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Ethnic differences in hepatitis A and E virus seroprevalence in patients attending the Emergency Department, Paramaribo, Suriname

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Background: Hepatitis A virus (HAV) and hepatitis E virus (HEV) have enteric modes of transmission and are common causes of acute hepatitis in low- and middle-income countries. HEV is also characterised as a zoonotic infection and is prevalent in high-income countries. Data on HAV and HEV prevalence in Suriname, a middle-income country in South America, are scarce.

Methods: Serum samples of 944 and 949 randomly selected patients attending the Emergency Department at the Academic Hospital of Paramaribo, the capital of Suriname, were analysed for anti-HAV antibodies (anti-HAV) and anti-HEV antibodies (anti-HEV), respectively. Determinants of anti-HAV and anti-HEV positive serology were evaluated using multivariable logistic regression.

Results: Anti-HAV prevalence was 58.3% (95% CI 55.4 to 61.4%) and higher prevalence was independently associated with belonging to the Tribal or Indigenous population and older age. Anti-HEV prevalence was 3.7% (95% CI 2.6 to 5.0%) and higher prevalence was associated with Tribal and Creole ethnicity and older age.

Conclusions: In Suriname, exposure to HAV is consistent with a very low endemic country and exposure to HEV was rare. Both viruses were more prevalent in specific ethnic groups. As anti-HAVantibodies were less frequently found in younger individuals, they could be susceptible to potential HAV outbreaks and might require HAV vaccination.

Keywords: epidemiology, hepatitis A virus, hepatitis E virus, indigenous population, multiethnic population, Suriname, tribal population

Introduction

Hepatitis A virus (HAV) infection occurs via faeco-oral transmission and is associated with limited access to safe drinking water, inadequate sanitation and poor hand hygiene, and is endemic in mostly low- to middle-income countries (LMICs).[1] In particular, a high prevalence of individuals positive for anti-HAV antibodies (anti-HAV) has been reported in several Indigenous communities where poor hygienic conditions are common.[2] In some high-income countries (HICs), outbreaks of HAV have also been reported among men who have sex with men (MSM)[3] and people who inject drugs.[4] Hepatitis E virus (HEV) is also enterically transmitted and is the leading cause of new viral hepatitis infections per year worldwide. HEV has two distinct epidemiological profiles comprising four genotypes: human-associated genotypes 1 and 2 (gt1/2), which are mainly prevalent in developing regions, are predominantly transmitted waterborne and observed in travellers returning from Asia or Africa; and the porcine HEV genotypes 3 and 4 (gt3/4), which are zoonotic viruses associated with consumption of undercooked meat (mainly pork), contact with swine and ingestion of water

contaminated by animal faeces, regardless of LMIC or HIC setting.[5]

HAV infection is generally cleared without significant morbidity or mortality; however, symptomatic liver disease, including jaundice and fulminant hepatitis, can be observed in older individuals with infection.[6] Similar to HAV, HEV is normally confined to self-limited hepatitis, but infection with genotypes 3 and 4 can progress to chronic infection in immunosuppressed individuals or recipents of organ transplants.[5,7] Moreover, HEV is also associated with extra-hepatic conditions, such as Guillain–Barre syndrome, meningoencephalitis and glomerulonephritis,[5] and has a higher mortality rate than HAV, especially gt1/2 infection in pregnant women.[8] Planning appropriate public health measures to help curb the morbidity and mortality associated with these infections (e.g. HAV vaccination for HAV and improvements in sanitation or measures taken to limit HEV infection in pig farming for HEV) require sufficient epidemiological data.

