



Inculcating Health Safety and Environment Knowledge in Nigeria's Tertiary Education Institutions: A Call for Action

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ABSTRACT

Occupational accidents and disasters usually occur as a result of unsafe act and unsafe condition in Nigeria. Major disasters frequently encountered in Nigeria are fires, oil and gas explosions, building collapses and environmental pollution. This necessitates the need for Health, Safety and Environment (HSE) awareness and compliance in all workplaces and even residential areas in Nigeria. It is much needed in Nigeria's Tertiary Education Institutions (TEIs) since it provides the bulk of the nation's workforce to various sectors of economy at semi-skilled and skilled levels. The application of the HSE knowledge by the workforce from TEIs is expected to eliminate or reduce accidents to as low as reasonably practicable in workplaces thereby enhancing economic growth and hence national development. Nigeria as of August 2021 has 511 duly accredited TEIs comprising 174, 152 and 185 universities, polytechnics and colleges of education respectively. Regardless of the substantial number of TEIs in Nigeria, only 3 universities and 4 polytechnics offer core academic programmes on HSE. Also, despite the rationale behind General Studies (GST/GNS) for all students of various disciplines, none of the TEIs impart on HSE. In view of the aforementioned, it is therefore recommended that the Federal Ministry of Education should encourage more TEIs in Nigeria to mount core HSE programmes, mandate TEIs in Nigeria to develop GST/GNS curriculum on HSE contents and equally mandate TEIs in Nigeria to ensure that the proposed GST/GNS curriculum on HSE contents becomes compulsory to each student. Furthermore, it is recommended that heads of Nigeria's TEIs should inculcate HSE based knowledge to staff and students in their respective institutions.

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INTRODUCTION

Human beings in a quest for survival engage in various activities that are inherently dangerous to their Health, Safety and Environment (HSE). For decades, researchers and scholars have already highlighted the safety and health issues in workplaces. The importance of health and safety and their close associations with the environment has necessitated the need for the effective management and control of the three critical dimensions (Farrokhi 2019).

Following the advancement of the industry, the entry of machinery into the lives of people, the increased role of equipment and devices in working processes, as well as more interactions of humans with the industrial environments have made organizations to constantly face novel challenges in terms of HSE matters (Mardani *et al.* 2013).

According to International Labour Organisation, ILO (2020) in its key facts and figures on global health and safety from 2016 to



2020, about 2.78 million workers die from work-related injury and diseases each year. The ILO equally revealed that 374 million workers suffer from non-fatal work-related injury and illnesses every year. The occupational accidents and diseases resulted in a 4 % loss in global GDP yearly. Over 60 per cent of the world's employed population works in an informal economy. Workers in the informal economy are often exposed to most hazardous jobs, conditions and circumstances across all economic sectors including construction and agriculture. From the Nigerian perspective on HSE, there are over 100 occupational fatalities as well as some billions of Naira lost in Nigeria between April 2009 and April, 2010 (NBF News, 2011). Also, over 200 cases of industrial accidents occur in the workplace in Nigeria daily with an equally high rate of fatalities. Based on facts and figures, it is envisaged that at least 50 million Nigerians are at risk of occupational hazards.

About 90 % of accidents that occur annually are due to unsafe acts done by human and this was largely due to less or poor knowledge of HSE (HSE Knowledge 2020). In general, HSE regulations are applicable to all businesses, workplaces and even residential areas. Therefore, HSE awareness and its subsequent compliance are needed for all workplaces in Nigeria including educational sector especially the Tertiary Education Institutions (TEIs). This could be attributed to TEIs being the provider of the bulk of the nation's workforce at semi-skilled and skilled levels. For instance, Nigeria's degree awarding institutions (First Degree/Higher National Diploma) alone produce about 600,000 graduates yearly according to Vanguard (2019). Consequently, inculcating HSE knowledge at TEIs would improve on the quality of workplace environment and certainly assist in accident prevention or its reduction to as low as reasonable as practicable. Equally, it is envisaged that the HSE knowledge gained from TEIs would be applied into various workplaces outside the educational sector thereby enhancing productivity and eventually national economic development. The aim of this paper therefore is to establish the need to inculcate HSE knowledge in Nigeria's tertiary institutions with a view to making recommendations to the relevant stakeholders.

