

Communicating Prevention in the COVID-19 Epidemic: Case Study on Macau SAR

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Research article

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Abstract

Background As the COVID-19 epidemic is unfolding, an infodemic has also developed. With commonplace social media usage, a massive amount of information and misinformation is spreading at the same time. Irrational responses are reported worldwide – face mask and detergent shortages, panic shopping, and xenophobia, which could possibly be a result of ineffective science communication. Using Macau SAR for a case study, this article sets out to understand effective prevention communication.

Methods An observation study was conducted to understand Macau’s prevention communication in the COVID-19 epidemic.

Results Macau has imposed a wide range of preventions, covering most dimensions of daily life. Lessons are learned in risk perception, language used, science communication, digital literacy, information flow, and support in STEM advancement.

Conclusions Macau’s prevention communication is not perfect, but Macau’s experience offers insights to European authorities on how to contain the epidemic and minimize undesirable outcomes as the epidemic is just beginning in Europe.

Background

Misinformation is a public health crisis.

On January 30, 2020, WHO declared the COVID-19 epidemic a Public Health Emergency of International Concern (PHEIC) during its second meeting of the emergency committee [1]. As of February 27, 2020, there are 82,294 accumulative confirmed cases and 2,804 accumulative deaths globally from 47 countries, surpassing Severe Acute Respiratory Syndrome (SARS) and afflicting China the most, followed by South Korea, Italy, and Japan [2]. There is no known treatment or vaccines for COVID-19 yet. Definitive epidemiology of this virus is still not established at the moment of the writing of this research (February 28, 2020). We have never experienced an epidemic of a new disease this scale ever since the rise and popularization of social media. Misinformation such as myths, rumours, and false precautionary measures or cures, are being spread at the same time with facts and information via social media. WHO even considered this phenomenon an “infodemic” and its management a technical focus [3]. There are also reports and anecdotes of face mask and detergent shortages, panic shopping, and xenophobia worldwide [4–11] which are all irrational responses. Why do people act like this? Should they not act according to reliable guidance especially in a time like this?

This phenomenon could partially be attributed to ineffective science communication. Understanding how to communicate prevention effectively for urging rational public actions is therefore the purpose of this research. Macau SAR is selected to be the subject of case study due to its relatively comprehensive and quick responses in the epidemic.

Macau SAR

Macau SAR is a small city at the Southern coast of China. It was a Portuguese colony. Its infamous gaming industry attracts millions of visitors every year and is the main economic driver of the city. Due to its vibrant tourism activities, Macau is also affected by the COVID-19 epidemic.

Current Status in Macau

There have been several suspected cases since early January 2020 and Macau observed its first confirmed case on January 22, 2020. As of the writing of this research (February 28, 2020), there are 10 confirmed cases, 8 of which are already discharged and the rest are expected to be discharged soon as well [12]. All are mild cases. There are 1,740 accumulative suspected cases and 12 of which are yet to be ruled out [13]. There have not been any confirmed case since February 4, 2020 [13–15].

Methodology

This research is primarily a qualitative research. An observation study was performed to understand the communication of prevention against the COVID-19 epidemic in Macau. As it is an observation study, there is no hypothesis.

Results

Macau's responses to the COVID-19 epidemic are provided in this section.

Advised Actions for the Public

The public is advised to wear a face mask as long as they are in a public space. They are also urged to wash their hands thoroughly and maintain good personal and environmental hygiene. Crowding and non-essential outings are strongly advised against. Home office is suggested to be the alternative of work if possible. People on the streets significantly increased although the risk from the epidemic is still not eliminated. It may be due to the public's perceived low risk as no new cases have been confirmed since February 4, 2020.

Establishment of the Novel Coronavirus Infection Contingency Coordination Centre

On the basis of the Law of Communicable Disease Control and Prevention, the Novel Coronavirus Infection Contingency Coordination Centre was established on January 21, 2020 for comprehensive planning, directing, and coordination of public and private institutions for prevention, control, and treatment of the novel coronavirus epidemic.

The Coordination Centre's members include the Chief Executive of Macau, representatives from the Secretariat for Social Affairs and Culture, Health Bureau, Customs, News Bureau, Municipal Affairs

Bureau, Public Security Bureau, Fire Bureau, Civilian Aviation Bureau, Marine and Water Bureau, Economic Affairs Bureau, Gaming Inspection and Coordination Bureau, Education and Youth Bureau, Higher Education Bureau, Social Work Bureau, Tourism Bureau, Tourism Crisis Management Office, and Consumer Committee [16].

