Current Prevalence of Human Immunodeficiency Virus Infection and Measurement of Anthropometric / Biophysical Parameters among Apparently Healthy Long-Distant Truck Drivers in Various Terminals in Calabar Municipality, Cross River State, Nigeria.

Forwah Jacques Ndeh[1*], Abeshi Sylvester Etenikang[2], Akpan, Idongesit Samuel[3], Ochie Johnson Mba[4], Otti Chidiebere Joel[5], Ebot Walter Ojong[6], Joshua Obase-Otumoyi Ofor[7], EZEA Prosper Chiazam[8], Immaculate Ihuoma Ekeagba[9].

[1,7]Department of Hematology / blood transfusion Sciences, Faculty of Clinical sciences, University of Calabar, Cross River State, Nigeria

[3]Department of Hematology and Blood Transfusion Sciences, Faculty of Clinical Sciences, University of Uyo, Akwa Ibiom State, Nigeria.

[4]Department of surgery, University of Nigeria Teaching hospital Ituku -Ozalla, Enugu State, Nigeria.

[5]Department of Obstetrics and Gynaecology, University of Nigeria Teaching hospital Ituku -Ozalla, Enugu State, Nigeria.

[8]Department of Integrated Health Sciences and Technological Training, Faculty of Multi-Clinical professionals and Innovative Research, WORCACCCE Union Group University, P.O. Box 45 Bamenda, North West Region, Cameroon.

[6]Department of Biomedical Science, Faculty of Health Sciences, University of Buea, South West Region, Cameroon

[*]Corresponding Author

ABSTRACT

The current study investigated human immunodeficiency virus I and II infections and measurement of selected anthropometric and biophysical parameters among apparently healthy male long-distant truck driver rivers (LDTDs) of commercialized private and public vehicle's terminals in Calabar Municipality, Cross River State, Nigeria. A semi close-ended structured and self-administered questionnaire was designed, validated institutional and administrative ethical approvals were sought from appropriate authorities in accordance with existing laws in force. About five milliliters of blood samples were collected from voluntary pre-counseled, recruited and consented 600 apparently healthy participants comprising of 276 (46%) married and 324 (54%) unmarried males and aged 20 years old and above. The samples were allowed to clot and serum samples were then gotten from the supernatant after centrifugation of the blood samples at 4000 revolution per minute for 10 minutes. The sera were screened for HIV 1 and 2 antibodies using three panels algorithm of the HIV 1 and 2 Antibody Point of care testing kit tools comprising of Determine[TM] HIV-1 and 2 (Inverness Medical Japan company limited), Stat-Pak HIV-1 and 2 (Chembio Diagnostic System International Inco-operation, United State of America) and HIV Uni-gold rapid test kit (Trinity

Biotech, United State of American) respectively. The levels of selected anthropometric and biophysical parameters were measured using standard clinical instruments recommended by the World Health Organization (WHO). After data collation and analysis using IBM-SPSS version 26, the current prevalence rate of HIV 1 and 2 in the 600 participants who turned out for the study that reacted positive was 27 (4.5%), while a total of 573 (95.5%) participants tested non- to the three HIV I &2 antibodies screening test kits. Using HIV 1 and 2 Determine screening test kit alone there were 10 (1.7%) participants reacted positive while 590 (98.3%) participants reacted negative, using Stat-Pak test kits alone 9 (1.5%) participants reacted positive and 591(98.5%) participants reacted negative. Finally, while using Unigold test panels alone 8 (1.33%) participants reacted positive and 592 (98.67%) reactive negative. There was no statistically significant difference between the positive and negative results of the three screening HIV antibody test kits according to marital status (p=0.7065) and age range. Mean age range was =32.99 ± 1.014 years for married group and 28.95±7.845 years for unmarried group respectively with statistically significant differences between groups ($p<0.05$). There was a statistically significant differences ($P<0.05$) between the Mean value of Body Mass Index, Mean value of Diastolic Blood Pressure and mean value of pulse rate (PR) for the married and unmarried group respectively ($P<0.05$). Conclusively, the overall current prevalence rate of HIV 1 and 2 infection determined by the use of the three panels of the HIV 1 and 2 antibody screening test kit tools according to World Health Organization 's algorithm for detection of HIV infection in the index population had been demonstrated to be 0.045% . The discrepancies associated with individual prevalence rate of the HIV 1 and 2 infection assayed by the HIV 1 and 2 antibody screening test kit tools shown no statistically significant. The levels of anthropometric and biophysical parameters appear to be a very importance screening pre-assessment indicator of nutritional status as well as obesity status and lifestyle risk assessment of the participants of the index study.

Keywords: current prevalence rate, Commercialized Private /Public vehicle's terminals, unmarried, married, Long-Distant Truck Drivers, three HIV I & 2 Antibody screening panels, Anthropometric / Biophysical Parameters, Calabar Municipality.

INTRODUCTION

Globally, long-haul truck driver (LHTD) or long-distant truck driver (LDTD) has been interchangeably used but all term that referred to an individual whose principal business or principal duty of employment is driving a long-haul truck or long-distant truck that are essentially involved in the transportation of goods and materials in both developed and developing countries [1]. In order word, long haul trucking involves drivers transporting freight hundreds or thousands of miles from their origin to their ultimate destinations [2]. These long-haul truck drivers operate heavy trucks and tractor-trailers (with a capacity of at least 26,000 pounds gross vehicle weight) and are majorly responsible for the freight including regular inspection before and during the transportation process to ensure that it is in great shape [3]. By law, drivers of commercial vehicles and trucks are permitted 14 hours of duty per day worked [4] and they are also required to take a mandatory 10-hours break before they can drive again for work in order to prevent stress, accident and poor health [5]. As a result, long freight delivery routes often require them to sleep away from their homes and life on the road makes it more difficult for them to live healthy because of the irregular schedules, long hours of delays, little or no physical activities , limited access to healthy foods on the interstates roads , mental stress and health challenges such as development of oxidative stress related illness and obesity [6,7,8,9].Long-distant truck drivers (LDTDs) could be considered also as a group of individual drivers who are vulnerable to human immunodeficiency virus (HIV 1 and 2) infections [10,11] and other sexually transmitted infections (STI) or urinary tract infections (UTI) due to the nature of their work which usually involved long hauling of transportation of goods and materials and frequent mobility in different routes from one city to another [12]. Studies have shown that the spread of HIV along major truck roads and the crucial role played by long-distant truck drivers (LDTDs) and their helpers traveling about 800 kilometers or more in a single direction with high risk of carrying HIV infections and other sexually transmissible infections

from one place to another thus helping in onward transmission of these infections from a very high-risk populations (high-risk population includes commercial female sex workers, men who have sex with men, and injecting drug users) to low-risk populations (low-risk population primarily includes spouses of migrants /mobile populations) [13,14,15]. A lot of researchers believed and supposed that there are always some chances, proportion or probability, although said to be very low percent risk of HIV transmission from infected HIV 1 and 2 long distant truck drivers (LDTDs) of commercial and public vehicles especially in some developing countries [16]. Measurement of anthropometric and biophysical parameters have been considered as non-invasive quantitative measurements of the body parts [17]. According to the Centers for Disease Control and Prevention (CDC), anthropometry provides a valuable assessment of nutritional status in children and adults as regard their health and disease states [18], diagnosis of obesity and lifestyle risk assessment [19]. Anthropometry also provides the single most portable, universally applicable, inexpensive and non-invasive technique for assessing the size, proportions and composition of the human body parts [20].

PROBLEM STATEMENT

Unfortunately, despite decades of aggressive study of human immunodeficiency virus (HIV) infection, prevention, transmission, and significant advances in its laboratory diagnosis, treatment and management in the developed countries, there are still many challenges to overcome especially in some developing countries [21-22]. It is undeniable and undisputable facts that the human immuno-deficiency virus / acquired immune deficiency syndrome (HIV/AIDS) epidemic had created serious devastating, substantive negative impacts on health, social status, and economic growth and development of individuals, households, local, national and international communities and life of the human race [23,24,25]. This is due to the fact that there was no vaccine for its prevention, no definite eradicative therapy and the high risk of continuous transmissible infective process [26]. The correct measurement of anthropometric parameters reflects both health and nutritional status and predicts performance, healthy living and survival and as such, it is a valuable, but currently underused tool for guiding public health policy and clinical decisions especially with the index study population [27].