OVERVIEW OF HEALTH SAFETY AND ENVIRONMENT

Definition of Key Terms

To ease full grasp of this paper, some relevant HSE terminologies are clearly defined below.

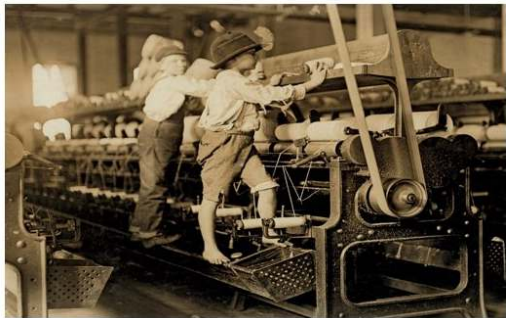
1. *Health* - State of being of free from illnesses or injury.
2. *Safety* - Freedom from the risk, danger or injury at the workplace.
3. *Environment* - Surroundings or conditions in which a person, animal, or plant lives or operates.
4. *Pollution* – An introduction or presence of a substance into an environment which has harmful or poisonous effects.
5. *Organization* - An institution, company or firm that has its own function and administration setup.
6. *Workplace* - Any place or location, where work should be performed under the management of organization.
7. *Ergonomics* - An applied science of equipment design, as for the workplace, intended to maximize productivity by reducing operator fatigue and discomfort.
8. *Danger* - A state or condition in which personal injury and/or asset damage is reasonably foreseeable.
9. *Hazard* - Any source or situation or unsafe act with a possibility for damage in terms of human health and injury, or a combination of these.
10. *Risk* - A combination of the possibility of an occurrence of a hazardous event or exposure(s) and the severity of injury or ill health that can be caused by the event or exposure(s).
11. *Near-miss* - An unplanned event with the potential to result in a loss.
12. *Incident* - An event that does not cause harm but under different conditions, it might have caused a harm.
13. *Accident* – An unwanted event leading to death, injury, damage to both health and property, or other forms of losses. In its simplest form, accident occurs when there is an unsafe act and unsafe condition.

14. *Disaster* - A sudden accident or a natural catastrophe that leads to loss of life or great damage.

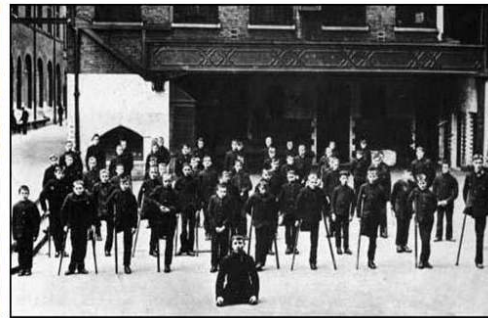
Global Evolution of Health Safety and Environment

Prior to the first industrial revolution in 1760s, it was the norm to make a living through agriculture or making and selling of products from the home. The introduction of machines and

heavy-duty equipment after 1760s led to establishment of factories and creation of more job opportunities (History, 2019). Challenges encountered by the majority of factory workers then were poor pay, increase in child labour and hazardous factory conditions. Other challenges were long working hours of over 12 hours per day and major injuries and loss of lives at work. Figure 1 shows the pictures of some major challenges encountered during the first industrial revolution.



(a) Use of underage children.



(b) Injured workers due to exposure to factory hazards.

Figure 1. Major challenges encountered during first industrial revolution (History, 2019).

