Societal Information Cultures: Insights from the COVID-19 Pandemic

Gillian Oliver1, Charles Jeurgens2, Zhiying Lian3, Ragna Kemp Haraldsdottir4, Fiorella Foscarini5, and Ning Wang3

1 Monash University, Melbourne, VIC 3145, Australia
Gillian.Oliver@monash.edu
2 University of Amsterdam, 1012 XT Amsterdam, The Netherlands
3 Renmin University of China, Beijing 100872, China
4 University of Iceland, 102 Reykjavík, Iceland
5 University of Toronto, Toronto, ON M5S 3G6, Canada

Abstract. National responses to the global COVID-19 pandemic provided the opportunity to gain insight into characteristics of societal information cultures. Experiences from four different countries (China, Australia, the Netherlands, and Iceland) were collected and analyzed from an information literacy perspective. Research was guided by Giddens’ structuration theory.

Keywords: Societal information culture · Information literacy · Health literacy · Structuration modalities

1 Introduction

Data, and its interpretation as information, is at the heart of responses to the COVID-19 Pandemic. This unprecedented crisis has had a global impact and provides a unique opportunity to compare and contrast information related responses occurring almost simultaneously in different parts of the world. The purpose of our research was to investigate characteristics of societal information cultures (the values, attitudes and behaviours relating to information) through the lens of responses to the pandemic. We focus specifically on four very different countries, namely China, Australia, the Netherlands and Iceland, comparing their approaches to the dissemination of COVID-19 related data. We use a theoretical framework derived from Giddens’ structuration theory to analyze societal information cultures, concentrating on information and health literacy perspectives.

The paper begins with a brief review of the literature relating to the critical nature of information in public health emergencies and then outlines our research design. This is followed by the findings for each country studied from the outbreak of the pandemic until 1st September 2020. The discussion section uses the framework to compare and contrast findings, and proposes an expansion of the theoretical framework. The conclusion indicates the further research streams that have emerged from this preliminary study.
2 Information and Public Health Emergencies

This century’s series of global public health emergencies (SARS, Ebola, H1N1, H7N9, MERS) has emphasized the critical role of real time and rapid information dissemination [1, 2]. Lessons learned from the 2003 SARS outbreak included the need for faster information exchange in the early phase of the outbreak, delays in sharing critical information with the World Health Organization (WHO) and possibilities of international players to hinder efforts to understand the cause and nature of the disease and to formulate the best strategy for containment [3, 4]. Governments may hesitate to report disease information because of possible political and economic repercussions [5].

Information has been identified as one of the four core elements of public health emergency legal preparedness together with laws, competencies, and coordination [6, 7], and the capabilities of information sharing and emergency warning as critical capabilities for public health preparedness [6, 8, 9]. Researchers have emphasized the need for empirical research to investigate what communication types are most effective for different demographics [10] and to develop emergency information strategies [11] that would enable regional public health agencies to release information with more autonomy [12, 13].

The WHO has developed global norms for sharing data and results during public health emergencies [15–18], with social media playing a key role in the dissemination of public health related information [19–21]. The negative role of social media in the public health emergencies [19, 22, 23] is a concern.

Lack of information literacy exposes citizens to risks and personal, social and physical harm [14]. The misinformation around the Covid-19 pandemic provides a vivid example of those risks. As the WHO Director General explained: “…we’re not just fighting an epidemic; we’re fighting an infodemic. Fake news spreads faster and more easily than this virus and is just as dangerous…”1 Dis-, mis- and mal-information thrive in the online attention economy of sensational and click-bait content of social media sites underlining the need for people to have the skills to interpret and respond critically to information disseminated by digital media [14].

There is very little research investigating health related information at national level from an information culture perspective. The single study we identified focuses on China [24, 25]. This study motivated our adoption of the theoretical framework outlined in the next section. We did not identify any other relevant comparative studies.

Abilities to access health related information have been investigated by information literacy researchers [26, 27] and are clearly related to improved health literacy.

