

**CRISIS MANAGEMENT AND DISASTER RESPONSE CENTRE OF
EXCELLENCE**

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COVID-19

PART 2

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This report represents a summary of open source information, gathered up to and including 26 March 2020, and was assembled on 27 March 2020. All views and opinions expressed are solely those of the author, unless otherwise stated and do not necessarily represent the official position of the CMDR COE or any government and non- government organisation or other group. The author does not bear responsibility for incomplete or incorrect facts cited or referred to herein. The majority of reference materials include official documents published by the World Health Organisation, governmental pages, and online statistical databases– i.e. World Meter.

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HISTORICAL TRACKING OF EPIDEMIES AND PANDEMIES IN THE LAST CENTURY

Annex A presents information collected and grouped by indicators for the various epidemics and pandemics over the last 100 years. The aim is to compare the causes of the outbreak, its spread, its effects over the various periods, and how humanity has coped depends on the time it was, technological advancement and the measures had taken. One of the things that emerges is the origin of the virus / disease - in the mass cases, China is source and spreads of the infection worldwide. Another link to these crises is the transmission of the infection from animals to people or the mutation of an animal virus.

The most deadliest is the Spanish flu. It erupted shortly after World War I, killing 3 times as many lives as the war itself, and the infected people are one-third of the world's population. China (which is the Entente's side) and Chinese workers who have been transported to France via Canada and the United States, and on their way left outbreaks of the disease. In just 25 weeks, the flu kills more than 50 million people - mostly young and middle-aged. Death came due to acute respiratory failure, and one in every ten of the infected died. National authorities applied solutions that are common with today's and the only effective ones in the absence of a vaccine - physical distance, quarantine, isolation, disinfection, wearing masks, washing hands. It is sure that If the nowadays transport activities (air and ground) had been existed, it would have been almost devastating to humanity.

Isolation and world division during the Cold War are linked to two major pandemics - the Asian and its comparable Hong Kong flu. Between 1958 and 1970, the death toll was 4 million (0.15% of the world's population). Everyone - from children to the elderly were affected and only the development of an effective vaccine has prevented many more victims. Another boon is the presence of the World Health Organization (WHO), established in 1948, successfully took on the role of an effective coordinator of efforts by all countries to fight the infection.

The twenty-first century is characterized by a much greater intensity of the spread of major pandemics that hit humanity. In the last 20 years, globalization, urbanization, the extraordinary dynamics of moving of people and goods have been the basis for the faster spread of viruses and infections against which man is not immuned. Swine flu affects nearly 15% of the Earth's population. It is difficult to calculate the exact death toll, but it certainly exceeds 200,000. The severe acute respiratory syndrome(SARS) has been limited due to the universal mobilization of the countries, despite the delay of the Chinese authorities in informing the global community of a new and deadly virus.

Characterized by its high mortality rate, SARS kills every tenth of those infected, and it is the reason in COVID-19 threat the Chinese government to act instantly, inform the global community and facilitate coordinated action.

Middle Eastern Respiratory Syndrome (MERS) and Ebola, despite the low incidence rate, are characterized by extremely high mortality rates of 30-40%. While a vaccine has been developed for Ebola, it has not yet been developed for the MERS, and the WHO is actively working to limit it through information campaigns, dissemination of up-to-date prevention and treatment information, risk assessment, etc.

Despite the situation we are facing today, humanity shows that it is willing to learn its lessons from the recent past. Because Ebola has shown us that border closure would have an extremely negative economic impact, both for the countries concerned and their trading partners. The Spanish flu has shown us that an infection should never be underestimated, because it can have an impact on future generations, and the delayed reaction is detrimental to humanity. SARS has shown that the more economic relations globalize, the more drastic measures are needed to control the pandemic. Many diseases have led to millions of casualties due to lack of hygiene, poor education and lack of medical care. In recent years, the European Union has opened its borders to a large number of refugees coming from countries where hygiene, education and medical care are certainly not a national priority. European leaders will have the difficult task of deciding exactly how to deal with this already emerged problem, and this will cost a lot for the overall European budget, which will at the same time combat the effects of a future recession.

With the global pandemic announced on March 11, 2020, as a result of the spread of COVID-19, the WHO has launched unprecedented restrictions on human movement, production shutdowns and interruptions of global supply - all elements of globalization. And while it is not yet clear to the general public what consequences this isolation will bring to the world in which we are accustomed to live, there are some opinions of high level experts who regard these restrictions as unacceptably high. The WHO has acted as coordinator of universal efforts to combat the spread of the virus, but at the regional level, multilateral unions remain ineffective and even in the shadow of individual states' efforts to counter the infection. This has led to unnecessary duplication of efforts by individual countries in places where, for example, the coordinating role of the European Union could have led to a lot of financial and material savings. And we must not forget the secondary effects that the current pandemic can cause. Increasing panic

can lead to growing divisions in society, and it can be at the root of a series of future crises and conflicts.

From the information in Table 1, one thing makes a strong impression - the close contact of humans with animals can lead to the spread of infections. This close contact, especially between humans and wildlife, is directly dependent on human activity leading to climate change. This will act as a trigger for future close contacts and the spread of epidemics and pandemics.

Despite several pandemics in recent years, technological advances have played an essential role in prompt and adequate intervention. Communication is instantaneous, enabling effective measures to be implemented almost simultaneously in different parts of the world. Also, thanks to communication, authorities, medical staff and people are in a constant relationship, which eliminates the impact of fake news and reducing the panic.

Developing a vaccine and building immunity will stop the spread of COVID-19, but will take time. Until then, a number of measures will have to be taken in the area of public health, economic stability of the population, and its unknown - whether and how COVID-19 will affect the future generation (Spanish flu had a very severe impact on future generations - mothers carriers of the infection, often gave birth to children with secondary illnesses such as schizophrenia, diabetes and epilepsy) and last but not least, the role of the media, and how the way information is transmitted affects a person and his or her ability to think adequately.

COVID 19 AND PANDEMIC MANAGEMENT APPROACHES

The World Health Organization (WHO) declared COVID-19 a pandemic on March 11, 2020. The infection is a new type of coronavirus. It lacks mass build-up of immunity (herd immunity) and therefore it propagates an exponentially functional relationship, in which a fixed change in the absolute value of the independent variable leads to a fixed proportional change (ie percentage increase or decrease) in the value of function. The elderly are particularly at risk, or so it was thought until recently. People with co-morbidities are also very vulnerable.

In an attempt to control the widespread occurrence of coronavirus in their societies, a large number of countries try to stabilize the situation by taking action on what is known as coronavirus such as physical distance, widespread population testing and quarantine. The pandemic has brought enormous burdens and trials to

medical staff and health care systems around the world. There are countries that rely on a larger pool of medical staff and intervention tools than others. The burden on the healthcare system depends on the regional distribution of cases, health capacity and initial containment measures (isolation, quarantine, physical distance, etc.), which vary in size and scope in some countries. Furthermore, the disproportionate impact on healthcare professionals creates a vicious cycle that makes it difficult to control the infection.

In total, 4 different approaches / views are outlined to combat the spread.

- The first is through the imposition of very strict restrictive measures, such as the blocking of entire regions, significant public restrictions, accompanied by wide-ranging monitoring and control to ensure compliance with the restrictions. China is the most prominent example of this method;
- The second approach is based on gradual control through best practices in public health. This method involves extensive testing, strict contact monitoring (so-called clusters), focusing on the safety of healthcare providers and integrated real-time case monitoring. South Korea, Singapore and Taiwan are countries that have implemented this and so far with successful performance as a result;
- The third approach is mass medical treatment and control, which requires a huge resource for the workload it generates in a healthcare system. Examples of this are already emblematic - Italy and Spain;
- The fourth approach is the so-called. "Herd immunity", which until recently has advocated a UK approach and continues to be an approach in the Netherlands and Sweden. With a population of 10 million, Sweden is disproportionately dispersed over 450,000 square kilometers, which puts it 198th in the world in density and their assumption that they do not need rigid restrictive measures.

“Herd immunity” is based on a vision for a strategy of suppressing the virus through gradual restraints instead of tireless efforts to fight it everywhere. It is planned to achieve collective immunity, leaving everyone to become infected. The purpose here is no longer to protect people from infection, but rather to infect the majority in order to achieve the collective immunity.

Collective immunity is achieved when in society a very large percentage of individuals have their own immunity against an infection and it becomes very difficult for an infectious pathogen to spread from person to person. For example, if a person is infected but is surrounded only by people who are resistant to the

infection, then the virus cannot be transmitted until the patient has recovered and thus the transmission strand breaks.

In this way, the emergence of infectious people in a society where most have immune protection does not lead to the spread of the infection. Those who are not immune to infection are protected by group immunity, even if they do not have their own, because they are surrounded by a "protective border" by "impermeable" to the infection people. What is special, however, is that the more infectious a pathogen is, the higher the percentage of individuals with established immunity must be in order to attain the herd immunity.

And here comes the big problem with this approach - in order to achieve "herd immunity", in a virus with this infectivity level, such as COVID-19, it is necessary to infect over 60-65% of the population of a society. The mathematical model shows that 60% of the 68 million, roughly the UK population is, need to be infected with nearly 40 million people. With an average expectation of 2% average mortality (and it turns out to be much higher), it would mean nearly 800,000 people die, which is more than the casualties given by Britain during World War I. These calculations rejected the country's preliminary intention to follow the herd immunity approach.

ACTION APPROACHES IN EUROPE

Presently there are two visible approaches in action versus the pandemic situation in Europe (March 27,). To a large extent, the elaboration of approach is determined by the assessment of available resources capacity and calculation of fiscal risk for each country and its concerns.

The first approach, conditionally called 'as Italy', is to take total, ubiquitous actions to cover all manifestations of the infection. The measures include mass testing and hospital treatment of affected cases, often regardless of the degree of urgency. These measures have led to an overload of the Italian and Spanish health networks, resulting in their collapse to a situation where even no one can cure, further compounded by the fact that thousands of medical professionals were infected with COVID-19.

Belgium

Such approach of offensive steps with testing is overlaid in Belgium, and until March 26th in Romania, where was abandoned due to the large financial pressure and human resources shortages.

Belgium has planned to start about 10000 screening tests daily, which will allow an early stage diagnose. Currently, the country has 6,235 confirmed cases of COVID-19 in 11 million people, testing only patients admitted to hospitals with severe symptoms. This new tactic is based on the idea of expanding the medical points that will test patients. All medical universities and laboratories in the country (Namur, Leuven and Mons) will be involved in the fight.

Local companies will increase the production of tests for the country, as Belgium has already announced that it has its own antigen test that it has certified for use. Allegedly it produces result in only 15 minutes even its reliability is lower as could detect 6 out of 10 carriers, but would be used to separate infected people from healthy ones. Rapid tests of 30,000 should be available in the beginning of April 2020. In addition, an antibody test was developed in collaboration with a Chinese company to determine if a person that already pass the disease has antibodies made. It is blood and the result is also ready in 15 minutes. The reliability of this test is 98%. Mass screening volumes through it will be available after the peak of the crisis, which is expected in the coming weeks. The Belgian authorities believe that such approach will allow to remove more quickly the restrictive measures imposed on 17 March 2020 as isolating only those who are actually infected and quarantining people who have had close contact with them.

Romania

Romania had intentions to impose this approach of action by examining firstly the population of its capital Bucharest and screening all residents for a coronavirus. This was the opinion of Romanian Health Minister Victor Costache. His idea was to implement a program similar to the one conducted in South Korea with the help of mobile teams where testing is from-door-to-door. The aim was to do millions of tests. It was planned that by the end of March 200,000 tests would be carried out. The resource and financial framework of these efforts were not justified, and the Minister resigned on 26 March. According to local media, this is due to his testing program. Prime Minister Ludovic Orban described the resign as "personal and professional". Romania has been in a state of emergency since 16 March. Classes in schools, kindergartens, shopping centers and markets are closed and a curfew has been introduced. A total of 1029 are infected (25 March 2020), 17 people died.

Spain

In Spain also were raised questions on rapid tests. There are doubts that the ones used so far have been ineffective. According to local media, Chinese quick test kits are less accurate than expected. About 340,000 tests, made by Shenzhen Bioeasy Biotechnology Co were imported to Spain however, they

appear to provide only 30% accuracy in detecting coronavirus infections, despite advertising that they can detect 80%. With this value (30%) the rationale of their use is under sever considerations.