A clamour over child labour situations led to the introduction of the Health and Morals of Apprentices Act 1802, generally referred to as the Factory Act. Workers tired of spending over 12 hours a day in the factories began a movement to reduce working days to 10 hours. This was popularly known as the “Ten Hours Movement” and pressure from the group led to the establishment of Factory Act 1833. To ensure compliance, factory inspectors were introduced within a span of 1833 to 1868. A ‘duty of care’ was introduced in 1837 as a result of multiple injuries suffered by employees in workplaces. In 1880, an Employer’s Liability Act was enacted to enable workers to seek compensation for injuries resulting from negligence of a fellow employee (Carey, 1910). With a number of subsequent health and safety acts and reforms, the HSE continued to soar across nations particularly the UK.

In 1974, Occupational Safety and Health Act as well as Health and Safety at Work Act were introduced in the USA and UK respectively. The latter did not only form part of the basic framework of safety laws in workplaces in

the UK, it equally influenced HSE legislations in New Zealand, Europe and other parts of the world (Stay Safe, 2021). In the Health and Safety at Work Act 1974, both the employer and employee are liable for ensuring the health, safety and wellbeing of individuals across all workplaces and members of the public who could be affected by the work activities. Although the philosophies have to a large extent remained similar, the Act remains to see updates and reforms alongside the evolution of the workplace and new HSE challenges that arise. According to Stay Safe (2021), changes in the workplace as a result of the Health and Safety at Work Act from 1974 to 2007 led to an incredible 73% and 70% reduction in the number of workplace fatalities and non-fatal injuries respectively.

Major Disasters in Nigeria

In recent years, disasters of various magnitudes are becoming more frequent, intense, and geographically diverse in various communities across Nigeria. This paper will be limited to major disasters frequently encountered in Nigeria such as fires, oil and gas explosions,

building collapses and environmental pollution (oil spillages, plastic waste and gas flaring). These disasters have destroyed properties worth several billions of naira, rendered survivors homeless, jobless and compounded to the economic and social problems in Nigeria. Table 1 gives an overview of major disasters in Nigeria and their consequences in terms of loss of lives and properties.

Fire outbreaks have occurred in both private and public facilities that are of great strategic value, thereby making fires an issue of public concern and debate. According to the 2016 World Life Expectancy Report, Nigeria is ranked first in the World for number of deaths by fires (Thisday, 2020). Oil and gas industry continuous to play a major role in Nigeria's economy. The flammable nature of oil and gas products have

made explosions more likely when there is leakage from an enclosure and ignition occurs. Nigeria has within 2 years of 2018 and 2019 recorded about 1,300 oil spills and this amounted to an average of 5 oil spills per day (NOSDRA, 2020). According to NNPC (2020), Nigeria had witnessed about 45,347 pipeline breakages and/or explosions across the nation over the past 18 years. Within the first half of 2018, Nigeria lost up to 7 Billion Naira to road traffic accidents involving 116 petroleum product tankers (FRSC 2018). DPR (2021) indicated that oil and gas explosions in the country are mainly due to lack of compliance with safety guidelines by retail outlets. Figure 2 shows the scene of 1998 oil pipeline explosions at Jesse-Delta Nigeria where about 1,500 lives were lost. It is considered to be one of the worst oil and gas disasters in Nigeria.



Figure 2. Oil pipeline explosions at Jesse-Delta Nigeria in 1998 (EtiWem 2020).

Building collapse in Nigeria is a thing of concern for investors and the government alike. In 2019 Nigeria recorded 43 incidents within the year (Nairametrics, 2021). The scene of the 1 November 2021 Ikoyi building collapse claiming at least 42 lives is shown in Figure 3. Major factors

responsible for building collapse in Nigeria include defective or substandard building materials, inadequate requisite technical knowledge and non-adherence to building codes and standards. Other factors are use of non-professionals and corruption.



Figure 3. Scene of 1 November 2021 Ikoyi building collapse (The Guardian 2021b).

A cycle from production to consumption occurs mostly with the discharge of pollutants into the environment which in turn hampers health stability. Figure 4 shows the major environmental challenges across Nigeria. The environmental

challenges include erosion, flooding, deforestation and desertification as well as oil spillages. Others are lead poisoning, air pollution, water pollution and solid waste management.

