HHS Public Access

Author manuscript

AIDS Behav. Author manuscript; available in PMC 2018 July 30.

Published in final edited form as:

AIDS Behav. 2016 April ; 20(4): 811–820. doi:10.1007/s10461-015-1194-8.

Prevalence of HIV and Associated Risk Factors Among Long Distance Truck Drivers in Inchope, Mozambique, 2012

Carlos Botão[1], **Roberta Z. Horth**[2], **Heidi Frank**[2], **Beverley Cummings**[3], **Celso Inguane**[4], **Isabel Sathane**[4], **Willi McFarland**[2], **H. Fisher Raymond**[2], and **Peter W. Young**[3]

[1]National Institute of Health, Ministry of Health-Mozambique,Maputo, Mozambique

[2]Global Health Sciences, University of California San Francisco, San Francisco, CA, USA

[3]Division of Global HIV/AIDS, Centers for Disease Control and Prevention (CDC), Maputo, Mozambique

[4]International Training and Education Center for Health (I-TECH), Maputo, Mozambique

Abstract

This is the first integrated biological and behavioral surveillance survey among long-distance truck drivers (LDTD) in Mozambique. Using modified time-location sampling in 2012 at a key transportation junction (Inchope), we enrolled 327 male LDTD. HIV prevalence was 15.4 % (95 % confidence interval : 11.4–19.4 %, n = 318 tested). Among HIV-positive LDTD, 83.7 % did not know their status. One-third of LDTD had never tested for HIV and three-quarters had not received free condoms, lubricants or HIV literature in the past 12 months. In that same period, 61.4 % of LDTD had at least four sexual partners and 27.1 % paid for sex. Among sexually-active LDTD, 76.5 % did not use a condom at last sex. HIV was associated ($p < 0.05$) with primary education or lower (AOR 2.1), residence in Mozambique (AOR 2.3) and never having tested for HIV (AOR 2.2). Our findings reveal that broader coverage of HIV prevention and comprehensive care services for LDTD are urgently needed.

Abstract

Resumen

Esta es la primera encuesta integrada de vigilancia biológica y de comportamientos entre los camioneros de larga distancia (CLD) en Mozambique. Participaran 327 camioneros del sexo masculino reclutados por muestreo por tiempo-lugar modificado en el año 2012 en un cruce clave de transporte (Inchope). La prevalencia del VIH fue del 15,4 % (95 % intervalo de confianza de 95 %: 11,4 a 19,4 %, n = 318 testados). Entre los camioneros VIH-positivo, el 83,7 % no sabía su seroestado. Un tercio de los CLD nunca había hecho la prueba del VIH y tres en cuatro CLD no recibieron gratuitamente condones, lubricantes o literatura del VIH en los últimos 12 meses. En lo mismo período, el 61,4 % de los CLD tuvo al menos cuatro parejas sexuales y el 27,1 % pagó por sexo. Entre los CLD sexualmente activos, 76,5 % no utilizó un preservativo en su última relación sexual. El VIH se asoció significativamente ($p < 0,05$) con educación primaria o inferior (razón de probabilidad ajustada-AOR: 2.1), residencia en Mozambique (AOR 2.3) y nunca haber hecho la

Carlos Botão botao220006095@gmail.com.

prueba del VIH (AOR 2.2). Nuestros resultados revelan la necesidad urgente de expandir la cobertura de la prevención del VIH y de servicios de cuidado integral.

Keywords

HIV prevalence; Long-distance truck drivers; Mozambique; Sub-Saharan Africa; Timelocation; Sampling; Behavioral surveillance; key populations

Introduction

Despite gains in treatment and prevention, the HIV epidemic remains a major public health concern throughout the world, especially in sub-Saharan Africa, including Mozambique [1]. The country has the eighth highest HIV prevalence in the world [1]. The first and only National AIDS Indicator Survey (INSIDA 2009) found that HIV prevalence was 11.5 % in the adult population aged 15–49 years with important regional variation [2]. HIV prevalence is higher in urban areas (15.9 %) compared to rural areas (9.2 %). Regionally, HIV prevalence is highest in the South (17.8 %), followed by the Central region (12.5 %), and it is lowest in the North (5.6 %). Prevalence among men was highest among those aged 35–39 years (14.2 %). INSIDA 2009 also found HIV to be positively associated with age and household wealth (as measured by an indicator composed of information about ownership of goods and household characteristics) [2].

Several studies have documented that migrant populations, including Long Distance Truck Drivers (LDTD), are disproportionately affected by the HIV epidemic [3]. LDTD in sub-Saharan Africa are considered at increased risk of HIV infection due to the mobile nature of their work, resulting in extended periods of travel through areas with elevated HIV prevalence and providing opportunities to engage in risk behaviors while away from their primary residences [3, 4]. Such risk behaviors include having multiple concurrent partners, engaging in sex with casual partners, being clients of sex workers who work along transportation corridors, and inconsistently using condoms, and have been well-documented in the region in the literature [5–14]. Several studies have also found high prevalence of HIV and other STI among LDTD [5, 7, 15], yet mobility reduces access to services and as such many HIV positive LDTD remain untested and unlinked to care [3, 7], and therefore unknowingly at risk for onward transmission of infections to partners in their primary areas of residence [7, 16, 17].

