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HUMAN IMMUNODEFICIENCY VIRUS, HEPATITIS B VIRUS AND SYPHILIS INFECTIONS AMONG LONG-DISTANCE TRUCK DRIVERS IN, A PORT CITY IN GHANA

Andrew A. Adjei[1, 5,*], Priscilla Boahema Atta[2], Francis Krampa[3], Margaret Lartey[4], Mubarak Abdul Rahman[5], Seth Agyeman[2], Theophilus K. Adiku[3], Yao Tettey[5], Richard K. Gyasi[5].

[1]Office of Research, Innovation and Development (ORID), University of Ghana, Legon, Ghana; [2]Immunology Department, Central Laboratories, Korle Bu Teaching Hospital, Korle Bu, Ghana, [3]Department of Microbiology, University of Ghana School of Biomedical and Allied Health Sciences, Accra, Ghana, [4]Department of Medicine and Therapeutics, University of Ghana School of Medicine and Dentistry, Korle-bu, Ghana; [5]Department of Pathology, University of Ghana School of Biomedical and Allied Health Sciences, Accra, Ghana.
***E-mail:** aaadjei@ug.edu.gh; andrewanthonyadjei@yahoo.com

Abstract

Background: Although the high prevalence of human immunodeficiency virus (HIV), hepatitis B virus (HBV) and syphilis infections among long-distance truck drivers has been well documented globally, such data are sparse from Africa, and there has been no such data from Ghana. This study carried out between the months of January and June 2013 sought to determine the sero-prevalence and risk factors of HIV, HBV and syphilis infections among long distance truck drivers at the Tema sea port, Ghana.
Materials and Methods: Of a total of 800 eligible drivers, 106 (13.25%) drivers consented to take part in the study. Subjects voluntarily completed a risk factor questionnaire and provided blood specimen for testing for HIV, syphilis and the surface antigen of HBV (HBsAg).
Results: The mean age of the drivers was 40.56 ± 11.56 years. The sero-prevalence of HIV was 0.94%, 14.2% had HBsAg and reactive syphilis serology was 3.8%. On multivariate analysis, the main determinants of HBV infection were; multiple sexual partnership (OR, 6.36; 95% CI: 1.35–29.79), patronage of commercial sex workers (OR, 6.85; 95% CI: 0.88 – 52.89), cross-border travelers (OR: 6.89-fold, 95% CI: 0.86 - 55.55) and prolonged duration of trips for more than two weeks (OR: 4.76; 95% CI: 0.59 – 38.02). The main determinant of syphilis infection on multivariate analysis was being a Muslim (OR, 2.19; 95% CI: 0.22 – 21.74).
Conclusion: The data indicate a lower sero-prevalence of HIV but a higher sero-prevalence of syphilis. However, the sero-prevalence of HBV infection is comparable to that of the general population.

Key words: HIV; Hepatitis B; Syphilis; Long distance truck drivers; Port.

Introduction

Mobile populations, including truck drivers, have been identified as vulnerable group for acquiring and transmitting human immunodeficiency virus (HIV), and other sexually transmitted infections (STIs) (Stratford et al., 2000; UNAIDS, 2007; Pandey et al., 2008). Studies from some parts of Africa and Asia have demonstrated a link between long-distance truck drivers and the prevalence of HIV/STIs (Manjunath et al., 2002; Mbugua et al., 1995; Mustikawati et al., 2009). Within these regions, there is growing evidence that the high rates of HIV and STIs among truck drivers largely occur by sexual contact with HIV, and STIs-infected women, often commercial sex workers (CSW) along the major transportation routes; the infected men then transmit the virus to wives and other sex partners en route and in their place of origin (Pison et al., 1993; Gangakhedkar et al., 1997; Brockerhoff , M. and Biddlecom,1999; Wolffers et al., 2002; McCree et al., 2010). Consistent with this pattern, there is growing public health concern that long-distance truck drivers and other mobile, individuals may act as bridge populations who spread the infections from high to low-risk populations and regions and urban to rural areas (Decosas et al., 1995; Morris et al., 1996; Entz et al., 2000; Chandrasekaran et al., 2005).

