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Prevalence and risk factors for HIV infection in truck drivers: a systematic review of global evidence

SeyedAhmad SeyedAlinaghi[1], Ramin Shahidi[2], Parisa Matini[3], Pegah Mirzapour[1], Ghazal Arjmand[4], Iman Amiri-Fard[5], Haleh Siami[6], Soudabeh Yarmohammadi[7], Esmaeil Mehraeen[8]*, and Omid Dadras[9]*

[1]Iranian Research Center for HIV/AIDS, Iranian Institute for Reduction of High-Risk Behaviors, Tehran University of Medical Sciences, Tehran, Iran; [2]School of Medicine, Bushehr University of Medical Sciences, Bushehr, Iran; [3]School of Medicine, Iran University of Medical Sciences, Tehran, Iran; [4]Shahid Beheshti University of Medical Sciences, Tehran, Iran; [5]Department of Community Health Nursing and Geriatric Nursing, School of Nursing and Midwifery, Iran University of Medical Sciences, Tehran, Iran; [6]School of Medicine, Islamic Azad University, Tehran, Iran; [7]Trauma Research Center, Kashan University of Medical Sciences, Kashan, Iran; [8]Department of Health Information Technology, Khalkhal University of Medical Sciences, Khalkhal, Iran; [9]Bergen Addiction Research, Department of Addiction Medicine, Haukland University Hospital, Bergen, Norway

Abstract

Transporting and driving long distances might be associated with an increased risk of contracting HIV in truck drivers, which is recognized as a link to network transmission of HIV among this population. The present study aims to systematically review the prevalence and risk factors of HIV infection in truck drivers globally. A comprehensive search of the databases of Embase, PubMed, Scopus, and Web of Science was carried out. The original papers reporting statistics on the prevalence and risk factors of HIV infection among truck drivers were included. In this study, 23 original articles that met the eligibility criteria were reviewed. All articles were cross-sectional studies in which a total number of 16,315 truck drivers were studied to estimate the prevalence and risk factors of HIV infection. Findings indicated high HIV seroprevalence among truck drivers, with the highest prevalence of 56% in South Africa. HIV/AIDS awareness and condom use among truckers were reported low. Having sex with other men, circumcision status, time away from home, marital status, years working as a truck driver, education, income, and drug/alcohol use are the most important risk factors for HIV in truck drivers. Longer time on the road can increase the risk of infection by creating conditions for unsafe sex, in particular, having sex with other men. Low socioeconomic status exacerbates the condition. HIV risk-reduction interventions for long-distance truck drivers are necessary to enhance the awareness of sexually transmitted infections and introduce protective measures such as condoms.

Keywords

Truck drivers. Prevalence. Risk factors.

Introduction

HIV has been a major global health problem since the beginning of the epidemic; 84.2 million (64.0-113.0 million) people have been infected with HIV, and about 40.1 million (33.6-48.6 million) people have died of HIV. Globally, 38.4 million (33.9-43.8 million) people were living with HIV at the end of 2021. An estimated 0.7% (0.6-0.8%) of adults aged 15-49 years worldwide are living with HIV, although the burden of the epidemic

***Correspondence to:**
Soudabeh Yarmohammadi
E-mail: yarmohammadisoudabeh@gmail.com
Esmaeil Mehraeen
E-mail: es.mehraeen@gmail.com

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continues to vary considerably between countries and regions[1]. It should also be kept in mind that according to the mentioned statistics, timely reminders are required to improve medication adherence, improve self-management skills, and negotiate safe sex for HIV-positive people[2,3]. All of these things remind us of the importance of HIV.

Transportation is a dynamic phenomenon worldwide that nourishes and stimulates the economy. One of the most important transportation systems is the road transportation system[4]. The main role in the transportation system is played by truck drivers and they play a key role in trade and transportation of goods across the regions[5]. In low- and middle-income countries, a high prevalence of sexually transmitted diseases such as HIV was observed due to risky sexual practices such as multiple sexual partners, and not using condoms. Transporting and driving long distances pose a higher risk of contracting HIV for truck drivers, which is recognized as a link to network transmission of HIV among this population, as their job requires constant commuting across geographical locations[6-8]. In addition, truck drivers have fewer social restrictions due to being away from their families for a long time, and for this reason, they are more likely to engage in high-risk sexual networks[9,10].

