Detection and sociodemographic distribution of rotavirus and hepatitis A virus infections among patients attending a regional hospital in Dédougou, Burkina Faso.

ABSTRACT

Background: Rotavirus (RV) and hepatitis A virus (HAV) are important causes of enteric infections, particularly in low- and middle-income countries. However, epidemiological data remain limited in several regions of Burkina Faso. This study aimed to assess their detection rateand sociodemographic distribution among patients in the Bankuy region.

Methods: A prospective study was conducted from July 2024 to April 2025 among 150 patients attending the Regional Hospital Center of Dédougou with gastrointestinal complaints. RV antigen was detected using an immunochromatographic test, while HAV RNA was identified by RT-PCR targeting the VP1/2A genomic region. Sociodemographic data were collected using a standardized questionnaire. Statistical analyses were performed using Stata version 14.

Results: RV was detected in 27 participants (18.0%; 95% CI: 12.2–25.1), while HAV was detected in four (2.7%; 95% CI: 0.7–6.7). No coinfections were identified. RV positive cases were predominantly observed among participants aged 25–64 years (59.3%), females (55.6%), and those without formal education (66.7%). Drinking water source was significantly associated with rotavirus positivity ($p = 0.02$). No significant associations were observed with other sociodemographic characteristics. HAVpositive cases were equally distributed between sexes and occurred in two age groups.

Conclusion: RV was more frequently detected than HAV. The association between drinking water source and RV positivity highlights the need for further investigation of environmental factors influencing viral transmission. These findings provide additional epidemiological data for the Bankuy region.

Keywords: Rotavirus; Hepatitis A virus; RT-PCR; Dedougou; Burkina Faso.

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INTRODUCTION

Enteric infectious diseases claim more than 1 million lives annually and are among the top ten causes of death in children younger than 5 years, making them a major global public health problem (Vongpradith et al., 2026). In low- and middle-income countries (LMICs), limited access to safe drinking water, sanitation, and healthcare contributes substantially to the disease burden, which may be further amplified in humanitarian or climate-affected contexts(Badjo et al., 2026). It is estimated that between a half and two-thirds of enteric infections are viral in origin(Vongpradith et al., 2026). They are transmitted to humans mainly via the feco-oral route, by direct person-to-person contact or by ingestion of contaminated water or undercooked food, particularly shellfish, fruit and vegetables(Cook & Richards, 2013).

Among the viral agents responsible for enteric infections in humans, Rotavirus (RV, family *Reoviridae*) and hepatitis A virus (HAV, family *Picornaviridae*) are of particular importance because of their predominantly faecal–oral transmission route and their impact on public health.

Rotavirus A (RVA) has historically been a leading cause of severe acute gastroenteritis among young children, particularly in sub-Saharan Africa. Despite the introduction of rotavirus vaccines, RVA continues to circulate in the region, although its prevalence has declined significantly(Godfrey et al., 2020). Similarly, HAV is an important cause of acute viral hepatitis worldwide, particularly in low- and middle-income countries, with an estimated that in 2023, 35 569 persons died from hepatitis A worldwide(Franco, 2012).

In Burkina Faso, enteric viral infections remain a public health concern, partly due to inadequate hygiene and sanitation conditions. Several studies have documented the circulation of enteric viruses, particularly RV, among children with acute gastroenteritis, with varying prevalence rates and seasonal patterns (Bonkoungou et al., 2018; Ouédraogo et al., 2016; Ouedraogo et al., 2017). Although the introduction of the pentavalent rotavirus vaccine

(RotaTeq®) into the national immunization program in 2013 contributed to a reduction in rotavirus-associated hospitalizations, particularly among infants, the virus continues to circulate in the population(Bonkoungou et al., 2018). Furthermore, studies investigating enterically transmitted hepatitis viruses have reported their circulation, including among asymptomatic individuals, suggesting ongoing exposure within the population (Traoré et al., 2012).

However, available epidemiological data on enteric viruses in Burkina Faso are derived predominantly from studies conducted in Ouagadougou, while data from other regions of the country, particularly the Bankuy region, remain scarce. Socioeconomic and environmental conditions, particularly access to safe drinking water, sanitation, and hygiene practices, may vary across regions and potentially influence the occurrence of enteric viral infections. Therefore, investigating RV and HAV in the Bankuy region may provide additional insights into their local distribution and contribute to a better understanding of their occurrence in this setting.

