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Diagnostic Quality of HIV Testing In Seafarers in the Maritime Industry in Nigeria

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Abstract

Although external quality assurance programme for assessingquality of laboratory data has been recognised in Africa but its role in evaluatingthe quality of test results for seafarers' medical fitness certificate in the maritimehealth industry has not been well established in Nigeria.The purpose of this studyisto determine the diagnostic quality of data from theMRLs in Nigeria through EQA programmes, using data on HIV todetermine the accuracy of laboratory results.This study is a cross-sectional study with the use of Proficiency Panel Testing to evaluate the quality of HIV data (Sensitivity, Specificity, accuracy and timeliness of results from MRLs). The HIV accuracy was 72.7%, respectively, which was lowwhen compared to the National Reference Laboratory (NRL) standards. The Sensitivity and specificity for HIV data were 77% and 68%, respectively. The turnaround time for HIV results showedthat only 40% of results were returned to seafarerswithin the recommended timescale. The mean overall SLIPTA score was51.23% with less than one-star rating in most MRLs. This study concludes that there is a low quality of data for seafarers in Nigeria. A highquality management system in the laboratory does not necessary indicateaccurate HIV results. However, a larger quantitative study needs to be conductedto determine the state/quality of data on infectious diseases in the maritimedomain.

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I. Introduction:

Quality laboratory testing is critical to confirming the clinical diagnosis,conducting accurate surveillance of infectious diseases, and guiding public health policy. But, at this moment of crisis, the currentlaboratory infrastructures are inadequate to meet these needs andmay have been ignored (Cathy et al., 2006).In large part of Africa, there is a lack of reliable diagnostic testing and this has negative Implications for healthcare systems (Audu et al., 2012). The World Health Organization (WHO) reports that the inaccuracy of up to one percent in laboratory data can result in compromised patients' outcome, avoidable costs and distrust of physicians and health authorities(Barbe et al., 2017). However, the adverse effects of inaccurate laboratory test resultsin Africa havebeen documented. A study in South Africa, for instance, reported that false positive human immunodeficiency virus (HIV) diagnoses led to unnecessary anti-retroviral costs, even with less than one per cent inaccuracy rate (Hsiao et al., 2017). The inability due to inexperience of a scientistto detect infective organisms in patient samples can result in false negative resultsand lead to the spread of infection in the community (Sarkinfada, 2009).These findings amplify the adverse effects of wrong diagnoses on individual and public health and highlight the need for better testing facilities in developing African countries (Mekonen et al., 2018).The laboratory Quality Management System (QMS) has a huge role to play in reducing diagnostics error (Bartlett et al., 1994). A QMS is defined as that part of the organisation's management system that focuses on the achievement of outputs in relation to the quality objectives(ISO, 2007).Audu et al. (2012) affirmed that a QMSis an effective way tomeet regulatory and customer requirements, as well as avoid errorsin any area of organization.In terms of healthcare facilities, QMS is highly recognised as an important overall aspect of process documentation, procedures, and responsibilities for achieving quality policies and objectives (Sarkinfada, 2009), which in turn reduces diagnostic errors in clinical settings.

Poor laboratory infrastructure, inadequate financial resources supporting diagnostic services, insufficiently skilled laboratory personnel, poor turnaround time andpoor-quality control practicesare factors undermining diagnostic accuracy in laboratory systems(Abay et al.,2015).

Onsite diagnostics facilities are not readily available in many healthcare system such as developing African countries like Nigeria (Audu et al., 2012).These lack of facilities and poor execution of health policy

contributes to Nigeria low ranking among the UN member states. This ranking encompasses short forms of implementation governing occupational health issues, such as the maritime healthcare policy which governs seafarers in Nigeria (Okeke, 2019).A seafarer is simply referred to as any person who is employed, engaged, or works in any capacity on board a ship (NIMASA, 2017b). The maritime healthcare policy does not currently ensure accurate test results for seafarers in Maritime Reference Laboratories (MRLs) in Nigeria while the accuracy of test results from the MRLs for seafarers is particularly important to protect their health and entitlements. The occupational health risks associated with exposure to HIV in the specific population of maritime workers make it important to evaluate the quality of laboratory data in the context of the disease and the maritime industry.An External Quality Assessment System (EQAs) is adopted to ascertain laboratories deficiencies and to evaluate the QMS in a laboratory setting (Sarkafinda et al., 2008).Laboratory EQAs almost always take the form of Proficiency Panel Testing, On-Site Evaluation Programmes, or both (Sarkafinda et al., 2008).Panel Testing and On-site evaluation techniques are not readily available in many healthcare systems (Audu et al., 2012).As identified above, MRLs in Nigeria lack readily available information on the quality of seafarers' data, because there are currently no mandated quality assurance programs in place for verifying the accuracy of seafarers' test results – with data on HIV. human immunodeficiency virus (HIV)infections arecommonly quoted in the literature as one of the most common infectious causesof death in developing countries (Mudenda et al., 2012) and the seafarers' long-term exposure at sea and contact with high-riskoccupational groups such as commercial sex workers, seafarers are often at ahigher risk of HIV infection than the general population (Rachiotis et al., 2010). Nigeria has maritime-accredited hospitals that are spread across four maritime zones, derivedfrom the geographic location of the maritime assets in the country, that is., thenorthern, central, eastern and western maritime zones. There are a total of 83maritime-accredited hospitals in Nigeria. The northern zone has only 2 facilities, the central zone has14, the western zone has 18 and the eastern zone has 49 facilities. Thesehospitals are required to have laboratories with the capacity to provide basicservices for HIVinfection tests, as mandated by the Nigerian MaritimeAdministration and Safety Agency (NIMASA). Singh's framework (2015) highlights the importance ofmeasurement of allaspects of the diagnostic process in a general hospital setting, which is 50comparable to the maritime-accredited hospitals (Figure 1)