Ghana, one of the growing economies in sub-Saharan Africa, has one of the largest road networks and sea ports in the sub-Saharan Africa and that most of the neighbouring land-locked countries such as Niger, Burkina Faso and Mali use the road networks and the sea ports at Tema and Takoradi to convey merchandise, equipments, raw materials, and consumer goods to their respective countries. Apart from the truck drivers from the neighboring countries, local companies operating haulage business engage Ghanaians in the truck driving occupation to convey goods to the land-locked neighbouring countries. These long-distance truck drivers spend many days away from home and their families and as such they are particularly vulnerable to HIV, HBV, and STIs. Undocumented reports over the last 11 years (2002-2013) estimated that between 5,000 and 100,000 long-distance truck drivers used the road networks in Ghana. During their journeys, long-distance drivers stop at rest houses, guest houses, and roadside hotels that usually provide food, rest, sex workers, alcohol and drugs. Unsubstantiated reports suggest that sex services, alcohol and drugs are common and cheap in many highways guest houses, rest stops, and restaurants. Due to high rates of unprotected sex and drug use behaviours, Ghana's "floating population" of long-distance truck drivers are at increased risk for HIV, HBV, syphilis infections and other STIs and may play a critical role in the spread of HIV, HBV and syphilis in Ghana as has been observed in other countries (Decosas et al., 1995; Morris et al., 1996; Entz et al., 2000; Chandrasekaran et al., 2005; Pinho et al., 2011). Within Ghana, there has been little or no information of long-distance truck drivers' sexual behaviours and how these may facilitate risks of acquiring and transmitting HIV, HBV and syphilis in the country. The uptake of safer sex measures and patterns of health service in these long-distance truck drivers is unknown. Also the demographic profile of these long-distance truck drivers and their lack of experience of the Ghana Health System may place these drivers or communities at higher risk of sexual ill health and reproductive morbidity compared with the general population. The prevalence rates of HIV and HBV in Ghana are 1.37% and 13.00% whereas the reported sero-prevalence of *Treponema pallidum*, the causative agent of syphilis is 0.6% (GAC, 2012). This work reports the prevalence rates of HIV, HBV and syphilis among long-distance truck drivers who use the Tema sea port, Ghana.

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Methodology

Study Design and Site Description

A cross sectional study was conducted between the months of January and June, 2013 among long-distance truck drivers at Tema sea port. Ghana is divided into ten (10) administrative regions, subdivided into a total of 216 districts or municipalities. Ghana has two seaports, the Takoradi seaport which is located in the Western Region and the Tema seaport located in the Tema metropolis, in the Greater Accra region, which is about 25 kilometers from Accra, the capital city of Ghana. The study site was chosen because it is the larger of the two sea ports with numerous light and heavy industries and companies and attracts a lot of both local and foreign haulage, short and long-distance haulage, transport companies, inland clearance depots, warehouses, and related service centres, and has one of the largest foreign haulage companies in the country. Tema seaport is well connected to the hinterland which makes it the preferred and ideal gateway to most of the regions in Ghana and also neighbouring countries such as Burkina Faso, Niger and Mali. The Port is serviced by leading shipping and clearing companies. In addition, the port is active and serves as a common destination for both short and long-distance truck drivers. The population of the Municipality is estimated at 161,612 using the 2000 Housing and Population Census as a base and applying a 4% annual growth rate (National Population and Housing Survey, 2000).

Study population

Subjects for this study were both male resident and non-resident citizens long-distance truck drivers at the Tema sea port. The study was proposed to the entire population of each long-distance truck driver in the trucking Company offices or group and the purpose of the study was explained to the group at the meeting organized for that purpose. The long-distance drivers (n=800) were informed at the meeting organized for that purpose that the study was confidential and that the information provided by them would not affect their immigration status or trucking business. After an explanation of the purpose of the study, all truck drivers were invited to participate, but only 106 long-distance truck drivers consented and were enrolled in the research. Written informed consent was obtained from each consenting long-distance truck driver and the information regarding the protocol and informed consent was presented at the appropriate literacy level. The study was conducted in a confidential manner and random unique study-generated numbers were employed to identify the long-distance truck drivers. None of the non-resident (foreign) citizens long-distance truck drivers took part in the study. The Ethical and Protocol Review Committee of the University of Ghana Medical School, Accra, Ghana, approved the study.

Questionnaire

All the participants completed a confidential structured questionnaire in a separate room assessing socio-demographic characteristics including age, sexual (types and number of sex partners, education, condom use) and drug histories, knowledge and history of STIs, and a risk factor profile for the infections under investigation.

Sample collection and serological analysis.

Blood samples (about 10 ml) were collected from each of the participants into EDTA tubes. Samples were centrifuged and the serum kept at -80^{o}C until analyzed. Sera were tested at the Public Health Reference Laboratory, Korle Bu, Accra, Ghana for the presence of antibodies to HIV 1 and 2 (ELISA and Western Blot; Abbot and Cambridge Biotech, respectively), and antibodies to HBV using HBsAg monoclonal ELISA test (Abbot). Serological tests for syphilis were performed using rapid plasma regain (RPR, Serodia Fujirebio, Japan) and then *Treponema pallidum* haemagglutination assay (TPHA, Serodia Fujirebio) test, in accordance with the respective manufacturer's instructions.

