Cross-sectional study of the health of southern African truck drivers

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ABSTRACT

Objectives Lifestyle and working conditions of truck drivers predisposes them to risk-factors associated with communicable and non-communicable diseases, but little is known about the health status of African truck driver. This study aims to assess a cross-section of truckers in South Africa to describe their health information.

Setting The study took place across three truck-stop rest areas in the South African provinces of Free State and Gauteng.

Participants Eligibility criteria included being males aged 18 years and older, full-time employment as a long-distance truck driver. A total of 614 male truck drivers participated; 384 (63%) were Zimbabwean and 325 (55%) completed high-school.

Primary and secondary outcome measures The trucker survey explored demographics; working conditions; sexual, eating and sleeping behaviours; mental health status, medical history and cardiac risk-factors. Medical assessments included physical measurements, glucose and lipid measurements, ECG, carotid intima-media thickness (CIMT) and cardiac ultrasound.

Results In the previous month, 554 (91%) participants were sexually active; 522 (86%) had sex with a regular partner; 174 (27%) with a casual partner; 87 (14%) with a sex worker. Average time driving was 10 hours/day, 20 days/month, 302 (50%) never worked night shifts and 74 (12%) worked nights approximately four times per week. 112 (18%) experienced daytime sleepiness and 59 (10%) were ever hospitalised from an accident. Forty-seven (8%, 95% CI 5.3 to 9.5) were HIV-positive, with half taking antiretrovirals. Forty-eight (9%) drivers had left ventricular hypertrophy using ultrasound.

Conclusion This first holistic assessment of health among southern African male truck drivers demonstrates substantial addressable cardiovascular risk factors, mental health issues and sexual risk behaviours.

INTRODUCTION

Land transport is a $3 billion industry in South Africa that employs over 70 000 commercial truck drivers, and due to operational demands, these long-distance truck drivers may be susceptible to a variety of adverse health outcomes. The extended time away, including long driving hours and night shifts, may make them vulnerable to risk-factors for communicable diseases, such as sexually transmitted infections (STIs), non-communicable diseases (NCDs) and mental health disorders.

Driving long hours disrupts sleep cycles and encourages drivers to lead a sedentary lifestyle. The risk of diabetes, hypertension and heart disease is exacerbated by job-related stress, sleep disruption, nightshift-related circadian misalignment and limited access to healthy food at rest stops. The travelling lifestyle may also
provide limited access to healthcare facilities, especially for long-distance drivers from outside of South Africa, who easily and frequently cross borders. While traditional public health facilities are available to truck drivers across the country, truck drivers hardly access these services as they cannot take leave or clinics are not reachable by large trucks. In order to reduce barriers to access, mobile HIV clinics and roadside wellness clinics have been established to accommodate all drivers at no cost. The North-Star Alliance (NSA) clinics, for example, use trained clinical and outreach teams to provide primary healthcare services, HIV prevention and screening for other infectious diseases in converted shipping containers.

These initiatives have shown successes with the general uptake of healthcare, including HIV counselling and testing (HCT) for truckers, however, most of the focus is on preventing communicable diseases and very little is known about long-term health trends within this group. Current findings have come from studies and interventions that examine individual factors or conditions, but they do not incorporate a comprehensive health approach that includes NCDs. The objective of this study is to use the Trucker Health Survey, which was developed to take a comprehensive snapshot of disease prevalence in truck drivers at selected South African locations, in order to determine what the common health problems are for truck drivers in South Africa. This body of evidence should establish a baseline to lead researchers towards future interventions.

METHODS
Study design and setting
The Trucker Health Survey is an initiative of the Wits Reproductive Health and HIV Institute and NSA, a non-governmental organisation located along the main sub-Saharan trucking corridors that provides truck drivers, sex workers and local communities with primary healthcare services. These services include general health check-ups, STI and malaria testing and treatment, HCT and tuberculosis (TB) screening.