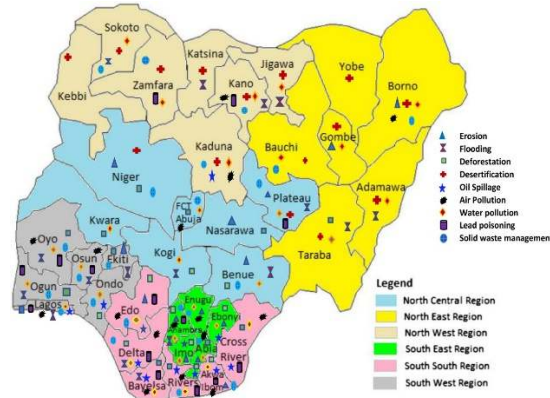


Figure 4. Major environmental challenges in Nigeria obtained from Pona et al. (2021).

On the menace of oil spills, European countries had only 10 incidences of oil spills in 40 years, but Nigeria witnessed about 9,343 incidences in 10 years (Albert *et al.* 2018). Oil spills in the Nigerian environment in five decades was at least 9-13 million. Nigeria is among the top 5 petroleum damaged environment in the world with devastating effects on farming and fishing activities as well and health challenges to flora and fauna (Osuagwu and Olaifa 2018). On plastic waste, Nigeria was estimated to have discharged around 200,000 tonnes of plastic waste into the ocean as of 2018 and this is projected to grow to 523,000 tonnes by 2022. Effects of plastic

pollution in Nigeria include death of marine and land creatures due to the non-biodegradability of plastics, emission of toxic gases when exposed or heated up as well as blockage of drainage lines and fill up land space causing floods and erosion (World Economic Forum 2021).

Gas flaring as a form of air pollution is a thing of concern in Nigeria since it is a leading country in Africa and 9th position globally in terms of gas reserves. Gas flaring costs the global economy a sum of 20 billion US Dollars in 2018 with Nigeria accounting to about 4 % of the global total cost (PWC Report, 2018).

Table 1: Overview of major accidents/disasters in Nigeria.

Description	No of Deaths	No of injuries	Property Damaged	Cause of Disaster	Source
Dugbe Market Fire, Ibadan on 16 April 2020.	Uncertain	Uncertain	Millions of Naira	Electric spark from welding equipment	The Guardian (2020)
Fire at IDP Camp, Maiduguri on 16 February 2021	3	Many	Over 600 makeshift homes	Heat from cooking burner.	Premium Times (2021)
INEC Headquarters Fire, Abuja on 17 April 2020	Nil	Nil	Office furniture and equipment	Unknown	Channels TV (2020)



Description	No of Deaths	No of injuries	Property Damaged	Cause of Disaster	Source
Oil pipeline explosions at Jesse, Delta on 17 October 1998	About 1,500	Many	Uncertain	Pipeline leakage	EtiWem (2020)
Gas plant explosions at Agbor, Delta on 23 January 2021.	4	11	Houses and farmlands	Unknown	The Guardian (2021a)
Petroleum tanker explosion at Okogbe, Rivers on 12 July 2012.	121	75	Uncertain	External spark ignition	BBC (2012)
Ikoyi 21 Storey Building Collapse, Lagos on 1 November 2021	44	Many	Billions of Naira	Non-compliance of standard.	The Guardian (2021b)
Building collapse at Synagogue Church of All Nations Ikotun, Lagos on 12 September 2014	116	Unknown	Unknown	Structural failure	Awoyera et al. (2021)
The Reigners Bible Church Uyo, Akwa Ibom on 10 December 2016	160	Many	Uncertain	Structural failure	Los Angeles Times (2016)
A 5-storey building collapse at Lekki, Lagos on 9 March 2016.	34	13	Unknown	violation of multiple regulations	Time (2016)

