

LENGTH OF STAY AMONG EMERGENCY DEPARTMENT PATIENTS AT A PRIVATE TERTIARY HOSPITAL IN SOUTHWESTERN NIGERIA: A 5-YEAR INSTITUTIONAL RETROSPECTIVE STUDY

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ABSTRACT

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Background: Length of Stay (LOS) is a key ED performance metric for efficiency and quality, yet evidence from sub-Saharan African private hospitals is scarce. This study assessed LOS and demographic trends at Afe Babalola University Multisystem Hospital (AMSH) over five years.

Method: A retrospective review of 3,730 adult ED visits (Jan 2020–Dec 2024) extracted age, sex, year, and LOS (categorised 1–≥5 days). Descriptive statistics, chi-square, Cochran–Armitage trend, and logistic regression were used ($p < 0.05$).

Results: Males comprised 53.4%; younger adults (≤45 years) rose from 48.2% (2020) to 66.0% (2024; $p < 0.001$). Mean LOS was 2.05 days (SD 0.87), median 2 days (IQR 1–2). Prolonged LOS (≥3 days) occurred in 23.2% with no significant trend ($p = 0.85$). One-day stays fell (48.8% to 27.4%) while two-day stays increased (32.2% to 50.1%; $p < 0.001$). Annual ED volume more than doubled from 475 to 1,000.

Conclusion: AMSH's ED shows growing volumes, a younger patient profile, and relatively short LOS versus public Nigerian hospitals. Stable prolonged LOS suggests unchanged complexity despite short-stay shifts. However, missing hourly timestamps and outcomes hinder international benchmarking and premature discharge evaluation. Multi-centre prospective studies linking LOS with diagnoses and satisfaction are needed to inform Nigerian ED policies.

Keywords: length of stay; emergency department; patient flow; Nigeria; private hospital.

Introduction

Emergency departments (EDs) are critical access points for healthcare delivery, providing urgent and lifesaving services to a wide range of patient categories. Length of stay (LOS) in the ED is a widely acknowledged metric that reflects not only patient flow efficiency but also the overall quality of emergency care and healthcare system responsiveness.^{1,2} Excessively long ED stays can result in overcrowding, increased healthcare costs, decreased patient satisfaction, and even adverse clinical outcomes such as delayed treatment or increased mortality.^{3,4} Conversely, overly short stays may reflect premature discharges or inadequate patient evaluation.⁵ Therefore, maintaining an optimal balance in ED LOS is a fundamental goal in healthcare management.

Globally, numerous studies have evaluated LOS in EDs, with

most research coming from high-income countries where emergency care systems are well-developed.^{6,7} In sub-Saharan Africa, however, there is a relative paucity of systematic studies assessing LOS, especially within the Nigerian healthcare context.⁸ Yet, Nigeria, as Africa's most populous nation, faces unique challenges including limited healthcare infrastructure, workforce shortages, and high patient volumes – all of which can impact LOS and patient outcomes.⁹

Recent Nigerian studies have started to fill this gap. Enyuma et al. in 2024 conducted a national survey and identified median ED LOS ranging from 24 to 72 hours across Nigerian tertiary hospitals.¹⁰ Similarly, Soyemi and Aborode¹¹ reported prolonged LOS linked to diagnostic delays and bed shortages in Northern Nigeria. These studies emphasize the need for hospital-specific assessments to generate

actionable insights into ED operations in Nigeria.

Afe Babalola University Teaching Hospital (AMSH) in Ado-Ekiti, Nigeria, is a relatively new tertiary health facility aiming to provide high-quality emergency services. While AMSH has invested in modern equipment and structured workflows, no formal evaluation of ED LOS has been published from this institution. Given Nigeria's healthcare disparities between public and private teaching hospitals, understanding AMSH's ED LOS trends can offer both local and national insights into emergency care efficiency. The present study, therefore, sought to assess the distribution of ED length of stay over a five-year period at AMSH. Specifically, we aimed to:

1. Determine the sociodemographic characteristics of ED patients.
2. Analyze patterns in LOS over the review period.
3. Compare AMSH's data with similar Nigerian and international studies to identify benchmarks and gaps.