Enrolment in this cross-sectional study took place between October 2016 and March 2017. Recruitment was done at truck stops in two provinces; one truck stop at the Shell garage at the N1 highway close to Bloemfontein (Free State), multiple truck stops in Pomona, Johannesburg (Gauteng) and one truck stop in Soweto (Gauteng). NSA already had a strong presence due to their current clinical infrastructure in Bloemfontein and Pomona. Some truck stops in Pomona were privately owned but did not belong to a transport company. They accommodated mainly foreign long-distance drivers as South-African drivers would stop at the premises of their company in South Africa. To reach South-African drivers the truck stop in Soweto, Johannesburg, was added from January to March 2017. As this was a harder group of people to recruit, we employed various methods of invitation to participate. These included handing out invitation cards individually and to groups at truck stops, placing them on truck windscreens where no driver was available and recruiting at companies. In some instances, the recruiter would be addressing one or two people and a group would form. These methods did not facilitate us accurately noting the number of invitations extended and as such no invitation log was maintained.

Eligibility criteria included: males aged 18 years and older, full-time employment as a long-distance truck driver and able to provide informed consent for study procedures.

Patient and public involvement
Patients and the public were not involved in the study design, or in the recruitment to, and conduct of the study.

Data collection
The invitation card contained details for where and when drivers could go to the study clinic (participating NSA wellness clinic) for study enrolment. Dependent on when a truck driver decided to enrol, he could go to the study clinic immediately on invitation or any time within the study period. Data collection was completed during a single visit that commenced with HIV testing and demographic data collection, followed by mental health and NCD risk-factor questionnaires. Participants underwent a physical examination, with functional and laboratory testing.

HIV testing
A trained nurse/counsellor conducted HIV pretest counselling, followed by rapid testing with tests supplied by the National Department of Health (NDOH). Testing was performed on whole-blood from a finger prick, using two rapid assays, according to the NDOH HCT Policy. If found HIV-positive, additional blood was collected for measurement of CD4+ cell count, with participants then referred to local public clinics for the accepted standard of care.

Questionnaire data
For demographic and health information, an interview and multiple externally validated questionnaires were administered. Due to the use of externally validated questionnaires, no pilot testing was undertaken with the study population before data collection. Mental and social health issues were explored with the following questionnaires (or relevant parts thereof): eating behaviour, health service use, HIV testing questionnaire, safe sex and behaviour, International Index of Erectile Function-5 (IIEF-5) questionnaire for erectile dysfunction (ED), NEO questionnaire, traumatic events questionnaire, post-traumatic stress disorder (PTSD) checklist (PCL-5) questionnaire and PHQ-9 (for depression). We also evaluated daytime sleepiness using the Epworth Sleepiness Scale (ESS), which was validated in a population of South Africans using English as a second language, similar to our truckers’ population. Overall, scores of 10 and less were considered as normal daytime

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sleepiness while 11 and more were considered as excessive daytime sleepiness. In addition, for our analysis, we further divided three categories of excessive daytime sleepiness, with scores of 11–12, 13–15 and greater than 16, corresponding to mild excessive, moderate excessive and severe excessive daytime sleepiness, respectively.

For respiratory health, the British Medical Research Council Respiratory questionnaire,25 the World Health Survey,26 the ATS-DLD-78-A survey27 and industry-standard questions from other publications were used. Cardiovascular health was explored with a modified version of the WHO STEPs instrument while a survey for musculoskeletal injuries was also administered.

Physical examination
Trained nurses took measurements of height, weight, waist and hip circumference and blood pressure. Blood pressure was measured at both arms, with a third measurement taken on the arm with the highest value. Waist circumference was measured halfway between the lower rib and the iliac crest during expiration in standing position. Non-fasting blood was collected from participants for the measurement of C reactive protein (CRP), creatinine, alkaline phosphatase, random glucose, total cholesterol, high-density lipoprotein (HDL) cholesterol, triglycerides and hepatitis B antigen. Low-density lipoprotein (LDL) cholesterol was calculated using the Friedewald formula. Urine was collected for measurement of protein. Extra blood and urine samples were stored for future research.

A standard 12 lead ECG was taken using a computer-based ECG device (SE-1515 DP12, EDAN) and left ventricular hypertrophy (LVH) assessed using the Cornell’s criterion, Cornell’s product and the Solokow-Lyon’s criterion.