RELEVANT FRAMEWORKS ON HSE COMPLIANCE IN NIGERIA

International and National Laws on HSE in Nigeria

The ILO as an organ of the UN was established in 1919 solely to bring employees, employers and governments of 187 member States together. It was geared towards promoting decent work for all through setting up labour standards, development of policies and devising programmes. The main objectives of the ILO are to promote global rights at work, encourage decent employment opportunities, enhance social protection and strengthen dialogue on work-related issues. The principle sets forth in the ILO Constitution is that employees must be protected from sickness, disease and injury arising from their employment. Nigeria became a member of the ILO upon gaining independence in 1960 and has since ratified 40 ILO Conventions till date.

The foremost national law on HSE in Nigeria is the 1999 Constitution of the Federal Republic of Nigeria. Precisely, Section 17

Subsection 3 of the Constitution made mention that the State shall direct its policy towards ensuring that the health, safety and welfare of all persons in employment are safeguarded and not endangered or abused.

Laws and Regulations on HSE in Nigeria

Law simply means a system of rules which a particular country or community recognises as regulating the actions of its members and which it may be enforced by the imposition of penalties. From legal perspective, act is regarded as a law or formal decision made by a parliament or other group of people who make the laws for their country. Nigeria has series of enacted laws on HSE and related matters which are aimed at providing safety and health of workforce. These include but not limited to the following:

1. Explosives Act, 1964.
2. Nigerian Nuclear Safety and Radiation Act, 1995.



3. The Factories Act, CAP F1, Laws of the Federation of Nigeria (LFN), 2004.
4. Nigerian Minerals and Mining Act, 2007.
5. Employees' Compensation Act, 2010.
6. Lagos State Safety Commission Law, 2011.

Legally, regulations usually prescribed by a superior or competent authority are rules of order having the force of law and are related to the actions of those under the authority's control. There are major regulations in Nigeria with respect to HSE and these encompass:

1. Minerals Oils (Safety) Regulations, 1962.
2. Explosives Regulations, 1967.
3. Petroleum (Drilling and Petroleum) Regulations, 1967.
4. Nigeria Basic Ionising Radiation Regulations, 2003.
5. Nigerian Radiation Safety in Nuclear Regulations, 2006.
6. National Environmental Standards and Regulations Enforcement Agency (Establishment) Act, 2007.
7. Lagos State Safety Commission, 2011.

National Policies on HSE in Nigeria

According to ILO (2016), Nigeria has in place a National Policy on Occupational Safety and Health developed in 2006 and reviewed in 2020. The goal of the Policy is to facilitate the improvement of occupational safety and health performance in all sectors of the economy and ensure harmonization of workers' rights and protection with regional and international standards. The National Policy is a government's approach for achieving, inter alia, a National Development philosophy of building a united, self-reliant and egalitarian economy through minimizing so far as is reasonably practicable, the sources and consequences of hazards inherent in the working environment. However, there is no national Occupational Safety and Health Board in place. The functions of such Board have been taken up by the Department of Occupational Safety and Health of the Federal Ministry of Labour and Employment.

The National Industrial Safety Council of Nigeria is a tripartite consultative labour council

comprising employers, workers and government. The Council was established in May 1964 by a cabinet decision under the sponsorship of the Federal Ministry of Labour and Employment. The Council's main objective is the prevention of industrial accidents and hazards as well as the promotion of occupational health and welfare in industrial establishments. There is, however, no formal National Occupational Safety and Health Management Systems that has been developed by the authorities in place, but the country adopts the ILO – OSH 2001 as a guide.

In Nigeria, there are four national competent authorities responsible for promoting and enforcing OSH in the country. These are:

1. Department of Occupational Safety and Health of the Federal Ministry of Labour and Employment.
2. Occupational Health and Safety Division of the Federal Ministry of Health.
3. Lagos State Safety Commission.
4. Nigerian Social Insurance Trust Fund (NSITF).

