Original Research Article

Assessing the Impact of Pre-Third-Party logistics (PRE-3PLS) and 3PLS on Viral Load Sample Turn-Around Time in the Management of HIV/AIDS Patients in Ekiti State, Nigeria: A retrospective cross-sectional study

**Abstract**

**Background:** In 2014, The Joint United Nations Program on HIV/AIDS and its partners launched the 90–90–90 treatment targets, which aimed to diagnose 90% of all people living with Human Immunodeficiency Virus (PLHIV), 90% of PLHIV should be on antiretroviral therapy (ART) and 90% of those on ART should achieve viral suppression by 2020. Prompt HIV viral load testing and reporting is crucial to achieving the third 90% component of the target. This study aims to assess impact of Pre-Third-Party Logistics (Pre-3PLs) and Third-Party Logistics (3PLs) on viral load sample Turn-around Time (TAT) in the management of HIV/AIDS patients in Ekiti State, Nigeria

**Methods:** A cross-sectional study was carried out in ten health facilities. Quantitative and qualitative data were collected and analyzed using the R statistical software.

**Results:** High load facilities had a mean TAT of 83.68 and 30.76 days for pre-3PLs and 3PLs respectively with a mean difference of 52.92 days (95% CI:18.86-86.97, p<0.05). Low load facilities had a mean TAT of 104.4 and 26.9 days for pre-3PLs and 3PLs respectively with a mean difference of 77.38 days (95% CI: 64.50-90.26, p<0.05). Other than transportation, manpower, sample quality/integrity, reagent stockout and machine downtime, proximity, and human factors were also identified as factors associated with TAT.

**Conclusion:** The TAT reduced significantly from pre 3PLs to the present era of 3PLs. The continuous use of 3PLs should be encouraged as this could further ensure that more PLHIV will have their viral load tested with their results received on time.

**Keywords**: Antiretroviral therapy, Turn-around Time, Third-party logistics, Human immunodeficiency virus

**Introduction**

Currently, there are about 39.9 million people living with Human Immunodeficiency Virus (PLHIV) globally [1] with the majority living in low- and middle- income countries (LMIC). An estimated 67% of this proportion resides in [SHYPERLINK "https://www.avert.org/node/393"ub-Saharan Africa](https://www.avert.org/node/393) (SSA) [1]. Nigeria has the second largest HIV epidemic in the world and one of the highest rates of new infection in sub-Sahara Africa [2]. According to UNAIDS, in 2014, 9% of PLHIV globally resided in Nigeria. In 2018, there were about 1.9 million PLHIV including adults and children. However, the Nigeria National HIV/AIDS Indicator and Impact Survey (NAIIS) conducted in 2018–2019 revealed a lower prevalence rate than previously estimated, indicating that approximately 1.4% of adults aged 15–49 were living with HIV.

In the recent years, there have been tremendous improvements in the prevention, access to diagnosis, treatment, and care of HIV/AIDS globally, especially in LMICs. The percentage of new infections, morbidity and mortality associated with HIV has decreased significantly [1]. In 2014, the Joint United Nations Program on HIV/AIDS (UNAIDS) and its partners launched the new 90–90–90 treatment targets. These targets aimed to diagnose 90% of all PLHIV, 90% of PLHIV should be on antiretroviral therapy (ART) and 90% of those on ART should have achieved viral suppression by 2020. In 2018, approximately 62% of PLHIV globally, were on ART, and 53% of these had achieved viral load suppression. This accounted for 23.3 million PLHIV receiving ART in 2018 as compared to 7.7 million in 2010 (3).

As per 2018 data, in Nigeria, 67% of PLHIV knew their status, 53% of PLHIV were on ART, and 42% of PLHIV achieved viral load suppression with respect to the 90-90-90 treatment target. Nigeria has made great progress in the fight against HIV/AIDS in terms of absolute numbers, from 3.2 million (3.2%) PLHIV in 2004, to 1.9 million (1.4%) in 2019 (4). However, this reduction is still low compared to the expected treatment target of the UNAIDS [3]. If no action is taken, it would be difficult to meet the global target of 30 million people on treatment by the end of 2020 and ending the HIV/AIDS epidemic as a public health threat by 2030 [3].