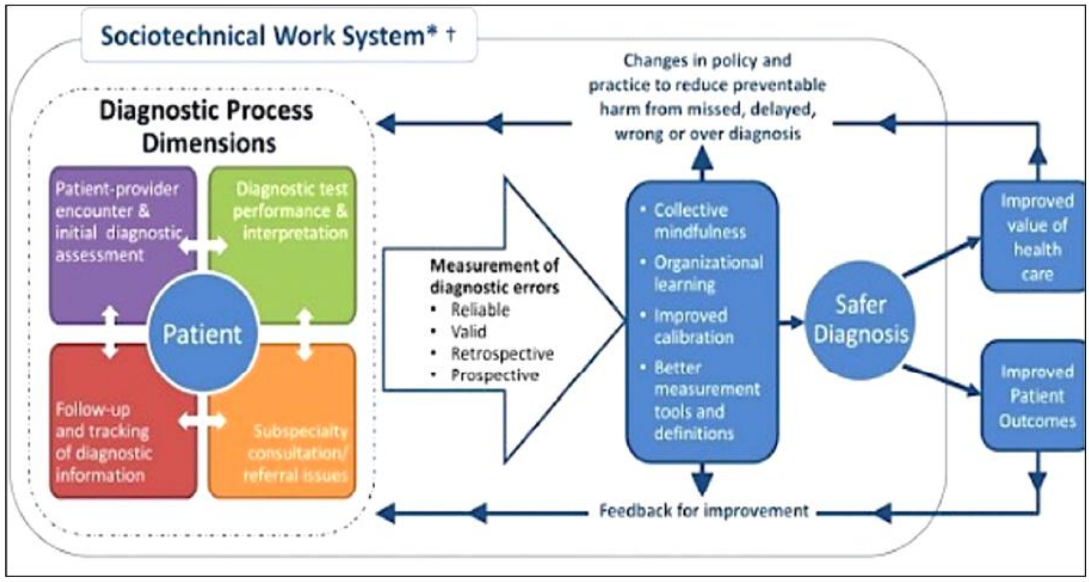

Figure1: The Safer Diagnosis Framework for the Measurement andReduction of Diagnostic Error, Detailing Diagnostic Processes (Source:Singh, 2015)

The quality of a laboratory is governed by the successfulimplementation of the pre-analytical,analytical and post-analytical phasesofthe whole examination process of the laboratory samples. The analytic phaseis mostly prone to errors by laboratory technicians; for instance, cognitive orsystem factors may contribute to the occurrence of diagnostic errors in theanalytic phase if laboratory technicians do not adhere to the national HIValgorithm or misreport test results. Diagnosis label failures occur in the MRLwhen a seafarer receives the wrong diagnosis through inaccurate reporting ofresults (Newman-Toker, 2014). A systematic review conducted to identify the factors that hinder returns in HIV test results found that thetiebreaker strategy was inferior because it left patients with an inconclusivestatus, requiring a re-test within 14 days and resulting in a follow-up loss(Ngangue et al., 2016). Despiteevidence that this kind of cognitive error mayresult in a much higher proportion of false positive diagnoses if not conductedaccurately, the national HIV testing algorithms in place in

