

## Assessment of the Impact of Human Factors and Safety Interventions on Air Transportation Management in North-west Nigeria

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### ABSTRACT

The assessment of the impact of human factors and safety interventions on the management of air transportation in Northwest Nigeria investigates the critical role of human factors and safety interventions (HFSI) in enhancing aviation safety and operational efficiency within the region. In light of the growing complexity of air transportation systems and the potential for human error, this research aims to provide a comprehensive understanding of the current landscape and the effectiveness of existing safety measures. The research is structured around four key objectives: (i) to conduct a situational analysis of the human factors and safety interventions currently in place, (ii) to explore in depth the contributing factors that lead to human error within the region's air transportation sector, (iii) to evaluate the impact of HFSI on overall air transportation systems, particularly in terms of safety and operational outcomes, and (iv) to identify and propose effective strategies to mitigate human error and enhance safety practices. The study adopts a mixed-methods approach, combining qualitative and quantitative data collection techniques. Data were gathered through interviews with key professionals, surveys of aviation personnel, and questionnaires. The Human Factors Analysis and Classification System (HFACS) was used to analyze the complexities of human error. The findings reveal significant gaps in the current implementation of safety interventions, particularly highlighting the need for improved training, better supervision, and more robust safety management systems. The study concludes with a set of practical recommendations aimed at strengthening safety culture, reducing human error, and fostering a more resilient air transportation management system in Northwest Nigeria.

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### INTRODUCTION

Air transportation stands as a significant consumer of energy within the transport sector, facilitating the movement of passengers, freight, and mail across global networks. In an increasingly interconnected global economy, air transportation has emerged as one of the swiftest modes of transportation. Its pivotal role extends to tourism, fostering

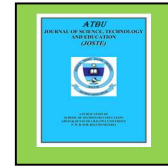
economic growth, particularly in developing nations (Bowen 2010). According to Niewiadomski, (2017), the aviation industry is a critical component of global transportation networks, facilitating economic growth, cultural exchange, and international trade. In regions like Northwest Nigeria, air transportation serves as a vital link connecting the region to the other part of the country and the rest of the world. However,

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the safety and efficiency of air transportation in this region face unique challenges due to human factors and the implementation of safety interventions (Adeniran & Yusuf, 2016). The aviation industry has integrated to the nation's economic vitality and connectivity, though in Nigeria, the industry has faced challenges exacerbated by economic downturns, notably the rise in aviation fuel prices and the devaluation of the naira since early 2022 (Adesina, et al.2024).

This industry's significance extends beyond its operational scope, fostering employment within airlines, air navigation services, and airports. Distinct from other transportation modes, the air transport sector typically shoulders its infrastructure and maintenance costs, encompassing runways, terminals, and air traffic control. In 2018, over \$75 billion was invested in Airport infrastructure with Asia Pacific region spearheading numerous airport projects (Mazareanu, 2021). Sukhikh et al (2017) stated that air transportation plays a pivotal role in economic growth and national development; the industry's future growth trajectory aligns with the burgeoning economies, as increased disposable income fuels demand for air travel.

Human factors refer to the multitude of influences that affect human performance, particularly in complex environments like aviation. These factors encompass a wide range of elements, including cognitive functions, ergonomics, communication, decision-making, and human-machine interaction (Aurino, 2000). In the context of air transportation, human factors can significantly influence the safety and efficiency of operations. For example in cognitive functions and decision-making, pilots and air traffic controllers must process vast amounts of information quickly and accurately. Also, Stress, fatigue, and workload can impair cognitive functions leading to errors in judgment and decision-making. In addition, effective communication is also crucial in aviation because communication between pilots, air traffic controllers, and ground personnel can lead to misunderstandings and errors that compromise safety (d'Agincourt *et al.*, 2011). The design of

cockpit instruments, control systems, and user interfaces must consider human capabilities and limitations. A poor design can increase the risk of errors and accidents. Lastly, adequate training and continuous professional development are essential to ensure that aviation personnel maintain high levels of competence and adhere to safety protocols. Safety interventions are measures implemented to enhance the safety of air transportation. These interventions can be technological, procedural, or organisational (Chan, and Li, 2023). Giles, (2011) said in Northwest Nigeria, addressing safety concerns requires a multifaceted approach tailored to the region's specific needs and challenges. Also stating that advanced technologies, such as automated flight control systems, collision avoidance systems, and improved navigation aids, can enhance safety by reducing the reliance on human judgment and minimising the risk of human error. Standard operating procedures (SOPs) and safety protocols are designed to provide clear guidelines for aviation personnel. Regular updates and adherence to these procedures are critical to maintaining safety standards (Giles, 2011). Furthermore, the safety culture within aviation organisations plays a pivotal role in ensuring compliance with safety regulations and fostering a proactive approach to safety management. In addition, effective leadership, safety training programs, and incident reporting systems are essential components of a robust safety culture.

