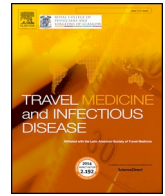




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COVID-19's final frontier: The central Africa region



Cases of COVID-19 have been rising in the African continent, though the entry was fortunately delayed as compared to other continents [1]. We posit that the potential impact and sequelae of the seeding of the causative virus, SARS-COV-2, would be the most significant in the central African region countries.

First, the region is a known hotspot for both disease outbreaks and as reservoirs for many infectious disease challenges that have been eradicated or contained in other parts of the world. HIV epidemic is believed to have begun in the 1920s in the region what now constitutes the Democratic Republic of Congo (DRC) and Cameroon. DRC, the most populated in the region, may have been the origin of early transmission the HIV epidemic before 1960 [2][2]. Since 2000, more than 10 Ebola outbreaks occurred in DRC (2007, 2009, 2018, 2019), Congo Brazzaville (2001, 2003, and 2005) Gabon (2001) and Sudan (2004). The region has ongoing outbreaks of measles, polio, cholera, yellow fever, tetanus, and is endemic for meningitis.

Second, weaknesses of health systems in the Central African nations make the region a sponge that absorbs and sustains epidemics [3] [3] (Table 1). Populations access to health care is limited either due to low investment in health systems or dysfunctional state of health insurance or social security systems. Health services require out of pocket payments even in government facilities and more than 60% of health facilities are for-profit [3] [3].

Third, out-migration of health personnel from Central African countries to southern African countries and elsewhere is common

making surge capacity a challenge even if temporary international emergency support is made available. 430 refugee doctors from DRC successfully integrated in the South African health system in 2017 [4,5]. Charlatans and fake religious experts exploit the society by promising cure for all ailments and discourage the use of western health concepts and services.

Fourth, poor drug regulatory systems and dependence on importation of medical supplies leads to proliferation of counterfeit products. This lack of regulatory systems provides a niche for traditional healers and practitioners without formal trainings to fill the gaps both in health care delivery and use of unregulated products. It was reported that in Lubumbashi, DRC, in 2016, 32% of the medicines sampled were counterfeits and 78% of prescriptions did not correspond to any established guidelines [5][5].

Fifth, wars and armed conflicts challenge disease control and have a very deleterious effect on provision of health services. The latest Ebola outbreak in Beni, DRC, is an example of how the conflict or the legacy of conflict impacted negatively and delayed epidemic control. The Lake Chad region and the adjoining Sahel region are well known hotspots of ongoing conflicts and displacement of people since the 1980s.

Finally, people of the central African region have the lowest of human development indices in the world (Table 1). DRC is well-known for its ironic national concept "Article 15" introduced by President Mobutu during the nationalization of Zaire- "everyone needs to work hard every day to find something to eat that day" (Photo). However,

Table 1
Key development indicators of Central African region^a.

Indicators	Central African Countries								
	Chad	DRC	Cameroon	CA-Republic	Angola	Congo	Gabon	E. Guinea	Saotome P
Population (in millions)	16.4	89.5	25.6	4.8	30.5	5.0	2.2	1.3	0.2
Total Fertility rate (Children born/Women)	5.8	6.0	4.58	4.8	6.0	4.26	4.0	4.2	4.1
Life expectancy (Years)	55.2	61.6	59.4	54.4	60.6	60.3	67.0	63.8	65.7
Infant mortality (infant deaths per 1000 live births)	67.1	59.7	49.8	71.1	65.8	53.5	31.1	63.3	44.1
Population in Urban area (%)	23.1	46.0	57.0	42.5	66.2	67.4	87.1	73.3	73.6
Age structure (Years)									
0–24	67.39	62.71	61.75	59.8	66.4	58.74	59.5	59.3	62.2
25–54	26.95	30.96	31.03	32.64	27.9	33.77	31.6	32.3	31.0
55 and older	5.66	6.33	7.22	7.56	5.7	7.49	8.9	8.4	6.8
HIV prevalence in 2018 (%), UNAIDS AIDS Info 2019	1.3	1.2	3.6	3.6	2.0	2.6	3.8	7.1	0.7
HIV incidence/1000 in 2018, UNAIDS AIDS Info 2019	0.6	0.3	1.6	2.0	1.6	1.6	1.5	6.2	0.1
History of armed conflicts or civil wars (Yes/No)	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No
Hospital bed density (Beds/10 000)	4.0	8.0	13.0	10.0	8.0	16.0	6.3	21.0	29.0
Service-Coverage index 2015	29.0	40.0	44.0	33.0	36.0	38.0	52.0	45.0	54.0
Expenditure on health by general government % GDP,2012	2.0	3.0	2.0	2.0	2.0	2.0	2.0	3.0	2.0
Out-of-pocket payment for health (%), 2012	53.0	32.0	63.0	46.0	27.0	25.0	41.0	44.0	52.0
Health worker density and distribution (MD/1000 populations)	0.05	0.09	4.7	0.06	0.2	0.1	0.3	0.4	N/A

^a Index Mundi, Demographics profile 2019; World meters.info/demographics 2020. N/A not available.



Photo. A market in Kinshasa in DRC. Credit: John DITEKEMENA.

there has not been a matching policy and infrastructural investment; 2018 data indicate that 73% of DRC's population live on < 2\$ per day. The region has some of the poorest or non-existent road networks, access to safe drinking water and education. A population with 30–50% who lack primary education and where traditional beliefs outweigh public health advisories including those facilitate ceremonial home-based funeral management can all precipitate disease acceleration.

Due to low levels of international commerce and travel in the region, the seeding of COVID-19 was delayed compared to other countries. Now, that COVID-19 has taken a strong hold in the region, crowded dwellings of the regions' cities can help rapid spread and the migrant populations can help spread from cities to rural areas. COVID-19 will compound the adverse effects of other persistent uncontrolled health threats as the existing resources are being repurposed for COVID-19 mitigation. Such donor-dependent resources are not unlimited. An exit strategy from a pandemic in the region is unlikely, unless in the rare case that some factors play a protective role against COVID-19, including the endemic diseases or their treatment such as malaria treatment, genetic traits such as sickle cell, lack of road network limiting mobility as in DRC, and potential low mortality from COVID-19 because of the demographic distribution of the population (only 5–8% of the population are elderly).

The situation can only be averted with massive international aid that flooded the region during the west Africa Ebola outbreak of 2014–2015. However, the countries that steered the financing of Ebola response are all severely affected by COVID-19 themselves. Rebel controlled areas with limited or no health systems or lack of economical resilience of the population will challenge the introduction of pandemic mitigation strategies such as social distancing. Population compliance to voluntary mitigation may be limited as the perception of a threat may be dwarfed by the low mortality of COVID-19, compared to > 60% mortality observed for Ebola. Allowing COVID-19 to go unmitigated in the Central Africa Region can exacerbate the ongoing civil unrest and conflict. The reservoir of infections in the region will remain a continuous threat to the rest of the world to seed seasonal and sporadic

outbreaks. Emergency action by international, regional and national stakeholders including the U.N. and African Union is urgently needed.

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Declaration of competing interest

None to declare.

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