Data on HAV and HEV in Suriname, a middle-income country in South America, are very limited. The most recent data showed an anti-HAV prevalence of 81.5% in 486 Surinamese blood donors in 1977.[9] There have been studies examining anti-HAV prevalence in individuals originating from Suriname, Aruba or the Dutch Antilles living in the Netherlands (2006–2007),[10] which found increasing anti-HAV seroprevalence as age increased; from 1–14 (7%) and 15–60 (43.9%) to >61 years old (91.8%). Two other community-based studies of first-generation Surinamese living in Rotterdam and Amsterdam, the Netherlands, found 50%[11] and 76%,[12] respectively, testing positive for anti-HAV antibodies in 2004. To the best of our knowledge, there are no published data on the prevalence of anti-HEV antibodies (anti-HEV) in Suriname; however, some inference on anti-HEV prevalance could be obtained from studies of individuals with a migration background from Suriname. In a study conducted in the Netherlands, anti-HEV antibodies were present in 2% of first- and second-generation South-Asian Surinamese (Hindustani) and 3% of the Afro-Surinamese individuals from 2011 to 2014.[13] Nevertheless, it is not known to what extent these data reflect the seroprevalence in Suriname.

The aim of this study was therefore to provide epidemiological data on anti-HAV and anti-HEV seroprevalence, along with determinants of these infections, among individuals living in Suriname. Furthermore, we aimed to evaluate anti-HAV and anti-HEV disparities among specific ethnic groups living in varying rural or urban settings in Suriname. This information could aid in the development of public health policies toward HAV and HEV, including HAV vaccination, which is currently not available in Suriname.

Methods

We used samples and data from a previous study conducted in Suriname,[14] in which the epidemiology and genotypic spread of hepatitis C virus (HCV) were evaluated. Details have been described elsewhere. In brief, 2278 individuals were recruited during November 2012 and November 2013 at the Emergency Department (ED) of the Academic Hospital of Paramaribo, the capital of Suriname. This ED is the only location providing emergency care and has a catchment area comprising the entire city of Paramaribo and its surroundings (i.e. approximately half of the Surinamese population). Furthermore, this ED provides emergency care for individuals transported from rural areas of the country. During these 2 mo, all patients who attended the ED were asked to participate in the study. We included participants who were aged ≥18 y with an emergency severity index >2, had blood drawn and completed a standardised, interviewer-led, HCV risk-factor questionnaire, which included questions on injection drug use, receipt of blood transfusion, hospitalisation, having had surgical or dental procedures, potential occupational exposure, placement of (cosmetic) tattoos or piercings, having received acupuncture, and rituals/customs, such as circumcision, scarification and bugrus (i.e. placement of self-made penile implants). Information on sociodemographics (i.e. ethnic background, sex, age and educational level) were collected through the same questionnaire. The questionnaire did not include information on sexual behaviours, farming practices or specific consumption of foods.

For this study, we performed a sex-stratified, random sample of 20% of individuals included in the parent study within each ethnic group (i.e. Javanese, Hindustani, tribal, Creole, mixed/other); however, all individuals included in the parent study who were from the indigenous group were sampled (as the sample size was much smaller compared with all the other ethnic groups).[14] Sera of selected individuals were tested for total anti-HAV antibodies using the enzyme-linked immunoassay (DiaSorin Anti-HAV Immunoassay Kit, Saluggia, Italy), and anti-HEV antibodies by means of an enzyme-linked immunosorbent assay-based assay (Wantai Hepatitis E Total Antibody Kit, Beijing, China).

We calculated the seroprevalence of anti-HAV and anti-HEV positive individuals by dividing the number of positive samples with the total number of samples with a result. Seroprevalence estimates were also adjusted by continuous age and sex using mean predicted values from a logistic regression model including these covariates. Seroprevalence was stratified by ethnic group.

We calculated the OR, comparing the odds of having anti-HAV–positive and anti-HEV–positive serology, separately, between levels of determinants, which was estimated, along with its 95% CI, using logistic regression. All variables with $p<0.10$ in the univariable analysis were entered into a full multivariable model. Ethnic group was forced in the final model. We then modelled the probability of anti-HAV seropositivity with increasing age using logistic regression with age as restricted cubic splines at 3 knots.

