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Title: Hepatitis C Virus in Sub-Saharan Africa: A long road to elimination

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On behalf of the HCV SSA Network

Hepatitis C Virus in Sub-Saharan Africa: A long road to elimination

The development of direct-acting antivirals against hepatitis C virus (HCV) has transformed the treatment landscape and underpinned the WHO goal of HCV elimination by 2030.

However, as of 2021, few countries remain on track to achieve this goal. Reliable data remain scarce, especially those on national plans for HCV elimination in many regions of the world and particularly in sub-Saharan Africa, which accounts for around 11 million of 71 million people estimated to be living with HCV (1).

We did a survey of the membership in the HCV sub-Saharan Africa Network, consisting of blood transfusion service experts and lead physicians for HCV treatment to gain an understanding of the size of the challenge that sub-Saharan Africa faces. The network was developed through funding from the Global Challenges Research Fund from the Scottish Funding Council. This collaboration resulted in the development of a network of 25 senior treating physicians across 13 countries, many of whom head their national viral hepatitis programs, and 13 blood transfusion service experts across 12 countries.

Physicians and blood transfusion service experts responded to separate surveys via REDCap, a secure electronic data capture tool hosted at University of Glasgow. Surveys were distributed in English and French. Questions on the survey covered availability of diagnostic tests, direct-acting antivirals, and associated costs. Participants were also asked what they thought were the main risk factors for HCV transmission in their countries. Survey responses were received from 20 physicians representing five countries. Ten countries were represented in total.

Most countries (nine [90%] of ten) reported that cultural practices contributed to HCV infection, which has been shown in Ghana, where tribal scarification and traditional circumcision procedures were associated with higher risks of HCV infection (2). Most countries also reported that health-care-associated activities were likely to have contributed to HCV infection. Three (30%) countries reported injecting drug use as a substantial risk factor. A rising epidemic of injecting drug use, in particular heroin, along the east coast of Africa was shown to be associated with HCV infection (3). Importantly, four (40%) of countries reported that there were unknown factors contributing to HCV infection thus highlighting the need for more exhaustive epidemiology studies.

Availability of direct-acting-antivirals varied, but the most commonly available regimens among countries participating in this survey included the first generation NS5A inhibitors, daclatasvir (90%) and ledipasvir (70%). Five (50%) countries reported having access to the second generation NS5A inhibitor velpatasvir, and none of the countries had access to protease-inhibitor based regimens or alternative NS5A inhibitors. Although the overall effectiveness of direct-acting-antivirals in the real-world setting is excellent, some HCV subtypes are more challenging to treat. For example, 11 and 4r subtypes were shown to have poor rates of sustained virological response at 12 weeks post-treatment when patients were given sofosbuvir-ledipasvir (4, 5), and these subtypes are prevalent in west Africa (mainly 11) and central Africa (4r).

All responding countries had access to serology tests; however, the type of tests available varied between and within countries. For example, in Uganda, serology tests often depended on what kits the laboratory had in stock. The cost of serological tests also varied in each country, ranging from \$0.60 to \$13 per test in Zimbabwe to \$25 per test in Benin. In Zimbabwe, the cheaper serology tests are only available in public health facilities that often have a short supply of kits, thus forcing patients to seek tests in private facilities where costs are inevitably higher. PCR tests to detect viral RNA were available in only six (60%) of ten countries. The costs of diagnosis and treatment are largely borne by the patient and only in Rwanda are funds provided for patients to be tested and treated, with treatment costs borne by private sector fundraising. Treatment costs per patient are substantial, ranging from \$500 in Uganda to \$2400 in DRC (appendix p 3). In Malawi, direct-acting antivirals are not readily available.

National HCV protocols were available in eight (80%) countries, whereas a protocol for direct linkage to care from national blood transfusion services was available in six (60%) countries (appendix p 3).

Countries such as Rwanda and Egypt have shown an incredible drive to develop their national HCV management programs, to improve the chance of achieving WHO elimination targets. However, most countries in sub-Saharan Africa have multiple barriers to overcome before they can reach these targets. Substantial investment and political commitment will be essential to overcome these challenges.

Author contributions

Rajiv Shah compiled and summarised survey responses, and wrote the manuscript.

Emma Thomson edited and reviewed the manuscript.

The remaining authors all reviewed the manuscript and responded to the survey.

References

1. Collaborators POH. Global prevalence and genotype distribution of hepatitis C virus infection in 2015: a modelling study. *The lancet Gastroenterology & hepatology*. 2017;2(3):161-76.
2. Layden JE, Phillips RO, Owusu-Ofori S, Sarfo FS, Kliethermes S, Mora N, et al. High Frequency of Active HCV Infection Among Seropositive Cases in West Africa and Evidence for Multiple Transmission Pathways. *Clinical Infectious Diseases*. 2015;60(7):1033-41.
3. Shah R, Boucheron P, Mandaliya K, Kattamaiyo A, Chevaliez S, Shimakawa Y, et al. Hepatitis C virus infection in people who inject drugs in Africa. *The Lancet Infectious diseases*. 2020;20(3):282-3.
4. Childs K, Davis C, Cannon M, Montague S, Filipe A, Tong L, et al. Suboptimal SVR rates in African patients with atypical genotype 1 subtypes: Implications for global elimination of hepatitis C. *Journal of hepatology*. 2019;71(6):1099-105.
5. Gupta N, Mbituyumuremyi A, Kabahizi J, Ntaganda F, Muvunyi CM, Shumbusho F, et al. Treatment of chronic hepatitis C virus infection in Rwanda with ledipasvir-sofosbuvir (SHARED): a single-arm trial. *The lancet Gastroenterology & hepatology*. 2019;4(2):119-26.