**Is the race still Between Trauma and Diabetes? - Reviewing the most common reasons for Lower Limb Amputations in Nigeria**

**Abstract**

**Background:** Lower limb amputation is a major healthcare concern globally, particularly in Nigeria, where trauma and diabetes mellitus (DM) are significant contributors. This study aimed to assess the causes of above-knee amputations at the National Orthopaedic Hospital Igbobi, Lagos, from 2011 to 2020, re-examining whether trauma and diabetes remain the predominant factors in the context of changing healthcare dynamics and demographic shifts.

**Methods:** This retrospective cross-sectional study analyzed the medical records of patients who underwent above-knee amputations between 2011 and 2020 at the National Orthopaedic Hospital, Lagos. Data were extracted on demographic information and the primary causes of amputation. Descriptive analysis was conducted using SPSS.

**Results:** Of the 541 patients who underwent lower limb amputations, 280 had above-knee amputations. Diabetic foot syndrome (DMFS) was the leading cause (43.4%), followed by trauma (31.4%). Other causes included peripheral vascular disease (8.3%) and malignancies (6.7%). The male-to-female ratio was 3.5:1, with the majority residing in urban areas.

**Conclusions**: Despite advancements in healthcare, trauma and diabetes remain the leading causes of above-knee amputations in Nigeria. Comprehensive interventions targeting both preventive care and healthcare system improvements are essential to address this public health challenge.

**Keywords:** Lower limb amputations, Retrospective study, Orthopaedic trauma, diabetic foot syndrome, Nigeria

**Introduction**

Lower limb amputations represents a significant healthcare challenge worldwide, serving as a stark reminder of the intersections between chronic illnesses [1], traumatic events [2], and systemic healthcare inefficiencies [3]. In Nigeria, the conversation surrounding the primary drivers of above-knee amputations has predominantly revolved around trauma and diabetes. Trauma, often linked to road traffic accidents and conflict, and diabetes, characterized by poorly managed cases leading to chronic complications such as gangrene, have long been acknowledged as the leading culprits [4,5,6,]. Recent systematic reviews and meta-analyses consistently confirm that trauma and diabetes remain the leading causes of lower limb amputations. A 2024 meta-analysis reported that diabetic foot ulcers accounted for an overall lower extremity amputation rate of 31% [8]. Similarly, another comprehensive review and meta-analysis emphasized that limb amputations are predominantly driven by traumatic injuries and diabetes [9]. However, is this prevailing narrative still accurate, or has the epidemiological landscape shifted?

The influence of trauma as a leading cause of above-knee amputations in Nigeria is well-documented, reflecting the country’s challenges with road safety, urbanization, and inadequate emergency medical response systems [10]. The high incidence of road traffic accidents, particularly involving commercial motorcycles and overcrowded vehicles, highlights the precariousness of daily life for many Nigerians [11]. Additionally, insurgencies and communal clashes in certain regions exacerbate the rates of traumatic injuries, leading to limb loss when timely surgical interventions are inaccessible [12,13].

Simultaneously, diabetes mellitus has become a growing concern, mirroring global trends in the rise of non-communicable diseases [14]. The lack of routine screening, limited access to quality healthcare, and poor health literacy contribute to late presentations of diabetes-related complications in Nigerian hospitals [15]. Peripheral neuropathy, ischemia, and infections frequently progress to gangrene, necessitating amputations when other treatment options are exhausted [16]. Despite targeted efforts to improve diabetes management, systemic healthcare gaps persist, disproportionately affecting rural and underserved populations [17].

There is a need to critically examine the well-established fact that trauma and diabetes remain the dominant causes of lower limb amputations. Advances in healthcare technology, increased awareness campaigns, and enhanced road safety regulations may have mitigated the burden of trauma-related amputations to some extent. Similarly, shifting demographics, urbanization, and lifestyle changes could be influencing the prevalence and impact of diabetes and its complications. Furthermore, other conditions, such as peripheral arterial disease, malignancies, and infections, might be contributing more significantly to the epidemiological profile of amputations than previously recognized, warranting further exploration. The Nigerian healthcare landscape is uniquely positioned at the crossroads of rapid change and persistent challenges [18]. With a predominantly young population, the country faces the dual burden of addressing preventable causes of amputations while adapting to the rising tide of non-communicable diseases [19,20]. This study aimed to revisit the narrative surrounding the most common causes of above-knee amputations in Nigeria through a retrospective lens, questioning whether the entrenched dominance of trauma and diabetes in this discourse remains justified. By examining the historical and recent data, this investigation seeks to illuminate trends, disparities, and opportunities for intervention within the Nigerian healthcare context.