Carotid intima-media thickness (CIMT) was measured in 217 (42.9%) participants, dependent on the sonographer’s availability, after a 15-min rest. A Siemens Acuson p500 ultrasound (Siemens Healthcare (Pty) Ltd, South Africa) with a ≥7 MHz linear probe was used. Measurements of common carotid artery walls were taken and analysed with the semi-automatically Artery Measurement System software (Chalmers University, Göteborg, Sweden) based on the standard procedures described by Bolus in 2016 and Naqvi in 2014.

Transthoracic echocardiography was performed on 132 (21%) participants, dependent on the sonographer’s availability, using a transducer on Siemens Acuson p500 ultrasound. Images were obtained according to a standardised protocol according to the 2015 American Society of Echocardiography chamber quantification guidelines.

Statistical analysis
In line with the aim of this paper data are descriptive only and reported as mean with SD, median with IQR or count and percentages as appropriate. Internal consistency among items of the PHQ-9, PCL-5 and ESS questionnaires was verified with Cronbach’s alpha tests. A score of >0.7–0.8 was considered acceptable, >0.8–0.9 good and any score >0.9 as excellent reliability.

RESULTS
Study population
Of 614 truck drivers responding to the survey most (96%) were black Africans. The median age of respondents was 37 years old (IQR: 31–42 years), and the majority (80%) were married. The majority of participants (63%) were Zimbabwean nationals, while 20% were South Africans and 7% reported Zambian nationality. Almost all respondents (99%) completed primary school, while more than half (55%) completed high school and further 9% completed tertiary education.

Occupational characteristics are presented in table 1. On average, truck drivers in this study reported 9 years of driving experience (IQR: 5–14 years), and spent an average of 10 hours per day on the road. The median days spent driving per month was 20 (IQR: 15–24 days). On average, drivers spent 4 days per month waiting for loading/offloading of their truck, had 3 days off a month and an additional 22 leave days per year.

When participants were asked to indicate how often they worked nights (at least 3 hours between 22:00 and 06:00), 302 (50%) stated that they never worked night shifts, while 74 (12%) reported that they worked nights at least four times a week. Sixty-five (10.6%) participants had worked in the mining industry for at least 1 year, 44 (7.3%) participants had worked in environments that exposed them to dust and another 17 (2.8%) had worked in jobs that exposed them to dangerous fumes. One hundred and fifteen (19%) truck drivers had reportedly been involved in an accident, with half of them (51%) hospitalised due to the accident.

Mental and social health characteristics
Health services
When truckers were asked to indicate the health facilities and services that they had utilised in the past 6 months, NSA health services were the most cited (n=278, 46%), followed by community health centres, and clinics (n=270, 44%). Some participants also utilised pharmacies and hospital-based clinics, however no one mentioned the use of mental health services. All information pertaining to mental and social health is presented in table 2.

Sexual activity and behaviour
Only four truckers (0.2%) reported that their sexual partners were men. Vaginal intercourse (n=607, 99%) was the most frequent type of sexual intercourse. Truck drivers had varying levels of recent sexual activity, with 554 (91%) reported having sex in the past month, and a median coital frequency of three times a month. 522 (86%) truckers stated that they had sex with a regular partner, while 174 (27%) stated that sex was with a casual partner, and 87 (14%) participants reported recent sexual activity...
Table 1  Sociodemographic and occupational characteristics

| Characteristic                          | Median | IQR    |
|----------------------------------------|--------|--------|
| Age in years (n=614)                   | 37     | 31–42  |
| Truck driving years (n=612)            | 9      | 5–14   |
| Hours spent driving per day (n=611)    | 10     | 8–12   |
| Days spent driving per month (n=614)   | 20     | 15–24  |
| Days waiting per month (n=609)         | 4      | 2–7    |
| Off days per month (n=610)             | 3      | 0–6    |
| Leave days per annum (n=603)           | 22     | 13–30  |

