

## ■ Review Article

# Protective Measures of Healthcare Professionals to Face COVID-19: Case of China and Morocco

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## ABSTRACT

A novel virus has emerged to the world causing a new pandemic of respiratory infection. On February 2020, the World Health Organization named it Corona disease 2019. The emergence of this epidemic was first reported in Wuhan, China in late December 2019, before it spread to other countries. In response to this pandemic, the World Health Organization has stressed the need for strengthening health professionals worldwide. Indeed, adequate protective measures can help protect patients and staff from the transmission of a highly infectious disease.

Managing COVID-19 patients exposes healthcare professionals to the risk of contracting the disease and transmitting it to those around them. This risk is very high because of the mode of transmission of SARS-CoV-2, which is transmitted by inhalation, contact with droplets and infected surfaces which makes it a very contagious disease. Thus, adequate precautions in healthcare establishments can help mitigate this risk, such as adopting several protective measures including personal protective equipment. By the same vein, healthcare professionals run a high risk of anxiety, stress, depression and burnout when managing COVID-19 patients. Therefore, the protection of the mental health of these health workers also includes psychological support measures.

In this regard, this article purports to describe the health and safety measures related to the prevention of the risk of COVID-19 infection to health professionals in China and Morocco. On the other hand, it seeks to present the psychological support measures for these agents in the two aforementioned countries.

**Keywords:** Coronavirus, COVID-19, health workers, protective measures, Mental health, China, Morocco

## INTRODUCTION

The COVID-19 pandemic poses a major threat to public health. On March 11th, 2020, the World Health Organization

(WHO) considered the outbreak of COVID-19 a pandemic after it has spread to other countries [1]. Health systems around the world are currently facing coronavirus pandemic, which is a highly contagious disease. Indeed,

COVID-19 is a new viral respiratory disease characterized by human to human transmission [2].

As well, the disease is transmitted via inhalation or contact with infected droplets with an incubation period that ranges from 2 to 14 days [3]. It was proven that the virus can last on contaminated surfaces for up to 9 days [4]. As a result, the infection is spread through contact with contaminated surfaces or droplets and the secretions of COVID-19 patients [5]. Clinically, the disease manifests as fever, cough, headache, tiredness, sore throat and myalgia. In addition, the clinical course of the disease can range from an asymptomatic state to an acute respiratory distress syndrome, leading to multiple organ failure [6]. At present, no standard treatment or vaccine is made available to prevent the disease.

Healthcare professionals (HCP) have an essential role not only in care but also in the prevention and infection control [7]. Their constant exposure to infected patients exposes them to the risk of contracting the infection and transmitting it to those around them [8]. As such, they are more exposed to the risk of infection compared to the general population. The exposure of HCP to the risk of COVID-19 is higher as the disease is transmitted via inhalation or contact with infected droplets [3]. In China, 3019 health workers were infected with the new coronavirus disease of 2019, 10 of whom died [9]. At Wuhan University's Zhongnan Hospital in Wuhan, China, 29% of HCP were infected with COVID-19 from January 1 to February 03, 2020 [10]. The substantive number of health workers affected by the disease, as explained by these same authors, was due to the inadequacy of awareness-raising measures and precautions to combat the disease [10].

The objective of this article is to share the Chinese experience in order to minimize the risk of COVID-19 infection to HCP, and to present the measures taken by the Ministry of Health in Morocco. To this end, the precautions presented herein will help maintain healthy personnel that will take charge COVID-19 cases as the number of infected and deceased patients increases dramatically all around the world.

## METHODS

This paper included literature that presents data on protective measures for HCP against the risk of COVID-19 infection in China and Morocco. The reviewed literature was selected from the PubMed database including the literature published from December 31 to April 30, 2020. The search in this database was limited to studies that reported data on

