Review

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Confronting Hepatitis E Virus in Africa: Insights from Nigeria and Pathways for Control

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Review

Confronting Hepatitis E Virus in Africa: Insights from Nigeria and Pathways for Control

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Abstract

Hepatitis E virus (HEV) is an under-recognized cause of acute viral hepatitis and remains a significant public health issue in Africa. Globally, over 20 million HEV infections and nearly 3 million symptomatic cases happen each year, but the true burden in Africa is poorly understood because of limited surveillance, inconsistent diagnostics, and underreporting. Outbreaks have been reported in several African countries, including Sudan, Uganda, Chad, Ghana, and Nigeria, often linked to floods, displacement, and poor sanitation. Prevalence studies show significant variation, from less than 1% in Tanzania to over 80% in Egypt, indicating different epidemiological situations across the continent. In Nigeria, two major outbreaks have been documented, while seroprevalence studies suggest widespread exposure in humans and high infection rates in pigs. Vulnerable groups include pregnant women, HIV-positive individuals, and livestock handlers; these findings reflect broader trends across Africa where waterborne transmission and zoonotic reservoirs help sustain HEV circulation. The challenges in controlling HEV across Africa include weak surveillance systems, inconsistent diagnostics, limited genetic characterization of circulating strains, inadequate knowledge of risk factors, gaps in blood bank safety, uncertain zoonotic pathways, and low public awareness. Addressing these issues requires a One Health approach that integrates human, veterinary, and environmental health systems, with priority interventions including expanding affordable diagnostics, strengthening WASH infrastructure, routine animal and blood donor screening, targeted education for high-risk groups, and investment in molecular epidemiology. Therefore, this review consolidates current knowledge of HEV in Africa, with insights from Nigeria, and provides recommendations for control through a coordinated One Health approach, essential to reduce transmission, protect vulnerable groups, and build resilient surveillance systems capable of preventing future outbreaks.

Keywords: Hepatitis E virus; Nigeria; one health; zoonosis; epidemiology; surveillance; prevention

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Background

Hepatitis E virus (HEV) is a globally significant cause of acute viral hepatitis, accounting for an estimated 20 million infections and over 3 million symptomatic cases annually [1]. HEV-induced hepatitis manifests as either acute or chronic viral hepatitis, transmitted through the ingestion of contaminated food or water via the enteric-fecal-oral route [2]. Although previously regarded as a self-limiting disease, HEV has garnered increasing attention owing to its severe clinical implications within vulnerable populations, including pregnant women and immunocompromised individuals, as well as its capacity to induce both sporadic cases and extensive waterborne outbreaks [3]. Mortality

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rates generally range from 1% to 2% among the general population but can surpass 40% during third-trimester pregnancies [2,3], with numerous reports documenting vertical transmission and adverse maternal–fetal outcomes [4]. HEV belongs to the family Hepeviridae and the genus Orthohepevirus [5], and is a small, icosahedral, non-enveloped virus with a single-stranded, positive-sense RNA genome measuring approximately 27–34 nm in diameter [6-7]. Five major genotypes infect mammals and birds: genotypes 1 and 2 are restricted to humans and cause large outbreaks in regions with poor sanitation [8], while genotypes 3 and 4 circulate in various animal reservoirs—including pigs, wild boars, and deer—and occasionally spill over into humans through zoonotic transmission [9-11]. Genotype 5 has been detected in birds and is not considered infectious to humans [9]. This diversity highlights the dual nature of HEV as both a waterborne and zoonotic pathogen.

The prevalence of HEV across Africa varies widely with 85.1% being documented in Egypt [10], 17.05% in Algeria [11], 7.7% in Nigeria [12], 10.7% in South Africa, 2.2 - 6.8% in Morocco [13] and <1% in Tanzania [14]. HEV outbreaks has been experienced in over half of sub-Saharan countries, with most outbreaks often linked to seasonal flooding, displacement, and inadequate sanitation [15] and inaccessibility to clean water [16]. Other risk factors associated with HEV in Nigeria includes, unhygienic environment, poverty and limited healthcare access [17]. These disparities collectively emphasizes the severe public health challenge faced in several African countries [16]. In Nigeria, studies on HEV remains limited due to patient's choice of traditional medications and self-medication [17]. Nigeria therefore exemplifies a useful case study for understanding the African HEV burden and for developing targeted One Health interventions [15]. Additionally, tackling this issue necessitates a One Health approach that integrates human, animal, and environmental health considerations. This review consolidates existing evidence on HEV epidemiology in Nigeria, highlights major challenges in surveillance, diagnostics, and prevention, and proposes strategies for adopting a One Health framework to reduce the impact of HEV-induced hepatitis.