**Sociodemographic characteristic**

| Characteristic                          | Frequency | Percentage* |
|----------------------------------------|-----------|-------------|
| Country (n=612)                         |           |             |
| South Africa                           | 123       | 20.1        |
| Zimbabwe                               | 384       | 62.6        |
| Zambia                                 | 45        | 7.4         |
| Other                                  | 60        | 9.8         |
| Race (n=608)                            |           |             |
| Black African                          | 587       | 95.6        |
| Coloured                               | 8         | 1.3         |
| Indian                                 | 6         | 1.0         |
| White                                  | 5         | 0.8         |
| Other/declined                         | 2         | 0.3         |
| Highest level of education (n=591)     |           |             |
| No formal education                    | 2         | 0.3         |
| Less than primary                      | 3         | 0.5         |
| Primary completed                      | 46        | 7.8         |
| High school completed                  | 325       | 55.0        |
| Matric completed                       | 161       | 27.2        |
| College complete                       | 54        | 9.1         |
| Marital status (n=607)                 |           |             |
| Married                                | 488       | 80.4        |
| Living together                        | 22        | 3.6         |
| Never married                          | 19        | 3.1         |
| Divorced                               | 18        | 3.0         |
| Widower                                | 9         | 1.5         |
| Other                                  | 51        | 8.4         |

| Occupational characteristic            | Frequency | Percentage* |
|----------------------------------------|-----------|-------------|
| Truck driving years (n=603)            |           |             |
| 1–5 years                              | 205       | 34.0        |
| 6–10 years                             | 172       | 28.5        |
| 11–15 years                            | 123       | 20.4        |
| >15 years                              | 103       | 17.1        |
| Night shifts (n=607)                   |           |             |
| Never                                  | 305       | 50.3        |

Continued

was with a sex worker. Reported condom usage for regular partners, casual partners, and sex workers, was 15%, 57% and 83%, respectively.

When asked about the number of regular partners in the past year, 453 (75%) truckers indicated that they only had one regular partner, while 130 (21%) had more than one, and 25 (4%) reported not having a regular partner. Among the 595 who responded about ED, 313 (53%) had no ED, while only 11 (1.9%) people had moderate-severe ED.

**Mental health and sleep wellness**

Depression was screened with PHQ-9 and the Cronbach’s alpha value was 0.76. The questionnaire showed that 48 (8.1%) participants had moderate depression, while none of the respondents reported severe depression. The PCL-5 tool; however, identified PTSD in 21 (3.6%) truck drivers, with a Cronbach’s alpha of 0.92. Daytime sleepiness was assessed using the ESS and the Cronbach’s alpha score was 0.77. Overall, 77 (12.7%) stated that they experienced moderate to severe excessive daytime sleepiness.

**HIV status and antiretroviral treatment**

Information on their HIV status was provided by 581 truck drivers (17 respondents did not provide data, and another 16 reported their status as unknown). Of those, 47 (8%) reported that they were HIV-positive, and 23 (49%) of those HIV-positive participants were on antiretroviral treatment (ART) (table 3). The majority of truckers (97%) agreed to an HIV test. HIV prevalence
| Mental and social health characteristic | Frequency | Percentage* |
|----------------------------------------|-----------|-------------|
| Health services (n=614)                |           |             |
| North-Star Alliance                    | 278       | 45.3        |
| Community health centres/clinics       | 270       | 44.0        |
| Pharmacies                             | 84        | 13.7        |
| Hospital-based clinics                 | 51        | 8.3         |
| Mental health services                 | 0         | 0           |
| Other                                  | 26        | 4.2         |
| Sexual activity (n=609)                |           |             |
| Regular partner                        | 522       | 85.7        |
| Casual partner                         | 147       | 24.1        |
| Sex worker                             | 74        | 12.2        |
| Overall                                | 554       | 91.0        |
| Condom use                             |           |             |
| Regular partner (n=513)                | 77        | 15.0        |
| Casual partner (n=136)                 | 78        | 57.4        |
| Sex worker (n=74)                      | 61        | 82.4        |
| Regular partners in the last year (n=614) | 453 | 73.8 |
| One regular partner                    |           |             |
| Multiple regular partners              | 130       | 21.2        |
| No regular partners                    | 25        | 4.1         |
| Depression (n=597)                     |           |             |
| Minimal                                | 399       | 66.8        |
| Mild                                   | 150       | 25.1        |
| Moderate                               | 40        | 6.7         |
| Moderately severe                      | 8         | 1.4         |
| Severe                                 | 0         | 0           |
| Post-traumatic stress disorder (PTSD)  | (n=583)   |             |
| Suffering PTSD                         | 21        | 3.6         |
| No PTSD                                | 562       | 96.4        |
| Intimate partner violence (IPV) (n=611) |           |             |
| Limited/no IPV last year               | 569       | 93.1        |
| Broad IPV last year                    | 42        | 6.9         |
| Limited/no IPV lifetime                | 509       | 83.3        |
| Broad IPV lifetime                     | 102       | 16.7        |
| Daytime sleepiness (n=608)             |           |             |
| Normal                                 | 496       | 81.6        |
| Mild excessive                         | 35        | 5.8         |
| Moderate excessive                     | 46        | 7.6         |
| Severe excessive                       | 31        | 5.1         |
| Erectile dysfunction (n=595)           |           |             |
| None                                   | 313       | 52.6        |
| Mild                                   | 206       | 34.6        |
| Mild-moderate                          | 65        | 10.9        |