Statistical analyses were performed using STATA 15.1 (College Station, TX, USA); $p=0.05$ was considered statistically significant.

Results

Patient flow and sample selection are illustrated in Figure 1. Of the 1000 selected samples from the parent study, we were able to test 944 and 949 samples for anti-HAV and anti-HEV antibodies, respectively. The demographic characteristics of the individuals providing samples are described in Table 1. In brief, the median age was 37 (IQR 27–53) y. The indigenous population represented 5.6% of the study population. Of those in the mixed/other ethnic group, 7.4% were European and 8.7% Chinese. The age and sex distribution by ethnic group is presented in Supplementary Table 1. The median age was significantly different across ethnic groups: the Creole, tribal and mixed/other

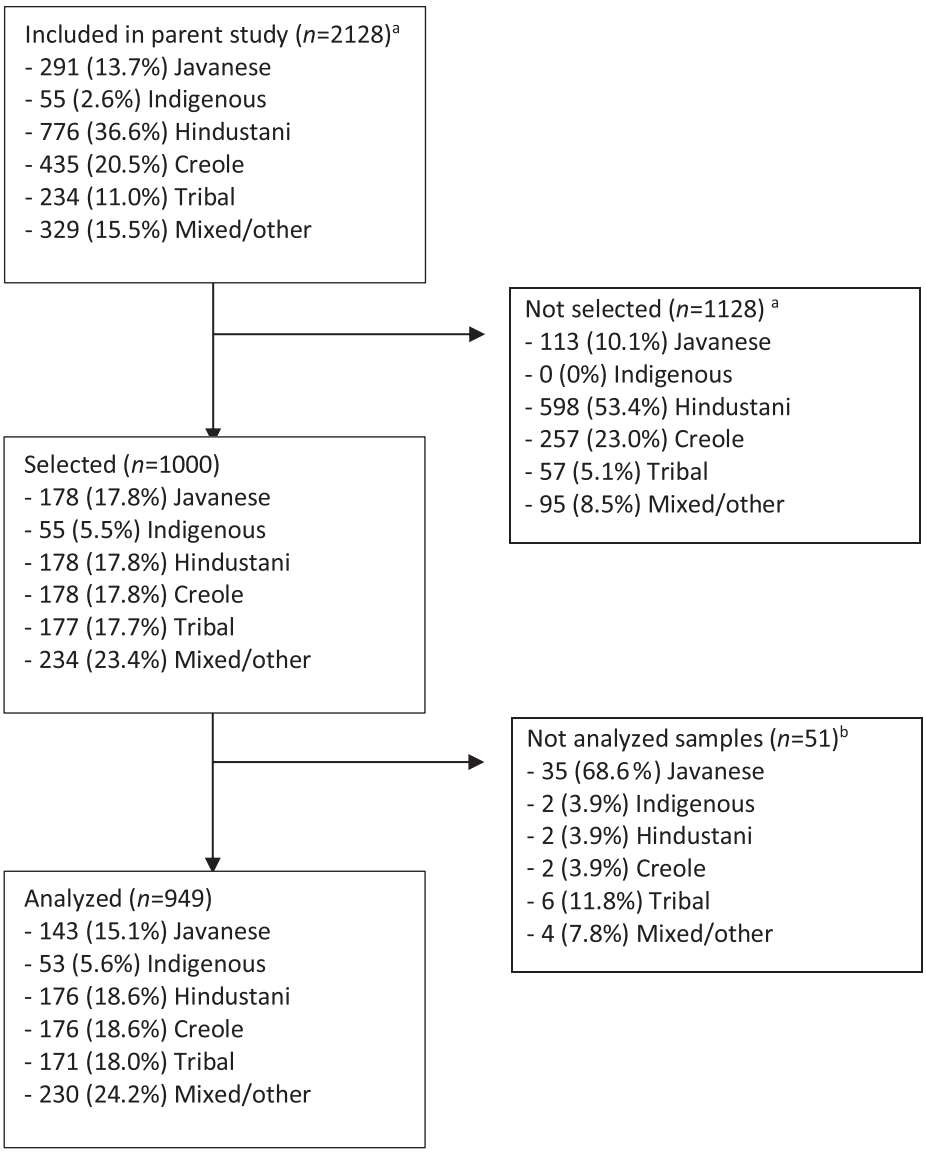

Figure 1. Patient flow and selection of samples for hepatitis A and hepatitis E antibody testing in the Emergency Department population of Suriname, November 2012 and November 2013.
[a]Ethnicities missing (n=8).
[b]Reasons for not being analysed: sample not available (n=36), insufficient sample (n=15).

groups were 8–10 y younger than the Javanese, indigenous and Hindustani groups (p=0.0016).

Overall, 550 of 944 participants (58.3%, 95% CI 55.4 to 61.4%) tested anti-HAV positive and the anti-HAV seroprevalence across ethnic groups was as follows: Javanese, 55/145 (37.9%); indigenous, 45/54 (83.3%); Hindustani, 80/171 (46.8%); Creole, 116/176 (65.9%); tribal, 133/170 (78.2%); and mixed/other, 121/228 (53.1%). Within the mixed/other group, Chinese and European participants had a 52.6% (10/19) and 70.6% (12/17) anti-HAV seroprevalence, respectively. The age- and sex-adjusted anti-HAV seroprevalence was 35.9% in the Javanese, 82.2% in the indigenous, 44.7% in the Hindustani, 65.9% in the Creole, 79.0% in the tribal and 56.1% in the mixed/other groups.