Statistical analysis

The Statistical Analysis Software (SAS Institute, Cary, NC, USA) version 9.1 was used to complete all data analyses. For each generally accepted risk factor for HIV, HBV and syphilis infections, the odds ratio (OR) and the 95% confidence interval (95% CI) were calculated to assess associations with socio-demographic and behavioural variables in univariate analysis. A P value of <0.05 was considered significant. Independent associations were evaluated by calculating the adjusted OR by multivariate analysis for the socio-demographic behavioural variables found to be significant in the univariate analysis.

Results

Study population

Between the months of January and June 2013, 106 long-distance truck drivers (range 18 – 73 years; mean age, 40.56 ± 11.56 years) were recruited for the study. All of them were Ghanaian citizens as none of the non-Ghanaian long-distance truck drivers consented to take part in the study. They completed interviews and blood testing; and the results herein presented. Of the 106 long-distance truck drivers, 84.9% (90 of 106) had been driving for more than five (5) years while 15.1% (16 of 106) had driven for less than 5 years.

Majority of the truck drivers, 74 (69.8%) were from the Greater Accra region, 30 (28.3%) were from the Ashanti region, 1 (0.95%) was from the Northern and 1 (0.95%) from the Brong–Ahafo region. Eleven (10.4%) had no formal education, 80 (75.5%) had basic education, while those who had Senior Secondary School Certificate education formed 15 (14.1%). Muslims formed 58.5% (62) while Christians were 41.5% (44). Regarding STIs, 14 (13.2%) reported signs such as genital ulcer, genital itch, painful urination and urethral discharge, whereas 17 16%) reported previous history of gonorrhoea.

The overall prevalence of HIV-1 was 0.94% (1), with none testing positive for HIV-2. Syphilis infection among the long-distance truck drivers was 3.8% (4) and 14.2% (15) had HBsAg.

Table 1 shows the odds ratios (OR) and the corresponding 95% confidence intervals (CI) according to age for HBV and syphilis. Hepatitis B virus and syphilis seropositivity were not associated with age. Hepatitis B virus sero-positivity was highest (6 of 15 sero-positives) among the 31-40 year group. Conversely, the greatest risk of HBV sero-positivity was found in those more than 50 years followed by those in the 21-30 year age group. Long-distance truck drivers aged 41-50 years were at decreased risk of HBV infection (OR: 0.98; 95% CI: 0.22-4.31).

Syphilis sero-positivity was highest among long-distance truck drivers aged 50 years and above (Table 1). Compared to truckers aged >50 years, long-distance drivers aged 21-30 years (OR: 0.47; 95% CI: 0.04-5.71) and those aged 31- 40 years (OR: 0.18; C1: 0.02-2.41) were at reduced risk of syphilis infection. None of the drivers aged 20 years and below, and those aged 41-50 years tested positive for syphilis. Long-distance truck drivers who were Muslims had a 2.19 fold higher risk (95% CI: 0.22 – 21.74) of syphilis infection and a 1.50-fold higher risk (95% CI: 0.47 – 4.74) of HBV infection as compared to long-distance drivers who were Christians.

Risk Factors

Table 2 shows the ORs and the corresponding 95% CIs according to behavioural characteristics of the truck drivers. Long-distance drivers who operated or travelled outside the country had a 6.89-fold higher (95% CI 0.86 - 55.55) risk of HBV infection as compared to those who operated or travelled within the country. Similarly, truck drivers who spent more than 2 weeks on the road before reaching their designated destination were at increased risk (OR: 4.76; 95% CI: 0.59 – 38.02) of HBV infection as compared to those who spent less than 2 weeks on the road before reaching their designated destination. Truckers who had multiple sexual partners had a 6.36-fold (95% CI: 1.35 – 29.79) higher risk of HBV infection as compared to those who had single sexual partners. Similarly, drivers who visited CSW had a 6.85- fold (95% CI: 0.88 – 52.89) higher risk of HBV infection as compared to those who reportedly do not visit CSWs. Truck drivers who had no previous history of condom use (70.8%) had no risk of Hepatitis B (OR: 0.99; 95% CI: 0.25-3.87) or syphilis infection (OR: 0.83; 95% CI: 0.82-8.45). Drivers with a previous history of alcohol use were at a decreased risk of HBV (OR: 0.24; 95% CI: 0.06 – 1.33) and syphilis (OR: 0.46; 95% CI: 0.06 – 3.34) infections. None of the drivers who reported illicit drug usage tested seropositive to HBV and syphilis infections.

