entrepreneurs and business owners did not have to supply the same information repeatedly, while allowing increased transparency in the delivery of financial support. This infrastructure was in place prior to COVID-19 and was enhanced to deliver targeted support during the pandemic
- Switzerland's public direct loan scheme established as a direct response to COVID-19, was made fully accessible online and as user-friendly as possible. The programme enabled loan applications to be approved in 30 minutes

The report prompts thinking as to how the COVID-19 experience may benefit future delivery of policies geared towards MSMEs and entrepreneurs. However, it also demonstrates how such rapid and easy access may also have unintended side effects, such as channeling financial resources to companies that do not need them, or keeping unproductive and loss-making firms afloat.

We consider how governments might be able to strike a balance between ensuring fast delivery of support measures to MSMEs and compliance. One approach could be to couple Digital Government with FinTech's algorithms and big data analysis[12],[14],[15]. Consider the following examples[1]:

- In Austria, a FinTech firm partnered with the government to speed up the delivery of COVID-19 relief measures, while limiting fraud
- In the USA, the Paycheck Protection Program (PPP), created as a COVID-19 relief program, drew early criticism for not reaching small businesses, while allowing some high-profile larger businesses to obtain funding. However, when FinTech companies, like PayPal and Square, became approved as PPP lenders, they state that they were able to deliver loans to small businesses. The Small Business Administration (SBA) cites an average PPP loan size of about $107,000 as of June 30, while Square averaged less than $11,000 and PayPal averaged about $25,000. PayPal has also stated that machine learning and other algorithms can help determine the creditworthiness of business customers

Including FinTech and Digital Government in recovery and renewal strategies – Funding Schemes and PPP

As stated earlier, COVID-19 highlighted how FinTech and Digital Government can be useful in reaching, in an effective way, citizens and businesses.

In this context, Governments may consider including, in their recovery and renewal strategies, financial envelopes for investments in the digitalization of public services, and Public and Private Partnerships (PPP) that create a more favorable environment for FinTechs.

Consider the EU's Recovery and Resilience Facility[16], which is a key instrument to help member states emerge stronger and more resilient from the COVID-19 crisis. EU countries have at their disposal €672.5 billion in loans and grants to finance reforms and investments included in their respective Recovery and Resilience Plans (RRP). The European Commission has strongly encouraged member states to put forward investment and reform plans in several areas, including Digital Government and increasing digital skills through education and training[17].

For example, and as stated above, Portugal's RRP expects total investments in digital transition worth around €578M. These include[18]:

- "Raise the digital skills of 800,000 workers
- Create a national network of 30 test beds that will allow companies to create and test new products and services
- Establish 10 digital business accelerators to increase the

10 https://www.fdic.gov/householdsurvey/2017/2017report.pdf

11 https://www.marketwatch.com/story/government-benefits-on-debit-cards-how-public-private-payment-partnerships-could-help-millions-of-people-11602845094

12 https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

13 https://www.oecd-ilibrary.org/economics/an-in-depth-analysis-of-one-year-of-sme-and-entrepreneurship-policy-responses-to-covid-19_6407deee-en;jsessionid=1Jq3o_stiwpNrKUi8ZQaQwZc.ip-10-240-5-21

14 https://www.ifc.org/wps/wcm/connect/news_ext_content/ifc_external_corporate_site/news+and+events/news/insights/fintech-financing-smes

15 https://recuperarportugal.gov.pt/

16 https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

17 https://ec.europa.eu/info/business-economy-euro/recovery-coronavirus/recovery-and-resilience-facility_en

18 https://recuperarportugal.gov.pt/

number of companies with e-commerce capabilities

- Reach a total of 126 Digital Innovation Hubs that will allow businesses better access to Artificial Intelligence, High Performance Computing, and Cybersecurity
- Directly support 3,000 startups, via special voucher schemes that will subsidize the acquisition of specific services related to the creation of new digital products and services
- Create new digital platforms for courts and business registers
- Expand the current listing of governmental services available online and enhance the current public platform for open data
- Increase the digitalization of schools"

These measures have the potential to enhance the country's digital capabilities, increase the adoption of digital tools, and foster an environment that is favorable to startups, including FinTech firms.

In addition, the EU's Cohesion Policy for 2021-2027 will make a total of €373 billion available to member states[19]. According to the policy's regulations, EU countries can use this budget to fund, via grants and financial instruments (e.g. subsidized credit lines), various investments in research and innovation, SME digitalization, digital government, support to startups and entrepreneurship, among many other policy areas that support job creation, social inclusion, and the green transition in the post-COVID[20].

Governments may also consider establishing or extending PPP, in addition to ambitious funding schemes like the EU's Recovery and Resilience Facility and Cohesion Policy for 2021-2027.

As seen above, the Angelano Card is an example of a successful PPP established during COVID-19, that might be extended to address the ongoing problem of financial exclusion in the US.

Another example is the COVID-19 Financial Health Challenge - a partnership between the United Nations Capital Development Fund, the MetLife Foundation, and the ASEAN Financial Innovation Network (AFIN) that aims to improve financial health and resilience, not only during the current pandemic, but also beyond[21].