Methods

This review was developed through a systematic search of peer-reviewed literature on hepatitis E virus (HEV), with a special emphasis on Nigeria and the broader African context. Scholarly databases, including PubMed, Google Scholar, and Scopus, were queried between January and March 2025. Search terms combined medical subject headings (MeSH) and free text keywords such as: "Hepatitis E Virus," "HEV," "Nigeria," "Africa," "epidemiology," "outbreak," "seroprevalence," "zoonosis," "One Health", and "prevalence." Boolean operators ("AND," "OR") were applied to refine results.

Inclusion Criteria

1. Studies published in English between 1990 and 2025.
2. Articles reporting human or animal HEV prevalence, outbreak investigations, or case series from Nigeria and Africa.
3. Reviews, surveillance reports, and policy papers relevant to HEV epidemiology, prevention, or One Health strategies.

Exclusion Criteria

1. Studies focusing on unrelated viral hepatitis (e.g., hepatitis A, B, C, D).
2. Case reports or studies lacking primary epidemiological or diagnostic data.
3. Duplicated reports already included in systematic reviews unless they contributed additional local context.

Data Extraction and Synthesis

Titles and abstracts were screened for relevance, and eligible full texts were reviewed in detail. Data extracted included study year, location, sample population, diagnostic method, prevalence, and

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key findings. To contextualize Nigerian findings, comparative African data were included, particularly from West African countries with similar ecological and socioeconomic conditions. Where available, results were cross-referenced with WHO fact sheets, national outbreak reports, and systematic reviews

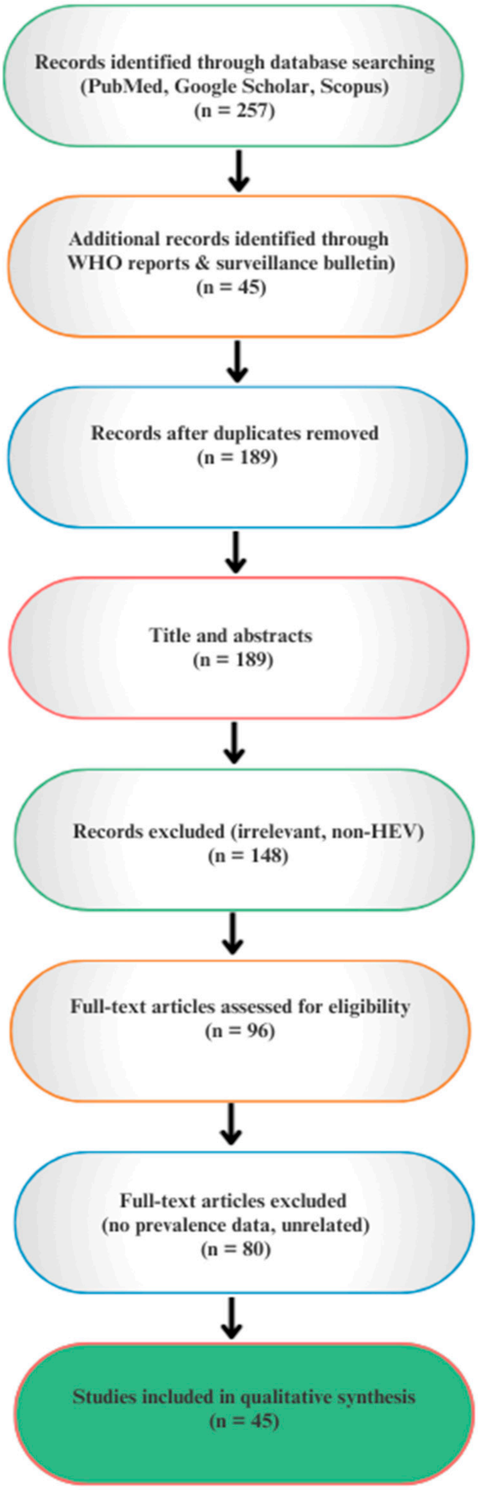

Figure 1. PRISMA-style workflow for study selection.