*Percentages may not add up to 100% as some subcharacteristics were not mutually exclusive.

ART, antiretroviral therapy; n, number.

among 597 tested drivers was 7.1% (n=42; 95% CI 5.3% to 9.5%). The validity of self-reported HIV status was assessed comparing self-report and rapid test. Seven drivers who reported to be HIV-negative, were rapid test positive. Three drivers who reported to be HIV-positive, had negative rapid test results. Most drivers appeared to be aware of their status, with sensitivity and specificity of self-reporting being 83% (95% CI 67.9% to 92.8%) and 99.8% (95% CI 98.3% to 99.9%), respectively.

### Chronic diseases history

#### Respiratory

TB infection was screened for in all participants with the NDOH TB screening tool, and 17 (2.8%) truckers had previously acquired TB. General breathing difficulty was assessed and 49 (13%) reported some shortness of breath, 18 (2.9%) drivers described persistent coughing, 7 (1.2%) had previously undergone a chest operation and 3 (0.5%) had experienced wheezing. All information pertaining to chronic disease history is presented in table 3.

#### Musculoskeletal injuries

A total of 51 (25%) truckers had work-related pain that lasted at least 2 days in the last year, and 63 (10%) had work-related pain that lasted more than 3 months. The most common work-related injuries were lower-back and upper-back pain, experienced by 92 (15%) and 74 (12%) truckers, respectively. Of the participants that experienced work-related pain, 45 (31%) stated that the pain interfered with their work, and 5 (3%) had to take time off work.

#### Cardiovascular disease and risk-factors

Self-reported cardiovascular outcomes identified that eight (1.3%) participants had a heart attack or stroke, while three (0.5%) reported angina. Only 290 (47%) truckers had ever undergone blood pressure testing and 32 (11%) had hypertension. Of these 32 drivers, 10 (30%) were currently on physician-prescribed medication for hypertension, while two (6.3%) were taking traditional...
Table 3  Chronic disease history