RATIONALE AND JUSTIFICATION OF THE CURRENT STUDY

The global situation and trends of HIV/AIDS according to World Health Organization Global Health Observatory (WHO- GHO, 2022) data on HIV/AIDS 2023 and United Nation Joint Programme on AIDS, Global HIV/AIDS 2023 fact sheets (UNAIDS, 2023) on HIV/AIDS, 2022, shows that about 39.0 million people were living with the HIV infection in 2022 worldwide, with adult prevalence rate of 0.7 percent and 85.6 million people have been infected with HIV since the start of the epidemic [28 29,30,31]. Although the current prevalence of HIV antibody test kits results in the Cross Rivers State, Nigeria have been reduced drastically from 2.1% to 1.7% [67]. However, the current prevalence rate of human immuno-deficiency virus infection and selected anthropometric / biophysical parameters among apparently healthy long-distant truck drivers in Calabar Municipality, Cross River State, Nigeria is not available.

RESEARCH QUESTIONS

1. What is the prevalence rate of HIV I & II infection of apparently healthy married and unmarried male long distant truck drivers of commercialized private and public vehicles in Calabar Municipality, Cross River State, Nigeria with ages from 20 years and above when using Determine[TM] HIV-1 and 2 (Inverness Medical Japan company limited)?
2. What is the prevalent rate HIV I & II infection of apparently healthy married and unmarried male long distant truck drivers of commercialized private and public vehicles in Calabar Municipality, Cross River State, Nigeria with ages from 20 years and above when using Stat-Pak HIV-1 and 2 (Chembio Diagnostic System International Inco-operation)?

3. What is the revalence rate HIV I & II infection of apparently healthy married and unmarried male long distant truck drivers of commercialized private and public vehicles in Calabar Municipality, Cross River State, Nigeria with ages from 20 years and above when using HIV Uni-gold rapid test kit (Trinity Biotech, United State of American)?

RESEARCH HYPOTHESIS (NULL AND ALTERNATE HYPOTHESIS)

H_O = There was no statistically significant between the prevalence rate of apparently healthy 300 married and 300 unmarried male long distant truck drivers of commercialized commercial and public vehicle's terminals in Calabar Municipality, Cross River State, Nigeria with ages from 20 years and above screened using three HIV antibody point of care testing panels.

H_a = There was statistically significant between the prevalence rate of apparently healthy 300 married and 300 unmarried male long distant truck drivers of commercialized private and public vehicle's terminals in Calabar Municipality, Cross River State, Nigeria and aged above 20 years screened using HIV antibody point of care testing panels.

GENERAL OBJECTIVE OF THE CURRENT STUDY.

The current study is aimed at the investigation of HIV 1 and 2 status amongst apparently healthy married and unmarried male long distant truck drivers of commercialized private and public vehicles terminals screened during their pre-employment medical examination using Determine™ HIV-1 and 2 (Inverness Medical Japan company limited), Stat-Pak HIV-1 and 2 (Chembio Diagnostic System International Inco-operation, United State of America) and HIV Uni-gold rapid test kit (Trinity Biotech, United State of American) respectively in Calabar with ages from 20 years and above.

SPECIFIC OBJECTIVES

1. To determine the HIV antibody status of healthy 300 married long distant truck drivers of commercialized private and public vehicles terminals screened using Determine™ HIV-1 and 2 (Inverness Medical Japan company limited), Stat-Pak HIV-1 and 2 (Chembio Diagnostic System International Inco-operation, United State of America) and HIV Uni-gold rapid test kit (Trinity Biotech, United State of American) respectively
2. To determine the HIV antibody status of apparently healthy 300 unmarried males long distant truck drivers of commercialized private and public vehicles terminals screened using Determine™ HIV-1 and 2 (Inverness Medical Japan company limited), Stat-Pak HIV-1 and 2 (Chembio Diagnostic System International Inco-operation, United State of America) and HIV Uni-gold rapid test kit (Trinity Biotech, United State of American) respectively
3. Determine the anthropometric and biophysical measurement of each participants in both married and unmarried groups.

SIGNIFICANCE AND JUSTIFICATION OF THE STUDY

1. The results of the current study are hoped to contribute information and knowledge to ongoing activities of HIV I and 2 testing and prevention amongst the study population and to bridge the gap of knowledge in this area
2. The results are to provide the status of HIV I and 2 of the index population
3. The results are hope to Antibody status and anthropometric and biophysical measurement of each long distant truck drivers in the recruited population of respondents.
4. The screening test results of the study population, will equip and inform the various stakeholders and actors in the field concerning the current prevalence rate of HIV 1 and 2 long distant truck drivers in

the index population under study.

5. The will contribute knowledge to humanity and scientific and research community.
6. The current study will be helped us better understand how certain health conditions, behavior, and work environment combine to affect long-haulers' safety and health.
7. The results from the current study will help guide truck driver's health and safety policy and address the health and safety concerns that these individuals are facing.

LITERATURE REVIEW

Reports on the econometric analysis of the influence on-road behavior of long -distance truck driver are not well documented in Nigeria unlike others countries. Previous research into management control of truck drivers' activities, while highly valuable has failed to provide a comprehensive framework of drivers control theory. However, as the core force in logistics transport of long-haul truck drivers profoundly impact global economy the theory of monotonous and demanding nature of the transport task often results in truck drivers neglecting their health and wellbeing and the resulting issues of the psychological safety and fatigues pose a significance challenge to truck drivers transport performance

STUDY SETTING

The present study was carried out in Calabar municipality. Calabar is one of the Local Government Area that makes up the city of Calabar which is also the capital of Cross River State in the south eastern part of Nigeria [32]. Geographically, Calabar Municipality has a total Surface land area of 142 kilometer squared (km²) while the total local government area population is estimated to be 320,826 of which 166,203 are males and 154,659 females respectively [34]. The inhabitants are mainly the Efiks, Quas, Ejagham, Efut, Ibibio, Annang and others – the migrant workers. They are mainly civil servants, subsistence farmers, traders and fishermen (**See figure 1**). The target participants of the current study were made up of long distant truck drivers (LDTDs). LDTD was defined as a trucker who takes a consignment from one place to another destination located along the national highways and who travels more than 800 km one-way before returning back to the place of origin.

The sites for recruitment of study population and HIV pre-counselling for samples collection were the bus terminals. There were seven different bus terminal or bus stop station in Calabar, Cross River State, Nigeria, that were selected randomly for subject's recruitment and HIV pre-counselling for sample collection in this study. This was done through balloting to avoid sample selection bias.

Experimental and analytic designed were adopted in this study and the analysis of the collected samples was carried out in the Hematology and Blood Transfusion and Chemical Pathology Departments of Medical Lab Sciences, University of Calabar, Nigeria between January ,2017 and December 2018.

Calculation of sample size.

The Cochran, 1977) formula for calculating sample size (S) was adopted in the current study [35, 36] and thus is given by $S = t^2 p (1-p)/ e^2$, where t value is alpha level used in determining sample size in most educational research studies is 1.96 for 95% confidence level for sample sizes above 120 [37]. P= prevalence rate in percentage (%) of infected HIV antibody-negative long distant truck drivers population in Calabar and in this case is 0.5 (or 50%) gotten from previous study [38, 39,40]. While e = tolerance error or confidence interval expressed as decimal and it is taken to be 0.05 in this study. Therefore substituting these values, $S = (1.96^2)^2 (.5(1-0.5)/ (0.05)^2$, $S = (1.96^2)^2 (0.5)^2/ (0.05)^2 = 384.16$, hence S = ~ 600 participants were used in cases of any loss data or specimen during the study or in cases of non-respondent individuals in the two groups.