Health literacy has been defined as “the degree to which individuals can obtain, process, understand, and communicate about health-related information needed to make informed health decisions” [28] and encompasses a variety of skills [29], including the ability to use technology, to network and to interact with others socially [30]. More specifically, health information literacy may be described as “the set of abilities needed to: recognize a health information need; identify likely information sources and use them to retrieve relevant information; assess the quality of the information and its applicability

1 https://www.who.int/dg/speeches/detail/munich-security-conference.
to a specific situation; and analyse, understand, and use the information to make good health decisions” [31].

Poor health literacy has been identified as a major but underestimated problem globally in the COVID-19 pandemic [32], exacerbating the risk of misinformation motivating resistance to public health measures. It is argued that “health literacy might help people to grasp the reasons behind the recommendations and reflect on outcomes of their various possible actions” [32].

3 Research Design

Our previous research [33] utilized a pyramid model of information cultures influenced by Gidden’s theory of the recursiveness of agency and structure [34] which facilitated micro-level analysis. In this project, we shifted our focus to gain a macro, societal level view of complex and emerging information landscapes, motivating the need for a more expansive theoretical model. Accordingly, we adopted a framework which also drew from Giddens’ structuration theory, with particular regard to the three modalities of structuration, i.e., interpretive schemes, resources, and norms. These modalities represent linkages between human action and social structure and have been conceptualized by Yingqin Zheng as the dimensions of societal information culture [24, 25]. This paper focuses primarily on the interpretive modality.

The interpretive modality is where participants make sense of, and communicate about, the information situations in which they are involved. Intrinsic to this is the existence of a knowledge base shared by all participants, thus Zheng equates this modality to information literacy, defined as “the capability of accessing, interpreting and using information” [24]. We have purposively included health literacy, as in this setting it appears to be inextricably intertwined with information literacy.

As all three modalities identified by Giddens contribute to the production and reproduction of information culture at a societal level, it is important to acknowledge that information literacy (i.e., the interpretive schemes constituting the first modality) depends on the “resources” available in a society, which Zheng equates to “information freedom” (second modality), and on the “formal and informal concepts and rules of behaviour”, that is, the “information norms” governing information activities (third modality) [24].

Our objective in this research project was to compare the information activities related to the pandemic in different parts of the world, in order to examine how these activities shaped local societal information cultures, and what role has been played by information literacy and, more specifically, health literacy. The overarching research question was formulated as follows:

What differences in societal information cultures can be identified in China, Australia, the Netherlands and Iceland when examining the management of COVID-19 related information?

Supporting research questions that we used to guide our investigative activities in the four countries were:
What COVID-19 related information/data is collected?
What COVID-19 information/data is made available to citizens?
How is information about COVID-19 communicated to citizens?

Each researcher developed an overview of the COVID-19 data in their own jurisdiction, based on analysis of government and specialist websites as well as media reports and discussion. This environmental scan took place in real time, i.e. as the crisis was unfolding, so there is extensive reliance on media reports as a source of data. Supplementary data is provided from a small-scale survey in China, and informal interviews in Australia. Zheng’s model of the dimensions of societal information culture provided the framework to report findings relating to information and health literacy, and a basis for comparative analysis.

4 Findings

Findings from the four countries studied are reported below, in chronological order according to the timings of each outbreak of the coronavirus, thus beginning with China, followed by Australia, the Netherlands and then Iceland. A brief contextual summary is provided for each country, followed by specific observations relating to information and health literacy.

4.1 China

The news that COVID-19 can be transmitted from human to human was officially disclosed on 20 January 2020 and caused public panic in China. Local governments were required to make information on COVID-19 public in real time and with precision. The city of Wuhan was locked down on 23 January. Across the country, people were asked to stay at home as much as possible, wear masks and maintain one-metre distance from others when outside. When entering a neighborhood or some public spaces, people were also required to have their temperature taken and to show their Health Code.