| Respiratory and cardiac history | Frequency | Percentage* |
|---------------------------------|-----------|-------------|
| TB (n=607)                       |           |             |
| History of TB                   | 17        | 2.8         |
| Cough of >2 weeks               | 7         | 1.2         |
| Fever >2 weeks                  | 5         | 0.8         |
| Dyspnoea (n=363)                |           |             |
| No regular trouble breathing    | 314       | 86.5        |
| SOB walking up a slight hill or hurrying | 44 | 12.1      |
| Walks slow with frequent stops  | 2         | 0.6         |
| Stops every 100 m to catch breath | 1 | 0.3        |
| Too breathless to leave house/undress | 2 | 0.6        |
| Other respiratory outcomes (n=583) |           |             |
| Cough several times per day     | 18        | 2.9         |
| Chest operation                 | 7         | 1.2         |
| Wheezing                        | 3         | 0.5         |
| Heart disease: self-reported (n=614) |           |             |
| Heart attack or stroke          | 8         | 1.3         |
| Angina                          | 3         | 0.5         |
| No previous heart disease       | 603       | 98.2        |
| Hypertension (HTN): self-reported (n=612) |       |             |
| Ever tested for HTN             | 290       | 47.4        |
| HTN diagnosed by a doctor (n=290) | 32 | 11.1        |
| Take HTN meds from doctor(n=32) | 10 | 30.3        |
| Take traditional heeler remedy (n=12) | 2 | 6.3         |
| Diabetes: self-reported (n=612) |           |             |
| Blood sugar tested by doctor    | 121       | 19.7        |
| Diabetes diagnosed by doctor (n=121) | 12 | 9.9         |
| Take oral meds from doctor (n=12) | 3 | 25.0        |
| Take insulin prescribed by doctor (n=12) | 3 | 25.0        |
| Take traditional heeler remedy (n=12) | 1 | 9.1         |
| Cholesterol: self-reported (n=612) |           |             |
| Cholesterol tested by doctor    | 20        | 3.3         |
| High cholesterol diagnosis (n=20) | 3 | 15.0        |

Continued
remedies. One hundred and twenty-one (19.7%) participants previously had their blood-sugar checked, and 12 (10%) had elevated blood-sugar. Of those, 5 (25%) were taking insulin, another three (25%) were taking oral medication, and one (9.1%) was on traditional remedies for diabetes. For cholesterol, only 20 participants (3.3%) previously had their levels checked and of these, three (15%) were diagnosed with raised cholesterol, but no one was taking medication (doctor-prescribed or traditional) for management.

For domestic smoke exposure, 121 (20%) had been exposed to secondhand smoke during childhood, and 160 (26%) had indoor fireplace exposure. Ninety (15%) drivers had ever smoked tobacco and 63 (11%) still smoked. Marijuana use was much lower, as only 28 (5%) had ever smoked it, and 23 (4%) identified as current smokers. The majority of participants who currently smoked reported that they smoke daily (76% for tobacco, 68% for marijuana). For alcohol use, 240 (40%) truck drivers had ever consumed alcohol and 196 (33%) still drank regularly. Of the drivers who drank, 54 (28%) were problem or heavy drinkers (>15 drinks per week), comprising 9% of the total population. One trucker reported using acid, but no other recreational drugs were disclosed by participants.

Study participants were asked to indicate how often they engaged in mild, moderate or strenuous exercise, and only 254 (41.3%) exercised strenuously at least two times a week. Mild and moderate exercise two times a week was even less with engagement levels of 78 (12.7%) and 125 (20.3%), respectively.

When asked about their diet, 347 (57%) had at least two fruits daily, while only 280 (46%) had two servings of vegetables. Snacks were much higher, as 474 (78%) drank at least two soft drinks daily, and 347 (71%) had at least one snack.

Regarding family history, 20 (3.4%) truckers reported a parent who had suffered a heart attack before the age of 60, while 18 (3.1%) had a parent experiencing a stroke before the age of 60.

**Clinical characteristics**

The median height and weight was 1.71 m (IQR: 1.65–1.76 m) and 79 kg (IQR: 69–90 kg), respectively. Median waist and hip circumference were 87 cm (IQR: 77–99 cm) and 101 cm (IQR: 94–108 cm), respectively. Calculated body mass index (BMI) revealed that 417 (69%) of all respondents were either overweight (BMI 25–29.9 kg/m²) or obese (BMI ≥30 kg/m²). All information pertaining to clinical characteristics is presented in table 4.

Blood pressure were taken for every truck driver, and the mean measurements were 131 mm Hg (IQR: 122–140 mm Hg) systolic and 83 mm Hg (IQR: 76–89 mm Hg) diastolic. Based on the South African hypertension practice guide that defined hypertension as systolic >140 mm Hg or diastolic >90 mm Hg, 35.8% (95% CI 32.1 to 39.7) were hypertensive.

The median blood-glucose level was 5.2 mmol/L (IQR 4.6–6.3 mmol/L) and 15 (2.6%) participants were considered to be diabetic with a non-fasting glucose above 11.0 mmol/L. The average cholesterol level was within normal ranges, as were serum creatinine and triglyceride levels, while median serum CRP levels were 1.2 mg/L.

