In December 2019, the novel coronavirus Coronavirus Disease 2019 (COVID-19) outbreak started in Wuhan, the capital of Hubei province in China. Since then it has spread to many other regions, including low-income countries.

**Keywords:** coronavirus; COVID-19; Africa; low income countries; middle income countries; cardiovascular disease
for prevention, diagnosis and management and is working continuously on therapeutic compounds and vaccines.

As a global organization representing the cardiovascular community, with more than 200 cardiovascular societies and foundations, the World Heart Federation is concerned that previous studies on other coronavirus diseases such as SARS-CoV and MERS-CoV have demonstrated a relationship between cardiovascular disease (cardiac disease and hypertension), diabetes and an increased morbidity and mortality due to coronavirus disease [5, 6]. Guan et al. reported in the New England Journal of Medicine on a case series of 1,099 cases with COVID-19 admitted to hospital in China. Patients with co-morbidities such as COPD, coronary artery and cerebrovascular disease, hypertension and diabetes were more likely to develop severe COVID-19 disease compared to patients without co-morbidities [2]. Another unpublished case series reported that about 10% of COVID-19 with severe disease developed acute cardiac injury with raised troponin-I/T (Bo Li et al, Clinical Research Cardiology, 2020, in press).

The goal of this document is to update our members from low-income countries on important facts on COVID-19 prevention in low- and middle-income countries.

**Important facts**

1. **The novel coronavirus**
   Coronavirus belong to a family of viruses that can cause mild disease such as a common cold, but also severe respiratory disease such as Middle East Respiratory Syndrome (MERS-CoV) or Severe Acute Respiratory Syndrome (SARS-CoV). The novel coronavirus epidemic Coronavirus Disease 2019 (COVID-19) is caused by a coronavirus named SARS-CoV-2 (Severe Acute Respiratory Syndrome Coronavirus 2).

2. **Transmission and infection**
   SARS-CoV-2 is thought to have a zoonotic origin and was first isolated from patients with pneumonia in Wuhan, China. The spread from human-to-human is mainly an aerosol transmission through contaminated respiratory droplets (coughing and sneezing). In addition, respiratory droplets containing the virus may contaminate surfaces up to 96 hours, for example screens of smart phones (Figure 2).

3. **Signs and symptoms**
   Signs and symptoms of COVID-19 include flu-like symptoms such as fever, cough, fatigue, headache, sore throat, shortness of breath and myalgia. In rare cases nausea, vomiting and diarrhoea have occurred. In severe cases pneumonia, acute respiratory distress syndrome (ARDS), multi-organ failure and death have been reported (Figure 3).
4. Prevention

Basic recommendations to prevent COVID-19: Follow six easy rules to reduce the risk of coronavirus transmission. The rules are built on the principle of protecting yourself and protecting others (Figure 4).

Recommendations on prevention for special populations

People with chronic underlying disease may be at increased risk of severe COVID-19 disease and death (Table 1). In the largest Chinese cohort, 16% of patients developed severe disease with a mortality rate of 8.1% [2]. Of those patients with severe disease, 38.7% had co-morbidities. Therefore, patients with co-morbidities require more rigorous prevention mechanisms. For people with chronic respiratory disease (e.g. chronic obstructive airways disease), infectious diseases (e.g. HIV and tuberculosis), chronic cardiovascular disease (e.g. cardiomyopathy, previous myocardial infarction, rheumatic heart disease), cancer or autoimmune diseases we recommend:
1. Avoid large gatherings – stay at home.
2. Keep at least 1–2 meters distance from a person with respiratory symptoms and do not stay in the same room with this person.
3. Vulnerable people should consider moving to relatives in rural areas and spend their time in voluntary isolation, such as a small hut, receiving food supplies via a neighbour or relative, but without direct contact.
4. Travel should be reduced to a minimum. Use a mask if travelling in a bus, train or plane. If masks are not available or affordable, cover your nose and mouth with a cloth or similar.

In case SARS-CoV-2/COVID-19 begins to spread in low-income countries at high risk of airborne diseases, as described above, containment may not be realistic and response efforts will likely need to transition to various mitigation strategies, which could include isolating ill people at home, closing schools, universities, places of religious worship and public events, which would also include attending funerals. Please follow recommendations of leading health organizations as outlined in Table 2.

Table 1: Risk factors for severe disease.

| Risk factors for severe disease               |
|----------------------------------------------|
| 1. Age                                       |
| >52 years (interquartile range 40–65)        |
| 2. Co-morbidities                            |
| present in 38% of patients with severe disease|
| Hypertension 24%                             |
| Diabetes 16%                                 |
| Coronary heart or cerebrovascular disease 8% |
| Chronic obstructive pulmonary disease (COPD) 4% |
| Chronic kidney disease 2%                    |
| Cancer 2%                                    |
| 3. Additional risk factor                    |
| unique for low-income countries              |
| HIV                                         |
| Tuberculosis                                |
| Chronic obstructive pulmonary disease (COPD) |
| Rheumatic heart disease (RHD)               |
| Cardiomyopathies                             |

The table outlines risk factors for severe COVID-19 disease and co-morbidities from China (from Guan et al. Clinical characteristics of coronavirus disease 2019 in China, NEJM, 2020) and low-income settings with a focus on Sub-Saharan Africa.
Competing Interests
The authors have no competing interests to declare.

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