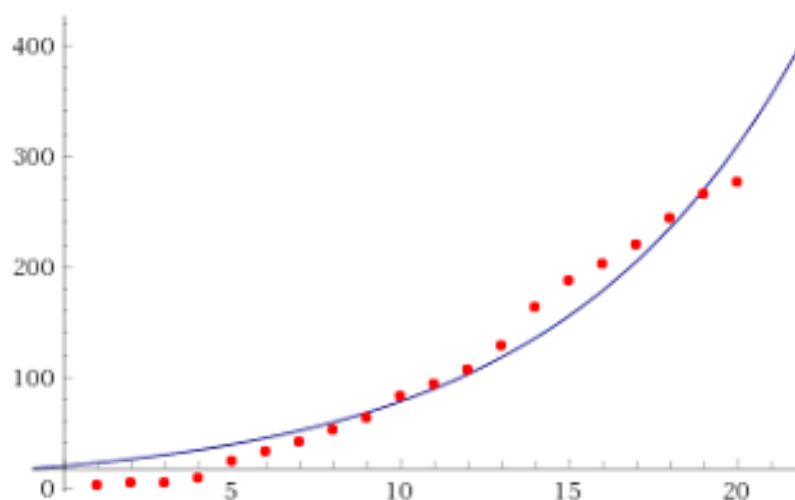
The second approach of a kind is followed by countries as Bulgaria, Greece, Denmark, Hungary, Portugal, and Switzerland. Here, priority is given to hospital treatment only in the most severe cases. The aim is to provide free resources so that the health care system remains fresh for long. It is based on the pathway of the disease (mainly from English virologists) in two phases where till the 6th day the illness is similar as with ordinary flu. The difference comes from the onset of shortness of breath and respiratory problems on day 6 with the coronavirus, respectively, and here comes the second phase. While with the usual and known flu disease, the patient still struggles with the typical flu symptoms on day 7. This watershed is considered to determine the further action of the health authorities - whether to go to specialized hospital care or to quarantine a patient at home. The risk here is that due to the high infectivity of the virus it is impossible to keep the infection at desirable low levels and the epidemic to grow slowly and smoothly, and that patients do not exceed the capacity of intensive care facilities There is no unique clear answer what approach so far is more appropriate for the spread and fight against the pandemic.

CMDR COE

Of great importance for the crisis management and implementation of adequate steps is the assessment of the current state of affairs, effectiveness of measures and prognosis of development. Currently, a number of models are used to predict the parameters changes of the crisis and mainly the number of coronavirus infected. CMDR COE employs a mathematical apparatus that demonstrates interesting dependencies in the trend in the spread of the virus. The graph shows that the spread of the virus in Bulgaria begins with a high acceleration characteristic of geometric progression. As restrictive measures are implemented and an information campaign is conducting, the first refraction of the chart on day 13 is observed. The propagation acceleration decreased but the geometric appearance remained. After another 4 days, the second refraction is observed and the function is already approaching strongly linear.

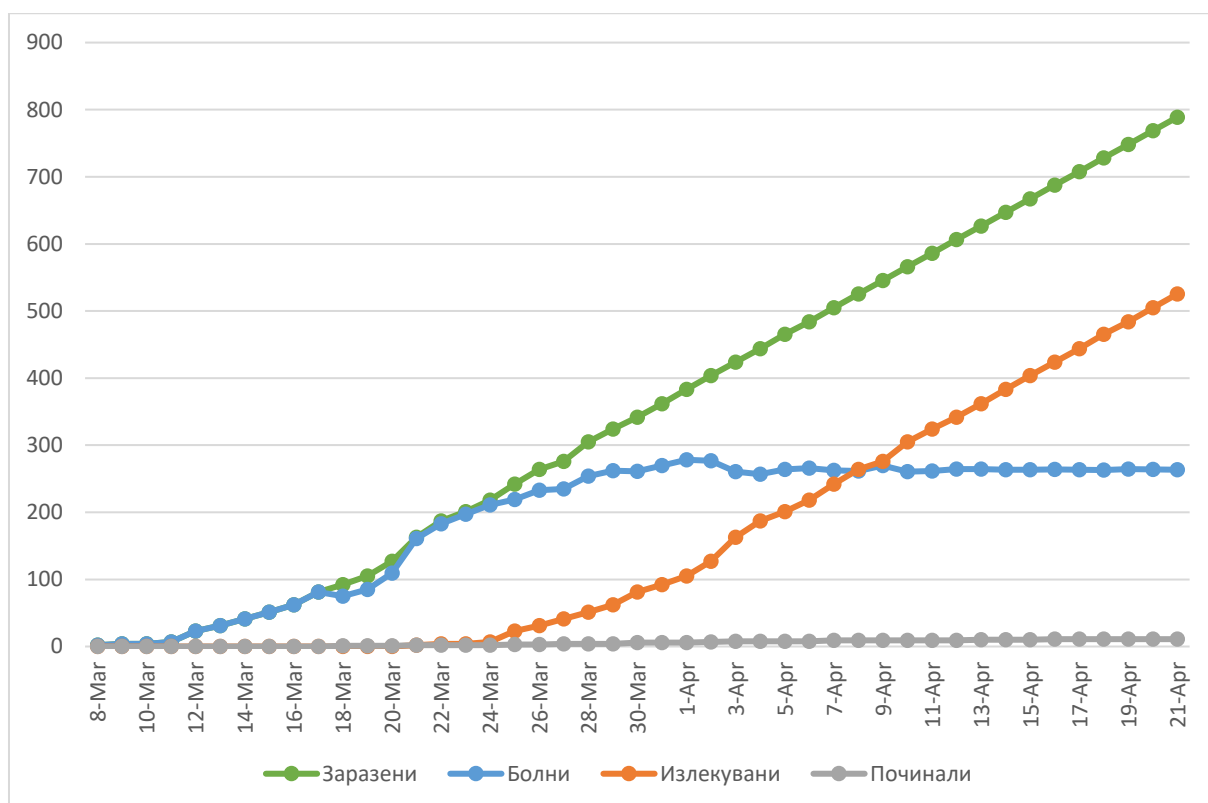
$$19.7119 e^{0.137889x}$$

Plot of the least-squares fit:



In this case, it can be expected to achieve saturation of the number of patients currently ill, ie. the total infected will increase linearly at a relatively constant and low rate, and the number of cured will increase. The models used by CMDR COE under these conditions predict 200-250 currently ill. Saturation can be said when the infected are not concentrated in just one area of the country. This condition is comfortable for the health system and carries a low risk of loss of life among the older population. The downside is production interruptions and job losses.

It is important for a government to pursue a strategy that will tackle the crisis with minimal losses for its country. At present, some countries do not take particularly restrictive measures. This is good for their economy but also leads to a relatively high number of infected. In Europe, that offers high freedom of movement, it carries an ongoing risk of spreading the virus to countries with controlled restrictions. Until such time as effective treatment of the disease and vaccine is discovered, the only approaches are to build herd immunity or quarantine. China and South Korea have successfully implemented the second approach so far.



After detaining the virus spread, the focus there now falls on stopping the infection from coming outside. For this purpose, a huge resource is harnessed. As mentioned above, this is almost impossible for Europe unless resorting to a mandatory 14-20 day quarantine of all those arriving from abroad, but posing economic risks if refusing to travel to the country.

When analyzing statistics for the most affected European countries, significant differences in the normalized data on mortality from the disease are observed. It is seen that with very similar normalized indicators, the mortality rate in Italy is 6.5-8 times higher than in Switzerland. Different reasons may be sought, but the most logical is that in Italy only severe cases are tested. This means that they are actually infected 7 times more and should already be approximately 500 thousand, which also explains the fact that, despite the harsh and extreme measures, there is still no decline in the rate of spread. There will still be one, but it is expected in the coming weeks. The implementation of the model on Bulgaria shows that the actual number of infected at the moment (March 27, 2020) should be between 300 and 500. Still a small number.

There are different legal procedures, regulations and practice in each European country for reporting the number of people affected and dead, and therefore the statistics vary dramatically at times. This refused many to opt out of the services of the mathematical model. There is no constant logic in the course

of the pandemic. Each country has its own epidemiological picture, sometimes diametrically different from that of a neighboring country. This is suggested by factors such as differences in social migration and territorial mobility of the population, differences in socio-cultural practices, even differences in the diet of the regions.

Federal Republic of Germany does not report COVID-19 for people who have died in their homes. At the same time, Germany is the country with the most extensive network of laboratories that test the population. The Robert Koch Institute found that the death rate in Germany was 0.22%, compared to 8.3% in Italy, 4% in China, 3.9% in the UK and 2.9% in France. Several major factors explain this result.

When detected. Germany is the first country in Europe to investigate small clusters of infection. The first cases of a coronavirus in Europe were discovered precisely in Germany, or at least it was earlier and faster than in Italy and Spain. Until they were detected in both southern European countries, the virus had spread unnoticed.

The quality of the health system. Intensive care (ICU beds) in Germany is 800 per 100,000 people, in Italy - 500 per 100,000 or more specifically, 28,000 in 89 million Germany and 5,000 in Italy with 66 million inhabitants. Germany has a network of independent laboratories, many of which has begun testing since January. Thus, whether or not it is at the beginning of the epidemic, Germany is somewhat more adequately prepared. At least for now.

Demographics, communications, social system. A large proportion of those infected in Germany are young, which is why the average age of patients in Germany is 45, while in Italy it is 60+. Both countries are among the world record holders in terms of population over 65 years. In Germany, unlike in Italy and Spain, people of active working age are much less likely to live with their parents, less often to be in contact with them, in the same area, in the same place or even (and this often happens in Italy) in the same neighborhood, same home, block. Thus, the likelihood of infecting their older relatives is less.

Deliberate statistics. There is increased testing in Germany, so there are also very mild cases in the total number of confirmed cases. Neither do the tests of the deceased as there are in other countries. The Robert Koch Institute does not consider deceased tests to be a deciding factor. The presumption is that patients are diagnosed before they die. In Germany, anyone who dies during quarantine without being admitted to a hospital does not enter the statistics at all.

Switzerland government has been taking heat for its targeted approach to coronavirus testing, arguing that the country has passed the point of catching every case. However, some cantons are rapidly building up back-end capacity to massively scale up testing.

On March 23, 2020, the World Health Organization (WHO) called on countries to ramp up testing as the best way to curb the coronavirus pandemic. “We have a simple message to all countries - test, test, test,” WHO Director General Tedros Adhanom Ghebreyesu told a news conference in Geneva. However, the Swiss government has not made testing the top priority in its strategy to contain the virus. The Swiss Federal Office of Public Health (FOPH) stated on March, 24 that widespread testing makes sense for countries at the beginning of an epidemic, in order to prevent a broad spread. That phase is over in Europe, so this [WHO] strategy is not specifically for Europe or Switzerland, said FOPH. It isn’t possible in Switzerland and other countries in a similar situation to test every person who has a head cold.

When the cases first started appearing in Switzerland on February 25, Switzerland had a systematic approach of testing those traveling from infected areas and those in contact with anyone who was infected. Once the virus started spreading within the country, the government decided in early March to target testing for high-risk groups (chronic illnesses or elderly) and those which have serious symptoms.

In defence of chosen strategy Swiss explanation is clear - “we have not access to 8.5 million tests, so we must act in a targeted manner.” A key part of the rationale was to not overload hospitals and rather reserve healthcare resources for those who are in the greatest danger if infected. For all others, they should stay home and follow the hygiene guidelines. The government says that it is testing around 2,500 people per day in contrast to around 20,000 tests performed per day in South Korea. Swiss government plans to increase capabilities and extend testing to a larger subset of the population but has given few details.

It is difficult to estimate the total number of cases that have been tested thus far and how many per day. Bern’s largest hospital, the Inselspital, has performed around 1,500 tests in the last three weeks.

With the new centres, health authority estimates that 2,500-3,000 tests will be possible per day in the canton of Bern. Currently, there are 15-16 locations that can take nose or throat samples. This includes hospitals, a couple of doctors offices as well as a few villages with private medical centres that have set up containers. The need is to get people out of emergency rooms and out of doctor’s

offices because they block the capacity for real emergency corona treatment for people. If someone tests positive in the cantonal tests, results are sent to the National Reference Center for Emerging Viral Diseases (CRIVE) for confirmation.

Even with the increasing capacity, questions remain about who should be tested. FOPH says that they are still in discussions about the protocol including whether people should call their primary doctor first and whether testing will be extended to more people. This has been the subject of debate and some unease among the population. (A journalist in Geneva, came down with a high fever, chills and a cough last Thursday. He had been traveling all over the city reporting and was worried that he might have been infected. He went to a private clinic in Geneva on Friday and asked to be tested. However, the doctor said that he didn't meet the criteria for testing. She added that it wouldn't make a difference anyway as the recommendations would be the same if he was positive or negative).

Criticism of Switzerland's targeted rather than widespread approach has been mounting when some virology experts inside the country have been calling for testing to be scaled up. One of the challenges with the strategy is the confusion it creates in understanding the numbers. It is difficult to understand the scale of the problem and put the mortality rate in perspective if it is not clear how many cases actually exist.

The Swiss government has been treading lightly to maintain public trust and not raise too many expectations. The clear voice so far states – 'numbers are no longer so important, what is important is to have enough beds ready for sick people when the wave comes.'