Results And Discussions

1. Burden of HEV in Africa

Hepatitis E virus (HEV) is widely distributed across Africa, with evidence of circulation in at least half of the continent's countries. Prevalence rates, however, show striking variation, reflecting differences in sanitation, water quality, population health, and diagnostic methods (Tables 1a & 1b). In Burkina Faso, seroprevalence rates of 10–19% have been documented among blood donors and pregnant women [13]. In adults suffering from chronic liver diseases, a seroprevalence of 14% has also been reported [18]. Similarly in Cameroon, HEV RNA has been identified in 14% of HIV-infected adults and 2% of HIV-infected children [19], whereas studies from the Central African Republic indicated a prevalence of 24% among patients attending sexually transmitted disease clinics [20]. In Djibouti, a prevalence of 13% was recorded among male peacekeepers [21]. North Africa consistently exhibits a high seroprevalence, with Egypt reporting IgG positivity rates exceeding 60–80% across various groups, including pregnant women, patients with chronic liver diseases, and residents of rural areas [22-29]. The Southern and Eastern Africa regions generally report lower prevalence trends; in Gabon, pregnant women have recorded approximately 14% prevalence, while young villagers have documented 0% prevalence [30,31]. This may suggest an enduring endemicity with continuous exposure among the general population. West Africa exhibits moderate to high prevalence levels. In Ghana, the prevalence of HEV detected by RT-PCR in HIV-positive patients was approximately 45% [19]. Seroprevalence varies from 4% to 38%, depending on the subgroup within the Ghanaian human sample population [33,34]. Serological studies conducted on pigs in Ghana revealed a prevalence rate exceeding 60% [35]. In Jordan, a prevalence ranging from approximately 8% to 14% was observed across different sampled ruminant species [36]. In Madagascar, among slaughterhouse workers, a prevalence of 14% was documented, with an even higher percentage recorded within the sampled animal population [37]. Among blood donors in Morocco, a seroprevalence of 8% was recorded [38]. For the adult population in Morocco, a prevalence of approximately 2% was reported utilizing ELISA and Western blotting techniques [39]. In Nigeria, Osundare et al. [2021] further elaborated on this data by recognizing notably high seroprevalence rates among HIV-positive individuals (11.4%), animal handlers (7.9%), and pregnant women (6.3%), thereby confirming these cohorts as high-risk categories within the nation [40]. Research involving animals confirms the significance of pigs as a reservoir. In Plateau State, Nigeria, widespread detection of HEV antibodies in pigs has been reported; however, the prevalence in goats and cattle was low or absent, indicating that swine serve as the primary zoonotic reservoir [41]. In South Africa, investigations have indicated the presence of rural-urban gradients, with a higher prevalence of HEV observed among rural populations [42, 43] These findings substantiate the predominant correlation between environmental conditions, sanitation, and the prevalence of this virus. In Tanzania, a 6% prevalence rate was estimated in women aged 15-45 years [44] which is one of the lowest among university students in Africa, at 0.2% [45], indicating heterogeneity of exposure within and between regions. Studies from Tunisia, on the other hand, provide granularity by subgroup, suggesting background seropositivity in the general population and indicating endemic transmission from broader-margin surveys [45]. Poly-transfused adults [46] and Pregnant women [47] showed prevalences of approximately 28% and 12% respectively, reflecting both biological vulnerability and transfusion-related exposure risks in contexts lacking systematic screening. Central Africa data indicate moderate endemicity, whereas Zambia yielded prevalence rates of 16% in children and 42% in urban adults [48, 49].

Table 1a. Human HEV prevalence in African countries.

Country	Population Studied	Year	Diagnostic Method	Prevalence	Reference
South Africa	Canoeists high-risk, medical students low-risk.	1994	ELISA, Western blot	2.6%, 1.80%	[43]
Djibouti	Male peacekeepers in Haiti	1995	ELISA	13.00%	[21]
Gabon	Young villagers	1995	ELISA	0.00%	[31]
Morocco	Adults	1995	ELISA & Western blot	2.20%	[39]
Egypt	Residents of a semiurban village in the Nile River Delta	1996	ELISA	57%	[25]
Egypt	Healthy Females (16 - 25 years)	1996	ELISA	38.90%	[27]
South Africa	Blacks in rural and urban area	1996	ELISA	15.3%, 6.6%	[42]
Burundi	Adults with chronic liver disease	1997	ELISA	14%	[18]
Central African Republic	STD clinic patients	1997	EIA	24.2%	[51]
Egypt	Blood donors, Haemodialysis patients	2000	EIA	45.2%, 39.6%	[24]
Tanzania	Healthy students	1998	ELISA	0.20%	[49]
Tunisia	Elderly, children with blood disorders, donors	1998	-	46%, 29.5%, 22%	[44]
Ghana	Teenagers	1999	ELISA	4.40%	[33]
Egypt	Rural residents of selected countries (16-30 years)	2000	ELISA	>20%	[24]
Egypt	Rural residents of two communities 1st decade, 2nd to 8th decade	2000	ELISA	60%, 76%->60%	[27]
Egypt	Sewage treatment plant workers	2000	Serology, Nested RT-PCR	20–40 years: 50.9% – 50.4% 41–50 years: 43.2% 51–60 years: 46.2%	[30]
Tanzania	Women between 15 and 45 years	2000	ELISA	6.60%	[44]
Morocco	Blood donors	2004	ELISA	8.50%	[38]
Egypt	Pregnant women	2006	EIA	84.3%	[29]
Nigeria	Internally displaced persons	2007	ELISA	64%	[52]
Gabon	Pregnant women	2008	ELISA	14.2%	[30]