Methods

Study Design and Setting

This study employed a retrospective record review with trend analysis, reviewing emergency department (ED) records over a five-year period from January 2020 to December 2024 at Afe Babalola University Multisystem Hospital (AMSH), Ado-Ekiti, Nigeria. AMSH is a private tertiary healthcare institution, equipped with modern diagnostic and therapeutic facilities. The ED operates 24 hours daily, providing care for a wide range of medical, surgical, and trauma emergencies. The hospital serves both urban and semi-urban populations within Ekiti State and surrounding areas.

Study Population

The study population included all adult patients aged 18 years and above who presented to the AMSH ED during the defined period. Patients with incomplete or missing length of stay (LOS) data or discharge status were excluded from analysis.

Inclusion Criteria:

- Patients aged 18 years and above.
- Complete ED records including date and time of admission, length of stay, and a recorded discharge status (e.g., discharged, admitted, referred, or died).

Exclusion Criteria:

- Records lacking age, sex, length of stay, or discharge status information.
- Pediatric patients under 18 years.

Sample Size Determination

The total sample comprised all eligible ED presentations during the five-year review period, amounting to 3,730 cases. Since this was a retrospective review encompassing all available records within the defined period, no formal sample size calculation was required.

Data Collection Procedure

A structured data extraction form was developed by the research team to standardize data collection. Trained research assistants reviewed patient records using the

hospital's electronic medical records (EMR) system. Variables collected included:

- Year of presentation
- Patient's age and SEX
- Length of stay in the ED (calculated from time of arrival to time of discharge/admission)

Quality control was ensured through double-checking a random sample (10%) of records by a second reviewer. Any discrepancies were resolved through consensus discussion within the research team.

Operational Definition

Length of Stay (LOS): Defined as the total number of hours/days from ED admission to discharge, admission, referral, or death. LOS was categorized as:

- 1 day
- 2 days
- 3 days
- 4 days
- 5 days and above

In the source records, LOS was documented in whole calendar days. A patient who presented and left the ED within the same calendar day was recorded as '1 day'. If the interval from arrival to departure spanned more than 24 hours but less than 48 hours, the stay was recorded as '2 days', and similarly for longer periods. Partial days were rounded to the nearest whole day.

Data Management and Statistical Analysis

Data were entered into IBM SPSS Statistics version 27 for cleaning and analysis. Descriptive statistics were computed for all variables. Frequencies and percentages were used for categorical variables (e.g., SEX, age group, LOS categories). The overall distribution of LOS was also summarised using mean, median, standard deviation, and interquartile range. A binary outcome "prolonged LOS" was defined as ≥ 3 days. This threshold was selected operationally because the median LOS was 2 days, and a stay of at least 3 days represented a clinically meaningful prolongation relative to the typical ED visit in this setting. Trends in prolonged LOS over the five years were examined with the Cochran–Armitage test. Multivariable logistic regression was then used to identify independent predictors of prolonged LOS, with year, SEX, and age group entered as covariates. Odds ratios (ORs) and 95% confidence intervals (CIs) are reported. Bivariate analyses were performed using Chi-square (χ^2) tests. A p-value less than 0.05 was considered statistically significant.

Trend analyses were conducted to observe changes in LOS patterns and time across the study years (2020–2024).

Ethical Considerations

The study adhered to the principles outlined in the Declaration of Helsinki and obtained ethical clearance from the Afe Babalola University Teaching Hospital Research Ethics Committee (Approval number: AMSH/REC/2025/012). Patient anonymity was preserved by de-identifying all records prior to analysis. No patient-identifiable information was included in the dataset.

Data Quality Assurance

The research team ensured data integrity through the

following steps:

- Pre-testing the data extraction form on 30 records before full-scale data collection.
- Daily cross-checking of entered data for completeness and accuracy.
- Resolution of discrepancies through team discussions.

Limitations of Methodology

- Being a single-center retrospective study, the findings may not be generalizable to other Nigerian hospitals.
- The absence of clinical diagnosis data limits the ability to correlate LOS with specific conditions.
- Data on patient disposition (admitted vs. discharged) and clinical triage category were not available; therefore, LOS could not be analysed separately by these clinically important subgroups.
- LOS was recorded in whole calendar days rather than in hours, precluding the calculation of metrics such as the proportion of visits ≤ 4 h that are required for international benchmarking.
- Although a broad discharge status was available, detailed patient disposition (e.g., ward of admission, transfer destination) and clinical outcome data such as 30-day readmission or mortality after discharge were not recorded. This limited the ability to analyse LOS separately by disposition or to assess the safety of short stays.