Scandinavian (Denmark, Norway, Finland and Sweden) countries are with similar parameters in terms of geographical location, climate and social stereotypes. The development of the virus follows a logical and consistent spread in this region of the world, which is likely to be justified by roughly identical climatic conditions. Denmark, Norway, Finland are almost identical to the Bulgarian restrictions, but neighboring Sweden is differentiated by the application of "herd immunity", which is likely to result effectively at the national level but could put the other three countries at great risk. One of the leading dice transmitters is the large number of Swedish health professionals who work in the Danish healthcare system and are in daily contact with both communities.

The tackles to combat COVID-19 are completely opposite. Denmark is one of the first countries in Europe to close its borders, schools and kindergartens,

restaurants and cafes and ban more than ten people in one place, while in Sweden they are still open and operating normally.

The Danish health authorities believe that the number of infected and spread rates will increase in the coming weeks and continue to tighten measures to combat COVID-19.

The Swedish side is based on cost-benefit analysis and national risk assessment to delay the closure of borders, schools, kindergartens and etc, claiming that it is too late to implement this measure since the infection has spread throughout the European countries. Quote: "If the infection is expensive, try living with the infection!". This approach is not scientifically justified, but cites differences in social systems and the demographic fact that the population concentration is 25 people per sq km and isolation is not necessary as it exists. Only the risk groups should be isolated: chronically ill and adults over 65 years.

Portugal also applies peculiar measures. The country is affected by the virus on a much larger scale than Bulgaria and is close to population, GDP and territory. Portugal declared a state of emergency on March 12, 2020, thereby activating its so-called internal safety protocols. In addition, the Government has issued a list of 30 measures (Annex 2) that will follow to counter the crisis, they are organized by public-function areas: *Human Resources, Education, Social Activities, Establishments, Workers, Companies, Civil Protection, Ports, Justice, Public Administration*.

Poland is an exemplary example of an adequate response to restrictive measures for the lockdown and follow-up of quarantined patients through an internet application specifically designed for this case. In case of violation of the quarantine, the system automatically sends messages and if the quarantined person fails to comply with them, he is automatically fined, with a fine from 2,000 to 30,000 zlotys (approx. 6000 euros) from 2 days. Church services, which are allowed to be no more than 5 people without a priest, are also prohibited. No more than half of the designated capacity for a given vehicle can travel on a bus. The private business of owning 3D printers has begun the massive production of goggles and safety masks. Scientists have developed a method for breathing 2 patients with one respirator. Poland's armed forces are also involved, with 5235 troops assisting the police, border troops and the health system as of March 25, and 836 technical resources available. In general, they closely follow Taiwan's model.

Taiwan example as we have mentioned, we show on it in more detail in Appendix 3. It demonstrates the effectiveness of the COVID-19 (containment of

COVID-19 transmission rate) approach through mass testing, systematic tracking and clustering in the analysis of infection cases. In addition, Taiwan is demonstrating a global pandemic crisis response in a transparent and democratic way.

The approach of many countries in Europe is to take action to mitigate the effects of the pandemic (flatten the curve) to provide time to prepare and enhance response capacity when the disease peak is reached. However, the readiness and sustainability of the population and of the socio-economic model systems are long-term goals that need to be built and strengthened before the crisis. Taiwan is an example of how the epidemic (SARS 2003) leads to the lessons learned from critical practices that result in the construction and refinement of emergency infrastructure - including a legal framework with clear parameters for drafting specific by-laws statutory instruments with the function of a state of emergency during a state of emergency, centralized command chain, headed by the Minister of Health and Welfare and assisted by a national command center and local epidemic centers. The flow of information within a connected and interdependent world allows the exchange of good practices and examples that help identify gaps that are filled in a timely manner.

Taiwan manages to keep the COVID-19's number of confirmed cases significantly low and prevent potential community transmission. It is of particular importance that negative cases (identified as potentially risky) are retested over time to look for patterns of disease development. Taiwan's success is due to a well-functioning, comprehensive coverage healthcare system that has trained qualified staff thanks to an effective education system and socio-economic policies. Taiwan's high-tech profile helps create and implement new technologies and techniques in crisis management. Public confidence in the institutions and their actions increases the success of the measures by increasing their strict adherence. Timely, clear and transparent risk communication maintains levels of universal support for the approach taken to deal with COVID-19.

Particularly practical is the decision to integrate National Health, Customs and Immigration Agency systems to analyze information through the use of Artificial Intelligence for large database processing (Shapiro 2020) to track risk cases and identify to already infected persons. The information collected and analyzed includes travel, medical history and occupational data to allow the creation of potential clusters (including through close contacts) to be further tracked by health authority surveys.

European Union.

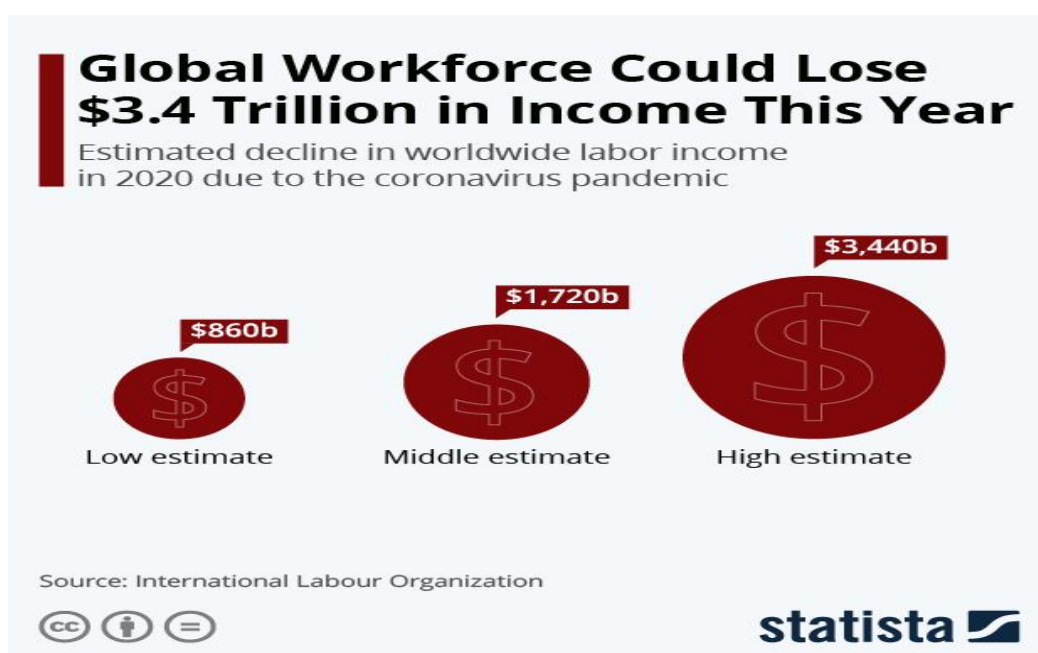
The ongoing crisis is an objective and test for the European Union. Unfortunately, the results and response of governments speak of a lack of integration and common solutions. Currently, individual states are self-isolating and encapsulating, compromising the idea of the Union and the options for a common and adequate response. It will also greatly affect the Union economically. For the moment, China is emerging from this and this advantage will be difficult to offset in the future with the implementation of new monetary policies. A specific decision to support the EU industry is to create a pool of affected industries and industries, to declare a willingness and opportunity for adaptation, and to redirect supply chains. Companies and companies have the choice to continue working with new suppliers and markets. Not only will this greatly revitalize production, it will also be a message backed up by global action. It is desirable that the European governments seek dialogue with other countries to improve coordination at different levels.

NATO has not been actively engaged in the fight against COVID 19, but it is closely monitoring what happening globally. The EADRCC is already receiving requests for assistance, which means that countries have already exhausted all available sources of support, including the EU. So far, requests have been received from Italy, Montenegro, Albania and the newest NATO country North Macedonia. It will be difficult for Member States to react, since each of them needs the same materials and equipment. It is clear that the crisis will be useful for NATO to reorient some concepts and doctrines where new rules need to be elaborated.

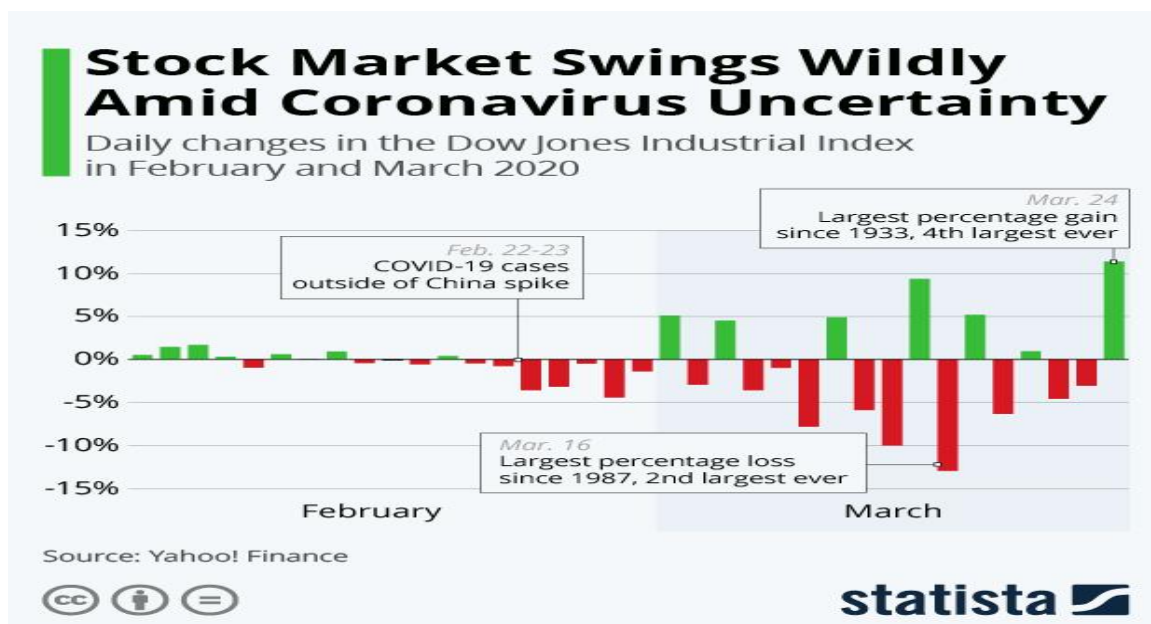
World Health Organization on March 26, 2020, outlined several steps that each country can take, regardless of its size or scenario for the epidemic. These are expansion, training and deployment of healthcare personnel; organizing a system for detecting any suspected case; increasing the availability of tests; adaptation of ICU rooms; isolation and separation and developing a plan to track people with quarantine.

BUSINESS - ECONOMIC IMPACT OF THE PANDEMIA

Although it is impossible to predict the business - economic fallout of the pandemic, is expected to have enormous economic consequences, The taken measures drive a sharp fall in consumer and business spending. According to a preliminary assessment by the International Labour Organization (ILO), the COVID-19 will have a significant effect on labor markets around the world, with unemployment rising by up to 24.7 million people. If a 2 percent decline in global GDP for 2020 will occur, the ILO expects global unemployment to increase by 5.3 million. A 4 percent drop in GDP would result in 13 million additional jobless people while in the most pessimistic projection which sees a global GDP 8 percent drop the increase in global unemployment will reach 24.7 million. It is overarching to consider the implications of such a steep increase in unemployment around the world. According to the ILO's estimates, workers could lose between \$860 billion and \$3.4 trillion in labor income this year.



Moreover, stock markets' drop, business investment contracts and corporate bankruptcies soar may put significant pressure on the financial and banking system. Since the Covid outbreak stock markets have seen some of the largest ups and downs in history proving how fragile the overall situation is. Day by day is becoming more clear that the toll on the world economy will be heavy.



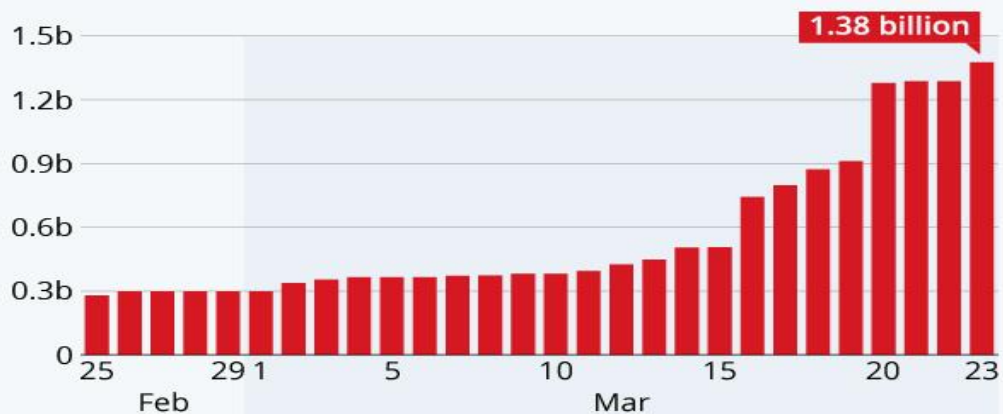
The optimistic scenario is that COVID-19 to be seasonal. In this case, It is estimated to take until the fourth quarter of 2020 for European and US economies in order to see a genuine recovery. The latter might happen in case that a probable resurgence of the virus during autumn 2020 will find the world better prepared to enable continued economic activity.