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Tunisia	Healthy persons between 16 and 25 years	2008	-	4.30%	[48]
Ghana	Pig handlers, Pregnant women	2009	ELISA	38.1%, 28.7%	[33]
Ghana	Blood donors	2009	ELISA, Western blot and Transcriptase PCR	4.06%	[53]
Nigeria	Sick and healthy individuals IgG, IgM	2009		14.9%, 1.3%	[54]
Egypt	Asymptomatic pregnant women (HCV)+ve and -ve	2011	ELISA	71.42%, 46.7%	[22]
Tunisia	Polytransfused patients	2011	-	28.9%	[46]
Tunisia	Pregnant women	2011	-	12.10%	[47]
Burkina Faso	Blood donors	2012	ELISA and Immunochromatography	19.1%	[55]
Burkina Faso	Pregnant women	2012	ELISA	11.6%	[55]
Cameroon	HIV-infected adults	2013	RT-PCR	14.2%	[19]
Ghana	HIV patients	2013	RT-qPCR	45.3%	[19]
Madagascar	Slaughterhouse workers	2013	ELISA	14.10%	[37]
Nigeria	Butchers, farmers (Plateau State)	2014	ELISA	High prevalence	[41]
Zambia	Urban adults, children	2014	ELISA	42.0%, 16.0%	[49]
Cameroon	HIV-infected children	2019	RT-PCR	2.0%	[19]
Nigeria	Hospitalized, healthcare workers, children, community, food handlers.	2019	ELISA, PCR	10.8%	[17]
Nigeria	HIV+, animal handlers, pregnant women	2021	ELISA, PCR	11.4%, 7.9%, 6.3%	[40]
Nigeria	Animal handlers, villagers, and students (IgG, IgM)	2023	ELISA	14.9%, 1.3%	[54]

Animal studies (Table 1b) underscore the zoonotic dimension of HEV transmission in Africa. High infection rates have been observed in pigs from Madagascar (71%) [37], Ghana (62%) [35], and Nigeria (33–65%), [41, 56, 17] while goats, sheep, and cattle show variable or negligible infection. Detection of HEV antibodies in nonhuman primates in Cameroon further supports the existence of diverse animal reservoirs [57]. The consistently high prevalence in pigs and other animals indicates that zoonotic transmission is a widespread concern across the continent.

Table 1b. Animal HEV prevalence in African countries.

Country	Animal Species	Year	Diagnostic Method	Prevalence	Reference
Madagascar	Pigs	2013	ELISA, RT-PCR	71.20%	[37]
Nigeria	Pigs, Goats, Sheep, Cattle	2014	ELISA	32.8%, 37.2%, 10.5%, 0%	[41]
Nigeria	Pigs	2018	ELISA	57.50%	[40]
Cameroon	Mandrill, Gorilla, Chimpanzee, Baboon	2019	ELISA	11.1%, 14.3%, 5.9%, 8.7%	[58]
Nigeria	pigs	2019	RT-PCR	65.70%	[17]
Jordan	Cows, Sheep, Goats	2020	ELISA	14.5%, 12.7%, 8.3%	[36]
Nigeria	Pigs	2020	ELISA, RT-PCR	13.20%	[56]
Ghana	Pigs	2022	ELISA	62.40%	[35]

2. HEV Epidemiology in Nigeria

Despite repeated evidence, hepatitis E virus (HEV) remains underrecognized in Nigeria. Historically, it was overshadowed by hepatitis B and C in clinical settings, and early cases were frequently misdiagnosed or underreported. To date, only two outbreaks have been formally documented. The first occurred in Port Harcourt (1997–1998), resulting in a small cluster of 10 confirmed cases [59]. The second, a large epidemic in Bornu State (2017), affected 1,815 people with a case fatality rate of 0.6% [52]. In response, local authorities launched WASH sensitization and HEV awareness campaigns [52]. These outbreaks underscore the urgent need for preventive strategies to mitigate future epidemics, even in periods when morbidity rates appear low. The historical trajectory of HEV in Nigeria reflects broader challenges in infectious disease surveillance. Weak reporting systems are further exacerbated by climatic disruptions, especially floods and other environmental disturbances that contaminate water supplies and increase the risk of HEV transmission [52]. Improved surveillance and diagnostics, alongside recognition of HEV as a significant public health threat, have more recently led to an increase in prevalence data from Nigeria and other African countries [40].