AFIN itself is a more permanent and sophisticated PPP established as a non-profit membership organization, in 2018, by the ASEAN

Bankers Association, International Finance Corporation (a member of the World Bank Group), and the Monetary Authority of Singapore. AFIN's Corporate Founding Members are AMTD Foundation and Mastercard. AFIN's governance has expanded to include international leaders such as Amazon Web Services, Experian, and BNY Mellon[22].

Financial institutions (which includes central banks and other regulators) and FinTech companies have different needs[23]. For example, a small bank might be looking to increase the number of digital services it provides (e.g. remote account opening, digital payments, and electronic loan applications), but lacks the resources to do so (e.g. budget, human resources, or adequate infrastructure). In addition, it might not have the necessary contacts to engage with a FinTech firm that might help it achieve its goals. FinTech companies, in the other hand, are normally young startups looking for support (e.g. funding opportunities and access events such as hackathons) and potential clients (e.g. banks).

In this context, one of the goals of AFIN is to build bridges between financial institutions and FinTech firms, thus fostering collaboration and innovation[24]. It does so via the marketplace, hackolosseum (a platform for competitions between FinTechs), and billboard components of its Application Programming Interface Exchange (APIX) platform where, for example, FinTech companies can propose solutions to business problems posted by banks.

APIX also provides a shared and cross-border testing platform (sandbox) that allows financial institutions and FinTech companies to create and test digital solutions, such as customer onboarding, credit scoring, merchant payments and compliance solutions amongst others.

Funding schemes can induce reforms and investments that contribute to increase regional and national resilience against disasters like the COVID-19 pandemic, as well as to the renewed response of societies to new challenges like climate change. During crisis, PPP could be a flexible, fast, and efficient tool to engage with the private sector and address specific challenges.

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19 https://ec.europa.eu/commission/presscorner/detail/en/ip_21_3058

20 https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R1060&from=EN

21 https://apixplatform.com/static/apix-news/batch65.html

22 https://apixplatform.com/static/about/

23 https://apixplatform.com/about#who-we-are

24 https://pressroom.ifc.org/all/pages/PressDetail.aspx?ID=25043

Lessons you may find helpful from across the world

We provide the lessons under six categories, with sub-categories for ease of reference. We have selected lessons that are of specific interest to the process of recovery and renewal although many also relate to the response phase, and the likely overlap between response, recovery, and renewal.

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Communities	Actions

Impact on:
Education and skills
 	
Chile
Uruguay
Bolivia
Colombia
Paraguay
El Salvador:
https://tinyurl.com/332jes9v
 	
Global; The World Bank:
https://tinyurl.com/9tv6zmt2
	Consider the role of new educational models after COVID-19. During COVID-19, schools were forced to move to remote delivery of teaching. The Economic Commission for Latin America and the Caribbean (ECLAC) note that high levels of pre-existing inequalities (e.g. poverty) have exacerbated the negative impacts of the pandemic on children's education. The World Bank report predicts that the "shock on human capital will substantially reduce intergenerational mobility and the likelihood of children from low educated families to complete secondary school". The bank also presents a call to action to address the significant learning loss experienced by Latin American and Caribbean children. As countries are transitioning back to face-to-face or to more hybrid styles of education delivery, consider:
	
	• Work in partnership with schools, community groups (e.g. parental committees) and local social care services to **identify vulnerable children and develop targeted measures** (e.g. through remedial programmes) to ensure that schools are teaching at an appropriate level for **all children**. Specifically take into account the learning needs of children from lower-income families who may not have had the resources at home to keep up with remote learning measures
	   o For example, 'Alerta Escuela', Peru uses early warning systems to identify students who are at risk of dropping out or who are in need of targeted interventions
	• Guide and support schools on **how best to combine remote and in-person learning** (e.g. the Ceibal initiative in Uruguay). To increase accessibility, blended learning recovery solutions should consider low- or no-tech options (e.g. educational TV programmes/local radio/community youth groups)
	• Design a **long-term transformational plan for accelerating the digital transformation** of local and national Education Management and Information Systems (EMIS), for example:
	   o The World Bank is collaborating with education agencies to establish a "new generation of EMIS based on an enterprise architecture focusing on learning data". The programme will collate best practices, tools and guidance that aim to enable education agencies to implement technology-driven solutions that accelerate cost effective educational programmes and generate high investment returns
	
	See also TMB Issue 33 – a case study which explores the "attainment gap" and digital divide, detailing international strategies that aim to support children to catch up on learning time lost during the pandemic

Economic	Actions

Impact on:
Business regeneration/ rejuvenation

Global:
https://tinyurl.com/97rmxyz9

Consider recovery and renewal initiatives that align agriculture with Sustainable Development Goals (SDGs). Agriculture is fundamental to sustaining livelihoods, by providing employment, income, and being key in the response to climate change – and food security and nutrition are challenges that have been exacerbated by the pandemic. Recovery and renewal present an opportunity to reform agricultural production in line with the SDGs. One of the challenges for such reforms is funding them, given that post-COVID-19 economies will have high levels of fiscal debt. Consider the strategies proposed by United Nations Economic Commission for Latin America and the Caribbean (ECLAC) to fund the recovery and renewal actions needed for a new and more sustainable agricultural sector:

Funding and finance for response and recovery

- Focus response and recovery on **food security across the most vulnerable regions**, by supporting consumers and producers to acquire essential goods
- Take a regional approach to fund programs among several communities, cities, or counties, instead of focusing only on the local jurisdiction
- Implement focused tax discounts for the most vulnerable producers and consumers
- Promote payments for environmental services **(PES) as a mechanism to transfer resources to producers** who commit to protecting the environment, or provide an environmental conservation service
- Involve firms in specific social projects, e.g. through "parafiscal" taxes - those taxes based on employees, imports, or exports, and are used to fund part of specific programs, reducing budget pressures without risking the quality of the intervention

Funding and financing to renew

- New types of funding should be used to achieve the sustainable transformation that agriculture needs e.g. Defra's 'Sustainable Farming Incentive' 2021 (UK) or the Agricultural Sustainability Framework (Australia)
- Invest in climate change mitigation measures in agriculture. For examples, see the following papers: 'Technical options for climate change mitigation in agriculture' (European Union); or '*Strategies for mitigating climate change in agriculture*' (USA)
- Start financial inclusion programs for vulnerable agricultural producers. Such programs can be conditional on producers adopting sustainable cropping practices
- Define new approaches to social responsibility, in which firms commit to work with local government and NGOs in risk reduction programmes

Infrastructure	Actions
Impact on: *Urban and rural infrastructure* Global: https://tinyurl.com/3cbrsknb	**Consider renewed urban planning strategies.** Historically, public health crises, such as pandemics, have transformed various elements of city planning - namely, urban ecology, sanitation systems, public parks, street design and housing regulations - and how people inhabit and interact within urban areas. The COVID-19 pandemic revealed various pre-existing problems, but also brought new opportunities to city planning. National, regional and local governments have the opportunity to address both old and new problems in their recovery and renewal plans. The UN recommends the following:

- "Strengthen coordination between cities, regions and territories through the creation of **shared decision-making platforms**", in order to leverage shared interests and align policies
- **Recognize the link between public health and environmental quality**, and introduce environmental protection measures, such as blue-green networks (natural and semi-natural landscape elements like trees and ponds), urban growth boundaries, land use and zoning regulations, and carbon-taxes to reduce ecosystem deterioration and improve air quality
- **Improve logistics and supply chains**, including:
  o "connectivity within cities and regions through national urban policies and plans that facilitate the secure flow and movement of goods, services and labour
  o Building regional resilience by strengthening localized means of production for essential provisions such as food and medical supply chains, by, for example, incentivizing investments that support local means of production and/or shorten supply chains"
- Increase resilience, by **identifying and improving urban "weak spots"**. These are locations vulnerable to shocks or stresses due to issues such as overcrowding, limited or poor connectivity, or being situated in flood plains
- Prioritise neighbourhoods in **city planning**, with a focus on developing "self-contained and socially inclusive communities". Consider the concept of a 15-minute neighbourhood, where all facilities can be accessed within a 15 minute walk
- Develop a **strategy for public spaces and urban mobility to renew public areas** and their potential uses. For example, in Milan:
  o The "Strade Aperte" project which details Milan's strategies for cycling and pedestrianization to "guarantee measures of distance in urban travel and for sustainable mobility"
  o The "Piazza Aperte" project which aims to "bring public space back to the centre of the neighbourhood and the life of the inhabitants"
- Address housing issues through public health strategies, recognising the social, economic and environmental benefits of adequate housing
- Identify and tackle the fragilities in infrastructure, e.g. the design of buildings such as offices, factories, plants, and hospitals that have emerged as epicentres for COVID-19 outbreaks

Environment	Actions

Impact on:
Living Sustainably

Brazil; Mexico; Argentina:
https://tinyurl.com/2t24bc68

Consider recovery and renewal as an opportunity to increase community access to locally produced food. Latin America benefits from vast access to natural resources, however many people living in rural areas have limited access to locally produced food and rely heavily on imported goods. The fragilities in food supply chains were exacerbated by COVID-19, which left people at risk of not being able to meet their immediate food needs. Recovery and renewal provides an opportunity to support Latin Americas rural agricultural sector to renew its practices, promote community health and resilience, and contribute to achieving environmental sustainability. Consider the actions proposed by the Food and Agriculture Organization (FAO) and the Economic Commission for Latin America and the Caribbean (ECLAC) for COVID-19 recovery and renewal:

Transform food production

- Finance and support the production of a diverse range of agricultural products. Invest in multi-crop programs together with small and medium producers
- Reduce food waste by providing access to locally produced food and resources
- **Prioritise local consumption and distribution** of agricultural products over exports
- Promote the adoption of healthy diets with local produce through voluntary information groups, labelling policies, eating healthy campaigns, and fiscal incentives to schools that purchase local produce