Inclusive and exclusive criteria for subject selection: A total of 600 apparently healthy voluntary subjects of male genders, aged between 18 years and 60 years and who were randomly recruited from the various terminal bus stop of the long distant truck drivers of commercial and public vehicles in Calabar, Cross River State, Nigeria. The respondents were divided into six study groups according to their ages and marital status and a questionnaire form was designed and used as a screening instrument for both inclusive and exclusive criteria

Ethical consideration and institutional approvals: These were sought and obtained from the Research Ethical Committee, Centre for Clinical Governance, Research & Training Ministry of Health Calabar, and Cross Rivers State, Nigeria and institutions concerned.

Informed and written consent: These were also sought and obtained from the index respondents prior to recruitment and inclusion in the current study.

Administration of questionnaire: The confidential and harmless nature and advantages of the study were explained to each participant in the form of voluntary counselling and testing (VCT) in which a questionnaire was administered to each of the index participants. Relevant clerkship was conducted to obtain more information about their medical and clinical history. After the Pre- HIV counselling, informed and written consent forms were filled and signed by index participants for screening to start. They were screened in accordance with the current World Health Organization HIV national algorithms and standard parameters set forth in these HIV screening centers.

Treatment of collected blood samples: About five milliliters of venous blood samples were withdraw from the ante-cubital vein of the arms of recruited, consented, pre-counseled participants by a mean of disposable plastic five milliliters syringe fitted with 21 SWG needle. The area of the venipuncture was first of all cleansed with 70 percent Alcohol and allowed to dry. A tourniquet was tied just for a short time. Collection of blood samples were done from Monday to Friday between the hours of 7.00 am and 1.00 pm continually for four months. The five milliliters of blood withdrawn were dispensed into pre-dried and labelled plain centrifugal tubes which were later centrifuged for 10 minutes at 4000 revolutions per minutes after being allowed to retract for two hours. Finally, the clear supernatants were removed from the retracted, centrifuged samples and dispensed into another cleaned, labelled dried tubes to be used for HIV antibody screening assays. Samples which were not analyzed immediately were stored in the refrigerator at 4- 6 ^{O}C until another batch of assays.

MATERIALS AND METHODS

Materials & methods for HIV 1 and 2 antibody assays

Three different types of HIV1 & 2 Antibody rapid test kit methods were used as approved by (UNSAID, 2011).

a) Determine HIV1 & 2 Antibody rapid test kit (Produced by Inverness Medical Japan Co, Ltd).

i) Principles of the test: Determine HIV-1 and 2 Abs Combo is an immunochromatographic test for the qualitative detection of antibodies to HIV 1 and 2. The manufacturer's instructions were strictly followed as follows: – Specimen was added to the sample pad. The specimen mixes with a biotinylated antibody and selenium colloid-antigen conjugate. This mixture continues to migrate through the solid phase to the immobilized avidin, recombinant antibodies and synthetic peptides at the patient window sites. If antibodies to HIV-1 and / or HIV-2 are present in the specimen, the antibodies bind to the antigen selenium colloid and to the immobilized recombinant antigens and synthetic peptides, forming one red bar at the patient HIV

Antibody window site. If antibodies to HIV-1 and / or HIV-2 are absent the antigen-selenium colloid flows past the patient window, and no red bar is formed at the patient HIV Antibody window site.

ii) Procedure of the test

All reagents and the test samples were removed from the refrigerator and allowed to assume room temperature. One strip from the right side of the package was torn and the cover removed. Exactly 50µl of serum was added to the sample pad and followed by the addition of the buffer and was timed for 20 minutes. After 20 minutes the results were read for HIV-1 and 2 antibodies (Ab).

iii) Built-in control feature: The control line appeared as a visible pink/red band in the control region of the device to indicate that the test device was functioning correctly. A positive result was visualized by a pink/red band in the test region of the device. A negative reaction occurred in the absence of detectable levels of human immunoglobulin antibodies to HIV-1 and / or HIV-2 in the specimen; consequently, no visually detectable band develops in the test region of the device.

b) Stat-Pak HIV 1& 2 Antibody Rapid Screening test kit (Produced by Chembio Diagnostic System Incorporation.)

i) Principle: The Chembio HIV 1and 2 Stat-Pak assay employs a unique combination of a specific antibody binding protein, which is conjugated to colloidal gold dye particles and HIV 1 and 2 antigens, which are bound to the membrane solid phase. The sample is applied to the Sample (S) well followed by the addition of a running buffer. The buffer facilitates the lateral flow of the released products and promotes the binding of antibodies to the antigens. If present, the antibodies bind to the gold conjugated antibody binding protein. In a reactive sample, the dye conjugated-immune complex migrates on the nitrocellulose membrane and is captured by the antigens immobilized in the Test (T) area producing a pink/purple line. In the absence of HIV antibodies, there is no pink/purple line in the Test (T) area. The sample continues to migrate along the membrane and produces a pink/purple line in the Control (C) area containing immunoglobulin G antigens. This procedural control served to demonstrate that specimens and reagents have been properly applied and have migrated through the device.
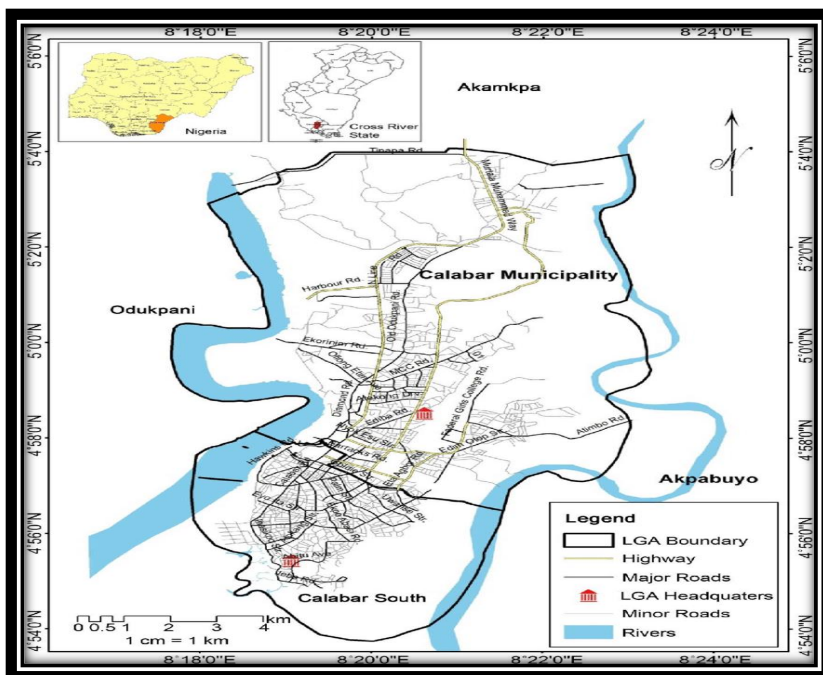

Fig1: Map of Calabar Metropolis showing roads in and out of town (Calabar south and municipality LGAs). (Source: adopted from the Office of the surveyor general, cross river (OSG-CR), 2015. [33] uploaded by Chukwudi Njoka)

ii)Procedure of the test:

Specimens to be tested if refrigerated, were removed from the refrigerator and allowed to come to room temperature of (approximately 18 to 30°C or 64 to 86°F) prior to testing. The Chembio HIV 1 and 2 Stat-Pak test device was removed from its pouch and placed on a flat surface. The test device was then labeled with the test identification number. Exactly 5 µL of the test specimen was added to the sample pad in the centre of the Sample (S) well of the device. Exactly 3 drops of buffer was added slowly, drop wise, into the Sample (S) well. The mixture was timed after the addition of the running buffer. The test results were read after 15 minutes.

iii) Built-in Control Feature:

When the test was completed a pink/purple line appeared in the Control (C) area of the test device, on non-reactive as well as reactive samples. This control line served as an internal control and gave confirmation of sample addition and proper test performance. A pink/purple line appeared in the Control (C) area. This shown that the test has been performed correctly and the device was working properly.

c) HIV Uni-gold rapid test kit (Produced and supplied by Trinity Biotech USA).

