

**Coronavirus Disease - 2019 (COVID-19)
Country Support Missions**

IRAN MISSION REPORT

2 - 11 MARCH 2020

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EXECUTIVE SUMMARY

On 19 February 2020, the Islamic Republic of Iran confirmed its first two cases of COVID-19 in Qom City. Subsequent investigations indicated that the virus had likely been circulating for several weeks. Qom is considered a holy city in Shi'a Islam and receives millions of pilgrims every year from across Iran and from overseas. Within 15 days of the first recorded case, confirmed COVID-19 cases had already been identified in all 31 provinces.

Iranian authorities moved quickly to respond to the outbreak, employing both a whole-of-government and whole-of-society approach. A cabinet-level National Committee for Managing COVID-19 was established, chaired by the Minister of Health and Medical Education with solid support from the President. Similar structures have been formed at provincial level, overseen by governors. For the health sector executive committees have been formed at national, academic/provincial and city levels, with operational teams at Comprehensive Health Centers (CHCs). Six hubs have been established across the country that are overseen by the respective Chancellor of the University of Medical Science. Civil society, the private sector and security forces have also been mobilized to support the operations.

Health authorities have set appropriate priorities and are open to adopting some of the lessons learned from China and elsewhere. The overall approach is solid with efforts being scaled up in early detection, early testing, early isolation, early treatment, contact tracing and community engagement. Similarly, an increasing effort in mitigation areas that emphasize physical distancing is being employed, including school closures, suspension of mass gatherings, modest travel restrictions etc. Nonetheless, these remain the early weeks of the response and further improvements are required across all these areas.

Good progress has been especially made in several key areas. Testing capacity has been rapidly expanded, under the coordination of the Pasteur Institute. At the start of the outbreak, only two laboratories had the capacity to test for the coronavirus; by 11 March the number was 30. But even with this capacity health workers were still only able to test primarily severe and critical cases. The goal is to establish over 100 testing sites and to test all suspect cases, even those with mild symptoms.

Designated hospitals have been established for COVID-19, thereby concentrating the patients, clinical staff, resources and quality of care. Medical staff are dedicated and committed, providing a good quality of care. The National Mobilization Campaign Against Coronavirus was launched on 5 March. It leverages the strong primary health care assets and health information system to enable education of the community, active surveillance, early detection and referral, home isolation, and follow up of both mild cases and close contacts.

Authorities have developed a well-structured approach to risk communications and community engagement that employs separate tactics for different target audiences, including those with varying levels of concern and knowledge about the outbreak. Authorities have engaged in broad community outreach on COVID-19 in collaboration with traditional media, social media, religious leaders, the private sector, celebrities, influencers, and others. This is being boosted by the national campaign, which includes over 300,000 volunteers who will also be undertaking active community outreach.

Among the areas of the response requiring most attention for strengthening are surveillance and epidemiological analysis, infection prevention and control, contact tracing and monitoring and evaluation.

As yet there is not a single, integrated surveillance system to collect information on COVID-19 cases. Similar to almost every country globally, the reported figures for COVID-19 cases are an underestimate, due to the still limited testing capacity, large number of mild cases not seeking care, and the surveillance system. The level of epidemiological analysis remains insufficient to drive the response to the outbreak.

One of the biggest challenges is the lack of personal protective equipment (PPE) for health workers. Again, this problem is not unique to Iran as there are major market disruptions at international level that are limiting the global supply. In addition to the PPE shortages, mission members observed several problems in the adherence to and enforcement of infections prevention and control (IPC) protocols.

Almost all mild cases are still being managed by home isolation, thereby risking further community transmission; although an increasing number of temporary isolation units are being established to accommodate them. Contact tracing has not yet been firmly instituted across the provinces, but it has been initiated in a number of sites and is gradually expanding. As yet there is no established system for monitoring the effectiveness of the response and key performance indicators need to be established.

The priority recommendations from the mission members are:

- Urgently intensify allocation of resources for the early detection, testing, isolation and treatment of all suspected COVID-19 cases, including mild cases. Consider different options for the isolation of mild cases based on available resources, e.g. temporary isolation units (TIU), home, hospitals;
- Continue to rapidly scale up national testing for COVID-19 by expanding the laboratory network and strengthening the capacities of individual laboratories;
- Continue to communicate with the population in an open and transparent manner regarding the evolution of and response to the COVID-19 outbreak. Ensure the following:
 - Clear guidance on measures that individuals can take to protect themselves and their families;
 - Clear recommendations on physical distancing, including staying at home wherever possible, working from home, avoiding large gatherings, limiting non-essential travel, etc.
- Rapidly expand and strengthen contact tracing, with initial focus on close contacts. Consider different options for the quarantining of close contacts based on available resources, e.g. temporary isolation units, home, other;
- Accelerate the integration of existing systems (i.e. MCMC, SIB, SSS, Sharepoint) to establish a single mechanism for collecting, reporting, analyzing, and communicating surveillance data (epidemiological, laboratory) on all COVID-19 cases;
- Enforce adherence to IPC policies and procedures in health care settings to prevent infections among health care workers and patients.

INTRODUCTION

The Islamic Republic of Iran, a country with a population of 81.8 million people, has a unique health system stewarded by Ministry of Health and Medical Education (MOHME). The backbone is a decentralized primary health care system that provides a minimum set of services for all residents. At the provincial level, the Universities of Medical Sciences and Health Services are responsible for providing health care and environmental health services. At the township and rural level, a District Health Network, comprised of a district health center, urban and rural health centers, health posts and health houses are charged with this responsibility.

The majority of health care delivery is publicly run; the private sector contributes to 10-20% and plays a more important role in the provision of secondary and tertiary care. Many clinicians who work in the public sector also practice in the private sector.

The MoHME has maximized the use of the technology to improve the health information system (HIS) across the country. There are number of HIS applications used by the health authorities for different purposes and objectives, including the Medical Care Management Center (MCMC, mainly hospital based), SIB (mainly primary care based), Syndromic Surveillance System (SSS) and others.

Iran has one of most sophisticated and robust disease surveillance systems at facility and community levels in the Eastern Mediterranean Region. The health authority developed Syndromic Surveillance System (SSS) application to enhance the real time reporting from health facilities to the higher level and rapid response to any public health event. In addition to this primary health care information system, a surveillance system for special groups of diseases is in place. One of the prioritized diseases is influenza, for which, the ministry has established sentinel sites for severe acute respiratory infections (SARI) and influenza-like-illnesses (ILI) across the country. This robust system has allowed Iran to conduct studies to estimate influenza burden and seasonal baseline and threshold values and accordingly use this data for health promotion and health policy making. Additionally, this system is an excellent example of Iran's surveillance system being connected to global surveillance platforms (such as FluNet).

Strengthening national capacity for emergency-preparedness and response with a focus on risk management has been among the priorities identified in the national strategy and emphasizes the government's commitment to universal health coverage. Iran's health system has strengthened its capacities to prevent, detect, and rapidly respond to public health threats, as per the International Health Regulations (2005). Using the data of the latest annual monitoring report, the country has been evaluated to have demonstrated capacities (score 4/5), with regards to outbreak preparedness and response.

On 31 December 2019, WHO was informed by Chinese authorities about several cases of pneumonia of unknown origin in Wuhan City, Hubei Province. Within 7 days the responsible agent was identified as a new coronavirus, subsequently named severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The new form of pneumonia caused by SARS-CoV-2 is now officially referred to as coronavirus disease (COVID-19).

Within 4 weeks of the first reports, China had documented over 4,500 COVID-19 cases and the disease had already spread to 14 other countries. On 30 January 30 2020, WHO declared a Public Health

Emergency of International Concern (PHEIC) – only the sixth such declaration since the revision of the International Health Regulations (IHR) in 2005.

On 19 February 2020, the Islamic Republic of Iran confirmed its first two cases of COVID-19 in Qom City, becoming the 26th country to document the disease. The outbreak spread quickly across the country; by 5 March – 15 days after the first official reports - cases had already been confirmed in all 31 provinces and 2,922 cases confirmed in total (Figure 1).

In light of the rapid spread and complexities of the COVID-19 outbreak, the Iranian Ministry of Health and Medical Education agreed to a technical support mission from WHO, together with the participation of experts from the Robert Koch Institute and the Chinese CDC. The final day of the mission, 11 March, also coincided with the public announcement by WHO Director General Tedros Adhanom Ghebreyesus that the global COVID-19 outbreak could be characterized as a pandemic. By that date that, Iran had already documented over 8,000 confirmed cases and the global total was in excess of 118,000.

This report describes the objectives, methodology, main findings and recommendations of the mission. It begins with a brief description of the health care system and operational context within Iran.

GOAL AND OBJECTIVES

The overall goal of the mission was to assist the MOHME in its analysis and control of the COVID-19 outbreak.

Objectives

- improve understanding of the evolving COVID-19 outbreak, including disease distribution, transmission dynamics, and at-risk populations,
- discuss current prioritization and implementation of control measures and agree on ways forward to improve their quality and the scale of the response;
- propose how response priorities and measures may be adjusted based on the evolution of the outbreak;
- identify how Iran can contribute to addressing knowledge gaps concerning COVID-19, including participation in collaborative research.