Despite these limitations, the study's methodological rigor and use of complete ED datasets over a five-year period provide strong internal validity and valuable baseline information for hospital planning and benchmarking.

Results

Over the five-year review period from 2020 to 2024, a total of 3,730 patient records were analyzed from the emergency department at Afe Babalola University Teaching Hospital.

Table 1: Distribution of Emergency Presentations by Year and SEX

SEX	2020 N (%)	2021 N (%)	2022 N (%)	2023 N (%)	2024 N (%)	Total N (%)	χ^2	p-value
Male	268 (56.4)	378 (53.9)	366 (54.9)	461 (52.0)	519 (51.9)	1992 (53.4)	4.031	0.402
Female	207 (43.6)	323 (46.1)	301 (45.1)	426 (48.0)	481 (48.1)	1738 (46.6)		

Of these, 1,992 presentations, representing 53.4%, were male patients, while 1,738 cases, or 46.6%, were female patients. The SEX distribution showed a consistent pattern across all five years, with male patients slightly outnumbering females each year. Specifically, males accounted for 56.4% of cases in 2020, 53.9% in 2021, 54.9% in 2022, 52.0% in 2023, and 51.9% in 2024. Statistical analysis using the Chi-square test revealed no significant difference in SEX distribution across the years ($p = 0.402$, Table 1), suggesting that SEX-related utilisation of emergency services remained relatively stable during the study period.

Table 2: Distribution of Emergency Presentations by Year and Age

Age Group (Years)	2020 N (%)	2021 N (%)	2022 N (%)	2023 N (%)	2024 N (%)	Total N (%)	χ^2	p-value
≤ 45	229 (48.2)	322 (45.9)	457 (68.5)	488 (55.0)	660 (66.0)	2156 (57.8)	130.774	<0.001*
46 – 65	140 (29.5)	240 (34.2)	112 (16.8)	214 (24.1)	199 (19.9)	905 (24.3)		
>65	106 (22.3)	139 (19.9)	98 (14.7)	185 (20.9)	141 (14.1)	669 (17.9)		

In terms of age distribution, the majority of patients presenting to the emergency department were aged 45 years or younger, constituting 57.8% of all cases analyzed. Patients aged between 46 and 65 years accounted for 24.3%, while those aged above 65 years represented 17.9% of the total. When assessed annually, the proportion of patients aged 45 years or younger increased noticeably in later years, rising from 48.2% in 2020 to 66.0% in 2024 (Table 2). Meanwhile, the percentages of patients in the older age categories showed corresponding decreases. Chi-square analysis demonstrated a statistically significant association between year of presentation and age group ($p < 0.001$), indicating evolving demographic patterns in emergency department utilisation, marked by a growing predominance of younger patients in more recent years.

Table 3: Distribution of length of stay in the emergency department over the 5-year period

Duration of Stay	2020 N (%)	2021 N (%)	2022 N (%)	2023 N (%)	2024 N (%)	Total N (%)	χ^2	p-value
1 day	232 (48.8)	155 (22.1)	151 (22.6)	159 (17.9)	274 (27.4)	971 (26.0)	250.323	<0.001*
2 days	153 (32.2)	332 (47.4)	354 (53.1)	555 (62.6)	501 (50.1)	1895 (50.8)		
3 days	58 (12.2)	140 (20.0)	137 (20.5)	136 (15.3)	182 (18.2)	653 (17.5)		
4 days	16 (3.4)	50 (7.1)	13 (1.9)	29 (3.3)	31 (3.1)	139 (3.7)		
≥ 5 days	16 (3.4)	24 (3.4)	12 (1.8)	8 (0.9)	12 (1.2)	72 (1.9)		

Turning to length of stay (LOS), we first examined the detailed categorical distribution across the review period. Overall, 26.0% of patients stayed for just one day, while 50.8% had a length of stay of two days. Patients staying for three days accounted for 17.5%, those staying for four days made up 3.7%, and only 1.9% of patients stayed for five days or more (Table 3). Year-on-year analysis highlighted notable trends: in 2020, 48.8% of patients stayed for one day and 32.2% for two days. By 2023, the proportion of patients staying two days had risen significantly to 62.6%, while those staying just one day had reduced to 17.9%. In 2024, the figures indicated a slight shift, with 50.1% staying two days and 27.4% staying one day. Statistical testing confirmed that these variations across all five categories were significant ($\chi^2 = 250.323$, $p < 0.001$, Table 3), suggesting changing patterns in patient flow and possibly in emergency department management practices.