Effective regulatory oversight is essential to enforce safety standards and monitor compliance. The role of aviation authorities in Northwest Nigeria is crucial in ensuring that safety interventions are implemented and maintained. Also, the region's climatic conditions, such as extreme weather events, can affect flight operations and safety. Therefore understanding the interplay between environmental factors and human performance is essential for effective safety management.(Budd and Ison. 2017). Assessing the impact of human factors and safety interventions on air transportation management in Northwest Nigeria is crucial for enhancing the safety and efficiency of the

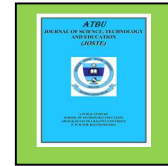
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region's aviation sector. A comprehensive approach that considers cognitive functions, communication, ergonomics, training, technological advancements, procedural adherence, and organisational culture is necessary to address the unique challenges faced by the region. By understanding and mitigating the influences of human factors and implementing effective safety interventions, in northwest Nigeria significant improvements will be achieved in air transportation safety and management.

### LITERATURE REVIEW

The aviation industry has been a gradual progression of the means of transportation, that is, the actual and unhindered movement of people or goods from one physical location to another. While land and water transportation; as old as civilisation have facilitated economic growth through trade and exchange, air transport appears to be more exclusive, novel and the fastest means of transportation. Upon attaining independence, Nigeria saw a need to negotiate her own air service contract and create a government-owned national carrier, Nigeria Airways Limited, which failed, unfortunately. A call for efficiency in the air transport system is necessary. The first aircraft to land in Nigeria was a British Royal Air Force plane it was a Bristol Fighter aircraft, though some stated that it was DE Havilland 9A (Filibus, et al, 1983). From 1925, the aviation affairs in Nigeria and West Africa were fully in the capacity of the colonial masters (The British). The major facilitator of aviation in Africa was to bridge the communication gap between the colonies in Africa and Britain, and this later turned out to be of utmost benefit during the Second World War. The Royal Air Force (RAF) had smooth use of aviation industry in Africa during the war. After the war, there arose the need to make aviation fully civil.

In 1946 the West Africa Territories Air Transport Order, established the West Africa Air Transport Authority and the West Africa Airways Corporation (WAAC). Each comprising of the four (4) West African British Colonial territories;

Nigeria, Gold Coast (Ghana), Sierra Leone and Gambia to take over air services previously run by the RAF. Nigeria Airways and WAAC operated from 1946 to 1958. Nigeria was the major shareholder 68%, followed by the Gold Coast (29.5%), Sierra Leone (2%), and Gambia holding the balance (Oji & Abili 2024). The carrier had its headquarters at the Airways House in Ikeja, Nigeria, and operated from its hub in Lagos Airport. It started operation with a capital of about 465,000 pounds funded by the four colonies following the delivery of its first aircraft. The De Havilland Dove aircraft inaugurated WAAC's first scheduled service from Lagos to Calabar in October 1947. The company aimed at providing the British West Africa with air transport facilities, to connecting it with Dakar and Khartoum in order to provide passengers with a gateway to America and the Middle East, respectively. From 1961, the Nigerian flag carrier started operating under the name Nigeria Airways Limited (NAL) using the country's national colours green, white, green all over the aircraft, vehicles and equipment. The airline quickly entered into long haul international travel and towards the end of the 1960s, it was granted access into New York by the United States Government, and the airline progressed in its operations. In the history of Nigerian aviation, from the first air crash, the Kano crash of BOAC Argonaut in 1956 which is the beginning of all the unfortunate air crashes in Nigeria. A large number of air crashes involving passenger planes have been recorded, while some were as fatal as claiming the lives of the entire passengers and crew, some recorded notable survivals air safety play major role in their operation and the importance of Human factor are greatly emphasised.