i) Principles: Uni-Gold Recombigen HIV was designed as a rapid immunoassay based on the immunochromatographic sandwich principle and is intended to detect antibodies to HIV in human serum. Uni-Gold Recombigen HIV test employs genetically engineered recombinant proteins representing the immunodominant regions of the envelope proteins of HIV. The recombinant proteins are immobilized at the test region of the nitrocellulose strip. These proteins are also linked to colloidal gold and impregnated below the test region of the device. A narrow band of the nitrocellulose membrane is also sensitized as a control region. If antibodies to HIV are present in the sample, they combine with an HIV antigen/colloidal gold reagent and this complex binds to the immobilized antigens in the test region of the device forming a visible pink/red band.

ii) Procedure of the test: Specimen to be tested if refrigerated, were removed from the refrigerator and allowed to come to a temperature of (approximately 18 to 30°C or 64 to 86°F) prior to testing. The Chembio HIV 1and 2 test device was removed from its pouch and placed on a flat surface, the desiccant from the pouch as recommended by its manufacturer. The test device was labeled with the test identification number. Exactly 5 µL of sample were dispensed into the sample pad in the center of the Sample (S) well of the device. About 3 drops (~ 105 LL) of buffer was slowly, added drop wise, into the Sample (S) well. 4) Timing was started after the addition of the Running Buffer. The test results were read exactly after 15 minutes.

iii) Built-in control feature: The control line was always appearing as a visible pink/red band in the control region of the device to indicate that the test device was functioning correctly. A positive result was visualized by a pink/red band in the test region of the device. A negative reaction occurs in the absence of detectable levels of human immunoglobulin antibodies to HIV-1 in the specimen; consequently, no visually detectable band develops in the test region of the device.

ANTHROPOMETRIC AND BIOPHYSICAL MEASUREMENTS

The variables that constituted the Anthropometric and biophysical measurable parameters included the body mass index (BMI) which was derived from the Weight and Height, and the vital signs such as Systolic and diastolic Blood Pressure, Respiratory Rate, temperature and Pulse Oximeter for both married and unmarried

male long distant truck drivers of commercialized private and public vehicles in Calabar Municipality.

Method for the measurement of height, weight and Body Mass Index (BMI)

The height in meters (m) of all participants were measured from two standard Scales and their Weights in kilograms (kg) were measured and recorded from two different standard weighing balances respectively without shoes, dresses, and heavy Jewries. The body mass index (BMI) was calculated and obtained by using the following formula below: BMI =Weight (kg) / Height (m^2). The international units were=kg/ m^2 (41)

Manual and Automatic Methods for Body temperature Measurement: The body Temperature in °C = (Temperature in °F – 32) x 5/9) was recorded from a standard clinical thermometer using the manual axillary body temperature measurement method and infrared automatic thermometer respective. The two readings were the added and the average was used (42).

Manual and Automatic Methods for Blood pressure measurement: Sitting blood pressures was measured after 15 minutes of rest and the by use of a Hawkeye's random-zero Sphygmomanometer standardized instrument, the blood measured was taken using standard clinical techniques and standard procedures as stated in the manufacturer's manual and instructions for usage. The final reading was taken by the average of the first and second measurements in the procedure. Systolic and diastolic blood pressures were defined as the first and the fifth Korotkoff's sounds. High systolic blood pressure ≥140 mm Hg or a diastolic blood pressure ≥90 mm Hg values greater than normal or equal to 140/90mm Hg differentiate hypertensive from normotensive consumers in accordance with World health organization (WHO) gradingand classifications. The reading from the automatic blood pressure machine was also taken and both readingwere added and an average was taken (43,44).

Pulse Rate, Respiratory Rate Measurements, Oxygen Saturation using Pulse Oximeter:

Measurement of the oxygen saturation, pulse rate and respiratory rates were done using the SpMetoximeter automatic device supplied by Masimo pulse CO-oximetry technology.

DATA COLLECTION AND STATISTICAL ANALYSIS

The raw data of the current study was subjected to statistical analysis after collation and codification using Statistical Package for Social Students (SPSS) software version 26 supplied by IBM-SPSS Incorporation, Chicago, United State of America. Discrete variables were represented with frequency and percentages tables while continuous data were expressed as mean plus or minus standard deviations (X±SD). One sample Kolmogorov-Smirnov test was used to assess the normality of the data. All data were normally distributed; hence, parametric procedure was used for the statistical analysis of the data. The prevalence rate formulae were used to calculate the prevalence rate of HIV 1 and 2 infections. A two tailed *p*-value of <0.05 was considered indicative of a statistically significant difference. Comparison of the parameters and variables between the samples   were performed using independent t-test while comparison among various age groups were analyzed using ANOVA. Association between variables were analyzed using Chi Square and Fischer exact tests. Alpha value of 0.5 was used.

RESULTS

A total of 600 samples that were made up of 324 male unmarried participants representing (54%) and 276 male married participants representing (46%) were randomly collected from apparently healthy long distant truck drivers (LDTDs) of commercialized private and public vehicles selected and recruited from six bus terminals in Calabar Municipality, Cross Rivers State, Nigeria. The results were displaced as shown in the

following Tables 1-5 below. **Table 1** shows the socio-demographic characteristics of 600 voluntary apparently healthy participants according to turn out rate, level of awareness of HIV infection and marital status in all the six-bus terminal across Calabar Municipality, Cross Rivers State, Nigeria. It is observed that both unmarried and married participants fall between the age ranges of 31-35 years and closely followed by 26-30 years. The prevalence percent distribution indicates a lower age range percent distribution in married participants.

Table 1: Turn out rate of unmarried and married voluntary apparently healthy participants according to Age and Gender demographic characteristics in all bus terminals across Calabar Municipality, Cross Rivers State, Nigeria.

Demographic Parameters			Turn Out Rates of participants and Marital Status				
NOBTSS	Age Range (Year)	Sex	Married males that turned out	un married males that turned out	Total Participants that turned out	F-ratio	*p*-value remarks
			(f)(%)	(f) (%)	(f)(%)		
1	20-25	M	79(13.17)	36 (06.00)	115 (19.17)	5.125	.008 *S**(P <0.05)*
2	26-30	M	51(08.50)	100 (16.67)	151(25.17)		
3	31-35	M	136(22.67)	160(26.67)	296 (49.33)		
4	36-40	M	10(01.67)	13 (02.16)	23(03.83)		
5	41-45	M	00 (00)	10(01.67)	10(01.67)		
6	46-50	M	00	5(0.83)	5 (0.83)		
7	51-55	M	00(00)	00(00)	00(00)		
Total(N)			276(46)	324(54)	600(100)		

N =total number of samples, frequency =f and percentage =%, long distant truck drivers= LDTDs, Number of bus terminal selected and studied=NOBTSS. *Using t-test there was statistically significant difference between unmarried and married subjects (Calculated t- test =3.0, alpha value =0.05, Right-tail p-value is 0.012, P<0.05) and **Using analysis of variance (ANOVA) there was statistically significant difference between age range and number of groups F-ratio=5.125, alpha value =0.05, F-test critical value =3.00, Right-tail p- value was 0.008, P<0.05)

Table 2 shows the total numbers of blood samples randomly collected by standard method from 600 apparently healthy subjects in the 7 recruitment and HIV pre-counselling sites which were bus terminal or bus stations of these Long Distant Truck Drivers of commercialized private and public vehicles. It is observed that the distribution of the 600 apparently healthy participants based on their company type and marital status. It is observed that unmarried and married participants who were in the public sector had more blood samples than the married and unmarried participants who were in the private sector. The prevalence percent distribution indicates a lower blood sample percent distribution in married participants.

Table 2. Distribution of the number of blood samples collected from commercialized private and public Long Distant Truck Drivers (LDTDs) according to their marital status in Calabar Municipality, Cross River state, Nigeria.