Nigeria are still dependent on a tiebreaker test to rule out HIV infection after discrepant test results havebeen obtained (Johnson et al., 2017). Such diagnostic errors are found in bothgeneral hospitals and in the MRLs in Nigeria. There are noestablished policies on the time limit for informing a seafarer of test results orhanding over a medical certificate of fitness after conducting testsin maritime health. HIVmisdiagnosedpatients placed on ART in developing countries have assertedthat they received at least one false negative test result before they wereplaced on treatment, while other patients claimed that their results were nevershown to them despite being given an HIV-positive diagnosis (Khan et al.,2017).The limitations of the Nigerian national checklist produced by the MLSCN isthat only four elements of the QSEs are used to assess laboratories' QMS.This means that seven important components of the checklist are entirelyneglected, despite the checklist theoretically recognising all QSEs of theSLIPTA checklist in its outline. For example, a report by MLSCN (2017)indicated that the national checklist used in an audited laboratory in Nigeriarecognised only documents and records, organisation, personnel and

customer service as the acceptable elements of the QSEs. Also missing fromthe national checklist was the exact overall scoring system used by the SLIPTAchecklist (MLSCN, 2012). For instance, the national checklist had a total scoreof only 184 points for audited laboratories instead of the 275 points as indicatedby the CLSI GP26 and ISO 15189 (SLIPTA) checklists.

However, the SLIPTAchecklist indicates that where a checklist question does not apply to a laboratory audit, it may be indicated as 'not applicable' (NA). The sum of thescores of allquestions marked NA is then subtracted from the total of 275.Since the denominatorchanges, the laboratory is then rated using apercentage score (WHOAFRO, 2015).The MLSCN does not apply thiscalculation in the rating of laboratories. Therefore, this national documentcannot be compared as a benchmark with the SLIPTA checklist to assesslaboratory quality output, and thereby raises possible causes for diagnosticerrors.Other studies have also used inadequate tools to assess diagnostic processesand errors in healthcare. For instance, a study in Uganda used a differentchecklist while assessing the performance of sputum smear microscopy in theperipheral diagnostic laboratory, thereby producing ambiguous results (Aziz,

2002). The purpose of this study, is therefore to determine the diagnostic quality of data from theMRLs in Nigeria through EQA programmes, using data on HIV todetermine the accuracy of laboratory results.

II. Methodology

Study Design and Period

This was a cross-sectional study with the use of Proficiency PanelTesting to assess the quality of theHIV data (Accuracy,timeliness and reliability of HIV data). SLIPTA checklist was used to examine the QualityManagement System in place to ascertain the risk factors for diagnostic errorsin the 30 Maritime Reference Laboratories (MRLs) in Nigeria.

Ethical Approval

Ethical approval was obtained for thestudy from the Health ResearchEthics Committee of the College of Medicine, University of Lagos.Ethical approval was also obtained from the University of Bath Ethics Committee. Only those laboratories that indicated an interest in participating were enrolledin the study without any cost. Laboratories were free to declineparticipation in the study at any point in time

Study Method

The study method is divided into two distinct phases.The first phase is theProficiency Panel Testing phase while the second phase is the On-siteevaluation phase. Proficiency Panel Testing is anExternal Quality Assessment (EQA) scheme where participatinglaboratories are sent a set of samples with known values at some definedintervals to assess the performance capabilities of individual laboratories.The samples were tested the same as routinesamples from patients. This method of EQA was selected as a regulatory tool to assess qualitylaboratory results and requirements for laboratory accreditation andregistration purposes (WHO/AFRO, 2015).

Population

The population consists of 49, 14, 18 and two laboratories in the eastern, central, western zoneand northern zones, respectively making a total of 83 maritime reference laboratories. This is the population from which the maritime reference laboratories were selected in this study.

Sample Size

Thirty laboratories were selected in this study to determine the diagnostic quality of data from theMaritimeReferenceLaboratories. Ten out of 49 in the eastern zone;9 out of 14 in the central zone; 9 out of 18

in the western zone; and all twolaboratories in the northern zone. A higher number of laboratories wasselected from the eastern zone than from other zones, because the easternzone had the highest number of MRLs.

III. Data Analysis

All scored results and reports for each individual laboratory were inputted intoa FileMaker Pro v10 database. The data in Microsoft Excel sheets was thenimported into the SPSS software,version 26.0, and analysed with the use of atwo by two tablefor test sensitivities, specificities, andpredictive values for PTs performances. Descriptive statistics such asfrequencies, percentage distributions, and cross-tabulation were used todescribe the EQA performance.Sensitivity and specificity were used as diagnostic parameters for HIVassays to determine theaccuracy of data on HIV in seafarers in the MRLs. Sensitivity is the pickup rate of true positive HIVspecimens identified bythe assay under evaluation while specificity is the rate at which a test can exclude the possibility of HIVspecimen. This is calculated as the ability to diagnose negative panels.The HIV positive detected is denoted by (A),divided by the sum of the numbers of specimens identified by the NRL assaysas positive (A) and by the MRL as negative (C), i.e., (A+C). The expectedsensitivity was set at 90% for HIV data following the standard used by Mengistu et al. (2015).The percentage of true negative (TB or HIV) specimens identified by theassay being evaluated as negative (D), divided by the sum of numbers ofspecimens identified by the NRL assays as negative (D) and by the MRL aspositive (B), i.e., (B+D). The specificity was set as 99.5% at 95% confidenceinterval for both TB and HIV data (Mengistu et al., 2015).