Information Literacy. Government statistics show that in March 2020 the number of Internet users in China had reached 0.904 billion, with 99.2% using instant messaging, 83% using search engines, and 80.9% accessing internet news sources. This shows that at least half of the population of China has basic digital skills, but not all have the capabilities to acquire, understand and process health-related information and thus to make informed health decisions. When the outbreak of COVID-19 first occurred, a lot of misinformation about it was transmitted through social media and various websites. For example, a lot of people falsely believed that the traditional Chinese medicines

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2 The health code is created on the basis of personal data and uses a colour code to demonstrate the status of people’s health: green (healthy), yellow (in 7-day quarantine), red (in 14-day quarantine).
3 The 45th China Statistical Report on Internet Development, available at http://www.cnnic.net.cn/hlwfzyj/hlwxb/hlwjbg/202004/P020200428596599037028.pdf, accessed on July 25, 2020.
Banlangeng and Shuanghuanglian and garlic could control and cure COVID-19, so they rushed to pharmacies to buy them. In 2019, the National Health Commission of China investigated the health literacy of 74,683 people aged between 15 and 69 from 31 provinces of China, concluding that a general level of health literacy belonged to 19.17% of the sampled population, which means that nearly 80 out of 100 individuals would lack health literacy. Levels of health literacy for rural residents, older citizens and residents in the Midwest of China were comparatively lower.

From the start of the outbreak, people could access COVID-19 information from various channels: health commission websites (including those of the National Health Commission and local health commissions); local government apps, official WeChat accounts and press conferences; traditional mass media, including TV and radio; and other media including news apps, WeChat moments, microblogs, business websites. Some people would get information directly from their families and friends by word of mouth. Research identified as the top five channels used by the public to access scientific information about COVID-19, WeChat (66.66%), TV (65.83%), website (56.38%), news app (53.73%) and microblog (46.03%) [35]. Another study found that the most trusted information source was central official media, including CCTV (China Central TV) and People Daily Online, followed by information disclosed by non-government organizations, and finally the local news media and business websites. It is noteworthy that 61.3% of the 11,055 respondents questioned news sent by their acquaintances [36].

During the outbreak, the National Health Commission and local health commissions published daily statistics, identifying numbers of confirmed, recovered, deceased, severe, and imported from abroad cases, and provided scientific knowledge about COVID-19 via various media. Press conferences were held regularly to communicate updates and combat the spread of rumours; medical professionals were invited to attend the conferences to share scientific information on personal protection and control of the disease; news about COVID-19 was broadcast by national and local channels all day and night. Government and other media as well as business websites established anti-rumour platforms. All such platforms enabled citizens to access information about COVID-19, and thus make informed health decisions. Current research reports that the majority of 5,982 respondents would not accept the following pieces of misinformation: “Chinese Academy of Science has invented the medicine to quickly cure COVID-19” (disbelieved by 75.7%); “COVID-19 is the biochemical weapon invented by foreign forces to target China” (disbelieved by 82.2%); and “COVID-19 can be transmitted from dogs and cats to human” (disbelieved by 68.8%) [37]. Wang et al.’s investigation found that 99.2% of the respondents to their survey believed that wearing masks outside and washing hands are necessary hygienic measures, and between 92.5% and 94% of the respondents actually did that [36].

4 Can “Shuanghuanglian” “Banlangeng” control COVID-19? Medical experts: do not blindly believe in “magic medicine”, available at https://kuaibao.qq.com/s/20200201A0JWZO00?refer=spider, access on August 24, 2020.

5 The level of national health literacy rises to 19.17% in 2019, available at https://www.cn-healthcare.com/article/20200424/content-535201.html, accessed on August 28, 2020.