National and International Organisations on HSE

There exist national organisations that assist in promoting HSE and related issues in Nigeria. Prominent amongst these organisations are:

1. Institute of Safety Professionals of Nigeria (ISPON).
2. Society of Occupational and Environmental Health Physicians of Nigeria (SOEHPON).
3. Safety Advocacy and Empowerment Foundation.
4. Nigeria Employers Consultative Association (NECA).
5. Nigeria Labour Congress (NLC) through its OSH Committee.

At international level, there are organisations established solely to enhance best global practices in workplaces as it concerns HSE and related fields. Key international organisations in this regard are:

1. Occupational Safety and Health Association (OSHA) – UK.



2. American Society of Safety Professionals (ASSP) – USA.
3. International Institute of Risk and Safety Management (IIRSM) – UK.
4. World Safety Organisation (WSO) – USA.
5. International Association of Safety Professionals (IASP) – India.
6. Institute of Occupational Safety and Health – UK.
7. The Institution of Fire Engineers – UK.
8. International Society of Explosive Engineers – USA.

HSE IN NIGERIA'S TERTIARY INSTITUTIONS *Overview of TEIs in Nigeria*

TEIs or post-secondary education, is any stage of education undertaken after high school. It is mainly composed of university for the award degree and polytechnic and monotechnic for the award of diploma. Others are colleges of education for the award of certificate as well as specialized institutions for the award of diploma/certificate. The roles of the TEIs in line with Nigeria's Education Policy are contribution to national development through high level manpower training as well as the development of intellectual capacity of individual to understand and appreciate their local and external environment. Another role is the acquisition of both physical and intellectual skills which enables individual to be self-reliant and useful members of the society.

As of August 2021, there are 174 accredited universities in Nigeria comprising 43 Federal, 52 State and 79 Private ownerships. On polytechnics, there exist 152 accredited institutions made up of 37, 51 and 64 Federal, State and Private owned respectively. There are 27 Federal, 50 State and 108 Private accredited colleges of education totalling 185 in Nigeria. The accrediting/regulating bodies in Nigeria responsible for TEIs in Nigeria are National Universities Commission (NUC), National Board for Technical Education (NBTE) and National Commission for Colleges of Education (NCCE).

The list of duly accredited academic programmes in Nigeria's TEIs is contained in the Joint Admission and Matriculation Board (JAMB)

Brochure (JAMB, 2021). TEIs accrediting/regulating bodies set up Benchmark Minimum Academic Standard (BMAS) to guide institutions on effective programme delivery (NUC, 2018; NBTE, 2021 and NCCE, 2020). Due to the peculiarities of engineering programmes, Council for the Regulation of Engineering in Nigeria (COREN) is equally mandated to regulate/accredit engineering courses in Nigerian universities (COREN, 2013).

Core HSE Programmes in Nigeria's TEIs

Despite the 174 accredited universities in Nigeria, only 3 universities constituting 0.02 per cent undertake core HSE academic courses and these are listed below as:

1. PhD Occupational Health, Safety and Environment - University of Port Harcourt.
2. PhD (Ed) Health and Safety Education - Delta State University.
3. MSc Health Safety and Environment - University of Ibadan.
4. MSc(Ed) Health and Safety Education - Delta State University.
5. BSc(Ed) Health and Safety Education - Delta State University.

It was also discovered that only 0.03% of the 152 Nigeria's polytechnics undertake core HSE academic courses as follows:

1. ND and HND Industrial Safety and Environmental Engineering Technology – Kaduna Polytechnic.
2. ND and HND Industrial Safety and Environmental Engineering Technology – Petroleum Training Institute Warri.
3. ND Environmental and Safety Management Technology - Enville Institute of Management and Technology Polytechnic Lagos.
4. Professional Diploma in Security, Health Environment and Safety Management (3 months) - Yaba Tech Consult.