**Table 1.** Protective measures of Healthcare professionals

Protective measures	Actions
Training and information [12]	- Training on infection prevention - training on infection control - Training on PPE: Dressing, removal and disposal technique.
Sufficient and quality material: PPE and infection control [12-13]	Medical masks, gloves, goggles or a face shield, gowns, hand sanitizer, soap and water, aprons.
Infection control [13]	- Availability of resources - Adapted infrastructure - Availability of laboratory tests - Patient triage - Social distancing among the patients and between the patient and the HCP (at least 1m). - Well ventilated isolation rooms
Work accidents [12]	- Work accidents must be reported - Follow-up measures during a work accident: Supporting victims Rehabilitation Curative services
Work Organisation [12]	Adapted working hours Rest breaks
Mental health [12]	Access to mental health resources.
Hygiene measures [13]	- Frequent hand hygiene - Avoid touching the eyes, nose and mouth.

protective measures for health professionals in China and Morocco. Search keywords included: "Coronavirus", "COVID-19", "SARS-CoV-2", "healthcare worker", "healthcare professional", "protective measure", "China", "Morocco". Concerning Morocco, the data were also searched on the Ministry of Health's official website since the declaration of the first case of COVID-19 on March 02, 2020 until April 30, 2020 [11].

## PROTECTIVE MEASURES FOR HCPS AGAINST COVID-19 RECOMMENDED BY WHO

The WHO described several measures to protect HCPs in charge of patients with COVID-19 disease (see **Table 1**) [12-13]. These measures include training, a sufficient amount of personal protective equipment (PPE), work organization and mental health.

While taking care of managing COVID-19 patients, HCPs wear PEPs according to this procedure. In addition, the use of PEPs depends on the activity and the care environment (**Table 2**) [13]. Rational use of this equipment is important to avoid the depletion of stocks.

**Table 2.** Personal protective equipments by activity and care [13]

Setting	Target staff	Activity	Type of PPE/Procedure
COVID-19 patient room	Healthcare workers	Direct care	Surgical mask Gown Gloves Goggles or face shield.
		Aerosol-generating procedures	FFP2 mask Gloves Goggles or face shield Long-sleeved water resistant gown Apron
	Cleaners	Entering the room of COVID-19 patients	FFP2 mask Gloves Gown Goggles or face shield Boots or closed work shoes
Laboratory	laboratory personnel	Use of respiratory samples	FFP2 mask Gloves Goggles or face shield Gown
Consultation room	Healthcare workers	Patient with respiratory symptoms.	Medical mask Gloves Gown Goggles / face shield
	Cleaners	After and between consultations with patients with respiratory symptoms	Medical mask Heavy duty gloves Gown Goggles or face shield Boots or closed work shoes

### CHINA'S MEASURES FOR PROTECTING HCP

According to the WHO, the number of COVID-19 patients reached 9 843 073 cases and 495 760 deaths worldwide on the 28<sup>th</sup> of June, 2020 [14]. This increasing number of cases also leads to an increased workload for HCP in many parts of the world. In other words, given the outbreak of the pandemic, it is crucial to adapt the working hours of each HCP team according to the load and the working conditions [15]. Previous study showed that the ideal number of hours for 78% of Chinese nurses at Guangdong Provincial General Hospital is 6 hours of continuous work, each shift is marked by one hour overlap [16]. Adapting this hourly schedule will make it possible to reduce the consumption of medical resources, reduce fatigue and mental stress. It will also allow HCP to satisfy their biological needs; going to the toilet; which is limited by wearing personal protective equipment in the isolation area [16].

The increase of COVID-19 infection among HCP was a result of the long-term exposure to a large number of infected cases, inadequate personal protecting, intensive work, insufficient time for training and practice together with the lack of rest and protective equipment [17]. Several studies

have revealed harmful effects on Chinese personnel while taking care of COVID-19 patients [18-19]. For instance, a study carried out on 1257 front-line health workers engaged in the diagnosis, treatment and direct care of COVID-19 cases in Wuhan and other parts of China revealed that they were associated with a higher risk of symptoms of depression ( $p=0.01$ ), anxiety ( $p=0.0001$ ), insomnia ( $p=0.001$ ) and distress ( $p=0.001$ ) [20]. Moreover, wearing PPE for a long period of time was found to cause skin damage to healthcare personnel and may also increase the risk of infection [18].

In fact, skin damage caused by infection prevention measures was found among Chinese HCP [19]. It is showed that HCP who wear medical devices for more than 6 hours are more likely to have skin damage [19]. The findings of a number of studies demonstrate the importance of having a team work that maintains a higher level of motivation and enthusiasm, a fair distribution of workload and respects rest time [16-20-17-19].