6 Anti-rumour special column of the prevention and control of COVID-19, http://www.piyao.org.cn/2020yqpy/. See also, real-time anti-rumour on COVID-19, https://vp.fact.qq.com/home.
We conducted a survey on citizens’ access to information on COVID-19 in China, via a questionnaire on the Wenjuanxing platform and distributed via WeChat on 29 August. A total of 142 people responded in two days. The survey found that the main business websites (e.g. Sohu and Sina, 66.9%), TV (55.63%), government WeChat official account (52.11%), WeChat comments (47.18%), and government websites (41.55%) were the top five ways to access information. Reasons given for these choices were: convenience (77.46%), authoritativeness (61.97%) and trustworthiness (52.82%). Over half of the participants (54.93%) questioned the authenticity of some information acquired from the above-mentioned channels, with 64.79% reporting that they confirmed authenticity by crosschecking with other information sources, tracing the information source (38.73%), and checking the information on anti-rumour platforms (30.99%). 99.3% of the participants stated that they wore a mask when going out, 96.48% washed hands frequently, 69.72% kept one-metre distance from others, 82.39% kept indoor ventilation, and 66.9% worked out frequently. Overall, our survey demonstrated that over half of the participants had adequate health literacy: they knew how to access information about COVID-19, and could make informed decisions about staying healthy. China has traditionally been regarded as an ‘acquaintance society’ [38], that is, a society where people tend to trust their acquaintances. Yet, many of the respondents of Wang et al.’s research questioned the accuracy of the information from their acquaintances. Yet, many of the respondents of Wang et al.’s research questioned the accuracy of the information from their acquaintances during the outbreak [36].

Health literacy is influenced by a number of factors including age, gender, level of education, where people live [39] and social contexts. In our survey, 11 respondents (7.75%) reported eating garlic to stay healthy, and 5 (3.53%) said they took the traditional Chinese medicines Banlangeng and Shuanghuanglian. A survey of 5,632 primary and secondary school students in Beijing after the outbreak of COVID-19 found that 15% did not wash their hands frequently, and nearly 20% did not cover mouth and nose when sneezing and coughing [40].

4.2 Australia

The first confirmed case of COVID-19 in Australia was reported on 25 January 2020. Australia’s governance model is based on the Westminster tradition with executive government, legislature and judiciary at national and state/territory level [41]. The initial response was coordinated at national level by the Commonwealth government and was heralded as being remarkably successful in comparison with other countries [42]. Unfortunately, this positive outcome reported in June 2020 no longer reflected the situation a few weeks later when Victoria, Australia’s second most populated state, returned to strict lockdown measures when cases there rapidly exceeded the previously reported national statistics. As case numbers rose, indications were that this new wave of clusters could be linked to problems with staffing and security at hotels used as quarantine stations for returning travelers [43]. A distinction has been made between the first and second waves, with the former linked to returning travelers (wealthier individuals) from overseas, and the latter associated with community transmission in poorer communities [44]. At the time of writing, Melbourne, the capital city of Victoria, is experiencing a period of stringent stay-at-home restrictions which include the imposition of a nighttime curfew for the first time in the history of the city [45]. The findings reported below are
centered on Victoria specifically because of its position as the hotspot of COVID-19 in Australasia and necessarily are heavily reliant on media commentary given the current and dynamic nature of the situation.

**Information Literacy.** Use of the Internet and engagement with social media are integral to the day to day lives of Australians. In addition, Australia has a well-established reputation for global leadership of information literacy research and practice, with a well-established standards framework for embedding information literacy into curricula [46]. This suggests that the majority of the population are likely to have the skills needed to access and evaluate information about the pandemic, but one specific problem area has already emerged. Australia is a multi-cultural society, characterized by large communities of migrant populations ranging from refugees and asylum seekers to international students. For refugees, differing cultural norms, language barriers and lack of trust in officialdom all contribute to problems accessing health information [26]. The Australian Migrant and Refugee Women’s Health Partnership highlights the main problems faced by these communities in accessing health related information, including low literacy and digital literacy, insufficient access to digital technologies, preference for in person communication, and limited understanding of what information can be trusted [47]. Similarly, older migrants have their own unique preferences and difficulties in accessing health related information [48].

There is a growing body of evidence that, despite official information being made available in a variety of languages, effective communication of pandemic policies and requirements has not taken place [49]. The Refugee Council of Australia has highlighted ‘nonsensical’ translations of official communications from Federal and Victorian governments, concluding that such errors will weaken trust in government sources [49]. We were able to conduct a preliminary investigation into this issue, thanks to one of our authors being an international student currently resident in Melbourne. In her experience, Chinese-language platforms, especially Chinese social media (WeChat public accounts, WeChat Moments, Weibo, etc.), are the main channels for obtaining information about the pandemic for Chinese students in Australia, despite the existence of various official multilingual forums.

