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REVIEW

Advancing Hepatitis C Elimination in Africa: Insights from Egypt

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Abstract: The hepatitis C virus (HCV) poses a significant risk to global public health and is linked to life-threatening clinical outcomes. According to the WHO, there are an estimated 58 million people worldwide who have a chronic hepatitis C virus (HCV) infection; there are 1.5 million new cases and more than 350,000 fatalities from HCV-related illnesses each year. Even though there are numerous diagnostic techniques, the lack of funding, inadequate healthcare infrastructure, and low public awareness of the Hepatitis C virus can make diagnosis and treatment difficult to obtain throughout the continent. The frequency of hepatitis C virus infection is highest in African nations (1–26%), raising serious concerns about the virus's impact on public health. The world's highest rate of Hepatitis C virus infection was found in Egypt, an African nation. Its nationwide hepatitis C elimination program stands out as a prime example of achievement, having screened, and treated over 60 million people, significantly reducing the disease's incidence and prevalence. Other African nations facing similar difficulties might benefit greatly from Egypt's methods, which provide valuable insights and flexible frameworks. This review aims to shed light on Egypt's successes and challenges while offering strategic recommendations to African nations to quicken their progress in eliminating hepatitis C.

Keywords: hepatitis C, elimination, Africa, Egypt, direct-acting antivirals, policy insights, hepatitis virus

Introduction

The Hepatitis C virus (HCV) is a type of tiny enveloped positive stranded RNA virus that is a member of the *Flaviviridae* family and genus *Hepacinivirus*. The World Health Organization (WHO) estimates that over 350,000 people die each year from complications and diseases associated to hepatitis C, and that over 58 million people have a chronic hepatitis C virus (HCV) infection.[1] In contrast to other hepatitis viruses (like HAV, HDV, and HEV), HCV is more likely to cause chronic infections, which can go years without causing symptoms and result in long-term liver damage;[1,2] it also demonstrates remarkable genetic diversity, with multiple genotypes and subtypes that influence how well a treatment works and how the disease progresses.; Additionally, unlike Hepatitis A and B, there is no known vaccine for HCV; instead, prevention is based on avoiding risk factors and engaging in safe behaviors. Furthermore, HCV sometimes progresses silently with minimal early signs that may occasionally even manifest concurrently with considerable liver damage.[1–4] Chronic liver disease (CLD) is primarily caused by HCV, and cirrhosis, hepatocellular carcinoma, liver failure, and death have all been associated with long-term infection.[5–7] When it comes to hepatitis viruses, intravenous drug use, risky medical operations, and blood transfusions are the most prevalent means of transmission. In contrast, other hepatitis viruses (such as HEV and HAV) mostly spread through contaminated water and food.[8,9]

According to estimates available, the hepatitis C virus (HCV) continues to be a major public health concern in Africa, where over 91 million people have either hepatitis B or C, accounting for 26% of the global burden of these infections and causing approximately125000deaths annually. Nevertheless, a number of obstacles stand in the way of effective management, as over 70% of hepatitis B cases worldwide occur in Africa, requiring intensive prevention and treatment initiatives.[1,4,9,10] Traditional practices (including scarification), a family history of viral hepatitis, geographic location, unsafe transfusion practices, unsafe injection drug use, and risky sexual activities involving blood exposure are some of

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the risk factors for HCV infection in Africa.[11–13] Despite the availability of affordable, efficient Direct-Acting Antiviral (DAA) drugs that can cure HCV in most cases with little side effects,[2,10,11] many obstacles prevent people from accessing healthcare, including exorbitant expenses, scarcity of resources, and low awareness. Numerous nations implemented HCV elimination initiatives and set a 2030 target of 90% lower chronic HCV incidence and 65% lower HCV mortality.[14] However, the negative effects of the SARS-CoV-2 epidemic on the healthcare system caused HCV elimination programs to be delayed or stopped, as a result, there are still large gaps in viral hepatitis testing and treatment options.[14–17]

However, among these difficulties are also some examples of creativity and achievement in the area that can act as templates for quickening the eradication of hepatitis C in other nations.[18] Egypt had the greatest frequency of HCV in the world, with over 6 million cases stemming from improper injection methods during the country's large treatment operations to eradicate schistosomiasis in the 1960s. The fast spread of HCV was caused by non-disposable needle reuse and lack of sterilization.

