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# Seroprevalence of Hepatitis E Virus in Pregnant Women in Brazzaville, Republic of the Congo: Sociodemographic Profile and Frequency of Infection

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## Abstract

***Background:*** *Hepatitis E is an emerging infection of concern in pregnant women, with maternal mortality reaching 20 to 25% in the third trimester. In the Republic of the Congo, no data existed on the seroprevalence of hepatitis E virus (HEV) in pregnant women.*

***Objective:*** *To describe the sociodemographic characteristics of pregnant women in Brazzaville and to determine the frequency of HEV infection in this population.*

***Methods:*** *A cross-sectional analytical study conducted from January to October 2025 across eight healthcare facilities in Brazzaville. Two hundred and three pregnant women were enrolled. Anti-HEV antibodies (IgG and IgM) were detected by rapid immunochromatographic test (HEV IgG/IgM Rapid Test Cassette, Biopanda), and viral RNA by RT-PCR (NZYtech Kit) in all participants.*

***Results:*** *The mean age was 27 ± 7 years; the 20–29 age group predominated (54.7%). The majority lived in cohabitation (75.9%), had secondary education (59.6%), and were unemployed (44.8%). The overall frequency of HEV infection was 19.7% (95% CI: 14.3–25.6). IgM were positive in 5.4%, IgG in 14.8%, and viral RNA detected in 6.9% of participants.*

***Conclusion:*** *The frequency of HEV in pregnant women in Brazzaville is 19.7%, placing the capital in an intermediate endemicity zone. These unprecedented data underscore the need to integrate HEV screening into routine prenatal care in the Republic of the Congo.*

**Keywords:** Hepatitis E virus, seroprevalence, pregnant women, Brazzaville, Congo.

## Introduction

Hepatitis E is an infection caused by the hepatitis E virus (HEV), one of the five main viruses responsible for liver damage [1]. First identified in 1978 during an epidemic in the Kashmir Valley, HEV is now considered a major public health problem in resource-limited countries [2,3]. Its transmission is primarily fecal-oral, via consumption of contaminated water or food [4].

According to the WHO, approximately 20 million people are infected each year, resulting in 3.3 million symptomatic cases and 44,000 deaths in 2015 [5]. The infection is generally benign and resolves spontaneously within 2 to 6 weeks, except in immunocompromised individuals and pregnant women [3]. In the latter, the mortality rate can reach 20 to 25% in the third trimester [3,4,6]. Complications include fulminant hepatitis, spontaneous abortion, and high neonatal mortality [4,7].

In Africa, the seroprevalence of HEV in pregnant women is heterogeneous: 16.2% in Benin [8], 11.6% in Burkina Faso [9], 83.3% in Egypt [10], 12.1% in Cameroon [11], and 6.6–14.1% in Gabon [12,13]. In the Republic of the Congo, a recent study by Mimiesse et al. (2025) reported a frequency of 19.2% among blood donors and pig farmers [14], but no data existed for pregnant women.

It is in this context that we conducted this study, with the objectives of describing the sociodemographic characteristics of pregnant women in Brazzaville and determining the frequency of HEV in this population.

## Materials and Methods

This was a cross-sectional, descriptive, and analytical study conducted from January to October 2025 (10 months) across eight healthcare facilities in Brazzaville: Brazzaville University Hospital, Blanche Gomes Mother-Child Specialized Hospital, Talangaï Reference Hospital, Makélékélé Reference Hospital, and four integrated health centers (Marien-Ngouabi, Jane-Vialle, Plateaux des 15 ans, Moukondo). Biological analyses were performed at the National Institute of Biology and Health Surveillance (INBVS) in Pointe-Noire.

Inclusion criteria: pregnant women attending antenatal consultations, aged ≥ 18 years, with amenorrhea ≥ 4 weeks, residing in Brazzaville for ≥ 6 months, and providing informed consent. Women with known hepatitis, those refusing consent, and those with incomplete data were excluded. The sample size (n = 218, with 10% margin of error) was calculated using the Schwartz formula, based on a theoretical proportion of 18% (Cameroonian prevalence [11]).

Four milliliters of venous blood were collected in EDTA tubes, processed according to ADR standards, pre-treated at the BIOQUALITE laboratory in Brazzaville, then transported by air to the INBVS in Pointe-Noire and stored at −20°C until analysis. Detection of anti-HEV IgG and IgM antibodies was performed by rapid immunochromatographic test (HEV IgG/IgM Rapid Test Cassette, Biopanda,

England). Viral RNA detection was performed by RT-PCR in all participants (Hepatitis E virus RT-qPCR Kit, NZYtech, Portugal), after total RNA extraction (Total RNA Purification Kit, Norgen Biotek Corp). RT-PCR was considered positive for a Ct < 40. Data were entered in Microsoft Excel 2021 and analyzed using STATISTICA version 12. Qualitative variables are expressed as frequencies and percentages. HEV prevalence and its 95% CI were estimated using the bootstrap method (1,000 resamplings). The significance threshold was set at $p \leq 0.05$.