Most of these WeChat public accounts do not have formal connections with Australian official institutions, and are likely to be established for commercial purposes, raising questions about the reliability of information provided. For example, after the initial apparent success of measures in controlling the virus, the Premier of Victoria announced the gradual easing of restrictions from 13 May. The potential for schools to change from online to on campus learning in the forthcoming semester was mentioned, which was communicated by one popular WeChat account targeted at Melbourne as “students are ready to return to school” without any reference to a specific time period. The operator of this WeChat account is a media technology company from Beijing. It is a for-profit company, working with major Australian supermarkets to help them market their products. Promoting Australia as a safe environment to attract more international students is inherent to its business model.

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7 [https://datareportal.com/reports/digital-2020-australia](https://datareportal.com/reports/digital-2020-australia).
8 [https://mp.weixin.qq.com/s/BcopwfsRhuvtGGG8YU4trA](https://mp.weixin.qq.com/s/BcopwfsRhuvtGGG8YU4trA).
WeChat public accounts may also produce or promote misinformation, exacerbating panic during the epidemic. For example, on 22 July, speaking to Australia’s national broadcaster, epidemiologist Tony Blakely said Victoria risked spending months or even years isolated from other states. This was his expert opinion, but not a public statement issued by the government. However, some WeChat public accounts took his words out of context, claiming that “Victoria will be blocked for 2 years”.9 Such expressions are very common, misinterpreting the government’s policy intentions to varying degrees and causing concern among the Australian Chinese community. The extent to which Chinese communities in Australia have the ability to evaluate the accuracy of these statements is unknown, but it seems likely that few would consider going to official sources to confirm such statements.

4.3 Netherlands

On 27 February 2020, the first Dutch patient with COVID-19 infection was diagnosed in the Netherlands. One week later, the first COVID-19 tested patient died. The same day, inhabitants in the province Noord-Brabant were advised to limit social contacts and stay at home if they coughed, had a cold or fever. A week later this measure came into effect nationwide, accompanied by advice not to shake hands. On 15 March schools and childcare facilities, eating and drinking establishments and sports and fitness clubs were closed. In a live broadcast press conference in the evening of 23 March, the prime minister announced stricter measures: people should keep 1.5-m distance from each other, groups of more than two people in public spaces were prohibited, professional contacts were forbidden, shops should take measures to secure the 1.5-m policy. Fines were imposed if these measures were violated. The government appealed to everyone’s responsibility to overcome this crisis and communicated these measures as a ‘smart lockdown’. After 11 May restrictions were gradually lifted and measures adjusted according to the number of infections. To increase insight into the current situation, the Ministry of Public Health developed a ‘Dashboard Coronavirus’10 in which data about infections, hospitalization, and R-value are communicated among other things. In September, a test-version of an infection tracing app was made available in certain areas of the country. The total number of confirmed COVID-19 death cases between 27 February and 31 August was 3,419 male and 2,811 female; and in total 12,170 COVID-19 patients were hospitalized during the same period.11

Information Literacy. According to the Dutch National Bureau of Statistics (CBS), 97% of the residents of the Netherlands over the age of 12 have access to Internet facilities and 88% are online on a daily basis.12 Compared to most European countries, the individual digital skills of Dutch citizens are considered high: 50% have above basic overall digital skills, 16% have low digital skills.13 However, a general problem for

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9 https://mp.weixin.qq.com/s/s-cSu4_JYrwNqcyFp5gFEA.
10 https://coronashadowboard.rijksoverheid.nl.
11 https://www.rivm.nl/coronavirus-covid-19/actueel; https://allecijfers.nl.
12 https://www.cbs.nl/nl-nl/cijfers/detail/83429NED?dl=35852.
13 https://is.gd/Ab9roR Digital skills are determined on the basis of results in four sub-areas: information, communication, computers/online services and software.
information consumers during the pandemic was the high degree of uncertainty about the reliability of the rapidly growing and ever-changing amount of COVID-19 related information that was released. Prime-minister Rutte emphasized the lack of knowledge about how best to tackle the crisis by saying: “with 50% of the knowledge, we have to make 100% of the decisions”.14 This means that insights are constantly adjusted, which might cause extra confusion for many people.