A recent boom in natural resource extraction in Mozambique has resulted in rapid economic growth and the expansion of transportation corridors in the central region of the country (Fig. 1). A rapid mapping study in the Beira and Tete corridors in central Mozambique found LDTD to be highly mobile, with one-third spending less than 40 days at home in a 12 month period [14]. Program data from the central region have also documented high levels of risk behaviors among LDTD [14, 18, 19].

Despite LDTD being widely recognized as a key population at risk, there are no data on prevalence of HIV and associated risk behaviors among LDTD in Mozambique. The lack of systematically collected data about LDTD working in the various transportation corridors

throughout the country has made designing tailored HIV interventions and targeting health services challenging. This paper presents the main findings from the first integrated biological and behavioral surveillance survey (IBBS) conducted in Mozambique among LDTD. LDTD are one of the five key populations selected as part of the national IBBS surveil-lance system which includes female sex workers, men that have sex with men, mineworkers and people who inject drugs. The objective of the survey was to estimate HIV prevalence and associated risk behaviors among LDTD working in Inchope, one of the busiest transportation crossings in central Mozambique [14]. The results of the survey are intended to inform policy and programs directed towards LDTD and the communities along the transport corridors they utilize.

Methods

Sampling Design

We conducted a cross-sectional integrated biological and behavioral surveillance survey between February and August 2012 using time-location sampling (TLS) modified to convenient sampling due to low recruitment in Inchope, a busy crossroads and truck stop in central Mozambique on the national highway EN1 linking the North of the country to the South and the EN6 which connects the port of Beira to Zimbabwe. Extensive formative research, including key-informant interviews and focus group discussions, was conducted in order to map venues and to create a universe of venue-day-time (VDT) periods where truckers could be sampled. To develop the list of VDT periods the survey team visited all potential venues in Inchope to observe the venues in operation and conduct type I and type II enumerations of attendants [20] to establish whether and when LDTD socialized at the location and to determine the logistical feasibility of recruiting at the venue. A list containing about one-hundred venues (updated and modified monthly) including bars, restaurants, hotels, boarding houses, food/drink stands, barber shops, merchandise shops, parking lots, and other sites was created. For each venue, four-hour blocks of recruitment day-times were identified. Between 16 and 22 VDT periods and up to two alternate events were selected at random from this list for each month to make a calendar of sampling events.

During the course of the survey, it was noted that participation rates were lower than anticipated. We modified procedures in an effort to improve recruitment at the eighty-third sampling event out of 139. Procedures were modified to permit interviewers to not only approach LDTD present at randomly selected venues but also those at nearby sites. This procedure was followed for the remaining 56 sampling events conducted. Thus, the initial TLS approach became a convenience sample of LDTD as recruitment reached out beyond that of the initial randomized locations and results may not be representative of the long-distance trucker population passing through Inchope.

Study Population

At each sampling event, potential participants were systematically counted, consecutively intercepted and screened for eligibility. Those that were eligible were invited to participate. Those that agreed to participate were taken to private tents set up for the duration of the sampling event.

Participants were eligible for the survey if they were male, over the age of 17, had made at least one inter-provincial or international trip in the last 12 months, had spent at least one night away from their primary residence in that same time period, had not previously participated in the survey, spoke Portuguese or English and were able to provide informed consent. Foreign nationality or knowledge of HIV-positive status were not eligibility criteria. A sample size of 282 was required to provide 80 % power to detect a significant ($p < 0.05$) 15 % change in condom use at last sex (found to be 21 % in adult men with two or more partners in 2011 National AIDS Indicator Survey) between rounds of LDTD IBBS assuming a design effect of 2.0. Additionally, a sample size of 398 was deemed sufficient to ensure a confidence interval of ±0.07 around a prevalence estimate of HIV of 37 % [21], with a design effect of 2.0.

Measures

LDTD who consented to participate responded to a behavioral interview and provided a dried blood spot sample that was sent to the central laboratory of the National Institute of Health for HIV surveillance testing. The HIV surveillance testing algorithm included screening with Vironostika HIV Uniform II plus O (Biomerieux SA, France), confirmation with Murex HIV 1.2.O (Dia Sorin S.p.A, UK), and resolution of discrepant results with Genscreen HIV 1/2 Version 2 (Bio-Rad, France). Rapid HIV testing with immediate results was also provided to participants on-site. All participants with positive or indeterminate rapid test results were referred to the Inchope Health Facility for follow-up care.

Participants were interviewed in either Portuguese or English via computer-assisted personal interviews (CAPI) developed using the Questionnaire Development System (QDS™ CAPI module). The survey lasted about 20–30 min and contained questions on demographic characteristics (e.g. age, sex, education level, marital status, primary language, nationality), sexual and other risk behaviors (e.g., number of sex partners, marital history, condom use and alcohol and drug use) and access to and use of health programs (e.g., access/participation in HIV and other STIs prevention programs, access to condoms and lubricants, previous HIV testing). Alcohol abuse or dependence was measured using AUDIT-C, an adaptation of the Alcohol Use Disorders Identification Test (AUDIT), which is a three question diagnostic tool designed to identify people who have hazardous and harmful patterns of alcohol consumption [22]; the screening threshold was set to ≥C4 points.

Data Analysis

Data were cleaned and analyzed using R v. 2.15 (R Foundation for Statistical Computing, Austria). Investigators explored the effect of weighting and clustering for key variables and found no significant impact on results, thus crude results and 95 % confidence intervals are presented. Associations with HIV were identified using logistic regression and the contribution of individual predictors is accessed using the Wald test statistic. Variables found to be associated with HIV in the literature [3] including specifically policy and programming relevant variables, such as country of origin, frequency of travel, access to health services, prior HIV testing and circumcision, were selected for bivariate analysis and for construction of multivariable logistic regression models. The multivariable model presented retained

variables significant at $p < 0.1$ selected by backward elimination using the akaike's information criterion (AIC).