Recent epidemiological investigations present a detailed overview of HEV prevalence across diverse Nigerian populations. Serological assessments often target **IgM** and **IgG antibodies**, which provide critical epidemiological insight. Elevated **IgM** levels indicate recent or active infection, while **IgG** positivity reflects prior exposure and immunity [56].

- Okagbue et al. (2019): Reviewing 1,178 human and 210 pig samples across a 10-year dataset, reported 10.8% prevalence in humans and a striking 65.7% in pigs [17]. Although a weak, non-significant association was found between human and animal infections ($r = 0.327$, $p = 0.474$), regression analysis ($p = 0.376$) explained only 9.3% of variability. The odds ratio (OR = 1.03, 95% CI: 0.95–1.20) suggested slightly higher prevalence in animals, reinforcing pigs as a key reservoir. Food and animal handlers, as well as those lacking access to clean water, were identified as primary risk groups.
- Antia et al. (2018): Reported 57.5% prevalence in pigs, but no evidence of infection in goats and cattle [60].
- Olayinka et al. (2020): Detected 13.2% prevalence in pigs using fecal samples tested by ELISA [61].
- Oluremi et al. (2023): Reported 14.9% IgG and 1.3% IgM positivity in communities in southwestern Nigeria, indicating both past exposure and ongoing active transmission [58].

- Ekiti State study: Documented an overall 13.4% antibody prevalence, consistent with findings from Oluremi et al. [62].

Together, these findings confirm that HEV is established in Nigeria, with humans exhibiting moderate exposure (6–15%) and animals, particularly pigs, demonstrating a high prevalence (>50%). The data accentuate both waterborne and zoonotic transmission pathways, indicating the highest risk among pregnant women, HIV-positive individuals, and occupationally exposed groups.

Demographic, Occupational, and Regional Patterns of HEV in Nigeria

Hepatitis E virus (HEV) affects all demographic groups in Nigeria, but certain populations are disproportionately vulnerable. Residents of rural areas, HIV-positive individuals, veterinary workers, women of reproductive age, and particularly pregnant women face the greatest risk [63]. In Osun State, seroprevalence was reported at 11.4% among HIV-positive persons, 7.9% among livestock owners, and 6.3% among pregnant women [40]. Similar variability is seen elsewhere: a study in Ogbomoso found 5.5% prevalence among HIV-positive individuals [40], while Osundare et al. (2021) confirmed higher rates of 11.4% in Osun State [63]. Gender-specific differences have also been documented. In Osundare's study of HIV-positive participants, no significant difference was observed in the overall prevalence of anti-HEV antibodies between men (13.9%) and women (10.6%). However, anti-HEV IgM prevalence was markedly higher in men (6.5%) than in women (0.7%), suggesting recent or ongoing infection may be more frequent among males [62]. Occupational risk factors are particularly evident among livestock handlers. While Osundare's study reported a relatively modest 7.9% seroprevalence among animal keepers in Osun State [63], much higher rates were recorded in Plateau State, where animal handlers showed prevalence levels exceeding 66% [41]. Junaid et al. (2014) also reported high HEV prevalence among pig farmers in Plateau State [41], linking this to occupational exposure and regional hazards such as intensive livestock rearing, population density, and environmental conditions.

Geographic disparities across Nigeria are striking. Southern states such as Ekiti, Osun, and Ibadan show moderate prevalence, while northern and northeastern regions, including Plateau and Borno, are recognized hotspots for transmission [64]. Outbreak-prone areas in these regions often suffer from inadequate water infrastructure and poor sanitation, conditions exacerbated by seasonal flooding and displacement events that favor HEV spread [65]. The most vulnerable Nigerians remain those in rural and peri-urban communities with limited access to clean water and healthcare [63,65,66]. However, current epidemiological surveys have largely focused on the livestock industry, particularly pigs, while data on other potential animal reservoirs remain sparse. This highlights the need for broader surveillance to clarify the zoonotic landscape of HEV in Nigeria.