Ever since its establishment, there have been daily press conference which is also broadcast to inform the public the latest development of the epidemic and preventive measures against it. Its website is hosted at that of the Macau Centre for Disease Control and Prevention (CDC). It also has a Facebook page. During the first week of the Coordination Centre's operation, the press has complained about inadequate translation of information into English and Portuguese to serve the communities who do not speak Cantonese or Mandarin. Sign language interpretation has been available in the broadcast of the daily press conference since February 6, 2020 as a collaboration of the Social Work Bureau, Macau Broadcasting Company, and Macau Deaf Association.

Preventive Measures

The preventive measures taken against the COVID-19 epidemic so far are provided in Table 1. Be noted that these measures are not announced and imposed all at once on the same day. Rather, these are accumulated actions which are deemed necessary at the time according to the development of the epidemic. They are likely to change in the near future.

Table 1

Preventive Measures of Macau Against the COVID-19 Epidemic

Area of Concern	Preventive Measures
Public Services	<ul style="list-style-type: none"> • Limited hours are imposed for non-essential public services and the opening hours are announced on public institutions' websites and various social media channels. The public is granted grace period for certain obligatory processes. Most public services are resumed to provide only basic services on February 17, 2020. Citizens are advised to make appointments online prior to visiting locations of public services. Normal operations are to resume on March 2, 2020. • Most public facilities, such as swimming pools, libraries, and museums, are closed. Parks have been reopened for limited hours. Some sport facilities are set to reopen on March 2, 2020. • Persons entering public institutions or facilities have to submit a health declaration whose form is available online on the Coordination Centre's website and Facebook page. • The Fire Bureau has cancelled leaves to support first response. • A pop-up notification is shown on most government department's website to remind viewers to cooperate and take preventions seriously (Fig. 1).
Education	<ul style="list-style-type: none"> • All levels of education are suspended until further notice. Resumption of school will be announced two weeks prior. Non-higher education may resume during late April, according to the Education and Youth Bureau [17]. • Guidance for online study resources are provided by schools and the Education and Youth Bureau. Remote learning is advised to compensate the suspension of school.
Public Transportation	<p>Bus services are limited. Both drivers and passengers of bus and taxi are required to wear a face mask. Drivers can refuse ridership if the person is not wearing a face mask.</p>
Environmental Hygiene	<ul style="list-style-type: none"> • Diligence for environmental hygiene of public space is strengthened. The public spaces include streets, guard rails, bus stops, public toilets, markets, and the borders, etc. • The surroundings of residence of confirmed patients are also properly sterilized [18]. • Dog owners are reminded on the streets by staff of the Municipal Affairs Bureau to properly clean up their dog's faeces.
Face Mask Supply	<p>The Macau government procured a very large amount of surgical face masks from various countries to guarantee supply for holders of Macau Citizen ID and Non-resident Worker's Permit. These face masks are sold at contracted pharmacies, Health Centres, and some non-governmental institutions at cost price. Every qualified person can purchase 10 face masks per 10 days by showing their ID at the point of purchase. Purchase of face masks is possible by surrogacy if authorized person is able to present the ID of the buyer. Their ID number is logged during each purchase to prevent unfair buying and fraud. The inventory of face masks is provided on the Coordination Centre's website and is refreshed every 15 minutes.</p>
Grocery	<p>Economic Affairs Bureau and Consumer Committee performs daily inspection and survey on grocery price and inventory. Such information is disclosed on Municipal Affairs Bureau's website, News Bureau's website, the Coordination Centre's website, and various social media channels. This is to inform the public that food supply will remain sufficient and reasonably priced so as to prevent panic shopping.</p>