In the worst case scenario that the virus will not be seasonal, leading to vast cases through the rest of the year, the financial system may suffer significant distress.. The global economic impact might be severe, approaching the global financial crisis of 2008–09 especially if fiscal and monetary-policy responses prove insufficient to break the downward spiral. Against this backdrop, GDP will shrink significantly in most major economies in 2020, and recovery will begin only in the second Quarter of 2021.

Another aspect is the impact on global education. According to the latest figures released by UNESCO 1,379,344,914 students or 80 percent of the world's learners around the world were not able to attend school or university as of March 23, 2020. It is still vague how all these lost educational time will be substituted.

COVID-19's Staggering Impact On Global Education

Number of learners impacted by national school closures worldwide



Figures refer to learners enrolled at pre-primary, primary, lower-secondary, and upper-secondary levels of education, as well as at tertiary education levels. Source: UNESCO



SELECTION OF MEDIUM-TERM AND LONG-TERM ACTION PLAN.

This brings us back to choosing an action approach. In the **current approach**, the need to implement passive safeguards can continue for a considerable period of time. This is mainly due to the inability to control entirely the input and output flow to the country and in the country. The global circulation of the virus most likely will continue for more than a year until the vaccine and the specific medication for the virus are found and administered. Some business and people begin to realize that the crisis and the danger will not end soon. Some employees are expected to return to work and some production will be resumed, while others will start reorganizing or reorienting to other production.

Of great concern is the fact that some industries are entirely dependent on raw materials or customers from outside. In either case, restarting is impossible. Keeping the current status quo for more than a few months will mean not only a permanent loss of jobs, but also a permanent loss of labor power. This process should be followed up and an action plan drawn up within a short timeframe, with a working group formed with a Minister of Economy, who would draw up a detailed map by industries, and draw up a specific path for each of them to restart production.

It is important to note that the country must ensure its own production of essential goods and services (food, water, security, communications, transport, awareness, electricity, heating, fuel, schools, kindergartens, right to work and pay) . At the same time, the fundamental democratic rights of the population under the constitution must be maintained, which can only be achieved through quality control for compliance with the obligations of the entire population residing on the territory of Bulgaria.

For some of the industries, the measures currently applied to wearing personal protective equipment, regular disinfection of the premises, observing personal hygiene and physical distance between individuals will be sufficient. For other areas, reorganization and investment will be needed to ensure the safety of workers. Industries where this is not possible (due to interruption of supply lines) a government assistance is needed.

These analyzes must be carried out within short periods by expert objective committees. This approach is characterized by initiative and reducing the risk of entering a long recession and severe secondary effects on the country's population. Leaving in a passive position, such as the current one, carries the risk of considerable time to find treatment and vaccines, but more importantly,

different groups will be formed, dissatisfied with the restrictions imposed, which may affect political life and lead to getting out of control of the environment and directly influencing one of the most important criteria for ensuring continuity of statehood.

In order for the right approach to return to production, it is necessary to carry out a mass, age-differentiated information campaign and all measures aimed at preserving the most risky part of society - adults and especially those with concomitant diseases (cardiovascular, diabetes, respiratory and others).

PROBABLE EXTREME CONDITIONS:

1. Given the global interconnectedness, if the virus continues to exist somewhere, it is always likely that a contaminant will transmit it to countries that are considered to be in control. This means that a pandemic could be over if all countries manage to minimize the infection at the same time, which is very unlikely to happen.
2. The virus is sharply washed away, diluted due to mass immunity acquired. This development could be at the cost of significant losses of human life and blocked health systems.
3. The third scenario is if efforts are directed towards reducing the retransmission of the virus and eliminating clusters. This can continue until the vaccine is discovered and available for mass production. This is a good scenario, but it is also the longest and most complex.
4. The virus develops in an avalanche, the health system collapses, the financial and economic crisis, civil disobedience, martial law, European and world conflicts - this would be the MOST dangerous option when planning.

CONCLUSIONS:

Lastly, the main conclusions are, to a great extent, already clear among scientists but are not yet fully understood by the majority of the population, are:

1. The crisis will be long-lasting and real results following the measures which have been already launched can be expected in 2-3 months;
2. The measures have been taken so far in Bulgaria for tackling the first phase / period of the crisis caused by the outburst of COVID19 are timely and adequate.
3. Our country is in a much better condition and is ready to respond to the spread of the infection, both in terms of ensuring the protection of health workers and the population, as well as of the economic measures taken to support small and medium-sized businesses.
4. The morbidity curve in the country is to rise up, which necessitates constant monitoring and analysis of the situation in order to prevent the uncontrollable spread of the virus among the population. Special attention should be paid to the Bulgarians returning to the country from abroad who should be strictly monitored for abiding their quarantine.
5. The relatively cold weather over the past week has largely helped to tighten compliance with the restrictions imposed. It is expected that in the upcoming warmer days and the long period of limitation of movement will make a considerable part of the population ignore the imposed restrictions and quarantine, especially on weekends, which will lead to an increase in the number of those infected. This calls for additional measures to be taken to prevent disruption of the discipline that has already been established. In this regard, it is noticeable that by the end of the week there is a gradual increase in the traffic of vehicles and passengers. This leads to another important conclusion that the accumulated energy from a long stay in their homes must be controlled otherwise force will have to be applied. Imposition of financial sanctions is also a penultimate measure.
6. Coordination of activities with neighboring countries and the EU is crucial, both to tackle the spread of the disease and to develop a common concept for the approaching economic crisis.
7. A broad discussion on the long-term effects of the current crisis should be initiated and led by key stakeholders and institutions, including civil society.

A potential topic of analysis should be the future of socio-economic models in Europe, in particular in Bulgaria, which are and have been seriously affected by the crisis. It is critical particular attention to be paid to building and strengthening societal resilience, social cohesion, solidarity and collective empowerment¹ in crisis situations of the COVID-19 scale, as illustrated by the example.

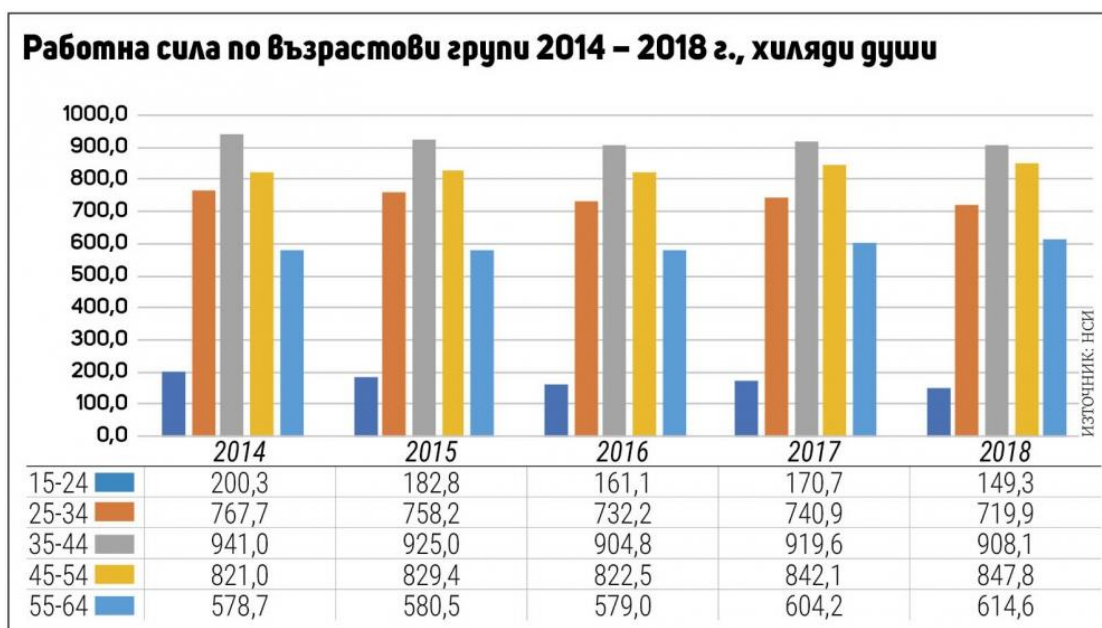
8. The reorganization of local production, e.g. protective masks and clothing, is a beneficial approach and should be expanded to include more businesses that, with their abilities and capabilities, can help cope with COVID-19. Exploring 3D printing capabilities for medical device manufacturing purposes - e.g. goggles, masks and breathing apparatus could fill the gaps and, at the same time, help companies financially.

9. The crisis will lead to a major economic collapse, with the working population at 3.233 million (by 2019), all affected for one reason or another, and at least one third of the 800,000 expected to weigh on the social system, for whom the country will not be able to provide for more than 2-3 months. The overall structure of the country is 67% in services, 28% in industry and 5% in agriculture.

10. The total fund for social assistance is about BGN 18 billion, with the expenses for social protection being about BGN 17 billion, that is, we have a free resource of no more than about BGN 1-1.5 billion that will cover the needs for no more than 1-2 months, to help those affected by the crisis.

Workforce by age groups 2014-2018 (1000 people)

¹ Also valid for a variety of international forums.



People employed by economic niches and gender in 2019

Niches	Total	Men	Women
Total	3 233.1	1 732.1	1 501.1
Agriculture, Forestry and Fishery	214.1	140.5	64.6
Mining Industry	33.9	25.8	8.1
Processing	607.3	316.5	290.8
Production and distribution of electricity and heat, and gaseous fuels	43.7	33.9	9.8
Water supply; sewerage services; waste management and rehabilitation	33.2	23.5	9.7
Construction works	252.5	237.2	15.3
Trade; Automobile and motorcycle services	539.8	240.6	299.2
Transport, storage and post services	212.7	174.4	38.2
Hotels and restaurants	183.6	70.7	111.9
Creation and dissemination of information and creative products; telecommunications	99.9	64.7	35.2
Finance and insurance services	67.3	20.4	46.8
Real estate	13.7	5.7	8.0
Professional services and research	113.3	37.8	75.5
Administrative and ancillary activities	124.3	86.7	37.6
Governance State governance	224.8	120.0	104.8
Education	185.0	37.8	148.0
Health care and social services	166.5	36.1	130.4
Culture, sport, entertainment	53.0	28.6	24.4
Others	64.8	21.9	42.8

The main affected sectors will be also the sectors that have the largest share capital in the formation of Bulgaria's GDP:

- Tourism - up to 400,000 people work and directly depend on the income in this sector. The country will lose almost BGN 3.7 billion in revenues (statistics for 2019) Apart from the winter season being terminated in its

peak, the summer season is expected to fully end to zero. Forecasts for the new winter season are not encouraging;

- Construction - up to 300 000 work and directly depend on the income in this sector. Revenues will sharply decrease in the investment in new facilities and from almost BGN 27 billion (statistics for 2018) will also drastically reduce. The only boom expected is in the purchase of real estate in order to preserve financial resources in the event of inflation;
- Services, culture, sports and entertainment - up to 100,000 work and directly depend on income in the industry;

11. Basically, there is a choice between two methods of action - to allow the population to build their own immunity and to test only those who are already ill or to carry out a universal population test and to separate the healthy from the sick:

- With the first option, we cannot expect the economy to recover even up to 50%. On the contrary, we can expect closing and bankruptcy of small and medium-sized businesses. The state is to provide for everything, which will take over most of the social services. It really means taking huge loans that the country cannot afford and the repayment period will be no less than 3-5 years.
- With the second option, we have a large initial investment and organization, but it could produce results in the short term, up to 1-2 months, and most of the country's life could be restored. An example is the quarantine of the town of Bansko, which after its completion and in case there are no longer infected patients would continue, but with the opposite direction, no longer allowing people carrying the infection into the town. If this example is to be followed, the procedure could be applied nationwide.
- As the high-risk mortality group is over 65 and the chronically ill, it is also possible to consider a third option. This group could be quarantined for a longer period, until the working population recovers the state's economic performance. For this purpose, all beds in the country can be used for accommodating the people.

12. In addition, the pandemic will affect the community and social relationships and that must be taken into account:

- People who have survived COVID-19 can be treated as survivors of SARS, Ebola and HIV; we cannot exclude occasions of strong disapproval, a reprimand that makes one undesirable to communicate with;

- Healthcare professionals will need time to overcome the post-traumatic stress;
- A long quarantine may result in a high percentage of active people with advanced agoraphobia;
- Communities can build a sustainable reflex for living in isolation and getting used to scarcity and hardship;
- Attitude towards health can also change for the better;
- People, businesses and institutions can develop new strategies and practices for living, including working home office, video-teleconferences, flexible care arrangements for children and the elderly;
- Governments are likely to realize the importance of employment and mobility policies and a stable and proportionate health system;
- Attention on public health systems is to be the major focus. This change can protect the world from the next inevitable disease.