Ethical Considerations

This survey protocol was approved by the Mozambican National Bioethics Committee for Health, and the Committee on Human Research at the University of California, San Francisco, and was reviewed by the CDC Division of Global HIV/AIDS Program as non-engaged research. All staff involved in data collection participated in a training focused on ethics in research involving human subjects and signed a confidentiality agreement. In order to protect the identity of participants no personally identifying information was obtained at any point. All participants received an incentive valuing ~US$10 which included (1) packaged food and a non-alcoholic beverage: and, (2) a kit containing hygiene and prevention materials, including a razor, nail-clippers, comb, toothpaste, toothbrush, condoms and HIV/AIDS information pamphlets.

Results

Enrollment in the survey took place between February 23 and August 26, 2012 with139 sampling events, during which 2,938 men were enumerated, 2033 were intercepted and 1438 were determined eligible. Among those who were eligible, 327 (22.7 %) LDTD agreed to participate in the survey, of whom 322 completed the behavioral interview, and of whom 318 provided blood for HIV surveillance testing. Among the 1111 refusals, 53.3 % rescheduled interviews but failed to show up during rescheduled days, 28.8 % were too tired to participate and 17.8 % were in a rush and had just stopped briefly for food or documents. Among participants, 103 (32 %) were recruited after the change in sampling.

Among participants, 45.3 % were between the ages of 31–40 years, 28.0 % spoke Portuguese as the primary language in their household, and 78.7 % had at least secondary education (Table 1). Fewer than half (44.4 %) were circumcised. Of the 88.5 % of participants who were married or living conjugally, 13.7 % had more than one wife or cohabiting partner. Half the participants were Mozambican (50.3 %) and lived in the central region of the country (53.1 %). Non-Mozambican LDTD were from Zimbabwe, Malawi, South Africa, Swaziland, Tanzania or Zambia. Over half (56.8 %) had made four or more trips per month in the past 12 months, with 67.7 % traveling primarily on the national EN6 highway during their last trip.

In the 12 months preceding the survey, about a quarter of participants (26.7 %) had two sex partners, 14.1 % had three sex partners and 20.6 % had four or more sexual partners (Table 2). Greater than one in ten (11.7 %) had at least three casual partners in the same time period and nearly a quarter (24.8 %) had at least one paid sex partner. Additionally, 23.3 % had sex during their last trip. Among participants who had sex in the 12 months preceding the survey (n = 284), 76.5 % did not use a condom at last sexual intercourse. Among participants who had a steady partner among their last three sexual partners (n = 265), 88.3 % had unprotected sex at last sex with at least one steady partner. Among participants who had a casual or paid sexual partner among their last three partners (n = 111), 44.2 % had unprotected sex at least once with their last casual or paid partner. A third of participants

(33.3 %) used alcohol in a manner indicative of probable abuse or dependence in the 12 months preceding the survey and 1.9 % of participants reported having used drugs in that same period (marijuana, cocaine and heroin were reported as having been used).

In regards to health and prevention service utilization (Table 3), 26.7 % received medical care, 14.0 % participated in HIV or AIDS educational lectures and 26.1 % received free condoms, lubricants or educational HIV pamphlets in Mozambique in the 12 months preceding the survey. Nearly one in ten (9.9 %) men reported having had STI symptoms (unusual discharge, sore, or ulcer) in the 12 months preceding the survey. Additionally, 65.8 % had tested for HIV prior to the survey, of whom 48.4 % tested and received results within the 12 months preceding the survey. More than a third (36.9 %) of participants believed they were at high or moderate risk of having HIV. HIV prevalence among LDTD in the survey was 15.4 % (49 of 318 tested).

Among participants who tested positive for HIV in the survey (n = 49), 83.7 % did not know that they had HIV infection prior to participating in the survey (Table 4). Among participants who had tested negative for HIV in the 12 months preceding the survey (n = 144), 8.5 % tested positive for HIV during our survey.

Bivariate analysis (Table 5) found that HIV infection was significantly associated with primary education or lower [odds ratio (OR) 2.9, 95 % confidence interval (CI) 1.5–5.6, p = 0.001). HIV prevalence was also significantly higher among those living in Mozambique (OR 2.9, 95 % CI 1.5–5.8, p = 0.002) compared to those whose primary residence was in a foreign country. Those who had received healthcare in Mozambique in the past 12 months also had higher HIV prevalence than those who had not (OR 2.0, 1.1–5.0, p = 0.017). Those who had never tested for HIV prior to the survey had higher HIV prevalence than those who had ever tested (OR 2.3, 95 % CI 1.3–4.3, p = 0.007). There was no significant association of HIV with making four or more trips in the past 12 months (OR 1.7, 95 % CI 0.9–3.3, p = 0.1).

In multivariate analysis, HIV infection was positively associated with having primary education or lower [adjusted OR (AOR) 2.1, 95 % CI 1.0–4.2, p = 0.04), having primary residence in Mozambique (AOR 2.3, 95 % CI 1.2–4.8, p = 0.02) and never having been tested for HIV (AOR 2.2, 95 % CI 1.2–4.3, p = 0.015).