To achieve the third 90 target, a consistent and sustained use of ART and an ongoing virologic monitoring to ascertain treatment success are required [5]. There is need to improve access to prompt and adequate viral load testing technologies [1]. Viral load informed care ensures optimal HIV clinical follow-up and resistance monitoring. Plasm viral load using Polymerase Chain Reaction (PCR) assay has been the popular method to ascertain the copies of HIV in the PLHIV. The rise in the number of viral resistance cases among those on ART makes it extremely important for the routine measurement of plasm viral load. The routine measurement helps to understand the progression of the disease, helps the patient and physicians establish if a therapy is effective or resistant and it helps ascertain when therapy must be changed (6).

Unfortunately, the challenges being faced by many LMICs, make it impossible to achieve the 2020 targets. Many of these challenges are associated with complexities surrounding logistics of both systems and settings, leading to inefficiencies in providing quality services. The Global Health Security Agenda (GHSA) clearly highlights the critical role of laboratory systems and networks in diseases control and prevention (7). The GHSA is an effort by nations, international organizations, and civil societies to accelerate progress towards a world safe and secure from the threats of infectious disease [8]. It is therefore critical to establish functional laboratories and strengthen specimen referral networks.

In Nigeria, inadequate laboratories and standardized referral system for clinical samples have been identified as a critical causative factor for low performance of in country laboratory capacity [9]. These inadequacies have resulted in inefficiencies such as high-costs, long turnaround for results and disproportionate testing burden on laboratories [9]. Hence, to increase access to specialized tests such as HIV viral load testing, it is important to develop a reliable laboratory network with a strong specimen-referral system and strengthening of laboratory systems. Human resource and infrastructure development, quality management, supply chain management, specimen referral and results-reporting and laboratory information systems, in an integrated and coordinated laboratory network is also paramount [10].

Improving the patient’s outcome, testing and access to results of test on time are crucial. To this effect, a national integrated specimen referral network (NISRN), currently being implemented by global health supply chain procurement supply management (GHSC-PSM) using third-party logistics (3PLs) providers to transport specimens from collection centers to testing laboratories was initiated [9]. With the introduction of the 3PLs it was expected that the average time from sample collection and return of results back to the health facilities would decrease when compared with the period before the 3PLs was introduced (NISRN SOP).

This study therefore aims at assessing the impact of Pre-Third-Party Logistics (Pre-3PLs) and 3PLs on viral load sample Turn-Around Time (TAT) in the management of HIV/AIDS patients in Ekiti State, Nigeria. By identifying the differences between Pre-3PLs and 3PLs on the Viral load sample TAT and identifying other factors that could be associated with viral load sample TAT. Also, the result from the study will help to ascertain whether the current use of 3PLs in NISRN will give findings that are similar to the existing evidence that TAT improved with the introduction of a 3PLs or other private organizations.

**Methods**

**Study Area**

The retrospective study was carried out in Ekiti State, Nigeria. HIV Prevalence in Nigeria was 1.4% in 2019**,** according to the[National Agency for the Control of AIDS (NACA)](https://nigerianwiki.xyz/history-national-agency-for-the-control-of-aids-naca/) [11]. Ekiti state is ranked the 29th state with a HIV prevalence of 0.7%. Ekiti State is one of the 36 states (including the Federal Capital Territory, Abuja) that constitute the Federal Republic of Nigeria. According to the most recent census, its population is about 3 million accounting for 1.71% of the total population of Nigeria. There are 16 Local Government Areas (LGA) in the State. There are 23 government health facilities spread across all LGAs of the State providing treatment, care, and support for PLHIV. Samples are collected from these facilities and sent to the regional PCR laboratory for viral load and early infant diagnosis. This PCR laboratory is in Obafemi Awolowo University Teaching Hospital, Ile-Ife, Osun State, and it is around 150 kilometers from Ado-Ekiti.

**Sampling**

All 23 HIV care facilities across the State and the referral laboratory were included in the sample frame. Both quantitative and qualitative data collection were conducted in 11 facilities including the referral laboratory. All 23 health facilities were arranged in ascending order, based on their workload. After arranging them, they were divided in to two groups, high and low load. One to thirteen were low load and 14-23 were high load. Five facilities were randomly picked from each group, giving a total of 10 facilities. We also ensured that these facilities were a representative of the three districts of the state.