In multivariable analysis (Table 2), anti-HAV prevalence was highest in the indigenous, tribal, Creole and mixed/other ethnic groups (compared with the Javanese ethnic group; p<0.001). Anti-HAV seropositivity was slightly higher, yet non-significant, in males rather than in females (p=0.153). Overall, seroprevalence increased with older age as a continuous variable (p<0.001). When modelling anti-HAV seroprevalence as a non-linear function of age, the lowest seroprevalence was found in individuals aged <30 y and was highest in those aged ≥50 y (Figure 2A); specifically, young individuals of Javanese origin had a low

Table 1. Hepatitis A and hepatitis E seroprevalence stratified by sociodemographic characteristics of the study population, Suriname, November 2012 and November 2013

	Anti-HAV antibodies		Anti-HEV antibodies	
	Positive (n=550) **n (%)**	Negative (n=394) **n (%)**	Positive (n=35) **n (%)**	Negative (n=914) **n (%)**
Ethnicity[a]				
Javanese	55 (37.9)	90 (62.1)	2 (1.4)	141 (98.6)
Indigenous	45 (83.3)	9 (16.7)	1 (1.9)	52 (98.1)
Hindustani	80 (46.8)	91 (53.2)	4 (2.3)	172 (97.7)
Creole	116 (65.9)	60 (34.1)	10 (5.7)	166 (94.3)
Tribal	133 (78.2)	37 (21.8)	10 (5.9)	161 (94.2)
Mixed/other	**121 (53.1)**	**107 (46.9)**	**8 (3.5)**	**222 (96.5)**
European	12 (70.6)	5 (29.4)	3 (17.7)	14 (82.4)
Chinese	10 (52.6)	9 (47.4)	3 (15.0)	17 (85.0)
Mixed/other	99 (51.6)	93 (48.4)	2 (1.0)	191 (99.0)
Age (y)				
median age (IQR)	41.6 (28.7–56.9)	30.8 (23.8–44.6)	43.9 (32.9–56.5)	36.3 (26.5–52.4)
<30	161 (46.3)	187 (53.7)	8 (2.3)	343 (97.8)
30–39	102 (57.0)	77 (43.0)	6 (3.3)	174 (96.7)
40–49	84 (56.8)	64 (43.2)	9 (6.0)	140 (94.0)
≥50	203 (75.5)	66 (24.4)	12 (4.5)	257 (95.5)
Sex				
Women	263 (56.0)	207 (44.0)	14 (3.0)	456 (97.0)
Men	287 (60.6)	187 (39.5)	21 (4.4)	458 (95.6)
Education[b]				
Low	414 (62.6)	247 (37.4)	27 (4.1)	636 (95.6)
High	128 (47.2)	143(52.8)	7 (2.6)	267 (97.5)