Specific Tasks

- Conduct rapid assessment of key core capacities and plans, including surveillance, rapid response teams, logistics and supply management, coordination and communication mechanisms, points of entry, referral facilities and infection prevention and control. etc.
- Review contingency plans for supplies and stockpiling
- Brief on the relevant available guidelines, online resources (dashboards), training materials and risk communication products and provide technical support in adaptation to national context

COMPOSITION OF THE TEAM

The mission members consisted of six technical experts from the World Health Organization, Robert Koch Institute (RKI) and the China Center for Disease Control and Prevention (China CDC). Unfortunately, three additional members (with expertise in case management, infection prevention and control, and risk communications and community engagement) were unable to participate. The WHO Country Office (WCO) in Iran facilitated the mission activities and organized meetings with health authorities and other stakeholders

The mission was carried out by the following team members:

Richard Brennan	Team Lead; Regional Emergency Director, Health Emergencies Programme, WHO Regional Office for the Eastern Mediterranean, Cairo
Abdinasir Abubakar	Programme Area Manager, Infectious Hazard Prevention and Preparedness, Health Emergencies Programme, WHO Regional Office for the Eastern Mediterranean, Cairo
Pierre Nabeth	Programme Area Manager, Health Information Management, Health Emergencies Programme, WHO Regional Office for the Eastern Mediterranean, Cairo
Amal Barakat	Technical Officer, Infectious Hazard Prevention and Preparedness, Health Emergencies Programme, WHO Regional Office for the Eastern Mediterranean, Cairo
Andreas Jansen	Head of the WHO Collaborating Centre for GOARN, Robert Koch Institute, Berlin
Xuejun Ma	Director, Department of Core Facility, National Institute for Viral Disease Control and Prevention, Chinese Center for Disease Control and Prevention, Beijing

METHODOLOGY

The main methods employed included: review of background documents; interviews with key informants; joint discussions with government officials, health workers, community leaders, UN Country Team members and the diplomatic corps; site visits and direct observations at hospitals, primary health care centers, laboratories, public health offices responsible for follow up of cases and contacts, temporary isolation units, and a provincial emergency operations centre (EOC). Refer to Annex 1 for the mission programme, including summary of people met during the mission.

Mission members appreciated the level of transparency and openness by the authorities at national and provincial levels, including the very professional exchanges with colleagues across the health system. The productive engagement of colleagues from other Ministries and sectors was also noteworthy. The field visits and meetings were strategically linked with the mission objectives.

AREA SPECIFIC FINDINGS

Description of the outbreak

On 20 February, the Islamic Republic of Iran IHR National Focal Point (IHR-NFP) notified WHO of five cases, including two deaths, of laboratory-confirmed COVID-19 cases. Three of the cases were from Qom City, and the fourth had a travel history to Qom.

The two first cases were owners of shoe factories that have close relationships with China (sister city with Ningxia). There are more than 700 shoe factories in Qom that are supported by Chinese industrial firms. Their maintenance is operated by a Chinese-led factory in Qom, and consultants regularly travel from China to Qom. On 20-25 January, a shoe fair was organized in Qom and attended by several Chinese visitors. There are also several Chinese students with their families and Chinese workers engaged in the building of the Qom-Isfahan railway living in the city of Qom.

The two first cases who died of severe pneumonia had no recent travel history. But in the days preceding the onset of symptoms other family members, including some with recent travel history to China or working in the factories, had developed mild symptoms. One of them consulted an infectious disease specialist in Tehran who was aware of the COVID-19 outbreak in China. He was sampled and tested positive in the Pasteur Institute.

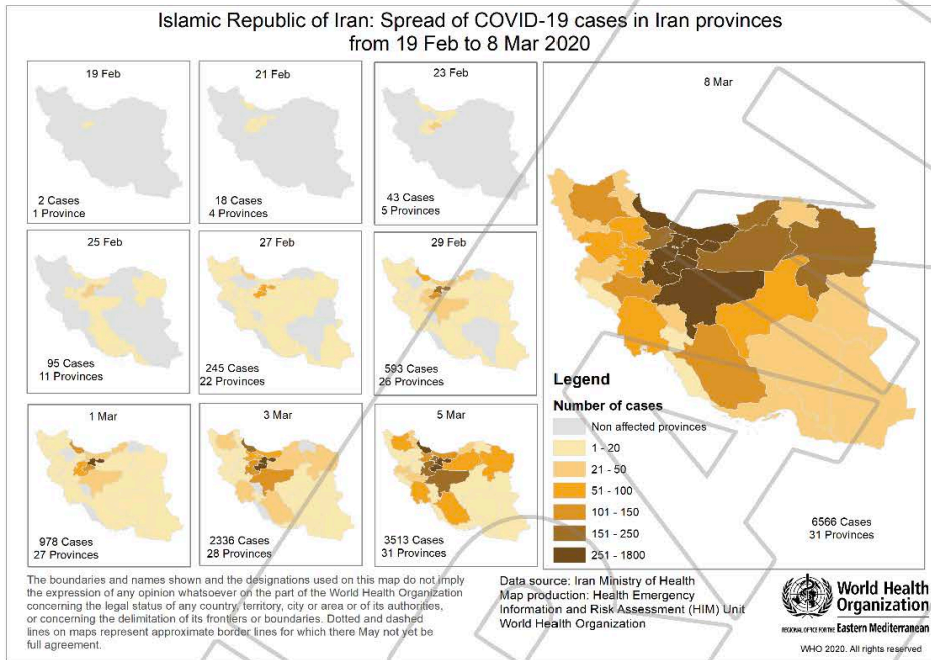
In the following days, the investigation concluded that the virus was probably circulating in Qom for several weeks, based on the following observations:

- Among 186 patients with severe acute respiratory infection (SARI) hospitalized during February, 8 deaths were observed (0 deaths for the same month last year);
- Samples taken in February in patients with influenza-like illness (ILI) symptoms that tested negative for Influenza were also tested for COVID-19. Among workers of the Salafchegan free zone located 50 km from Qom city centre, 5 tested positive for COVID-19; their onset of symptoms was 10 February;
- In late February, of 17 Chinese workers who had not traveled back to China for the Chinese New Year, 5 tested positive.

There was no mass gathering in Qom around the time when the first cases occurred. However, Qom, a city of 1.2 million inhabitants, is considered as a holy city in Shi'a Islam and it welcomes millions of pilgrims annually, mainly from Iran but also from across the World.

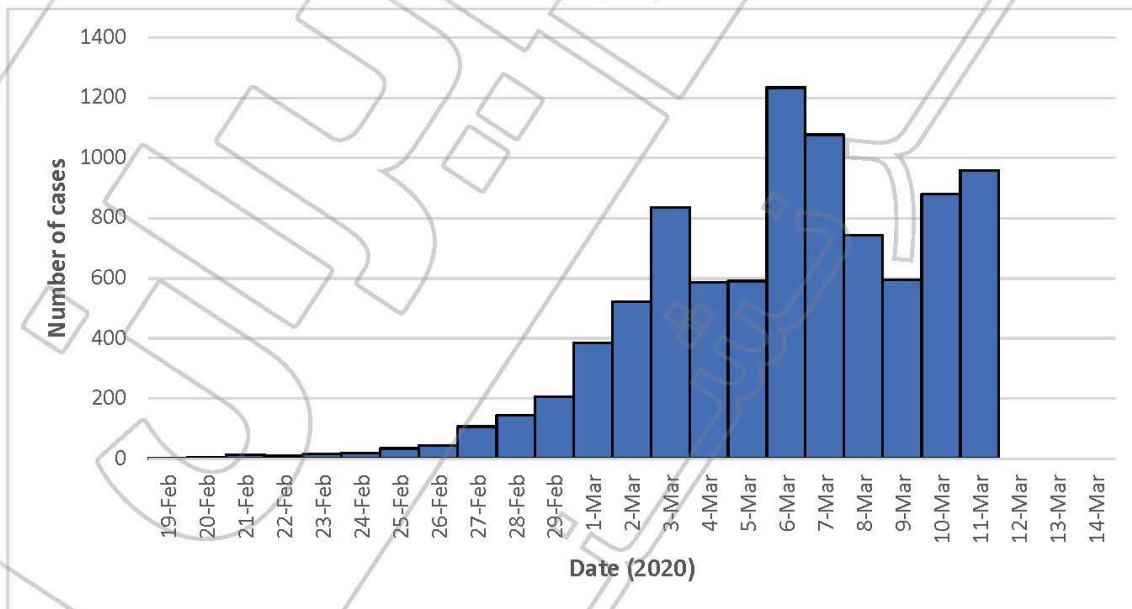
Observation of the daily reporting of cases by province suggests that the outbreak started in Qom and progressively spread to all other provinces by 5 March (see Figure 1):

Figure 1: Progressive spread of COVID-19 cases in the provinces, 19 February – 8 March 2020



Current situation (as of 11 March, 2020)

Figure 2: Daily distribution of COVID-19 cases in the Islamic Republic of Iran, 19 February - 11 March 2020 (n=9,000)



LEADERSHIP, COORDINATION AND PLANNING

Main Findings

The mission members observed a commitment to an all-of-government and all-of-society approach to the national response to the COVID-19 outbreak. The President has appointed a National Committee for Managing COVID-19, with representation of the Ministers from seven key ministries: Industry, Mining and Business; Roads and Urban Planning; Interior; Education; Tourism and Heritage; Culture and Islamic Guidance; and Hadj and Pilgrims. Each Minister chairs a related sub-committee for separate pillars of the response; it is expected that the Committee will soon be expanded, with additional sub-committees. The Minister of Health and Medical Education chairs the National Committee and has been assigned exceptional authority to make requests/demands of the other Ministers and their sub-committees. The President reportedly meets regularly with Committee members and holds each accountable for their contributions to the response.

There was clearly a strong commitment and engagement within the response from all of the Committee and sub-committee members with whom we met, and apparently good coordination. Similar multi-sectoral committees have been formed at provincial level that the governor convenes, which we observed in Qom.

For the health sector, executive committees have been formed at national, academic/provincial and city levels, with operational teams at Comprehensive Health Centers (CHCs). Six hubs have been established across the country that are overseen by the respective Chancellor of the University of Medical Science. The Chancellor has authority to mobilize resources from other sectors.

In addition to its well-functioning health system, Iran has a strong National Disaster Management Organization and strong military. All three sectors are being leveraged for the response and are reflective of the whole-of-society approach. As one example, the three are collaborating to establish and manage temporary isolation unit for confirmed cases who have been recently discharged from hospital (see under Case Management). During a meeting at the Tehran Disaster Management Headquarters – which has an impressive and well-equipped EOC – officials from other sectors also outlined concretely how they were contributing to the response and requested guidance from the mission members on how this could be improved. Sectors present included public transportation, food, environment, social services/NGOs, primary health care, and a private taxi company, among others.

