DR GAUDEN GALEA
WHO REPRESENTATIVE, CHINA

COVID-19 A View from China

The views expressed are those of the author alone and do not necessarily represent those of WHO.

MARCH 1, 2020 (WITH MINOR UPDATES ON MARCH 29, 2020)

Since this article was first published online, a month has passed and that is a long time for COVID-19. Malta has gone from zero to 149 cases and the number will have grown by the time this appears in print. Figure 1 sets the number of cases in Malta epidemic against those in Hong Kong SAR (China) and Singapore. The rise in the Hong Kong SAR and Singapore figures relate to a rise in imported cases, but also to some efforts to relax the stringent constraints on population movement. The curves illustrate the speed with which the epidemic can take off and emphasise how important it is for the population not to become complacent, and to strictly adhere to the public health guidance to stay at home. With the extensive preparations being made in Malta, and the cooperation of the general public, it is hoped that the line in Malta will remain flat and avoid the rapid take off. As has been shown elsewhere, a flat, long drawn out epidemic curve is associated with lower mortality and much lower costs to society.

The graph suggests that Malta's numbers are about a month behind Hong Kong SAR and Singapore. During an epidemic, its rate of spread may be estimated using the index R(t), also called the effective reproduction number. R(t) varies over time and takes into consideration the number of susceptible people in the population and the effectiveness of control measures. An R(t) above 1 means that an epidemic will continue to grow; a value near 1.5 will lead to explosive growth unless checked. Such a value has been discussed recently in the Maltese media, rightly with a call not to relax the control measures. A period of stringent constraints with intensive testing of suspects will ascertain whether R(t) has been brought below 1. For the next few months, all populations around the world will be adopting what has been called "the dance" of social constraint and relaxation, in pulsed containment efforts that seek to keep R(t) below 1 while minimising the social and economic impact.

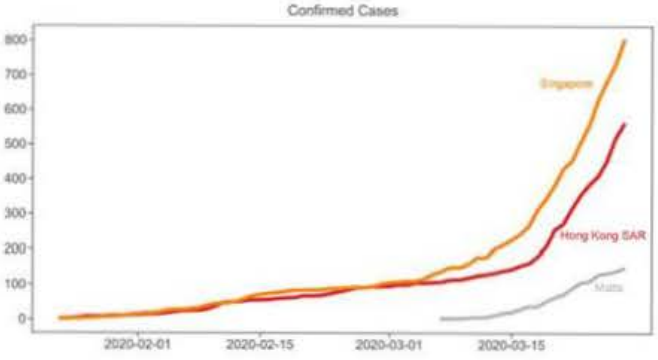

Figure 1. Confirmed cases in Malta, Hong Kong SAR (China), Singapore

THE CHINA EXPERIENCE

It is Day 89 of the COVID-19 epidemic, counting from the date of closure of the Huanan Seafood Wholesale Market in Wuhan, Hubei Province, in China. In the three months since then, the country has reported over 81 thousand cumulatively diagnosed cases and over three thousand deaths but has now achieved a state of zero local cases, a major milestone. This article summarizes the key findings of the report of the WHO-China Joint Mission on COVID-19 for the attention of the Maltese medical community as it gears itself for Malta's own outbreak.

CHINA HAS DEMONSTRATED THAT IT IS POSSIBLE TO CHANGE THE COURSE OF COVID-19 OUTBREAKS

The epidemic curve (figure 2, taken from the WHO-China Joint Mission Report) should be a much taller normal distribution based on the reproduction number ranging between 2.0-2.5 estimated from models of the transmission dynamics of the virus. Instead, the curve is blunted, flattened, skewed to the right, indicating that in the last week of January, some intervention changed the course, slowed down the spread, and initiated a plateau, then a decline. In the absence of a vaccine or therapy, China used time-honoured measures of containment and social distancing that have been part of the arsenal of public health for centuries. It is possible to emulate the success of China, but the measures call for collective action with great determination.

FIVE STEPS TO CONTAINMENT

The containment of an outbreak of COVID-19 needs five steps of increasing intensity:

1. The **universal population measures** of hand hygiene, food hygiene, respiratory etiquette, and social distancing came first in China and were aggressively promoted in social media and all traditional media. China also required mask wearing for all.
2. **Case Isolation**: The high transmissibility of the virus and the infective nature of even mild cases requires active and rigorous case finding and isolation. Case definitions should not unduly restrict eligibility for testing - within the limits of kit availability and lab capacity. Cases should be rapidly diagnosed and taken out of circulation; China initially took two weeks on average to identify a case; that has now been reduced to three days from onset.
3. **Close contact quarantine**: Close contacts of all cases should similarly be rigorously quarantined for 14 days beyond the last exposure to the case. With each infected