As aircrafts have become increasingly reliable form of transportation, the significance of human performance in accident causation and safety interventions has grown proportionately (Holmes et al, 2004). Dekker (2001), has argued that human error is intrinsically linked to various aspects of individuals' tools, tasks, operational procedures, and organisational environments. In recent years, the aviation industry's focus on error and accidents has shifted away from

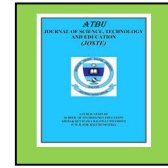
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technical skill deficiencies and towards the examination of non-technical, or 'soft,' skills that form the foundation of effective Crew Resource Management (CRM). Aircraft accidents are complex processes in which many factors are involved and contribute to accident development as such, effective analyses with combination of factors. These soft skills encompass decision-making, attitudes, supervisory factors, and organisational culture (Jensen 2003).

In 1983, Rasmussen made a significant contribution to the analysis of human errors in accidents with the development of the 'Skill, Rule and Knowledge' (SRK) framework. This framework categorises human performance and corresponding errors into three distinct types: Skill-based, Rule-based, and Knowledge-based behaviors, each representing different levels of conscious control during tasks (Drivalou and Marmaras, 2009).

#### CONCEPTUAL FRAMEWORK:

International Civil Aviation Organization ICAO recognizes that the development and adoption of standardized terms, definitions, and taxonomies for safety reporting systems in aviation hold the potential to foster global coordination and alleviate the limitations faced in aviation safety analysis due to the absence of universal descriptors (Agustini et.al 2021). In the aviation industry, there are three widely embraced taxonomies namely: Accident/Incident Data Reporting (ADREP), Maintenance Error Decision Aid (MEDA), and the Human Factors Analysis and Classification System Maintenance Extension (HFACS-ME) (Canton, H. 2021). There are five components of the conceptual framework often used for assessments in air transportation namely: Independent Variables, Dependent Variable, Mediating Factors, Moderating Factors and Technological Advancements.

**Independent Variables:** are the variable that is manipulated or categorized to observe its effect on the dependent variables, in the context of human factors and safety intervention. These could include variables such as Pilot fatigue,

training levels, communication effectiveness, decision-making processes, stress level or ergonomic design. Each of these factors could be independently assessed as an example Pilot fatigue could be independently examine how varying level of fatigue (e. g., no fatigue, moderate fatigue or severe fatigue) affect the rate of errors or incidents during flight. Within the context of assessing the impacts of human factors and safety interventions on air transportation management in Northwest Nigeria, the examination of crew communication is paramount due to its profound influence on decision-making processes, error mitigation, and overall operational effectiveness (Oyewole et.al 2022). Safety interventions within the context of personnel training encompass a spectrum of measures aimed at minimizing risks and enhancing operational safety. These interventions may include advanced simulator-based training, scenario-based learning, crew resource management (CRM) techniques, and aeronautical decision-making training. Such interventions directly intersect with the cognitive and behavioral aspects honed during training, amplifying the capacity to respond effectively to emergent situations (Hussain et.al 2020).

**Dependent Variable:** In the realm of human factors, dependent variables are outcomes or result that is influenced by other variables such as the number of human errors, efficiency of crew performance, or levels of fatigue among pilots and air traffic controllers. Assessing how different levels of workload affect pilot performance, the dependent variable could be the pilot's error rate or reaction time during flight operations. . It includes aspects like flight scheduling, route planning, air traffic control, maintenance procedures, and incident reporting. In the unique context of Northwest Nigeria, Adesina *et al.*, (2024) stated the significance of training and safety interventions assumes a distinctive dimension because factors such as the local aviation infrastructure, geographic challenges, and cultural influences can influence the efficacy of training programs and the subsequent adoption of safety interventions.

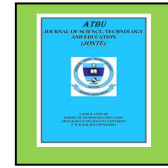
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Communication within multicultural and multilingual environments requires heightened awareness of linguistic nuances and cultural norms Adesina *et al.*, (2024). Navigating the complexities of communication in Northwest Nigeria involves sensitivities to local languages, operational practices, and socio-economic factors. Safety interventions tailored to this regional context can engender more effective communication strategies that resonate with local crew dynamics.