The national strategy and plan for the COVID-19 response continues to evolve, informed by national developments and lessons learned from other affected countries, especially China. Team members were very impressed with how eager MOHME and other officials were to discuss priorities, strategies and the most effective technical interventions for controlling the outbreak. On the first day of the mission, Dr. Bruce Aylward, Team Lead for the recent WHO technical mission to China, conducted a briefing by videoconference for the Iranian Deputy Minister for Public Health, the Director General for the CDC and other senior MOHME officials. He shared the main observations and recommendations taken from China, emphasizing the centrality of early detection, early testing, early isolation and treatment, rigorous contact tracing, and risk communications and community engagement. These reflections helped to inform the evolution of the MOHME priorities and strategies.

On 5 March the government launched its National Mobilization Campaign Against Coronavirus, initially targeting the three hot spot provinces of Gilan, Mazandaran and Qom. It is designed to leverage the strong primary health care assets and health information system to enable education of the community, active surveillance, early detection and referral of suspect cases, home isolation and care, and follow up of both mild cases and close contacts.

Over 90% of the population are registered within the PHC information system - the Comprehensive Integrated System for Health (SIB). Staff at health posts and health houses are instructed to use their established linkages with the community to actively follow up with all community members through either phone calls or household visits regarding potential COVID-19 symptoms, exposure and/or risk factors. If any household member is considered a suspect case the details are recorded within SIB and s/he is then referred to a Comprehensive Health Centre for further assessment and possible onward referral. At the same time, the population is being encouraged to register their current status re potential COVID-19 symptoms, exposure and/or risk factors via a specifically developed portal related to SIB. Comprehensive Health Centres are being supplied with pulse oximeters, personal protective equipment (PPE), anti-virals and educational materials.

The campaign has only recently been launched, but integrates many of the public health measures that have proven to be effective in China.¹ Other elements of the overall government strategy and plan are described in the following sections.

EPIDEMIOLOGY AND SURVEILLANCE

Main Findings

Within the COVID-19 response structure, an Epidemiology Sub-committee is responsible for compiling and analyzing data, developing models, and providing evidence-based information and recommendations to senior officials. The only epidemiological data that is consistently shared daily by MOHME through its website or its twitter account is the daily numbers of cases and deaths by province. Although from 14 March, mission members started to receive a daily report that provided more descriptive analysis.

The epidemiological data presented in the reports and at meetings during the mission was not sufficiently comprehensive and lacked detailed analysis. There was limited description of clusters, patterns of transmission, risk factors or infections occurring within health facilities. As a result the available data and analysis was not suitable to help to drive the response to the outbreak. These limitations are partly explained by the fact that there is no database containing all the information on cases (see below) and also because of problems with the quality of the databases, including errors and incomplete data. Nonetheless, data on 559 confirmed cases was shared with the mission team, analysis of which is presented in Annex 2. Moving forward, daily and weekly reports of surveillance data should be systematically produced to guide the response to the outbreak. Information should be systematically shared with WHO.

Case definition – Identification of cases

¹ Note: By 23 March, over 43 million people had registered their COVID-19 status.

There are three case definitions for COVID-19 in Iran that are regularly updated - suspect cases, probable cases, and confirmed cases (Annex 3). The case definition for probable cases is not used; the case definition for suspect cases is applied to patients with severe symptoms only. Because of the lack of testing capacity across the country to date, only severe/critical patients are tested and the scale of the outbreak is therefore substantially underestimated. The case fatality rate (CFR) is overestimated for the same reason. It should be noted that these problems are being noted in almost all countries with local or community transmission, and are not specific to Iran. It is expected that as the testing capacity (see Laboratory section below) and active outreach through the national campaign expands, so will the reported number of cases increase. The aim is to eventually test all suspect cases, even those with mild cases. As long as mild cases are not considered as suspect, tested and isolated if positive, it will be very difficult to interrupt transmission of the virus.

The flowchart for the diagnosis of patients is well established but is not aligned to the case definition. WHO is proposing to modify it to ensure this alignment (Figures 3 and 4)

Figure 3: Current flowchart for the diagnosis of and referral for COVID-19

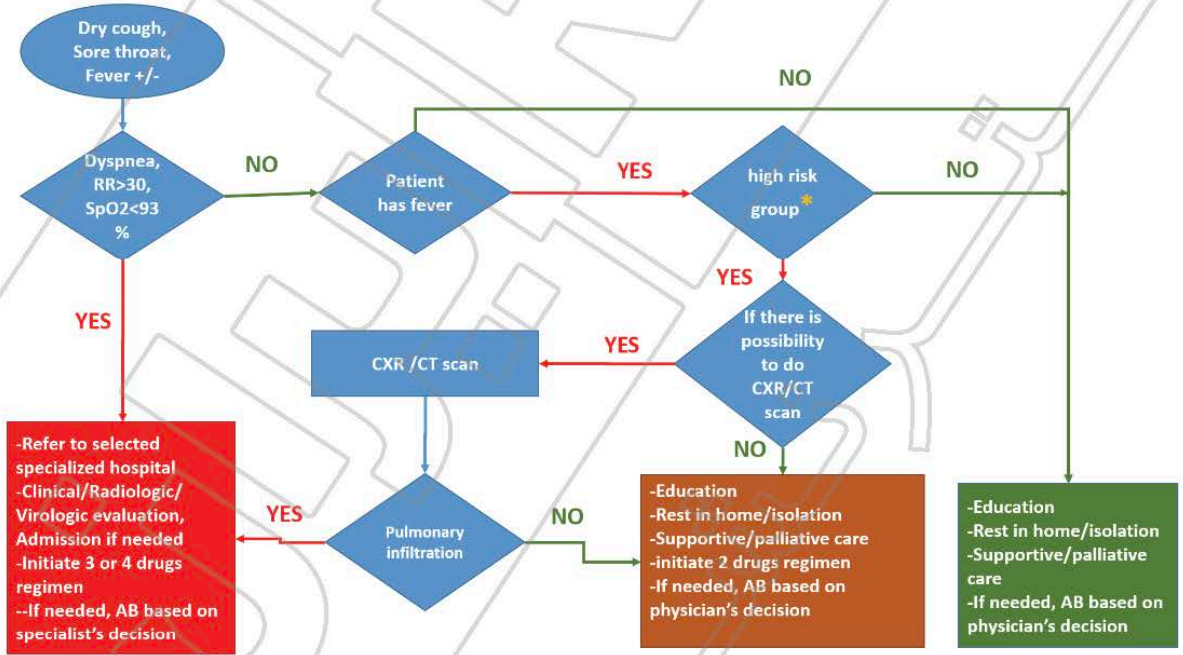
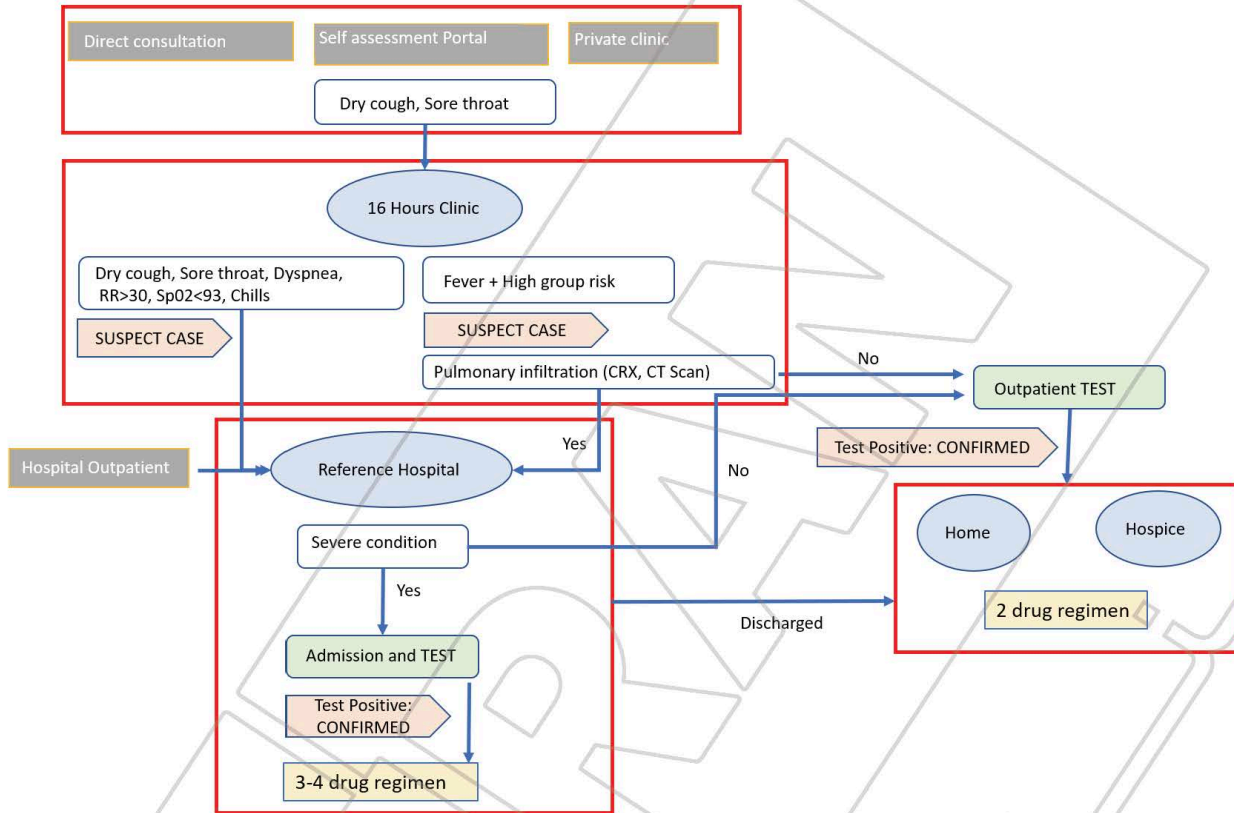