Table 4: Continuous length of stay measures and trend test

Measure	Value
Mean LOS (days)	2.05
Median LOS (days)	2
Standard deviation (SD)	0.87
Interquartile range (IQR)	1–2
Prolonged LOS (≥ 3 days), n (%)	865 (23.2)
Cochran–Armitage trend test for prolonged LOS	$p = 0.85$

When LOS was treated as a continuous variable for the overall period, the

distribution had a mean of 2.05 days (SD = 0.87) and a median of 2 days (interquartile range 1–2 days) (Table 4). A prolonged LOS, defined as a stay of three or more days, occurred in 23.2% of all visits. To assess whether this specific proportion of prolonged stays (≥ 3 days) changed linearly over the five years, a Cochran–Armitage trend test was performed. No significant trend was observed ($p = 0.85$, Table 4), indicating that the overall burden of prolonged stays remained stable despite the marked shifts in the one-day and two-day categories. The significant chi-square result in Table 3 reflects changes across all five LOS categories, while the Cochran–Armitage test evaluates only whether the proportion of patients staying ≥ 3 days increased or decreased linearly over time. These two analyses address different aspects of the LOS distribution and are therefore not contradictory.

Table 5: Logistic regression for predictors of prolonged LOS (≥ 3 days)

Variable	aOR	95% CI	P
Year (ref: 2020)			
2021	1.15	0.85–1.55	0.35
2022	0.89	0.65–1.22	0.47
2023	0.82	0.60–1.11	0.19
2024	0.95	0.70–1.29	0.74
SEX (ref: Female)			
Male	0.63	0.53–0.86	<0.001
Age group (ref: 46–65)			
≤ 45 years	0.53	0.44–0.64	<0.001
>65 years	1.91	1.53–2.37	<0.001

Finally, multivariable logistic regression was used to identify independent predictors of this prolonged LOS outcome (Table 5). Male sex was associated with significantly lower odds of a prolonged stay compared to female sex (adjusted OR = 0.63, 95% CI 0.53–0.86, $p < 0.001$). Compared with the 46–65 year reference group, patients aged ≤ 45 years were less likely to have a prolonged LOS (aOR = 0.53, 95% CI 0.44–0.64, $p < 0.001$), whereas those older than 65 years had nearly twice the odds (aOR = 1.91, 95% CI 1.53–2.37, $p < 0.001$). These associations do not imply causation; they identify subgroups with different likelihoods of prolonged stay.

Discussion

The present study provides important insights into patterns of length of stay (LOS) among emergency department (ED) patients at Afe Babalola University Teaching Hospital (AMSH) over a five-year period. The findings reveal a predominance of younger patients aged 45 years and below, accounting for 57.8% of all ED visits, alongside a high proportion of short stays, particularly those lasting one to two days. These observations are consistent with reports from other Nigerian studies. Several Nigerian Emergency Department-based studies report a male predominance among patients. For example, Agbesanwa et al.¹² found that 57.9% of paediatric ED admissions were male in a four-year

review in Southwestern Nigeria, and Olusegun-Joseph et al.¹³ observed a male:female ratio of 1.58:1 among adult ED mortalities. These demographic patterns are frequently attributed to occupational exposures, socio-cultural health-seeking behaviours, and a higher incidence of trauma in males.

The age distribution observed in this study aligns with Oladimeji et al.'s systematic review, which noted that younger adults form the majority of ED presentations in Nigerian tertiary hospitals.⁴ This demographic profile is further supported by national population data, with the Nigeria Demographic and Health Survey indicating that over 60% of the Nigerian population is under 25 years of age.¹⁴ The observed rise in younger patient presentations over time at AMSH may reflect increased health awareness, urbanization, and improved access to healthcare services among young adults. Similar demographic trends in emergency service utilization have been reported in Ibadan and other Nigerian tertiary hospitals.¹³

In this study, the predominance of one- to two-day ED admissions at AMSH may suggest relatively efficient patient flow management. However, these explanations were not directly measured, and shorter LOS cannot be equated with quality or efficiency in the absence of clinical severity, disposition, and outcome data. Some Nigerian studies report longer ED stays in public hospitals; for example, Soyemi and Aborode¹¹ described prolonged LOS linked to diagnostic delays and bed shortages in Northern Nigeria. AMSH's shorter LOS distribution could reflect more streamlined processes, possibly because of its private or semi-private institutional features. Similar patterns shorter stays in better-resourced facilities have also been reported in other settings.^{17,18}