## Results

### Sociodemographic Characteristics

Two hundred and ten women were contacted; 203 were enrolled. Participants consulted mainly at integrated health centers in 70.4% of cases (n = 143), followed by Brazzaville University Hospital in 7.9% of cases (n = 16). The mean age was 27 ± 7 years (range: 18–43 years). The 20–29 age group predominated at 54.7%.

Sociodemographic characteristics are summarized in Table 1.

Table 1. Sociodemographic characteristics of participants (n = 203)

| Characteristic | n | % |
|---|---|---|
| **Age group (years)** | | |
| < 20 years | 26 | 12.8 |
| 20–29 years | 111 | 54.7 |
| ≥ 30 years | 66 | 32.5 |
| **Educational level** | | |
| None | 1 | 0.5 |
| Primary | 14 | 6.9 |
| Secondary | 121 | 59.6 |
| Higher education | 67 | 33.0 |
| **Marital status** | | |
| Cohabitation | 154 | 75.9 |
| Single | 34 | 16.7 |
| Married | 12 | 5.9 |
| Divorced | 3 | 1.5 |
| **Occupational status** | | |
| Unemployed | 91 | 44.8 |
| Other sectors | 72 | 35.5 |
| Student/Pupil | 33 | 16.3 |
| Healthcare sector | 7 | 3.4 |
| **Socioeconomic level** | | |
| Low | 83 | 40.9 |
| Middle | 109 | 53.7 |
| High | 11 | 5.4 |

### Obstetric and Medical Characteristics

The population was predominantly multigravid in 39.9% of cases (n = 81). The median gravidity was 3. Among participants, 21.7% had a history of miscarriage. The majority were in the second trimester of pregnancy (50.7%, n = 103), with a median gestational age of 22 weeks. Twin pregnancies accounted for 5.9% (n = 12). Medically, 2% were co-infected with HIV, 12.8% had a history of blood transfusion, and 3.4% reported a prior history of jaundice.

### Frequency of HEV

In total, 40 participants presented with HEV infection (positivity of at least one biological marker), representing an overall frequency of 19.7% (95% CI: 14.3–25.6). Anti-HEV IgM were positive in 5.4% (n = 11), IgG in 14.8% (n = 30), and viral RNA detected by RT-PCR in 6.9% (n = 14) of the 203 participants. One participant tested positive for both IgM and IgG simultaneously. Serological and molecular results are summarized in Table 2.

Table 2. Serological and molecular results (n = 203)

| Marker | n | % |
|---|---|---|
| Anti-HEV IgM positive | 11 | 5.4 |
| Anti-HEV IgG positive | 30 | 14.8 |
| Viral RNA (RT-PCR) positive | 14 | 6.9 |

## Discussion

### Sociodemographic Characteristics

### Age

The mean age of participants (27 ± 7 years) is consistent with African data reported in sub-Saharan Africa, where the mean age of pregnant women typically ranges between 25 and 30 years, as confirmed by the meta-analysis of Dagnew et al. (2019) covering 22 studies and 8,008 women [15]. The predominance of the 20–29 age group (54.7%), the period of highest reproductive activity, is consistent with observations from Benin, Burkina Faso, Cameroon, Ghana, Nigeria, and Ethiopia [8,9,11,17]. Differences were nonetheless noted with certain series: in Senegal, Diouara et al. observed a predominance of younger women (18–23 years, 43% of the sample) [3], while in the Tigray region (northern Ethiopia), a markedly higher mean age of 33.88 ± 16.91 years was described, likely related to specific local demographic dynamics [25].

In terms of analysis, no statistically significant association between age and HEV infection was found in multivariate analysis, which is consistent with the majority of African series, notably those from Burkina Faso, Gabon, Cameroon, and Ghana [9,12,22,21]. This absence of association contrasts with certain studies from Egypt, Ghana, and Ethiopia where age was significantly associated with seropositivity [10,17,20], as well as with European data where seroprevalence increases progressively with age, reflecting cumulative food-related exposures [27,28]. In sub-Saharan Africa, HEV transmission appears to be more influenced by environmental factors (water quality, sanitation, animal proximity) than by the accumulation of exposures related to biological age.

### Geographic Coverage and Representativeness

All districts of Brazzaville were represented in the study, although unevenly according to the patient volumes of the included healthcare facilities. This broad geographic coverage, spanning eight healthcare facilities of different levels (university hospital, reference hospitals, specialized hospital, and integrated health centers), constitutes a major strength of the study and reinforces sample repre-

sentativeness. It suggests HEV circulation across the entire city, without any strictly localized cluster.