Area of Concern	Preventive Measures
Entertainment	<ul style="list-style-type: none"> • Entertainment venues, including cinemas, theatres, indoors playgrounds, indoor arcades, electronic gaming rooms, internet bars, billiard rooms, and beauty salons, are ordered to suspend operations from February 5, 2020 onwards. • These venues can resume operations on March 3, 2020. • Upon reopening, employees and customers should wear a face mask unless they are eating.
Gaming and Junket Activities Operations	<ul style="list-style-type: none"> • All 41 casinos are ordered to close for 14 days from February 5, 2020 to February 19, 2020. • 29 casinos resumed operations on February 20, 2020. • Casino workers are mandated to wear face masks during working hours until March 22, 2020.
Financial Support	<ul style="list-style-type: none"> • Subsidies are to be provided to aid small and medium-sized enterprises and individuals for the lack of work during the epidemic. • Taxes are reduced or exempt depending on the type. • Cash-sharing scheme schedule is to be moved up to April. • Medical coupons are to be distributed to citizens one more time this year.
Art and Culture	<ul style="list-style-type: none"> • Cultural Affairs Bureau have been creating and posting attractive graphics on its Facebook page to urge following through of preventive measures. Figure 2 is the graphic to urge people stay at home for Valentine's Day. • Cultural Affairs Bureau posts photos and texts of some exhibitions on social media to offer a virtual cultural life for viewers.
Border Control	<ul style="list-style-type: none"> • Body temperature screening and health declaration are enforced at all points of entry. Health declaration can be made by filling in a paper or electronic form. Announcements for these two measures are made when people are approaching and at the points of entry. When I was on the ferry sailing from Hong Kong International Airport to Macau Outer Harbour on January 24, 2020, videos of advised preventive measures were played on the ferry TV. The staff on the ferry distributed health declaration paper forms to the passengers while holding up a piece of paper with the QR code directing to the electronic form. The QR code was also shown on the ferry TV from time to time. It seemed non-Chinese speaking visitors preferred the paper form since the electronic form was not properly translated into English at that time. When I arrived at the ferry terminal, I showed the inspection and quarantine staff the screenshot of my health declaration on my phone while some others handed in the paper form. • From January 27, 2020, people from Hubei Province and non-residents who have been to Hubei Province in the past 14 days will be denied entry unless they have a special medical notice declaring that they are not infected by the novel coronavirus issued by medical institutes recognized by the Health Bureau. There have not been any successful attempt to enter Macau by those from or have been to Hubei Province ever since this measure was imposed. • Visitors from Hubei Province are being tracked down and escorted out of Macau. As of February 25, 2020, there are still 126 of them and they are deemed to be low-risk people as they have already been in Macau for over 14 days. Some of which are overstaying in Macau and the police are in search for them [19]. • Compulsory medical observation is imposed on people entering Macau from or have been to highly affected area since February 20, 2020. The medical observation lasts for hours in order to screen for those who have taken antipyretic medication. Highly affected areas include South Korea since February 26, 2020.

Area of Concern	Preventive Measures
Public Security	<ul style="list-style-type: none"> • People who refuse or do not follow through medical observation will be subjected to criminal charges. • A man was criminally charged for spitting on 320 unused face masks causing the need to destroy them [20]. • A man who committed fraud in face mask sales on social media was charged for criminal violations on February 27, 2020 [21].
Tourism	<p>Macau citizens who are in highly affected area have been in contact with the Macau Government Tourism Office. Some of them asked for evacuation aid. However, whether how or when they will be evacuation by the Macau government is still undetermined at the moment as coordination for movement involves authorities from different jurisdictions.</p>
Public Inquiry	<p>A hotline is set up for residents to inquire information about the epidemic and advice for actions. The number and types of inquiry received each day are disclosed the next day on the Coordination Centre's website, Information Bureau's website, and various social media channels.</p>
Community Announcement	<ul style="list-style-type: none"> • The community announcement system is activated on February 6, 2020 to broadcast daily reminders of preventive measures every two hours from 10 am to 8 pm. There was a glitch in some of the systems that announcements were falsely broadcasted at the sleeping hours of February 11, 2020. This has been rectified after complaints were received. • Vehicles with portable speakers cruise the streets to remind the public to avoid non-essential outings.
Debunking Misinformation	<ul style="list-style-type: none"> • Myths, rumours, and misinformation are debunked to prevent irrational responses. A section is dedicated to debunking misinformation on the website of the Coordination Centre's website. • On February 14, 2020, the Coordination Centre clarified a rumour which claims that the Health Bureau "has imported face masks infested with lice. As a result, the contracted pharmacies have to unbox the masks and repack them in storage bags for sales". The Coordination Centre responded that "the Health Bureau did not import any masks from the concerned brand. The face masks are packed in tens instead of in a box for sales. Rigorous inspection is imposed on the masks and they meet protection specifications and health standard" [22]. • On February 8, 2020, to debunk a rumour circulated on the social media channel Wechat which claims that "a high amount of chlorine is added to tap water for sterilization. Tap water should be set aside for at least two hours prior to drinking or cooking.", Macao Water Supply Company responded that "residue chlorine concentration is strictly monitored and water is sampled daily at several points for water analysis to assure that standard of drinking water. There is no need to set aside tap water prior to using" on its Facebook Page [23].