Therefore, this study aimed to assess the detection rate of RV and HAV among patients in the Bankuy region of Burkina Faso and describe the distribution of positive cases according to sociodemographic characteristics.

MATERIALS AND METHODS

1. Study design

This was a prospective study conducted from July 2024 to April 2025 in Dédougou, Bankuy Region, Burkina Faso, on a relatively low socio-economic status urban population. Stool samples were collected at the Regional Hospital Center (CHR) of Dédougou, while laboratory analyses were performed at the Research Platform of Université Daniel OUEZZIN COULIBALY and the National Livestock Laboratory. The study was conducted in a context of limited epidemiological data on rotavirus and hepatitis A virus (HAV) circulation in this area.

2. Study population and sampling

The study population consisted of patients attending the Regional Hospital Center of Dédougou for consultation with gastrointestinal complaints during the study period. The study population consisted of patients attending the Regional Hospital Center of Dédougou with gastrointestinal complaints during the study period. Adults (≥18 years) were included upon written informed consent, while participants under 18 years required parental or legal guardian consent. Individuals with conditions deemed by the investigation team to preclude participation were not included. For each participant enrolled, approximately 10–50 g of stool was collected in a sterile container for rotavirus and hepatitis A virus (HAV) detection. Samples were transported to the laboratory in cool boxes containing ice packs and stored at −20°C until analysis.

3. Sociodemographic data collection

Sociodemographic data were collected using a standardized questionnaire administered to participants or their accompanying persons. Variables included age, sex, educational level, occupation, and drinking water supply conditions. Collected data were coded and entered into an electronic database for subsequent statistical analysis.

4. Laboratory investigations

4.1 Detection of rotavirus by immunochromatography

RV antigen detection was performed using the SD BIOLINE Rota/Adeno Rapid test (Standard Diagnostics Inc., Korea), a one-step lateral-flow immunochromatographic assay designed for the qualitative detection of group A RV and adenovirus antigens in stool specimens. The test is based on the use of colloidal gold-conjugated monoclonal antibodies targeting the VP6 capsid protein of rotavirus and the hexon antigen of adenovirus. Briefly, a fresh stool sample was mixed with 1 mL of the manufacturer's assay diluent until homogenization. Subsequently, 4–5 drops (approximately 100–125 µL) of the suspension were added to the sample well of the test device. Results were interpreted according to the manufacturer's instructions.

4.2 HAV Detection

4.2.1 Extraction of total RNA

Approximately 25 g of stool was homogenized in 40 mL of phosphate-buffered saline (PBS) and filtered to remove coarse particles. The filtrate was centrifuged at 10,000 × g for 30 min, and the resulting supernatant was collected for viral RNA extraction. Viral RNA was extracted using a FavorPrep™ kit, according to the manufacturer's instructions(Favorgen Biotech Co., Taiwan) according to the manufacturer's instructions. RNA concentration and purity were assessed using a NanoDrop Genova spectrophotometer (Jenway, Cole-Parmer, UK). The extracted RNA samples were stored at −20°C until further analysis.

4.2.2 RT-PCR

HAV RNA was reverse-transcribed and amplified using the Access RT-PCR System (Promega Corporation, Madison, WI, USA), according to the manufacturer's instructions. Briefly, the reaction mixture contained the extracted RNA, Access RT-PCR buffer, $MgSO_4$, dNTPs, AMV reverse transcriptase, Tfl DNA polymerase, and HAV-specific primers: 1854-fw(5′-TATTTGTCTGTYACAGAACAATCAG-3′) and 1855-rev (5′-AGGRGGTGGAAGYACTTCATTTGA-3′) (Taffon et al., 2011). The final reaction volume was 50 µL. Reverse transcription and PCR amplification were performed sequentially in a single reaction tube. The thermal cycling conditions consisted of reverse transcription at 45°C for 45 min, followed by an initial denaturation at 94°C for 2 min. This was followed by 40 amplification cycles of denaturation at 94°C for 30 s, annealing at 60°C for 1 min, and extension at 68°C for 2 min. A final extension was performed at 68°C for 7 min. Subsequently, 5 µL of each PCR product was analyzed by electrophoresis on a 2% agarose gel, and the amplicon sizes were estimated using a commercially available 100-bp DNA ladder (Solis BioDyne, Estonia).