Besides, an infection control system in negative pressure isolation rooms is necessary in order to minimize nosocomial infection. This system, as implemented in China,

provides real-time monitoring of medical and nursing staff on computer screens and helps with instant correction [16-21]. This system requires the installation of cameras in all departments where COVID-19 patients are hospitalized, except the confidentiality zones [21]. Yifan et al suggested appointing infection control nurses as observers to monitor staff compliance with infection control guidelines, provide clarification and advice, and record significant problems related to infection control procedures [22]. The observers are personnel who are trained to maintain the normal functioning of isolation rooms at negative pressure, supervise the implementation of disinfection, ensure the sufficient supply of protective materials and organize samples to inspect and alleviate anxiety of medical staff when treating patients [21]. They also monitor the procedure for putting on or removing PPE when HCP enter and leave the negative zone [16-21]. This is to detect the omission of a step or its ignorance by the health staff during dressing which may promote potential exposure to a nosocomial infection in negative pressure isolation rooms [21].

HCP put their lives at risk to save the lives of COVID-19 patients around the world. All HCP should be trained in infection control to familiarize themselves with appropriate steps in hand hygiene, wearing and removing personal protective equipment [23-24]. The training of Chinese health professionals in the face of this pandemic aimed at understanding and applying safety measures during the management of COVID-19 patients [16-15]. It also focused on professional skills such as clinical diagnostic criteria for COVID-19, current therapeutic patterns, invasive and non-invasive ventilation and so forth [15]. The training methods contain face-to-face and practical training, online lessons, manuals and videos [15].

Other measures have been considered to ensure the protection of HCP, namely: (a) the avoidance of unnecessary contact with the introduction of a computerized information system, (b) the avoidance of papers, (c) the creation of the personal digital assistant systems, and (d) an internal network [16]. Also, the body temperature of all HCP was measured before work [23-24]. They should report the onset of symptoms such as fever, chills, myalgia, sore throat, runny nose, cough, vomiting, diarrhea or pneumonia [23-24]. Isolation and quarantine measures should be applied to any health professional who has been exposed to the risk or tested positive [16-21-24]. Studies showed that patient overload, physical and mental exhaustion, symptoms of depression, anxiety, anger, fear, and sleep problems were common mostly among primary HCP in Wuhan, China [25-

26-27-28-29]. As such, the mental health of HCP may be at stake and should not be overlooked [26]. Indeed, protecting professionals' mental health is essential to control the epidemic and the health of these agents in the long term [27]. Of 1,257 HCP in 34 hospitals in China, symptoms of depression, anxiety, insomnia were reported respectively in 50.4%, 44.6%, and 30% from HCP caring for COVID-19 patients [29]. A psychological intervention team whose role is to participate in the clinical psychological intervention for health workers and patients has been set up by the Hospital of Wuhan University [27]. Psychological interventions by a specialized team of were carried out via internet platforms for patients and their families as well as medical staff [30]. Finally, the delivery of protection warning and comfort messages was done through the official WeChat account and mobile messaging accounts of the Chinese nursing department [15].

The epidemic begun in China in late December 2019. As a consequence, Chinese HCPs were faced with a new virus and an unexpected health emergency. The number of HCP infected in China was explained by the ignorance of this new virus, the workload, the high number of infected patients and the lack of rest [31]. Also, the shortage of PPE and the insufficient time allocated to training may have caused this number of HCPs infected [31].

Despite the high number of infected and deceased HCPs, China has made considerable efforts. Its health system has taken up the challenge and won the fight against this new epidemic that has emerged to the world.

#### **MOROCCO'S FOLLOW-UP AND PROTECTION MEASURES FOR HEALTH PERSONNEL**

In Morocco, the number of COVID-19 cases and deaths is on the rise. This number reached 12248 cases with 8790 recovered cases, 224 deaths and 638471 cases excluded after negative results on June, 29<sup>th</sup> 2020 [32]. Morocco had its first case of COVID-19 on March 02, 2020. The measures of deconfinement and the wearing of masks by the population have been mandatory since the start of the epidemic in Morocco.