**Methodology**

***Study Design***

This study employed a retrospective cross-sectional design to analyze the most common reasons for lower limb amputations in Nigeria. The design was chosen to explore and compare data from medical records over a specific period, focusing on trauma and diabetes as leading causes, while considering other potential contributing conditions.

***Study Setting***

The study was conducted at the National Orthopaedic Hospital, Igbobi, Lagos, Nigeria, a premier level one trauma center renowned for providing specialized care in orthopaedics and trauma management. The hospital serves as a hub for advanced orthopaedic treatment, offering postgraduate training for surgeons specializing in orthopaedics and trauma surgery. It boasts multiple subspecialties, including plastic and reconstructive surgery, physiotherapy, prosthetics, orthotics, and other disciplines integral to comprehensive orthopaedic practice. Strategically located within Somolu Local Government Area, the National Orthopaedic Hospital, Igbobi, lies between the Onipanu and Fadeyi bus stops along the bustling Ikorodu Road in Lagos. Its geographical coordinates are approximately 6.5312° N latitude and 3.3701° E longitude, ensuring accessibility to patients and healthcare professionals across Lagos and neighboring regions. The hospital’s multidisciplinary approach and state-of-the-art facilities position it as a center of excellence in orthopaedic care, making it an ideal setting for investigating the causes and trends of above-knee amputations in Nigeria.

*.****Study Population***

The study population consisted of patients who underwent lower limb amputations between January 2011 and December 2020. Inclusion criteria included patients aged 18 years and older, those with confirmed lower limb amputation cases, complete medical records, and documented primary causes of amputation. Exclusion criteria included cases with incomplete or missing records.

***Data Collection***

The case files of all patients who underwent amputations between 2011 and 2020 at the National Orthopaedic Hospital Igbobi, Lagos, were retrieved for analysis. These files, routinely maintained in folders by the medical records department, were systematically reviewed. A structured data extraction form was utilized to gather key variables, including demographic information such as age, gender, and place of residence. The primary cause of amputation was recorded, categorizing conditions such as trauma, diabetes, peripheral arterial disease, malignancies, infections, and other relevant factors. Information obtained from the surgical register was also incorporated to supplement the case files, ensuring a comprehensive dataset for analysis.

#### *****Data Analysis*****

#### Data extracted from the case files were initially entered into Microsoft Office Excel to facilitate organization and preliminary cleaning. After ensuring accuracy and consistency in the data, it was transferred to Statistical Package for the Social Sciences for Windows version 26 (SPSS Inc., Chicago, IL, USA) for more detailed analysis. Descriptive statistics, including frequencies, percentages, means, and standard deviations, were used to summarize the demographic and clinical characteristics of the study population. Data were presented in tables, graphs, and charts for clearer interpretation.

**Results**

Between 2011 and 2020, a total of 541 patients underwent lower limb amputations (LLA), including both above-knee and below-knee procedures. The male-to-female ratio was 3.5, with 421 males (77.8%) and 120 females (22.2%). The mean age of patients was 51 years (SD ± 4.36), with ages ranging from young adults to older individuals.Regarding place of residence, 405 patients (74.9%) lived in urban areas, while 136 (25.1%) resided in rural settings. In terms of marital status, the majority (346, 64%) were married, while 108 (20%) were single and 87 (16%) were widowed or divorced.Employment status revealed that 89 patients (16.4%) were unemployed or retired, 102 (18.9%) were employed, and 350 (64.7%) were self-employed, reflecting a significant proportion of individuals engaged in informal work. Educational attainment showed that 162 patients (30%) had no formal education, 243 (45%) had primary or secondary education, and 136 (25%) had tertiary education.

As depicted in table 2, a total of 541 patients underwent lower limb amputations, with 280 undergoing above-knee amputations (AKAs) and 261 undergoing below-knee amputations (BKAs). Diabetic foot syndrome (DMFS) was the most common indication, affecting 235 patients (43.4% of all cases). Among these, 97 patients had AKAs, while 138 patients had BKAs.Trauma was the second most frequent cause, involving 170 patients (31.4%). Of these, 101 patients required AKAs, and 69 had BKAs. Tumors contributed to amputations in 36 patients (6.7%), evenly split between AKAs (18 patients) and BKAs (18 patients).Peripheral vascular disease (PVD) was recorded in 45 patients (8.3%), with 26 patients undergoing AKAs and 19 having BKAs. Tuberculosis (TBS) led to amputations in 15 patients (2.8%), mostly in AKAs (12 patients). Infections accounted for 16 amputations (3.0%), affecting 10 patients with AKAs and 6 with BKAs.Less frequent causes included ulcers, which were seen in 13 patients (2.4%), and burns, recorded in 3 patients (0.6%). Ulcers were present in 8 AKA patients and 5 BKA patients, while burns were observed only in BKA patients. Rare conditions such as fasciitis (3 patients, 0.6%), compartment syndrome (4 patients, 0.7%), and lymphedema (1 patient, 0.2%) were also noted, with fasciitis and compartment syndrome seen exclusively in AKAs. Figure 1 shows the amputation trends between BKA’s and AKA’s.