13. Households, private life, will constitute another affected social factor. While people are forced to stay into their homes, social deprivation will increase - a sense of scarcity, of deprivation of a certain good. It is a process in which social actors are isolated from prestigious, socially acceptable values and is accompanied by stigmatization of individuals or social groups. Even in a case of a not considerably long period of isolation, various disorders can be developed: fatigue (sluggishness, drowsiness), loss of sense of reality, irritability or anxiety, which can even lead to panic. Lack of stimulation of active purposeful activity causes anatomical and biochemical changes in the brain, the correction of which sometimes takes a long time. On the other hand, marginalization of identity affecting social behavior can even include an increase in cases of domestic violence. Thus, as in a vicious cycle, social deprivation will very seriously persist among the victims' group, which is a significant social problem to overcome after the quarantine of the pandemic.

14. Last but not least, it should be borne in mind that quarantining people for a longer period will also cause a boom in the next year's birth rate, for which we also need to be prepared and evaluate how it would affect the social system.

RECOMMENDATIONS:

1. In the short to medium term, Bulgaria is to continue to apply physical distancing within the framework of a thorough strategy to limit the spread (transmission) of the COVID-19 infection. All measures taken under this strategy should rest on a sound legal basis and be communicated to the public in a transparent and timely manner. In the long run, relevant laws, regulations and guidelines for crisis situations of health nature (epidemic, pandemic), among other natures, should be analyzed, updated or established in order to provide a unified response system that can quickly be put into action.

2. It is of the utmost importance to apply the principle of mass testing and systematic and coordinated data collection (data pooling and processing and analysis of data using artificial intelligence) to trace infected and potentially infected² individuals in order to detect interdependencies and patterns in the development (symptoms) and the transmission of the virus. The coordination of systems and databases providing critical travel history and medical status information, in combination with close interagency collaboration, facilitates better identification and subsequent quarantine, thereby helping to reduce the rate of COVID-19 dissemination (transmission). The provided support and empathy by the population is a key indicator of the success of implementation and should be maintained through transparent communication of risk through appropriate means and channels of communication³. The systematic collection and analysis of data on gender, age, social and economic status, ethnicity will help to track dependencies and inform long-term recovery measures to overcome the crisis.

3. In regard of protecting the population from the spread of COVID-19, our view is to continue to adhere to the measures taken so far without allowing them to be ignored or violated, including:

- providing a reinforced and continuous process for the production of masks, protective clothing, goggles and disinfectants, with priority to hospitals and medical establishments;
- obligating all persons who go out of their homes to wear protective masks and gloves, which will mostly reduce the risk of transmission of the infection by infected individuals who do not suspect carrying the disease, and not as previously imposed, only infected persons to wear masks;
- enhanced control over the disinfection of public buildings and premises;

² Provided that anonymity is guaranteed.

³ Attention to be paid to improving communication with communities at risk (e.g. chronically ill and patients with serious diseases, Romas, migrants, homeless).

- exploring the potential of the international experience regarding different medicines for the treatment of the disease, although in experimental phase, but already given a positive result;
- maintaining the health of elderly, which may include additional restrictive measures to limit their movement;
- Continuing the information campaign aimed at making the population aware of the whole situation and what is yet to come before taking full control of the infection (radio, television, use of online learning by students). It is important to prepare people mentally to face the difficulties ahead and the time needed to overcome them;
- conducting a campaign (radio, television) for recruiting volunteers who will assist the elderly;
- encouraging home office for suitable professions;
- synchronizing national measures against COVID 19 with those of neighbor and EU countries to ensure faster passage of transport companies' vehicles;
- stimulating cashless payments in order to minimize the exchange of banknotes and coins between merchants and customers;
- banks in the country not to return the received banknotes. They should charge the ATMs and give customers only "clean" disinfected money, which was previously stored for at least 3-4 days. This measure is based on the conclusion that the corona virus is active on banknotes for up to 24 hours and up to 30 hours on coins.

4. Based on the analysis, urgent decisions should be taken next month on how to continue the economic life in the country in conditions of restricting the infection. These measures should be long-term for at least one year until the vaccine is put into service.

5. The economy should not stop, but reorient or reorganize, meeting the requirements set by the National Operation Centre. The establishment of control bodies which carry out permanent checks on the working environment and take strict measures in the event of non-compliance will ensure that production is not stopped and unemployment is reduced.

6. So far, the National Operation Center (NOC) is fulfilling its task of responding to the ongoing crisis, but it is necessary to establish a National Crisis Center (NCC) with permanent representation of all ministries under the direct leadership of the Prime Minister. Representatives of scientific organizations are

to be involved as well. Not only issues related to the virus itself will be discussed, but also measures to overcome the economic crisis which has already occurred. NOC should be the operative body of the NCC. It is time for each ministry to deploy its own crisis headquarters to support the activities of the NCC. This is also enshrined in Chapter II and Chapter III of the Law on the Management and Functioning of the National Defence and Security System of 2015. The establishment of a Security Council is essential in the context of escalating tensions in the population.

7. At the same time, the country's regulatory framework must be revised and strict measures for compliance with hygiene standards and plans for continuous action in case of new epidemics of new virus strains unknown in the history of humankind should be introduced. (Example: the regulations which Taiwan introduced following their experience with SARS (2003).

8. Persons whose incomes have fallen by more than 30% or reached the level of provision of only essential products to be entitled to freeze payments on their consumer and mortgage loans, which shall be extended to a deadline set by the Council of Ministers. Applications and necessary documents to suspend payments should be organized online by the banking system.

9. To elaborate Emergency Rules of Engagement (on the basis of the newly adopted law) in the Ministry of Defence and upon invitation to support other ministries and agencies upon request. It is also worth recalling the procedures for action by military personnel in declaring a state of martial law.

In conclusion, on a global scale, the situation is very dynamic and must be taken seriously. It is evident it is a crisis with a vague end. The unprecedented global health crises combined with the financial crises and their economic impact lead to the conclusion that the impact on the human race is critical and the cyclicity of such viruses of uncertain nature will increasingly mutate more often over shorter intervals of time.

HOW CMDR COE SUPPORTS THE CRISIS MANAGEMENT PROCESS

1. The Center analyzes the affected countries on a daily basis and summarize the information, producing a weekly analysis with suggestions and conclusions. The analysis is provided to the Ministry of Defense in Bulgarian and published on its website (www.cmdrcoe.org) in English.
2. Cancels all events by mid-June and plans the same by the end of 2020 related to training and preparation and gathering of people in one place. (courses, seminars, workshops, conferences). Including the celebration of the 5th anniversary of accreditation as an international organization, scheduled for March 31, and the annual conference, scheduled for June 2-3, 2020.
3. Developed an online distribution training platform, with 2 main courses already uploaded and their first release is in the coming months:
 - Crisis Management and Disaster Response Exercise Planners Training Course (Nato Approved; Nato Etoc Code: Ete-Cm-21785)
 - Crisis Management and Disaster Response Course - (Nato Approved; Nato Etoc Code: Ete-Cm-21784)
4. It plans to hold an annual conference on 14 May 2020, in conjunction with MILMED COE, focusing on the results and measures of COVID 19. In addition, a letter will be sent to all institutions.
5. It plans to hold an online conference with all NATO Centers of Excellence and command structures to discuss how NATO should be prepared for crises of this nature and the Centers' role in assisting national crisis management systems.
6. Works on developing a model for measuring societal resilience in different types of disasters and crises.
7. Proposes, as soon as possible, to organize CPE with a real COVID 19 scenario, with all BA command structures, involving other ministries and agencies, the Bulgarian Academy of Sciences, the Red Cross, scientific centers and organizations. CMDR COE can offer staff, halls (1 to 60 people, 3 to 20 people, 3 to 10 people - following distance measures) and the necessary technique equipment for conducting it:
 - developing options for updating national, EU and NATO response plans in the face of such challenges that will appear to be cyclical;
 - dealing with the effects of the crisis;
 - supporting the economy;
 - dealing with social consequences;

- additional measures and approaches that can actually be offered at NOH to be used as measures to deal with the situation.
- others

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No		Spanish flu	Asian Flu	Hong Kong flu	Severe acute respiratory syndrome (SARS)	Swine flu	Middle East respiratory syndrome (MERS)	Ebola	Severe acute respiratory syndrome (SARS) - Coronavirus	Seasonal flu
1.	Abbreviation	H1N1	H2N2	H3N2	SARS-CoV	H1N2	MERS-CoV	Ebola virus	SARS-CoV-2	A/H3N2, A/H1N1, B, ...
2.	Year	1918-1920	1957-1958	1968-1970	2002	2009-2010	2012	2013-2016	2019	Всяка година
3.	Place	France	China	Hong Kong	China	Mexico	Jordan	Democratic Republic of the Congo	China	Appears in late autumn and winter throughout the world
4.	Origin	Birds	Wild ducks	Mutated form of Asian flu	Asian cats (Paradoxurus hermaphrodites)	Прякото предаване на свински грип от свине към хора понякога е възможно, но не е причината за заразяване на хората	Bats Sick camels	Humans become infected by direct contact with bats or by contact with live or dead bats infected animals.	Genetically closely related to the SARS virus	-
5.	World's population in the year of the pandemic	1,8 billion	2,8 billion	3,5 billion	6,2 billion	6,9 billion	7,1 billion	7,1 billion	7,7 billion	-
6.	Infected people	500 million	500 million	500 million	8,098	1 billion	2000	27500	734 000 (30.03.2020)	1 billion – 1,5 billion (every year)
7.	% from the world population	30%	18%	13%	0,00013%	15%	0,000028%	0,00038	0,01%	-

									(30.03.2020)	
8.	Deaths	50 million (10% from the infected)	3 million	1 million	774 (9,55% from the infected)	151,700–575 400	670 (30% from the infected)	11,316 (40% from the infected)	34 700 (30.03.2020) - 2-10 % смъртност.	290,000–650,000 every year
9.	Transmission	Air drops	Droplets and secretions from the respiratory tract of the infected individual	Droplets and secretions from the respiratory tract of the infected individual	Air droplets when people sneeze, cough or exhale	Droplets in the air from person to person and by contacting the person with objects contaminated with the virus and transferred to the eyes or nose.	Droplets and secretions from the respiratory tract of the infected individual	The infected people emit viruses with all of their bodily secretions (sweat, blood, lymph, saliva, urine, semen, faeces), after a certain period the virus is also separated from the cells destroyed by the epidermis, and then even touching the skin can cause infection.	Air droplets when people sneeze, cough or exhale	Through small droplets and secretions from the respiratory tract of the infected individual and indirectly by contacting objects that have respiratory secretions and viruses.
10.	Incubation period	2-4 days	2 – 10 days	2 – 10 days	1 - 10 days	5-6 days	5-6 days	2 - 21 days	2 - 14 days	1 – 4 days

11.	The most vulnerable people	<p>Young and middle-aged people.</p> <p>Almost all the victims are under 65 years old and have a large number of young and healthy people.</p>	Dangerous for the elderly.	Dangerous for the elderly and children.	<p>People with pre-existing chronic conditions</p> <p>Elderly people with cardiovascular disease, diabetes, high blood pressure, chronic respiratory problems and cancer.</p>	<p>People over 65, children under 5 years of age.</p> <p>People with weak immune systems.</p> <p>Suffering from chronic heart disease, lungs, diabetes.</p>	People with weakened immune systems or with chronic conditions such as diabetes or chronic respiratory distress.	Affects poor African countries (Guinea, Liberia and Sierra Leone)	<p>People with pre-existing chronic conditions are prone to severe disease</p> <p>Younger people are less vulnerable.</p> <p>Risk factors for severe course include age over 65 and smoking.</p>	<p>“Type A” mainly affects adults and young children.</p> <p>“Type B” affects students and young people of working age.</p> <p>At-risk groups are suffering from chronic heart disease, lungs, kidneys, pregnant liver, diabetic patients, immunodeficiency patients, people over 65, children under 5 years of age.</p>
12.	Symptoms	<p>Fever, fatigue at the beginning</p> <p>In the development of the disease - skin blueness, the lungs are filled with fluid.</p>	Chills, fever, muscle aches, headaches, loss of appetite.	Chills, fever, muscle aches, headaches, loss of appetite.	<p>In the beginning - chills, fever, muscle aches, headaches.</p> <p>After 2-4 days dry cough and shortness of breath develop</p>	<p>Temperature, coughing, sore throat, moisturizing eyes, muscle aches, shortness of breath, headache, weight loss, chills, sneezing, runny nose, dizziness, abdominal pain, lack of</p>	<p>Fever Cough Bouts of shortness of breath,</p> <p>With pulmonary inflammation and renal failure, the disease cannot be controlled and the outcome is fatal.</p>	Feeling tired, fever, muscle and joint pain, headache and sore throat. These symptoms are often followed by vomiting, diarrhea and abdominal pain.	<p>Fever, Fatigue, Dry cough, It's worse breathing, respiratory distress.</p> <p>It can become ill without symptoms.</p>	It starts suddenly, accompanied by severe muscle and joint pain, chills, fever, dry cough, eyeball pain, and headache.