Heterogeneity and representativeness of samples were ensured by randomly selecting facilities that were representative of all the geographical locations of the state and representative of their workload. Facilities were selected based on the senatorial districts of the state. There are three senatorial districts in the state, namely, Ekiti central, Ekiti North, and Ekiti South as represented in figure 2. From each district, one high and low load facility was randomly selected. Data were termed incomplete if it missed, date sample was collected, date sample was sent, and date result was returned, as these were the major predictors of TAT. Any sample that was incomplete was removed from the data set and not included for analysis. To further understand, if there are other factors affecting TAT other than transportation, semi-formal interviews were conducted using a semi-structed question guide. Verbal consent was sort from the respondents before administration of the question. The respondents were the focal persons at the facility laboratory.

A facility is termed high load if it performs 50 and more samples per month and low load if it performs less than 50 samples per month. Unfortunately, we have more low load facilities across the State. Thus, during sampling, we ensured the selection of equal numbers for both groups. The selected facilities are shown in table 1.

**Data Source**

This study utilized quantitative data from the laboratory viral load log in the facility. The data for each facility was divided into two, data available before July 2018 (pre 3PLs) and those after July 2018 to January 2020 (3PLs). For the qualitative component, respondents of the interview were the laboratory focal person for each of the facilities. To get the response from the 3PLs, the operators were also interviewed.

**Data collection**

The extraction period for this analysis was for viral load test conducted pre-3PLs and 3PLs eras. The dates vary from one facility to the other, as they did not start viral load testing at the same time and the availability of data source also differ. Data was obtained from the laboratory viral load log in the facility. The data for each facility was divided into two, data available before July 2018 (pre 3PLs) and those after July 2018 to January 2020 (3PLs). For the qualitative component, respondents of the interview were the laboratory focal person for each of the facilities. To get the response from the 3PLs, the operators were also interviewed.

**Ethical approval**

The ethical approval was obtained from the Research Ethics Committee at Indian Institute of Public Health Gandhinagar (Reference No. 13/13/2019-20).

**Data analysis**

For quantitative findings, total sample collection (by pre 3PLs and 3PLs) was 18 datasets, a pair of data for each facility. The date interval for which data were available and the number of samples collected within that time frame is recorded for both high and low load facilities separately. The total TAT for the facilities pre 3PLs and 3PLs were calculated. Mean TAT was also estimated for high and low load facilities. To ascertain if there is a statistical difference in the mean TAT pre-3PLs and 3PLs era, we employ the R commander statistical software to determine the mean difference for high load facilities and low facilities differently. We used the paired t-test statistical test to analyze the pre- and post-mean TAT at 95% confidence interval (CI) to obtain the p-values. To get a complete picture of the TAT, the analytical time at the PCR lab was estimated as well to determine the mean TAT.

For qualitative findings, results are presented under the themes emerging from the semi-structured interviews and are reported using the Standards for Reporting Qualitative Research (SRQR). To further understand the other factors that can affect TAT other than transportation, 11 semi-structured interviews were conducted. Of these 11, only 3 respondents consented to recoding their response. After the transcripts of the voice recording were done and analyzing notes taking from others, several themes and concepts emerged.

**Results**

**Characteristics of high and low load facilities**

Date interval for each facility differ as this is dependent on the available register in the facilities, hence the date interval for the facilities were calculated independently. Table 2 gives a summary of all the facilities, the date interval when data were extracted and the total number of samples that were sent within that date interval. For instance, EKSUTH generated a total number of 1631 within 524 days (1.44 years), IYIN could only generate 122 within the same time frame. It was also observed that date interval for both groups range between 1 to 2 years.

**Quantitative findings**

**TAT in high and low load facilities**

The Average TAT for each facility was calculated within the date interval for both pre-3PLs and 3PLs era. The TAT was estimated in days. It was found that the mean (±SD) TAT for the high load facilities for pre-3PLs era was 83.68 ±27.3) days, while during 3PLs study period the mean TAT came to 30.76 (±5.7) days. For the low load facilities, the mean TAT pre-3PLs is 104.4 (±10.4) days and during 3PLs the value came to 26.9 (±4.0) days. These are highlighted in table 3. For the high load facilities, the mean difference was 52.93 days (p <0.05) and for the low load facilities the mean difference was 77.38 days (p<0.05).