IV. Results and Discussion of Findings

Table 1 summarises the performance of the MRLs, using Proficiency Panel Testing on HIV samples. Overall, the accuracy value of results on HIV samples was poor. The MRLs had only 72.7% accuracy in correctly diagnosing the HIV status of patients (Table 1).In the MRLs, a total of 138 (46.0%) and 162 (54.0%) samples were HIV negative and positive, respectively compared to the NRL, where 152 and 148 samples were HIV negative and positive, respectively. Where TP is the true positive, FN is the false negative, TN is the true negative and FP is the false positive, TP = 114, FN = 34, TN = 104 and FP = 48. Therefore, the sensitivity indexindicated that if HIV infection is present, there is a 77.0% chance of the test picking it up, while the specificity value implies that if there is no HIV infection, there is a 68.4% chance of the test being negative.

Table 1. Diagnostic accuracy of HIV data of seafarers

Diagnostic parameter	Percentage (%)
Sensitivity	77.0
Specificity	68.4
Positive predictive value	70.4
Negative predictive value	75.4
Accuracy	72.7
False positive rate	31.6
False negative rate	23.0

Figure 2 suggests that about one third of laboratories in this study showed inadequate compliance with the national HIV algorithm. Only 30% of the participating MRLs did not have the ability to report HIV results using the national HIV algorithm, while 70% of the MRLs had adequate knowledge of the national HIV algorithm to report results.

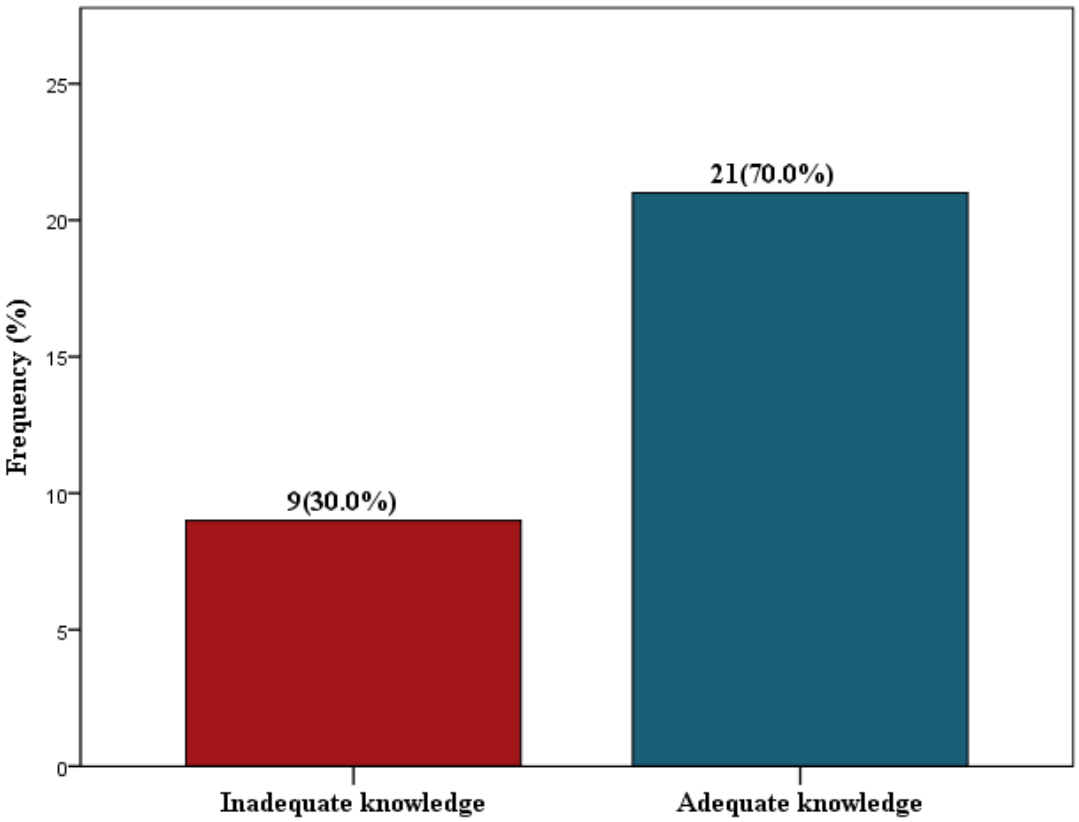

Figure 2. Percentage of knowledge on national HIV algorithm

Figure3illustrates the total number of staff working in the MRLs. Overall, more than half (56.7%) of all the laboratories assessed had staff strength of between one and five, while seven (23.3%) had staff strength between six and ten. Six (20.0%) had staff strength of more than ten people. The mean staff strength was 6.5.