Several studies have reported on the prevalence of HIV among long-distance truck drivers. A study found high rates of unprotected sex among long-distance drivers, putting them at greater risk of contracting HIV[11]. In another study, the prevalence of high-risk behaviors in bus and truck drivers appeared to be high and to prevent this, drivers were advised to pay more attention to self-care[12]. Another study in Kenya found that the frequency of sexual interactions was higher among long-haul truck drivers, those who spent more than a week in transit, and those who consumed alcohol; therefore, the risk of contracting HIV/sexually transmitted infection (STI) is high among them[13]. In addition, due to the lack of a proper self-care system[2] and loss of follow-up[14], HIV can progress faster and affect the quality of life and resilience in HIV-positive people[15]. Moreover, improper lifestyle could not only increase the risk of contracting HIV but also other infections, including HTLV-1[16].

Although there are numerous studies on high-risk groups such as drug addicts, prisoners, and sex workers, less attention has been paid to truck drivers. It should be noted that truck drivers and long-distance commuters in the transportation system are vulnerable groups in terms of HIV infection, high-risk behaviors, sexually transmitted diseases, and social harm. Therefore, the present study aims to systematically review the prevalence and risk factors of HIV infection in truck drivers globally.

Methods

Search strategy

Using a combination of relevant keywords, a comprehensive literature search on the databases of Embase, PubMed, Scopus, and Web of Science was conducted in June 2023. The Embase subject headings (Emtree), medical topic headings (MeSH), and previous literature were used to identify the keywords and search terms and construct the search strategies in this study. Here are examples of such search strings in Scopus and WoS:

Scopus: (TITLE-ABS ("HIV" OR "Human immunodeficiency virus" OR "acquired immunodeficiency syndrome*" OR "Acquired Immunologic Deficiency Syndrome*" OR "Acquired Immune Deficiency Syndrome*" OR "Acquired Immuno-Deficiency Syndrome*" OR "Acquired Immunodeficiency" OR "HIV" OR "AIDS")) AND (TITLE-ABS ("Truck driver* OR transporter*")).

Web of Science: (TS = ("HIV" OR "Human immunodeficiency virus" OR "acquired immunodeficiency syndrome*" OR "Acquired Immunologic Deficiency Syndrome*" OR "Acquired Immune Deficiency Syndrome*" OR "Acquired Immuno-Deficiency Syndrome*" OR "Acquired Immunodeficiency" OR "HIV" OR "AIDS")) AND (TS = ("Truck driver* OR transporter*")).

Selection criteria

The studies were selected with the criteria included (1) original articles; (2) articles published in English; (3) studies that addressed the prevalence and risk of HIV in truck drivers. Furthermore, the studies include (1) non-original articles (i.e., meta-analyses, reviews, *in vitro* observations, case reports, and articles presented at conferences, letters to the editor); (2) articles with unavailable full texts; (3) studies that were not in accordance with the purpose of our research were not selected.

Selection of the studies

Publications that meet the inclusion criteria were selected and two reviewers screened the retrieved records. Any potential conflict was addressed

by another impartial researcher. The screening consisted of two steps. First, the titles and abstracts were screened against the eligibility criteria. In the second stage, the full texts of selected articles were thoroughly, and the most pertinent papers were included in the final qualitative synthesis.

Data extraction

To extract the data, the selected records were reviewed by two independent researchers. The extracted data were additionally reviewed and verified by another reviewer to determine their accuracy. The first author's name, the publication date, the type of study (original article), the number of included studies, the population of the study, the sex of the participants, their comorbidities, the outcomes reported, and a summary of additional significant findings are all extracted.

Quality assessment

The data from the selected studies were extracted and evaluated by the two independent researchers to ensure consistency and replicability of the results. Using the Newcastle-Ottawa Quality Assessment Scale (NOS), which has been modified for cross-sectional studies, the quality of the included studies was assessed[17,18].

The NOS consists of three quality parameters: "selection," which is scored up (0-4 points), "comparability," which is scored up (0-2 points), and "an outcome," which is scored up (0-3 points). The tool provides a total score of nine stars classified as good, fair, and bad. "Poor" was used in status when the selection domain, comparability domain, or outcome domain received 0 or 1 stars; "fair" was used for 2 stars, in the comparability domain for 1 or 2 stars, and in the outcome domain for 2 or 3 stars; and "good" was used for 3 or 4 stars in the selection domain, 1 or 2 stars in the comparability domain, and 2 or 3 stars in the outcome domain. "Very good quality" for scores of nine, "good quality" for scores of 7-8, "satisfactory quality" for scores of 5-6, and "unsatisfactory" for scores of 0-4. All selected articles score very high on the scale. The quality assessment is provided as a separate file (Table 1)[18].