The number of health professionals infected or died in Morocco due to COVID-19 is not yet declared by the Moroccan Ministry of Health. However, in order to protect its staff, the Moroccan Ministry of Health has taken several measures to monitor and protect health professionals from exposure to COVID-19 [33-34]. The health and safety measures undertaken include actions related to general hygiene procedures, namely (a) hand washing, (b)

avoidance of close contact via keeping one metre distance, (c) avoidance of elevators and use of stairs without touching ramps, (d) ventilation of offices and workplaces, (e) suspension of all non-urgent meetings or trainings and (f) giving priority to online work [33].

Other specific measures to monitor and protect health professionals in accordance with ministerial guidelines include organizing trainings and awareness-raising sessions for health professionals, in small groups respecting the required separation rule [34]. Video capsules explaining the techniques of using PPE have been available for HCPs [11]. Additionally, pregnant women and health professionals with severe chronic diseases or with immune deficiency were excluded from contact with COVID-19 patients [34]. Medical follow-up of HCP in support of COVID-19 patients was ensured by self-monitoring system. This monitoring system involves taking the temperature twice a day and observing the clinical signs of the disease [34]. In addition, the cessation of professional activities and isolation with a test for any health professional with respiratory symptoms similar to those of SARS-Cov-2 infection [34].

Hydroxychloroquine chemoprophylaxis is used, with a specific protocol and immediate management with the procedures in force in case of confirmation of the test, for any HCP who provided care to a patient with COVID-19 without protective measures [34]. The Moroccan ministry of health has insisted on having work teams who ensure a high level of motivation of professionals [34]. It also emphasized setting up a team within hospitals, composed of a doctor and a member of the committee for control of nosocomial infections [34]. The role of this team is to provide medical monitoring, gather information and alert activities by filling in the individual daily monitoring sheets for HCP and agents works in COVID-19 support structures. This team also has the role of issuing a weekly report on the situation to the Department of Health, Epidemiology and Disease Control and establishing a specific epidemiological investigation for each health professional with COVID-19 [34]. Psychological support units were created in several hospitals in the kingdom in order to reduce and overcome psychological problems such as stress, anxiety and exhaustion. Besides, a video capsule together with a telephone number are made available to HCP for psychological follow-up [11].

The strategy of the Moroccan Ministry of Health for protecting its HCPs respects the recommendations of the WHO. Equally pivotal, the psychological follow-up was not neglected. However, the ministerial strategy did not emphasize the dermatological monitoring of skin damage

for HCP. Finally, the evaluation of the effectiveness of these actions in the field requires the results of epidemiological investigations conducted by the Ministry.

In the future, the rate of health professional who may be infected or die because of COVID-19 in Morocco will allow for evaluating the effectiveness of these measures taken by the Moroccan Ministry of Health.

## CONCLUSION

In a nutshell, HCP are in the front-line towards combatting COVID-19. As such, they are subject to numerous risks including physical exhaustion, long working hours, psychological problems, as well as risks of infection. Protecting HCP along this pandemic is a responsibility of every country's government. The elaboration of strategies, protective measures and the availability of protective materials are deemed necessary to save HCP from COVID-19 while taking charge of infected cases.

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## REFERENCES

1. World Health Organisation. Regional office of Europe: <http://www.euro.who.int/fr/health-topics/health-emergencies/coronavirus-COVID-19/news/news/2020/3/who-announces-COVID-19-outbreak-a-pandemic>
2. Lai CC, Shih TP, Ko WC, Tang HJ, Hsueh PR. Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) and Coronavirus disease-2019 (COVID-19): The Epidemic and the Challenges. *Int J Antimicrob Agents*. 2020 Mar; 55(3): 105924. (doi: 10.1016/j.ijantimicag.2020.105924).
3. World Health Organisation. Coronavirus disease 2019 (COVID-19) Situation Report – 73. 2 April 2020. [https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-COVID-19.pdf?sfvrsn=5ae25bc7\\_2](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200402-sitrep-73-COVID-19.pdf?sfvrsn=5ae25bc7_2)
4. Kampf G, Todt D, Pfaender S, Steinmann E. Persistence of Coronaviruses on Inanimate Surfaces and Their Inactivation with Biocidal Agents. *J Hosp Infect*. 2020 Mar; 104(3): 246-51. (doi: 10.1016/j.jhin.2020.01.022).