Parameters	Number of Samples Collected From married male	Number of Samples Collected From Unmarried male	Total number of Samples collected from both participants	Calculated Chi Squared	*p*-values
Type of LDTDs	f(%)	f(%)	f(%)	X^2	
Private	76(12.67)	100(16.67)	176(29.33)	3.10	**0.013

Public	200(33.33)	224(37.33)	424(70.67)		
Total (N)	276(46)	324(54)	600(100)		

N =total number of samples, frequency =f and percentage =%, Long Distant Truck Drivers =LDTDs

*Using Chi Square X^2 test there was statistically significant difference between the numbers of samples collected from the two centers. Calculated Chi Square test (X^2) was =5.825, at degree of freedom (df) =1, Total of sample collected (N) =600, alpha value =0.05, and Chi Square test (X^2) critical value or Table value =3.84. The obtained Chi Square test (X^2) value (5.825) was greater than the critical value (3.84) or (X^2 calculated value > X^2 table value) and right-tail p-value is 0.0158 (P<0.05).

**Using Chi Square X^2 test there was statistically significant difference between the numbers of samples collected from unmarried and married male subjects. Calculated Chi Square test (X^2) was = 5.825, Total of sample collected (N) =600, alpha value =0.05, and Chi Square test (X^2) critical value or Table value =3.84. The obtained Chi Square test x2 value (5.825) was greater than the critical value (3.84) or (X^2 calculated value > X^2 table value) and right-tail p-value is 0.0158 (P<0.05).

Table 3 shows the results of the three HIV I &2 antibody screening test kits based on marital status, company sector and type of studied long-distant truck drivers bus terminal. Out of 600 participants' blood samples collected a total of 27(04.5%) samples tested reactive and 573(95.5%) tested non-reactive. There were 10(1.7%) and 590 (98.3%) participants,9(1.5%) and 591 (98.5%) participants, and 8(1.33 %) and 592(98.67%) participants tested positive and negative to HIV 1& 2 Determine, Stat-Pak, and Unigold antibody screening test kits respectively if done alone and one at a time. There was no statistical significance different between the positive and negative results of the three HIV 1 & 2 antibody screening test kits (p>0.05). There were 2 discordant samples between HIV 1 & 2 Determine and Stat-Pak, 3discordant samples between HIV 1 & 2 Determine and Unigold antibody test screening kits, 1 discordant sample between Stat-Pak, and Unigold antibody test screening kits.

Table 3. Results of the three HIV I & 2 antibody screening test kits according to marital status of the 600 studied long-distant truck drivers in Calabar Municipality, Cross River state, Nigeria.

Variable	Hiv Determine Antibody Test Kit		Hiv Stat-Pak Antibody Test Kit		Hiv Uni-Gold Antibody Test Kit		Total
Marital status	Number of participants tested Positive	Number of participants tested Negative	Number of participants tested Positive	Number of Participants tested Negative	Number of participants tested Positive	Number of participants tested Negative	participants tested positive to both tests
	f(%)	f(%)	f(%)	f(%)	f(%)	f(%)	f(%)
Unmarried	6(1.0)	318(53)	6(1)	318(53)	3(.5)	321(53.5)	15(55.56)

| Married | 4(0.7) | 272(45.3) | 3(.5) | 273(45.5) | 5(.83) | 271(45.17) | 12(44.44) |
| Total (N) | 10(1.7) | 590(98.3) | 9(1.5) | 591 (98.5) | 8(1.33) | 592(98.67) | 27(100) |

N =total number of samples, frequency =f and percentage =%,

*There was no statistically significant different between the positive results of the three HIV 1 & 2 antibody screening test kits despite the disparity in the percentage positivity. (F -ratio = 1.7997, df1 = 2, df2 = 3, F-critical value = 9.55, at alpha value of 0.05, Right-tail p-value is 0.307) (p>0.05).

**Using t-test there was no statistically significant different between the mean positive results of the three HIV 1 & 2 antibody screening test kits in unmarried and married male subjects (Calculated t- test =2.5, Degree of freedom (df) =2, alpha value =0.05, t-test critical value =1.943, Right-tail p-value is s 0.06481, P>0.05).

The **Table 4** below shows the results of the anthropometric and biophysical parameters for the two groups participants and according to marital status and type of the company sector of the 600 studied long-distant truck drivers in Calabar, Nigeria. For the unmarried participants the mean Weight (W/Kg) =72.28±11.85, the Height (H/M) =1.65 ±.07, Body Mass Index (BMI), =25.25 ±6.50, Systolic Blood Pressure (SBP/mmHg)=119.17±13.28, Diastolic Blood Pressure ((DBP/mmHg) =83.62±10.78, Pulse Rate (PR/Bpm)= 83.85±12.62, Pulse Oximeter (SPO2) 98.51±0.70, Respiratory Rate (RR/cpm=17.57±1.61,Abdominal Circumference (AC/cm)=98.86±10.88= Mean Upper Arm Circumference (MUAC/cm)= 23.34 ± 9.74 and Temperature (T/ ^{0}C)=37.17 ± 0.71. Comparatively, in the married group the Weight (W/Kg) =74.30 ±10.13,Height (H/M) =1.66 ± 0.05,Body Mass Index (BMI)= 27.02 ± 3.33, Systolic Blood Pressure (SBP/mmHg)= 120.89 ± 12.37, Diastolic Blood Pressure (DBP/mmHg)=87.46 ± 9.40,Pulse Oximeter (SPO2) =98.50 ± 0.65, Pulse Rate (PR/Bpm) =88.22 ± 11.70, Respiratory Rate (RR/cpm)=17.58 ± 1.46, Abdominal Circumference (AC/cm)= 99.58 ± 8.67, Mean Upper Arm Circumference (MUAC/cm)= 23.50 ± 5.61 and Temperature (T ^{0} C)= 37.06 ± 0.73. There was a statistically significant differences (*P*<0.05) between the Mean value of Body Mass Index for the married group and the unmarried group respectively (degree of freedom (Df) =528, t-value =3.5151, *P*-value =0.0005 at alpha level=.05). There was a statistically significant differences between the Mean value of Diastolic Blood Pressure for the married group and the unmarried group respectively (*P*<0.05, the t-value =3.9167, and p-value =0.0001 at alpha level=.05). Total number of sample (N) =600. There was a statistically significant differences between the Mean value of pulse rate (PR) for the married group and unmarried group respectively (*P*<0.05). The t-value =3.7092, the *P*-value =0.0002 at alpha level of 0.05

There were no statistically significant differences between the Mean value of Weight, Height, Systolic Blood Pressure, Pulse Oximeter, Respiratory Rate, Abdominal Circumference, Mean Upper Arm Circumference and Temperature for the married group and unmarried group respectively (P>0.05), at alpha level of 0.05. the private group were made of married and the unmarried male respondents while commercialized group were made of married and the unmarried male respondents respectively.

Table 4: Results of the anthropometric and biophysical parameters for both married and unmarried long-distant truck drivers

Anthropometric/ Biophysical Parameters Studied			Married group (n=276)	Unmarried group n=324)			
Names of Parameters	Codes	Units	Mean value ±SD*	Mean value ±SD*	t-values	P-Value	Remarks
Weight	W	Kg	72.28±11.85	74.30 ±10.13	1.8916	0.0592	NS***
Height,	H	M	1.65 ±.07	1.66 ± 0.05	1.3509	0.1775	NS***

Body Mass Index	BMI		25.25 ±6.50	27.02 ± 3.33	3.5151	0.0005	S**
Systolic Blood Pressure,	SBP	mmHg	119.17±13.28	120.89 ± 12.37	1.3845	0.1669	NS***
Diastolic Blood Pressure,	DBP	mmHg	83.62±10.78	87.46 ± 9.40	3.9167	0.0001	S**
Pulse Oximeter	SPO2	%	98.51±0.70	98.50 ± 0.65	0.1532	0.8783	NS***
Pulse Rate =PR,	PR	Bpm	83.85±12.62	88.22 ± 11.70	3.7092	0.0002	S**
Respiratory Rate	RR	Cpm	17.57±1.61	17.58 ± 1.46	0.0673	0.9464	NS***
Abdominal Circumference	AC,	Cm	98.86±10.88	99.58 ± 8.67	0.7491	0.4542	NS***
Mean Upper Arm Circumference	MUAC	cm	23.34 ± 9.74	23.50 ± 5.61	0.2042	0.8383	NS***
Temperature	T	^{0} C	37.17 ± 0.71	37.06 ± 0.73	1.2949	0.1961	NS***
Total sample size(N)			**600 (100.0)**				

X±SD* = Mean value plus or minus two standard deviation for private and commercial group that were made of married and the unmarried male respondents respectively respondents. Total number of sample (N) =600, n= sample size for both groups.