[a]Mixed ethnicity (n=174); the other ethnic group includes: Brazilian (n=9), Chinese (n=19), Dominican (n=1), European (n=17), Guyanese (n=2), Lebanese (n=1), mixed (n=174), Vietnamese (n=1) and non-specified (n=4).
[b]Education level: low: none, primary or lower secondary school educational level or lower vocational level; high: upper secondary, upper vocational level or university.

anti-HAV prevalence (<20%), whereas the indigenous and tribal ethnic groups had the highest anti-HAV seroprevalence at earlier ages.

Overall, 35 of 949 (3.7%, 95% CI 2.6 to 5.0%) were anti-HEV positive and the anti-HEV seroprevalence across the ethnic groups was as follows: Javanese, 2/143 (1.4%); indigenous, 1/53 (1.9%); Hindustani, 4/176 (2.3%); Creole, 10/176 (5.7%); tribal, 10/171 (5.9%); and mixed/other, 8/230 (3.5%). Within the mixed/other group, Chinese and European participants had a high anti-HEV seroprevalence: 17.6% (3/20) and 15.0% (3/17), respectively. The age- and sex-adjusted anti-HEV seroprevalence was 1.4% in the Javanese, 1.8% in the indigenous, 2.2% in the Hindustani, 5.7% in the Creole, 5.9% in the tribal and 3.6% in the mixed/other groups.

As shown in Table 2, in multivariable analysis, anti-HEV seropositivity was highest in the tribal and Creole groups (p=0.64) and was observed more often in men than in women (p=0.22), albeit non-significantly. Anti-HEV seropositivity significantly increased with age as a continuous variable (p=0.046). When modelling anti-HEV seroprevalence as a non-linear function of age (Figure 2B), individuals from the mixed/other groups had the fastest increase in anti-HEV seroprevalence with age, whereas anti-HEV seroprevalence remained higher across most ages in individuals from the tribal ethnic group compared with other groups.

Discussion

In this cross-sectional study of patients attending the ED in Paramaribo, Suriname, over a period of 2 mo, approximately 60% tested positive for anti-HAV and 4% for anti-HEV. Of the individuals who were anti-HAV positive, <50% showed HAV seroimmunity by the age of 30 y, making Suriname a very low HAV endemic country as defined by the WHO.[15] Anti-HEV seropositivity was much less common and in line with lower estimates found in non-endemic countries.[16] Importantly, ethnic differences in seroprevalence were noted, with tribal (78.2%) and indigenous (83.3%) ethnic groups having the highest anti-HAV seroprevalence and tribal (5.9%) and Creole (5.7%) displaying the highest

Table 2. Bivariable and multivariable logistic regression analyses of determinants associated with anti-HAV or anti-HEV seropositivity in the Emergency Department population of Suriname, November 2012 and November 2013