Figure 4: Proposed modified flowchart for the alignment of the case definition and the diagnosis of patients with COVID-19



Sources of epidemiological information

As noted above, there is no single source of epidemiological information in Iran to guide the response to COVID-19. Several systems are working in parallel making it difficult to compile comprehensive data and conduct analysis in a timely manner. These systems include:

- Portal for Medical Care Management Center (MCMC). A centralized system under the responsibility of the Deputy Minister for Therapeutics. It extracts information from the Health information system (HIS) that functions in all public hospitals. It was developed for reporting emergencies and was initially designed for road traffic injuries, but it has been adapted to COVID-19. Information on all patients hospitalized for more than 6 hours and tested for COVID-19 in the reference hospitals is entered in the system. No information on potential exposure is collected.
- Portal for Syndromic Surveillance System (SSS). The system established by the Iran Center for Disease Control (CDC) to report cases of influenza-like illness (ILI) and severe acute respiratory infections (SARI) from hospitals and sentinel sites. It also reporting of laboratory results. It is not currently functional in Qom.
- Sharepoint. As SSS was not collecting information from all health facilities, CDC established a Sharepoint at the beginning of the outbreak. Information on COVID-19 is actively collected in health facilities and hospitals, the WHO case reporting form is completed and the CDC Surveillance Officer working in the District Health Centre enters the information into the system. In addition to demographic information and symptomatology, information on risk factors and exposure of all tested patients is collected. Laboratories have access to the system and can

enter the results. Plans are to enter retrospectively patients tested since January. By 5 March there were 8060 records in the database

- Comprehensive Integrated System for Health (SIB). This 4 year old system operates in Primary Health Care facilities and records information on public health services. Data are entered at the health house/health post level. A total of 72 million citizens are registered (88% of the population of 82 million); 6.5 million citizens are registered in other systems. As noted above, the system now occupies an important role in the National Mobilization Campaign Against Coronavirus. Behvarzan (local health workers based in health posts) are actively following up via telephone and home visits to screen community members and entering data in the SIB system. This is complemented by the self-reporting platform through which community members report any symptoms, history or risk factors related to COVID-19.
- Reference laboratory for COVID-19. All COVID-19 laboratories are expected to submit their results via a web-based database, but it is not yet fully functional.

Unfortunately, none of these systems collects all the relevant information on COVID-19 cases. As almost every suspect/tested case is hospitalized, they are currently all reported in MCMC. However, other relevant information such as exposure or laboratory test results are not routinely reported through this system; such data is recorded in the other systems that themselves collect only limited information. A single system capturing all the required information should be established. Whatever system is selected, it must integrate data from hospitalized cases, mild cases that are not hospitalized, laboratories and other relevant surveillance data.

Modelling – Use of new technologies

To help to guide the planning and response to the outbreak, the Epidemiology Sub-committee has developed models for forecasting the number of cases. These are mainly based on the estimated R0 and differ according to the level of intervention. The models are regularly being revised and updated to inform planning. The sub-committee has requested WHO assistance in undertaking further modeling.

Investigation of cases

Response teams are active and have conducted outbreak investigations in all provinces with cases. Guidelines have been developed in Gilan and Qom and will be shared with all other provinces and with WHO.

Contact tracing

Contact tracing had not yet been scaled up in Iran at the time of the mission. The process, which is evolving across the provinces and country, involves home quarantine with regular follow-up through the primary health care system. Unlike China, there is not the capacity to place all close contacts in temporary quarantine facilities.

Close contacts are considered as those living under the same roof or working in a common place with a confirmed case. Contact tracing is not systematically organized in all provinces, but measures are being taken to improve this. In the province of Qom, which has a population of 1.3 million people, 1.2 million of whom live in the city, contact tracing activities were initiated on 1 March, leveraging the primary health care system. Contact tracing was not yet fully operational in Tehran at the time of the mission, but a mechanism is being put in place.

The process in Qom is evolving. Information concerning cases and contact is provided by the hospital to the District Health Center (DHC). This information is then conveyed to the behvarz – community health workers who are based in health posts, serving a population of between 500 - 1000. The behvarz visits or calls the households occupied by contacts of confirmed cases and informs the contacts about the need for home quarantine for 14 days and provides appropriate education. They then follow up with each contact twice per day by phone or home visits to determine whether the contact has developed symptoms. They establish linelists of contacts, record all relevant information and report on the status of contacts by telephone to a supervisor at a local coordination. When a contact develops symptoms, s/he is referred to one of the 27 Urban Comprehensive Community Health Centers (UCCHCC) across Qom. Supervisory checks are made through random calls made to 10% of households by the DHC and the UCCHCC.

Between 1 – 7 March, 20 of the 700 contacts followed developed symptoms and 2 tested positive. During the 2 last days, 250 households were visited and 25 suspect cases were identified. Contact tracing appears well implemented in Qom but should be extended and systematized in all provinces; identified contacts should be systematically quarantined. This activity could potentially be strengthened with the use of Go-Data, a tool developed by WHO that has been designed and effectively implemented for contact tracing.

Monitoring and evaluation

There is no formal monitoring and evaluation system currently in place to track the performance of the overall response to COVID-19. Such a system would inform evidence-based adjustments to operational priorities and actions. A list of key performance indicators (KPIs) with specified targets, to monitor the implementation of activities at country level is found in Annex 4.

LABORATORY TESTING

Main Findings

Within days of the confirmation of the first two COVID-19 cases 19 February, the MOHME established the National Laboratory Committee for COVID -19 chaired by the Director of the Pasteur Institute in Tehran, with additional representation from the Director of the National Reference Health Laboratory, the Director of the Food and Drug Reference Laboratory, and the Head of the Virology Lab at the Pasteur institute.

At the onset of the outbreak only the Pasteur Institute in Teheran was able to conduct SARS-CoV-2 testing. But the committee rapidly and impressively expanded diagnostic capacities across the country, establishing a national COVID-19 laboratory network. By 2 March, 22 laboratories were able to test for the virus and by the end of the mission on 11 March over 30 laboratories had the capacities.

This progress was facilitated by a number of accelerated measures: engagement of 13 influenza laboratories and nine Medical University laboratories in the national network; development of standard operating procedures and reporting tools; repurposing of existing staff and recruitment of additional staff; training on new protocols and SOPs; external quality control assessments to validate laboratories prior to their inclusion in the network; and prepositioning of PCR kits. In the current situation with

widespread COVID-19 transmission and constraints in testing capacity, the Pasteur Institute simplified the testing algorithm in line with WHO guidance. Specifically, E-gene positive samples are considered as confirmatory and not requiring repeat PCR.

At the time of the mission, the COVID-19 Laboratory network was undertaking about 4,000 tests per day with the aim to reach 10,000 per day by mid-March, and expanding to up to 3.2 million for the subsequent 6-8 weeks. Information sharing is done through the MOHME database and the test results are shared with the National Task Force daily; however, the integration of the data with epidemiological and other operational data is not yet well established.

The Pasteur Institute is tracking test consumption and needs and is monitoring the performance of testing protocols (different target genes, different brands, and different technologies) to exclude low quality kits from their supplies.

The network is not performing virus isolation and has limited sequencing capacity. The network has NGS capacity but has very limited experience with sequencing viruses in clinical samples.

The National Influenza Center hosted by the School of Public Health at Tehran University of Medical Sciences coordinates the influenza surveillance network including 13 regional influenza laboratories and has an excellent infrastructure for molecular diagnostic and Biosafety Level 2 Plus (BSL-2+) for cell culture and isolation of influenza viruses in cell lines and in eggs. Currently, they undertake about 250 tests for COVID-19 per day with a maximum capacity of 400 tests.

The Public Health Laboratory in Qom has a good PCR with a uni-directional flow of real-time RT-PCR processing within three discrete work areas (reagent preparation, RNA extraction, and PCR amplification). However the laboratory needs to implement and enhance the quality management program. Current capacity is 80 tests per day and can reach 200 tests with an automated extractor (that was expected to arrive the day after the visit).

During the mission, the importance of further expanding testing was discussed in detail with health authorities at national and provincial levels. While rapid progress has been made, testing for suspect cases with mild symptoms is still not widely available across the country. To date testing is available almost entirely at the designated referral hospitals for COVID-19, at the Pasteur Institute in Teheran, and some laboratories related to medical universities. To address this challenge, the MOHME has progressively expanded the target for testing sites from 50 to over 100, including the likely future engagement of private laboratories that would be required to undergo a certification process before they are included in the national network.

CASE MANAGEMENT AND INFECTION PREVENTION & CONTROL

Main Findings

Experience from China and elsewhere demonstrates that the clinical spectrum of COVID-19 varies from mild respiratory symptoms to acute respiratory failure. About 80% of the patients with COVID-19 have a relatively mild clinical presentation and uncomplicated disease course characterized by a flu-like illness with fever, dry cough, fatigue, myalgia, headache, sore throat and shortness of breath. Approximately 15% of patients will develop severe pneumonia with more severe symptoms and low blood oxygen

saturation (SpO₂). A further 5% of the patients progress to the critical stage characterized by acute respiratory failure often requiring mechanical ventilation in an intensive care units (ICU), which can be complicated by bacterial infections, septic shock and multi-organ failure.

In general similar clinical observations have been made in Iran, although anecdotal reporting from at least one site suggested a somewhat different clinical pattern. Clinicians from a designated COVID-19 hospital in Qom reported that up to 50% of patients do not have fever and that the main presenting symptoms are myalgia, dyspnea and cough. But there was no documentation to support this reporting.