4.2.3 Statistical analysis

Data were entered into Microsoft Excel and analyzed using Stata version 14 (StataCorp, College Station, TX, USA). Categorical variables were summarized as frequencies and percentages, while age was described using appropriate measures of central tendency and dispersion. The prevalence of rotavirus and hepatitis A virus (HAV) was estimated with exact 95% confidence intervals (CIs). Associations between categorical variables were assessed using Fisher's exact test, while age comparisons according to infection status were performed

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using the Mann–Whitney test. Logistic regression was used to assess factors associated with rotavirus infection, with results expressed as 95% CIs. Given the small number of HAV-positive cases, no multivariable analysis was performed for HAV. All statistical tests were two-sided, and statistical significance was set at $p< 0.05$.

RESULTS

1. Socio-demographic characteristics of the study participants

Table 1 shows the socio-demographic characteristics of the study participants. The sex distribution was balanced, with a sex ratio of 1. The mean age of participants was 29.5 years, ranging from 0 to 76 years. The most represented age group was 25–64 years, comprising 94 participants (62.7%). Most participants reported consuming tap water (77.3%). Regarding educational attainment, the majority had formal education (73.3%).

Table 1: Socio-demographic characteristics of respondents

Socio-demographic	Frequency (n = 150)	Percentage (%)
Age (years)		
[0-14]	39	26
[15-24]	13	8.7
[25-64]	94	62.7
≥65	4	2.7
Sex		
Female	75	50
Male	75	50
Educational level		
No formal	110	73.3
Primary	21	14.0
Secondary	8	5.3
Higher	11	7.3

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Occupation		
Healthcare worker	1	0.7
Trader	2	1.3
Farmer	29	19.3
Livestock farmer	2	1.3
Teacher	10	6.7
Student	23	15.3
Homemaker	24	16
Unemployed	59	39.3
Source of Drinking Water		
Borehole	1	0.7
Tap	116	77.3
Tap and Bottled water	1	0.7
Tap and well	16	10.7
Well	14	9.3
Borehole and well	2	1.3

2. Distribution of viral infections

The distribution of viral infections among the study participants is presented in Table 2. Rotavirus (RV) and hepatitis A virus (HAV) were detected in 18% (95% CI: 12.2–25.1) and 2.7% (95% CI: 0.7–6.7) of participants, respectively. The prevalence of RV infection was higher than that of HAV infection. No co-infections involving both viruses were detected among the study participants.

Table 2: Distribution of rotavirus (RV) and Hepatitis A Virus (HAV) infections among study participants.

Viral infection	Positive (%)	Negative (%)	IC95 %
Rotavirus (Rv)	27 (18)	123 (82)	12,2 – 25,1
Hepatitis A Virus (HAV)	4 (2.7)	146 (97.3)	0,7 – 6,7

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3. Distribution of rotavirus and hepatitis A virus (HAV) positive cases according to sociodemographic characteristics.

The distribution of rotavirus and HAV-positive cases according to participants' sociodemographic characteristics is presented in Table 3. Rotavirus positive cases were predominantly observed among participants aged 25–64 years (16/27; 59.3%), females (15/27; 55.6%), and those with no formal education (18/27; 66.7%). Regarding occupation, farmers accounted for the highest proportion of positive cases (8/27; 29.6%), followed by homemakers (7/27; 25.9%) and unemployed participants (6/27; 22.2%). Most rotavirus-positive cases were recorded among participants using tap water (16/27; 59.3%). A statistically significant association was observed between rotavirus positivity and drinking water source (p = 0.02), whereas no significant associations were found with age (p = 0.14), sex (p = 0.67), educational level (p = 0.26), or occupation (p = 0.06).

HAV positive cases were equally distributed between participants aged 0 to14 and 25 to 64 years (2/4; 50% each), as well as between females and males (2/4; 50% each). Regarding educational level, equal proportions were observed among participants with no formal education and those with primary education (2/4; 50% each). By occupation, HAV-positive cases were equally distributed between students and homemakers (2/4; 50% each). Concerning drinking water sources, half of the cases were identified among participants using both tap and well water (2/4; 50%), while the remaining cases were equally distributed between tap water and well water users (1/4; 25% each). No statistically significant associations were observed between HAV positivity and age (p = 0.24), sex (p = 1.00), educational level (p = 0.22), occupation (p = 0.12), or drinking water source (p = 0.06).