	Anti-HAV seropositivity				Anti-HEV seropositivity			
	Bivariable		Multivariable		Bivariable		Multivariable	
	OR (95% CI)	p	aOR (95% CI)	p	OR (95% CI)	p	aOR (95% CI)	p
Ethnicity[a]		**<0.001**		**<0.001**		0.150		0.064
Javanese	1		1		1		1	
Indigenous	8.18 (3.71 to 18.03)	<0.001	8.80 (3.83 to 20.21)	<0.001	1.36 (0.12 to 15.27)	NS	1.31 (0.12 to 14.82)	NS
Hindustani	1.44 (0.92 to 2.26)	NS	1.48 (0.92 to 2.38)	NS	1.64 (0.30 to 9.08)	NS	1.66 (0.30 to 9.21)	NS
Creole	3.16 (2.00 to 5.00)	<0.001	4.03 (2.47 to 6.59)	<0.001	4.25 (0.92 to 19.71)	NS	4.43 (0.95 to 20.62)	0.058
Tribal	5.88 (3.58 to 9.65)	<0.001	7.79 (4.56 to 13.30)	<0.001	4.38 (0.94 to 20.322)	NS	4.60 (0.99 to 21.41)	0.052
Mixed/other	1.85 (1.21 to 2.83)	0.004	2.53 (1.59 to 4.02)	<0.001	2.54 (0.53 to 12.14)	NS	2.73 (0.55 to 13.59)	NS
Age[b]	1.03 (1.02 to 1.03)	<0.001	1.04 (1.03 to 1.05)	<0.001	1.02 (1.00 to 1.04)	0.072	1.02 (1.00 to 1.04)	0.046
Age (categories; in years)		<0.001				0.016		
<30	1				1			
30–39	1.54 (1.07 to 2.21)				1.48 (0.51 to 4.33)			
40–49	1.52 (1.04 to 2.25)				2.76 (1.04 to 7.23)			
≥50	3.57 (2.52 to 5.06)				2.00 (0.81 to 4.97)			
Sex		NS				NS		
Women	1				1			
Men	1.21(0.93 to 1.57)				1.49 (0.75 to 2.97)			
Education[c]		<0.001		NS		NS		
Low	1		1		1			
High	0.53 (0.40 to 0.71)		0.77 (0.55 to 1.06)		0.62 (0.27 to 1.44)			

Abbreviations: aOR, adjusted OR; NS, not significant.
[a]Mixed ethnicity (n=174), the other ethnic group includes: Brazilian (n=9), Chinese (n=19), Dominican (n=1), European (n=17), Guyanese (n=2), Lebanese (n=1), mixed (n=174), Vietnamese (n=1) and non-specified (n=4).
[b]Age as a continuous variable.
[c]Education level: none, primary or lower secondary school educational level or lower vocational level; high: upper secondary, upper vocational level or university.

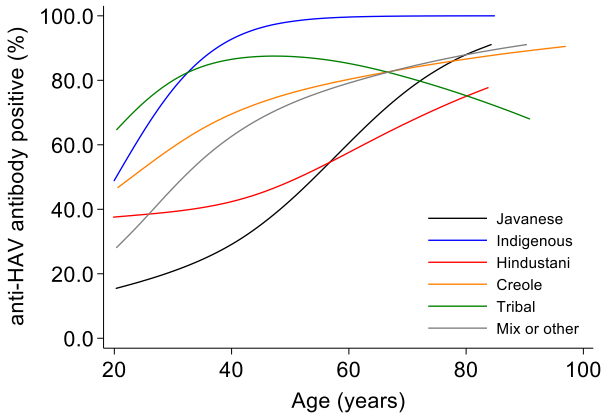

Figure 2A. Hepatitis A seroprevalence in 944 individuals attending the Emergency Department in Paramaribo, Suriname (2012 and 2013), by age in years. Lines represent expected hepatitis A seroprevalence, which was estimated from restricted cubic splines at 3 knots with a logistic regression model.