**Mediating Factors:** This factor bridges the gap between human factors, safety interventions, and air transportation management. It assesses the practical outcomes of safety interventions and how well human factors are managed to ensure safer air transportation operations. In 1972, Edwards Elwyn introduced the SHELL model, as a framework for illustrating the interactions between humans and machines in complex systems such as air transportation. This model comprises four primary interfaces; Software, Hardware, Environment, and Liveware (Molloy and O'Boyle, 2005). Disruptions within any of these interfaces can result in operational errors, potentially leading to safety vulnerabilities. Training interfaces intimately with human factors, which constitute the psychological, physiological, and ergonomic aspects of human performance in aviation. Effective training acknowledges the limitations and potential cognitive biases inherent in human decision-making. By incorporating principles from cognitive psychology and ergonomics, training programs can instill a deep understanding of how personnel perceive, process, and react to information during critical phases of flight (Kim, 2023). This understanding empowers personnel to anticipate challenges and implement appropriate safety interventions.

**Moderating Factors:** The regulatory environment is an external factor that influences the relationship between human factors, safety

interventions, and air transportation management with price sensitivity as a moderating factor (Kaudhair *et al.*, 2021). Regulations set by aviation authorities can affect the implementation and effectiveness of safety interventions and human factor management, affect quality, customer satisfaction and customer loyalty to an airline.

**Technological Advancements:** In 1984, Perrow introduced the Normal Accident Theory (NAT), which has found wide application in characterising potential failures within complex technological systems, including air traffic and marine traffic. This factor moderates the impact of safety interventions on air transportation management. New technologies can enhance safety but also require adjustments in human factors and management practices. Ćosić, and Wiederhold, (2024) stated that automation and application of Artificial Intelligent (AI) will be useful in this regards.

## MATERIALS AND METHODS

The assessment was conducted in Nigeria's northwest region comprises seven states, namely, Sokoto, Kebbi, Zamfara, Katsina, Kaduna, Kano and Jigawa States, and lies in a geographical marvel that extends between latitude 12.38'N on the northern part of the region and 9.58'N on the southern part of the region, with longitude 9.36'E on the eastern part of the region and 4.21'E on the western part region on Greenwich meridian (Figure 3.1). Covering an expansive area of approximately 215,065 square kilometers, with population of 35,915,471 (NPC 2006 figure). This region is a pivotal piece of Nigeria's diverse landscape. To the north and west, it shares its borders with the neighboring Niger Republic, while the northeastern states form its eastern boundary, and the North Central states complete the southern demarcation (National Bureau of Statistics, 2011).

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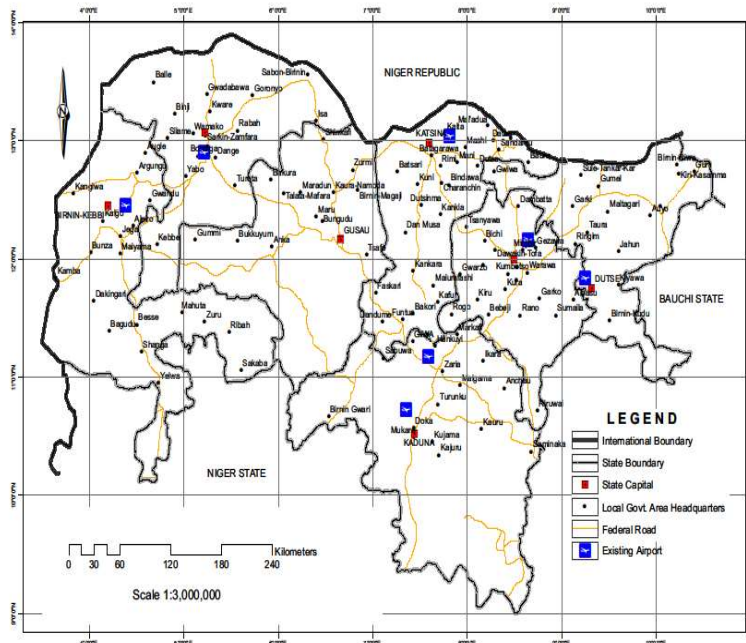
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Source: Extracted from Administrative Map of Nigeria  
Map of Northwest Nigeria showing position of airports in the region