Results

In this systematic review, using the applied systematic search strategies, 360 records were identified and retrieved from four databases PubMed, Embase, Scopus, and Web of Science. At the initial review, 71 duplicates were removed, and the titles and abstracts of the remaining 289 articles were reviewed. Applying the selection criteria, 266 articles were excluded, and only 23 articles met the inclusion criteria and were included in the final analysis. Figure 1 illustrates the PRISMA flow diagram of this systematic search.

All 23 included studies were cross-sectional studies with a cumulative number of 16,315 truck drivers from various geographical regions. The majority of studies were conducted in Africa (n = 10) and India (n = 8) in which HIV is more prevalent. The study sampling size ranged from 40 to 3763. The participants were truck drivers with heterogeneous mean ages and ethnicities.

ELISA was the most frequently applied HIV diagnostic method. Out of 23 reviewed articles, all were quantitative studies and 23 of them mentioned the prevalence of HIV. The overall HIV prevalence among truck drivers ranged from 0% to 56%. The duration of trips showed a wide range from 1 to 40 days. Years working as a truck driver ranged from < 6 months to more than 40 years. Among the 23 publications analyzed, 18 mentioned condom use prevalence. Most of the drivers had unprotected vaginal sex and just a few of them stated consistent condom use. Alcohol/drug consumption prevalence among truck drivers was mentioned in 13 articles. Alcohol use prevalence ranged from 15.3% to 87% in different studies. Compared to studies exploring HIV seroprevalence among truckers, fewer articles captured information about other STI prevalence (n = 13). Syphilis, herpes genitalis, gonorrhea, chlamydia, hepatitis B, and hepatitis C were other STIs which was detected among truck drivers.

Having sex with other men, circumcision status, time away from home, marital status, years working as a truck driver, education, income, and drug/alcohol use are the most cited risk factors for HIV infection in truckers.

There is a high prevalence of HIV infection among males who had sex with other men. Lack of circumcision is a significant risk factor for HIV infection. Time away from home is a significant risk factor for HIV as seropositivity increases with a longer duration of occupation. Unmarried truck drivers were more likely to have HIV than married drivers. The high-experienced drivers were more likely to be HIV-positive than the low-experienced drivers (Table 2).

Discussion

The purpose of the study was to systematically explore the prevalence and risk factors of HIV infection

Table 1. Newcastle-Ottawa scale (NOS) quality assessment of the studies

First author (reference)	Selection (out of 4)	Comparability (out of 2)	Exposure/outcome (out of 3)	Total (out of 9)
Azuonwu et al. (2011)[34]	4	2	3	9
Botros et al. (2009)[35]	3	2	3	8
Prem Kumar et al. (2013)[27]	3	2	1	6
Dude et al. (2009)[24]	2	2	3	7
Manjunath et al. (2002)[21]	3	1	3	7
Mosoko et al. (2009)[36]	4	2	3	9
Adeoti et al. (2021)[11]	3	1	2	6
Botão et al. (2016)[32]	3	2	2	7
Gouse et al. (2021)[37]	4	2	2	8
Pinho et al. (2011)[38]	3	2	3	8
Bachmann et al. (2018)[39]	2	2	2	6
Mustikawati et al. (2009)[30]	4	2	3	9
Ramjee et al. (2002)[40]	3	2	3	8
Roche et al. (2021)[41]	3	2	2	7
Karimi (2021)[12]	4	2	2	8
Schneider et al. (2009)[42]	4	2	3	9
Singh and Malaviya (1994)[43]	3	2	2	7
Valway et al. (2009)[44]	3	2	1	6
Adjei et al. (2016)[31]	4	2	2	8
Pandey et al. (2008)[8]	3	2	3	8
Atilola et al. (2010)[29]	4	2	3	9
Bwayo et al. (1994)[23]	3	2	2	7
Mishra et al. (2012)[22]	3	2	3	8

in truck drivers. A total of 23 cross-sectional studies met the inclusion criteria and were included in the final analysis. Most of the studies were carried out in Africa (n = 10) and India (n = 8), where HIV infection is very common. The study sampling size ranged from 40 to 3763, with a cumulative number of 16,315 truck drivers from diverse geographical regions. The mean ages varied across studies, with most participants being in their 40th. Although some studies stated a strong correlation between age and HIV prevalence in people younger than 50 years, particularly at the age of 25-29 years, such an association is not certain in this review[19].