Discussion

To our knowledge, our study is the first IBBS to determine HIV prevalence and risk factors for HIV among LDTD in Mozambique. The study is part of the first round of Integrated Biological and Behavioral Surveillance surveys conducted in Mozambique among key populations at higher risk for HIV [23–25]. Consistent with published literature on LDTD in Southern, Eastern, and West Africa, we found that substantial numbers of Mozambican LDTD were involved in risky behaviors such as casual partners, sex with sex workers, unprotected sex with both casual and transactional partners and probable alcohol abuse (as measured by AUDIT-C) [5, 7, 10, 12, 13]. Moreover, few LDTD had received any HIV prevention interventions in the past 12 months, withonly one in four having received either

free condoms, lubricants or printed HIV prevention materials in that period. Furthermore, about one in three LDTD had never tested for HIV prior to study participation. This is slightly higher as compared to the general population of men ages 15–49 in Mozambique (81 % never tested [2]), but lower compared with truckers in Namibia (20 % never tested [26]). Among HIV-positive LDTD, over four-fifths did not know they were infected. Substantial numbers of LDTD living with HIV are therefore out of care and have high potential for onward transmission over large distances.

Congruent with results from a recent cross-sectional survey of LDTD in South Africa [7], we found that LDTD who have never received an HIV test have two times higher odds of HIV infection compared to those who state they have tested. Other research has also shown that lack of HIV testing, along with little or no knowledge about HIV, are potential risk factors for HIV infection [3]. Limited use of health service programs and educational interventions, fear, stigma and preconceived ideas may be a source of limited uptake of testing.

The LDTD we intercepted in Inchope have a high HIV prevalence (15.4 %) especially among Mozambican LDTD (21.8 %). In contrast, the HIV prevalence among men ages 15–49 in the rural central region of Mozambique is 7.8 % [2]. HIV prevalence was significantly lower among truck drivers who lived outside of Mozambique (8.9 %) than in Mozambique, despite coming from countries with historically high HIV prevalence, mainly Zimbabwe (where HIV prevalence among men ages 15–49 is 12.3 % [27]) and Malawi (where HIV prevalence among men ages 15–49 is 8.1 % [28]). We recommend further work be carried out in order to better understand the multilevel dimensions of mobility of national and foreign LDTD and HIV in Mozambique.

As with other cross-sectional studies, IBBS surveys are prone to self-reporting, self-selection, recall and social desirability bias. To reduce recall bias, we have limited most sexual behavior questions to a time-frame of past 12 months; as a result, behaviors prior to past 12 months cannot be associated with HIV infection. The use of a single recruiting site is a potential limitation of our study, limiting the number of LDTD who primarily work in the center and north of the country. Thus, we cannot say this study is representative of all LDTD working or passing through Mozambique. Nonetheless, the corridors of transportation through Inchope are likely to include LDTD living and working in the southern two-thirds of the country and on the other side of nearby borders. Although extensive formative research had been conducted prior to the survey, participation rate was much lower than anticipated, leaving doubt as to whether persons who declined had higher or lower prevalence of HIV or differed in other ways. Based on field team feedback, we believe the provision of a non-cash incentive may have played a role and future studies should investigate alternative incentive schemes. In addition, due to structural changes resulting in fewer truck drivers overnighting in Inchope, potential participants had less free time to participate in the survey. It is possible that other truck stops with longer wait times, for example at ports or borders with customs clearance procedures, may provide more favourable venues for future surveys. We also recognize that the adaptation to a modified TLS design could have introduced selection bias that we are unable to quantify. Finally, the venue-based design leaves uncertainty in who is included in the conceptual sampling frame (e.g., who may pass through Inchope) and with

what relative probabilities of inclusion. Despite limitations, we believe that our field-based sample contributes important information about LDTD that will assist the Mozambican Ministry of Health, non-governmental organizations and employers to design programs and strategies to prevent and combat HIV for this population.

Our findings reveal that broader coverage of HIV prevention and comprehensive care services for LDTD are urgently needed. Quick and ready access to services is all the more poignant given the high mobility of this population. Although HIV counseling and testing are available at health facilities in Inchope and along LDTD routes; Lafort et al. via focus-group discussions with LDTD in Mozambique identified a preference for separate stand-alone clinics over public health clinics [18]. At the time of the survey FHI-360's ROADS to a Health Future (ROADS II) project had only recently been established in the area, as such most LDTD participants of the survey may not yet have benefited from the program. Projects such as ROADS II and North Star Alliance Roadside Wellness Centers (established in Inchope in 2013) [29] can help increase access to voluntary HIV counseling and testing and to HIV comprehensive care for LDTD living with HIV by the provision of interconnected mobile or stationary testing units throughout the country's major transportation corridors and truck stops. The results of this survey can serve as a baseline for assessment of these new activities.

A multisectorial approach, involving not only nongovernmental organizations, but also the public and private sector, is key. Workplace interventions have shown some degree of success in increasing HIV testing uptake and decreasing HIV risk elsewhere [26, 30]. As such, considering the fragmented nature of the national trucking industry, an encompassing model such as the Avahan HIV program in India might be more effective [31, 32] than independent workplace interventions. This type of model should extend beyond LDTD to the communities that serve LDTD (e.g. truck-stop towns) and incorporate other intrinsically involved key populations in the response (e.g. sex workers).