Within this expansive landscape, the northwest of Nigeria boasts of two international airports that serve as gateways to the world. Moreover, the region hosts a network of local airports and airfields, further enhancing its connectivity within Nigeria airspace, shown is the location of all airport in northwest Nigeria (figure 3.1). Among those in the Northwest is Kaduna International Airport which occupies a significant place, positioned at coordinate's 10.69'N and 10.70'N latitude and 7.32'E and 7.33'E longitude. Situated at about 22 kilometers from the center of Kaduna, the state's capital, this airport plays a vital role in regional and national aviation. Also is Mallam Aminu Kano International Airport (MAKIA) its coordinates, 12.65'N latitude and 8.52'E longitude, place at an elevation of 481 meters above sea level. This airport serves as a pivotal hub for northern connectivity and air travel. In summary, the northwest of Nigeria, with its strategic positioning, extensive landmass, and robust aviation infrastructure, plays a vital role in the nation's

aviation and transportation networks. The assessment was carried out on the two international airports and the Nigerian College of Aviation Technology Zaria (NCAT) it stands tall as a higher education institute in Zaria, Kaduna State, Nigeria. Positioned at coordinates 11.14'N latitude and 7.67'E longitude, this institution contributes significantly to the advancement of aviation education in Nigeria.

The climate Northwest of Nigeria is characterized by diversity meticulously sculpted into two distinct climatic zones. It orchestrates a symphony of three separate seasons, each with its unique character and fervor. First, the stage is set for the Haze/Harmattan season, gracing the region with its presence from December to mid-February (Garuba, *et al.*, 2021). It impact air transportation in the region as it witness more flight cancellation due to low visibility.

### The Study Population

This study use all the key Aviation Professionals in the two international airport in

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the region and the aviation training institute in Zaria, they comprises of Pilots, Maintenance Engineers, Aircraft Technicians, Air traffic controllers, Instructors and Safety Officers. For the assessment they were form into four groups for the study due to the structure of their activity. (a) The Pilots, (b) Maintenance Engineers/Aircraft Technician (c) Air traffic controllers and (d) Instructors/Safety Officers. Data for the assessment were obtained through questionnaires, Interview and Focal discussion. The interviews used informal (open-ended questions) conversations to obtain more qualitative information and an in-depth understanding as to assess the impact of human factor and safety intervention on air transportation management in the region. Various groups were interview and focal discussions were carried out which cover every area of operations majorly in the two international airports and the aviation institute. From interviews was jotted down. Jon Swain, (2022) argued that the informal conversations create a greater ease of communication and often produce more naturalistic data.

#### Data Type and Sources

The data obtained from the questionnaire was analyzed using measures of frequencies and measures of central tendency types of inferential and descriptive statistics

through the use of Statistical Package for the Social Sciences (SPSS) software package, version 29.0.0.0 (241), and were presented in tables, graphs and charts for clarity. Total of 219 respondents was used in the assessment they comprises of 18 pilots that fly in or out of the two airports, 135 Maintenance Engineers/Aircraft Technician that works in the two airports and the aviation institutes, 14 Air Traffic Controllers in the two airports and 52 , Instructors/Safety Officers in NCAT and the two airports. Information we got from interview and the questionnaire was used to examining the situational analysis of Human Factors and Safety Interventions (HFSI) in air transportation management in Northwest Nigeria, similarly discussions with Organize focus group and various stakeholders to gather diverse perspectives on human factors and safety interventions. Direct observation of the operational processes was performed to understand how HFSI as being applied in real-time situations.

#### RESULTS AND DISCUSSION

The analyses of the data collected are discussed under the following sub-heading; Socio- demographic characteristics of the respondents, most common human factors contributing to safety incidents in aviation industry (Dirty dozen) and impacts of HFSI on air transportation systems.

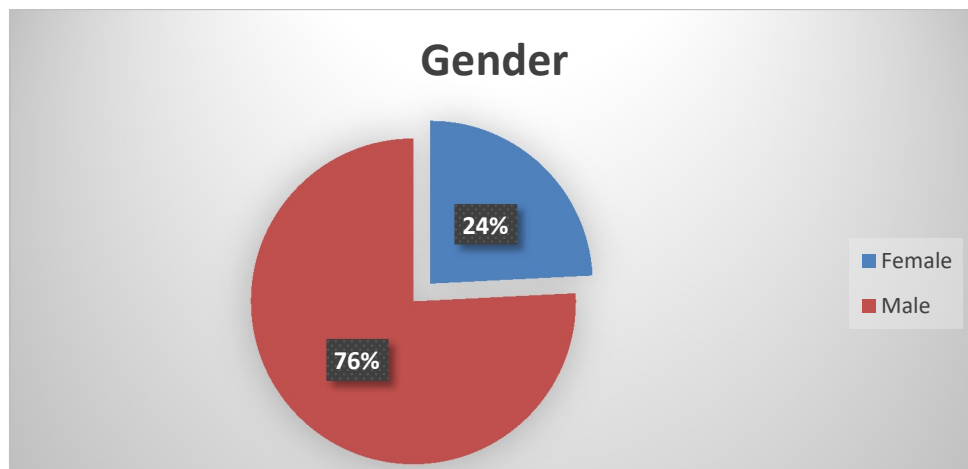


Figure 1: Gender of the Respondents. Source: Author's Analysis, 2022.