Rural development

- Provide quality **education and skills-training** to the rural agricultural sector
- Establish sustainable practices in the agricultural sector, that recognize the diversity of the ecosystem and the cultural and traditional practices or its habitants
- Increase the infrastructure for public services and connect with urban areas. This can help to reduce rural vulnerability and enables producers to access urban markets for their products

Sustainable agriculture

- Promote water conservation and soil maintenance practices
- Protect the ecosystem by delimiting conservation areas outside of agricultural practices
- Implement early warning systems and risk reduction programmes focused on local hazards

Governance	Actions

Impact on:
Governance of delivering Recovery & Renewal

Croatia:
https://tinyurl.com/8yse6tvn
https://tinyurl.com/3hjxmr7k

Consider recovery and renewal strategies that build multi-hazard resilience. The proliferation of concurrent disasters (including natural disasters such as hurricanes, earthquakes, and technological threats), alongside COVID-19, highlights the need for recovery and renewal strategies that tackle the multiple hazards facing society. Croatia's National Recovery Plan considers both the lessons learned by the COVID-19 crisis and the earthquake experienced in 2020. Consider some of Croatia's recovery and resilience strategies:

Economy, education, the environment & research

- Introduce new labour market policies that focus on building green and digital skills, and specifically target vulnerable groups
- Recognise the economic value of the culture and tourism industries through targeted investment
- Review the social welfare system, establish new social services, and implement measures that increase "coverage, adequacy, and targeting of social benefits"
- Reform the education system by updating school curricula, "increase access to early childhood education and care, and implement single-shift, full-day teaching"
- Establish **partnerships between universities, research centres, and the private sector, to inform the development of context specific risk management strategies** through collaborative research and action

Digitalization of government

- Decentralise governance practices, to simplify and increase the efficiency of local government systems
- Increase the use of ICT in statutory agencies (e.g. health care and judiciary systems)
- Implement **community outreach services, to promote and integrate resilience building activities at the local level**

Infrastructure

- Targeted investment in repair and reconstruction of infrastructure impacted by the earthquake and COVID-19, both public and private, including local heritage sites
- Regulate, create, or change local building regulations, codes of practice and requirements for infrastructure, to consider the needs of a multi-hazard management approach
- Improve the water and waste management system through **strategies that focus on the environment and transitioning to a circular economy**

Governance	Actions
Impact on: *Planning for recovery* Global: https://tinyurl.com/26axxzav	**Consider lessons learned from previous crises for COVID-19 recovery and renewal.** COVID-19 differs from previous crises in terms of its scale, its complex and prolonged nature, and the fragilities that it has exposed. Yet, the disruptions and losses experienced are broadly similar to those brought about by other recent major emergencies. Consider the lessons learned from previous disaster recovery efforts that aim to "promote longer-term, integrated thinking and planning, to create pathways out of the pandemic that more effectively support recovery" and renewal: • Analyse **how the crisis has changed vulnerability** (prolonged crises in particular). Use this knowledge to inform recovery strategies and renewal initiatives (e.g. Ecuador) • Recognise the long-term needs of recovery and renewal. Acknowledge that the impacts of pandemic are not static and will not end on a particular date (e.g. India). A flexible and adaptable approach will support longer-term activities that can change where and when required • Plan **recovery and resilience programmes that integrate actions to deal with the risk of other hazards** that can interact and exacerbate the impacts of the current crisis (e.g. Ethiopia & Mozambique) • Implement an approach that targets the most vulnerable and marginalised sectors of the population, given the uneven impacts of the pandemic and response strategies (e.g. Montserrat) • Depoliticise, as far as possible, the recovery agenda by **establishing the needs of those more vulnerable above political interests** (e.g. Chennai) • Understand recovery and renewal as a holistic process that focuses on the impacts of COVID-19 on the economic, social, and mental wellbeing of communities (e.g. Dominica) • Support community-building activities and engage the community in recovery and mitigation activities (e.g. Colombia)

Briefing C:
International examples of COVID-19 mapping and vulnerability

Written by Eduardo Robles Chavez, University of Manchester and the Manchester Briefing Team

Geographic mapping of infection rates and vaccine distribution has been used widely during COVID-19 as a tool to design and analyse response strategies. Epidemiology and public health professionals have been using geographic information systems (GIS) for some time, strengthened by investments from national and local governments in shared information systems and big data to provide better estimations and visualizations of health phenomena[1].

However, the complexity and dynamic nature of the pandemic has challenged the creation of up-to-date visual representations due to the difficulty of obtaining sufficient, timely, accurate data across different geographical areas. Data refined to detailed geographic areas is essential if the impact and severity of COVID-19 is to be pinpointed, given the wide variation between different contexts[2]. Also, to achieve a better understanding of the dynamic spread of the virus, the effectiveness of response strategies, and improve planning, the mapping of COVID-19 could consider local vulnerabilities.

We present examples of effective vulnerability mapping during COVID-19 in New Zealand and Wales, contrasting these with Mexico and Chile where mapping focused only on infection rates.