Notably, Egypt's noteworthy advancements in the fight against hepatitis C offer hope. Egypt has received international attention for its efforts to eradicate hepatitis C, and its preemptive measures have drastically reduced the prevalence of new infections.[19] Egypt has started a national drive to eradicate hepatitis C by 2023, dubbed "**100 million seha**" (100 million healthy lives), providing free testing and treatment to everybody. This initiative is the result of years of coordinated government action.[19–22]

The purpose of this review is to highlight Egypt's progress and challenges in their effort to eradicate hepatitis C, providing other African nations that are dedicated to doing the same with insightful analysis and actionable suggestions.

Prevalence of Hepatitis C in Africa

In Africa, the hepatitis C virus (HCV) continues to be a serious public health concern. Although there is a significant HCV disease burden in Sub-Saharan Africa, there is no comprehensive epidemiology or understanding of the disease burden in this region. One major obstacle in this regard is the dearth of trustworthy prevalence statistics and population-based research. As stated by WHO With roughly 60 million having hepatitis B and 10 million having hepatitis C, over 70 million Africans suffer from chronic viral hepatitis. HCV infection is currently curable, however hepatitis B infection is not prevented or treated.[23] Around 125,000 people worldwide have died from hepatitis B and C, with 26% of cases occurring in the African continent. Furthermore, modeled data indicates that 600,000 people in South Africa are estimated to be infected with HCV, representing a prevalence of less than 1%. Over 71 million people worldwide suffer from HCV, with 14% of those affected living in sub-Saharan Africa.[1,3,4,24] Some of the greatest HCV prevalence rates are seen in North Africa, most notably in Egypt, which formerly had one of the highest rates of HCV infection in the world with over 6 million infected, mostly as a result of improper injection practices et al[4,24,25] The Democratic Republic of the Congo, Nigeria, Cameroon, Gabon, Libya, and others have notable prevalence rates. The fact that several studies in the same area may find different prevalence numbers is significant because it illustrates the difficulty of epidemiological surveillance. A sizable percentage of the HCV epidemic worldwide in 2019 was concentrated in the African continent, where the illness was also responsible for a sizable number of fatalities (Figure 1). The goal of the WHO's continuous efforts to monitor and manage this public health issue is to lessen the prevalence and effects of HCV throughout the continent.

Increasing the coverage of routine childhood immunization against Hepatitis B, which is now at 72% for the region—below the worldwide target of 90%—is one of the ways the WHO is fighting Hepatitis B and C. Additionally, the rates of Hepatitis C diagnosis and treatment remain shockingly low, with around 5% of infected individuals receiving treatment and only 5% receiving a diagnosis.[3,27]

In order to lessen the prevalence of Hepatitis C in Africa, these data emphasize the critical need for enhanced healthcare measures, such as immunization, safe injection techniques, and access to diagnosis and treatment services.

Methods for Africans to Be Free of Hepatitis C

Even though there are little comprehensive and trustworthy HCV seroepidemiological data in many regions of sub-Saharan Africa, the estimations that are now available point to a significant burden.