5. Ong SWX, Tan YK, Chia PY, et al. Air, Surface Environmental, and Personal Protective Equipment Contamination by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) From a Symptomatic Patient. *JAMA*. 2020, 28 April; 323(16): 1610-2. (doi: 10.1001/jama.2020.3227).
6. Huang C, Wang Y, Li X, et al. Clinical Features of Patients Infected With 2019 Novel Coronavirus in Wuhan, China *Lancet*. 2020 Feb 15; 395(10223): 497-506. (doi: 10.1016/S0140-6736(20)30183-5).
7. Mo Y, Deng L, Zhang L et al. Work stress among Chinese nurses to support Wuhan for fighting against the COVID-19 epidemic. *J Nurs Manag*. 2020 Apr7: 10.1111/jonm.13014. (doi: 10.1111/jonm.13014).
8. Phan LT, Maita D, Mortiz DC, Bleasdale SC, Jones RM. Environmental Contact and Self-contact Patterns of Healthcare Workers: Implications for Infection Prevention and Control. *Clin Infect Dis*. 2019 Sep 13; 69(Suppl 3): S178-S184. (doi: 10.1093/cid/ciz558).
9. Xiang YT, Jin Y, Wang Y, Zhang Q, Zhang L, Cheung T. Tribute to Health Workers in China: A Group of Respectable Population During the Outbreak of the COVID-19. *Int J Biol Sci*, 16 (10), 1739-1740. 2020 Mar 15 eCollection 2020. (doi: 10.7150/ijbs.45135).
10. Lai TH, Tang EWH, Chau SKY, Fung KSC, Li KW. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. *Graefes Archive for Clinical and Experimental Ophthalmology* (2020). 2020 May; 258(5): 1049-55. (doi: 10.1007/s00417-020-04641-8).
11. Moroccan Ministry of Health. The official portal of Corona virus in Morocco. Available at: <http://www.COVIDmaroc.ma/Pages/ProfessionnelSanteAR.aspx> (Accessed: 25 May 2020).
12. World Health Organisation. Coronavirus disease (COVID-19) outbreak: rights, roles and responsibilities of health workers, including key considerations for occupational safety and health. [https://www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-COVID-19.pdf?sfvrsn=bcabd401\\_0](https://www.who.int/docs/default-source/coronaviruse/who-rights-roles-respon-hw-COVID-19.pdf?sfvrsn=bcabd401_0)
13. World Health Organisation. Rational use of personal protective equipment for coronavirus disease 2019 (COVID-19). Interim guidance 27 February 2020. [https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPE\\_use-2020.1-eng.pdf](https://apps.who.int/iris/bitstream/handle/10665/331215/WHO-2019-nCov-IPCPE_use-2020.1-eng.pdf)
14. World Health Organisation. Coronavirus disease 2019 (COVID-19) Situation Report – 160. <https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports> (Accessed: 29 June 2020).
15. Liu Y, Wang H, Chen J, et al. Emergency management of nursing human resources and supplies to respond to coronavirus disease 2019 epidemic. *International Journal of Nursing Sciences*. 2020 Apr 4; 7(2): 135-8. (doi: 10.1016/j.ijnss.2020.03.011).
16. Huang L, Lin G, Tang L, Yu L, Zhou Z. Special attention to nurses' protection during the COVID-19 epidemic. *Crit Care*. 2020 Mar 27; 24(1): 120. (doi: 10.1186/s13054-020-2841-7).
17. Wang J, Zhou M, Liu F. Reason for healthcare workers becoming infected with novel coronavirus disease 2019 (COVID-19) in China. *Journal of Hospital Infection*. 2020 May; 105(1): 100-1. (doi: 10.1016/j.jhin.2020.03.002).
18. Yan Y, Chen H, Chen L et al. Consensus of Chinese Experts on Protection of Skin and Mucous Membrane Barrier for Health-Care Workers Fighting Against Coronavirus Disease 2019. *Dermatol Ther*. 2020 Mar 13: e13310. (doi: 10.1111/dth.13310).
19. Lan J, Song Z, Miao X, et al. Skin Damage Among Health Care Workers Managing Coronavirus disease-2019. *J Am Acad Dermatol*. 2020 May; 82(5): 1215-6. (doi: 10.1016/j.jaad.2020.03.014).
20. Lai J, Ma S, Wang Y, et al. Factors Associated with Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA network open*. 2020 Mar 2; 3(3): e203976. (doi: 10.1001/jamanetworkopen.2020.3976).
21. Chen X, Tian J, Li G, Li G. Initiation of a new infection control system for the COVID-19 outbreak. *Lancet Infect Dis*. 2020 Apr; 20(4): 397-8. (doi: 10.1016/S1473-3099(20)30110-9).
22. Yifan T, Ying L, Chunhong G, et al. Symptom Cluster of ICU nurses treating COVID-19 pneumonia patients in Wuhan, China. *Journal of Pain and Symptom Management*. 2020 Jul; 60(1): e48-e53. (doi: 10.1016/j.jpainsymman.2020.03.039).