**Table 5 presents the cardiovascular measurements and ECG results showed that 23 (4.9%) and 29 (5.3%) drivers, respectively, had LVH using the Cornell criterium and product. According to the Solokow-Lyon criterium 136 (23.8%) participants had LVH. CIMT measurements showed that nine (4.2%) drivers had a carotid atherosclerotic plaque. Echocardiographic outcomes showed that 10 drivers (7.6%) had a left ventricular mass above 115 g/m², which is an indicator of LVH. The median ejection fraction (EF) was 59% (IQR 55–65). No driver had an EF <50% which is a sign of heart failure. No moderate or severe valve pathology was observed.**

**DISCUSSION**

With over 600 participants, this study is possibly the largest and most comprehensive truck driver health and wellness investigation in sub-Saharan Africa, and the methods used have established a comprehensive reference point of health problems and associated risk factors present in this group. Almost all participants were black African males, the majority from Zimbabwe and over half of the participants had completed high school. Most participants were sexually active with a regular partner, while one quarter had a causal partner and 14% reported sexual activity with a sex worker. Participants drove an average of 10 hours per day, 20 days per month, and half had never worked night shifts, while 12% reported that they worked nights at least four times a week. Daytime sleepiness was experienced by almost 20% of participants, while moderate depression and PTSD were experienced by less than 10% of all participants. One-in-five drivers had been in an accident, and half of these drivers had been...
Table 4  Physical testing

| Physical measurements                       | Median     | IQR         |
|---------------------------------------------|------------|-------------|
| Systolic blood pressure (n=614)             | 131 mm Hg  | 122–140 mm Hg |
| Diastolic blood pressure (n=614)            | 83 mm Hg   | 76–89 mm Hg  |
| Heart rate (n=614)                          | 75 bpm     | 66–83 bpm   |
| Height (n=614)                              | 1.71 m     | 1.66–1.76 m |
| Weight (n=614)                              | 79 kg      | 69–90 kg    |
| Neck circumference (n=614)                  | 37 cm      | 36–40 cm    |
| Waist circumference (n=614)                 | 87 cm      | 77–96 cm    |
| Hip circumference (n=614)                   | 101 cm     | 94–108 cm   |

| Laboratory assessments                     | Median     | IQR         |
|--------------------------------------------|------------|-------------|
| Serum C reactive protein (n=584)           | 1.2 mg/L   | 0.5–2.7 mg/L |
| Protein urine quantitative (n=16)          | 0.44 mmol/L| 0.22–0.62 mmol/L |
| Blood-glucose (n=583)                      | 5.2 mmol/L | 4.6–6.3 mmol/L |
| Serum creatinine (n=585)                   | 91 mmol/L  | 81–104 mmol/L |
| Serum cholesterol (n=585)                  | 4.39 mmol/L| 3.9–5.13 mmol/L |
| Serum LDL Cholesterol (n=585)              | 2.7 mmol/L | 2.24–3.35 mmol/L |
| Serum HDL cholesterol (n=585)              | 1.2 mmol/L | 1.02–1.45 mmol/L |
| Triglyceride (n=585)                       | 1.33 mmol/L| 0.92–2.05 mmol/L |

| Physical characteristic                    | Frequency  | Percentage* |
|--------------------------------------------|------------|-------------|
| Blood pressure-tested (n=614)              |            |             |
| Normotensive (sys: <140; dias: <90)        | 394        | 64.2        |
| Grade 1 (sys: 140–159; dias: 90–99)        | 151        | 24.6        |
| Grade 2 (sys: 160–179; dias: 100–109)      | 43         | 7.0         |
| Grade 3 (sys: >180; dias: >110)            | 26         | 4.2         |
| Total HTN (sys: >140; dias: >90)           | 220        | 35.8        |
| Blood sugar-tested (n=604)                 |            |             |
| <4.5 mmol/L                                | 121        | 20.7        |
| 4.5–7.8 mmol/L                             | 414        | 71.0        |
| 7.9–11.1 mmol/L                            | 34         | 5.8         |
| >11.1 mmol/L                               | 15         | 2.6         |
| Body mass index (BMI) (n=604)              |            |             |
| Underweight (BMI <18.5)                    | 7          | 1.2         |
| Normal weight (BMI 18.5–24.9)              | 180        | 29.8        |
| Overweight (BMI 25–29.9)                   | 244        | 40.4        |
| Obese (BMI >30)                            | 173        | 28.6        |
| Hepatitis B (n=586)                        |            |             |
| Positive                                   | 29         | 5.0         |
| Negative                                   | 557        | 95.0        |