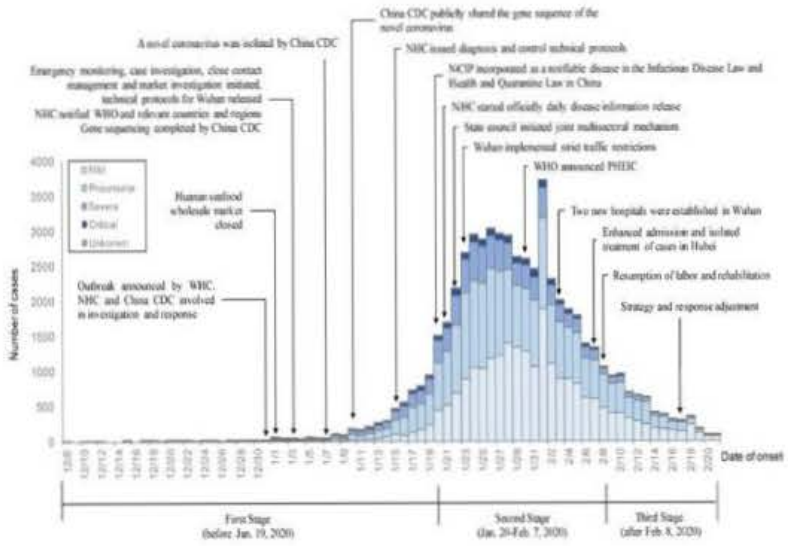

Figure 2. Epidemic curve by date of onset. **China CDC:** China Centers for Disease Control and Prevention; **WHC**: Wuhan Health Commission; **NHC:** National Health Commission; **PHEIC:** Public Health Emergency of International Concern; **NCIP:** Chinese name for the disease officially called COVID-19 by WHO.

individual leading on average to two more cases among their close contacts, rigorously enforced quarantine is the only way to effectively break the chains.

4. **Suspension of public gatherings**: China set the example during the Chinese New Year Festival (a two week period that started on 25th January this year). Temple fairs, cinemas, restaurants, and all large scale festivities were cancelled. Schools were closed (still closed at the time of writing). The traditional week of public holiday was extended.
5. **Movement restrictions**: At its extreme, these involved the complete closure of Wuhan, a city of 11 million people. In other cities lesser measures were adopted but still quite effective in restricting movement on a large scale, including the closure of express ways into certain large cities.

These five steps were not applied evenly throughout China, but a tailored approach to applying these measures was taken in different provinces, based on the prevalence of infection. In a province where there are no cases, universal precautions and public mobilisation will be appropriate, but in one where there is sustained community transmission, the more powerful of these interventions (suspension of mass gatherings and movement restrictions) will be needed. In order to **gauge the level of community transmission**, testing should be applied liberally to samples from the Influenza-like Illness surveillance system (the ILI sentinel system) but also opportunistically on suspicious cases presenting in general practice or ambulatory settings.

COPING WITH THE OUTBREAK

Even as these containment measures were proving successful, China still prepared and is preparing still for the possibility of larger numbers of cases. Lessons for Malta include:

1. President Xi Jinping and Premier Li Keqiang took personal responsibility and leadership for the response. A Joint Prevention and Control Task Force **repurposed to the whole machinery of government** and all government departments were required to make the fight against the virus their top priority.
2. **Collective action by the population** is essential. In China it is inspiring to see the thousands of health care workers and volunteers mobilised to the front line in Wuhan. It is also important to note the acceptance by the population and community grid system (a form of neighbourhood watch) to monitor and enforce quarantine. Clear guidelines are available: for landlords, for business owners, for hotel managers, and all the population, from taxi drivers to security guards are informed of their part in the battle. **Communication and risk communication** are key to keeping the population informed about their personal behaviour and about their need to adhere to the public health directives.
3. While the measures taken to contain the epidemic have been available since the Middle Ages, China's approach to them has been **highly technological**. Big data has been deployed to track cell phones and to monitor quarantine. Artificial Intelligence has been deployed in the diagnosis of CT scans. Virtual hospitals and telemedicine have been used to reduce the number of routine visits that people have to make for other reasons to hospital.
4. Given that severe and critical cases may take three to six weeks to recover or die, in a community outbreak there will be high demand for oxygen, for ventilation, and the occupancy of intensive care beds will be prolonged. The **availability of life support (beds and ITU staff) for prolonged periods** will be one of the determinants of case fatality. A recent paper estimates that the overall symptomatic case fatality risk (the probability of dying after developing symptoms) of COVID-19 in Wuhan was around 1.4% - this is lower than previous published estimates but still many times the 0.1% rate usually estimated for seasonal influenza.
5. Throughout all this, access to health care expertise is essential, and the protection of health care workers through strengthened **infection prevention and control** procedures is essential. Indeed, evidence in China suggests that many of the HCWs infected acquired the virus earlier on, when possibly the use of personal protection and universal precautions may not have been as rigorous.