**Table 1: Baseline characteristics of patients by presence of Lower Limb Amputation, 2011–2020 (n=541)**

|  |  |
| --- | --- |
|  | N (%) |
| **Gender** |  |
| Male | 421 (77.8) |
| Female | 120 (22.2) |
| **Age (Mean ± SD)** | 51 ± 4.362 |
| **Residence** |  |
| Urban | 405 (74.9) |
| Rural | 136 (25.1) |
| **Marital Status**  |  |
| Married | 346 (64) |
| Single | 108 (20) |
| Widowed/divorce | 87 (16) |
| **Employment status** |  |
| Unemployed/Retired | 89 (16.4) |
| Employed | 102 (18.9) |
| Self employed | 350 (64.7) |
| **Educational Level** |  |
| No formal education | 162 (30) |
| Primary/Secondary | 243 (45) |
| Tertiary | 136 (25) |

**Table 2: Distribution of Causes of Above-Knee and Below-Knee Amputations (2011–2020)**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **AKA** | **BKA** | **Total AKA+BKA** |
| DMFS  | 97 | 138 | 235 (43.4) |
| Trauma | 101 | 69 | 170 (31.4) |
| Tumours | 18 | 18 | 36 (6.7) |
| PVD | 26 | 19 | 45 (8.3) |
| TBS | 12 | 3 | 15 (2.8) |
| Ulcers | 8 | 0 | 8 (1.5) |
| Infections | 10 | 6 | 16 (3.0) |
| Fasciitis | 3 | 0 | 3 (0.6) |
| Compart synd | 4 | 0 | 4 (0.7) |
| Ulcers | 0 | 5 | 5 (0.9) |
| Burns | 0 | 3 | 3 (0.6) |
| Lymphoedema | 1 | 0 | 1 |
|  | 280 | 261 | 541 |

AKA: Above knee amputation; BKA: Below knee amputation

**Figure 1: Comparison of BKA and AKA Trends (2011–2020)**

**Discussion**

The findings of this study reaffirm that diabetes and trauma remain the predominant causes of above-knee amputations in Nigeria, accounting for the majority of lower limb amputations during the study period from 2011 to 2020. Despite advancements in healthcare, these two conditions continue to present significant challenges to the Nigerian healthcare system.

DMFS emerged as the leading cause of amputations, responsible for 43.4 percent of all cases. Among these, 97 patients required above-knee amputations, while 138 underwent below-knee procedures. This finding highlights the increasing burden of diabetes and its complications in Nigeria. A recent systematic review and meta-analysis conducted in China reported an amputation incidence of 22.4% (95% CI: 18.3–26.5%) among patients with diabetic foot complications [21]. Similarly, a study in Northern Nigeria found that 45.2% of diabetic foot syndrome patients underwent limb amputation. This study highlighted a significant association between severe arterial stenosis, as detected by Doppler ultrasound, and higher rates of amputation [22]. Edet (2020) also emphasized that diabetic foot gangrene was the leading indication for amputation, accounting for 56.8% of cases in his study. Supporting this, research from Eastern Nigeria reported that diabetic foot gangrene was responsible for 54.8% of all major amputations in the region [23]. These findings collectively highlights the persistent and severe burden of diabetic foot complications as a major cause of limb loss, with variations in prevalence across geographic regions.

The high prevalence of DMFS as a cause of amputation is likely due to a combination of factors. Many individuals in Nigeria with diabetes are diagnosed late [20], and poor glycemic control remains common [24], contributing to severe complications such as foot ulcers and infections that eventually necessitate amputation [25]. Limited access to specialized care, including endocrinologists, podiatrists, and advanced wound management, also exacerbates the progression of diabetic foot ulcers to stages requiring amputation [26,27]. Cultural and socioeconomic factors further compound the issue, as some individuals rely on traditional medicine or delay seeking care due to financial constraints, stigma, or lack of awareness [28].