ELISA was the most frequently HIV diagnostic method. The overall HIV prevalence was between 0% and 56%, with a mean of 9.84%. In line with previous

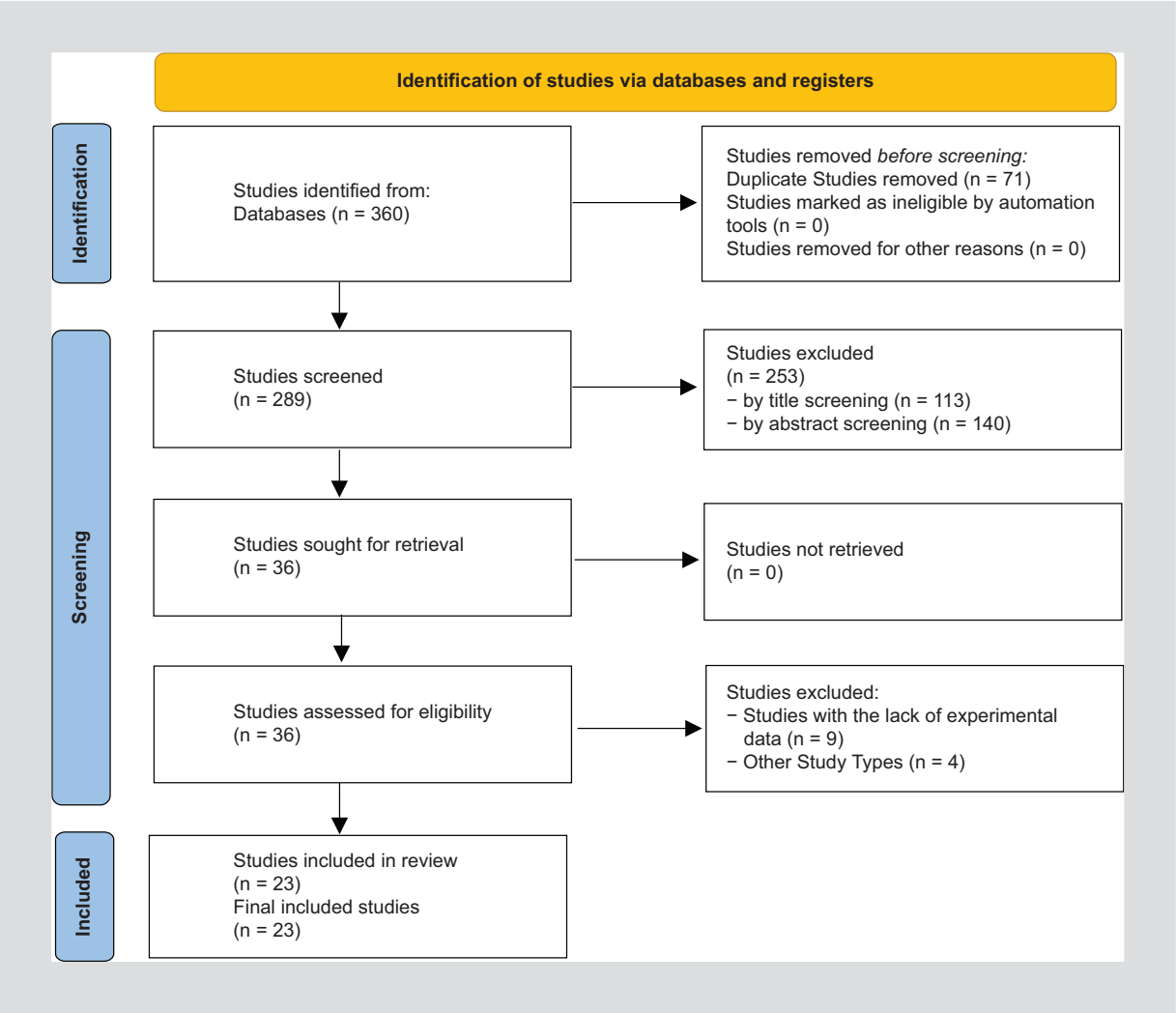

Figure 1. *PRISMA 2020 flow diagram of the study retrieval process.*

studies, this review acknowledged the increased HIV infection among the truckers compared to the general population, which reflects the higher risk of contracting blood-borne and sexually transmitted disease in this vulnerable population[20]. The duration of the trip ranged from 1 to 40 days and was a substantial risk factor for HIV. For instance, longer trip duration was associated with a higher prevalence of HIV[21].