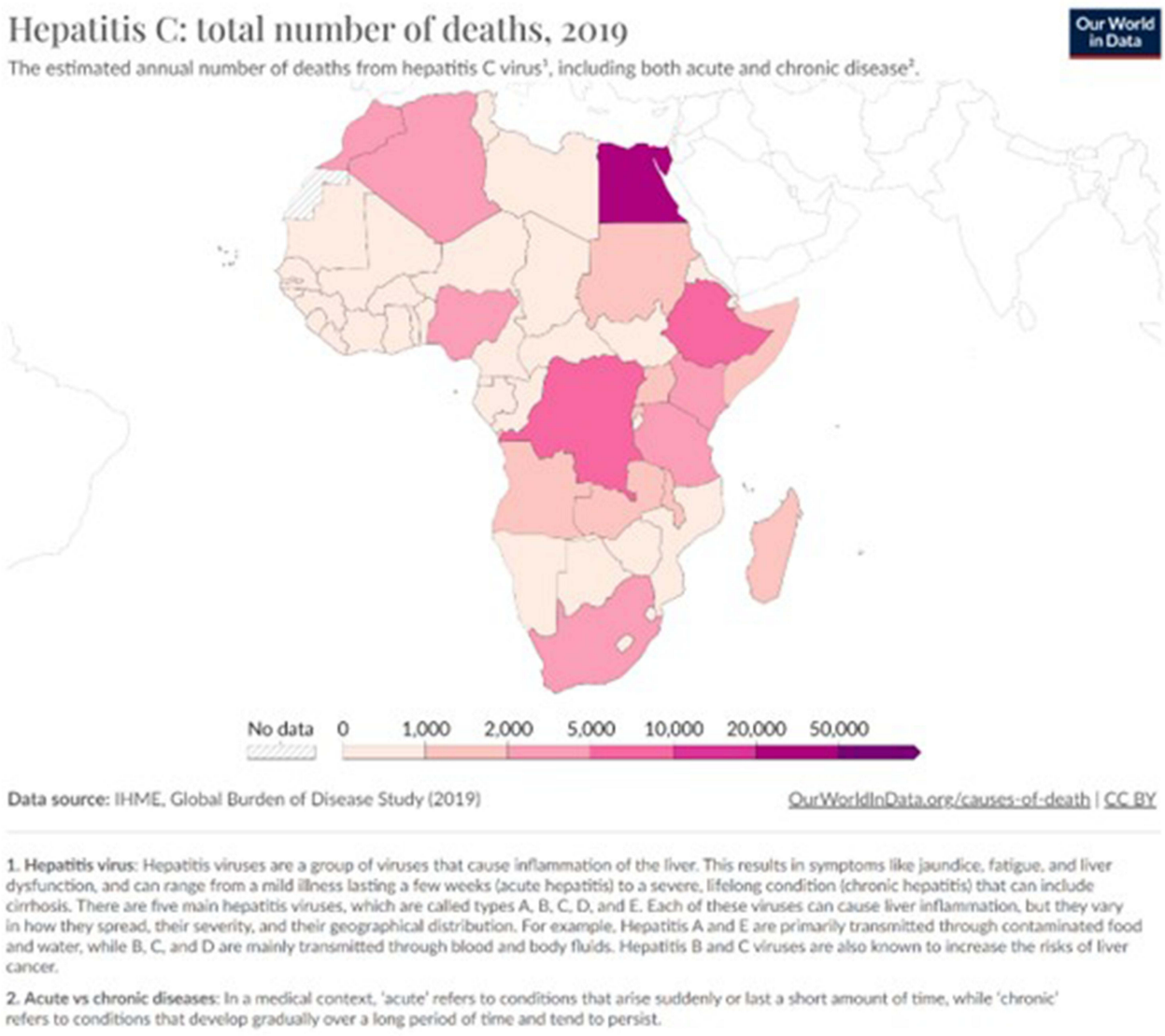

Figure 1 The Global Burden of Disease Study (2019) by IHME estimates the total number of deaths caused by the hepatitis C virus in 2019.
Note: Reproduced with permission from IHME, Global Burden of Disease Study. (2019). Available from: https://ourworldindata.org/grapher/hepatitis-c-number-of-deaths?region=Africa.[26]

The resources required to eradicate viral hepatitis are currently at hand, but a global coordinated response to the disease is being implemented slowly and with several obstacles. Among these are low levels of overall health investment; insufficient data and weak surveillance systems; inadequate infrastructure; low awareness among primary care practitioners, at-risk populations, and policymakers; high costs of certain diagnostics and treatments; and a failure to prioritize viral hepatitis. When building models of national plans for management of HCV in the region, systematic population-based seroprevalence investigations should be incorporated to determine the true burden. Significantly, the lack of seroprevalence statistics should not impede the growth of HCV screening programs for the general public and at-risk individuals, nor should it impede the development of HCV infection identification, therapy linkage, and efficacious treatment.

Raising awareness, enhancing infrastructure, and implementing focused interventions are all necessary to combat this silent epidemic and lower the prevalence of HCV in the area. The World Health Organization's 2016 Global Health Sector Strategy on viral hepatitis established a target of 90% lower incidence and 65% lower mortality from 2015 levels

Table 1 Impact and Coverage Indicators, Targets, and Milestones for Viral Hepatitis by 2030