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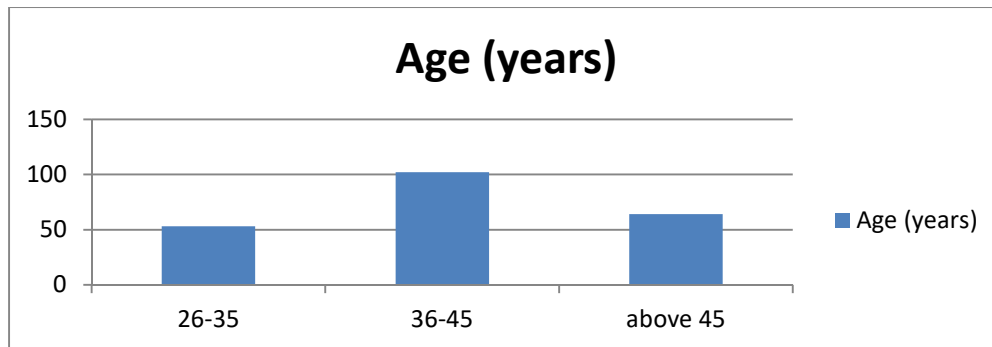
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From the findings, the study found out that there was an unequal distribution in the gender of respondents with 75.8% being male and 24.2% being female as shown in Figure 1 This disparity is a trend within the aviation industry in Northwest Nigeria. It runs contrary to

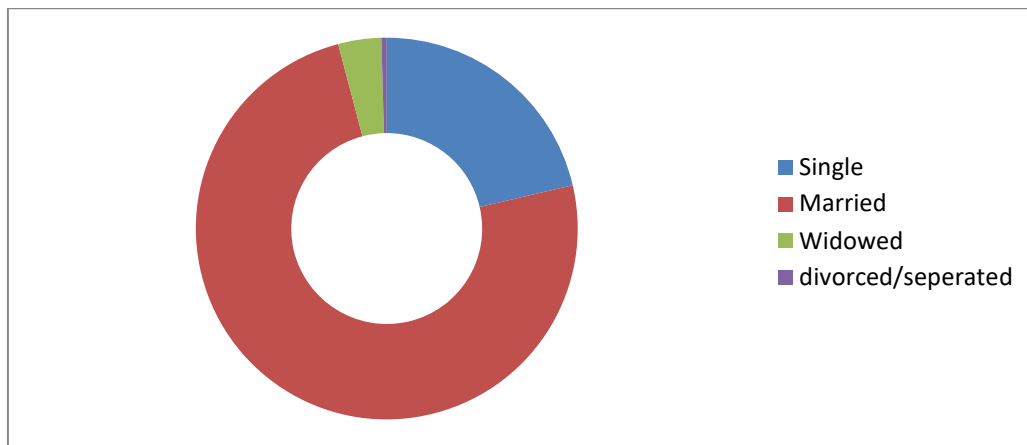
the concept of the religious belief, socio-cultural and traditional barrier of the people in the area, where women are restricted in activities that involve mixture with men particularly in technical and maintenance roles, which have traditionally been a male-dominated profession.



**Figure 2:** Age of the Respondents. Source: Author's Analysis, 2022.

The age distribution of the study respondents reveals a workforce primarily in the mid-career stage. The largest age group is 36-45 years, comprising 46.6% of the sample, which indicates that nearly half of the respondents are in their most productive years, with substantial professional experience likely contributing to the effectiveness and receptiveness to human factor. The 26-35 years age group accounts for 24.2%,

suggesting a significant proportion of younger professionals who may bring fresh perspectives and adaptability to training programs. Respondents aged above 45 years constitute 29.2%, the diversity in age groups ensures a balanced view of the impacts of training across different career stages. Flight training, like all other parts of aviation, is not without risks (Somerville et.al. 2023).