Response in Research

A team of researchers at University of Macau's State Key Laboratory of Analog and Mixed-signal VLSI (AMS-VLSI) has developed a rapid test kit named Virus Hunter with the purpose to assist timely screening. According to Chen Tianlan, a Ph.D. graduate of University of Macau's Faculty of Science and Technology and the AMS-VLSI Laboratory, Virus Hunter only takes 30 minutes to complete the whole

virus detection process. The team has been in touch with relevant institutes and Virus Hunter will be available for use after verification [25].

On February 9, 2020, the Science and Technology Development Fund opened a call for research proposals on development of new detection techniques, prevention, and drug development for the novel coronavirus and prevention and control mechanisms against sudden infectious diseases and post-epidemic social recovery [26]. The call is open from February 10, 2020 to February 20, 2020. Each proposal amount should not exceed MOP 500,000 and the project should not exceed one year.

Discussion

As no more cases have been confirmed since February 4, 2020, Macau's preventive measures should be considered adequate, but its prevention communication is not without flaws. Lessons learned from Macau's prevention communication are discussed in this section.

Risk Perception

The preventive measures cover a wide range of daily life. Some of the measures seem to be draconian at first glance, but they are not unfounded; they are all stemmed from the purpose of limiting crowds, thereby reducing the possibility of community outbreak. Considering that no community outbreak has happened in Macau, it is suffice to state that these measures are indeed collectively effective.

Most of these measures were imposed prior to Lunar New Year, which is a significant traditional festival in Chinese culture. Most citizens seem to have complied to the advised actions and avoided gathering during Lunar New Year. This could be explained by that the perceived high risks from the imminent danger outweighed the benefits from festivities. The public's perception of risks is probably cultivated from the constant massive information feed from social media which is a phenomenon that was not experienced in the SARS epidemic.

On the other hand, when we compare the possible consequences of the climate crisis to that of the COVID-19 epidemic, the scale of damage of the former is much greater and long-lasting. Logically, we should have had plans in place to mitigate and adapt to rising sea levels as Macau is at a quite vulnerable location. Nonetheless, the government and citizens of Macau have not taken proactive climate actions which is ironic since Macau has already been afflicted by super typhoons, storm surges, and floods caused by climate change. What could partially explain this is also risk perception. If a threat is not perceived as immediate and close to oneself, it is challenging to urge actions. By then, we will have to develop strategies to communicate the consequences of inaction and make the public care enough to drive actions. Yet, risk communication is on the delicate balance of generating rational action and mongering fear and should be performed with deliberation.

Language

As the number of non-Cantonese-speaking workers and immigrants (e.g. from China, the Philippines, Portugal) is growing in Macau, it is necessary to communicate preventive measures in these languages for adequate outreach. Although the Coordination Centre now disseminates information in Cantonese, Mandarin, Portuguese, English, and Chinese sign language through a variety of media including broadcast, print, display, and social media, most of the press releases, updates, and reports are still only in Chinese and Portuguese and staff at public services and facilities primarily communicate to the public in Cantonese. Some of the population groups could be, as a result, excluded from crucial information and act uninformed, imposing danger on themselves and others unintentionally and unknowingly. Prevention communication, therefore, requires consideration of the demographic composition.

Lack of Science Communicators

Science communication is the dissemination of science-related knowledge and information to the general public. There are many types and formats of science communication and of course science communicators also come in many different varieties. They usually have a background in STEM and could be public engagement and public relations officers in research institute, lecturers, museum curators, comedians, and science slammers, etc. Generally, science journalists are also considered as a type of science communicators because they convert complex science-related knowledge to reporting that is digestible by the public. Good science communication can help the public understand complex issues better and act rationally. With a defined target audience, good science communication can reach out and convey crucial information to them while also listening to their concerns.