S* = statistically significant differences between the Mean value of variables for both groups (P<0.05

NS * = No statistically significant differences between the Mean value of variables for both group (P>0.05).

DISCUSSION

Long-haul truck drivers are individuals who operate heavy trucks and tractor-trailers (with a capacity of at least 26,000 pounds Gross Vehicle Weight) [47]. These individuals are essential to the transportation of varieties of goods and materials in both the public and commercial sectors of the economy in many industrialized countries of the world [48]. Recent studies have shown that these types of jobs are highly demanding especially when low self-control, tight delivery schedules, no delays, and sometimes over-stressing can cause stress related sicknesses which finally cumulate or lead to poor health status [49]. By occupational law, drivers of commercial private and public vehicles or trucks are permitted only 14 hours of duty per day worked. They are required to take a mandatory 10-hours break before they can drive again for work. As a result, long freight delivery roads often require them to sleep away from home. Life on the road makes it more difficult to live healthy because of irregular schedules, long hours, little physical activity, limited access to healthy foods on the interstates stress [50].

The results in **Table 1** shows the frequency distribution of demographic parameters of 600 voluntary apparently healthy subjects according to turn out rate, level of awareness of HIV infection, age and marital status in Calabar Municipality, Cross River State Nigeria. There was a high turnout rate for voluntary counselling and testing (VCT) among married group of long distant truck drivers (LDTDs) than the unmarried group long distant truck drivers (LDTDs). The reasons for this result is because of high level of awareness of voluntary counselling and testing (VCT) and good knowledge ,good perception, good attitude, good preventive majors and good practices of HIV I and 2 by the married groups before their respective marriages .Another reason for differences in this result is that married group were mindful or afraid ofthe wives and children and the damaging impacts and effects HIV I and 2 that they might have alreadyseen on the life of other infected victims. On the other hand unmarried group have had no

premarital experience, no wives and children to worried about and hence they never bothered to show up. These results were in line with of that of [51] who had a similar observation in Indian and [52]. However, these results were not in line with of [53]. This might be so because of evolution in the epidemiological update and aggressive fight against the HIV I and 2 infection.

Similarly, the results in **Table 2** shows the frequency distribution of voluntary apparently healthy subjects and their blood samples collected from commercial public and private LDTDs according to their marital status in Calabar, Cross River State , Nigeria. There were more married group of public long-distant truck divers than private groups. Our results are in line with the studies of the following researchers who had advanced three theories for the explanation of these results. The first is that there is the general conception that the public companies are more lucrative than the private companies in eyes of Nigeria population and the theory that more unmarried groups are usually in the private sector than in public sector which is in line with *[54]*. Secondly, it is on records that public companies usually pay more salary than private companies [55] and since more married men need increase wages or higher salary because of their family's financial burdens, they will usually prefer to join the public companies and hence more married men are involved. In sharp contrast to this, the unmarried groups of men are not bothered whether it is private or public companies. The third theory is that the private companies preferred employing unmarried men than married men .however ,these results were not in line with the study of [56] .The results in **Table 3** are based on the national HIV tests algorithm in Nigeria that have been recommended by WHO,2021 [57], which employed three different HIV toolkits, the first is considered as the baseline usually Determine and Sat-Pak and Unigold which are tiebreakers .The results obtained were not in line with previous studies [58 ,59,60] and reasons for this result was due to low level of knowledge existing between HIV married men and unmarried individuals [61].In spite of the disparities of the results of three individual test kits there was an overall no different in the two groups of participants and this was in line with study of [62] and the discordant rate was also not low but insignificant which is also in line with the study of [63].

Table 4 shows the results of the anthropometric and biophysical parameters for both groups of participants. The mean value of Body Mass Index (BMI) for married group was 25.25 ±6.50 and unmarried group 27.02 ± 3.33 and t-value =3.5151and critical value =1.962 and p-value 0.0005, There was a statistically significant differences between the Mean value of body Mass Index for both groups ($P<0.05$). The degree of freedom (df) =598, Total number of sample (N) =600. However, this difference was not considered to be clinically significant hence P< 0.05 and. These results are in line with those early reported by [17,18]. The mean Diastolic Blood Pressure (DBP) -mmHg of married group was 83.62±10.78 and test group was 87.46 ± 9.40, t=3.9167, there was a statistically significant differences between the Mean value of Diastolic Blood Pressure for both group ($P<0.05$) at the degree of freedom (Df) =598, the t-value =3.9167, and *P*-value =0.0001 at the alpha level of 0.05, critical value =1.962 and Total number of sample (N) =600. However, this difference was considered to be statistically and clinically significant hence P< 0.05. Similarly, the value of mean Pulse Rate (PR)Beats/ min of control group =83.85±12.62 and test group =88.22 ± 11.70, t=3.7092 and critical value 1.962 and p-value =0.0002. Similarly, using the unpaired t-test there was a statistically significant differences between the Mean value of pulse rate (PR) for the test group and the control group ($P<0.05$) at degree of freedom (Df) =598, the t-value =3.7092, the *P*-value =0.0002 at alpha level of 0.05 and with Total number of sample (N) =600. this difference was considered to be clinically significant hence P< 0.05. All these findings were in line with the reports of [6,7,8] who have early reported the effects of fuel on the cardiovascular systems of fuel vendors in different parts of the world. There were no statistically significant differences and findings between the Mean value (±SD) of Weight, Height, Systolic Blood Pressure, Pulse Oximeter, Respiratory Rate for both the test group and the control groups (P>0.05) at the degree of freedom (Df) =598, with alpha level of 0.05 and Total number of sample (N) =600. These findings were considered to be statistically and clinically insignificant hence p>0 .05. More so, there was no statistically significant differences between the Mean value (±SD) of Abdominal Circumference and Mean Upper Arm Circumference for the both test and the control groups (P>0.05).

These results was considered to be statistically and clinically insignificant hence p>0 .05. These results were also in line with those published by [64,65,66].

CONCLUSION

In the current study, statistically insignificant discrepancies associated with prevalence rate of HIV 1 and 2 infection determined by the use of the three panels of the HIV 1 and 2 testing kit tools according to WHO's algorithm had been demonstrated. The levels of anthropometric and biophysical parameters appear to be a very importance screening pre-assessment indicator of nutritional status as well as obesity status and lifestyle risk assessment of the participants of the index study.

RECOMMENDATIONS

From the findings of this study it is recommended that selected appropriate anthropometric and biophysical parameters should be included in screening panels as a pre-assessment indicator of nutritional status as well as obesity status and lifestyle risk assessment of the participants of the index study in all centers where all HIV 1 and 2 tests are done.

We also strongly recommend that government should make it as a policy that HIV1 and 2 screening tests should be used done mandatory in terminals of all commercialized public and private Long-haul truck drivers who operate heavy trucks and tractor-trailers.

AUTHORS' CONTRIBUTIONS

1) Conception of study: FJN, (2) Design of study: FJN IIE & OCJ, (3)Sample analysis: FJN, EWO, ASE (4) Data analysis: FJN, EWO & IIE; (5) Statistical analysis: FJN, EWO , JOOO and AIS ; (6) Initial manuscript draft: FJN, EWO ,EPC and OJM, (7) All authors read and approved the final manuscript

FUNDING

AVAILABILITY OF DATA AND MATERIALS

Datasets generated and analyzed in this study are available from the corresponding author on request.

CONSENT FOR PUBLICATION

Not applicable.