Soon after the confirmation of the first two cases of COVID-19 in Iran, MOHME began designating specific hospitals across all provinces for the management of COVID-19 patients. The number of such hospitals continues to expand, as the cases increase, e.g. in Qom province there were four designated hospitals at the time of our visit, with a fifth about to be opened; there were 1,000 COVID-19 beds available, with plan to establish 1,600 based on projection of needs. Dedicated hospitals help to concentrate the patients, clinical staff and resources into a dedicated facilities, which contributes to the quality of care. It also means that other hospitals remain functioning to provide other essential services.

Most of these designated hospitals for the management of severe/critical patients are university hospitals with adequate resources, both personnel and equipment. The mission members visited two main referral hospitals in Tehran and Qom cities. Overall, appropriate systems and protocols for identifying, assessing, and referring suspected cases are in place, and the staff is following the national protocols. Bed occupancy rates were close to 100% at each facility – previously, rates were 65 – 70%.

Suspect patients who present to or are referred to these hospitals are screened based on brief history, symptoms and signs at the triage center. As noted, only severe and critical COVID-19 patients are tested and hospitalized – although, a proportion of “moderate” patients may also be tested and admitted. Turnaround time to receive the lab results is about 48 hours. A chest X-ray contributes to screening of the suspected patients. CT-scan is used for complementary diagnosis to the lab test among hospitalized patients and also to monitor the recovery of severe patients. At the hospital in Qom, physicians stated that up to 50% of samples were considered poor quality and the test results were therefore not reliable; in this context, CT scans were considered especially important.

Patients with mild symptoms are not tested in the hospital or elsewhere; instead, the triage staff advises them for home isolation for 10 days. Nonetheless, as noted above the Government has initiated a comprehensive plan to expand the screening and testing capacities at all levels in order not to miss the confirmation of symptomatic cases, including mild cases.

The following treatment regimens are offered to COVID-19 patients admitted to the referral hospitals in Iran:

- **Moderate patients** are admitted to general wards and receive symptomatic care and antiviral therapy (Oseltamivir and Chloroquine).
- **Severe patients** are admitted to a separate emergency ward and received supportive treatment, including oxygen therapy, IV fluids and non-invasive ventilation; and antiviral drugs (Oseltamivir, Lopinavir/ritonavir, and chloroquine).
- **Critical patients** are admitted to ICU rooms and received supportive treatment, invasive or non-invasive ventilation, extra-corporeal membrane oxygenation (ECMO) and antiviral therapy (Oseltamivir, Lopinavir/ritonavir, Ribavirin, Interferon and chloroquine).

Risk factors for severe and critical patients include older patients and those with chronic medical conditions such as diabetes, high blood pressure, and cardiovascular disease. The case-fatality ratio is also highest among older patients and those with co-morbidities.

Both hospitals visited had to substantially increase the number of intensive care unit (ICU) beds, e.g. 23 new ICU beds were opened on a general ward at the hospital in Qom. Clinicians shared interesting observations regarding use of invasive and non-invasive mechanical ventilation among critical patients, and it would be useful to document these experiences to contribute to global knowledge. At the referral hospital in Tehran, intensive care specialists have reported a high rate of complications of mechanical ventilation and stated that no patient requiring intubation had survived during the first two weeks of the outbreak. Those receiving non-invasive ventilatory support, such as CPAP and BiPap had better outcomes. Clinicians were using ECMO earlier in the clinical course than usual, trying to avoid the need for intubation and ventilation. At the hospital in Qom, clinicians reported a mortality rate of 85% for patients requiring intubation and ventilation. The intensivists identified training of medical and nursing staff in ventilatory support and other elements of intensive care management as priorities, especially for clinicians working at provincial level.

The Government is continuously reviewing the bed occupancy rate for the designated hospitals while revising projections of inpatient bed needs, based on the evolution of the outbreak. Each province maintains a list of additional hospitals ready to be designated for the management of COVID-19 patients. The average hospitalization for severe cases was reportedly 5-6 days, while critical patients were above 10 days. Patients are discharged earlier from the referral hospital due to a shortage of beds and high caseloads. Two main measures are being used to address this problem: a system of monitoring and supporting discharged patients in the home and a network of temporary isolation units. The monitoring system involves daily follow up of patients in their home by a community health worker or volunteer. Discharged patients and their families are educated on infection prevention and control and advised to minimize interaction between the patient and family, and always wear masks.

Temporary isolation units are increasingly being established across Iran to decongest hospitals. They are being opened in dormitories, repurposed sporting facilities and other buildings. They are intended to accommodate patients who do not require close medical attention, but are not yet well enough to go home and/or may still be infective. Discharge criteria from the hosices will include two negative PCR tests. Mission members visited one temporary isolation units in Qom and two in Tehran – only the one in Qom had yet received patients. The facilities appeared well staffed and equipped; they reflect strong collaboration between the MOHME, the disaster management agency and the military, who manage the temporary isolation units under the supervision of the local health authorities.

The team also visited primary health care facilities in Tehran and Qom cities and observed that frontline health workers were screening patients with influenza-like illnesses and referring the suspected cases to the nearest hospitals according to an appropriate protocol. The health centers were well equipped, staff were well motivated and there was a good quantity of educational materials available. A general practitioner at one of the health enters stated that the patient caseload had declined substantially during the first two weeks since the announcement of the outbreak, probably due to people's concerns about exposure to the virus in a health care setting

INFECTION PREVENTION AND CONTROL (IPC)

Main Findings

Physicians, nurses, and other support staff working in the referral hospitals are well motivated, knowledgeable, and fully engaged in all aspects of patient care, including identification, isolation, testing, referral, clinical care, follow-up, and risk communication. They are working long hours with heavy workload and are at significant risk of contracting the virus themselves. Health authorities are committed to protecting the health workers from infection, but face challenges in terms of the availability of personal protective equipment (PPE). Shortage of PPE and other commodities is one of the biggest challenges facing the Iranian health system – again, this is not a problem specific to Iran, as global market failures are leaving almost all countries with shortages of essential supplies, including PPE.

In all of the health facilities visited PPE was available to the staff, but was of variable quality. At the hospital in Tehran the PPE was imported and of good quality. However, due to the lack of PPE available, local manufacturing in Iran has been repurposed to produce PPE. We observed some of the locally made PPE in Qom which is of poor quality and tore easily. Locally made PPE used at one of the temporary isolation units in Tehran is of intermediate quality. It will be important to ensure that local production of PPE follows relevant standards and meets WHO specifications.

At the referral hospitals the mission members observed variable adherence to PPE protocols by staff and visitors. One important problem noted included the inappropriate mixing of confirmed patients with suspect cases who were still awaiting their results. Such practices may contribute to the spread of the infection within the hospital setting, and it is therefore important to implement measures that focus on the isolation and separation of confirmed and suspect patients. Other violations of good IPC practice were also observed, e.g. visitors in wards without PPE, staff walking from “dirty” to “clean” zones, inappropriate physical placement of change rooms for staff. In addition, there is a relatively small number of staff tasked with managing IPC and monitoring adherence to IPC practices. Hence, improved IPC management and supervision should be implemented as a matter of priority.

Although there are no consolidated data on infection among healthcare workers in Iran at national level, the team was informed that many healthcare providers contracted the infection at the beginning of the epidemic, and some may have died. For example, 37 health care workers across Qom have reportedly contracted the infection through transmission in the health care settings in Qom city. But no documentation was provided.

Steps are also being taken by health authorities and hospital managers to address stress and burnout among staff, in addition to IPC. These include establishing a dedicated coffee shop for staff in one hospital, providing access to counseling, managing shifts to minimize overwork, and seeking inputs from staff. Mission members were impressed by the commitment that health officials had to protecting and supporting their staff.

RISK COMMUNICATIONS AND COMMUNITY ENGAGEMENT (RCCE)

Findings

The Deputy Minister for Culture and Islamic Guidance is responsible for the Communications pillar of the national response. He was able to explain a well-structured approach to RCCE that targeted various elements of the community, including those with varying levels of concern and knowledge about the outbreak. The Government of Iran has engaged in broad community outreach on COVID-19 in collaboration with traditional media, social media, religious leaders, the private sector, celebrities, influencers, and others. This is being boosted by the national campaign, which includes over 300,000 volunteers who will also be undertaking active community outreach.

Health workers are reaching out to the local communities through health facilities, home visits, and phone calls to promote preventive measures to limit the transmission of the virus. The mission members visited primary health care centers in Tehran and Qom cities and observed that health workers are effectively raising awareness among their patients on how to prevent COVID-19 infection, how to recognize symptoms, and what to do if and when they or a member of their family gets infected.

Messaging about coronavirus is visible throughout the cities and communities – including TV, print, social media etc - and the key messages about coronavirus are conveyed in a straightforward and digestible manner. They highlight well the personal hygiene and physical distancing measures that individuals, families and communities can take. The mission members observed print education materials distributed through health facilities, public transport hubs, port of entries, market places, etc. Provincial authorities and local municipalities are playing an important role in developing and disseminating culturally sensitive education materials. In Qom, over 350,000 households are to receive a package of printed leaflets and supplies of masks, gloves and hand sanitizers - to be distributed by the military. Monitoring and documentation is being undertaken to ensure that the households receive their package.

The Government has put in place mechanisms to identify misinformation, dispel rumors and convey evidence-based information to the public about COVID-19. There are multiple TV and radio channels broadcasting from outside Iran that are in opposition of the government and have reportedly politicized the outbreak, including by promoted biased stories about the government response. The authorities took advantage of our visit to undertake multiple interviews with local media, to help “counter the political with the technical,” including by helping to counter rumours, misinformation and excessive fears. But some of our interviews were misrepresented in the media, exaggerating the generally positive view of the government response that we had conveyed. We gave frank feedback on our concerns regarding this practice to the Deputy Minister for Culture and Islamic Guidance.