**Figure 3:** Marital Status of the Respondents. Source: Author's Analysis, 2022.

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The findings reveal that majority (74.4%) of the respondents are married 21.5% were single, 3.7% were widowed only 0.5% are Divorced or Separated. The dominant role in the aviation industry was Aircraft Maintenance

Engineer/Technician, with 61.6% of respondents, while pilots, air traffic controllers, and instructor's/safety officers represented 8.2%, 6.4%, and 23.7%, respectively.

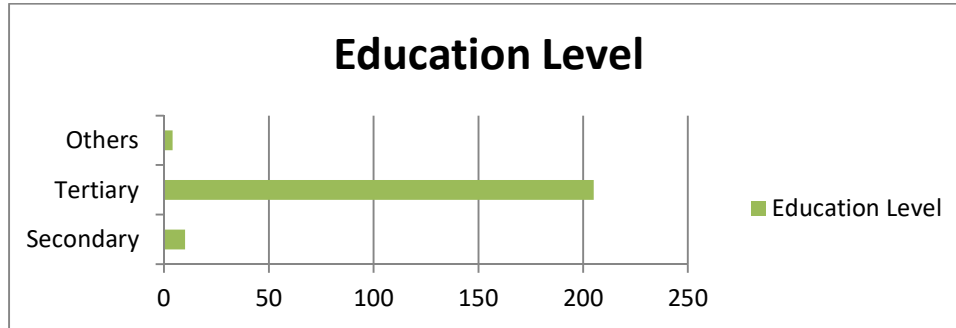


Figure 4: Education level of the Respondents. Source: Author's Analysis, 2022

The education levels of key professionals in aviation industry were predominantly tertiary education with 93.6%, while secondary education is 4.6%, and others 1.8% making up the rest of the Aviation sector in Nigeria, the high level of education in the industry is the reason for a rapid development in the sector. This implies that education is a significant factor in human capital development Komollo (2010).

#### Most common human factors contributing to safety incidents (Dirty Dozen)

The most frequently reported factor was a lack of communication, which accounted for 124 occurrences. Fatigue was the second most common factor, n=76, followed closely by a lack of resources (n=75) and norms (n=72). Other notable factors included lack of awareness (n=58), stress (n=48), pressure (n=49), and lack of assertiveness (n=38). Factors such as distraction, complacency, and lack of knowledge were reported less frequently, with 31, 24, and 24, respectively figure 5.

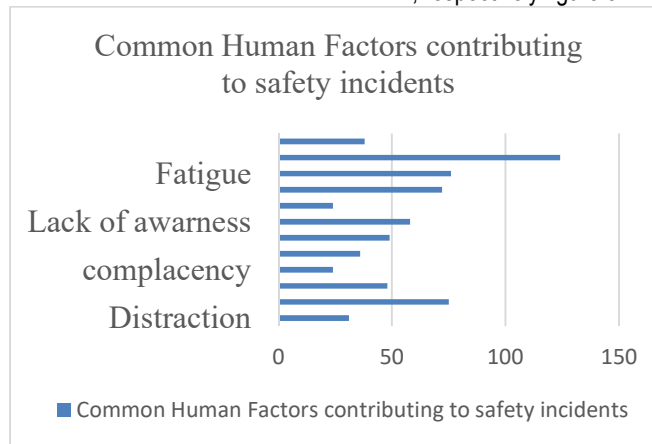
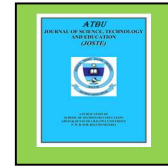


Figure 5: Respondents response to occurrence of common human factor contribution to safety incidents in air transportation.



Improving communication will greatly reduce air incidents in the industry and boost people confident in air travel.

### Assessing the impacts of HFSI on air transportation systems

In assessing the impacts of human factor and safety intervention, qualitative data obtain from the jotting of interview and the focal discussion with the key professionals at the two international airports were used to evaluate the tangible outcomes of HFSI practices in their operations. As was done by Chan and Li, (2023), five different approaches on human factors interventions was evaluated by five different evaluation criteria, which are effectiveness, acceptability, cost, sustainability and feasibility.