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**TAT in PCR laboratory**

Total sample TAT estimation includes the analytical time, i.e., the time it takes to analyze the sample once it reaches the testing laboratory. The viral load samples are pooled to the testing PCR lab. TAT in the PCR lab is independent of the facility type. Table 4 shows the average time it takes for a sample to be run to when the result is released and dispatched from the laboratory to the facility. This TAT is a fraction from the total TAT of each viral load sample. We found that the mean (±SD) TAT for samples at the PCR lab is 9.99 (±0.95) days

**Qualitative findings**

Upon completion of the semi-structured interviews with all respondents, five themes were identified to be associated with TAT. These themes were, inadequate human resource, sample collection and quality, proximity of facility, stockout and equipment downtime and human factors.

**Human resources**

The issues of human resource/workforce were mentioned by some respondents. They mentioned that if more hands were employed there will be better performance. For example, there are only two 3PLs operators for the whole of Ekiti State. They are required to go around all 23 facilities to pick up samples and to return the same way.

*…” I had an accident sometimes ago on my way back from Ikere facility when I was enforced to go, and dispatch result that day and it was only God that saved my life. And there are only 2 of us in the State” ...* (3PLs operator)

**Sample collection and quality**

When asked about some of the challenges faced concerning the samples, the respondents highlighted that samples rejection occurred when samples were not separated, were insufficient and had problems with power supply.

*when samples are not collected properly, when the recommended amount is not collected and if the sample is not separated properly, this leads to rejection of that sample*” (Referral laboratory staff).

**Proximity of facility**

The longer the distance the more the travel and transportation time. Some of the respondent identified this as another challenge that further increases the TAT, this makes it impossible for all facilities in the same state to have the same TAT, as some facilities will get their samples and results faster than others due to their proximity to the testing lab.

…” *you know that our hospital is very far from town, if we collect samples today, the riders can’t pick it up that day, sometimes it takes 2 to 3day before they can pick to ado and from ado it might not go on that same day, so you…”* (health facility worker).

**Stock out and equipment downtime**

Stock out and equipment downtime were also identified to affect TAT when discussing with the respondents.

“*Any little trigger with electricity will get that machine down and nobody, as a lab scientist can fix the machine, you have to call the engineer. You call through the supporting IP (implementing partners) to get to the supplier of that machine. time of the reporting of the PCR lab, the time action will be taken and the time the engineer will be deployed to come and work, at the time the engineer will get it fixed is another time, so for that period, there is nothing coming out of the PCR lab, so if it is 2weeks they use in getting it sorted out, those samples will be there for 2weeks and the result will not come out until the following week, which is almost one month down the line*” (program coordinator)

**Human factors**

Many of the respondents mentioned the problem of insufficient remuneration and incentives for doing other job. The 3PLs operators mentioned the risk of travelling to the same route every day. Some others mention time taken to do paperwork. Also, it was observed that workers wanted to do their work at their convenience.

“*like that time, it was crazy we were given a stipulated time to deliver 10,000 samples… in a year we do between 30,000-45,000. So, you can imagine, to deliver 10,000 sample within a short period... and so… nothing was coming from it, so at some point in time, no additional incentive” ...* (referral lab staff)

 “*I tell the riders to make sure they bring the CD*4 *samples before 12noon so that I can run them before the end of the day*” (HUB staff)

**Discussion**

This study aimed to assess the impact of pre-3PLs and 3PLs on viral load samples in the management of HIV/AIDS patients. Nine facilities of all 23 health facilities in Ekiti state providing HIV treatment, care and support were studied. Ten health facilities were selected based on the time available. The studied health facilities had significantly reduced TAT during the period when 3PLs are being used to transport samples and results when compared to the period before the inception of the 3PLs.

This study also identified factors other than transportation that could affect TAT. Pre-3PLs samples were sent at a time convenient through public transport system with little or no standardized transportation procedures. The results take longer time because, results are only collected by the same staff on a subsequent visit. In addition, the problem of missing samples and sample rejection were high. These reasons can explain the longer TAT observed pre-3PL but during the 3PL period the reduction in TAT was evident.