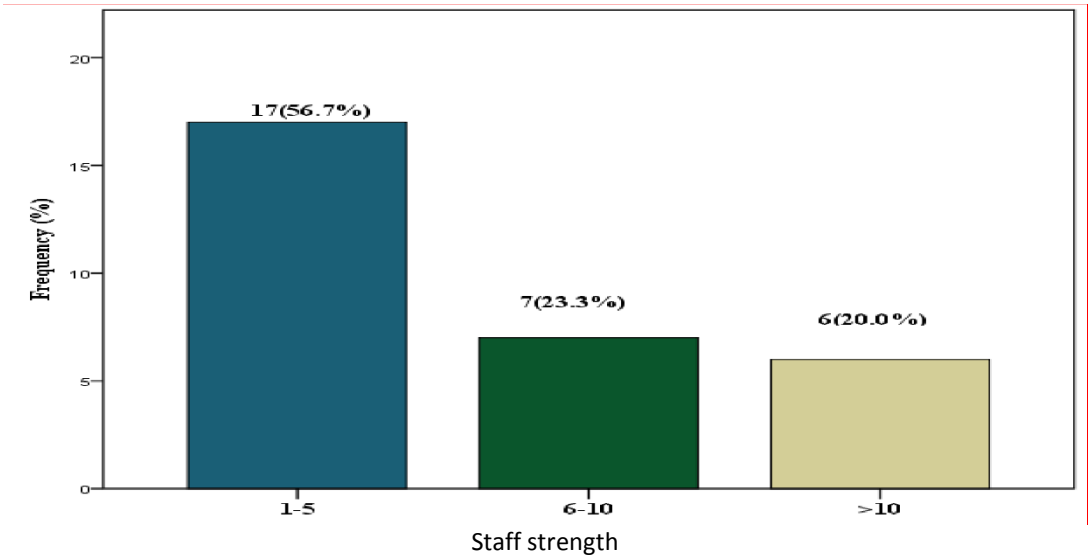

Figure 3. Numbers of staff in Maritime Reference Laboratories

The box plot presented in Figure 4illustrates the spread of overall SLIPTA scores of the MRLs in percentages. The median score is 51.3%, which is <55% (0-142points) and equivalent to zero (0) star(Table 2). The minimum SLIPTA score achieved is 13%, while the maximum SLIPTA score is 93%. The range of overall percentage score is 80%. The first quartile (1Q) is 10%–30%, the 2Q is 30%–51%, the 3Q is less than 70% and the 4Q lies between 70% and 90%.The interquartile range (IQR) of data in the box plot is 40%.