23. Lai T1, Tang EHT, Chau S, Fung K, Li K. Stepping up infection control measures in ophthalmology during the novel coronavirus outbreak: an experience from Hong Kong. *Graefe's Archive for Clinical and Experimental Ophthalmology*. 2020 May; 258(5): 1049-55. (doi: 10.1007/s00417-020-04641-8).
24. Wei W, Zheng D, Lie Y, et al. Radiotherapy Workflow and Protection Procedures During the Coronavirus Disease 2019 (COVID-19) Outbreak: Experience of the Hubei Cancer Hospital in Wuhan, China. *Radiother Oncol*. 2020 Mar 30; 148: 203-10. (doi: 10.1016/j.radonc.2020.03.029).
25. Li W, Yang Y, Liu Z, et al. Progression of Mental Health Services During the COVID-19 Outbreak in China. *Int J Biol Sci*. 2020 Mar 15; 16(10): 1732-8. (doi: 10.7150/ijbs.45120).
26. Xiang YT, Jin Y, Wang Y, Zhang Q, Zhang L, Cheung T. Tribute to Health Workers in China: A Group of Respectable Population During the Outbreak of the COVID-19. *Int J Biol Sci*. 2020 Mar 15; 16(10): 1739-40. (doi: 10.7150/ijbs.45135).
27. Kang L, Li Y, Hu S, et al. The Mental Health of Medical Workers in Wuhan, China Dealing With the 2019 Novel Coronavirus. *Lancet Psychiatry*. 2020 Mar; 7(3): e14. (doi: 10.1016/S2215-0366(20)30047-X).
28. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: A cross-sectional study. *Psychiatry Res*. 2020 Jun; 288: 112936. (doi: 10.1016/j.psychres.2020.112936).
29. Lai J, Ma S, Wang Y, et al. Factors Associated with Mental Health Outcomes Among Health Care Workers Exposed to Coronavirus Disease 2019. *JAMA Netw Open*. 2020 Mar 2; 3(3): e203976. (doi: 10.1001/jamanetworkopen).
30. Lima CKT, Carvalho PMM, Lima IAAS, et al. The emotional impact of Coronavirus 2019-nCoV (new Coronavirus disease). *Psychiatry Res*. 2020 May; 287: 112915. (doi: 10.1016/j.psychres.2020.112915).
31. Wang J, Zhou M, Liu F. Reasons for Healthcare Workers Becoming Infected with Novel Coronavirus Disease 2019 (COVID-19) in China. *J Hosp Infect*. 2020 May; 105(1): 100-1. (doi: 10.1016 / j.jhin.2020.03.002).
32. Moroccan Ministry of Health. The official portal of Corona virus in Morocco. Available at: <http://www.COVIDmaroc.ma/Pages/AccueilAR.aspx> (Accessed: 29 June 2020).
33. Moroccan Ministry of Health. The direction of epidemiology and fight against diseases (DELM). Circular N° 21 DELM/2020. Available at: <http://www.COVIDmaroc.ma/Pages/ProfessionnelSanteAR.aspx>
34. Moroccan Ministry of Health. The direction of epidemiology and fight against diseases (DELM). Circular N° 32 DELM/2020. Available at: <http://www.COVIDmaroc.ma/Pages/ProfessionnelSanteAR.aspx>