In other studies that assessed the use of private organizations in the transportation of various types of clinical samples have recorded significant reduction in the TAT of these samples [12,13,14,15]. A study conducted in Ethiopia, showed that the average TAT reduced from 7 days to 2 days in Addis Ababa and from 10 days to 5 days in Amhara Region (13)], with the introduction of public private partnership. Another study in Uganda, found that there was an increase from the 35% to 51% for samples analysis and the cost reduced by 62% while TAT was reduced by 46.9% with the improvement in EID transportation (12)]. Another study in Nigeria, identified that Tuberculosis samples been handled by non-professionals always experience delay as compared to those transported by 3PLs (14)]. These are some of the expected outcomes when employing the services of 3PLs, such as service improvement, cost reduction and a desire by the organization that engage these 3PLs to focus on their own other non-logistics core competencies [15]. In this study significant reduction in TAT were observed when 3PLs transported samples which is comparable with finding from other studies.

It was found in this study that other than transportation, there are some other factors which can affect TAT. These factors include *insufficient manpower*, *sample quality/integrity*, *reagent stockout and machine downtime*, *proximity of the health facility* and *other human factors*.

It was identified in a study that inadequate manpower has been seen to threaten the realization of plans for scaling up interventions to control the spread of diseases such as HIV/AIDS, malaria, and tuberculosis in sub-Sahara Africa [16]. The problem of inadequate supply, poor distribution, low [remuneration](https://www.sciencedirect.com/topics/social-sciences/remuneration) and accelerated migration of skilled health workers are increasingly regarded as key systems constraints to scaling up of [HIV](https://www.sciencedirect.com/topics/medicine-and-dentistry/human-immunodeficiency-virus) treatment identified in Africa [17]. Studies have shown that specimen integrity is a cornerstone of a quality viral load test [18,19], and ways to protect this integrity is by collecting the samples appropriately. When the specimen is not collected correctly, it leads to rejection and will in turn increase the TAT of that sample. In a Nepal study, 15.5% of patients did not get their results at the predefined time due to sample related factors [20]. A study in Ethiopia, which found that repeated reagent stock out was one of the reasons for result delays in the testing lab [21], and in Nepal 11.4% of patient reports were delayed due to irregular maintenance or lack of properly functioning of equipment/analyzers [20]. In India, another study identified factors such as machine breakdown and interrupted electricity and water supply also contributed to prolonged TAT [22]. Evidence have shown that pre-analytical phase of laboratory testing accounts for over 70% of the TAT. A study in Malawi, found that the absence of a molecular testing laboratory in the collection district, specimen type and testing laboratory appeared to contribute to longer TAT [23].

Staff motivation level, competency, satisfaction, involvement among others, are some of the identified factors affecting TAT [24]. For instance, a 3PLs operator will prefer to go and pickup samples cumulatively from facilities within the same axis on a particular day rather than going every other day. Meanwhile, the samples would have been collected days before adding to the TAT for such samples. Corruption within the system is also a contributory factor as explained by some of the respondents. This can be seen in cases where the third-party companies employing riders that are less qualified so that they can be paid less, and in cases where they are supposed to buy a car to pool the samples to the PCR, they may use a motorcycle.

The implication of this study for practice and research is that the finding from this study points out the importance of assessing the time interval for viral load sample from time to time to make improvements as and when due. This could also help to identify and address some of the other factors that contribute to longer TAT. Some of the research gap observed were, the paucity in studies that assessed other factors that contributed to laboratory samples TAT in Nigeria.

Limitation

The study used secondary data from facility registers and logs for the quantitative analysis. Unfortunately, if any vital information is missing in those logs, we would have missed it. If all information such as the date samples were sent from the health facility to the HUB and from the HUB, were recorded in the log, it would have probably given a more comprehensive data set. We are not sure if the extracted information overestimates the findings of this study. For the qualitative findings, there were possibilities of bias, as the researcher is a professional colleague with many of the respondents and might have agreed with some of the responses. Due to time constraints and the effects of the present COVID-19 pandemic data collection for one of the facilities was not completed.

Despite these limitations, this study also has notable strengths. To our knowledge, this is the first study to assess the difference in viral load samples TAT between Pre-3PLs and 3PLs era in Nigeria. The results could be useful to decision makers on ways to improve TAT.