To the authors' knowledge, there is no any colleges of education in Nigeria that runs core HSE programmes. In general, Nigeria's TEIs have paid little or no attention in the areas of administering core HSE courses. This implies that the bulk of the workforce produced from TEIs in



Nigeria will not have both generic and in-depth knowledge of HSE and this would contribute in the rise of workplace incidents, accidents and even disasters. Consequently, it would lead to negative impacts on the nation's economy. In view of this, there is need for the Ministry of Education as a key stakeholder to mandate Nigeria's TEIs to mount core HSE programmes in their respective institutions.

Courses Taught as General Studies in TEIs

In TEIs especially Universities and Polytechnics, certain courses are taught across to all students irrespective of the programmes of study being science, engineering, social sciences and arts. The main essence of general studies courses is to produce a well-rounded morally and intellectually capable graduates with vision and entrepreneurial skill in an environment of peace and social cohesiveness. The key objective is the acquisition of the body of situational relevant knowledge outside of the respective field of specialization of the students for productive, healthy living and promotion of peaceful coexistence. This is in addition to the development of competence in the use of English Language as

a tool for their studies and effective means of communication in the society and in their future employment/enterprise.

Table 2 gives an overview of General Studies (GST) courses in Nigeria's universities. Students are expected to pass a minimum of 10 units of GST course including the compulsory Communication in English I (GST 111), Use of Library, Study skills and ICT (GST 121) and Communication in English II (GST 122) before graduating. From the course title, two courses namely Contemporary Health Issues (GST 125) and Environments and Sustainable Development (GST 211) are seemed to be related HSE. Analysis of the course contents for GST 125 revealed that there is nothing related to HSE is contained. But in the case of GST 211, only about 30 per cent of the course contents that has captured HSE related areas. Generally, it could be viewed that the GST courses taught in Nigeria's universities have not considered core safety courses. Even the health and environment titled courses have not actually tackled core HSE contents as it relates to incidents, accidents and disasters in workplaces.

Table 2: General Studies (GST) courses taught at Nigerian universities.

Course Code	Course Title	Units	Remarks
GST111	Communication in English I	2	Compulsory
GST112	Logic, Philosophy and Human Existence	2	
GST113	Nigerian Peoples and Culture	2	
GST121	Use of Library, Study skills and ICT	2	Compulsory
GST122	Communication in English II	2	Compulsory
GST123	Communication in French	2	
GST124	Communication in Arabic	2	
GST125	Contemporary Health Issues	2	Seems Close to HSE
GST211	Environments and Sustainable Development	2	Seems Close to HSE
GST222	Peace and Conflicts Resolution	2	
GST223	Introduction to Entrepreneurship	2	
GST224	Leadership Skills	2	
GST311	Entrepreneurship	2	
TOTAL		26	

In the case of polytechnics, the General Studies (GNS) available to all diploma students are English Language, Communication, History, Social Studies and Citizenship Education. Others

are Political Science, Geography, Entrepreneurship, Philosophy, Sociology as well as Physical and Health Education. The GNS component is to account for not more than 15 per



cent of the total contact hours for a programme student is to undertake. It is glaring from the course titles that there is no any GNS course that is HSE inclined.

The engineering programmes in universities as outlined in COREN (2013) equally have common courses to all forms of engineering students usually taught at 200 and 300 Levels and there is only a tiny fraction (about 5%) of HSE based course contents. Prominent amongst these courses include Engineering Technology, Engineer in Society, Engineering Management and Industrial Studies. This is equally the case of some key engineering programmes that need utmost safety consideration. The key programmes and the HSE based courses are Chemical Engineering (Loss Prevention in Production Industries Course), Civil Engineering (Construction Engineering Course) and Food Engineering (Food Engineering Course). Others are Industrial and Production Engineering (Ergonomics and Human Factors), Mechanical Engineering (Engineering Design Process), Mine Engineering (Mine Health and Safety Course) and Petroleum Engineering (Petrochemical Engineering Process Design Course).