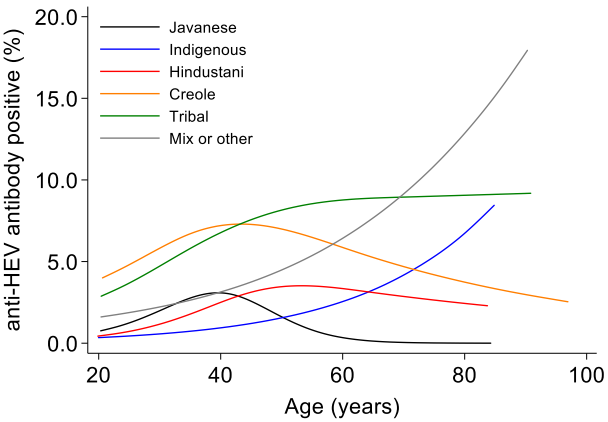

Figure 2B. Hepatitis E seroprevalence in 949 individuals attending the Emergency Department in Paramaribo, Suriname (2012 and 2013), by age in years. Lines represent expected hepatitis E seroprevalence, which was estimated from restricted cubic splines at 3 knots with a logistic regression model.

anti-HEV seroprevalence. This study provides the first comprehensive update on the epidemiology of these two enteric, hepatotrophic viruses in Suriname.

There is substantial variation in anti-HAV prevalence in Latin American countries,[6,17] while the 58.3% anti-HAV positive prevalence found in our study would be at the lower end of these estimates. Nevertheless, it should be noted that studies conducted among first-generation Surinamese living in the Netherlands found similar anti-HAV prevalence: 61.6% (180/292)[10] and 50% (32/64).[11] Of note, the highest anti-HAV prevalence was observed in the tribal and indigenous ethnic groups, the majority of which live or have lived in the rural rainforest or coastal areas of Suriname, where access to safe drinking water is limited, and sanitation is often difficult to maintain. A much higher anti-HAV prevalence has been found in riverine populations of the Amazon, Brazil, compared with metropolitan cities,[2] which was likely the result of improved access to clean water and sanitation.[17,18] Similarly, the urbanisation that took place in Paramaribo, the capital of Suriname, in the 1950s, and its suburbs in the 1970s,[19] enabled increased access to safe drinking water and proper sanitation and could explain the transition from low to very low HAV endemicity (i.e. >50% had immunity by the age of 15–30 y and <50% had immunity by the age of 30 y).[15]

The association between older age and higher anti-HAV positivity is witnessed throughout much of the world.[6] In Suriname, the average age of individuals with anti-HAV immunity is also increasing, while the pool of susceptible individuals at risk of HAV is becoming larger. Taking into account that this study was conducted >10 y ago, the proportion of susceptibile individuals is likely even higher. Generalised HAV vaccination programmes could help increase the proportion of individuals protected against HAV infection.[15] Nevertheless, considering recommendations from the WHO,[15] the data from our study suggest that the very low HAV endemicity setting in Suriname would warrant only vaccinating high-risk groups. Vaccinating individuals living in the city who travel to the rural interior, where HAV endemicity is higher, should also be considered. Successful HAV vaccination policies have been implemented for second-generation migrants living in the Netherlands who visit their parents' country of birth with an intermediate or high HAV endemicity.[20] Likewise, HAV vaccination is recommended for international travellers to Suriname.[21]

The 3.7% HEV seroprevalence found in our study is comparable with other countries in the Caribbean (4.2% in Curacao and Aruba)[22] and South America (4.2–12.9% in Brazil, 12% in Chile),[23] as well as the anti-HEV prevalence found in first-generation Surinamese living in the Netherlands (2% and 3% anti-HEV positive among Hindustani Surinamese and Afro-Surinamese, respectively).[13] Remarkably, anti-HEV prevalence did not mirror anti-HAV prevalence among ethnic groups. For instance, individuals of the indigenous and tribal ethnic groups had the highest anti-HAV prevalence, yet the anti-HEV prevalence was divergent, with the second lowest (1.9%) and highest prevalence (5.8%) in the indigenous and tribal groups, respectively. Given that both these groups probably had poor access to safe drinking water, this source would be an unlikely mode for HEV transmission.