New Zealand and Wales: integrating vulnerability into maps

Figure 1 presents three maps from New Zealand that show local vulnerability to COVID-19. The maps categorize vulnerability for each local area by considering two dimensions:

- The "primary variable" - Age e.g. the older age group is represented by strong blue shading;
- And a "secondary variable". The secondary variables include factors that increase a person or groups vulnerability to COVID-19. In this instance the secondary variables are: health, socio-cultural and socio-economic factors. A high score on the secondary variable is represented by strong red shading. For the first map in Figure 1, the secondary variable is a composite measure of health factors; for the second it is a measure of sociocultural factors; for the third map it is a measure of socioeconomic factors. This helps us to understand vulnerability to COVID-19 from different perspectives.
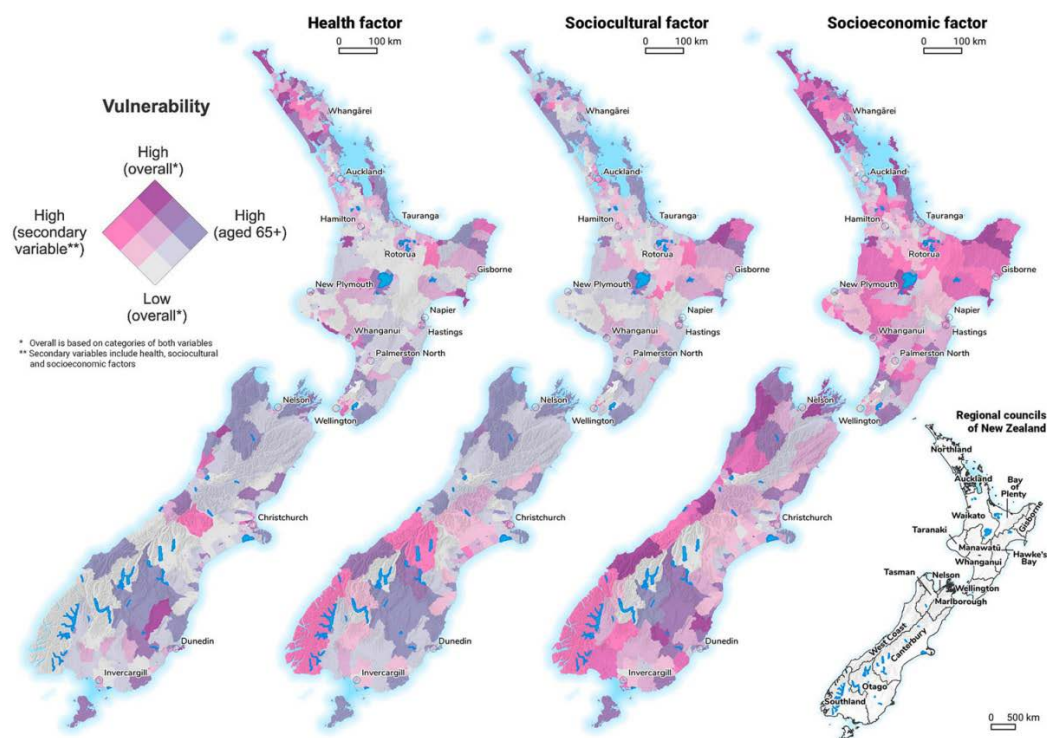

Figure 1. Nationwide area-level vulnerability in New Zealand by age of the population (65+), and measures of health, sociocultural, and socioeconomic factors (Wiki et al., 2021, p.S188)[3]

1 Carroll, L. N., Au, A. P., Detwiler, L. T., Fu, T. chieh, Painter, I. S., & Abernethy, N. F. (2014). Visualization and analytics tools for infectious disease epidemiology: A systematic review. *Journal of Biomedical Informatics*, 51, 287–298. https://doi.org/10.1016/j.jbi.2014.04.006

2 Mocnik, F. B., Raposo, P., Feringa, W., Kraak, M. J., & Köbben, B. (2020). Epidemics and pandemics in maps—the case of COVID-19. *Journal of Maps*, 16(1), 144–152. https://doi.org/10.1080/17445647.2020.1776646

3 Wiki, J., Marek, L., Hobbs, M., Kingham, S., & Campbell, M. (2021). Understanding vulnerability to COVID-19 in New Zealand: a nationwide cross-sectional study. *Journal of the Royal Society of New Zealand*, 51(S1), S179–S196. https://doi.org/10.1080/03036758.2021.1900294

Figure 2 maps vulnerability to COVID-19 for areas in Wales. In this case, the map considers two concepts: 'Local need' and 'Local support'. The concepts are then supported by variables (indicators) including:

- Local **need** indicators (8): "COVID-19 high risk; COVID-19 moderate risk; Over 65 age; COVID-19 cases; Population density; Welsh index of deprivation; No Internet access; No online GP registration"
- Local **support** indicators (6): "Wales council for voluntary action (WCVA) registered volunteers; WCVA increase in volunteers; Mutual aid community support group; Sense of community belonging; Symptoms tracker: can count on someone else; Twitter community support"