The working experience of truck drivers ranged from < 6 months to more than 40 years; however, the majority had more than 5 years of experience. Work experience was positively correlated with HIV prevalence and the high-experienced group was more likely to have a positive HIV test as compared to the low-experienced group (5.1% vs. 0.4%)[22]. Another risk factor was the time away from home and a higher HIV infection rate was observed among those with less frequent visits to wives and longer driving duration[23]. This highlights the importance of addressing not only occupational factors but also personal and social factors in efforts to prevent HIV transmission among this population.

The findings of this review indicated a high prevalence of unprotected vaginal sex among truck drivers and a low rate of consistent condom use, which is critical to HIV prevention[24]. This finding is consistent with previous studies that have shown that truck drivers are at a higher risk of acquiring and transmitting HIV due to their mobility and engagement in high-risk sexual behaviors[25]. The low rate of consistent condom use among truck drivers further highlights the need for targeted interventions to promote safe sex practices. Interestingly, enhancing awareness of HIV infection and its prevention measures encouraged truck drivers to use condoms with regular partners[24]. This finding

Table 2. Description of the findings reported in the eligible studies

First author (reference)	Country	Local place	Study type	Study population (n)	Mean age ± SD	HIV assessment methods	HIV seroprevalence	Duration of trips	Drug/alcohol use	Years working as a truck driver	Use a condom	Getting other sexually transmitted infections	Other findings
Azuonwu (2011)[34]	Nigeria	Port Harcourt Rivers State	Cross - sectional	100	42.36 ± 5.23	ELISA	10% (n = 10) of the study population 90% HIV type 1 (n = 9) 10% HIV type 2 (n = 1)	N/A	N/A	More than 6 months	N/A	N/A	The age group of 31-40 years had a significantly higher HIV prevalence.
Botros (2009)[35]	Azerbaijan	Baku	Cross - sectional	3763	44.6 ± 7.8	Using two different rapid tests: determine (Abbott Laboratories Abbot Park, IL, USA) and quick determine HIV-1/2	1.54% (n = 58) of the population 22.4% HIV type 1 (n = 13) 77.5% HIV type 2 (n = 45)	N/A	Injecting drug user: n = 70	< 10 years: 1640 43.6% More than 10 years: 2123 56.4%	No: n = 833 Yes: n = 2284	N/A	Injecting drug users (IDUs) had the highest prevalence of HIV (60%) compared to non-IDUs (0.4%). There was a high prevalence of HIV infection (42.9%) among males who had sex with other men.
Prem Kumar et al. (2013)[27]	India	Hyderabad city	Cross - sectional	n = 1800 total sample n = 1602 had an interview and provided a blood sample	Age group 16-24 (30.4%) 25-34 (37.6%) ≥ 35 (32.0%)	Fourth generation ELISA	2.8%	N/A	N/A	≤ 5 years: n = 809 (50.5%) 5 < years: n = 792 (49.5%)	69.1% did not use a condom for the last sex with a man	Syphilis 3.7% and HSV 13.4%	Truckers who had sex with men were significantly more willing to have a circumcision for HIV prevention.
Dude et al. (2009)[24]	India	Hyderabad city	Cross - sectional	189	31.2 ± 61.4	Three sequential ELISAs	2.1%	N/A	Alcohol use daily/more than twice weekly 43.4%	≤ 6 months: 88.9% > 6 months: 11.1%	59.11% always used condoms with sex workers in the past 6 months	Previous STI diagnosis: 3.2% had genital symptoms in the past 12 months: 8.5%	Drivers were more likely to use condoms with regular partners when they knew more about HIV and HIV prevention techniques. Time away from home, income, urban residence, and marital status are important factors of risk behaviors.
Manjunath et al. (2002)[21]	India	Pondicherry Tamil Nadu	Cross - sectional	263	27.6	EIA	15.9%	Local trip: 1-3 days Long trip: 5-40 days	Alcohol consumption: 59.6% and drug use: 0%	Median: 4 years	Never used condoms: 34% Always used condoms: 16.3% Used condoms occasionally: 49.4%	Syphilis 13.3% (n = 35), herpes genitalis 7.6% (n = 20), and gonorrhea 1.9% (n = 5)	Duration of occupation is a significant risk factor for HIV. (Seropositivity increased with a longer duration of occupation).
Mosoko et al. (2009)[36]	Cameroon	N/A	Cross - sectional	n = 4011 total sample n = 301 truck drivers	35.97 ± 1.91	First rapid test Second ImmunoComb biospot HIV ELISA	16.3% (n = 49) among truck drivers	N/A	N/A	N/A	N/A	N/A	HIV prevalence was highest among sex workers and truck drivers.
Adeoti et al. (2021)[11]	Nigeria	Ado-Ekiti	Cross - sectional	306	42.3 ± 9.1	HIV self-testing (HIVST)	32.2%	N/A	Intravenous drug user 7.4% Alcohol user 78.1%	1-5 years n = 30 (9.8%) 6-10 years n = 71 (23.2%) Above 10 years n = 205 (67%)	3% had continuous condom use	N/A	38.6% of drivers had more than one sexual relationship.