Interventions targeting this group must continue to address factors that serve as barriers to appropriate HIV prevention, including the frequency and fiuidity of regular and casual partners and sex workers; inconsistent condom use, particularly with casual partners; and problematic alcohol use which may lead to reduced inhibitions and risky behavior. Interventions should also account for the diversity of LDTD; specifically, that of nationality, education and language.

Finally, there is a need to coordinate programs for LDTD who live in Mozambique with HIV prevention strategies being used for LDTD in neighboring countries. Collaborative approaches to sharing prevention, care and treatment interventions for mobile populations crossing borders would benefit all communities along transportation corridors.

Acknowledgments

We would like to acknowledge the IBBS-Truckers survey team for their assistance in the field and office; the Center for the Investigation of Infectious Diseases (CIDI) of the Catholic University of Mozambique, the Manica Provincial Health Directorate (DPS de Manica); Pathfinder International for their technical and logistical support; and Angelica Miranda for helping edit the manuscript. This research was supported by the President's Emergency Plan for AIDS Relief (PEPFAR) through the U.S. Health and Human Services, Centers for Disease Control and

Prevention (CDC) Mozambique Country Office under the terms of Cooperative Agreement Number U2GPS001468. The views expressed in this report do not necessarily reflect the views of the U.S. Centers for Disease Control and Prevention or the Government.

References

1. Joint United Nations Programme on HIV/AIDS, United Nations. Global Report: UNAIDS Report on the Global AIDS epidemic: 2012 [Internet]. [Geneva]: UNAIDS; 2012 [Accessed 9 Jun 2013]. http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120_UNAIDS_Global_Report_ 2012_en.pdf.
2. Instituto Nacional de Saúde, Instituto Nacional de Estatística, ICF Macro. Inquérito Nacional de Prevalência, Riscos Comportamentais e Informação sobre o HIV e SIDA em Moçambique 2009. Calverton, Maryland, USA; 2010.
3. Weine SM, Kashuba AB. Labor migration and hiv risk: a systematic review of the literature. AIDS Behav. 2012;16:1605–21.22481273
4. Deane KD, Parkhurst JO, Johnston D. Linking migration, mobility and HIV. Trop Med Int Health TM IH. 2010;15: 1458–63.20958895
5. Ramjee G, Gouws E. Prevalence of HIV among truck drivers visiting sex workers in KwaZulu-Natal South Africa. Sex Transm Dis. 2002;29:44–9.11773878
6. Atilola GO, Akpa OM, Komolafe IOO. HIV/AIDS and the long-distance truck drivers in south-west Nigeria: a cross-sectional survey on the knowledge, attitude, risk behaviour and beliefs of truckers. J Infect Public Health. 2010;3:166–78.21126721
7. Delany-Moretlwe S, Bello B, Kinross P, Oliff M, Chersich M, Kleinschmidt I, HIV prevalence and risk in long-distance truck drivers in South Africa: a national cross-sectional survey. Int J STD AIDS. 2014;25:428–38.24352131
8. Sunmola AM. Sexual practices, barriers to condom use and its consistent use among long distance truck drivers in Nigeria. AIDS Care. 2005;17:208–21.15763715
9. Matovu JKB, Ssebadduka BN. Sexual risk behaviours, condom use and sexually transmitted infection treatment-seeking behaviours among female sex workers and truck drivers in Uganda. Int J STD AIDS. 2012;23:267–73.22581951
10. Mosoko JJ, Macauley IB, Zoungkanyi A-CB, Bella A, Koulla-Shiro S. Human immunodeficiency virus infection and associated factors among specific population subgroups in Cameroon. AIDS Behav. 2009;13:277–87.17694430
11. Morris CN, Ferguson AG. Sexual and treatment-seeking behaviour for sexually transmitted infection in long-distance transport workers of East Africa. Sex Transm Infect. 2006;83:242–5.
12. Morris CN, Ferguson AG. Estimation of the sexual transmission of HIV in Kenya and Uganda on the trans-Africa highway: the continuing role for prevention in high risk groups. Sex Transm Infect. 2006;82:368–71.16854995
13. Azuonwu O, Erhabor O, Frank-Peterside N. HIV infection in long-distance truck drivers in a low income setting in the Niger Delta of Nigeria. J Community Health. 2011;36:583–7.21116696
14. International Organization for Migration (IOM). HIV ‘‘Hop-spot’’ mapping of two transport corridors in Mozambique. Maputo, Mozambique; 2011.
15. Bwayo J, Plummer F, Omari M, Mutere A, Moses S, Ndinya-Achola J, Human immunodeficiency virus infection in long-distance truck drivers in east Africa. Arch Intern Med. 1994;154:1391–6.8002691
16. Coffee M, Lurie MN, Garnett GP. Modelling the impact of migration on the HIV epidemic in South Africa. AIDS Lond Engl. 2007;21:343–50.
17. Lagarde E, van der Loeff MS, Enel C, Holmgren B, Dray-Spira R, Pison G, Mobility and the spread of human immunodeficiency virus into rural areas of West Africa. Int J Epidemiol. 2003;32:744–52.14559743
18. Lafort Y, Geelhoed D, Cumba L, Lázaro CDM, Delva W, Luchters S, Reproductive health services for populations at high risk of HIV: Performance of a night clinic in Tete province, Mozambique. BMC Health Serv Res. 2010;10:1–9.20044945