Table 3: Distribution of rotavirus and hepatitis A virus (HAV) positive cases according to sociodemographic characteristics

Characteristics	**Categories**	**RV positive n (%)**	***p value***	**HAV positive n (%)**	***p value***
Age (years)	[0-14]	11(40.7)	0.14	2 (50)	0.24
	[15-24]	-		-	
	[25-64]	16 (59.3)		2 (50)	

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	≥65	-		-	
Sex	Female	15 (55.6)	0.67	2 (50)	1
	Male	12 (44.4)		2 (50)	
Educational Level	No formal	18 (66.7)	0.26	2 (50)	0.22
	Primary	7 (25.9)		2 (50)	
	Secondary	1 (3.7)		-	
	Higher	1 (3.7)		-	
Occupations	Healthcare worker	1 (3.7)	0.06	-	0.12
	Trader	-		-	
	Farmer	8 (29.6)		-	
	Livestockfarmer	-		-	
	Teacher	-		-	
	Student	5 (18.5)		2 (50)	
	Homemaker	7 (25.9)		2 (50)	
	Unemployed	6 (22.2)		-	
Source ofdrinking water	Borehole	-	0.02	-	0.06
	Tap	16 (59.3)		1 (25)	
	Tap and Bottled water	-		-	
	Tap and well	5 (18.5)		2 (50)	
	Well	4 (14.8)		1 (25)	
	Borehole and well	2 (7.4)		0	

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DISCUSSION

The present study aimed to assess the prevalence of hepatitis A virus (HAV) and rotavirus infections among patients attending the Regional Hospital Center of Dédougou in the Bankuy region of Burkina Faso, and to describe the distribution of positive cases according to sociodemographic characteristics. The findings revealed a rotavirus prevalence of 18% (95%

CI: 12.2–25.1) and an HAV prevalence of 2.7% (95% CI: 0.7–6.7). These results indicate a higher detection rate of rotavirus than HAV among the study population.

A previous review investigating enteric viral infections in Burkina Faso reported a pooled rotavirus prevalence of 27.7% among children under five years of age, while HAV accounted for 52% of the serological findings (Traore et al., 2024). The rotavirus prevalence observed in our study was lower. However, this difference should be interpreted cautiously, given the differences in age distribution between the study populations. Similarly, the HAV prevalence observed in our study was lower than the proportion reported in the review. Nevertheless, these findings are not directly comparable because of differences in diagnostic approaches and study populations.

Regarding the sociodemographic distribution of rotavirus positive cases, the highest proportion was observed among participants aged 25–64 years (16/27; 59.3%). Although rotavirus infection is commonly associated with acute gastroenteritis in young children, its detection among adults in our study highlights its potential contribution to gastrointestinal infections across different age groups. This finding is consistent with the results reported by (Nakajima et al., 2001), who demonstrated the role of group A rotavirus in acute diarrhea among adults, with a detection rate of 14.2% (97/683) among patients presenting with acute diarrhea. These findings underscore the relevance of rotavirus infection in adults presenting with gastrointestinal symptoms, as they may represent a potential source of household transmission, particularly to young children who are at greater risk of severe disease. Nevertheless, the absence of a statistically significant association between age and rotavirus positivity in our study (p = 0.14) does not establish an age-related difference in infection occurrence.

A notable finding was the statistically significant association between drinking water source and rotavirus positivity (p = 0.02). Most positive cases were recorded among participants reporting the use of tap water (59.3%). This observation is relevant given the predominantly faecaloral transmission of rotavirus and the potential role of contaminated water in its spread. However, this finding should be interpreted cautiously, as the high proportion of positive cases among tap water users does not necessarily indicate a higher risk of infection associated with this water source. Contamination may occur during water distribution, transportation or household storage. Our finding is consistent with that of (Bonkoungou et al., 2010) in Ouagadougou, Burkina Faso, who reported a significantly higher occurrence of rotavirus

diarrhea among children under five years of age consuming municipal tap water compared with those drinking bottled water (p = 0.0001). The authors suggested that contamination of the municipal water supply or secondary contamination during household handling could contribute to rotavirus transmission. Although the two studies involved different populations and drinking water categories, their findings highlight the need for further investigation into the potential contribution of drinking water to rotavirus transmission in Burkina Faso.