The Government has also implemented additional mitigation and physical distancing measures, including temporary closures of institutions (e.g. schools), suspension of mass gatherings, travel restrictions, etc. Messages that encourage the public to remain at home, work from home, avoid restaurants and public spaces, and limit their movement are being promoted. During the first week of the outbreak in Iran all schools and universities were closed, while Friday prayer was suspended in all major urban centers. This was a decisive decision taken by the Supreme Leader and senior government

officials, and represents the first time Friday prayer was suspended in the country. Iran was reportedly the first country in the region to suspend Friday prayers. On the feast of Iman Ali - which is also Fathers' Day – team members visited a major mosque in Qom which would normally hosted tens of thousands of people on that day. But only a few hundred people were present.

Such measures can help to slow the spread of the outbreak and thereby play an important complementary role to containment measures (e.g. early detection, early testing, early isolation, early treatment, community engagement). But many have been met with mixed adherence by the population. The government advised communities to limit their travel and the size of family gatherings during the recent Norwuz celebrations, but significant numbers did not follow this guidance closely. Given their inconsistent application by communities, the government is now considering appropriate enforcement measures for physical distancing measures that are not too draconian, but ensure more consistent application by the population.

The team observed some areas which required special attention in relation to the risk communication and community engagement, including lack of a formal monitoring mechanism for the effectiveness and impact of the awareness campaigns, and the need for a better strategy to identify and address rumors, disinformation, and fear. In view of the potential physical and mental health impacts of COVID-19 outbreak among medical staff, patients and their families, the government together with local organizations should prioritize the availability and the accessibility of psychosocial support programmes to address the emotions and possible stigmatization associated with the infection.

POINTS OF ENTRY

Findings

The first case of COVID-19 in Iran is believed to have been imported from China, while cases from Iran have subsequently been exported to 17 other countries, including 10 in the Eastern Mediterranean Region. Strengthening entry and exit screening is therefore clearly a priority for Iran and progress has been made in recent weeks.

Time constraints did not permit for a detailed review of measures being taken at points of entry. But team members were able to observe the processes for the screening of arriving and departing passengers at the international airport in Tehran. Reasonable measures appeared to be in place. The initial step consists of screening the temperature of all incoming and outgoing passengers by nursing staff. Any passenger who is identified as having a fever and/or relevant symptoms such as dry cough, is referred to an on-site physician. A more detailed history and examination is then taken (including for co-morbidities and possible exposure to COVID-19) and anyone meeting the case definition is then referred to a designated hospital via ambulance, which is on-site 24 hours per day. Passengers not meeting the case definition are provided with essential health education and are permitted to proceed with their journey.

Staff were well aware of the screening and referral protocols. They were also reasonably well equipped with PPE. Educational materials were present on-site at the airport, but were perhaps not as prominent and visible as expected. Screening procedures have reportedly been strengthened at all points of entry across the country, including at ground crossings.

LOGISTICS AND SUPPLIES

Findings

Similar to every country globally currently, Iran is struggling to meet the needs of essential supplies such as PPE, medicines such as oseltamivir (included in COVID-19 treatment protocols), other commodities such as hand sanitizers, and equipment such as ventilators. This is due to market failures and disruptions at global and regional levels.

Early in the outbreak logistics staff within the MOHME undertook a series of steps to secure a more regular supply chain. This included clarification of the essential medicines and supplies required; review of current warehousing stocks and warehousing capacities; mapping of producers, suppliers, distributors and pharmacies; active outreach to identify new sources and suppliers; negotiations with vendors and development of agreements; identification of new local producers for specific items (e.g. hand sanitizer) and issuance of new product licenses as appropriate.

Quantification exercises have been undertaken at national and provincial levels to provide estimates of the required drugs, commodities and equipment. It is not clear how aligned these different exercises have been or whether a consistent methodology is used. Consumption of medicines and commodities is being tracked; within Qom, consumption was estimated to have increased by 7 – 8 times during the visit, with projections that it would increase by a factor of 20. As noted earlier, other industries are being repurposed to produce PPE and other commodities and equipment, including beds, bed sheets, other hospital furniture etc.

It was not possible to determine what impact international sanctions are having on the national response, but there is a general recognition among health workers and government authorities that limitations on imports of specific products and raw materials represent a large constraint. Senior MOHME staff indicated that the government had sufficient funds for procurement in off-shore bank accounts, but was unable to access these due to the sanctions. Somewhat ironically, at the time of the onset of the outbreak WHO was in the process of negotiating an agreement with the Government of Iran for reimbursable procurement of medicines, supplies and equipment. The agreement is still being negotiated.

RESEARCH AND KNOWLEDGE MANAGEMENT

Findings

The Deputy Minister of Research enthusiastically outlined an ambitious range of proposed and on-going activities, including a new on-line app to assist with early detection (linked to SIB as above); a new patient registration system for COVID-19; proposed clinical trials; and serological studies. The proposed studies are reportedly either being considered by the ethics review board or still in the design phase. The Deputy Minister is interested in participating in WHO-coordinated research and knowledge management activities, including randomized clinical trials and the new platform for anonymized COVID-19. We connected him with colleagues from HQ to facilitate the collaboration. Colleagues from the Robert Koch Institute will also seek to collaborate on studies of household transmission.

Several features of the Iranian response to COVID-19 merit additional analysis and documentation. Just as MOHME colleagues demonstrated eagerness to learn lessons from China and elsewhere, other countries could also learn lessons from several elements of the Iran experience. These include: observations on epidemiology and the natural history of the disease; active outreach through the national campaign to register the entire population (52% persons reached by 23 March); the impressive scale-up of testing capacity; experiences with non-invasive ventilation and ECMO in the management of acute respiratory failure; leveraging the primary health care system for monitoring mild cases and contact tracing, among others. WHO will follow up to support documentation and dissemination of these experiences and lessons learned.

RECOMMENDATIONS

Priority Recommendations

- Maintain and strengthen full engagement of the highest level of government in driving the whole-of-government response, i.e. office of the President and Cabinet;
- Continue to communicate with the population in an open and transparent manner regarding the evolution of and response to the COVID-19 outbreak. Ensure the following:
 - Clear guidance on measures that individuals can take to protect themselves and their families;
 - Clear recommendations on physical distancing, including staying at home wherever possible, working from home, avoiding large gatherings, limiting non-essential travel, etc.
- Urgently intensify allocation of resources for the early detection, testing, isolation and treatment of all suspected COVID-19 cases, including mild cases. Consider different options for the isolation of mild cases based on available resources, e.g. temporary isolation units, home, hospitals;
- Continue to rapidly scale up national testing for COVID-19 by expanding the laboratory network and strengthening the capacities of individual laboratories;
- Rapidly expand and strengthen contact tracing, with initial focus on close contacts. Consider different options for the quarantining of close contacts based on available resources, e.g. temporary isolation units, home, other;
- Accelerate the integration of existing systems (i.e. MCMC, SIB, SSS, Sharepoint) to establish a single mechanism for collecting, reporting, analyzing, and communicating surveillance data (epidemiological, laboratory) on all COVID-19 cases. Undertake a rapid and objective analysis of the pros and cons of existing systems to determine which is best suited to allow integration of COVID-19 data at district level; clearly define the flow of data, including the tasks and responsibilities for each step of the surveillance process;
- Produce daily and weekly reports of surveillance data, and use this information to drive the response to the outbreak. Ensure that reports are uploaded to the MOHME website on a timely basis and freely available;
- Enforce adherence to IPC policies and procedures in health care settings to prevent infections among health care workers and patients;
- Consider other more restrictive measures on travel and quarantining of communities informed by a case-by-case risk assessment. As far as possible, ensure that measures are evidence-based, proportionate to risk, and short-term. Compensatory and supportive measures to individuals, communities and businesses may be required, focusing on the most vulnerable;

- Develop a national, multi-sectoral response plan linked to the National Campaign with clear priorities, actions, and targets. Include the following elements:
 - Clearly defined mandates, responsibilities, and lines of command for relevant stakeholders;
 - Adapted guidance for areas with different patterns of transmission, e.g. single cases, clusters, community transmission;
- Establish a monitoring system that covers all aspects of the COVID-19 response, including key performance indicators (KPIs) with specified targets, and adjust response priorities and actions accordingly;
- Contribute to the global body of knowledge to accelerate the generation of critical scientific information for the control of COVID-19 outbreak, including:
 - Participation in global expert networks;
 - Conduct of research, including participation in global research initiatives;
 - Regular documentation and sharing of experiences;
 - Rapidly sharing virus materials with WHO collaborating centres;
- Share detailed data on confirmed COVID-19 cases with WHO on a timely basis, as requested by the Director General and Regional Director.

Specific Technical and Operational Recommendations

Leadership, coordination and partnership

- Clarify response structure for management of the outbreak response at national and provincial levels. Ensure prioritization of epidemiology function within these structures;

Epidemiology

- Review the case definition regularly as the outbreak evolves and update as required;
- Align the protocol/flowchart of outpatient and inpatient diagnosis with the case definition (see Figure 4);
- Prioritize the identification of clusters, chains of transmission and risks factors for COVID-19; utilize the information to inform control measures;
- Undertake a national risk assessment for the COVID-19 outbreak and update regularly. Supplement with event-specific risk assessments (e.g. for mass gatherings), based on context;
- Strengthen modeling process in collaboration with international partners, to better inform planning and operations
- Consider the use of Go-data software to assist with the conduct of contact tracing;

Laboratory diagnosis

- Strengthen the quality management programme and biosafety at all laboratories within the network;
- Undertake regular genomic sequencing by engaging support of WHO collaborating centres. Strengthen capacities for whole genomic sequencing at national level;
- Develop a procurement and distribution plan for testing kits, reagents, other supplies and equipment in collaboration with partners; increase national investment as a component of the procurement plan to promote longer-term sustainability;

- Integrate testing for COVID-19 into existing ILI and SARI virological surveillance network.