19. Provincial Department of Health of Tete Province, International Center for Reproductive Health of the University of Ghent. Prevalência de ITS/HIV e comportamento de saúde sexual em grupos de alto risco na província de Tete: Relatório Final. Mozambique; 2008.
20. Raymond HF, Ick T, Grasso M, Vaudrey J, McFarland W. Resource guide: time location sampling (TLS), 2nd edition [Internet]. San Francisco, United States: San Francisco Department of Public Health, HIV Epidemiology Section, Behavioral Surveillance Unit; 2007 http://globalhealthsciences.ucsf.edu/sites/default/files/content/pphg/surveillance/modules/global-trainings/tls-res-guide-2nd-edition.pdf.
21. Direccao Provincial de Saude de Tete, International Center for Reprodutive Health. Prevalência de ITS/HIV e comportamento de saúde sexual em grupos de alto risco na província de Tete: relatório final. Tete, Moçambique: ICRH; 2008.
22. Bush K, Kivlahan DR, McDonell MB, Fihn SD, Bradley KA. The AUDIT alcohol consumption questions (AUDIT-C): an effective brief screening test for problem drinking. Arch Intern Med. 1998;158:1789.9738608
23. Nalá R, Cummings B, Horth R, Inguane C, Benedetti M, Chissano M, Men who have sex with men in Mozambique: identifying a hidden population at high-risk for HIV. AIDS Behav. 2015;19:393–404.25234252
24. Baltazar CS, Horth R, Inguane C, Sathane I, César F, Ricardo H, HIV prevalence and risk behaviors among mozambicans working in South African mines. AIDS Behav. 2015;19:59–67.
25. Young PW, Horth RZ, Inguane C, Sathane I, Ngale K, High burden of HIV infection and risk behaviors among female sex workers in three main Urban areas of Mozambique. AIDS Behav. 2015. doi:10.1007/s10461-015-1140-9.
26. Kiderlen TR, Conteh M, Roll S, Seeling S, Weinmann S. Cross-sectional study assessing HIV-related knowledge, attitudes and behavior in the Namibian truck transport sector: readjusting HIV prevention programs in the workplace. J. Infect. Public Health [Internet]; Accessed 30 March 2015 http://www.sciencedirect. com/science/article/pii/S1876034115000386.
27. Zimbabwe National Statistics Agency (ZIMSTAT), ICF Internation. Zimbabwe Demographic and Health Survey 2010–11. [Internet]. Calverton, Maryland, USA: ZIMSTAT and ICF International Inc; 2012 Available from: http://dhsprogram.com/pubs/pdf/FR254/FR254.pdf.
28. National Statistical Office (NSO), ICF Macro. Malawi Demographic and Health Survey 2010. [Internet]. Zomba, Malawi, and Calverton, Maryland, USA: NSO and ICF Macro; 2011 Available from: http://dhsprogram.com/pubs/pdf/FR247/FR247.pdf.
29. Gomez GB, Venter WDF, Lange JMA, Rees H, Hankins C. North-South corridor demonstration project: ethical and logistical challenges in the design of a demonstration study of early antiretroviral treatment for long distance truck drivers along a transport corridor through South Africa, Zimbabwe, and Zambia. Adv Prev Med. 2013;2013:9.
30. Ojo O, Verbeek JH, Rasanen K, Heikkinen J, Isotalo LK, Mngoma N, Interventions to reduce risky sexual behaviour for preventing HIV infection in workers in occupational settings. Cochrane Database Syst Rev. 2011. doi:10.1002/14651858. CD005274.22161391
31. Juneja S, Tirumalasetti VR, Mishra RM, Sethu S, Singh IR. Impact of an HIV prevention intervention on condom use among long distance truckers in India. AIDS Behav. 2012;17:1040–51.
32. Pandey A, Mishra RM, Sahu D, Benara SK, Sengupta U, Paranjape RS, Heading towards the Safer Highways: an assessment of the Avahan prevention programme among long distance truck drivers in India. BMC Public Health. 2011;11:S15.