	Indicator	Baseline- 2020	Targets-2025	Targets-2030
Impact	Prevalence of hepatitis B surface antigen (HBsAg) in children under five years of age	0.94%	0.5%	0.1%
	Annual number of new cases of hepatitis B	1.5 million fresh instances 20 out of 100,000	850 000 new cases 11 per 100 000	170 000 new cases 2 per 100 000
	The annual number of new cases of hepatitis C infections	1.575 million new cases 20 per 100 000	1 million new cases 13 per 100 000	350 000 new cases 5 per 100 000
	Number of newly diagnosed cases of hepatitis C among drug injectors annually	8 per 100	3 per 100	2 per 100
	Annual number of deaths due to hepatitis B	820 000 deaths 10 per 100 000	530 000 deaths 7 per 100 000	310 000 deaths 4 per 100 000
	Number of hepatitis C fatalities annually	290 000 deaths 5 per 100 000	240 000 deaths 3 per 100 000	140 000 deaths 2 per 100 000
Coverage	Hepatitis B: proportion of patients diagnosed and treated for hepatitis B	30%/30%	60%/50%	90%/80%
	Hepatitis C: The proportion of individuals with hepatitis C who have been diagnosed and treated	30%/30%	60%/50%	90%/80%
	The proportion of infants who have benefited from receiving a hepatitis B vaccination dose on time for their birth as well as from additional interventions aimed at preventing the vertical (mother-to-child) spread of the virus	50%	70%	90%
	Children's vaccination coverage against hepatitis B (third dose)	90%	90%	90%
	The quantity of syringes and needles given to each drug injector	200	200	300
	The percentage of blood units checked for bloodborne infections is known as blood safety.	95%	100%	100%
	Safe injections: percentage of safe injections used in healthcare	95%	100%	100%
Milestones	***Planning***: the count of nations having budgeted plans to eradicate hepatitis	TBD	30	50
	Surveillance **-** number of nations that yearly report on burden and cascade	130	150	170
	Hepatitis C virus drug access **–** % average price drop (to 2025 equivalent generic pricing)	20%	50%	60%
	Hepatitis B virus drug access **-** % average price drop (to be in line with HIV medication costs by 2025)	20%	50%	60%
	Elimination of vertical (mother-to-child) transmission - number of nations whose efforts to end the vertical spread of syphilis, hepatitis B, or HIV have been verified	15	50	100
	Elimination **-** number of nations where the eradication of hepatitis C and/or hepatitis B has been validated	0	5	20
	Integration **-** percentage of HIV-positive individuals who were tested for/cured of hepatitis C	TBD	60%/50%	90%/80%

in order to eradicate the illness as a danger to public health by 2030 (Table 1).[3,28,29] With a high coverage of preventative treatments, this strategy offers countries a framework to monitor their success in lowering hepatitis B and C infections and related mortality. Infant hepatitis B immunizations, safe blood and injection practices, harm reduction, HBV/HCV testing and treatment, etc. are some of these approaches.[14]

The majority of African nations still have draft national hepatitis strategies, despite this strategic objective. Less than eight nations in the region provide subsidized hepatitis testing and treatment, leaving large gaps in the market. Securing sufficient finance, political support, the ability of the health system, community involvement, and the preservation of the human rights of hepatitis C patients are among the difficulties.[14,27,30]

A notable example of how a nation might tackle a significant public health burden is Egypt's program, which started in 2014 and accelerated in 2018, with the goal of eradicating hepatitis C by 2023. Key elements included administering direct-acting antivirals (DAAs), which can cure more than 95% of instances of hepatitis C, to everyone diagnosed with the condition nationally and evaluating them for noncommunicable diseases (NCDs) like diabetes and hypertension. Public health institutions offered free care, which was made possible by creative financing methods like social solidarity funds and health insurance, as well as locally produced generic DAAs and negotiated price reductions,[15,25] to enhance blood safety, infection control, and harm reduction procedures in order to stop the spread of new infections. The program also raised awareness about hepatitis C transmission and prevention among the general public and healthcare providers. Additionally, it promoted the hepatitis B vaccination, which can prevent hepatitis D co-infection. Finally, it used a comprehensive surveillance system, which included sentinel sites, regular surveys, and viral load testing, to monitor and assess the program's effectiveness. The World Health Organization (WHO) and other partners worked with the initiative to verify its successes and disseminate the lessons it had learnt.[19,31–34]

The program produced remarkable and unheard-of results. Over 60 million people had been examined and over 4 million had been treated by the program by 2022. In Egypt, the frequency of new infections fell from 300 per 100,000 in 2014 to 9 per 100,000 in 2022, and the prevalence of hepatitis C fell from 10% in 2014 to 0.38% in 2022.[18,24] Egypt is the first nation to reach the "gold tier" designation on the WHO's route to hepatitis C eradication, meaning it has met the coverage goals for the program, which will allow it to reach the 2030 full elimination targets for reduced incidence and mortality.[28]

Egypt's Hepatitis C Elimination Program: Lessons to Be Learned and Advice for Other African Nations

An estimated 1.4 million fatalities, 3.5 million new infections, and 62 billion USD in economic damages might be avoided if hepatitis C is eradicated in Africa by 2030.[3,4,35–37] As a result, we urge all parties involved to step up their financial support, political dedication, and teamwork in order to eradicate hepatitis C in Africa and enable millions of people to live healthy, fulfilling lives.