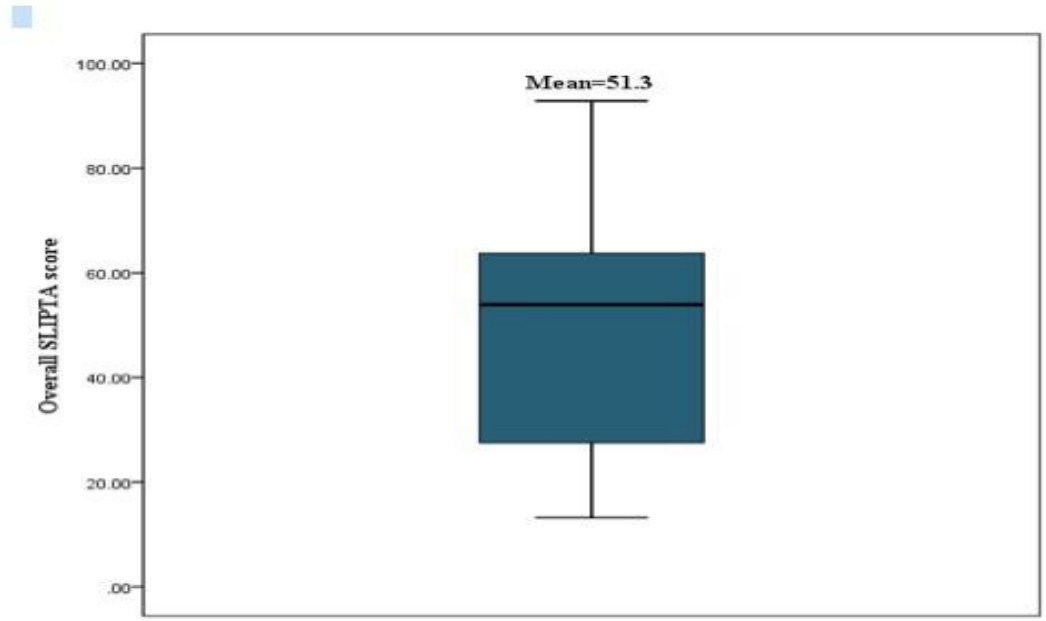

Figure 4. Box-and-whisker-plot of distribution of SLIPTA checklist scores

The results, as shown in Tables 4.61, 4.62 and 4.63, indicate that overall the MRLs had the lowest QSEs scores in Evaluation and Audit whilst the highest QSEs score was in purchase and inventory. Evaluation and Audit were not performed by 14 facilities (0% score) whilst purchase and inventory was performed by all the facilities (5 MRLs scored 100%)

Table 2a: Quality System Essential scores for each Maritime Reference Laboratory

QSEs	Expected Overall Score	Maritime Reference Laboratories- n(%scores)									
		Lab 021	Lab 022	Lab 023	Lab 024	Lab 025	Lab 026	Lab 027	Lab 028	Lab 029	Lab 030
Document and records	28	18(64.3)	16(57.1)	26(92.9)	20(71.4)	22(78.6)	24(85.7)	9(43.1)	14(50.0)	9(32.1)	16(57.1)
Management review	14	12(85.7)	10(71.4)	14(10.0)	4(28.6)	12(85.7)	13(92.9)	0(0.0)	9(64.3)	1(7.1)	10(71.4)
Organization and personnel	22	21(95.5)	14(63.6)	19(86.4)	11(50.0)	20(90.9)	22(100.0)	8(36.4)	12(54.55)	14(63.6)	3(13.6)
Client management and customer service	10	7(70.0)	6(60.0)	8(80.0)	2(20.0)	7(70.0)	10(100.0)	3(30.0)	5(40.0)	4(40.0)	6(60.0)
Equipment	33	31(88.6)	16(45.7)	24(68.6)	19(54.3)	30(85.7)	29(82.3)	13(37.1)	14(40.0)	9(25.7)	16(45.7)
Evaluation and audits	15	8(53.3)	3(20.0)	13(86.7)	5(33.3)	9(60.0)	15(100.0)	6(40.0)	0(0.0)	0(0.0)	3(20.0)
Purchasing and inventory	24	24(100.0)	18(75.0)	23(95.8)	21(87.5)	22(91.7)	24(100.0)	17(70.8)	19(79.2)	15(62.5)	19(75.0)
Process control	32	28(87.5)	27(84.4)	31(96.9)	24(75.0)	31(96.88)	30(93.8)	14(43.8)	17(53.1)	14(43.8)	27(84.4)
Information management	15	12(57.1)	12(57.1)	13(61.9)	10(47.6)	13(61.9)	13(61.9)	8(38.1)	9(42.9)	6(28.6)	12(57.1)
Correction action	19	0(0.0)	6(31.6)	19(100.0)	19(100.0)	12(63.2)	14(73.7)	0(0.0)	6(31.6)	4(21.1)	6(31.6)
Occurrence / incident management and process improvement	12	12(100.0)	10(83.3)	10(83.3)	9(75.0)	10(83.3)	12(100.0)	1(8.3)	8(66.7)	2(16.7)	10(93.3)
Facilities and safety	43	30(67.8)	22(51.2)	31(72.1)	22(51.2)	38(88.4)	40(93.0)	23(53.5)	15(34.9)	4(9.3)	22(51.2)
Overall percentage per lab	265	**203(76.6)**	**160(60.4)**	**231(87.2)**	**166(62.6)**	**226(85.3)**	**246(92.8)**	**102(38.5)**	**128(48.3)**	**73(27.6)**	**160(60.4)**
Star Rating		3 stars	1 star	4 stars	1 star	4 stars	4 stars	No star	No star	No star	1 star