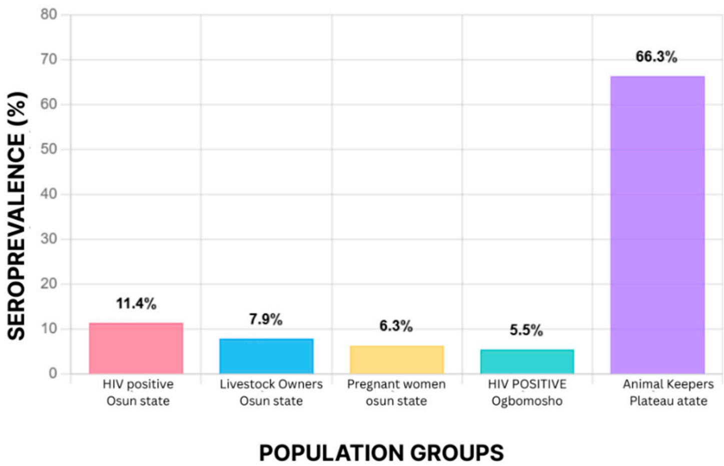

Figure 2. HEV Seroprevalence Among At-Risk Populations in Nigeria.

3. Comparative Insights: Nigeria vs Africa

When positioned against broader African data:

1. Nigeria's human prevalence (10–15%) is moderate compared with Egypt (50–80%), but higher than Tanzania (0.2–6%).
2. Nigeria's pig prevalence (30–65%) is among the highest on the continent, comparable to Ghana and Madagascar.
3. Occupational exposure patterns (butchers, pig handlers) [38] mirror those reported in Ghana and Cameroon, suggesting a shared West/Central African risk profile.

These comparisons reinforce the argument that Nigeria's HEV burden is both representative of African trends and a key case study for One Health interventions.

Challenges Affecting HEV-Induced Hepatitis

Despite growing recognition of the hepatitis E virus (HEV) as a public health threat, several challenges hinder effective surveillance, prevention, and control in Nigeria and across Africa. These barriers span epidemiological, diagnostic, genetic, and socio-environmental domains.

1. Underestimated and Unquantified Burden

The health impact of HEV infection remains largely underestimated, primarily due to inadequate surveillance and reporting systems. Although statistical studies suggest that more than 20 million HEV infections occur globally each year [1, 9, 66], this estimate may be incomplete, as there are no comprehensive data repositories for many regions [66]. Underreporting and under-documentation reflect limited awareness of HEV among healthcare providers and the absence of routine screening in healthcare facilities [9]. This oversight narrows the perception of the actual burden of HEV, reduces opportunities for preventive interventions, and impedes the development of effective control measures. Ultimately, the paucity of reliable epidemiological data makes it difficult to define the true impact of HEV in the population and complicates efforts to allocate and manage public health resources effectively [66].

2. **Inconsistencies in Diagnostic Practices**

Inconsistencies in diagnostic techniques for HEV remain a major challenge, often leading to misdiagnosis or delayed identification of infections. These gaps are particularly acute in developing regions, where access to sophisticated laboratory equipment is limited. Although five genotypes of HEV have been identified worldwide [8,9], the virus's complex epidemiology [67] has hindered the establishment of universal diagnostic standards. Consequently, healthcare workers frequently struggle to diagnose and confirm HEV infections, especially in areas without well-equipped laboratories [67,68,69]. This diagnostic uncertainty contributes to delayed treatment and worsens the clinical impact of HEV. Addressing the problem requires expanding access to reliable and affordable diagnostic kits, particularly in low-resource settings. Potential strategies include the development of **low-cost, efficient diagnostic procedures**, training and educational programs for healthcare professionals, and the formation of **international diagnostic partnerships** to promote standardization and knowledge sharing [67].

3. **Limited Genetic Characterization of Circulating Strains**

The absence of regularly described HEV strains with well-defined genetic profiles limits the ability to assess the virus's epidemiology. Without adequate genetic characterization, it becomes difficult to classify circulating strains accurately, which in turn hampers understanding of transmission routes, the effectiveness of control measures, outbreak management, and the evolutionary dynamics of the virus [70].

4. Insufficient knowledge of Predisposing Risk Factors

Information on the predisposing factors for HEV-induced hepatitis remains limited [66,70,69]. Significant gaps persist in understanding the drivers of HEV infection across different age groups and populations. Identifying these risk factors is critical for designing effective prevention strategies and tailoring public health interventions to protect high-risk groups [69].

5. Pathophysiology in Immunocompromised Hosts

The etiological factors and physiological mechanisms that drive chronic liver injury in HEV-infected immunocompromised patients remain poorly understood. This knowledge gap limits understanding of the natural history of HEV in this population and constrains the development of effective therapeutic interventions [71].