Trauma was the second most common cause of lower limb amputations, accounting for 31.4 percent of cases. Among these, 101 patients required above-knee amputations, while 69 underwent below-knee procedures. The high prevalence of trauma-related amputations reflects Nigeria’s socioeconomic landscape, where road traffic accidents, occupational injuries, and violence remain pervasive [29]. Road traffic accidents are a significant contributor to traumatic amputations, driven by poor road infrastructure, inadequate enforcement of traffic regulations, and unsafe driving practices [30]. A study conducted in Ethiopia identified trauma as the second most common cause of lower extremity amputations, accounting for 11.05% of cases [9]. Similarly, studies from Nigeria have consistently reported trauma as a significant contributor to amputations. According to Nwosu et al. (2017), trauma was responsible for 23.5% of amputations [3], while Thanni et al. (2007) documented a slightly higher prevalence of 34% [2]. In Maiduguri, another study highlighted trauma as a prominent cause of limb loss, further emphasizing its impact in the Nigerian context [31].

Peripheral vascular disease (PVD) emerged as a cause in 8.3% of amputations, with AKAs (26 cases) slightly exceeding BKAs (19 cases). PVD is often associated with critical limb ischemia, exacerbated by comorbidities such as diabetes, hypertension, and smoking [32]. This finding is slighty lower than a study carried out at a Nigerian Private Tertiary Hospital, which reported PVD as a significant cause, contributing to 11.8%% of cases [33].

This study also provide critical insights into the distribution of less common causes of lower limb amputations in Nigeria, reflecting the unique challenges of managing diverse etiologies in resource-constrained settings. Tumors accounted for 6.7% of amputations, with an even distribution between above-knee amputations (AKAs) and below-knee amputations (BKAs). This finding highlights the significance of malignancies as a cause of amputation, particularly in cases of advanced-stage disease or late presentation, which are prevalent in Nigeria due to limited access to timely diagnostic services [3]. A study conducted in Easatern Nigeria, similarly identified malignant bone tumors, particularly osteosarcomas, as a significant contributor to amputations, accounting for 19.3% of cases [1].

Infections contributed to 3.0% of amputations, with 10 cases involving AKAs and 6 involving BKAs. Uncontrolled infections, including sepsis and necrotizing fasciitis, remain significant challenges, particularly in regions where traditional healing practices delay hospital presentation. Acording to a study, amputation wound infections occur in 48% of the stumps, with Pseudomonas aeruginosa being the most commonly isolated pathogen (40%) [34]. Fasciitis and compartment syndrome, though rare (0.6% and 0.7%, respectively), were exclusively observed in AKAs, reflecting the rapid progression of these conditions requiring emergent surgical intervention

We also found out that traditional bone setting (TBS) was a contributing factor in 2.8% of lower limb amputations, with 12 cases involving above-knee amputations (AKAs) and 3 involving below-knee amputations (BKAs). This highlights the significant impact of practices associated with traditional bone setters on limb health in the Nigerian context. Traditional bone setters are commonly consulted in Nigeria, particularly in rural and underserved areas, due to their perceived affordability, accessibility, and cultural acceptance [35]. However, their interventions are often associated with complications that can result in severe limb damage. Studies conducted in Nigeria have corroborated these findings. For instance, a study documented that complications arising from traditional bone setting practices accounted for a substantial proportion of amputations in Kano, with 194 out of 297 major limb amputations (65.3%) being directly attributed to these practices [36]. Similarly, another study reported that 40.8% of complications associated with traditional bone setters involved non-union of fractures, while malunion was observed in 24.5% of cases [37].

**Conclusion**

Over the years, diabetes mellitus (DM) and trauma have persistently emerged as the leading causes of above-knee amputations in Nigeria, highlighting the ongoing public health and socioeconomic challenges these conditions present. Ultimately, the race between trauma and diabetes as the leading causes of amputations in Nigeria reflects the broader challenges of balancing preventive care, healthcare access, and societal awareness. A concerted effort involving healthcare professionals, policymakers, and community leaders is essential to stem the tide of amputations, improve patient outcomes, and ensure equitable access to limb-saving interventions. This calls for a commitment to innovation, education, and collaboration, as Nigeria seeks to rewrite the narrative of limb health and amputation care in the coming decades.

***Ethical Approval***

Ethical approval for the study was obtained from the hospital’s ethical review committee. Patient confidentiality was maintained throughout the study. No identifiable information was included in the final dataset, and all patient data were anonymized prior to analysis.

Disclaimer (Artificial intelligence)

Option 1:

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc.) and text-to-image generators have been used during the writing or editing of this manuscript.

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