COMPETING INTERESTS

The authors declare that they have no conflict of interest

REFERENCES

1. Definition of long-distance trucker from the Collins English Dictionary ,2023 . Retrieved and accessed November 28, 2023 and available online at: https://www.collinsdictionary.com/dictionary/english/longdistance-trucker
2. Centre for disease control and prevention (CDC). The national institute for occupational safety and

health (NIOSH) Studies on Long -Haul Truck Drivers (LHTD),2018, accessed retrieved on November 15th 2023 and available at ;https://www.cdc.gov/niosh/topics/truck/default .html .

3. Transportation Research Circular. The domain of truck and bus safety research. Transportation Research Circular E-C117 ,(2007). Available at: http://onlinepubs.trb.org/onlinepubs/circulars/ec117.pdf.

4. Bureau of Labor Statistics .Nonfatal occupational injuries and illness requiring days away from work, 2012. Table 4. Available at: http://www.bls.gov/news.release/pdf/osh2.pdf.

5. Chen, G. X., Sieber, W. K., Lincoln, J. E., Birdsey, J., Hitchcock, E. M., Nakata, A., et al., NIOSH national survey of long-haul truck drivers: Injury and safety. Accident; analysis and prevention, (2015). 85, 66–72. https://doi.org/10.1016/j.aap.2015.09.001.

6. Sieber WK, Robinson CF, Birdsey J, Chen GX, Hitchcock EM, Lincoln JE, Nakata A, Sweeney MH. Obesity and other risk factors: the national survey of U.S. long-haul truck driver health and injury. Am J Ind Med. ,2014, 57 (6): pages 615-626. https://doi.org/10.100/ajim.22293

7. Robinson CF, Burnett C. A. Truck drivers and heart disease in the United States, 1979-1990. Am J Ind Med., 2005, 47(2):113-119.

8. Bachmann LH, Lichtenstein B, St Lawrence JS, Murray M, Russell GB, Hook EW 3rd. Health Risks of American Long-Distance Truckers: Results From a Multisite Assessment. J Occup Environ Med. 2018 Jul;60(7):e349-e355. doi: 10.1097/JOM.0000000000001319. PMID: 29538273; PMCID: PMC6037566.

9. Pachauri, S., Pachauri, A., Mittal, K. Sexual Behaviors of Long-Distance Truck Drivers. In: Sexual and Reproductive Health and Rights in India. Springer Briefs in Public Health. Springer, Singapore (2022). https://doi.org/10.1007/978-981-16-4578-5_5.

10. Sharma V, Saggurti N, Bharat S. Health care coverage among long-distance truckers in India: an evaluation based on the Tanahashi model. HIV AIDS (Auckl), 2015, 7:83-94 ,https://doi.org/10.2147/HIV.S76416.

11. International Labour Organisation. Report and analysis of "A Truck Driver's Life: Working Conditions and Sexual Health". HIV and Long-distance Transport in Paraguay. Santiago: International Labour Organisation;2012, http://www.ilo.org/wcmsp5/groups/public/@ed_protect/@protrav/@ilo_aids/documents/publication/w cms_182012. Accessed January 3, 2015.

12. Singh YN, Malaviya AN. Long distance truck drivers in India: HIV infection and their possible role in disseminating HIV into rural areas. Int J STD AIDS. 1994;5(2):137–138.

13. The World Bank. Transport Against HIV/AIDS: Synthesis of Experience and Best Practice Guidelines. Washington, DC: The World Bank; 2009. Available from: http://siteresources.worldbank.org/INTTRANSPORT/Resources/336291-1227561426235/5611053-1229359963828/tp-25-HIV-AIDS.pdf. Accessed January 3, 2015

14. Chandrasekaran P, Dallabetta G, Loo V, Rao S, Gayle H, Alexander A. Containing HIV/AIDS in India: the unfinished agenda. Lancet Infect Dis. 2006;6(8):508–521.

15. Rao KS, Pilli RD, Rao AS, Chalam PS. Sexual lifestyle of long-distance lorry drivers in India: questionnaire survey. BMJ. 1999;318(7177):162–163.

16. Hudson CP. AIDS in rural Africa: a paradigm for HIV-1 prevention. Int J STD AIDS. 1996;7(4):236–243.

17. Casadei K, Kiel J. Anthropometric Measurement. [Updated 2022 Sep 26]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2023 Jan-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK537315/

18. Gavriilidou NN, Pihlsgård M, Elmståhl S. Anthropometric reference data for elderly Swedes and its disease-related pattern. Eur J Clin Nutr. 2015 Sep;69(9):1066-75. [PMC free article] [PubMed]

19. Biology Dictionary Editor and Reviewed by: Biology Dictionary of Editors, Last Updated: May 15, 2017. Accessed and retrieved on 12th December,2023 and available at: https://www.cdc.gov/niosh/topics/anthropometry/default.html

20. WHO Expert Committee for the present and future uses and interpretation of anthropometry.

conclusions and recommendations of the Meeting report of 28 February 1995. Accessed and retrieved on 12th December,2023 and available at: https://www.who.int/publications/i/item/9241208546

21. Ayesha B.M. Kharsany and Quarraisha A. Karim, HIV Infection and AIDS in Sub-Saharan Africa: Current Status, Challenges and Opportunities, Open AIDS J. 2016; 10: 34–48, 2174/1874613601610010034

22. Fadela Chaib and Tunga Namjilsuren, The World Health Organization (WHO) flags key challenges to global HIV response at International AIDS Conference, meets at the International AIDS Conference in Durban, South Africa, from 18–22 July 2016, Note for Media, Reading time: 4 min (989 words). https://www.who.int/news/item/14-07-2016-who-flags-key-challenges-to-global-hiv-response-at-international-aids-conference.

23. Simon Dixon,Scott McDonald, Jennifer Roberts,,The impact of HIV and AIDS on Africa's economic development, BMJ. 2002 Jan 26; 324(7331): 232–234.

24. Joses M Kirigia , Luis G Sambo, Tuoyo Okorosobo, Germano M Mwabu ,Impact of HIV/AIDS on Gross Domestic Product (GDP) in the WHO Africa Region Afr J Health Sci . Jan-Jun 2002;9 (1-2):27-39.

25. Shongkour Roy , The effects of HIV/AIDS on economic growth and human capitals: a panel study evidence from Asian countries Multicenter Study AIDS Care. 2014;26 (12):1568-75.

26. Helene D. Gayle and Gena L. Hill, Global Impact of Human Immunodeficiency Virus and AIDS, Clin Microbiol Rev. 2001 Apr; 14(2): 327–335.

27. Malcolm Kendrick. "Why being 'overweight' means you live longer: The way scientists twist the facts".(2015). http://www.independent.co.uk. Retrieved 12 April 2015.

28. Britannica, T. Editors of Encyclopedia anthropometry. Encyclopedia Britannica. (2019, March 7). Accessed and retrieved on 13th December ,2023 and available at https://www.britannica.com/science/anthropometry

29. Jeffrey E. Harris, Why We Don't Have An HIV Vaccine, And How We Can Develop One Meeting HIV/AIDS Costs; Fighting Neglected Diseases, Health Affairs November/December 2009, Vol. 28, No. 6:

30. World Health Organization Global Health Observatory data on HIV/AIDS (WHO GHO, 2023).

31. United Nation Joint Programme on AIDS, Global HIV/AIDS 2023 (UNAIDS, 2023): fact sheets.

32. Akintola A, Adutola M, Olayinka T, et al., editors. cancer in Nigeria 2009-2016 internet. Nigeria: Nigeria national system of cancer registries, Cross Rivers State, 2021.And available at: https://www.ncbi.nlm.nih.gov/book/nbk581069/.

33. Evaluation of domestic access to pipe -born water in Calabar Metropolis, Southern Nigeria -scientific figure on ResearchGate available from: https://www.researchgate.net/figure/map_of Calabar_metropolis _Calabar south_and _municipality _LGAs_source _office of the _fig5_322079641. https://www.script.org

34. National Population Commission (NPC) [Nigeria] and ICF Macro. 2009. Nigeria Demographic and Health Survey2008. Abuja, Nigeria: National Population Commission and ICF Macro.