6. **Unclear Genetic Risk Factors**

The genetic determinants that predispose individuals to HEV infection and facilitate viral entry into host cells are not well understood [72]. While evidence suggests that certain host genes may mediate viral attachment and replication, the mechanisms remain unclear. This lack of knowledge represents a barrier to understanding HEV transmission dynamics and developing effective containment strategies [72].

7. Zoonotic Uncertainty

Screening blood donations for HEV is critical to reducing the risk of transfusion-transmissible infections. Effective testing of blood banks can significantly lower the public health threat associated with HEV transmission through transfusion [64, 65, 73]. At the same time, although HEV has been isolated from several animal species, the extent to which these animals contribute to human infection is not well defined. Further research is needed to clarify zoonotic transmission pathways, which are essential for designing effective prevention and control strategies [74].

8. Environmental Contamination

HEV in wastewater has been reported in some Nigerian communities, but the relevance of HEV wastewater pollution to humans has not been established. Knowledge of factors affecting HEV transmission is crucial for developing a comprehensive strategy in the healthcare system [75].

9. Gaps in Public Awareness and Education

Current efforts to inform the Nigerian population about HEV-induced hepatitis remain limited, inconsistent, and often ineffective. Strengthening communication systems is essential to improve public understanding and to assess community responses during outbreaks [17]. The absence of sustained educational interventions leaves both the public and healthcare workers with inadequate knowledge of HEV transmission and prevention. Well-designed awareness programs are crucial, as they can significantly reduce infection rates by improving understanding of the virus and promoting protective practices [76].

Prevention and Control of HEV-Induced Hepatitis: The One Health Approach.

The One Health idea recognizes the interdependence of human, animal, and environmental health in combating zoonotic diseases such as HEV [77,78]. Collaboration between disciplines is crucial for implementing prevention and control measures that benefit public health, veterinary health, and the physical environment [78]. A One Health approach is necessary to understand and contain HEV transmission, as HEV can be transmitted zoonotically [79] - via substances of human origin, animals, food, and the environment. They should be considered part of the One Health concept to prevent the spread of HEV from animals to humans.

1. **Human-Animal-Environment Interface**

HEV transmission involves interactions between people, domestic animals (particularly pigs), and the environment. A thorough investigation of this interface by conceptualizing factors that enhance viral infection of human cells through exploration of the JAK-STAT signaling pathways and other signaling pathways that mediate HEV entry into hepatocytes will help to clarify the interface and mode of action [80]. A better understanding of therapeutics and antivirals can be created for effective disease management. Various high-risk practices, knowledge gaps, and misconceptions about HEV have been shown to exist among occupationally exposed groups in slaughterhouses, including slaughterhouse workers, butchers, veterinarians, and livestock handlers [46,81]. This group of people needs to be examined qualitatively and quantitatively for socio-cultural and workplace factors that influence the adoption of preventive measures, such as using PPE in their respective populations [82]. Further analysis of the main epidemiological factors triggering HEV-induced hepatitis should be conducted to understand how the season and climatic conditions of the environment strengthen or reduce the factors contributing to the transmission of viral pathogens in the most susceptible species, including humans [66]. Understanding this interface is crucial for effective disease management since previous studies by Lu and Wu (2020) confirmed the complexity of reservoirs and pollution that sustain the transmission cycle [83].

2. **Integration of Epidemiological Data**

Combining human health data and case reports of suspected and confirmed cases of HEV-induced hepatitis with veterinary reports from local slaughterhouses and abattoirs, as well as environmental data on weather forecasts, climatic changes, and other competing environmental hazards, contributes to a comprehensive analysis of HEV transmission dynamics [84]; Further, supporting the identification and integration of sources of infection and the assessment of risk factors. Veterinary and genomic sciences have played a critical role in disease epidemiology, with veterinary sciences focusing on screening animals while genomics elucidates genetic factors that influence susceptibility and transmission [85]. To integrate the epidemiological trend line, the veterinary and genomic approaches must be combined to monitor the trend line of disease prevalence and incidence. A holistic approach that would lead to more effective control measures.

3. **Animal Screening as a Key Component of the One Health Framework**

Monitor and test all livestock and domestic animals, particularly those previously reported to transmit HEV, as well as all other animals in the vicinity. Additionally, test the range of putative viral vectors that can acquire viral deposits through the fecal-oral route, as they are in susceptible proximity to humans and could potentially spread HEV infection to prevent zoonotic transmission [86]. Surveillance and screening techniques include Routine clinical examination for signs of HEV infection in animals, which can help identify symptomatic cases. Laboratory tests: Diagnostic methods such as polymerase chain reaction (PCR), enzyme-linked immunosorbent assays (ELISA), and serological tests are used to detect HEV in animal samples [87]; Risk-based assessment and targeted screening in high-risk areas or farms with known outbreaks can effectively control the spread of HEV [88]; Evidence-based case studies, particularly in countries with extensive swine industries, regions with high swine populations, such as Nigeria, to prevent transmission of infected pigs or offal to humans through undercooked pork [89].