(Continues)

Table 2. Description of the findings reported in the eligible studies *(continued)*

First author (reference)	Country	Local place	Study type	Study population (n)	Mean age ± SD	HIV assessment methods	HIV seroprevalence	Duration of trips	Drug/alcohol use	Years working as a truck driver	Use a condom	Getting other sexually transmitted infections	Other findings
Botão et al. (2016)[32]	Mozambique	Inchope	Cross - sectional	318	Age group 18-30 (29.8%) 31-40 (45.3%) > 41 (24.8%)	Vironostika HIV Uniform II plus O confirmation Murex HIV 1.2.O resolution Rescreen HIV 1/2 Version 2	15.4%	Away from home for at least 1 month in the past 12 months: n = 138	Alcohol abuse and/or dependence: n = 107 (33%) drug use in the last 12 months: n = 6 (1.9%)	N/A	76.5% of sexually active drivers did not use a condom during their last sex.	N/A	HIV is more in drivers with primary education or less and never having tested for HIV.
Gouse et al. (2021)[37]	South Africa	N/A	Cross - sectional	n = 40 total sample (n = 20 HIV-positive) (n = 20 HIV-negative)	39.2 ± 7.05	N/A	50%	≥ 12 h of driving per week	N/A	> 1 year	N/A	N/A	General cognitive impairment was more prevalent in HIV-positive drivers.
Pinho et al. (2011)[38]	Brazil	Foz do Iguaçu	Cross - sectional	n = 1945 total sample n = 1833 (94.2%) were tested for HIV	Median: 39 Age range: 31-47	ELISA	0.3%	< 1 week n = 453 (23.3%) 1-2 weeks n = 787 (40.5%) 3-4 weeks n = 528 (27.2%) > 4 weeks n = 106 (5.5%) Variable n = 67 (3.4%)	N/A	N/A	Unprotected vaginal sex in the past 6 months with: Steady partner 1340 (73.6%) Occasional partners 236 (38.6%) Commercial partners 103 (11.8%)	Syphilis 4.5%	N/A
Bachman et al. (2018)[39]	United States	North Carolina Tennessee Mississippi	Cross - sectional	266	45.6 ± 11.0	Rapid HIV antibody testing	0%	N/A	50.8% reported alcohol consumption during the last month. 1.8% used drugs during the last 3 months.	N/A	N/A	17.3% reported having had at least one STI.	Drivers had lower rates of STI/ HIV infection and higher rates of cholesterol, smoking, obesity, and diabetes compared to the U.S. average.
Mustikawati et al. (2009)[30]	Indonesia	Medan (North Sumatra) Batang (Central Java)	Cross - sectional	n = 3008 total sample n = 600 (19.94%) truck drivers	Median: 33	HIV was tested using two rapid tests conducted in parallel: SD Bioline HIV 1/2 3.0 and determine HIV-1 results were re-tested using ELISA	2.4%	N/A	N/A	N/A	Consistent condom use in the past year in truckers: 5.6% with a sex worker 6.7% with a casual partner	10.4% any STI (excluding HIV)	For a non-core transmitter group, STI rates were high, particularly syphilis. The most at-risk group was truck drivers.