Regarding educational level, most rotavirus-positive cases in our study occurred among participants without formal education (18/27; 66.7%). This observation is consistent with findings from a study conducted in Burkina Faso, which reported a higher proportion of rotavirus positive cases among children whose mothers had no formal or only primary education compared with those whose mothers had secondary or higher education (Rönnelid et al., 2020). Similarly, a study conducted in Kenya reported an association between the absence of formal maternal education and rotavirus infection in children in the bivariate analysis, although this association was no longer significant after multivariable adjustment(Fidhow et al., 2017). These findings suggest that educational and socioeconomic conditions may influence exposure to enteric infections, potentially through differences in hygiene practices and living conditions. However, in our study, educational level was not significantly associated with rotavirus positivity (p = 0.26). Furthermore, no significant associations were observed with sex (p = 0.67) or occupation (p = 0.06), suggesting that the observed distributions should be interpreted descriptively rather than as evidence of independent risk factors.

Concerning the sociodemographic distribution of HAV-positive cases, the four positive participants were equally distributed between males and females and were identified in two age groups (0–14 and 25–64 years). Similar observations regarding sex distribution were reported in a study conducted in Burkina Faso, which found no significant difference in anti-HAV IgG seroprevalence between male and female blood donors(Traoré et al., 2012). Furthermore, a systematic review of HAV epidemiology in Africa reported relatively comparable rates of acute HAV infection among children and adolescents (approximately 7%) and adults (approximately 5%), suggesting that recent HAV infection may occur across different age groups (Patterson et al., 2019). The detection of HAV-positive cases among both children and adults in our study is consistent with these observations. However, the very small number of positive cases limits the interpretation of these findings and prevents any

reliable assessment of age- or sex-related differences. Moreover, differences in diagnostic approaches, particularly the detection of viral RNA in stool specimens in our study compared with the detection of anti-HAV antibodies in previous serological studies, should be considered when comparing these findings.

An interesting observation concerned the distribution of HAV-positive cases according to drinking water source, with half of the cases (2/4) occurring among participants reporting the use of both tap and well water. This observation is noteworthy given the established role of contaminated water in HAV transmission through the faecal–oral route. In Burkina Faso, (Hortense et al., 2019) reported a high prevalence of anti-HAV IgG antibodies among pregnant women, with most seropositive participants reporting the use of fountain water, highlighting the importance of investigating water-related exposures in the local epidemiological context. Furthermore, (Takuissu et al., 2023), in a systematic review and meta-analysis, demonstrated the presence of HAV in different water matrices, including groundwater, surface water and untreated wastewater, suggesting that contaminated water environments may contribute to HAV circulation.

Overall, these findings highlight the importance of considering environmental and sociodemographic factors in the epidemiology of enteric viral infections. While drinking water source was statistically associated with rotavirus positivity, the observed distributions for other sociodemographic characteristics, particularly those related to HAV, should be interpreted cautiously. Larger studies incorporating more detailed information on water quality, sanitation and individual exposure histories are needed to better understand the factors associated with these infections in the Bankuy region.

CONCLUSION

This study provides additional epidemiological data on the occurrence of RV and HAV infections among patients attending the Regional Hospital Center of Dédougou, in the Bankuy region of Burkina Faso. RV was detected in 18% of participants, whereas HAV was detected in 2.7%, indicating a higher detection rate of rotavirus in the study population. A statistically significant association was observed between rotavirus positivity and drinking water source, suggesting a potential contribution of environmental factors to rotavirus transmission. However, these findings should be interpreted in light of certain limitations. The relatively small sample size, the hospital-based recruitment, which may limit the

generalizability of the findings to the wider population, and the low number of HAVpositive cases restricted the assessment of potential associated factors. Furthermore, the absence of detailed information on water quality, sanitation conditions, and individual exposure histories limited the investigation of potential transmission pathways. Despite these limitations, this study contributes to improving knowledge of enteric viral infections in a region of Burkina Faso for which epidemiological data remain scarce. Larger community-based studies incorporating molecular characterization of circulating viral strains and more comprehensive environmental assessments are needed to better understand the epidemiology of these infections and guide appropriate public health interventions.

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