Table 2b. Quality System Essential scores for each Maritime Reference Laboratory

QSEs	Expected Overall score	Maritime Reference Laboratories- Points (% score)									
		Lab 009	Lab 010	Lab 011	Lab 012	Lab 013	Lab 014	Lab 015	Lab 031	Lab 032	Lab 033
Document and records	28	7(25.0)	2(7.1)	11(39.3)	3(10.7)	11(39.3)	9(32.1)	13(46.4)	5(17.9)	6(21.4)	17(60.7)
Management review	14	6(42.9)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	5(35.7)	12(85.7)	0(0.0)	1(7.1)	1(7.1)
Organization and personnel	22	17(77.3)	3(13.6)	7(31.8)	6(27.3)	5(22.7)	8(36.4)	17(77.3)	9(40.9)	8(36.4)	21(95.5)
Client management and customer service	10	7(70.0)	0(0.0)	2(20.0)	1(100.0)	0(0.0)	3(30.0)	8(80.0)	3(30.0	2(20.0)	2(20.0)
Equipment	33	24(68.6)	6(17.1)	11(31.4)	5(14.3)	3(8.6)	26(74.3)	33(94.3)	3(8.6)	12(34.3)	10(28.6)
Evaluation and audits	15	5(40.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	7(46.7)	1(6.7)	0(0.00	0(0.0)
Purchasing and inventory	24	23(95.8)	1(4.2)	7(29.2)	8(33.3)	21(87.5)	13(54.2)	22(91.7)	11(45.8)	14(58.3)	16(66.7)
Process control	32	28(87.5)	8(25.0)	15(46.9)	13(40.6)	15(46.8)	20(62.5)	31(96.9)	7(21.9)	1(3.1)	11(34.4)
Information management	15	13(61.9)	9(42.9)	5(23.8)	8(38.1)	9(42.9)	10(47.6)	12(57.1)	4(19.1)	6(28.6)	11(52.4)
Correction action	19	4(21.1)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	19(100.0)	1(5.3)	0(0.0)	1(5.3)
Occurrence / incident management and process improvement	12	10(83.3)	0(0.0)	0(0.0)	1(8.3)	1(8.3)	0(0.0)	10(83.3)	1(8.3)	3(25.0)	9(75.0)
Facilities and safety	43	29(67.44)	6(13.9)	5(34.9)	10(23.3)	18(41.9)	24(55.8)	29(67.4)	13(30.2)	6(14.0)	25(58.1)
Overall score	265	**168(63.4)**	**35(13.2)**	**73(27.6)**	**55(20.8)**	**83(31.3)**	**118(44.5)**	**213(80.4)**	**58(21.9)**	**68(25.7)**	**124(46.8)**
Rating		1 star	No star	No star	No star	No star	No star	3 stars	No star	No star	No star

Table 2c. Quality System Essential scores for each Maritime Reference Laboratory

QSEs	Expected Overall score	Maritime Reference Laboratories - Points (% score)									
		Lab 004	Lab 005	Lab 006	Lab 007	Lab 008	Lab 016	Lab 017	Lab 018	Lab 019	Lab 020
Document and records	28	2(7.1)	13(46.4)	19(67.4)	3(10.7)	9(32.1)	2(7.14)	2(7.14)	10(35.7)	14(50.0)	12(42.9)
Management review	14	0(0.0)	14(100.0)	2(14.3)	3(21.4)	3(21.4)	0(0.0)	0(0.0)	1(7.1)	10(71.4)	8(57.1)
Organization and personnel	22	2(9.1)	22(100.0)	14(63.6)	5(22.7)	2(90.9)	4(18.2)	5(22.7)	13(59.1)	14(63.6)	4(18.2)
Client management and customer service	10	2(20.0)	8(80.0)	6(60.0)	2(20.0)	7(70.0)	1(10.0)	1(10.0)	4(40.0)	5(50.0)	6(60.0)
Equipment	33	7(20.0)	31(88.6)	31(88.6)	19(54.3)	25(71.4)	2(5.7)	12(34.3)	20(57.1)	16(45.7)	22(62.9)
Evaluations and audits	15	0(0.0)	15(100.0)	2(13.3)	0(0.0)	6(40.0)	0(0.0)	1(6.67)	4(26.7)	0(0.0)	5(33.3)
Purchasing and inventory	24	14(58.3)	24(100.0)	24(100.0)	20(83.3)	23(95.8)	16(66.7)	17(70.8)	20(83.3)	24(100.0)	21(87.5)
Process control	32	5(15.6)	32(100.0)	24(75.0)	20(62.5)	18(56.3)	16(50.0)	15(46.88)	23(71.9)	27(84.4)	25(78.1)
Information management	15	7(33.3)	13(61.9)	11(52.4)	8(38.1)	11(52.4)	8(38.1)	8(38.1)	13(61.9)	10(47.6)	13(61.9)
Correction action	19	0(0.0)	19(100.0)	0(0.0)	2(10.5)	19(100.0)	0(0.0)	0(0.0)	14(73.4)	1(5.3)	2(10.5)
Occurrence / incident management and process improvement	12	0(0.0)	12(100.0)	6(50.0)	9(75.0)	9(75.0)	0(0.0)	3(25.0)	5(41.7)	12(100.0)	8(66.7)
Facilities and safety	43	10(23.3)	38(88.4)	19(44.2)	22(51.2)	35(81.4)	11(25.6)	19(44.2)	31(72.1)	31(72.1)	31(72.9)
Overall score	265	**49(19.5)**	**241(90.9)**	**158(59.6)**	**113(42.6)**	**188(70.9)**	**60(22.64)**	**83(31.3)**	**167(63.2)**	**162(61.3)**	**169(63.8)**
Rating		No star	4 stars	1 star	No star	2 stars	No star	No star	1 star	1 star	1 star