(Continues)

Table 2. Description of the findings reported in the eligible studies *(continued)*

First author (reference)	Country	Local place	Study type	Study population (n)	Mean age ± SD	HIV assessment methods	HIV seroprevalence	Duration of trips	Drug/alcohol use	Years working as a truck driver	Use a condom	Getting other sexually transmitted infections	Other findings
Ramjee et al. (2002)[40]	South Africa	Port of Durban	Cross - sectional	391	37	ELISA (a positive test was confirmed by a second such assay)	56%	N/A	N/A	8.4	29% never used condoms. 47% always used condoms.	In the past 6 months, 66% of the drivers had a sexually transmitted infection.	Along the route, 37% of drivers always stopped for sex, 56% of sex workers had HIV.
Roche et al. (2021)[41]	South Africa	Bloemfontein Pomona Road Soweto	Cross - sectional	575	37.7 ± 9.0	Rapid testing with tests supplied by the National Department of Health (NDoH)	9.4%	Driving 10.0 ± 3.4 h a day	N/A	10.0 ± 7.0	N/A	N/A	N/A
Karimi (2021)[12]	Iran	Kurdistan	Cross - sectional	601	44.04 ± 11.44	ELISA	0.33%	N/A	15.3% history of drug use 1.1% history of injecting drugs	14.69 ± 9.05 years	N/A	N/A	A history of high-risk sexual behavior outside of marriage was reported in 21.8% of drivers.
Schneider et al. (2009)[42]	India	Bowenpally	Cross - sectional	189	31.2 ± 6.4	Three sequential ELISAs	2.1%	N/A	43.4% use alcohol daily or more than twice weekly.	N/A	59.1% always used condoms with commercial sex workers in the past 6 months.	3.2% report previous STI diagnosis. 8.5% had any genital symptoms in the past 12 months.	Personal hygiene habits such as handwashing is a modifiable behavior whereas HIV risk-taking behavior is not.
Singh and Malaviya (1994)[43]	India	N/A	Cross - sectional	302	20-40 years	Standard ELISA and Western blot tests	0.99%	N/A	Alcohol consumption: 87% Intravenous drug use: 0%	N/A	32% always use condoms.	N/A	HIV/AIDS awareness and condom use among truck drivers is low. Truck drivers play an important role in the spread of HIV infection in rural India.
Valway et al. (2009)[44]	United States	New Mexico	Cross - sectional	652	44	EIA (positive EIA results were confirmed using a HIV-1 western blot assay)	0.2%	Mean 288 nights per year away from home	Drug use in the previous year: 14% No alcohol consumption in the previous year: 25%	N/A	46% used condoms less than half of the time. 32% never used condoms.	HCV antibodies (8.5%) Hepatitis B anticore (anti-HBc) Antibodies (10.4%) Chlamydia (1.3%) Gonorrhea (0.2%) Syphilis (0.2%)	There is a need for STI and HIV risk-reduction interventions and wellness programs for truck drivers.
Adjei et al. (2016)[31]	Ghana	Ghana	Cross - sectional	106	40.56 ± 11.56	HBsAg monoclonal ELISA test (Abbot)	0.94%	> 2 weeks: 77.3% < 2 weeks: 22.6%	Drug use: No: 6 (5.66%) Yes: 100 (94.33%) Alcohol use: No: 72 (67.92%) Yes: 34 (32.07%)	> 5 years: 84.9% < 5 years: 15.1%	No previous history of condom use: 70.8%	HBsAg: 14.2% Syphilis: 3.8%	There was a lower seroprevalence of HIV but a higher seroprevalence of syphilis.
Pandey et al. (2008)[8]	India	Four routes: North-East North-South North-West South-East	Cross - sectional	2066	31.9 ± 8.1	ELISA	3.5%	11.4 ± 5 days	N/A	9.5 ± 7.2	45.1% had consistent condom use with non-regular female partners.	3.7%	Unmarried truck drivers were more likely to have HIV than married drivers.

(Continues)

Table 2. Description of the findings reported in the eligible studies *(continued)*