						appetite and general fatigue.		Then there may be shortness of breath and chest pain, accompanied by swelling, headache and confusion. In some cases, internal and external bleeding may occur.		
13.	Treatment	The same measures as today for coronaviruses - social distance measures, the only ones effective in the absence of a vaccine. Quarantine, isolation, masks, hand washing.	The infection was only controlled after the vaccine was created.	Effective vaccines have been developed since November 1968.	The spread of SARS was stopped due to the introduction of quarantine and excellent international cooperation; Fortunately, doctors and scientists manage to destroy the SARS virus by isolating and	Antiviral medicines can reduce the disease and cure the person faster. Controlling the temperature, soothing the pain and maintaining the water balance	Still working to find a vaccine	There is no officially approved specific treatment for Ebola at this time. Patients are left to rest, given water. The goal is to maintain the vital activity of the body while it fights the	There is no specific treatment	Vaccines - as prevention, but not 100% effective. The use of antibiotics is not recommended as there is no specific drug to counteract the flu virus. Alleviating the symptoms of infection - the numerous analgesics that

					quarantining the infected until the virus is completely wiped out of their body so that they cannot transmit it to other people.			virus, and it is generally believed that the patient's immune system will eventually deal with the virus. There is a developed vaccine for Ebola.		are available to relieve pain. Strengthening the immune system can also contribute to faster recovery
14.	Consequences	This flu has a very grave impact on future generations - mothers who carry the infection, often giving birth to children with secondary illnesses such as schizophrenia, diabetes and epilepsy. A huge	The virus, is usually "repeated" every 60 years.	It continues to circulate among the population today The US is one of the hardest hit	There have been no confirmed cases since 2004. The association of doctors from around the world helps to suppress the pandemic.	Most people with the virus recover completely without medical help or antiviral medication	What is specific about this infection is that the second phase - lung inflammation, kidney failure and blood poisoning - occurs very quickly. WHO coordinates the efforts of stakeholders, including conducting information campaigns, disseminating	In 2014 and 2015, this infection erupted in a pandemic. In the event of a cure, the virus continues to live for an additional 7 - 8 weeks in the male reproductive system, making seminal fluid dangerous	Access to Europe - will be totally rethought The problem is that if mortality exceeds some critical level, panic can occur with severe economic effects and growing divisions in society. Our health systems	When the flu is not accompanied by another disease, it usually goes away without complications and is not dangerous.

		<p>drop in labor leads to high levels of pay.</p> <p>It slows down the progress of affected societies for several decades.</p> <p>Contributes to the creation of the world's first health agencies.</p>					g up-to-date prevention and treatment information, risk assessment, etc.	during this period even after the "complete" cure.	are probably underfunded for the current aging population.	
15.	Some specific characteristics	It has been identified as a unique deadly product of nature, evolution and close human-animal contact.	It mutates and 10 years later manifests itself as Hong Kong flu	<p>The epidemic has triggered major international mobilization coordinated by the WHO</p> <p>Considered the first pandemic of modern times, its spread has been aided</p>	<p>Even as doctors begin to realize that it is an unknown virus, they continue to retain information locally.</p> <p>- China is acting very slowly. Initially, there is no information.</p> <p>- It passed several months</p>	<p>A pandemic was declared on 11 June 2009 and canceled on 10 August 2010.</p> <p>It's called swine flu because it resembles one of several types of swine flu viruses</p>	Human-to-human transmission is more difficult than regular flu.	<p>It is less contagious than other viral diseases but has a very high mortality rate.</p> <p>The natural reservoir of the virus in nature is not yet known.</p> <p>There is still no documente</p>	<p>China informed in a timely manner.</p> <p>Name of the disease: COVID-19 (Corona Virus Disease - 19)</p>	<p>It manifests itself seasonally, so the likelihood of getting sick from it is higher in the late autumn and winter.</p> <p>Attention should be paid to good physical activity, a balanced diet and sufficient time to sleep and rest. These are the prerequisites for</p>

				by the increase in international air travel. Highly contagious	before China begins sharing information with WHO.			d airborne distribution in the natural environment.		maintaining a strong immune system that would fight all the viruses and bacteria that can infect our body.
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Table 1

Table 1 presents information collected and grouped by indicators for the various epidemics and pandemics over the last 100 years. The aim is to compare the causes of the outbreak, its spread, its effects over the various periods, and how humanity has coped depends on the time it was, technological advancement and the measures had taken. One of the things that emerges is the origin of the virus / disease - in the mass cases, China is source and spreads of the infection worldwide. Another link to these crises is the transmission of the infection from animals to people or the mutation of an animal virus.

The most deadliest is the Spanish flu. It erupted shortly after World War I, killing 3 times as many lives as the war itself, and the infected people are one-third of the world's population. China (which is the Entente's side) and Chinese workers who have been transported to France via Canada and the United States, and on their way left outbreaks of the disease. In just 25 weeks, the flu kills more than 50 million people - mostly young and middle-aged. Death came due to acute respiratory failure, and one in every ten of the infected died. National authorities applied solutions that are common with today's and the only effective ones in the absence of a vaccine - physical distance, quarantine, isolation, disinfection, wearing masks, washing hands. It is sure that If the nowadays transport activities (air and ground) had been existed, it would have been almost devastating to humanity.

Isolation and world division during the Cold War are linked to two major pandemics - the Asian and its comparable Hong Kong flu. Between 1958 and 1970, the death toll was 4 million (0.15% of the world's population). Everyone - from children to the elderly were affected and only the development of an effective vaccine has prevented many more victims. Another boon is the presence of the World Health Organization (WHO), established in 1948, successfully took on the role of an effective coordinator of efforts by all countries to fight the infection.

The twenty-first century is characterized by a much greater intensity of the spread of major pandemics that hit humanity. In the last 20 years, globalization, urbanization, the extraordinary dynamics of moving of people and goods have been the basis for the faster spread of viruses and infections against which man is not immuned. Swine flu affects nearly 15% of the Earth's population. It is difficult to calculate the exact death toll, but it certainly exceeds 200,000. The severe acute respiratory syndrome(SARS) has been limited due to the universal mobilization of the countries, despite the delay of the Chinese authorities in informing the global community of a new and deadly virus. Characterized by its high mortality rate, SARS kills every tenth of those infected, and it is the reason in COVID-19 threat the Chinese government to act instantly, inform the global community and facilitate coordinated action.

Middle Eastern Respiratory Syndrome (MERS) and Ebola, despite the low incidence rate, are characterized by extremely high mortality rates of 30-40%. While a vaccine has been developed for Ebola, it has not yet been developed for the MERS, and the WHO is actively working to limit it through information campaigns, dissemination of up-to-date prevention and treatment information, risk assessment, etc.

Despite the situation we are facing today, humanity shows that it is willing to learn its lessons from the recent past. Because Ebola has shown us that border closure would have an extremely negative economic impact, both for the countries concerned and their trading partners. The Spanish flu has shown us that an infection should never be underestimated, because it can have an impact on future generations, and the delayed reaction is detrimental to humanity. SARS has shown that the more economic relations globalize, the more drastic measures are needed to control the pandemic. Many diseases have let to millions of casualties due to lack of hygiene, poor education and lack of medical care. In recent years, the European Union has opened its borders to a large number of refugees coming from countries where hygiene, education and medical care are certainly not a national priority. European leaders will have the difficult task of deciding exactly how to deal with this already emerged problem, and this will cost a lot for the overall European budget, which will at the same time combat the effects of a future recession.

With the global pandemic announced on March 11, 2020, as a result of the spread of COVID-19, the WHO has launched unprecedented restrictions on human movement, production shutdowns and interruptions of global supply - all elements of globalization. And while it is not yet clear to the general public what consequences this isolation will bring to the world in which we are accustomed to live, there some opinions of high level experts who regard these restrictions as unacceptably high. The WHO

has acted as coordinator of universal efforts to combat the spread of the virus, but at the regional level, multilateral unions remain ineffective and even in the shadow of individual states' efforts to counter the infection. This has led to unnecessary duplication of efforts by individual countries in places where, for example, the coordinating role of the European Union could have led to a lot of financial and material savings. And we must not forget the secondary effects that the current pandemic can cause. Increasing panic can lead to growing divisions in society, and it can be at the root of a series of future crises and conflicts.

From the information in Table 1, one thing makes a strong impression - the close contact of humans with animals can lead to the spread of infections. This close contact, especially between humans and wildlife, is directly dependent on human activity leading to climate change. This will act as a trigger for future close contacts and the spread of epidemics and pandemics.

Despite several pandemics in recent years, technological advances have played an essential role in prompt and adequate intervention. Communication is instantaneous, enabling effective measures to be implemented almost simultaneously in different parts of the world. Also, thanks to communication, authorities, medical staff and people are in a constant relationship, which eliminates the impact of fake news and reducing the panic.

Developing a vaccine and building immunity will stop the spread of COVID-19, but will take time. Until then, a number of measures will have to be taken in the area of public health, economic stability of the population, and its unknown - whether and how COVID-19 will affect the future generation (Spanish flu had a very severe impact on future generations - mothers carriers of the infection, often gave birth to children with secondary illnesses such as schizophrenia, diabetes and epilepsy) and last but not least, the role of the media, and how the way information is transmitted affects a person and his or her ability to think adequately.

COVID-19 Response

Case study – Taiwan

Disclaimer: *This report represents a summary of open source information, gathered up to and including 26 March 2020, and was finalised on 27 March 2020. All views and opinions expressed are solely those of the author, unless otherwise stated and do not necessarily represent the official position of the CMDR COE or any government and non-government organisation or other group. The author does not bear responsibility for incomplete or incorrect facts cited or referred to herein. The majority of reference materials include media sources, official websites of governmental institutions, documents published by the World Health Organisation, and online statistical databases – i.e. World Meter.*

Introduction

COVID-19 pandemic has triggered unprecedented response measures across the globe and has clearly indicated that vulnerability and risk assessment should be coupled by commensurate preparedness measures to effectively prevent the spread of a highly infectious disease. The pandemic has also challenged global, and particularly European, socio-economic models. While countries fight with time in an attempt to hammer out measures to address the crisis, the differences in approach become evident. From virtually little to none (up until recently the UK), through light (Sweden) to heavy precautionary and restrictive measures (China), fighting an invisible, yet known enemy has raised significant questions as per preparedness and anticipation, resolve and solidarity, confidence in and public support for actions.

A positive characteristic of global connectedness and interdependence in a time of pandemics is the flow of information and the exchange of good practices. Therefore, searching for good examples illuminates countries who not only experience epidemics, but learn from lessons identified during times of emergency. Taiwan's response to COVID-19 showcases that systematic and massive tracking and tracing, coupled by mass testing within a strategy of suppression and containment are critical in curbing the spread of the virus. This strategy is in a stark contrast with the response of the majority of countries in Europe, which largely favour a mitigation course of action, i.e. "flattening the curve", so that preparedness is ramped up and capacity is gradually built to face the peak of onset. Preparedness and resilience, however, are long-term capacities, which inform capability development and prime for facing emergencies, before the actual occurrence. Taiwan's response to COVID-19 exemplifies the added value of lessons well-learned from SARS epidemics in 2003 – the country developed well-gearred emergency response infrastructure primed for medical / health emergencies.

Taiwan's response represents a balanced understanding that if applied early-on less restrictive measures such as mass testing and quarantine for people at risk¹ lead to early identification even before symptoms occur, and prevent further transmission of the virus. Noteworthy, tailored and targeted awareness-raising and education enables people to identify symptoms earlier, improve personal protection (personal distance, mask-wearing, washing hands or disinfecting spaces), and thus reduce overall contagiousness (Pueyo 2020). Transparent and regular public risk information ensures trust and respect for measures, and increases mental strength and preparedness to deal with isolation and distancing. When these *lighter* early-on measures are not or are hastily (the urgency of the crisis) planned for, and ultimately fail to achieve the intended and expected outcome of reducing transmission (the situation largely in Europe and in the USA currently), stricter (physical distancing²) measures could and should be considered regardless of the economic cost. The long-term cost-benefit analysis in such an emergency is not essentially economic, but human /social.

The assessment of the effects of measures applied to limit the transmission of the virus requires skilled, well-trained and well-equipped³ medical personnel, which is a task for the education system. Assessing the effects of measures on the financial stability is a matter of importance for the economic system. Importantly, these even if the respective analysis is performed independently, there should exist a clear understanding of the matter at stake – human life, of a common direction of preparedness for similar future scenarios, and an exit strategy for the long term.