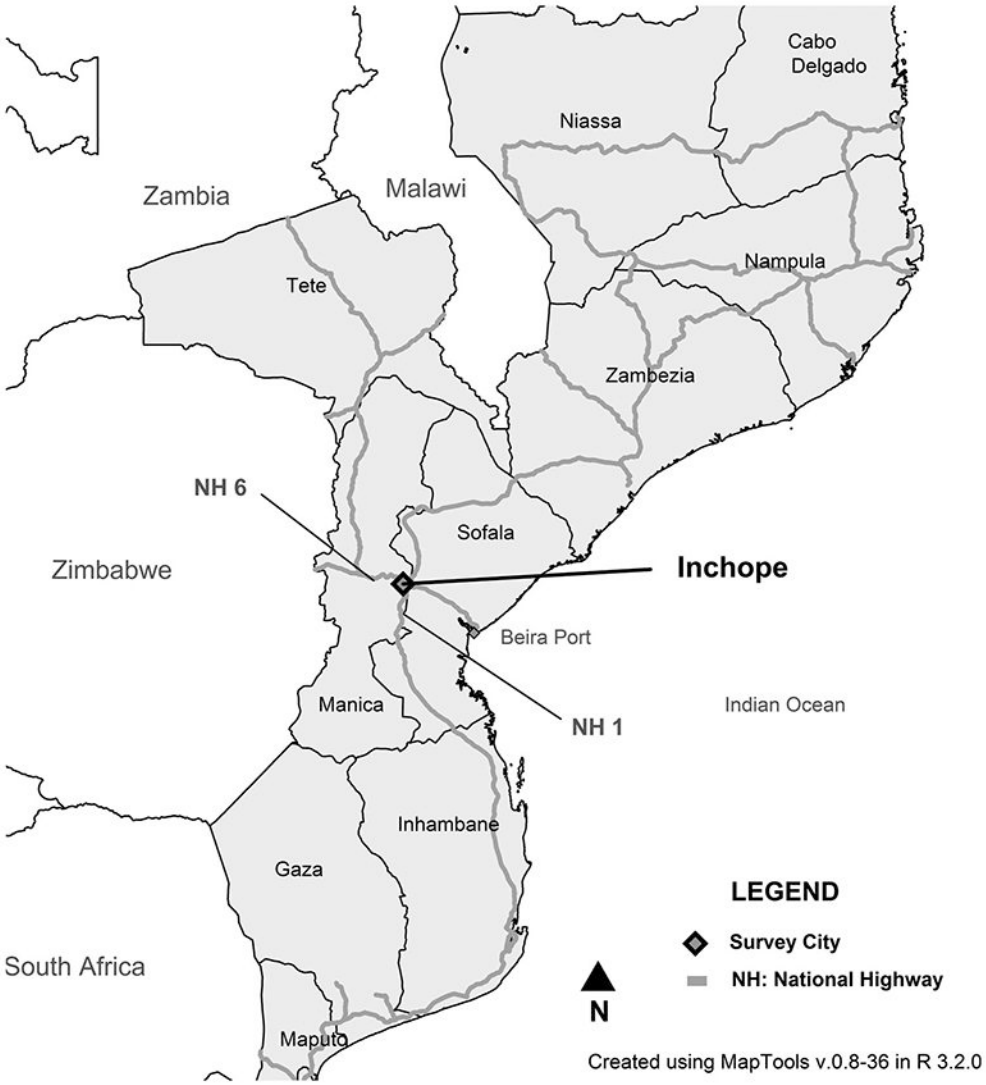

Fig. 1.

Long-distance truck drivers' Integrated Biological Behavioral Surveillance survey site, Inchope, Mozambique, 2012

Table 1

Characteristics of long-distance truck drivers, Inchope, Mozambique, 2012

Characteristic	n = 322	%	(95 % CI)
Age group (years)			
18–30	96	29.8	(24.8–34.8)
31–40	146	45.3	(39.9–50.8)
>41	80	24.8	(20.1–29.6)
Primary language spoken at home			
Portuguese	90	28.0	(23.0–32.9)
English	42	13.0	(9.4–16.7)
Shona	84	26.1	(21.3–30.9)
Other	106	32.9	(27.8–38.1)
Attended secondary schooling or higher	251	78.7	(74.2–83.2)
Circumcised	143	44.4	(39.0–49.8)
Marital status			
Never married	25	7.8	(4.8–10.7)
Married or living conjugally	285	88.5	(85.0–92.0)
Widowed, divorced or separated	12	3.7	(1.7–5.8)
Has >1 wife or cohabitating partner	39[a]	13.7	(9.7–17.7)
Nationality			
Mozambican	162	50.3	(44.8–55.8)
Zimbabwean	109	33.9	(28.7–39.0)
Malawian	39	12.1	(8.5–15.7)
Other	12	3.7	(1.7–5.8)
Primary residence in Mozambique	162	50.3	(44.8–55.8)
Primary region of residence in Mozambique			
Southern	73[b]	45.1	(37.4–52.7)
Central	86[b]	53.1	(45.4–60.8)
Primary road of travel in last trip			
EN1	121	37.6	(32.3–42.9)
EN6	218	67.7	(62.6–72.8)
EN7	99	30.7	(25.7–35.8)
Other	52	16.1	(12.1–20.2)
Four or more trips per month in <12 months	183	56.8	(51.4–62.2)

[a] Among participants who were married or cohabitating (n = 285)

[b] Among participants who had their primary residence in Mozambique (n = 162)

Table 2

Risk behaviors of long-distance truck drivers, Inchope, Mozambique, 2012

Risk behavior	n = 322	%	(95 % Cl)
Number of sex partners in last 12 months (missing = 11)			
0	27	8.7	(5.6–11.8)
1	93	29.9	(24.8–35)
2	83	26.7	(21.8–31.6)
3	44	14.1	(10.3–18.0)
≤4	64	20.6	(16.1–25.1)
Number of main partners (spouses or girlfriends) in last 12 months (missing = 12)			
0	44	14.2	(10.3–18.1)
1	171	55.2	(49.6–60.7)
2	69	22.3	(17.6–26.9)
≤3	26	8.4	(5.3–11.5)
Number of casual sex partners in last 12 months (missing = 14)			
0	217	70.5	(65.4–75.5)
1	44	14.3	(10.4–18.2)
2	11	3.6	(1.5–5.6)
≤3	36	11.7	(8.1–15.3)
Had at least one paid sex partner in last 12 months (missing = 11)	77	24.8	(20–29.6)
Had sex during their last trip	75	23.3	(18.7–27.9)
Ever had anal sex with a man	2	0.6	(0.0–1.5)
Used a condom at last sex in last 12 months (missing =11)	66[a]	23.5	(18.5–28.4)
Used a condom at last sex with each partner (up to last three) in last 12 months (missing =11)	37[a]	13.0	(9.1–16.9)
Used a condom at last sex with each steady partner (up to last three) in last 12 months	31[b]	11.7	(7.8–15.6)
Used a condom at last sex with each casual or paid sex partner (up to last three) in last 12 months	73[c]	65.8	(56.9–74.6)
Used alcohol in a manner indicative of probable abuse and/or dependence (AUDIT-C) (missing = 1)	107	33.3	(28.2–38.5)
Used drugs in the last 12 months	6	1.9	(0.4–3.3)