First author (reference)	Country	Local place	Study type	Study population (n)	Mean age ± SD	HIV assessment methods	HIV seroprevalence	Duration of trips	Drug/alcohol use	Years working as a truck driver	Use a condom	Getting other sexually transmitted infections	Other findings
Atilola et al. (2010)[29]	Nigeria	Southwestern Nigeria	Cross - sectional	451	21-30 years	Determine® and Starpac® test kits	2.4%	N/A	N/A	N/A	Never used: 19.7% Rarely used: 9.3% Use condom when having extra-marital sex: 52.1%	N/A	55.3% of drivers had more than one sexual partner.
Bwayo et al. (1994)[23]	East Africa	Kenya	Cross - sectional	970	Median: 30 age Range: 17-66	Enzyme-linked immunosorbent assay (Organon Teknika BV, Boxtel, the Netherlands) confirmatory test by immunoblot (Dupont, Geneva, Switzerland)	27%	N/A	Alcohol use: 15.3%	Median 5 years Range: 0-40	Ever having used condoms: 40%	147 (25%) of 578 men had a reactive TPHA for syphilis.	HIV infection was correlated with less frequent visits to wives, longer duration of driving, and travel outside of Kenya. Lack of circumcision is a significant risk factor for HIV infection.
Mishra et al. (2012)[22]	India	Four routes: North-East North-South North-West South-East	Cross - sectional	2066	555 drivers (26.9%) were adolescents (< 18 complete years) 1511 drivers (73.1%) were adults (≥ 18 complete years)	Microlisa HIV kit and Genedia HIV 1/2 ELISA 3.0 kit	0.4% in low-experienced drivers 5.1% in high-experienced drivers 6% in adolescent drivers 2.6% in adult drivers	N/A	N/A	Low experience (duration ≤ 6 years): n = 705 High experience (duration ≥ 7 years): n = 1361	Adolescents were 2 times more likely than adults to have inconsistent condom use. (46.4% vs. 26.8%, respectively)	1.3% of low-experienced drivers 4.9% in high-experienced drivers 6.1% of adolescent drivers 2.8% of adult drivers	The high-experienced group was more likely than the low-experienced group to test positive for HIV (5.1% vs. 0.4%) and syphilis (4.2% vs. 1.2%).

EIA: enzyme immunoassay; STI: sexually transmitted infection; HCV: hepatitis C virus; TPHA: treponema pallidum hemagglutination assay; ELISA: enzyme-linked immunosorbent assay.

underscores the importance of education and awareness-raising campaigns in promoting safe sex practices among high-risk populations.

Alcohol/drug consumption was reported in 13 articles with a range of 15.3% to 87% and had a strong correlation with a higher HIV prevalence in truck drivers[26]. Other risky behaviors also played crucial roles in spreading HIV, such as having intercourse with other men. This not only led to a higher incidence of HIV infection, but also they were more enthusiastic about having sex with a commercial sex worker[26,27]. Therefore, it is essential to address this issue through targeted interventions such as education campaigns, counseling services, and access to health-care services. In addition, addressing other risky behaviors, such as having intercourse with other men, can also help reduce the spread of HIV among this population.

The results also indicated a great number of drivers had more than one sexual relationship and a history of high-risk sexual behavior outside of the marriage[11,28,29], and there were also reports of higher prevalence of other STIs, such as syphilis, herpes genitals, gonorrhea, chlamydia, hepatitis B, and hepatitis C[30,31]. The high prevalence of STIs among drivers may be attributed to a range of factors, including their frequent travel and exposure to different sexual networks. In addition, the nature of their work may make it difficult for them to access health-care services and receive appropriate treatment for STIs. This highlights the importance of developing tailored interventions that take into account the unique challenges faced by this population[30,31].

Several sociodemographic factors can increase the risk of HIV infection in truck drivers, such as low education and income[32]. A study conducted by Panda et al. found that low education and income were associated with a higher risk of HIV infection in this population. The authors reported that truck drivers with no or primary educational status had a higher prevalence of HIV infection compared to those with secondary or higher education[33]. Therefore, it is essential to emphasize the need for targeted interventions that address these underlying social determinants of health to effectively prevent and control the spread of HIV among this population.

Conclusion

Based on the findings of this review, it is evident that truck drivers are at a high risk of HIV infection due to various factors. Due to the high seroprevalence of HIV infection in Africa and India, especially in Africa, it seems that the most important risk factor is the location. The length of time spent on the road, coupled with the duration of being away from home, increases their vulnerability to risky sexual behaviors such as having multiple sexual partners and engaging in unprotected sex. In addition, high-risk behaviors such as drinking alcohol and taking recreational drugs further exacerbate their risk of contracting HIV. Furthermore, low socio-economic status is also a significant risk factor for HIV infection among truck drivers. Poverty and limited access to health care services make it challenging for them to access HIV prevention and treatment services. Therefore, addressing these underlying social determinants of health is crucial in reducing the burden of HIV among truck drivers. STI and HIV risk-reduction interventions should be prioritized to increase awareness about the risks associated with risky sexual behaviors. Programs aimed at promoting safe sex practices, such as providing condoms or teaching personal hygiene, can also help reduce the spread of HIV among truck drivers.

Supplementary data

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