Discussion

Migration and mobility have contributed significantly to the HIV/AIDS epidemic, HBV, and syphilis infections due to the risky behaviour adopted by mobile population such as having multiple sexual partners, participation in commercial sex, poor condom use, and illicit drug use (Saggurti et al., 2008; McCree et al., 2010). One of such migrant populations is long-distance truck drivers. Several reports suggest that long-distance truck drivers act as bridge populations who spread the infections from high-risk to low-risk populations (Bwayo et al., 1994; Decosas et al., 1995; Morris et al., 1996; Entz et al., 2000; Gawande et al., 2000; Chandrasekaran et al., 2005; Delany-Moretlwel et al., 2013; Zhang et al., 2013). Hence knowledge of the prevalence rates of infections, risk factors and distribution of HIV, HBV, and syphilis among long-distance truck drivers is important for planning of preventive measures and for development of vaccination programmes (Pandey et al., 2008). Further comparison of prevalence and the risk factors among long-distance truck drivers and the general population in the same geographical area is important to provide a basis for action, and changes in public health policy, education and in clinical practice. This study determined the prevalence rates of HIV, HBV and syphilis infections among long-distance drivers who use the Tema sea port and the road networks in Ghana.

The study demonstrated a considerable potential for the transmission of HBV and syphilis infections among truck drivers in Ghana. The sero-prevalence rates of HIV, HBV and syphilis in the general population are 1.37%, 13.00%, and 0.60% respectively (GAC, 2012). However, the sero-prevalence rate of HIV (0.98%) among the long-distance truck drivers is lower than the sero-prevalence rate of HIV (1.37%) among the general population (GAC, 2012). The reason(s) for the low prevalence rate of HIV infection could not be discerned from our study. However, the small sample size may be a contributing factor. Another reason may be that drivers who were at higher risk of HIV due to their risky sexual behaviour did not consent despite the assurance of confidentiality. Our data of low prevalence rate of HIV (0.98%) infection among long-distance truck drivers is similar to a study conducted in Brazil, in which the investigators reported 0.3% HIV sero-prevalence rate among the long-distance truck drivers (Pinho et al., 2011). In another development, Chen *et al*., 2006, reported no HIV infection among long-distance truck drivers in Tongling, China. The sero-prevalences of HBV and syphilis reported herein are higher than the results of similar studies conducted in India (HBV, 14.2% versus 5.7%; syphilis 3.8% versus 0.7% (Gawande et al., 2000)) and China (syphilis 3.8% versus 0.68% (Zhang et al., 2013)) but lower than similar studies conducted in Brazil (HBV, 14.2% versus 32.3%; syphilis 4.5% versus 3.8% (Pinho et al., 2011); Indonesia [syphilis 3.8% versus 7.4% (Mustikawati et al., 2009)]. This study therefore adds to the growing evidence that long-distance truck drivers represent a high-risk group for HBV and syphilis infections (Jackson et al., 1997; Ramjee and Gouws, 2002; Pandey et al., 2008; Ozuonwa et al., 2011) and suggestive that HBV and syphilis infections may be widespread in the haulage and trucking businesses and therefore reasonable to speculate that HBV and syphilis may circulate in the general population in the Tema community and among the various communities patronized by the long-distance drivers. Further studies need to be done to define the prevalence of HBV and syphilis infections and other STIs associated with long-distance truck drivers and other long-term migrants who worked or have been working in the haulage and trucking profession in Ghana.

On multivariate analysis, the independent determinants for HBV infection were being a long distance driver, having multiple sexual partners and previous visit to CSW. The higher sero-prevalence of HBV and syphilis among truck drivers is a major public health problem in view of the growing numbers of individuals and co-operate bodies in the haulage and trucking business. The implications of these findings raise concern about the need for preventive measures such as educational campaign in the haulage and the trucking business. The risk of HBV and syphilis infections did not correlate with increasing age, nevertheless greater proportion of the drivers who tested positive for HBV and syphilis infections were in the 31-40 years and above 50 years age groups. The reason(s) for this disparity cannot be discerned in this study; further studies with a large number of truck drivers who are in active service in the haulage and truck driving business will be necessary to draw a definitive conclusion.

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Table 1: Prevalence of HBV and Syphilis among truck drivers according to socio-demographic characteristics.