A 2018 survey showed that 9.5% of the Dutch population (1.5 million people) scored inadequate and 26.9% problematic in terms of health literacy [50]. Another survey, with a focus on the importance of the Internet as a crucial source for citizens to access information about COVID-19 developments, investigated how the Internet was used for purposes of searching and using information and communication in the Netherlands. The survey identified several groups of people as vulnerable, such as the elderly, lower educated, physically or mentally ill people, and people with low literacy skills, and concluded that these vulnerable groups are less likely to take advantage of the COVID-19 related information opportunities the Internet offers [51]. The way in which government agencies and the official health institutions make COVID-19 information available is by no means always understandable for these groups, and this results in alarming forms of digital information inequality. There have been non-governmental initiatives aiming to increase comprehensibility of COVID-19 related information. The Reading and Writing Foundation rewrites and reformats COVID-19 related press conferences and government information in simple language which is understandable by these vulnerable groups.15 The Pharos Foundation translates COVID-19 related information in 13 languages to reduce information inequality for the many migrants in the Netherlands who do not have mastery of the Dutch language.16

Distinguishing the information sources people use is significant. The National Institute for Public Health and Environmental Hygiene (RIVM) is the official hub for collecting and disseminating COVID-19 related medical information. RIVM is a government agency which is independent in its research activities. It plays an important advisory role for policy- and decision-makers, and at the same time is the key-provider of COVID-19 information to the public. RIVM operates in a public health network in which doctors, general practitioners, medical laboratories and the Municipal Health Services (GGDs) cooperate and collect information about people who are tested positive for COVID-19.17 The website of RIVM provides guidelines and large amounts of daily updated statistical information regarding the development of the virus, sometimes supplemented with explanation. Although this is probably the most accurate and detailed information hub about the pandemic, it is not always easy for citizens to interpret the data properly. This became painfully clear when the mortality rates from different data sources were compared. The Dutch National Bureau of Statistics keeps accurate mortality rates regardless of the cause of death and these figures show a big gap between the confirmed COVID-19

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14 Press conference prime-minister, 12 March https://www.youtube.com/watch?v=0iD1FN6I87Y.
15 https://www.lezenenschrijven.nl/wat-wij-doen/corona-in-begrijpelijke-taal/.
16 https://www.pharos.nl/coronavirus/. The government provides covid-19 information in English via https://www.government.nl/topics/coronavirus-covid-19.
17 https://www.rivm.nl/documenten/epidemiologische-situatie-covid-19-in-nederland-23-maart-2020-0.
causes of death and the probable number of COVID-19 victims. For instance, between 30 March and 12 April, excess mortality was 3,793, meaning that 3,793 more people died than it could be expected based on the average mortality rates in the first ten weeks of 2020. In total, 2,178 deaths were registered as being infected with COVID-19 (based on confirmed testing), but it is more than probable that a significant part of the total excess mortalities is related to COVID-19, since by no means everyone has been tested because of limited test capacity.

This complexity might be an important reason why these official health platforms are not the number one information source citizens use. Several surveys show that traditional media were the most popular sources of information on the pandemic [52, 53]. Of those surveyed in March, 76.8% used TV, 63% newspaper and mobile news applications, and 40% social media; only 39% used official health websites [53]. Traditional media agencies play a major role in the dissemination of accurate and understandable COVID-19 related information.

4.4 Iceland

Iceland is an island nation with only one major gateway into the country. It has around 364,000 inhabitants, one of the most sparsely populated countries in Europe. In January 2019, around 14.1% (50,272) of the inhabitants were immigrants.