4. **Community and Veterinary Rural and Urban Extension Services**

A Veterinary Medicine and Agriculture Advisory Committee should be established and adequately utilized by the government and research institutions [9,90] Research has shown that average farmers need to be more educated, especially in developing countries like Nigeria, and it is essential to ensure that they are adequately informed about the research findings [78,91]. Rural extension services that understand, interpret, translate, and disseminate research findings to rural and local farmers in diverse communities are essential in combating hepatitis caused by HEV and preventing future increases in viral pathogenesis affecting the population [92]. It is crucial to involve farmers and veterinarians in HEV surveillance and control measures. Education about proper animal care and hygiene practices can reduce the risk of HEV transmission.

Recommendations and Perspectives: A Need for a Holistic Treatment Approach

The persistence and spread of HEV in Nigeria result from a combination of environmental, socioeconomic, and infrastructural challenges. Climatic conditions, seasonal flooding, and inadequate water management frequently contaminate drinking sources, while poor sanitation infrastructure in overcrowded urban centers further drives transmission [29,67]. Compounding these issues are poverty, low educational attainment, and limited access to healthcare, all of which sustain the high prevalence of HEV [67]. Addressing these drivers requires a holistic and multi-layered response. A national strategy should prioritize the development of robust surveillance systems capable of integrating clinical, environmental, and veterinary data [90]. Such systems would enable timely detection of outbreaks and support evidence-based interventions. Parallel to this, hygiene and preventive practices—including boiling water, hand washing, and proper cooking of meat—must be promoted through sustained public health campaigns. Community education and engagement are critical to ensure these practices become part of everyday routines [93].

Policy and regulatory actions should target food safety and environmental hygiene, with governments and health authorities ensuring routine inspection of animals, as well as systematic pre- and post-slaughter data collection in abattoirs [94]. These measures, combined with stronger food safety enforcement, will reduce zoonotic transmission risks. Community-based initiatives that empower local populations to understand HEV risks and adopt preventive measures can further enhance compliance and long-term control [94]. Future directions should include advancing diagnostic capacity [85], making tools more accessible for both human and animal screening. Genomic research offers an additional frontier, with the potential to uncover genetic determinants of susceptibility and transmission that could inform targeted interventions [94]. Finally, combating HEV effectively will require strong international collaboration, partnerships among governments, global health authorities, and research institutions are vital for sharing best practices, harmonizing control measures, and strengthening collective resilience against HEV [11, 94].

Limitations

We acknowledge the limitations inherent in this review methodology. Firstly, dependence on published studies excludes unpublished surveillance data, potentially leading to an underestimation of the actual HEV burden. Secondly, inconsistencies in diagnostic methods (ELISA, PCR, rapid immunoassays) across studies hinder comparability. Thirdly, Nigeria-specific data remain limited, with most studies concentrated in particular states, thereby restricting the ability to generalize findings to the entire nation. Notwithstanding these limitations, triangulating evidence from multiple sources has enabled us to delineate epidemiological trends and principal challenges pertinent to policy development and One Health interventions.

Conclusions

Hepatitis E virus (HEV) remains a neglected yet significant cause of acute viral hepatitis in Nigeria and across Africa [1, 9]. Although sporadic outbreaks have highlighted the public health risk, the true burden is underestimated due to poor surveillance, inconsistent diagnostics, and widespread underreporting [11]. Seroprevalence studies show that HEV is maintained not only through contaminated water sources but also amplified by zoonotic reservoirs, particularly pigs [63-65]. 62=65 Pregnant women, HIV-infected individuals, and livestock handlers are the most vulnerable populations [66,68,70], emphasizing both clinical and occupational health implications. Overcoming these challenges requires moving beyond isolated interventions. A One Health approach that integrates human, veterinary, and environmental health is essential. Nigeria offers a clear case study of these issues, but its lessons resonate across Africa. The continent's diverse yet interconnected experiences underline both the scale of the problem and the urgency for coordinated action. Strengthening HEV surveillance, diagnostics, and control within a continent-wide One Health framework will be crucial to reducing the burden of this neglected pathogen and preventing future epidemics.

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