	[N=106]	HBV Status		OR	95% CI	p-value	Syphilis status		OR	95% CI	p-value
		Pos(15)	Neg (91)				Pos (4)	Neg (102)			
Age											
≤ 20	2	0	2	-	-	0.81	0	2	-	-	0.81
21 –30	18	3	15	1.30	0.29-5.88	0.51	1	17	0.47	0.04-5.71	0.50
31 –40	45	6	39	*			1	45	0.18	0.02-2.14	0.47
41 –50	23	3	20	0.98	0.22-4.31	0.59	0	23	-	-	0.19
≥ 50	18	3	15	1.30	0.29-5.88	0.55	2	16	*		
Religion											
Muslim	62	10	52	1.5	0.145-4.74	0.14	3	59	2.19	0.22-21.74	0.45
Christian	44	5	39	*			1	44	*		
Education											
None	11	3	8	*			0	11	-		
Basic	80	9	71	0.34	0.08-1.51	0.16	3	77	*		
Secondary	15	3	12	0.67	0.11-4.17	0.51	1	14	1.83	0.18-18.9	0.50

Pos: Positive; Neg: Negative; * : Baseline for OR calculation

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Table 2: ORs and the corresponding 95% CIs according to driving distance and behaviour characteristics of the truck drivers.
Pos: Positive; Neg: Negative; * : Baseline for OR calculation

	[N=106]	Hepatitis B Status		OR	95% CI	P-value	Syphilis status		OR	95% CI	p-value
		Pos (15)	Neg (91)				Pos (4)	Neg (102)			
Driving distance											
Long Distance	75	14	61	6.89	0.86-55.55	0.03	1	74	0.19	0.02-2.17	0.19
Short Distance	31	1	30	*			3	28	*		
Duration of Trip											
>2 Weeks	82	14	68	4.76	0.59-38.02	0.11	4	78	-	-	0.46
< 2 Weeks	24	1	23	*			0	24			
Marital Status											
Yes	83	12	71	1.13	0.29-4.39	0.58	3	79	1.11	0.12-10.50	0.70
No	23	3	20	*			1	22	*		
Knowledge of HIV/STI											
Average	60	6	54	0.46	0.15-1.39	0.13	3	57	2.37	0.24-23.54	0.41
Good	46	9	37	*			1	45	*		
Multiple sexual partners											
Yes	59	13	46	6.36	1.35-29.79	0.09	1	58	0.25	0.02-2.51	0.21
No	47	2	45	*			3	44	*		
Visit to CSW											
Yes	4	2	2	6.85	0.88-52.89	0.04	0	4	-	-	0.83
No	102	13	89	*			4	98	*		
Condom Use											
No	75	12	73	0.99	0.25-3.87	0.61	3	72	0.83	0.82-8.45	0.63
Yes	21	3	18	*			1	20	*		
Alcohol Use											
Yes	34	2	32	0.24	0.06-1.33	0.07	2	32	0.46	0.06-3.34	0.40
No	72	13	59	*			2	70			
Drug Use											
Yes	6	0	6	-	-	0.74	0	6	-	-	0.73
No	100	15	85	*			4	96	*		

Of interest, most of the long-distance truck drivers who were seropositive for HBV and syphilis had no history of condom use; suggesting a low risk perception and poor knowledge about the efficacy of condoms in preventing the transmission of HIV, HBV, syphilis and other STIs (Marck, 1999; Arulogun et al., 2011). Based on these findings, it is likely that low risk perception or poor knowledge among the truck drivers led to less protected sexual behaviors which render them more vulnerable to HBV and syphilis infections.

Finally, the present study had some limitations. The study participants are unlikely representative of the general long-distance truck drivers using the two sea ports as they were recruited from only the Tema port. Moreover, none of the non-Ghanaian (foreign) citizens consented to take part in the study despite the assurance that their participation in the study would not affect their immigration status and trucking businesses. Other limitations included the small sample size, inability to collect information on sexual practices prior to the truck driving business, under reporting of sexual activity and other risky behaviors. Furthermore, the study was based on self-reporting information gained from interviews, which could be biased by the long-distance truck drivers recall ability.

Despite these limitations, the results may suggest an increased potential risk of HBV and syphilis infections among long-distance truck drivers using the Tema sea port; and that HBV and syphilis infections among long-distance truck drivers are likely to be bridged to the broader population through sexual contacts without strong preventive programmes. Further studies are needed in order to obtain and define a better understanding leading to the differentials in low HIV and high HBV and syphilis sero-prevalence infections among the long-distance truck drivers in Ghana.

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