However, science communication is still an emerging field in Macau, so science communicators are low in supply or they are simply not officially regarded as science communicators. Macau should, therefore, allocate more resources in science communication and training programmes for science communicators. This could not only lay a foundation for better prevention and risk communication, but also nurture a rational society with a culture of science.

Digital Literacy and Exclusion

As internet connection and access to social media is commonplace in Macau, digital seems to be the optimal way to disseminate prevention information and updates of the epidemic. However, the use of this channel assumes that most people have acquired a decent level of digital literacy. The assumption may be true, but a group of people is excluded from important information. Traditional media should hence still be used to reach those who do not have access to internet or a basic level of digital literacy. Community announcement system and broadcast vehicles could be deployed to compensate the shortcomings of online dissemination as well, just as Macau have been doing (Figs. 3 and 4). A hotline for public inquiry is another more accessible way for clarifying the public's doubts and intaking public opinions. Digitization is inevitable; to create an inclusive digital environment, user interface and user experience should be a high priority. Digital literacy programmes should also be provided at the same time to close the digital divide. International Federation of Library Associations and Institutions' (IFLA) guidelines on public internet access in libraries could be a reference for action [27].

Too Much or Too Little Information?

There is an infodemic in the midst of the COVID-19 epidemic. The common use of social media could be a factor for this phenomenon. As not much is known about SARS-CoV-2, people are desperate to know more and tend to grasp on whatever information that is available to them. The same information, be that facts, speculations, myths, or rumours, is being circulated continually on social media and fed constantly to its viewers. This could generate a false consensus effect which is an attributional type of cognitive bias where one overestimates how many people agree with a certain matter. People then may potentially act or react based on the misinformation which they believe to be facts agreed by many.

Fortunately, Macau has not experienced major mass irrational responses, except the two instances where people did panic shopping for groceries and emptied many shelves of supermarkets. To assure residents that supply will be stable, the Macau government performs daily inspection and survey to report prices and inventory of different items. There have not been any panic shopping reported ever since. In this case, we can see that that particular irrational behaviour stemmed from the lack of information. Offering facts can diminish anxiety and irrational behaviours, but a better and more proactive way to counter misinformation is to make science communication a regular activity, which is explained previously.

Supporting STEM Advancement

Macau is more well-known for tourism and its infamous gaming industry. STEM (science, technology, engineering, mathematics) advances are rarely associated with Macau; or they are not commonly celebrated. Exceptions include the discovery of a new species *Nanhaipotamon macau* in 2018 [28] and multiple new species by a local entomologist Chi Man Leong: *Meristolohmannia macaoensis* in 2018 [29], *Dimiodiagalumna ilhaverdeensis* in 2018 [30], and *Leptanilla macauensis* in 2017 [31]. While Macau Foundation and Macau Science and Technology Development Fund grant financial support to associations, groups, and individuals for science-related activities, the popularization of such activities still remains to be a challenge and their impacts are yet to be determined.

The swift mobilization of research grant of Macau Science and Technology Development Fund offers incentive to push scientific research on COVID-19 in local research institutions. This is possibly a response due to the Fund's perceived risk of the epidemic. However, open science and open access are not mentioned as a focus for funding. These two aspects of research should be emphasized because they remove barriers in science and facilitate scientists to communicate and work better. To truly lend a hand in STEM advancement, open science and open access should be criteria of funding at the first place, but not an afterthought.

Moreover, with open science and open access, science communicators can easily catch up with recent development in STEM by directly obtaining information from the source, i.e. the research articles, and then create digestible contents for the public, who can later verify with the source. As a result, not only STEM advancements can be known and celebrated by the public, the public can also learn and practice scientific thinking.

Limitations

This research focused only on prevention communication of public institutions. Actions from private institutions, civilian organizations, and individuals were not covered. As a result, the full scale of prevention communication may not be revealed.

Conclusions

Macau's fast responses to the COVID-19 epidemic offer insights into how to contain an epidemic and prevent mass panic. Its prevention communication is not perfect, but the lessons learned show us how to do better if we are to encounter similar scenarios in the future. As the epidemic is just beginning in Europe, European authorities should take notes from the experience of Macau so as to minimize undesirable outcomes.

Declarations

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Anna Weng lan Au is a health scientist and science communicator, thereby is apt to conduct public health research.