**Effectiveness:** Majority (63.8%) of the respondents believed that there are recent intervention but 58.4% agreed that the intervention are not effective, of the 41.6% of the respondents that see the recent intervention as effective majority are newly employed staff, most of the older staff (those that have put in more than 10 years in the industry) said the interventions are ineffective.

**Acceptability:** The level of acceptability of HFSI is very high as 84.9% accept the intervention, while 15.1% reject it. During the focus group discussion, we discovered that the cultural location of the airport is a contributing factor to the acceptability of the safety interventions. In evaluating the acceptability of the intervention amongst the new staffs and the more experience one, virtually all the new staffs accept the introduced intervention, but some of the older hands reject the interventions because they felt they are not adequate.

**Cost:** Malighetti, *et al.*, (2011), stated that the average market cost valuation of airport operations is higher than that of carriers. Cost play a major role in the implantation of the safety interventions. 72.1% of respondents see lack of resources as the primary challenge hindering successful safety interventions. From the focal discussions, the old experience professional said earlier HFSI were not implemented due to lack of

resources. The aviation industry is a high cost operating sector and the cost influence most of the decision, though effort in continuously being made to ensure that safety is not compromised due to cost (Jongsaguan, and Ghoneim, (2017)).  
**Sustainability:** Sustainability is clearly one of the most difficult challenges that humanity has ever faced Ekici *et al.*, (2022). Attaining sustainability requires addressing many fundamental issues at local, regional, and global levels, and achieving the goals and objectives of sustainability presents a great challenge for all segments of society. A core principle of sustainable development is to improve human well-being and to sustain these improvements over time [Ekici *et al.*, (2022)]. The analysis of the interview and focal group discussion reveal that the previous HFSI was not sustained as 94.8% of respondents said the newly introduced interventions could not be sustained only 5.2% think it could be sustained.

**Feasibility:** Some intervention approaches have better or worse feasibility Chan and Li, (2023), from the focal discussion it was discovered that amongst the five evaluation criteria, only feasibility, cost, and effectiveness differed across the five approaches while Task- and human-based interventions were more feasible. With 82.7% of the respondents are of the opinion that all human based intervention are feasible while only 17, 3% said it is task- and organisation-based interventions.

In general, culture and organisational factors also play a significant role in the acceptance and adoption of safety interventions, with 78% of respondents acknowledging their influence. This highlights the importance of understanding and addressing the internal dynamics of an organisation when implementing HFSI. Factors such as leadership support, communication strategies, and organisational values can significantly affect how safety interventions are perceived and integrated into daily practices. Positive cultural and organisational environments that prioritize safety are more likely to see successful adoption and sustained improvement in safety outcomes. 35.4% of respondents who did not observe

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changes in safety culture or practices indicate areas where interventions may need to be reinforced or re-evaluated. This subgroup might be experiencing barriers such as resistance to change, lack of engagement, or inadequate resources. Addressing these barriers is crucial to ensure that safety interventions have the intended impact across the entire organization. Continuous monitoring and feedback mechanisms can help identify and address these challenges promptly.

### CONCLUSION AND RECOMMENDATIONS

The study findings established that there is general familiarity with the importance of human factors and safety interventions in air transport in northwest Nigeria, though it also highlights needs for enhanced education and training to elevate overall awareness. The significant issues identified included lack of assertiveness, distraction, stress, complacency, and lack of knowledge, emphasising areas that require targeted intervention. The training programs and reporting initiatives that are presently in place are ineffective and could undermine the overall safety efforts. Highlighted are the need to address barriers to effective reporting to enhance error identification and mitigation. The study further found out that a positive influence of HFSI on employee behavior and attitudes toward safety exist. It also found out that cultural and organisational factors were significant. Collaboration and communication among stakeholders were predominantly high and that full potential of advance technology was yet to be realised which will improve human factors management. The implications of these findings are profound for improving safety and operational efficiency in the aviation sector. Enhanced training and awareness programs are essential to elevate the understanding of human factors among the workforce. Government needs to create continuous professional development implement regular and comprehensive training programs focused on human factors and safety management, which should include both theoretical knowledge and practical simulations to prepare aviation personnel for real-life

scenarios. The need to provide specialised training in using analytical tools like HEART and HFACS so that personnel can better understand and mitigate human errors. Lastly, developing and adopting a more integrated safety management system that encompasses all aspects of aviation operations.

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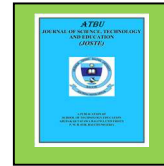
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