**Conclusion**

TAT reduced significantly from pre 3PLs to the present era of 3PLs. The continuous use of 3PLs should be encouraged as this could further ensure that more PLHIV will have their viral load test done and results received on time. This would help improve their treatment outcome and in the long run reduce the prevalence of HIV and bring an end to the HIV epidemic as a public health threat. Other factors that can affect TAT should be investigated. It is also noteworthy that continuous improvement of viral load testing and TAT, will help improve the management and quality of life of PLHIV in Ekiti state, and ultimately reduce the prevalence of HIV in Nigeria

**What is already know on this topic**

* Viral Load (VL) testing is the gold standard for HIV treatment monitoring. Timely and periodic VL tests are the most accurate way of determining whether ART is working to suppress replication of the virus.
* A joint planning and assessment committee identified gaps in the sample referral system for prioritization and intervention and piloted the system in Addis Ababa and Amhara Region. The PPP established standardized, streamlined specimen logistics, using the Ethiopian Postal Service Enterprise to support a laboratory network in which 554 facilities referred specimens to 160 laboratories. The PPP supported procuring 400 standard specimen containers and the training of 586 laboratory personnel and 81 postal workers. The average TAT was reduced from 7 days to 2 days in Addis Ababa and from 10 days to 5 days in Amhara Region

**What this study adds**

There are many other factors that affect the TAT of laboratory testing of clinical specimen, this is not specific to Viral load testing.

* It further elaborates the importance of conducting regular evaluation on the projects being implemented to improve health.

**List of figures**

[Figure 1 MEAN TAT COMPARISON 24](#_Toc70508860)

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| Table 1 FACILITIES STUDIED |  |  |  |
| **Name** | **Location** | **Ownership** | **Type** |
| Ekiti State University Teaching Hospital, Ado-Ekiti (EKSUTH) also the central HUB for the state. | Ekiti Central district | State tertiary healthcare facility  | High load |
| General Hospital Emure Ekiti | Ekiti South district | State secondary healthcare facility | High load |
| Federal Teaching Hospital Ido-Ekiti (FTHI) | Ekiti North district | Federal government tertiary healthcare facility | High load |
| State Specialist Hospital Ikere-Ekiti | Ekiti South district | State secondary healthcare facility | High load |
| St Gregory’s Hospital | Ekiti Central district | Private secondary healthcare facility | High load |
| State Specialist Hospital Ijero-Ekiti | Ekiti Central district. | State Secondary Healthcare facility | Low load |
| Comprehensive Health Centre (CHC) Ilawe Ekiti | Ekiti South district | State Primary healthcare facility | Low load |
| General Hospital Ifaki Ekiti | Ekiti North district | State secondary healthcare facility | Low load |
| General Hospital Iyin Ekiti | Ekiti Central district | State secondary healthcare facility | Low load |
| General Hospital Oye-Ekiti | Ekiti North district | State secondary healthcare facility | Low load |

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| Table 2 Mean TAT for each facility |
| **S/N** |  **Facility name** | **Mean TAT pre-3PLs** | **SD** | **Mean TAT 3PLs** | **SD** |
| 1 | EKSUTH | 79.4 | 51.9 | 23.4 | 14.1 |
| 2 | Emure | 107.4 | 82.3 | 29 | 18.5 |
| 3 | FTHI | 97.7 | 66.0 | 30.6 | 30.1 |
| 4 | Ikere | 95.7 | 66.5 | 39.3 | 76.4 |
| 5 | St Gregory | 42.9 | 32.0 | 31.2 | 12.3 |
| 6 | Ijero | 95.9 | 47.0 | 32.6 | 21.2 |
| 7 | Ilawe | 119.5 | 71.5 | 26.9 | 18.2 |
| 8 | Oye | 101.7 | 56.6 | 24.5 | 17.0 |
| 9 | Iyin | 100.5 | 73.7 | 23.6 | 14.3 |
| 1-5 (High load), 6-9 (low load) |

|  |
| --- |
| Table 3 Statistical TAT mean difference |
| **Facility name** | **Facility type** | **Sum of Total count** | **Sum of Average TAT****(in days)** |
| Eksuth | H | 1402 | 10.6 |
| Emure | H | 151 | 9.1 |
| Fthi | H | 1180 | 11.9 |
| Ijero | L | 132 | 9.6 |
| Ikere | H | 366 | 10.7 |
| Ilawe | L | 55 | 9.1 |
| Iyin | L | 93 | 10.6 |
| Oye | L | 71 | 9.5 |
| St Gregory | H | 189 | 9.5 |
| **Mean Average TAT** |  |  | **10.1** |
| **SD** |  |  | **0.95** |