Ethics Declarations

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Figures

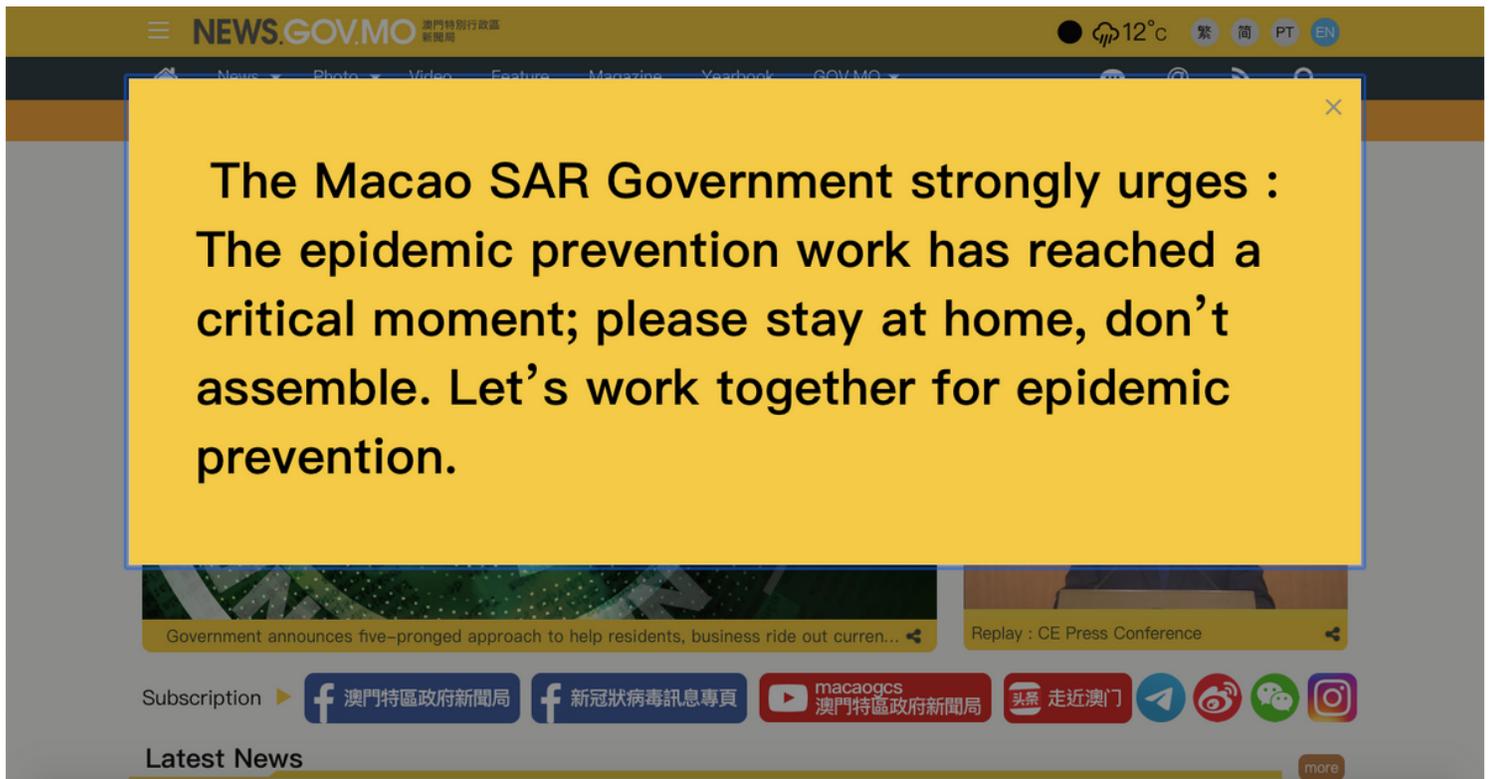


Figure 1

Pop-up Notification on the Front Page of the Macau News Bureau

抗疫情人節

2020 · 2 · 14



何妨延緩一刻約會

我們還有地久天長

留在家中才是最好的禮物

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Figure 2

Graphic to Urge Stay-in Celebrations on Valentine's Day [24]



Figure 3

A Community Announcement System in Macau



Figure 4

Another Type of Community Announcement System in Macau