### Educational Level

Secondary education predominated (59.6%), in contrast with certain countries such as Senegal, where 31.7% of pregnant women had no education [3]. In univariate analysis, an educational level at or below secondary was associated with HEV infection, an observation consistent with data from Iran, Burkina Faso, Ghana, and Ethiopia [4,9,17,20]. This association disappeared in multivariate analysis, suggesting that educational level does not act directly on the risk of infection, but constitutes an indirect marker of access to health information, safe water, and sanitation [17].

### Marital Status, Occupation, and Religion

The predominance of cohabitation (75.9%) represents a specificity of the Congolese context, distinct from Senegal (92% married women) [3], Ghana (59.5%) [17], and Ethiopia (90.4%) [20]. The absence of significant association between marital status and HEV infection confirms that this factor does not constitute a direct determinant of viral transmission in our population, which is also consistent with African observations [15]. Similarly, no significant association between occupation and HEV was found, a result coherent with data from Benin, Ghana, and Ethiopia [8,17,20]: occupation constitutes a risk factor only in contexts of specific exposure (livestock farming, slaughterhouse work, animal handling), which were poorly represented in our population. The predominantly Christian population (94.6%) faithfully reflects the religious configuration of Congo [18], and the absence of association between religion and infection confirms that religious practices do not directly intervene in viral transmission.

## Frequency of HEV

### Overall Frequency

The overall frequency of HEV infection (19.7%; 95% CI: 14.3–25.6) places Brazzaville in the intermediate range of African endemicity. This value is higher than estimates from Gabon (6.6%) [13], South Africa (3.1%) [19], and Senegal (7.8%) [3], but lower than Egypt (84.3%) [10], Ethiopia (31.6%) [20], and Ghana (28.66%) [21]. It is close to Benin (16.2%) [8], Cameroon (18%) [22], and Brazzaville blood donors studied by Mimiesse et al. in 2025 (17.6%) [14], reflecting regional coherence.

The continental meta-analysis by Dagnew et al. (2019) estimated the pooled seroprevalence at 29.1% (95% CI: 14.6–43.6) with considerable heterogeneity ($I^2$ = 99.7%), related to differences in geographic zones, serological techniques, and study populations [15]. Our estimate falls within the lower bound of this interval. The global meta-analysis by Ahmad et al. (2020), covering 7,160 pregnant women, reported a pooled IgG prevalence of 16.5%, a value close to ours (IgG: 14.8%) [16]. Mimiesse et al. (2025) found in Brazzaville an overall frequency of 19.3% among blood donors and pig farmers, with 17.6% among donors and 23.3% among farmers [14]: the overlap of this frequency with that of pregnant women (19.7%) confirms active and diffuse viral circulation across the city.

### Serological Profile of IgG, IgM, and Viral RNA Markers

The IgG seroprevalence (14.8%) was higher than that of IgM (5.4%), reflecting cumulative viral exposure predominating over active infections at the

time of sampling. This profile is characteristic of a context of moderate to intermediate endemicity, marked by old and intermittent viral circulation, without acute epidemic outbreak [7,23]. Comparable serological profiles have been reported in sub-Saharan Africa: in Benin (IgG 16.2%; IgM 1.4%) [8], Ghana (IgG 12.2%; IgM 0.2%) [17], Ethiopia (IgG 31.6%; IgM 0.5%) [20], and South Africa where only IgG were detected (3.1%) [19]. Outside Africa, similar profiles have been reported in France (Renou et al. 2014: IgG 7.7%, IgM 0%) [24] and Iran (Farshadpour et al. 2018: IgG 6.2%, IgM 0.8%) [4].

Detection of HEV RNA by RT-PCR in 14 participants (6.9% of the total sample, i.e., 35% of seropositive women) demonstrates active viremia at the time of sampling. This frequency is higher than that reported in China (0.5%) [23] and contrasts with Gabonese, South African, and French series, where no viremia was detected in seropositive patients [12,19,24]. The coexistence of IgG, IgM, and RNA within our population argues in favor of continuous and active HEV circulation in Brazzaville, with superposition of resolved infections (IgG+) and active infections (IgM+ and/or RNA+).

These results must be interpreted with caution regarding the analytical limitations of the immunochromatographic test used, whose performance (sensitivity, specificity) has not been validated by reference ELISA in the Congolese context [26]. A validation study on a subsample is recommended for future research.

## Conclusion

This study documents, for the first time in the Republic of the Congo, a high frequency of HEV among pregnant women in Brazzaville. The population concerned is young, predominantly in cohabitation, with secondary education and without formal employment. These data constitute a strong argument in favor of integrating HEV screening into systematic prenatal care and establishing national epidemiological surveillance of viral hepatitis in pregnant women in the Republic of the Congo.

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