Clinical management and infection prevention and control

- Continue to enhance the skills of clinicians in the management of severe and critical cases, including through mutual exchange with expert networks; prioritise initial trainings for staff in dedicated COVID-19 hospitals at provincial and national levels;
- Review, revise and disseminate guidance for home and community care in the management of mild acute respiratory infections and patients recovering from COVID-19.
- Review IPC policies and procedures to ensure that they promote and reinforce the prevention or limitation of transmission in healthcare settings, and revise as needed;
- Determine the clinical characteristics of severe patients and outcomes of critically ill patients, and fully describe the spectrum of illness and risk factors for infection and severe disease;
- Contribute to the global understanding of the natural history of COVID-19 through collaboration on WHO-coordinated research projects - specifically the *Data platform for anonymized COVID-19 clinical data*
- Contribute to the global understanding of the treatment of COVID-19 through collaboration on WHO-coordinated research projects – specifically the *Multi-centre, adaptive, randomized trial of the safety and efficacy of treatments of COVID-19 in hospitalized adults*.

Risk communication and community engagement

- Consider the role of KAP (Knowledge, Attitudes, Practice) surveys in monitoring the effectiveness of risk communications and community engagement (RCCE) activities in promoting behavior change related to COVID-19;
- Promote non-pharmaceutical countermeasures to interrupt chains of human-to-human transmission and limit the community spread of the infection, including use of personal protection, physical distancing, environmental cleaning, reduction of public gathering and community engagement
- Increase engagement of community influencers to reach out to the public and population at risk to receive the basic preventive information about the COVID-19 and ensure everyone is aware of the necessary measures to protect themselves and others;
- Encourage media to report accurately on messaging from public health officials and international experts; avoid exaggeration or misrepresentation of expert opinion and messaging.

Points of entry

- Review surveillance and screening process at points of entry and points of exit.
 - Points of entry. Refer patients meeting the national case definition to the relevant referral health facility for more detailed medical examination and possible testing;
 - Points of exit. Ensure that suspect cases with mild symptoms are restricted from travel until COVID-19 excluded;
- Propose ongoing voluntary travel limitations and continue to review the suspension of mass gatherings based on updated risk assessments;

ANNEX 1: IN-COUNTRY PROGRAMME

Accommodation: Parsian Azadi Hotel

Day 1: Monday, 2 March 2020					
Time	Description	WHO Team	MOHME Team	Venue	N/C
	Visit of IKA International Airport	All mission members WCO Team	Dr. Gouya, Head of CDC	IKA	Dr. Akbari
Day 2: Tuesday, 3 March 2020					
09:00-09:30	Meeting with WR			WCO	
09:30-11:30	Meeting with outbreak response Task-force: <ul style="list-style-type: none"> • Dr. Raeisi: Overall situation of Virus transmission in Iran • Dr. Janbabaeei: Curative care and hospital preparation • Dr. Gouya: Sources of Virus in Iran and Disease surveillance system • Dr. Safikhani: Registration of Hospital data • Dr. Tabrizi: Awareness building Campaign “we will overcome Virus” • Dr. Brennan • Wrap Up by Dr. Raeisi 	All mission members Chinese CDC WCO Team	Dr. Raeisi, Deputy for Public Health Dr. Janbabaeei, Deputy for Curative affairs Dr. Safikhani, Head of IT Dr. Gouya, Head of CDC Dr. Tabrizi, DG for PHC	1 st Floor, Block B	
11:30-13:00	Meeting on Surveillance and reporting system	All mission members	Dr. Gouya, Head of CDC and his team	1 st Floor, Block B	

			China Red Cross Team WCO Team				
13:00-14:00	Lunch					Azadi hotel	
14:00-16:00	Meeting with Epidemiological Team: focus on epidemiology and data analysis		All mission members China Red Cross Team WCO Team	Dr. Haghdoost, Deputy for Education Dr. Assai, Adviser to Minister for Public Health Dr. Mostafavi, (IPI) Dr. Gouya, Head of CDC Dr. Tavakoli, Qom Supervisor (via Skype) Dr. Nasehi, Rasht Supervisor (via Skype) Dr. Asadi-Lari, DG International Affairs		Deputy for Education (13 th Floor, Block C)	
16:30-18:30	Visit of Pasteur Institute of Iran		All mission members China Red Cross Team WCO Team	Dr. Biglari Dr. Gouya Dr. Naeii		IPI	Dr. Mostafavi
Day 3: Wednesday, 4 March 2020							
Time	Description			WHO Team	MOHME Team	Venue	

08:00-10:00	Visit of Hospital		All mission members China Red Cross Team WCO Team	Dr. Gouya Dr. Naeli	Masih Daneshvari	Ms. Mostoofian
10:00-15:00	Visit to Pasteur		Dr Amal Barakat		Pasteur	
10:30-11:15	Visit of health facility (PHC, 16 hours Health Center)		All mission members China Red Cross Team WCO Team	Dr. Gouya Dr. Tabrizi Dr. Naeli	Ozgol Comprehensive Service Center	Dr. Tabrizi
12:00-14:00	Meeting with Dr Gouya		Dr Pierre Nabeth	Dr Gouya	MOHME Building, CDC	Dr Gouya
12:00-13:00	Lunch				Azadi Hotel	
13:00-15:00	Meeting with Tehran Municipality, Multisectoral engagement		All mission members (except Dr Amal and Dr Pierre) WCO Team		Crisis Management Organization	Mr. Salehi
16:00-17:00	Meeting with UNRC and UNCT		Dr Christoph Dr Richard WCO Team	-	WCO	
17:30-18:30	Meeting with Dr Jamshidi, Acting Minister for National COVID Committee		All mission members China Red Cross Team WCO Team		MOHME Building	

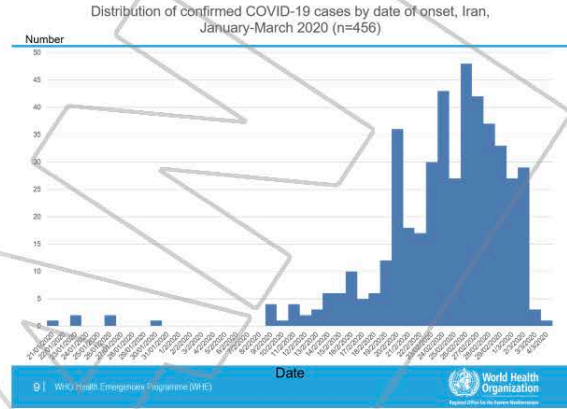
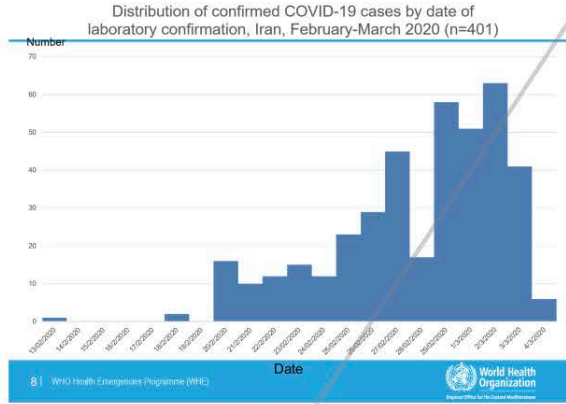
					Bloc A, 15 floor	
Day 4: Thursday, 5 March 2020						
08:30-09:30	Meeting with Dr Mehralian , Director General for Drug and supplies under control, food and Drug Organization	All mission members China Red Cross Team WCO Team	Dr. Mehralian and FDA team	IRD, MOHME building, 12 th Floor	Ms. Khani	
10:00-12:00	Meeting with Dr. Zali , Chancellor of Shahid Beheshti University of Medical Science and Operational Manager in Tehran	All mission members China Red Cross Team WCO Team	Dr. Zali and his team	Shahid Beheshti University of Medical Science, Building No 1, 7 th floor		
12:30-13:00	Lunch			Azadi Hotel		
13:30-14:00	Meeting with Mr Baharvand , Deputy Minister of Foreign Affairs for Legal issues	All mission members China Red Cross Team WCO Team		Ministry of Foreign Affairs		
14:00-16:00	Meeting with the Diplomatic Corps and International Agencies	All mission members China Red Cross Team WCO Team		Ministry of Foreign Affairs, Building No 1		
Day 5: Friday, 6 March 2020						

11:00-12:00	Meeting with Dr Reza Malekzadeh, Deputy Minister for Research	Dr Richard Brennan Dr Piere Nabeth Dr Abdinasir Abubkar		MOHME Building, 15 th floor, Block A	Dr Reza Malekzadeh
13:00-14:00	Meeting with the Minister to present the launch of National Mobilization plan to combat COVID-19	All mission members		MOHME Building, Ministerial Office, Block A, 16 th floor	
Day 6: Saturday, 7 March 2020					
11:00-13:30	Meeting with Dr Haghdoost, Deputy Minister for Education and the team of Epidemiologists to discuss epidemiological issues and Lunch	All mission members WCO Team		MOHME Building, 13 th floor, Block A	Dr Haghdoost1
14:00-15:00	Wrap Up meeting with H.E. the Minister	All mission members WCO Team		MOHME Building, Ministerial Office, Block A, 16 th floor	
15:00-16:00	Press Conference	All mission members WCO Team		MOHME Building (Exact venue TBD)	
16:30	Departure to Qom (directly from MOHME)				
19:00	Meeting with Chancellor and Deputies of the University, Dr Ebrazeh	All mission members		Qom province	Dr Naeli