On 27 January a state of uncertainty was declared due to the COVID-19 outbreak. Two days later the Chief Epidemiologist advised against travelling to China and that arrivals from China should undertake a 14-day quarantine. On 3 February, Iceland identified several high-risk areas, including northern Italy and Tirol in Austria, earlier than other states. At that point, the Directorate of Health and the Department of Civil Protection and Emergency Management revised the current pandemic preparedness response plan. They then initiated a nationwide surveillance program for COVID-19, including diagnostic testing which began on 31 January in close collaboration with the National University Hospital and deCODE genetics. Initial testing was conducted on residents returning from high risk areas and contacts of confirmed cases. This was widened to include the general community who presented symptoms. On 27 February, the first of what was to become daily press briefings, was held on national television, a national radio station and streamed on several local social media sites. These briefings were usually conducted by the Chief Epidemiologist, the Director of Health and the Chief Superintendent who informed the media and the public about the current situation of the pandemic and necessary measures, both globally and locally. After several daily briefings, it soon became clear that contact tracing was a community affair and this catch phrase became popular; “Follow Willow” (Hlýðum Víði] meaning that ‘we do as Vidir says’ (the Chief Superintendent). This catch phrase became a business idea as people started wearing T-shirts with the slogan.

18 https://www.cbs.nl/nl-nl/nieuws/2020/16/sterfte-onder-bewoners-van-institutionele-huishoudens-bijna-verdubbeld/weekcijfers.
19 https://hagstofa.is/utgafur/frettasafn/visindi-og-taekni/notkun-fyrintaekja-a-samfelagsmidlum-i-evropu-2017/.
20 https://www.statice.is/statistics/population/inhabitants/.
21 https://www.covid.is/english.
The objective of the measures taken by the Icelandic authorities was to ensure that the necessary infrastructure, particularly the healthcare system, would be able to resist the strain of the pandemic (see footnote 21). The premise for these actions was a community-wide consensus to follow expert advice. “Civil protection is in our hands”. The first COVID-19 infection in Iceland was confirmed on 28 February in a traveler returning from northern Italy. On 13 March, a ban on gatherings of more than 100 people was implemented, and a week later, all travel outside Iceland was designated as high risk. On 22 March, the regulation was updated so that a maximum of 20 people could gather simultaneously. Upper secondary schools and Universities were closed, and operations of Kindergartens and Primary schools were limited. Nursing homes were closed to visitors. Sports clubs, hair salons and similar establishments were closed. The first COVID-19 death was announced on 22 March, and the total number of deaths on 8 September was 10.

Starting on 13 March, Iceland has provided a COVID-19 dashboard for an overview of relevant data (see Fig. 1). The dashboard is the responsibility of the Directorate of Health and the Department of Civil Protection and Emergency Management. Approximately two weeks later, it was translated into 8 languages, including English, Polish, Lithuanian, Thai, and Arabic. Now it is possible to access the site in 11 languages.

The site is intended to be the centre for official health information related to Covid-19, including regular announcements, advice regarding isolation or quarantine, possible infection and statistical data.

The infection tracing app “Ranking C-19” became available on the App Store and Google Play on 2 April. People were encouraged through daily briefings by the Directory of Health to use the app. Only three weeks later, approximately 130,000 individuals in Iceland had started using it. The purpose of the app is to track those who are diagnosed with COVID-19. If registered in the app, people may be contacted by the Department of
Civil Protection and Emergency Management and asked to share their data. Individuals have a choice to agree to this by entering their national ID number into the app. If the individual agrees, the data is sent to the Contact Tracing Team who can use the location data to identify the individuals and places that have potentially been exposed to the virus.

**Information Literacy.** The Icelandic National Curriculum Guide outlines the frame and conditions for learning and teaching based on laws, regulations and international conventions. One of six fundamental pillars that form the curriculum is literacy [56]. Iceland is reported to have 99% of homes connected to the Internet [57]. With near omnipresent access, Icelanders are frequent Internet users. Government departments support the COVID-19 dashboard by providing relevant information. Recent research from the Social Science Research Institute found that 97.5% of the respondents declared that they generally were “very or rather content” with the information provided to citizens about COVID-19 [58]. Respondents had considerable trust in the information provided by the Director of Health (very much 85.4%; rather good 13%), the Chief Epidemiologist (very much 87.9%; rather good 10.6%) and the Chief Superintendent (very much 81.8%; rather good 16.1%). In comparison, a total of 36.4% trusted the information provided by the government very much, 40.1% trusted information from the WHO very much, and 18.4% trusted information provided by the Media very much. A total of 9.2% had full trust in information provided by social media sites. Nearly half (47%) of respondents followed the briefings on national TV or radio three times or more per week.