In possession of Documents and Records for their practices, MRL 023 had the highest score 92.9% for Documents and Records and the lowest score was 7.1% in MRLs 010, 004, 016 and 017 (See Tables2a, 2b and 2c).The highest score100.0% for management review was reported by MRL023 and 005 (See Table 2a and 2c *)* while MRL 010, 011, 012, 013, 031, 004, 016, 017 and 027 had the lowest scores of 0.0 % (See Table 2a, 2b and 2c). This was the same score range for Customer Services, Corrective actions and Occurrence management and process improvement. The highest score was 100% and least score was 0%. For customer services, the highest and lowest score were from MRL 026 and MRL 010, 013, respectively (Table 2a and 2b).

Corrective actions, recoded the highest scores from MRLs (005,015, 008,023 and 024) and least scores from MRLs(021,027,010,011,012,013,014,032,004,006,016 and 017). MRLs 005,021,026 and 019 scored the highest scores for occurrence management and process improvement while the least cores were from MRLs 016, 004, 010, 011 and 014. With regards to organization and personnel, the highest and least scores were 100.0% and 9.1% respectively.MRL 005 and 026 recorded the highest score and the least was MRL 004. The scores for equipment records, MRL015 had the highest score of 100% while the least score was 9% from MRL 013 and 031 respectively. In terms of Process Control, highest score was 100% from MRL 005 and least scores

was 3.1% from MRL032. For Facilitate and safety the highest score 93 % and least score 9.3% from MRL 026 and MRL 029 respectively. Information management scores vary among the participating facilities, highest score 61.9%(MRL 023, 025,026,009,018,020) and least score 19.1% (MRL 031).

The Turnaround Time for HIV results in the MRLsshowed in the Overall that fewer than half of the MRLs achieved the recommended TAT forHIV results. Only 12 (40.0%)MRLs were able to return HIV results to seafarers withinthe recommended timeframe (i.e., 30 minutes) while 18 (60.0%) of MRLs returned HIV results beyond the recommended time.

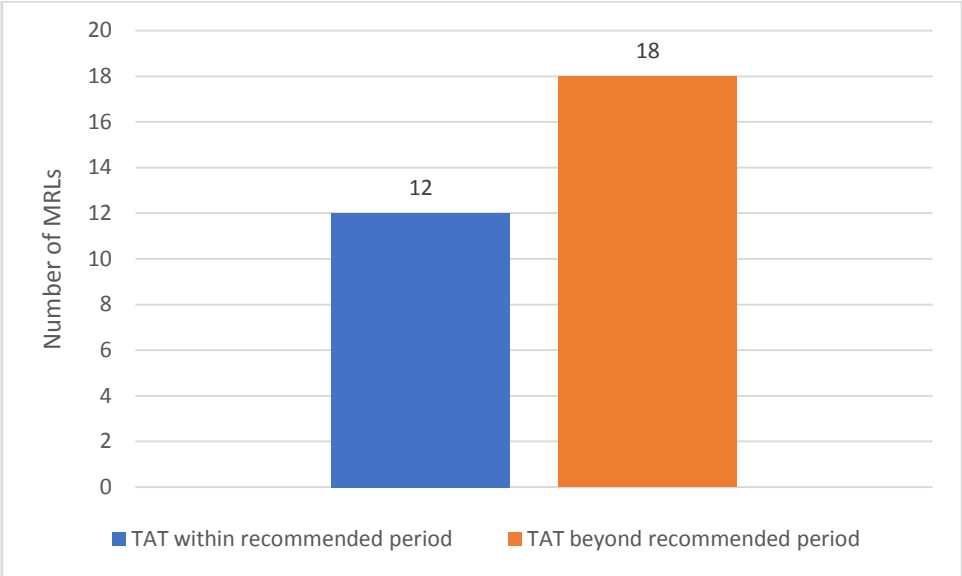

Figure 5. Turnaround time for HIV results

V. Conclusion

The HIV accuracy was 72.7%which was lowwhen compared to the National Reference Laboratory (NRL) standards.Sensitivity and specificity for HIV data was 77% and 68%, respectively. The turnaround time for HIV results showedthat only 40% of the Maritime Reference Laboratories returned HIV results to seafarerswithin the recommended timescale. The mean overall SLIPTA score was51.23% with less than one-star rating in most MRLs. The false positivity rate of HIV slides fromall the MRLs was 32%. The percentage of false negative HIV results was 23%. These inaccuracies may be partially responsible for the low casedetection rate and management of HIV findings in Nigeria. This study also found out that more than 50% ofMRLs scored above the agreed proficiency level in HIV results (>80%).

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