The map indicates where and when local need might exceed available local support, and vice versa:
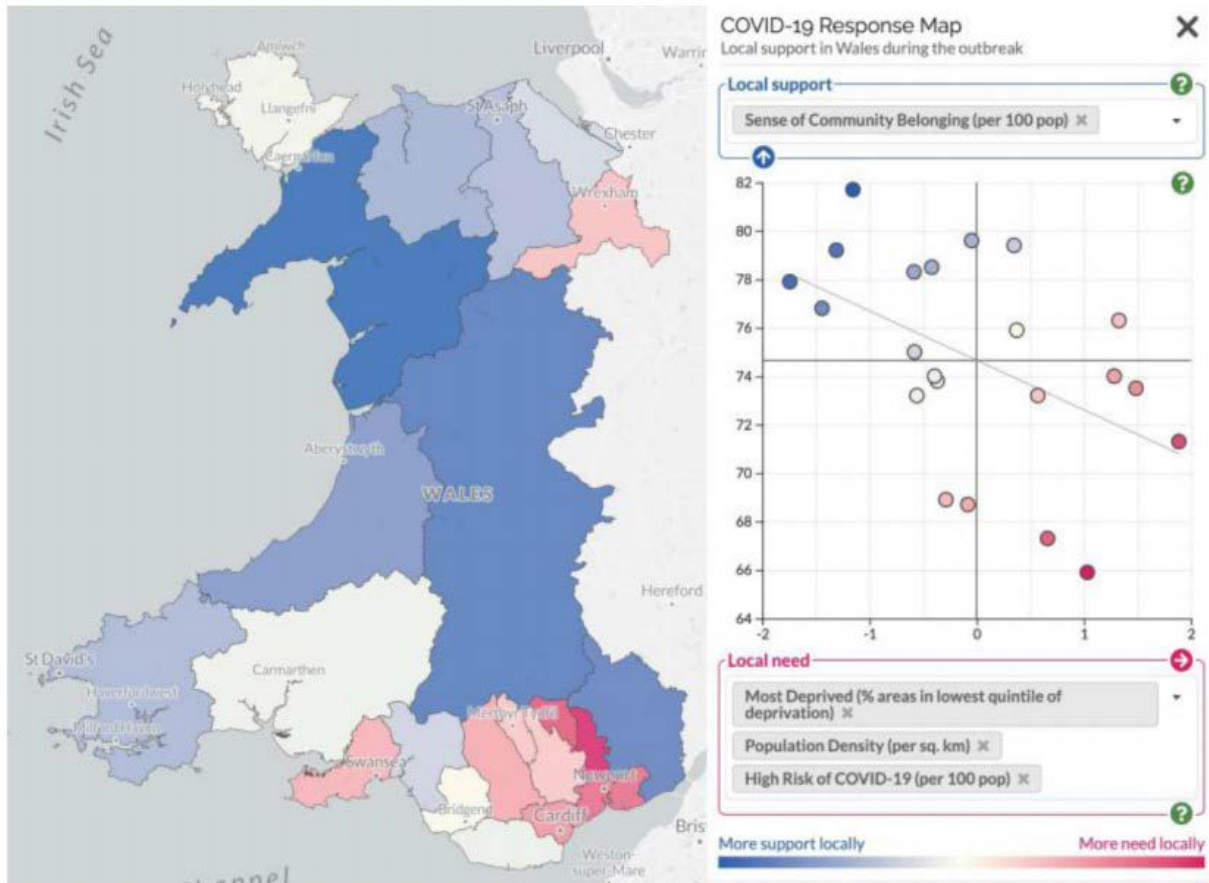

Figure 2. Illustration of mapping a composite need score using the number of people at high risk, population density, and deprivation (local need indicators) against an area's sense of community belonging (variable within local support indicators) (Di Cara et al., 2021, p.5)[4]

Both cases presented a more balanced picture of the COVID-19 infection rates by integrating knowledge on specific local needs, vulnerabilities and local supports which supported the identification of areas and populations with higher levels of vulnerability. Such maps can enable more effective distribution of response resources and targeted recovery and renewal planning.

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4 Di Cara, N. H., Song, J., Maggio, V., Moreno-Stokoe, C., Tanner, A. R., Woolf, B., ... Davies, A. (2020). Mapping population vulnerability and community support during COVID-19: A case study from Wales. *International Journal of Population Data Science*, 5(4). https://doi.org/10.23889/IJPDS.V5I4.1409