Generally, it is evident that despite the importance of GST/GNS courses for all students of various disciplines, none of the TEIs impart on HSE. This implies that the graduates would not have the basic HSE based knowledge to be applied in workplaces and even at residential areas thereby increasing the chances of accidents. To avert this, it is imperative for the Federal Ministry of Education to mandate TEIs in Nigeria to develop GST/GNS curriculum on HSE contents. Additionally, the Ministry could mandate the TEIs in Nigeria to ensure that the proposed GST/GNS curriculum on HSE contents becomes compulsory to each student.

CONCLUSION

The introduction of machines in the first industrial revolution and their interactions with humans mainly to boost economic growth had led to challenges related to HSE. Globally from 2016 to 2020, over 60 per cent of the world's employed population works in an informal economy where each year about 2.78 and 374 million workers die and suffer non-fatal injury and illnesses

respectively. The occupational accidents and diseases accounted for a 4 % loss in global GDP yearly. Between 2009 and 2010, Nigeria experienced over 100 occupational fatalities in addition to huge amount of money lost in such accidents. It is equally predicted that at least 50 million Nigerians are at risk of occupational hazards. Occupational accidents usually occur as a result of unsafe act and unsafe condition hence it is imperative for HSE awareness and compliance in all workplaces and residential areas in Nigeria. This is much needed in Nigeria's TEIs since it provides the bulk of the nation's workforce to various sectors of economy at semi-skilled and skilled levels. The application of the HSE knowledge by the workforce from TEIs is expected to eliminate or reduce accidents to as low as reasonably practicable in workplaces thereby enhancing economic growth and hence national development.

Historically, HSE awareness, regulations, compliance and where necessary enforcement began in the UK with the introduction of Factory Act in 1802. With a number of subsequent health and safety acts and reforms, the HSE continued to increase across nations particularly the UK. A major global turning point in HSE regulations was the enactment of Health and Safety at Work Act 1974 by the UK Parliament. The Act formed the basic framework of safety laws in workplaces in the UK and equally influenced HSE legislations in Europe, New Zealand and other parts of the world. In Nigeria, the foremost national law on HSE is Section 17 Subsection 3 of the 1999 Constitution of the Federal Republic of Nigeria. It mentions that 'State shall direct its policy towards ensuring that the health, safety and welfare of all persons in employment are safeguarded and not endangered or abused.' From the Constitution, other relevant national acts, regulations and policies were formulated to promote HSE compliance in Nigeria.

Despite effort to curtail accidents/disasters especially at workplaces in Nigeria, the country had in recent years witnessed disasters of various magnitudes which are becoming more frequent, intense, and geographically diverse in various communities across the country. Major disasters frequently encountered in Nigeria are fires, oil and gas



explosions, building collapses and environmental pollution (oil spillages, plastic waste and gas flaring). A fraction of major historic disasters in Nigeria were identified and analysed. It was discovered that the disasters have destroyed properties worth several billions of naira, rendered survivors homeless, jobless and compounded to the economic and social problems in Nigeria.

Nigeria as of August 2021 has 511 duly accredited TEIs comprising 174, 152 and 185 universities, polytechnics and colleges of education respectively. Regardless of the substantial number of TEIs in Nigeria, only 3 universities and 4 polytechnics offer core academic programmes on HSE and this accounts to just 0.02 % and 0.03 % respectively. Also, despite the rationale behind General Studies (GST/GNS) for all students of various disciplines, none of the TEIs impart on HSE. Hence, there is need for relevant stakeholders to take urgent steps in inculcating HSE based-knowledge to students of Nigeria's TEIs in order to ensure a safe and healthy workforce.

RECOMMENDATIONS

It is recommended that:

1. Federal Ministry of Education should encourage more TEIs in Nigeria to mount core HSE programmes.
2. Federal Ministry of Education should mandate TEIs in Nigeria to develop GST/GNS curriculum on HSE contents.
3. Federal Ministry of Education should mandate TEIs in Nigeria to ensure that the proposed GST/GNS curriculum on HSE contents becomes compulsory to each student.
4. Heads of Nigeria's TEIs should inculcate HSE based knowledge to staff and students in their respective institutions.

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