The government set up a working group to focus on information disorders and COVID-19. The purpose of the group is to promote public health and health security by examining the extent of organized dissemination of dis- and misinformation about COVID-19 in Iceland. It is also to ensure access to educational material with reliable information about the pandemic and facilitate the distribution of correct information to the media and the general public. [23]

### 5 Analysis and Discussion

Despite some disparities in the initial reactions to the outbreak (partly a result of timing), what stands out when looking at the societal information cultures emerging from the cases examined is a certain uniformity. This may be surprising considering the very different histories and the current political, social, and economic circumstances of China, Australia, the Netherlands, and Iceland. All our case studies show a number of competing information sources – from traditional media and official websites to various social media platforms used by both the government and the general public – that complicate the information landscape in which we all try to navigate what we know, and what we do not yet know, about the pandemic. Extensive access to the Internet and widespread (digital) information literacy provide the basis on which governments try to build awareness and

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22 https://www.internetworldstats.com/stats4.htm.
23 https://www.stjornarradid.is/verkefni/almannaoryggi/thjodaroryggisrad/vinnuhopur-um-upp lysingaoreidu-og-covid-19/ [In Icelandic] and partly on https://www.government.is/government/covid-19/#measures.
consequent actions on the part of their citizens. Programs to increase health literacy of all strata of population, especially the more disadvantaged, appear to be in place in all countries examined. Yet, all suffer from the ‘plague’ of misinformation that the plethora of media outlets cannot but amplify.

The interpretive modality that was the main focus of this research project brought us to investigate how meaning-making is enacted socially when dealing with complex, ever-changing and potentially upsetting information, such as that related to a highly infectious novel global disease. The Chinese case study highlighted the effectiveness of government actions aiming at improving information literacy and fighting against “rumours” through the reinforcement of the normative framework (i.e., Giddens’ third modality). With its efforts to broaden access to official health information through multiple translations, Australia tried to support its diverse population, thus emphasizing the facilitative or resource-based aspects of societal information culture (i.e., Giddens’ second modality). The availability and transparency of information in society was also central to the Dutch case study, where, however, the understandability of official health information proved to be a major source of concern. In the Icelandic case, information norms, exemplified by the “expert advice” and the success of the contact tracing app, offered the insular community a good basis of trust in, and legitimization of, government’s decisions, despite the lack of stable and unambiguous knowledge around the virus, its effects, and how humans can protect themselves against it.

One of the fundamental tenets of structuration theory is that structures are “inherently ambiguous, and subject to contested interpretation, application and use” [24]. As social science and humanities scholars of the 21st century, we all feel comfortable within this post-modern paradigm, and embrace plurality and fluidity in our critical approaches to information. However, when it comes to health, these very notions of ambiguity and contestation became problematic. We have been living in times of deep uncertainty for many years now; yet, the sense of fragility and disorientation that COVID-19 has thrown us in seems to have upset basic meaning-making mechanisms. Anecdotal evidence collected through this research (e.g., search for quick, home-made health remedies; preference for simple messages, even when unscientific; belief in charismatic leaders) shows attitudes towards information that might be labelled as ‘irrational’. Is this a fourth modality, or dimension of structure, that should be considered when examining societal information cultures during a time of crisis?

6 Conclusion

Our limited study did not analyze important sources of information on the response to the pandemic, such as, parliamentary debates, and tools for the self-reporting of symptoms. These, together with investigations of how agencies explain the data they provide, the extent to which knowledge about collection and use of data is transferred internationally, demographic breakdowns of data about access to COVID-19 related information, and changes in the way health information is being communicated, are some of the areas we have identified for future research. From a more theoretical perspective, the suggestion that a fourth modality dealing with irrational information behaviour be added to the three identified by Giddens may be explored further.
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