Mexico and Chile: Infection rate mapping

Figure 3 shows the daily maps used by the Mexican government to present the advance of the crisis. The top half of the figure presents information disaggregated by the municipality, including time graphs. The bottom half of the figure is from a platform that permits the comparison of trends for different states and variables, such as confirmed cases, active cases, and deaths.
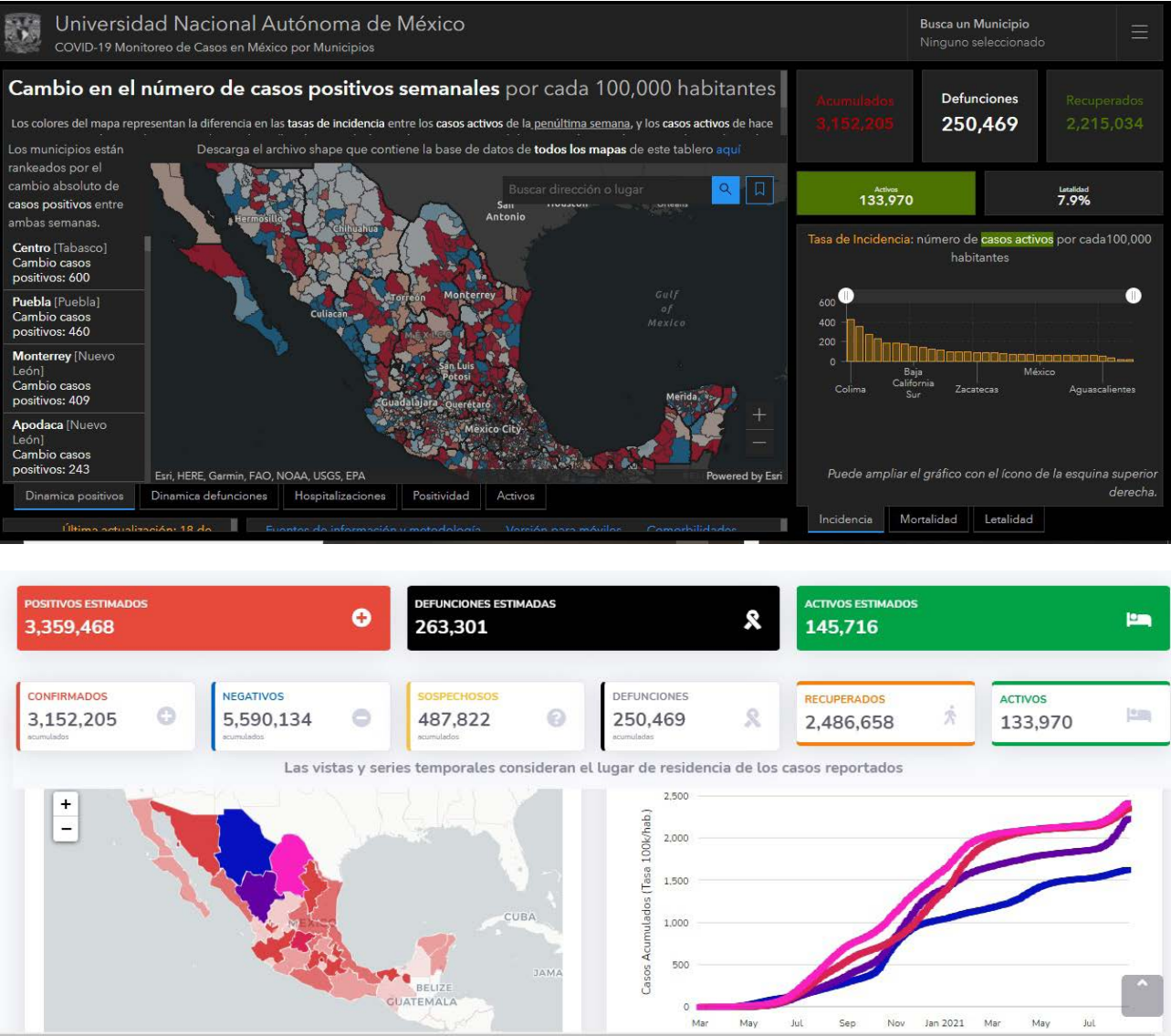

Figure3. The number of confirmed cases of COVID-19. Obtained from the Official Government Site. .(UNAM 2021; SS 2021a)[5]

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5 The first image corresponds to data from updated on February 2, 2021. Obtained on April 14, 2021, from https://www.arcgis.com/apps/opsdashboard/index.html#/f0f10e692a814fd8aa8afc7f8575f5d2

The second image corresponds to data from updated on April 14, 2021. Obtained on April 14, 2021, from https://datos.covid-19.conacyt.mx/#COMNac