Taiwan has maintained a considerably low number of confirmed cases, and detected most cases⁴ of possible community spread, while Europe and the United States are currently the epicenters of the global pandemic (Chang 2020). Taiwan's containment is possible due to the well-functioning healthcare system linked to the country's medical education and training system, which provides skilled personnel well-equipped (including technical infrastructure) to understand the virus better, respectively respond to it in a more effective manner.

Given Taiwan's example, an early response successfully limiting the transmission of COVID-19 is a function of discipline by the entire population, which is supported by high levels of trust and acceptance of the process of elaboration and implementation of measures. The latter process is kept transparent through an accurate, timely and understandable risk communication. Key to the strategy of containment of COVID-19 is suppressing its transmission rate, as Pueyo points

¹ Such who have travelled to high risk countries, have been in contact with confirmed cases of COVID-19, or have been in contact with people who have returned from these countries at risk.

² The author considers the newly established convention of terming COVID-19 measures as "social distancing" incorrectly representing a situation in which people are socially closer than perhaps ever before uniting in solidarity and shared sympathy for all those fighting with the spread of the virus. This is evident in social media, regular media – TV and radio, and showcased by numerous initiatives, including charities and donations, around the globe. Therefore, the author would suggest instead, referring to **physical distancing** as this is more indicative of what COVID-19 measures aim at and achieve in practice, though with varying success. Note, physical distancing does not necessarily require or induce social distancing, but changes the means of establishing and maintaining contact.

³ 3D printing is already gaining traction in terms of supporting the production of life-saving emergency equipment such as ventilators and intensive care units (ICUs). This also helps companies possessing 3D printing capabilities and not operating within their standard business routines (i.e. car companies) to re-orient production and thus keep their businesses functional. More on this topic in Appendix 1.

⁴ Mass testing to identify and isolate cases, i.e. places where the virus is concentrated.

out, to an average that prevents an outbreak into an epidemic or pandemic (Pueyo, Coronavirus: The Hammer and the Dance 2020), and Taiwan provides a noteworthy example to this effect.

Taiwan's examples – COVID-19

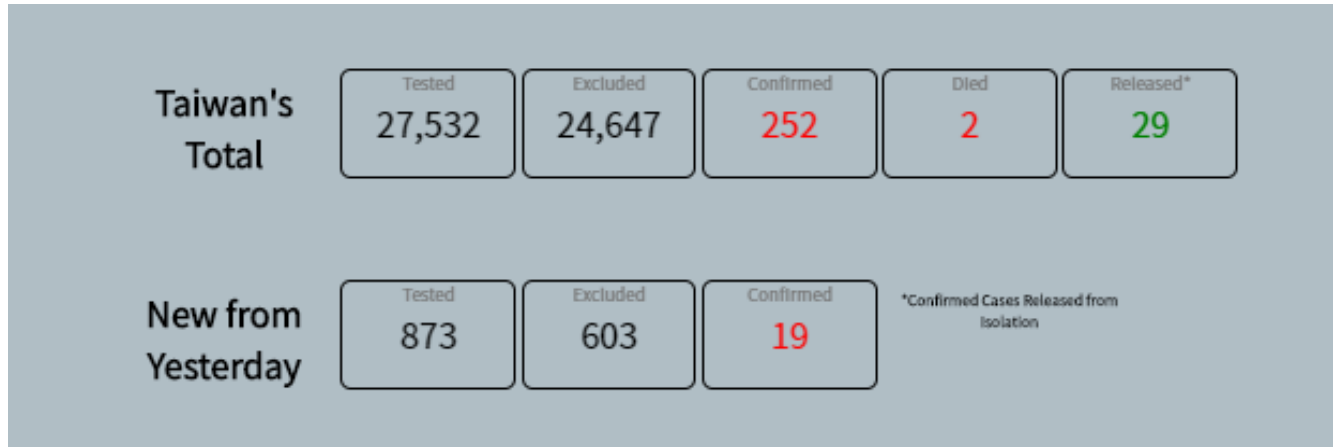


Figure 1: Data for 26 March 2020. Source: Taiwan Centers for Disease Control: <https://sites.google.com/cdc.gov.tw/2019-ncov/taiwan>

Despite proximity to the original outbreak of COVID-19 (i.e. China), the high number of people working or residing in China (i.e. high exchange of travels / visits), and a high density of population⁵, Taiwan is successfully containing the spread of the COVID-19 (Figure 1). The country's situation remains in stark contrast with developments in Europe, particularly in Italy and Spain, and now – the USA.

Also in contrast is the fact that Taiwan has had to manage the crisis without any direct communication channel with the World Health Organisation (WHO)⁶ (Di Paolo Emilio 2020). Not being part of WHO (observer status) also prevents systematic sharing of data⁷ (on cases), information (response), and best practices (measures) in tackling the pandemic.

Taiwan Response could be generally described as “a combination of preparedness, technology, and transparency” (Shapiro 2020) aimed at *containing the spread* COVID-19 by strict control of internal transmission⁸ through mass testing for detecting cases of possible community spread, and contact tracing⁹. Critically, public acceptance and respect for measures implemented is

⁵ Total area: 35,980 km², density of population: 658.05 km², concentrated in urban zones. Source: CIA Factbook Taiwan: <https://www.cia.gov/library/publications/the-world-factbook/geos/tw.html>

⁶ For more on this matter see, for instance, (Hale 2020), (Yip 2020), and (The Guardian 2020)

⁷ WHO does not provide separate data for Taiwan and it is not clear for the author whether WHO computes Taiwan's data on COVID-19 together with data for China. WorldoMeters data on China statistics vary in relation to data from WHO on the same country.

⁸ The majority of cases reported are such of people coming to the country – *imported* cases.

⁹ Contact tracing, including door-to-door monitoring to identify cases with symptoms (Di Paolo Emilio 2020). Furthermore, existing neighbourhood **warden system** facilitates enforcement of the quarantines and helps delivery of meals and other assistance (Shapiro 2020).

remarkably high and attributed to a timely, transparent and understandable public risk communication.

Coordination lies at the centre of efforts, which are exerted in a well-organised, and tailored for emergency situations, legal and operational framework. A central command led by the Ministry of Health and Welfare¹⁰, the Taiwan Centers for Disease Control (Taiwan CDC), and the specially designed National Health Command Centre¹¹ (NHCC)¹² ensure interagency interaction and coordination of efforts, capacities and capabilities for swift yet well-informed, science- and analysis-based decision-making and response. The Central Epidemics Command Center (CECC or Central Command) was established to coordinate a wide-array of combating measures, including departmental coordination and mobilisation of resources. In addition, Taiwan's *single-player* healthcare system ensures universal coverage and hence, access to services.

Mass testing and systematic contact tracking and recording allowed Taiwan to identify, process and contain transmission of COVID-19. Daily PCR testing capacity for COVID-19 reached approximately 1,300 samples¹³ and, critically, **people who tested negative for the virus were retested to keep track of new cases.** Sex-disaggregated data on medical and travel histories is collected to create patient profiles and further seek links and patterns (including in terms of transmission¹⁴) and ultimately shed light on COVID-19 characteristics, thus increasing the understanding of the virus¹⁵. In addition, a specific focus is placed on identifying

¹⁰ The Minister acting as a commander-in-chief (Shapiro 2020).

¹¹ Established in the aftermath of the SARS outbreak in 2004. See, for instance, (Duff-Brown 2020) and (Di Paolo Emilio 2020). It is a unified central command system that includes the Central Epidemic Command Center, the Biological Pathogen Disaster Command Center, the Counter-Bioterrorism Command Center and the Central Medical Emergency Operations Center. This joint framework serves as a comprehensive platform for preventing major epidemics (source: Taiwan Centers for Disease Control: <https://www.cdc.gov.tw/En/Category/MPage/gL7-bARtHyNdrDq882pJ9Q>)

¹² NHCC prepared a list of 124 measures for managing COVID-119 spread. See (Wang and RH 2020)

¹³ Daily capacity for Bulgaria for PCR testing was reported at approximately 1000-1200 samples.

¹⁴ An example of a notice issued by Taiwan CDC:

1. Sex-disaggregated data and anonymity kept: "On March 25, the Central Epidemic Command Center (CECC) announced 19 new confirmed imported cases of coronavirus disease 2019 (COVID-19) in Taiwan. Among the 19 imported cases (**Cases #217-235**), **12 patients are women and seven are men**, with their ages ranging between **10 and 69 years old**. These patients entered Taiwan between March 12 and March 22 and displayed symptoms between March 15 and March 23. The countries these patients had traveled to before the onset of disease include Belgium, Egypt, France, Thailand, Turkey, the Netherlands, the United Kingdom and the United States.

2. Search for patterns among cases (continuous monitoring and analysis of links), regardless of sequence: "With respect to **Cases #222-225**, the four patients studied abroad at the same education institution in the United Kingdom **as Case #152**. "

3. Identifying clusters: "They were detected **at the airport** and reported to health agencies when entering Taiwan on March 22. Infection with COVID-19 was laboratory-confirmed in the cases on March 25. Related **investigations suggest that it is a cluster infections on campus**. [...]Case #226 is a member of **a travel group to Egypt**. During the home isolation period, the patient had a dry throat on March 21, and health officials arranged medical care for the patient who was then tested for COVID-19. Infection with COVID-19 was laboratory-confirmed in the case on March 25. A total of **ten individuals in the cluster involving the tour group have been diagnosed with COVID-19 (nine group members, one contact)**."

4. Importantly, non-cluster cases are marked for further investigation: "The remaining 13 cases are not linked to other confirmed cases."

The full text of the notice is available at: <https://www.cdc.gov.tw/En/Bulletin/Detail/pqRXxBZDUwUzwGLYDkxk3g?typeid=158>

¹⁵ Key questions still lacking definite scientifically derived answers: 1. How does the virus spread? 2. How long does the virus survive? On what surfaces? 3. How can the spread be slowed down? 4. What is the share of asymptomatic carriers? Are they contagious? How much? 5. What are effective treatments? 6. How do different social distancing measures impact the transmission rate? What's their cost? 7. What are best practices in tracing and tracking?

and containing cluster cases, which to also enable information sharing with other countries (for imported cases).

Normative / legal framework

Overall, all measures undertaken by the emergency establishment of Taiwan have firm legal grounds (Chang 2020). Lessons-learned from 2003 SARS included specific legal changes, most importantly the adoption and continuous update¹⁶ of the Communicable Disease Control Act.

In addition, Special Act for Prevention, Relief and Revitalization Measures for Severe Pneumonia with Novel Pathogens (Special Act or COVID-19 Special Act) was promulgated in February 2020. Under this act, two important regulations were adopted: 1. the Regulations Governing Compensation for Periods of Isolation and Quarantine for COVID-19 (10 March 2020) stipulating that those imposed with isolation or quarantines, or such who must take care of isolated or quarantined can receive (eligibility criteria) a daily compensation of 1000 NTD for 14 days (Chang 2020).

As early as 30 December 2019, Taiwan CDC undertook inspections on travels from Wuhan, China¹⁷. On 15 January 2020, the CDC officially added the novel coronavirus, COVID-19, into the Category V Communicable Disease. These measures were, as Chang points out, “undertaken well before the first meeting of the WHO’s Emergency Committee and its declaration of the new coronavirus as a global emergency” (Chang 2020), which emphasises Taiwan’s pre-emptive and anticipatory capacity. However, such a capacity would not have been possible without a firm and legally-grounded technical and institutional infrastructure.

Taiwan’s approach in fighting COVID-19 has demonstrated the country’s capacity to swiftly manage a health crisis in a transparent, democratic and legal manner. The legal and normative framework is hammered out in cooperation and consultation with a vibrant civil society able to support governmental efforts in elaborating workable and effective solutions in time of high public health urgency (Chang 2020).

Technology and big data analysis

Taiwan integrated databases belonging to the National Health Insurance Administration, National Immigration Agency, and Customs Administration and then used artificial intelligence and big data techniques to identify people at greatest risk through their travel and medical history (Shapiro 2020)¹⁸. Information collected concerned every citizen’s 14-day travel history and led to requests for those who had visited high-risk areas to self-isolate. Further, information about infected patients’ location and TOCC (travel, occupation, contact, and cluster)

¹⁶ Latest in 2019. See (Chang 2020).

¹⁷ Including, health officers boarding planes to check passengers for symptoms, not allowing disembarkation prior to a medical check-up (Shapiro 2020).

¹⁸ Shapiro (Shapiro 2020) also points to a potentially serious transmission issue concerning an estimate of 50,000 undocumented workers from Southeast Asia, the majority of whom serving as caregivers for the elderly. Their reluctance to seek medical help and treatment and to report symptoms could cause a significant downturn in efforts to curb COVID-19 spread. Proposals made by civil society organization revolve around amnesty for the illegal immigration status.

resulted in rapid case identification by generating real-time alerts during a clinical visit based on travel history and clinical symptoms.