Instead, HEV transmission in Suriname could be zoonotic. It is well known that consumption of pork products is a major risk factor for HEV infection.[24] Surinamese in general mainly eat white meat,[25] and have among the highest per capita poultry consumption in the world.[26] Pork consumption is less than one-tenth of the poultry per capita consumption, and is more often locally produced by a small number of farms.[26] Furthermore, individuals of the Javanese ethnic group who most often do not consume pork, based on Muslim religious beliefs,[27] had the lowest anti HEV prevalence (1.3%). Although the numbers were small, 15% of individuals of Chinese descent, who are traditionally frequent pork consumers,[28] had anti-HEV antibodies. These observations would suggest that HEV transmission is mostly concentrated in those who consume pork and not due to exposure to pig farming, which, unfortunately, could not be confirmed in this study due to the lack of data on dietary practices and environmental exposures. Given that HEV gt1/2 are more frequently associated with contaminated drinking water and gt3/4 with consumption of undercooked meats (mainly pork), genotypic analysis could help with establishing the probable modes of transmission in this setting. Unfortunately, sequencing was not available in this study.

Ethnic differences in the ratio of anti-HAV to anti-HEV prevalence have been observed before in the Netherlands[10,13] and other LMICs. Although not characterised by ethnicity, the anti-HEV prevalence in a rural Brazilian population,[29] and in a combined population of mainly blood donors, persons with acute or chronic liver disease, and healthy adults in Rwanda,[30] did not mirror the overall high anti-HAV prevalence found in these regions. The overall anti-HEV prevalence is also significantly lower in Latin American countries compared with the USA and a number of countries in Europe,[23] despite having a lower economic status and poorer hygienic conditions. Taken together, the differences in HAV and HEV prevalence contrasted between groups suggest very different epidemiological patterns of these enterically transmitted viral infections.

This study presents updated data on anti-HAV prevalence and is the first of its kind to assess anti-HEV prevalence in Suriname. Nevertheless, our study has several limitations. First, our study only represents individuals seen at the ED. However, the selection procedure ensured an equal sample size of each of the five main ethnic groups in Suriname, and a large representation of the smaller indigenous population, hence ensuring a large enough sample size to assess HAV and HEV epidemiology per ethnic group. Second, smaller ethnic groups were not included and the number of participants with either a Chinese or European background was small, which greatly reduced the power to detect a significant difference in anti-HAV and anti-HEV prevalence when compared with other groups. As this category did have the highest anti-HEV prevalence, a more comprehensive study including adequate sampling is advised. Third, we did not ask questions regarding HAV vaccination status, making it impossible to differentiate between participants who recovered from an HAV infection vs those who were vaccinated. However, as HAV vaccination is largely unavailable in Suriname, only participants who had lived elsewhere may have been vaccinated. Lastly, we did not have data for many potential HAV- and HEV-specific risk factors. These limitations should be taken into account when assessing HAV and HEV epidemiology in future studies.

In conclusion, the general anti-HAV prevalence in our study population is consistent with very low endemicity, with a somewhat higher endemicity level in the interior of Suriname. Anti-HEV seroprevalence is also rather low in Suriname. The epidemiological patterns of anti-HAV seroprevalence suggest that HAV vaccination for at-risk populations and individuals travelling to the interior are needed. Furthermore, monitoring and sequencing of HEV in imported swine products, and pigs in local pig farms, would be of interest to identify the source of HEV infections in Suriname.

Supplementary data

Supplementary data are available at *Transactions* online.

Authors' contributions: MSMO, MP and SGSV conceived the initial study. NR and JR were responsible for the HAV and HEV antibody testing, and critically revised the manuscript. MSMO, MP and AB were responsible for the statistical analysis and interpretation of these data. MSMO, WCWRZ, SGSV and AB drafted the manuscript; MSMO, MP, JvD, WCWRZ, SGSV and AB critically revised the manuscript for intellectual content. All the authors read and approved the final version of the manuscript. MSMO, SGSV and AB are guarantors of the paper.

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Data availability: Data available on request from the authors.

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