Other African nations with limited resources, infrastructure, and knowledge that confront a high incidence of Hepatitis B or C infections should take inspiration from Egypt's methodology for eradicating the disease.[35,38] However, each nation must modify the model and take into account the WHO Strategic plan in light of its unique circumstances, taking into account the capacity of the health system, the political climate, cultural norms, and the epidemiology, transmission, and risk factors of hepatitis C.

Egypt's incredible achievement was made possible by its innovative finance and collaborations, political dedication and leadership, and community awareness and mobilization. These elements made it possible for Egypt to carry out an extensive and ambitious program that impacted millions of individuals nationwide and encompassed hepatitis C screening, diagnosis, treatment, prevention, and surveillance.[16,19,37,39,40]

We advise African governments, international organizations, and other stakeholders to take the following steps to expedite hepatitis C elimination efforts in Africa, based on Egypt's success story:

- *Perform a gap analysis and scenario analysis* to determine the extent and features of the hepatitis C outbreak as well as the advantages and disadvantages of the current approach. This could entail mapping stakeholders and resources, evaluating policies and guidelines, and conducting seroprevalence surveys.[16,39]

- *Create and carry out national hepatitis C operational and strategic plans* that are in line with the priorities and context of the nation, based on the WHO global health sector strategy and the regional framework for action.[3,24]
- Create a governance framework and a national coordinating mechanism to supervise and monitor the program and guarantee accountability and openness. Establishing a national committee or technical working group including members from the government, academia, civil society, and development partners is one way to do this.

- To finance and carry out hepatitis C elimination programs, as well as to take advantage of already-existing platforms and initiatives, mobilize both internal and external resources and collaborations. In order to do this, one could propose raising the budget, apply for grants from the Global Fund and other sources, bargain with drug companies for voluntary licenses and price reductions, and work with other health initiatives related to HIV, TB, and noncommunicable diseases.[18,29,38,41]
- Launch phased and prioritized hepatitis C elimination programs, focusing first on the most vulnerable and impacted populations and regions before progressively and methodically scaling them up.[11,13,42,43] In addition to using a patient-centered and human rights-based approach, the programs should address the following components: screening, diagnosis, treatment, prevention, and surveillance.
- Boost the capabilities of health systems and the medical staff to provide safe and effective hepatitis C services, as well as to guarantee the accessibility and availability of medications and tests.[24,28,44] This could involve developing blood safety and infection control procedures, strengthening supply chain and logistics management, and educating and inspiring healthcare professionals.
- Apply the WHO validation criteria and tools, as well as a reliable and standardized data collecting and reporting system, to track and assess the program's effectiveness.[18,28] In order to make improvements, the program should also carry out routine reviews and evaluations, distribute the results, and apply the lessons discovered.
- Increase community involvement and public awareness in order to combat stigma and prejudice against those who are hepatitis C positive or at risk, as well as to boost demand for and uptake of hepatitis C services. This can entail running social media campaigns to encourage behavior changes, disseminating accurate and trustworthy information, and incorporating celebrities, religious institutions, and civil society organizations into the initiative.[45,46]

Enhancing access to diagnosis and treatment through the decentralization and simplification of the service delivery model, connecting hepatitis C services with other health services, and utilizing point-of-care and self-testing technologies are additional tactics and interventions that could aid in the eradication of hepatitis C in Africa.[18,24] Bolstering health systems through increasing the ability and drive of healthcare professionals, guaranteeing the standard and security of medical care, and streamlining the distribution and handling of pharmaceuticals and diagnostics.[42,47] Raising public awareness through tackling stigma and prejudice against those who have hepatitis B and C or are at risk of getting it, implementing social and behavior change communication initiatives, and supplying accurate and trustworthy information.[2,45,47,48]

Conclusion

Millions of fatalities can be avoided and significant improvements in public health can be achieved if HBV and HCV infections are eradicated by 2030. Much of what's required to accomplish these aims already exists. Chronic HCV must be eradicated immediately and completely. Ingenious barrier-breaking measures by African health systems are required to accomplish this goal. Success requires modifying WHO's objectives and approach as well as providing resources, awareness, training, and training. Egypt's national hepatitis C elimination campaign is an example of a successful approach to this task, despite the difficulties involved. To lower morbidity and death, it is imperative to take lessons from Egypt's historic achievement. Overall, countries with national programs that included extensive HCV screening and treatment initiatives have had exceptional success; on the other hand, countries without such programs continue to have high HCV burdens. For the millions of people who deserve a healthier, more respectable life, hepatitis C elimination must be a reality, requiring cooperation from all parties involved.

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Disclosure

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