QR codes were used to classify travelers' infectious risks based on flight origin and travel history in the last 14 days - people who had not traveled to high-risk areas were sent a health declaration border pass via SMS for faster immigration clearance; people who had traveled to high-risk areas were quarantined at home and tracked through their mobile phones¹⁹

A mask-rationing system (see below in Concrete measures) was introduced which used the National Health Insurance (NHI) cloud computing system for monitoring the respect for the rationing rules and for the sale of the masks. A significant challenge, well-managed by Taiwan, was handling the additional load during peak sales periods so that mask sales did not compromise the main function of the NHIA's PharmaCloud System of storing medical records and allowing health care institutions access to them (Yip 2020).

Specific measures²⁰

1. Travel restrictions - Wuhan's case considered showing that a travel ban is only useful when it is enacted early on, not after an outbreak has occurred. Therefore, already at the end of December 2019 Taiwan Centers for Disease Control began monitoring passengers who arrived in the country from Wuhan (arrivals were subject to health screenings before human-to-human transmission of the virus was confirmed on Jan 20).
2. Border controls and ban on exports of surgical masks.
3. Special unpaid leave of fourteen days for workers for taking care of dependent children.
4. Tax deduction incentives for businesses providing workers with paid leaves.
5. Since the pandemic of COVID-19 is largely under control, businesses and events are not compulsorily closed or banned, however, there are specific requirements stipulated in Guidelines for Large-Scale Public Gatherings in the Wake of the COVID-19 Outbreak: 1. ability to gain information on participants beforehand; 2. air ventilation and replacement; 3. distance between participants; 4. whether participants are in a fixed position; 5. event duration; 6. hand hygiene and surgical masks. If an assessment of the nature of the gathering points to a high degree of risk, the CECC recommends that the gathering be postponed or cancelled, or held in a different manner (Taiwan CDC info notice²¹).
6. Masks, sanitisers, thermometers - a rationing system for purchasing face masks was introduced based on odd or even numbered National Health Insurance (NHI) cards, and places the limit for an adult at two face masks at government fixed price per week at NHI contracted pharmacies and local public health clinics in rural areas. Masks made available for children under the age of 12. By late February, Taiwan distributed nearly 6.5

¹⁹ Phone tracking to enforce mandatory quarantine was based on phone sim cards and nearby base stations. Despite assurances from Taiwanese officials that the action is legal as the tracking takes place only during the period of mandatory quarantine (The Guardian 2020), caution should be exercised as to eliminate the possibility of overstepping democratic principles.

²⁰ Based on / adapted from (Wang and RH 2020).

²¹ Available at: <https://www.cdc.gov.tw/En/Bulletin/Detail/ShUbXkJuFTOs3DCianO-YQ?typeid=158>

million masks to primary and secondary schools, as well as after-school institutions, plus 84,000 liters of hand sanitizer and 25,000 forehead thermometers. Soldiers were mobilised to production lines at local mask factories. 60 additional surgical mask machines installed (technology) with 10% of capacity reserved for children. Each machine can manufacture 100,000 surgical masks per day - daily output boosted to 10 million masks a day.

7. Disinfection - coordination between the CECC, the Environmental Protection Administration, the Ministry of Education, and local environmental protection departments to disinfect public spaces around schools and school areas open to the public during winter break - Ministry of Education oversaw commissioning of licensed companies to disinfect universities and colleges (Wang and RH 2020).

Taiwan's approach is therefore, a combination of quick legally-based mobilization, organised institutional cooperation and coordination, emergency implementation of data analysis and new technologies, wide public trust, and transparent communication strategy aimed at containing the transmission of the virus.

Conclusions and recommendations

In the short to medium-term the Republic of Bulgaria should continue implementing strict distancing measures within an overall strategy of containment²², and these measures should be positioned on a firm legal foundation. Laws and guidelines for health emergencies of the kind should be updated and improved, and a specific command and control emergency structure should be specified and should we easily activated when required. Simultaneously, discussion on long-term effects of the emergency / crisis should be taking place among relevant stakeholders, including the civil society. An important long-term consideration which would require wide coordination and cooperation, should address bottlenecks, as showcased by the current crisis, within existing socio-economic models, particularly in Europe. Specifically, attention should be placed on (building / strengthening) societal resilience, and societal cohesion, solidarity (particularly among partners within various fora), and nurturing a collective consciousness – all of which to increase the preparedness of societies for similar future scenarios.

Taking Taiwan's case, Bulgarian authorities should step up testing and improving tracking investigations while also strengthening data recording and analysis, including through the use of AI for big data analysis. Coordination of different systems providing separately critical

²² Mitigation strategy has triggered a controversial discussion on "herd immunity" for COVID-19. The lack of medically confirmed immunity after recovery from the disease, coupled by mutation rate estimates for RNA-based viruses (some argue 100 times faster than DNA-based viruses) turns such a strategy into a very risky and potentially deadly enterprise particularly enabling further virus mutations (Pueyo, Coronavirus: The Hammer and the Dance 2020).

information on medical status and travel history would evidently enable better case identification and subsequent quarantine, hence decrease in transmission rate. Achieving full population support and thereby increased respect for measures implemented, should be a matter of first order priority. The communication established is transparent and regular, however, cases of disrespect for hygiene instructions and worse – quarantine, signal that channels of communication should be diversified and messages tailored to reach out to specific societal groups²³ while also analysing data disaggregated by, inter alia, age, sex, social and economic status, ethnicity.

Supporting local production, as in the mask production example, is a beneficial approach and should be extended to include re-organisation of production of businesses currently not operating under standard routine to capitalize on capacities available for handling shortages caused by the crisis. Exploring 3D printing capabilities for the production of emergency equipment, i.e. ventilators, could also prove a salient measure in the emergency of the situation.

Decision-making matrix

Figure 2 (below) shows that Non-pharmaceutical measures are interrelated, and failure to introduce early-on measures results in more urgent stringent actions, and more *expensive* (in every aspect) measures later on. The examples provided point at difficult trade-offs between health protection and economic viability.

²³ Attention should be placed on communicating timely and clearly measures for addressing communities at risk, i.e. Roma communities, refugee camps, migrants, homeless people

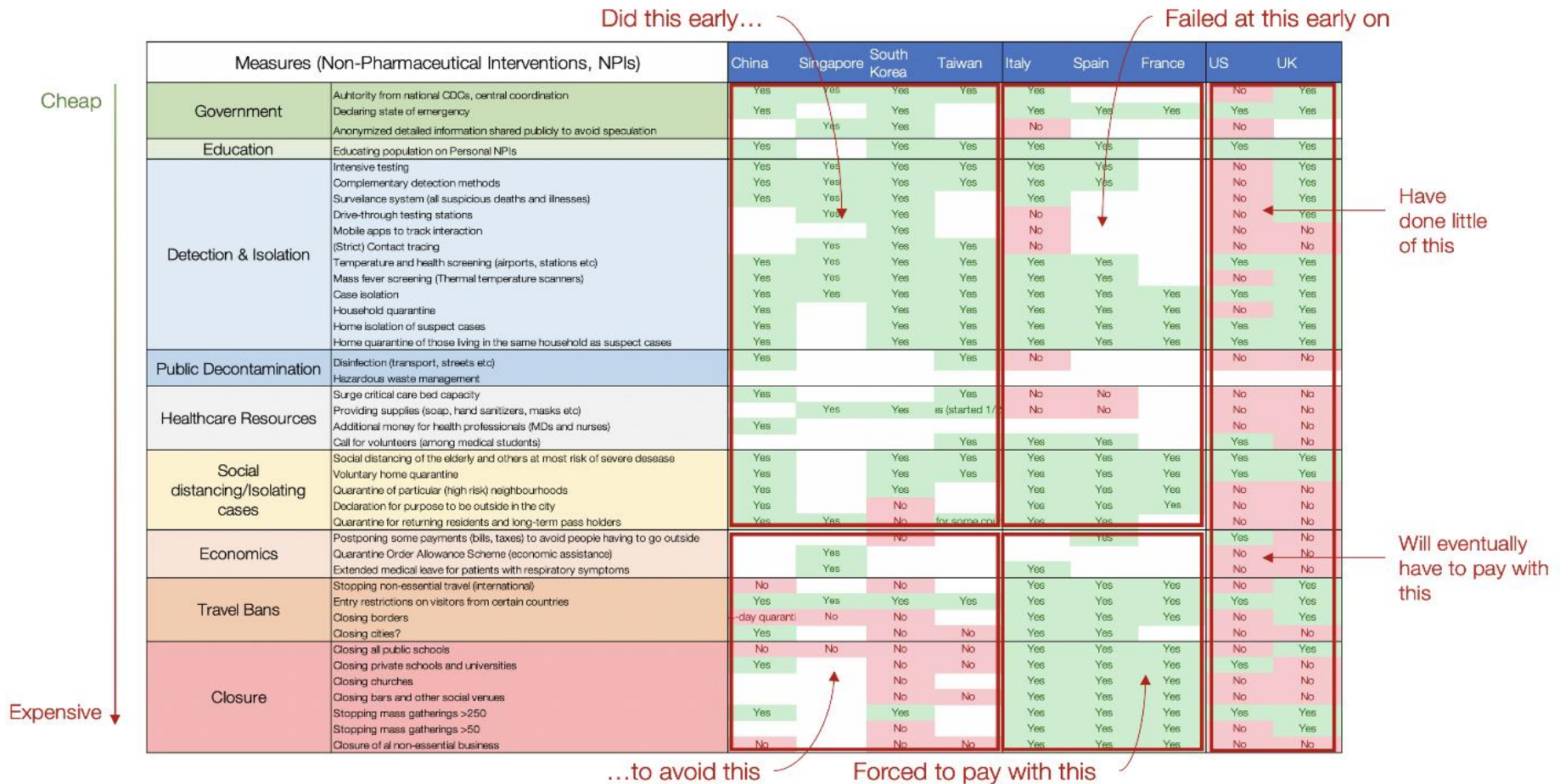


Figure 2: Non-pharmaceutical Interventions (NPIs). Source : (Pueyo, Coronavirus: The Hammer and the Dance 2020).

In an attempt to provide a matrix for COVID-19 decision-making, holding that suppressing transmission rate is key to a successful disease containment, the author would like to suggest, adapting the model presented by Pueyo (Pueyo, Coronavirus: The Hammer and the Dance 2020), the following:

		Benefit As per reducing the transmission rate – estimation of transmission rate	Realisation of benefit (confidence in benefit)	Importance if realised	Cost	Decision on implementation	Elaboration, If partial implementation
Measures			Choose an item.	Choose an item.		Choose an item.	
			Choose an item.	Choose an item.		Choose an item.	
			Choose an item.	Choose an item.		Choose an item.	

The matrix aims to estimate the impact of every measure on reducing the transmission rate, and their social and economic costs so as to enable informed and analysis-based decision-making. This is not an exhaustive list of consideration but an illustration of an additional tool for better informing the process of decision-making.

Benefit as per reducing the transmission rate – involves calculation of transmission rate and estimation of change after introduction of a concrete measure. The closer the transmission rate to 0, the smaller the possibility of an outbreak of infection (the slower the peak of onset and fewer cases resulting in death) (Pueyo, Coronavirus: The Hammer and the Dance 2020).

Realisation of benefit – would the benefit materialize – gauging from low to high confidence in the success (achieving the intended outcome) of the measure.

Importance if realised – as per the decrease of transmission rate - from low to high.

Note that, there could be measures that score low in confidence in realisation but high on importance if achieved.

Cost – in material terms of the implementation of the measure - could be per day / week/ month – BGN

Decision on implementation – alongside other analysis and assessment – whether to apply the measure or not, or to some extent (partially).

Elaboration for partial implementation – why such decision – what in the current situation prevents from full implementation; expectations of future full implementation. Allows to follow changes in understanding of the severity and scope of the crisis.

The use of modern technology in production of ICU units

3D Printing providing a solution

In an attempt to respond to the shortage of critical life-saving equipment, specifically – ventilators, governments have turned to modern technology, more precisely 3D printing. Already companies such as Vauxhall and Airbus have pledged to 3D-print parts in ‘wartime’ drive to make 20,000 ventilators in weeks (Davies 2020). Car companies, which have shut down regular production, have been redirecting production towards medical equipment receiving blueprint from governments and selling the produced to the governments (Davies 2020).

3D printing in Bulgaria

3D printing in Bulgaria is still not wide-spread and well-developed. However, Sofia Technical University works with 3 technologies for 3D printing. The type of technology, respectively 3D printing machine, depends on the sort of detail to be produced (complexity). Additionally, there are private companies and firms specialising in different technologies, as it follows:

- Easy 3D - <https://easy3d.bg/> - FDM and SLA technology for printing
- DiTra - <https://www.ditra.bg/> - using Stratasys
- B2N/3D Happiness - <http://b2n.bg/>
 - SLA – Stereolithography
 - SHS – Selective Heat Sintering
 - PJP – Plastic Jet Printing
 - LPD – Layer Plastic Deposition
 - SDL – Selective Deposition Lamination

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