*Percentages may not add up to 100% as some subcharacteristics were not mutually exclusive.
dias, diastolic;n, number; sys, systolic.

hospitalised due to the accident. Reported histories of TB, myocardial infarction and diabetes were below 3%, however, prominent cardiac risk-factors included smoking (11%), consuming alcohol (>15 drinks/week) (9%), overweight/obesity (69%) and hypertension (36%). The frequency of hypertension and diabetes is in line with nationwide data from South Africa but the frequency of overweight/obesity is double of what is seen in the general population (69% vs 31%). Report HIV prevalence was less than the national average (13.1%), at 8%, and less than half were taking ART.
Table 5  Cardiovascular measurements

| Electrocardiography: heart | Median | IQR  |
|---------------------------|--------|------|
| **Left ventricle**        |        |      |
| LVED index, mm/m² (n=132) | 24.32  | 22.53–26.11 |
| LVESD index, mm/m² (n=132) | 16.01  | 14.41–17.74 |
| IVS index, mm/m² (n=132)  | 5.15   | 4.60–5.89  |
| LV PW index, mm/m² (n=132) | 4.81   | 4.26–5.40  |
| LV EDV index, mL/m² (n=128) | 51.45 | 42.26–57.54 |
| LV ESV index, mL/m² (n=129) | 19.72  | 16.36–24.17 |
| LVM index g/m² (n=132)    | 79.70  | 68.34–94.88 |
| **Left atrium**           |        |      |
| LA, mm/m² (n=132)         | 17.40  | 16.13–19.36 |
| LA, volume mL/m² (n=132)  | 17.09  | 12.85–20.30 |
| **Systolic and diastolic function** | | |
| Simpsons EF, % (n=130)    | 59     | 55–65 |
| Mitral inflow E/A ratio (n=130) | 1.35 | 1.15–1.59 |
| Mitral flow deceleration, ms (n=131) | 172 | 150–200 |
| **Right ventricle**        |        |      |
| RV base index, mm/m² (n=132) | 19.21 | 17.33–21.51 |
| TAPSE, mm (n=124)          | 19     | 17–22 |
| **Carotid intima-media thickness** | | |
| Mean-mean CCA-IMT, mm (n=217) | 0.529 | 0.493–0.596 |
| Mean-max CCA-IMT, mm (n=217) | 0.608 | 0.554–0.685 |
| Max bulb IMT, mm (n=216)   | 0.668  | 0.570–0.830 |

The methods described here are not only feasible to execute, but their findings provide valuable information regarding the comprehensive health and wellness of truck drivers in South Africa. By examining the findings, relatively low condom use and ART coverage indicate that HCT is still a priority in this population. Elevated risk-factors for NCDs and mental health suggest that screening and linkage to care for these areas need to be prioritised. Surprisingly, although nearly 50% of truck drivers reported doing night shifts at least once a week, only 18% had symptoms of excessive daytime sleepiness. While these findings have highlighted priority areas for truckers in South Africa, these methods could be replicated in similar populations to describe their baseline health statistics and identify areas of need.

Limitations include challenges in recruiting South African truck drivers because long-distance driving is mainly performed by foreign drivers. Accessing healthcare programme and information directly from the trucking companies was difficult, as this is strictly regulated and controlled by unions. The comprehensiveness of the survey also presented a limitation, as some drivers...
could not join because it would take too much time (it couldn’t be performed over a lunch break, for example). A sampling bias may also be present, as the HIV prevalence in the survey is lower than that of the general population, suggesting that truck drivers with risky behaviours may be failing to test for HIV.

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