[a]Among participants who had a partner in last 12 months (n = 284)

[b]Among participants who had a steady partner in last 12 months (n = 265)

[c]Among participants who had a casual or paid partner in last 12 months (n = 111)

Table 3

HIV prevalence, testing history and use of health and prevention services among long-distance truck drivers, Inchope, Mozambique, 2012

Health or preventive service, HIV test result	n = 322	%	(95 % CI)
Received any medical care in Mozambique, last 12 months	86	26.7	(21.9–31.5)
Had any difficulty in obtaining care from a doctor, nurse or other health professional, last 12 months	10	3.1	(1.2–5.0)
Participated in an HIV or AIDS talk in Mozambique, last 12 months	45	14.0	(10.2–17.8)
Received any free condoms, lubricants or HIV educational leaflets in Mozambique, last 12 months	84	26.1	(21.3–30.9)
Had a genital discharge, sore or ulcer or was informed they had an STI, last 12 months	32	9.9	(6.7–13.2)
Ever tested for HIV	212	65.8	(60.7–71.0)
Tested for HIV, received test results or had previously been diagnosed with HTV, past 12 months[b]	156	48.4	(43.0–53.9)
Believed risk of having HIV was moderate or high (missing = 21)	108[c]	36.9	(31.3^12.4)
Tested positive for HIV during the survey (missing = 4)	49	15.4	(11.4–19.4)

[a]Among participants who had a genital discharge sore or ulcer or was informed they had and STI in\12 months (n = 32)

[b]Includes participants who already knew their HIV-positive status before the past 12 months

[c]Among participants who had never tested positive for HIV prior to the survey (n = 314)

Table 4

Undiagnosed and previously diagnosed HIV infection among long-distance truck drivers, Inchope, Mozambique, 2012

	n	%	(95 % Cl)
Of participants testing HIV positive in the current survey:	n = 49		
Had never previously tested positive for HIV	41	83.7	(73.3–94.0)
Had previously tested positive for HIV	8	16.3	(6.0–26.7)
Of participants who self-reported to have tested negative for HIV in the 12 months preceding the survey :[a]	n = 144		
Tested positive for HIV during the survey	12	8.5	(3.9–13.0)
Tested negative for HIV during the survey	130	91.5	(87.0–96.1)
Refused HIV testing	2	–	–

[a]Among participants who self-reported as having tested negative for HIV in the 12 months preceding the survey (of the remaining 178 participants after excluding the 144 who self-reported a negative HIV test, 110 had never tested for HTV, 61 had not tested in the last 12 months, and 7 tested in the past 12 months but did not receive negative test results)

Table 5

Bivariate and multivariate correlates of HIV infection among long-distance truck drivers, Inchope, Mozambique, 2012

	n = 318	% HIV+	OR (95 % Cl)	z score	p value[b]	AOR (95 % Cl)	z score	p value[b]
Age group (years)								
18–30	95	15.8	1.0					
31—40	145	11.7	0.7 (0.3–1.5)	−0.90	0.4			
≥40	78	21.8	1.5 (0.7–3.2)	1.01	0.3			
Level of education (missing = 3)								
Secondary or greater	247	11.7	1.0			1.0		
Primary or less	68	27.9	2.9 (1.5–5.6)	3.20	0.002	2.1 (1.0–4.2)	2.05	0.04
Ever circumcised								
Yes	142	17.6	1.0					
No	176	13.6	0.7 (0.4–1.4)	−0.97	0.3			
Country of primary residence								
Other country	158	8.9	1.0			1.0		
Mozambique	160	21.9	2.9 (1.5–5.8)	3.12	0.001	2.3 (1.2–4.8)	2.33	0.02
Was away from their primary residence for at least one month in past 12 months								
Yes	138	17.4	1.0					
No	180	13.9	0.8 (0.4–1.4)	−0.86	0.4			
Average number of trips per month, past 12 months								
1–3	138	11.6	1.0			1.0		
≥4	180	18.3	1.7 (0.9–3.3)	1.64	0.1	1.8 (0.9–3.6)	1.69	0.09
Number of sexual partners, past 12 months (missing = 11)								
0–1	117	17.1	1.0					
≥2	190	13.7	0.8 (0.4–1.5)	−0.81	0.4			
Had any unprotected sex, past 12 months (missing = 7)								
No	94	14.9	1.0					
Yes	217	15.7	1.1 (0.6–2.1)	0.17	0.9			
Received any medical care in Mozambique, past 12 months								
No	233	12.4	1.0					
Yes	85	23.5	2.0 (1.1–5.0)	−2.39	0.017			
Ever tested for HIV prior to the survey								
Yes	210	11.4	1.0			1.0		
No	108	23.1	2.3 (1.3–4.3)	2.69	0.007	2.2 (1.2–4.3)	2.42	0.015

OR odds ratio, *AOR* adjusted odds ratio (adjusted for other variables in the model)

[a]Limited to participants who provided blood samples for HIV testing; numerator = HIV positive participants and denominator = total number of participants in each category

[b] Wald-test