35. Cochran, W. G. Sampling techniques (3rd edtion.), 605 third Avenue, New York, New York, 10016 by John Wiley & Sons inc, (1977). ISBN0-471-02939-4

36. Bartlett, J. E., II, Kortrijk, J. W. & Higgins, C. Organizational research determining appropriate sample size for survey research", Information Technology, Learning, and Performance Journal, (2001)."19(1), 43- 50.

37. Rao J.N.K., Sample size calaculation, by Rao soft, Internationa incooporation, (2004):

38. Ary, D., Jacobs, L. C., & Razavieh, A. (1996). Introduction to research in education. Fort Worth,TX: Harcourt Brace College Publishers.

39. Charan J. and Biswas T. How to calculate sample size for different study designs in medical research . *Indian Journal of Psychological Medicine,* (2013). 35(2), Pages 121-126.

40. Glenn D. Isreal Determining sample size , University of Florida, Cooperative Extention service, Institute of Food And Agriculture Sciences (IFAS), EDIS, Florida ,psychosphere.com., (2013): https://www.psychosphere.com/.

41. The U.S. Agency for International Development (USAID) List of Approved HIV Rapid Test Kits includes (1) the HIV rapid test kits below and (2) HIV rapid test kits approved by the World Health Organization (WHO) Prequalification of Medicines Program (2017). https://www.unsaid.gov.

42. Global Fund Quality Assurance Policy for Diagnostic Products in force since 1st March 2011.(https://www.theglobalfund.org/media/5885/psm_qadiagnostics_policy_en.pdf),

43. WHO releases new toolkit to support quality HIV testing services,16 November 2021 Departmental news Reading time: 2 min (427 words). https://www.who.int/news/item/16-11-2021-who-releases-new-toolkit-to-support-quality-hiv-testing-services

44. Kosack CS, Shanks L, Beelaert G, Benson T, Savane A, Ng'ang'a A, Bita A, Zahinda JBN, Fransen K, Page A. 2017. Designing HIV Testing Algorithms Based on WHO Guidelines Using Data from Six Sites in Sub-Saharan Africa. J Clin Microbiol ,2015, 55: https://doi.org/10.1128/jcm.00962-17

45. IBM Corp. Released IBM SPSS Statistics for Windows, Version 26.0. Armonk, NY: IBM Corp. 2019.

46. Latham Michael C. Human nutrition in the developing world by Professor of International Nutrition, Cornell University Ithaca, New York, USA, produced by Food and Agriculture Organization of the United Nations. Food and Nutrition Series No. 29, (1977). ISBN 92-5-103818-X and ISSN 1014-3181.

47. Del Bene Ve,Temperature in : Walker HK, Hall WD, Hurst JW, Editors . Clinical Methods: the history, physical, and laboratory, examination, 3rd editions, Boston :Butterworths,1990.chapter 218. Available at https://www.ncbi.nlm.nih.gov/books/NBK331/

48. WHO, technical specification for automated non-invasive blood pressure measuring devices with cuff ,2020,https://www.who.int/docs/default-source/searo/inonesia/tech-spec-for-automated-no-

49. Medscape, hypertension guidelines online ,2022, https://emedine.medscape.com/article/241381-guideline

50. Dimitrova DS, Kaishev VK, Tan S (2020). "Computing the Kolmogorov–Smirnov Distribution when the Underlying cdf is Purely Discrete, Mixed or Continuous". Journal of Statistical Software. 95 (10): 1–42. doi:10.18637/jss.v095.i10.

51. Dembe, AE, Delbos, R, Erickson, JB. (2005) The impact of overtime and long work hours on occupational injuries and illnesses: new evidence from the United States. Occupational and Environmental Medicine 62(9): 588–597. Google Scholar | Crossref | Medline | ISI.

52. Beilock, R. Schedule tightness and work hours of long-distance tractor trailer drivers in the United States. In: Canadian Transportation Research Forum. Victoria, BC, Canada: Canadian Transportation Research Forum, (1994), pp. 519–531. Google Scholar.

53. Federal Motor Carrier Safety Administration (FMCSA), US Department of Transportation 49) FMCSA Field HOS Survey: Motor Carrier Industry Implementation and Use of the April 2003 Hours of Service Regulations. Washington, DC: FMCSA, US Department of Transportation, (2005). [Google Scholar]..

54. Michael H Belzer, Stanley A Sedo, Why do long distance truck drivers work extremely long hours?, First Published ,September 18, 2017, Vol 29, Issue 1, 2018 Article Research, Available at: https://doi.org/10.1177/1035304617728440..

55. Sunil S Solomon, Shruti H Mehta, Amanda Latimore, Aylur K Srikrishnan, David D Celentano . The impact of HIV and high-risk behaviours on the wives of married men who have sex with men and injection drug users: implications for HIV prevention . (2010) : Avaible at : https://doi.org/10.1186/1758-2652-13-S2-S7.

56. Augustin J. Kposowa, marital status and HIV /AIDS Mortality: Evidence from the US National Longitudinal Mortality Study, International Journal of infectious Diseases, Volume17, Issue 10, (2013), Pages e868-e874.

57. Shisana ,N. Zungu-Dirwayi, Y. Toefy, L. C. Simbayi, S. Mark, K. Zuma , marital status and risk of HIV infection in South Africa, july 2004 ,Volume 94, No7 ,SAMJ.

58. Scott, Patrick G. and Santa Falcone. "Comparing Public and Private. Organizations: An Exploratory Analysis of Three Frameworks," American,1998.

59. Samuel Aryee, Public and Private Sector Professionals: A Comparative Study of their Perceived

Work Experience First Published Mar 1, 1992; pp. 72–85. Available at: https://doi.org/10.1177/1059601192171006.

60. Samuel Aryee, Dail Fields, Vivienne Luk A Cross-Cultural Test of a Model of the Work-Family Interface First Published August 1, 1999 Research Article. Available at: https://doi.org/10.1177/014920639902500402

61. The release of new toolkit to support quality of HIV testing services, department news, 2021.

62. Olive Shisana, Kathryn Risher, David D Celentano, Nompumelelo Zungu, Thomas Rehle, Busani Ngcaweni, Meredith GB Evans Does marital status matter in an HIV hyperendemic country? Findings from the 2012 South African National HIV Prevalence, Incidence and Behaviour Survey AIDS Care. Author manuscript; available in PMC 2017 Jan 1.Published in final edited form as: AIDS Care. 2016; 28(2): 234–241. Published online 2015 Nov 9. doi: 10.1080/09540121.2015.1080790 PMCID: PMC5146982.

63. Nabukenya, A.M., Nambuusi, A. & Matovu, J.K.B. Risk factors for HIV infection among married couples in Rakai, Uganda: a cross-sectional study. BMC Infect Dis 20, 198 (2020). Available at: https://doi.org/10.1186/s12879-020-4924-0.

64. Jonathan Peter E, Experiences of Married Men with HIV during the Early Phase of Diagnosis within the Context of Mandatory Disclosure: A Literature Review, Journal of AIDS Clinical Research & STDs Category: Clinical Type: Review Article.

65. Glenda Roberta Oliveira Naiff Ferreira, Ingrid Saraiva de Oliveira, Wanne Letícia Santos Freitas, Ana Luisa Brandão de Carvalho Lira, Renata Karina Reis, Elucir Gir, Aline Maria Pereira Cruz Ramos, et al. Factors associated with low knowledge about sexually transmitted infections in subnormal agglomerate, in the Brazilian Amazon,Prim Health Care Res Dev. 2021; 22: e70. Published online 2021 Nov 12. doi: 10.1017/S1463423621000700 PMCID: PMC8628559.

66. Rose Kisa, Joseph K. B. Matovu, Esther Buregyeya, William Musoke, Caroline J. Vrana-Diaz, Jeffrey E. Korte, Rhoda K. Wanyenze, Repeat HIV testing of individuals with discrepant HIV self-test results in Central Uganda AIDS Res Ther. 2019; 16: 26. Published online 2019 Sep 12. doi: 10.1186/s12981-019-0243-1,PMCID