Figure 4 displays two maps used by the Chilean government to communicate the spread of, and fatalities from, COVID-19. The platform adds daily information about the number of cases, together with graphs showing trends over time in the number of active cases.
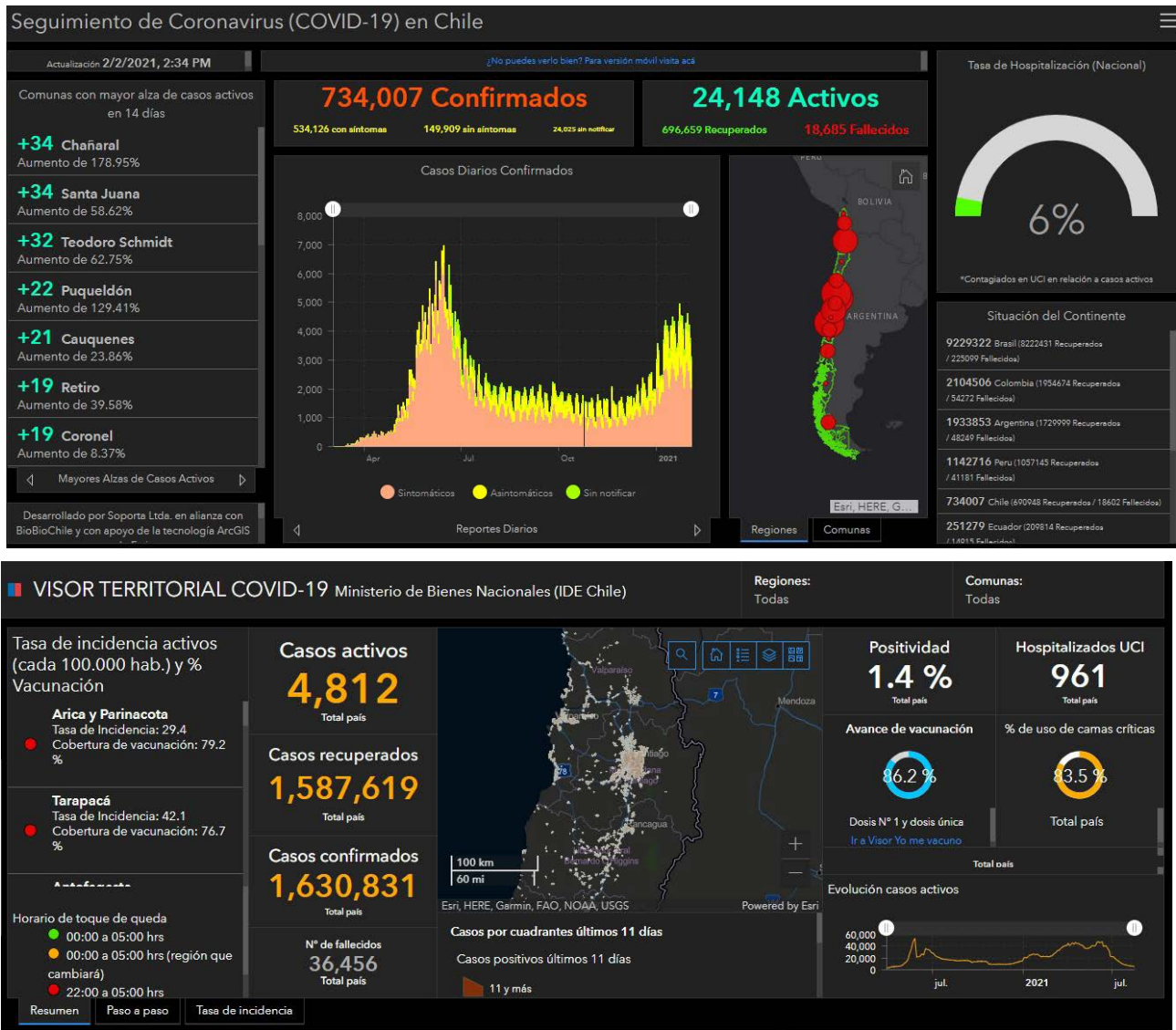

Figure 4. Number of Confirmed Cases by COVID-19. Obtained from the Chilean Government COVID portal[6]. (SoportaLtda. 2021; IDEChile 2021a)

There are two maps of Chile in Figure 4 - both showing the temporal evolution of the pandemic, but neither map represents the severity of impacts by population, vulnerability, or access to public health services, which could provide a better understanding of the crisis and management of resources.

Implications for recovery

Mapping vulnerability is critical if maps are to be effective inputs for decision making about allocation of resources. The variables and the methods used, together with the level of aggregation of data across geographical areas, are all important[7]. A measure aggregated at state level may not show the same results as one aggregated at county level. Omitting vulnerability data in maps could mean that response and recovery activities do not help those in most need of support. Consider:

- Include vulnerability variables as well as COVID-19 infection rates e.g. access to public services (hospitals, ambulances), number of vaccinations administered, average income and inequality, cultural characteristics
- Use bivariate indicators (two-colour shading) to map the interaction between COVID-19 variables and other vulnerability variables
- Use temporal progression maps to see the change of the interaction across time
- Use national and state surveys to get the socioeconomic, demographic, and health data. If necessary, deploy local teams to gather local data
- Use open-source software, such as Qgis or Python, to create the maps. This will allow sharing among other institutions or local agencies
- Share the mapping process and the results with the public, to ensure the public are informed during emergency response
- Adapt the definition of vulnerability according to the local context. Map the key indicators of the area that increase the danger of COVID-19 and need priority attention e.g. age and family members in the area for cities where there are high proportions of elderly people

6 The first image corresponds to data from updated on February 2, 2021. Obtained on April 14, 2021, from https://www.biobiochile.cl/mapacoronavirus/

The second image corresponds to data from updated on April 14, 2021. Obtained on April 14, 2021, from https://covid.visorterritorial.cl/

7 E., F., W., G., J, H., L., H., & Brian, L. (2011). A Social Vulnerability Index for Disaster Management. *Journal of Homeland Security and Emergency Management*, 8(1).