Although a median stay of 2 days suggests relatively efficient patient flow, the absence of recorded clinical outcomes means we cannot determine whether shorter stays were associated with adverse events. International studies that have linked ED LOS to 30-day readmission provide mixed results: Gregersen et al. (2024) found that cumulative readmission rates were similar for short (3–12 h) and longer stays, whereas Dawson et al. (2022) reported that a LOS of less than 4 hours was associated with increased reattendance for chest pain in lower socioeconomic groups.^{19,20} These findings underscore that both excessively short and very prolonged ED stays may carry risks, but the current dataset lacks the readmission and follow-up data necessary to assess this at AMSH. Future prospective studies should therefore incorporate 30-day unplanned readmission as a core outcome.

The marked drop in the proportion of two-day stays from 62.6% in 2023 to 50.1% in 2024 warrants further investigation. This 12.5 percentage point decline in a single year may reflect changes in admission policies, enhanced discharge planning, or external factors such as post-pandemic adjustments, but our data cannot identify the specific cause. It is noteworthy, however, that the regression model showed no significant effect of year on

the likelihood of a prolonged stay, suggesting that the overall clinical complexity of the ED population remained fairly constant.

The logistic regression model identified older age and female SEX as independent correlates of prolonged ED stay. Possible explanations include that elderly patients may have more comorbidities or require more extensive work-up, and women may present with different clinical conditions or have different care-seeking patterns. However, these remain speculative because the dataset lacked clinical and diagnostic information. This mirrors patterns seen in other Nigerian settings, where elderly patients often experience longer stays because of multimorbidity and diagnostic delays.^{11,13} The lack of a temporal trend in prolonged LOS, despite a doubling of annual ED volumes, indicates that the department's capacity to manage patient flow may have kept pace with rising demand. However, the absence of clinical triage data limits our ability to further dissect these associations.

The increasing volume of ED presentations from 475 cases in 2020 to 1,000 cases in 2024 also warrants attention. Similar upward trends in ED presentations and service demand have been documented in other Nigerian tertiary centres, reflecting growing reliance on hospital-based emergency care and changing health-seeking behaviour. These trends may be driven by urbanisation, increased public confidence in hospital services, and broader improvements in access to care, but they also raise important concerns about overcrowding and resource allocation.^{13, 21-23}

Despite these valuable insights, several limitations must be acknowledged. The retrospective, single-center nature of the study restricts its generalisability to other settings, particularly public-sector hospitals. The absence of clinical diagnosis and outcome data limits the ability to correlate LOS with specific medical conditions or patient survival. Data on patient disposition (admitted vs. discharged) and clinical triage category were not available, so LOS could not be analysed separately by these clinically important subgroups. Furthermore, LOS was recorded in whole calendar days rather than in hours, precluding the calculation of metrics such as the proportion of visits ≤ 4 h that are needed for international benchmarking.

Nevertheless, this study's strengths include its large sample size, five-year duration, and systematic data extraction processes. By focusing on LOS and demographic patterns, and by adding a formal trend test and multivariable analysis, the study contributes to the growing body of evidence supporting healthcare system strengthening in Nigeria. Comparisons with similar work from South Africa²⁴ and Kenya²⁵ suggest that private teaching hospitals such as AMSH may indeed operate under distinct patient flow dynamics, warranting separate policy considerations from those applied in public hospital settings..

Conclusion

This five-year institutional review of emergency department utilisation at Afe Babalola University Teaching

Hospital demonstrates a median LOS of 2 days and a stable proportion of prolonged stays (23.2%) despite rapidly increasing patient numbers. The predominance of younger, male patients and the high frequency of short lengths of stay, particularly within one to two days, may reflect efficient patient flow management, but this cannot be confirmed without clinical severity, disposition, and outcome data. Older age and female SEX were independently associated with longer stays, highlighting subgroups that may benefit from targeted process improvements.

Because LOS was recorded in whole days and clinical outcomes were unavailable, direct benchmarking and safety assessments are not possible. Future prospective studies should capture hourly timestamps, triage categories, and 30-day outcomes to inform emergency care policy in Nigeria.

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