20:00	Meeting with Provincial Task Force – Governor’s Office, Mr. Sarmast	All mission members		Qom province	Dr Naeli
Day 7: Sunday, 8 March 2020					
	Visit of Forghani Referral Hospital, Dr. Shafiee	All mission members	Dr Shafiee	Qom province	Dr Naeli
	Visit of Reference Lab, Dr. Fotohi	Dr Amal Barakat	Dr Fotohi	Qom province	Dr Naeli
	Visit of Contact Tracing Center, Dr. Bagheri (Deputy for Public Health)	All mission members		Qom province	Dr Naeli
	Working Lunch, Provincial Health Center	All mission members		Qom province	Dr Naeli
	Press Conference	All mission members		Qom province	Dr Naeli
	Visit of Follow-up Center of Patients, Dr Adeli	All mission members	Dr Adeli	Qom province	Dr Naeli
	Meeting on Supply Chain Management, Dr. Hozori	All mission members	De Hozori	Qom province	Dr Naeli
	Conclusion meeting, Dr Ebrazeh and his deputies	All mission members	Dr Ebrazeh	Qom province	Dr Naeli
	Visit of Hospice Quarantine Center, Dr Mortazavian, special Rep for H.E Minister in Qom province and Dr Ebrazeh Chancellor of Qom University	All mission members	Dr Mortazavian Dr Ebrazeh	Qom province	Dr Naeli
	Visit of Holy Mosque of Jamkaran, Dr Mortazavian, special Rep for H.E Minister in Qom province and Dr Ebrazeh Chancellor of Qom University	All mission members	Dr Mortazavian Dr Ebrazeh	Qom province	Dr Naeli
11 March 2020					

08:30– 10:00	Meeting with Dr Haghdoost (Deputy Minister for Education) and the team of epidemiologists	All mission members WCO Team		MOHME Building, Block C, 13 th floor	
10:00-11:00	Final discussion among mission members and WCO Iran Task force	All mission members WCO Team		WHO Office	
11:00	Departure to airport				

Annex 2: Initial analysis of COVID-19 cases in Iran, February-March 2020

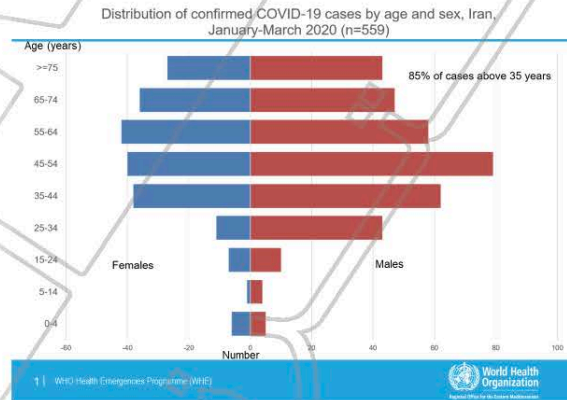


Sex and age among confirmed COVID-19 cases, Iran, February-March 2020 (n=456)

Sex-ratio M:F = 1.7

Age

- Mean: 53 years
- Median: 52 years
- Min: 1 month
- Max: 96 years



Characteristics of confirmed COVID-19 cases, Iran, February-March 2020 (n=456)

Pregnant women: 3 (15-45 yo women: 115)

Health care workers: 7

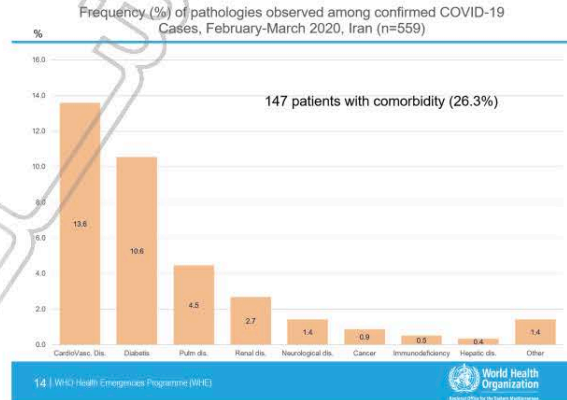
Nationality

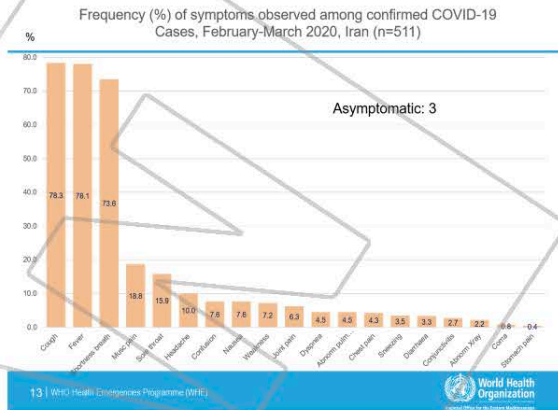
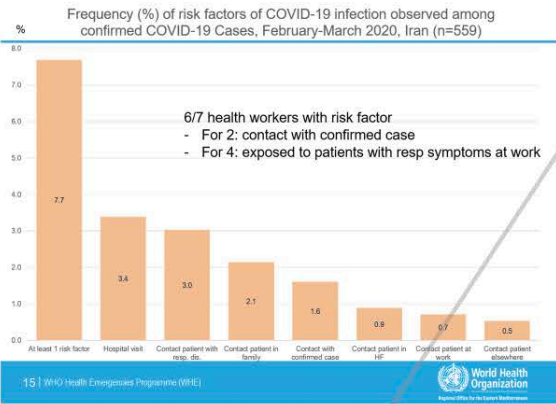
- Iranian: 546 (98%)
- Afghani: 11 (2%)

Detected at Point of Entry: 16 (2.9%)

Deaths: 75 (13.4%)

1 Cluster identified (3 cases infected by same person)





Confirmed COVID-19 cases, Iran, February-March 2020 (n=559)

Time Date of onset – Date of admission (n=363):

- Mean: 2.3 days
- Median: 1 day
- Min: 0 days
- Max: 31 days

Time Date of onset- Date of sampling (n=454):

- Mean: 3.1 days
- Median: 2.0 days
- Min: 0 days
- Max: 32 days



Characteristics of deaths among confirmed COVID-19 cases, Iran, February-March 2020 (n=75)

CFR = 13.4% (75/559)

Comorbidity = 49.3% (37/75)

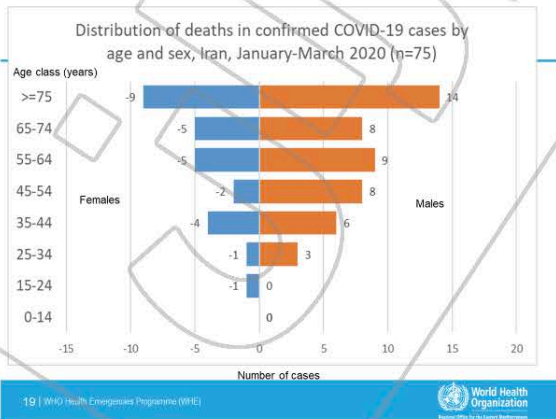
Age:

- Mean: 62 years
- Median: 64 years
- Min: 23 years
- Max: 96 years

Sex-ratio M:F = 1.8

Time Date of onset- Date of death:

- Mean: 5.9 days
- Median: 5 days
- Min: 1 day
- Max: 22 days



Annex 3: Case definitions COVID-19, Iran, March 2020

Suspected case:

- ☐ Patient with dry cough, chills, sore throat **with** dyspnea, with/without fever
- ☐ Patient with upper/lower respiratory presentation with multi-lobular infiltration in chest X-ray (CXR) or pulmonary CT scan

Probable case:

- ☐ Any suspected case with history of close contact with confirmed COVID-19 case, over the past 14 days
- ☐ Any suspected case with history of presence in areas where epidemics have been reported, over the past 14 days
- ☐ Any case with Pneumonia that, despite appropriate treatments, has an abnormal clinical course and progress to the severe condition with an unexpected speed

Confirmed case:

- ☐ Laboratory (molecular) confirmed case for SARS-CoV-2

Annex 4: PROPOSED Key Performance Indicators

For countries experiencing sustained human-to-human transmission

Sector/Pillar	Indicator	Target	Notes/justification/questions
General	Number of new suspected cases	N/A	N.B. Some countries may only report a subset of the categories suspected, probable and/or confirmed, not all three.
	Number of new probable cases, disaggregated by age group and sex		
	Number of new confirmed cases, disaggregated by age group and sex		
	Total number of suspected cases		
	Total number of probable cases, disaggregated by age group and sex		
	Total number of confirmed cases, disaggregated by age group and sex		
	Number of new confirmed cases in healthcare workers (acquired through healthcare)		
	Total number of confirmed cases in healthcare workers (acquired through healthcare)	0	
	Number of hospitalized (+ severe if possible) probable+confirmed cases		From Global Surv guidance
Surveillance & Rapid detection	Surveillance guidelines disseminated to healthcare workers including private sector	YES	
	Proportion of Case investigations of all verified alerts completed within 48 hours of alert		
	Number of contacts under followup		Denominator for other indicators
	Percentage of contacts lost to follow up		
	% of confirmed cases detected from contact tracing		
	Percentage of laboratory results for all suspected cases available within 24 hours		Time from sample collection to result
Laboratory	Proportion of lab tests conducted in past week that are positive		From Global Surv guidance
Clinical Management (inpatient and outpatient) & Home care	Case Fatality Ratio amongst probable and/or confirmed cases		Target to be determined
IPC & Biosafety	% of cases who are health care workers	0	Calculated from above, not separately recorded

	Median Time from symptom onset to effective isolation (in days)	0 days	
	Triage and isolation guidelines disseminated to primary care facilities?		
	Sufficient isolation capacity meeting IPC requirements (see link) for existing/projected number of cases		https://www.who.int/publications-detail/infection-prevention-and-control-during-health-care-when-novel-coronavirus-(ncov)-infection-is-suspected-20200125
Risk Comms	% cases detected from telephone calls/ or other means of communication used by patients and relatives/community alerts		Maybe better just to identify whether a risk comms strategy is in place for nCoV
Logistic, and supply	Sufficient stock of IPC and case management supplies for existing/projected number of patients		
Partners Coordination	% of partners involved in the response included in a monthly (weekly) updated 4W (at the narrowest geographic level)		